APPENDIX 2-B
INTERNATIONAL RIVERS IMPROVEMENTS ACT
LICENCE APPLICATION

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Seabridge Gold Inc.

KSM PROJECT
Application for a Licence under the *International River Improvements Act*

SEABRIDGE GOLD

Rescan Engineers & Scientists

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January 2013

SEABRIDGE GOLD

January 31, 2013

The Honourable Peter Kent
Minister of the Environment
Les Terrasses de la Chaudière
10 Wellington Street, 28th Floor
Gatineau, Quebec
K1A 0H3

Attention: Honourable Peter Kent, Minister of Environment

Dear Mr. Kent

Re: Application for a Dam Licence under the International River Improvements Act for the KSM Project

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Seabridge Gold Inc. is proposing to develop the KSM Gold-Copper Mine in British Columbia, Canada. Seabridge is submitting an Application for an Environmental Assessment Certificate pursuant to the BC *Environmental Assessment Act*, and an Environmental Impact Statement for an Environmental Assessment Decision Statement and associated Course of Action decisions by the Government of Canada in accordance with the *Canadian Environmental Assessment Act.*

The KSM Project will require a Dam Licence under the *International River Improvements Act* because the project is proposing an Improvement on Mitchell Creek, a tributary of the Unuk River, which is an International River as defined under the Act, and the Improvement is forecast to alter the flow of the Unuk River, during periods of time in the life of mine, which exceed 0.3 m^3/s.

Seabridge has completed the attached application in accordance with the *International River Improvements Act* Regulations (C.R.C., c. 982) Section 6 (a to h) for the review and decision of the Minister.

Please contact Brent Murphy, Vice-President Environmental Affairs or Elizabeth Miller, Manager of Environmental Affairs if there are any questions.

Sincerely,

R. Brent Murphy, Vice-President Environmental Affairs
Seabridge Gold Inc.

B.C. Environmental Assessment Office – Chris Hamilton

Application for a Licence under the *International River Improvements Act*

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1 Application for a Licence under the *International River Improvements Act*

Seabridge Gold Inc. is applying for a licence under the *International River Improvements Act* and Regulations for the proposed KSM Project in northwestern British Columbia, Canada. The KSM Project is located partly within the Unuk River watershed, an international river as defined in the Act. The proposed Project is forecast to alter downstream flow on the Unuk River at the Canadian boundary greater than $0.3m^3/s$ during phases of the project, therefore requiring the proponent to apply for a licence under the Act.

The *International River Improvements Act* Regulations (C.R.C., c. 982) Section 6 (a to h) stipulates that the licence application addressed to the Minister shall contain the following information:

a) the name, address and occupation of the applicant;

b) the name and a clear description of the international river on which an international river improvement is to be made;

c) the place where the said improvement is to be made and a description of the improvement;

d) details as to the effect of the improvement on the level or flow of water at the Canadian boundary;

e) details as to the effect of the improvement on the use of water outside of Canada;

f) details of the adverse effects of the improvement on flood control and other uses of water together with information at to plans to minimize such effects;

g) a brief economic analysis of the direct and indirect benefit and costs of and resulting from the improvement, and

h) any further details concerning the improvement tending to indicate that it is compatible with a sound development of the resources and economy of Canada.

Sections 1.1 to 1.8 of this document provide the licence application information in accordance with Section 6 of the Regulation.

1.1 Regulation S6(A): Name, Address and Occupation of the Applicant

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Toronto, Ontario, M5A 1E1

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British Columbia Project Office:

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Smithers, BC V0J 2N0

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Seabridge Gold Inc. (Seabridge) is a Canadian mining company with two world-class undeveloped gold-copper projects in Canada, one situated in northwestern BC (the KSM Project) and the other located in the Northwest Territories (Courageous Lake).

The KSM gold-copper Project in northwestern BC is located approximately 65 km northwest of Stewart and contains an estimated measured and indicated resource of 38.2 million ounces of gold and 9.9 billion pounds of copper, as well as molybdenum and silver. Seabridge proposes to develop the deposit and has released an updated Prefeasibility Assessment in 2012 which outlines a proposed 52-year mine life processing 130,000 tonnes per day ore.

Seabridge is submitting an Application for an Environmental Assessment Certificate pursuant to the BC *Environmental Assessment Act,* and an Environmental Impact Statement for an Environmental Assessment Decision Statement and associated Course of Action decisions by the Government of Canada in accordance with the *Canadian Environmental Assessment Act.*Permit Applications will be submitted in early 2013.

Seabridge is a publicly listed company and trades under the symbols SEA:TSX and SA:NYSE.

Seabridge head office is in Toronto, Ontario, with a KSM project office in Smithers, BC where project development activities are staged from, and the company representatives actively engage with community, the Nisga’a Nation and First Nations’ members, regarding project information and business opportunities.

1.2 Regulation S6(B): Description of the International River Pertinent to the Application

Seabridge proposes an international river improvement on a tertiary tributary of the Unuk River which flows west into the Pacific Ocean in northwestern British Columbia. From its headwaters in BC, the Unuk River flows west and south for 129 km, emptying into Burroughs Bay, an inlet at the head of the Behm Canal in Alaska. The Unuk River originates in rugged and largely inaccessible Coast Range Mountains north of the Nass River drainage and south of the Stikine River drainage and crosses the Canada-United States of America international boundary at approximately 130°44’23”W; 56°20’28”N or 392460E; 6245414N (Nad83 and UTM9N) some 20 km upstream of its mouth (Figure 1.2-1).

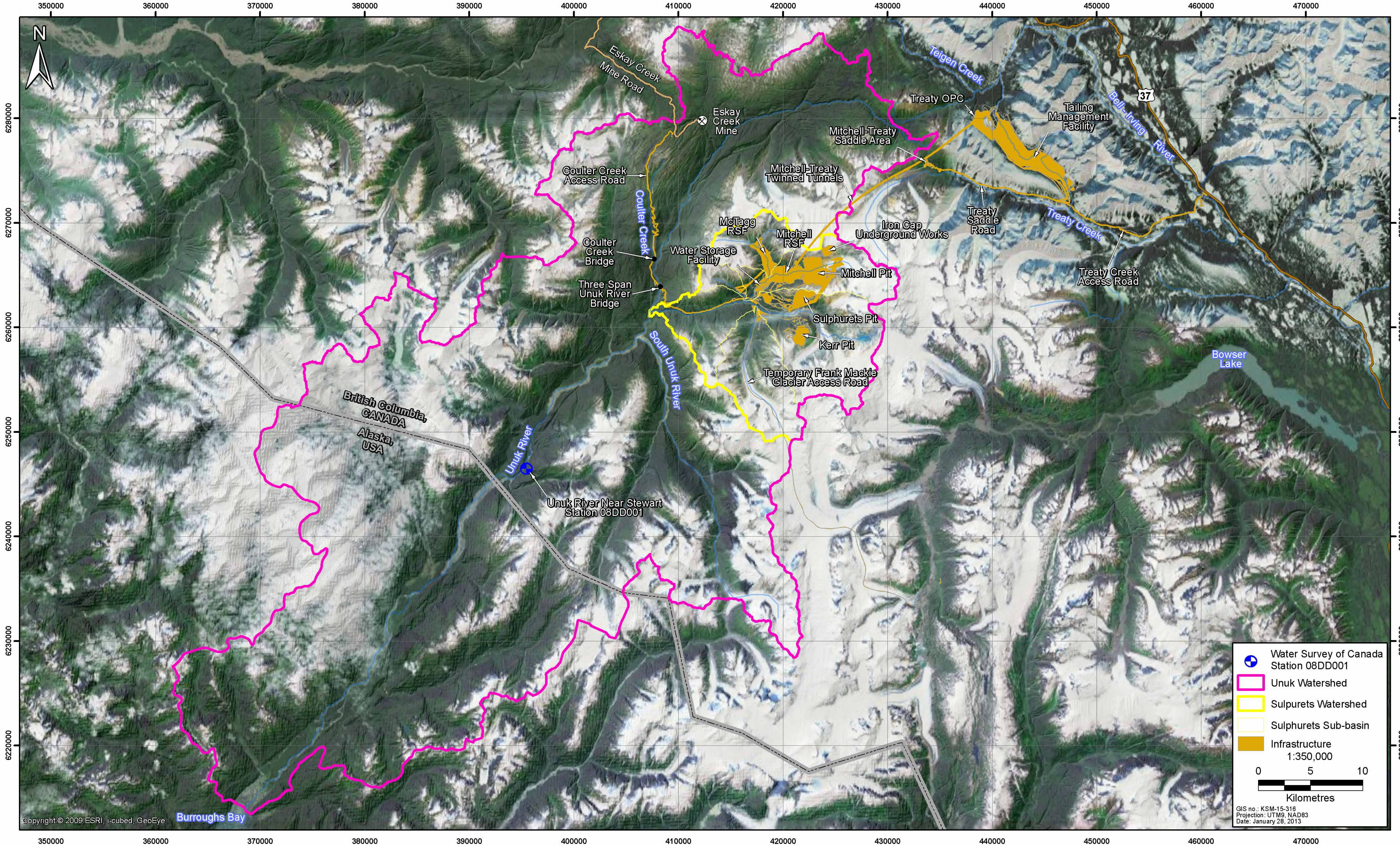

Figure 1.2-1

Unuk River Watershed and International River Improvement

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The Unuk River watershed encompasses an area of approximately 2,450 km^2 upstream of the discharge gauging station at Burroughs Bay Alaska, of which approximately 1,480 km^2, or 60.4 %, represents the Unuk River catchment area in Canada above Water Survey of Canada (WSC) stream gauging station 08DD001 (Unuk River north of Stewart). The mean annual flow of the Unuk River at Burroughs Bay, Alaska is 170 m^3/s (6,000 cfs), and at WSC 08DD001, 105 m^3/s (3,720 cfs).

Under the *International River Improvements Act*, a change in flow of 0.3m^3/s triggers a requirement to apply for a licence. This flow volume represents a change of 0.29% in the mean annual flow of the Unuk River at WSC 08DD001 just upstream of the border.

The communities nearest to the mouth of the Unuk River are Wrangell, Alaska 98 km west-northwest, and Ketchikan, Alaska 105 km west-southwest. Both Wrangell and Ketchikan are at considerable distance from the mouth of the Unuk River with intervening mountainous islands and peninsulas. The Unuk River watershed is accessed by boat or seaplane at its mouth and by helicopter in its upper, roadless reaches.

The area of Sulphurets watershed which includes the proposed works, measured at Sulphurets Creek near the mouth (408256mE, 6261490mN, UTM9) is 298.6 km^2, or 12.2% of the Unuk River watershed upstream of Burroughs Bay Alaska and 20% of the area of the Unuk River catchment above WSC 08DD001 (Rescan, 2012). The catchment area of the proposed improvement relative to the total Unuk River watershed is 0.026% (Klohn Crippen Berger 2012a). Table 1.2-1 summarizes the Unuk River and tributary catchment areas.

Table 1.2-1. Summary of Unuk River and Tributary Catchment Areas

Watershed	Area (km^2)	Percent of Total Unuk WS
Unuk River upstream of Burroughs Bay discharge station	2450	100
Unuk River above Canada-US Boundary	1480	60.4
Sulphurets Creek watershed (Unuk River tributary)	298.6	12.2
Catchment area above proposed Improvement in Mitchell Creek, a Sulphurets Crk tributary	0.63	0.026

1.3 Regulation S6(C): Location and Description of the Improvement

1.3.1 Project Overview

Seabridge's KSM Project involves the development of a major gold-copper deposit that includes four major mineralized zones, identified as the Mitchell, Kerr, Sulphurets, and Iron Cap deposits. The deposits contain significant gold, copper, silver, and molybdenum mineralization. All four deposits are situated in the Unuk River watershed. The KSM Project pre-feasibility study issued June 2012 demonstrates the economic viability of mining the deposits (Tetra Tech-Wardrop 2012). The KSM Project includes two distinct and geographically separate areas: 1) Mine Site and 2) Processing Tailing Management Area (PTMA; Figure 1.2-1). The Mine Site is situated in the Mitchell, McTagg, and Sulphurets creeks, which are tributaries to the Unuk River, and the PTMA is situated in the Nass River Watershed. The Unuk River is an International river, whereas the Nass River is wholly within Canada and is not an International river.

The proposed KSM Mine will involve a number of infrastructure components typical of a large mine, for its construction and operation. The principal Project components, phased over the 5-year construction period and 51.5-year mine life, will include:

- three open pits (Mitchell, Sulphurets, Kerr);
- two underground mines (Mitchell and Iron Cap);
- pre crushing and mineral processing plant;
- plant and mine services buildings and accommodations complex;
- truck shops;
- up to 12 temporary construction camps and 2 operating camps;
- two 35 km access roads, represented by the Treaty Creek access road and the Coulter Creek access road connecting to the existing regional road system;
- two major bridge crossing, the Bell-Irving River along the Treaty Creek access road, and the Unuk River along the Coulter Creek access road;
- pits, quarries, waste areas, and log laydown areas required for road clearing and construction;
- stream crossings, diversion ditches, and tunnels;
- twin, 23-km long tunnels (MTT) connecting Mine Site to Process Plant Site;
- tailing impoundment and seepage containment impoundments;
- rock storage facilities;
- temporary and permanent water treatment facilities;
- two landfills for solid waste and landfarms for hydrocarbon contaminated soil remediation
- 28.5 km 138 kV electrical power transmission line between a switching station to be constructed near Highway 37 and the Process Plant; most of this transmission line will parallel the Treaty Creek Access Road;
- temporary diesel generators along with associated fuel storage for construction;
- avalanche and debris flow protection structures at portal entrances and along roads traversing hazardous terrain;
- active avalanche monitoring and control during construction and mine life;
- helipads, temporary and permanent radio-communication structures;

1.3.2 Location and Description of the Improvement

The International river improvement proposed by Seabridge Gold is an integrated system of water diversion structures and a Water Storage Facility located in Mitchell and Sulphurets valleys to collect and convey clean water around mine development areas, and to collect, store and convey water requiring physical or chemical treatment prior to discharge, to the natural environment. A number of the improvements will be constructed and operated for the life of mine and well into the mine post-closure phase. The centre of the crest of the ultimate Water Storage Dam will be located at: 130° 20' 20" W; 56° 30' 45" N, or 417614E; 6263932N (NAD 83 and UTM 9N. The improvements are shown on Figure 1.3-1.

The following improvements are proposed to be constructed on tributaries of the Unuk River:

Mitchell Creek:

- Water Storage Facility (Water Storage Dam, Water Storage Pond, Southeast Water Storage Facility Diversion)
- Mitchell Diversion Tunnels (Mitchell Glacier, sub-glacial water diversion to Sulphurets Creek)
- North wall dewatering

Tributaries to Mitchell Creek:

- McTagg Creek Inlet Dam
- Diversion structures on 4 small un-named upper Mitchell Creek tributaries conveying water to McTagg Creek Inlet Dam

Of the above listed proposed improvements, only the Mitchell Creek WSF includes a water storage in its design and management. The remaining listed improvements intercept and/or convey water (i.e. no storage) from one location within the Sulphurets basin, to another, such that they do not alter the natural flow on Sulphurets Creek below the confluence with Mitchell Creek.

The following sections describe the Mitchell Creek WSF and McTagg Creek diversion improvements in more detail.

1.3.2.1 Mitchell Creek Water Storage Facility

The proposed Water Storage Facility is situated in a narrow canyon of Mitchell Creek and is designed to: temporarily store the Mine Site contact water, attenuate seasonal flows, and regulate the flow of water to the Water Treatment Plant prior to release. The WSF includes a water storage dam (WSD), water storage pond, downstream seepage collection dam and pond (SCD), and peripheral water collection / diversion ditches for clean water diversion around the WSF (Southeast WSF diversion). The WSF will occupy approximately 63 ha.

Over 70% of the mine waste rock stored in the rock storage facilities (RSF) is predicted to become acid generating over time. The purpose of the Water Storage Facility, located downstream of the RSFs is to collect and store drainage water from the RSFs which cannot be released to the environment without chemical treatment.

A water storage dam (WSD) will be constructed across the lower section of Mitchell Creek where the creek occupies a steep-sided canyon. The dam will be located approximately 2 kilometres upstream of the confluence of Mitchell and Sulphurets Creek, 12 kilometres above the confluence of Sulphurets Creek with the Unuk River, and 37 kilometres upstream of the Canada-US boundary at the Unuk River and 77 km from Burroughs Bay into which the Unuk River discharges into tidal waters in Alaska. The dam will be located approximately 1200 metres downstream of the confluence of McTagg Creek and Mitchell Creek. The impoundment formed upstream of the WSD will provide a reservoir for the collection and storage of contact water from the three rock storage facilities located in the Mitchell, McTagg, and Sulphurets creek valleys, water pumped from the open pits and underground mines, and drainage water from the Mitchell-Treaty Tunnels connecting the Mine Site with the Process Plant and Tailing Management Facility.

The WSF is designed to store a maximum of 63 Mm^3 (million cubic metres) of contact water which is the volume projected to occur during the 200-year wet year.

The pH of water stored in the WSF is predicted to be in the range of 3 to 4 during dry periods, similar to the naturally occurring acidity of Mitchell Creek. The pH will likely be higher during freshet due to dilution. The pond level will rise each spring during freshet and levels will fall over the remainder of the year as water is removed for treatment. The WSF will typically operate between a low pond elevation of 610 m in spring and a high pond elevation of 650 m in fall. During a 200 year wet year, the pond level may reach an elevation of 706 m.

The WSD is designed to minimize seepage and have the flexibility to be resistant to varying drainage water quality. Seepage from the dam will be collected by seepage interception tunnels and the WSF Seepage Dam (SCD) located downstream.

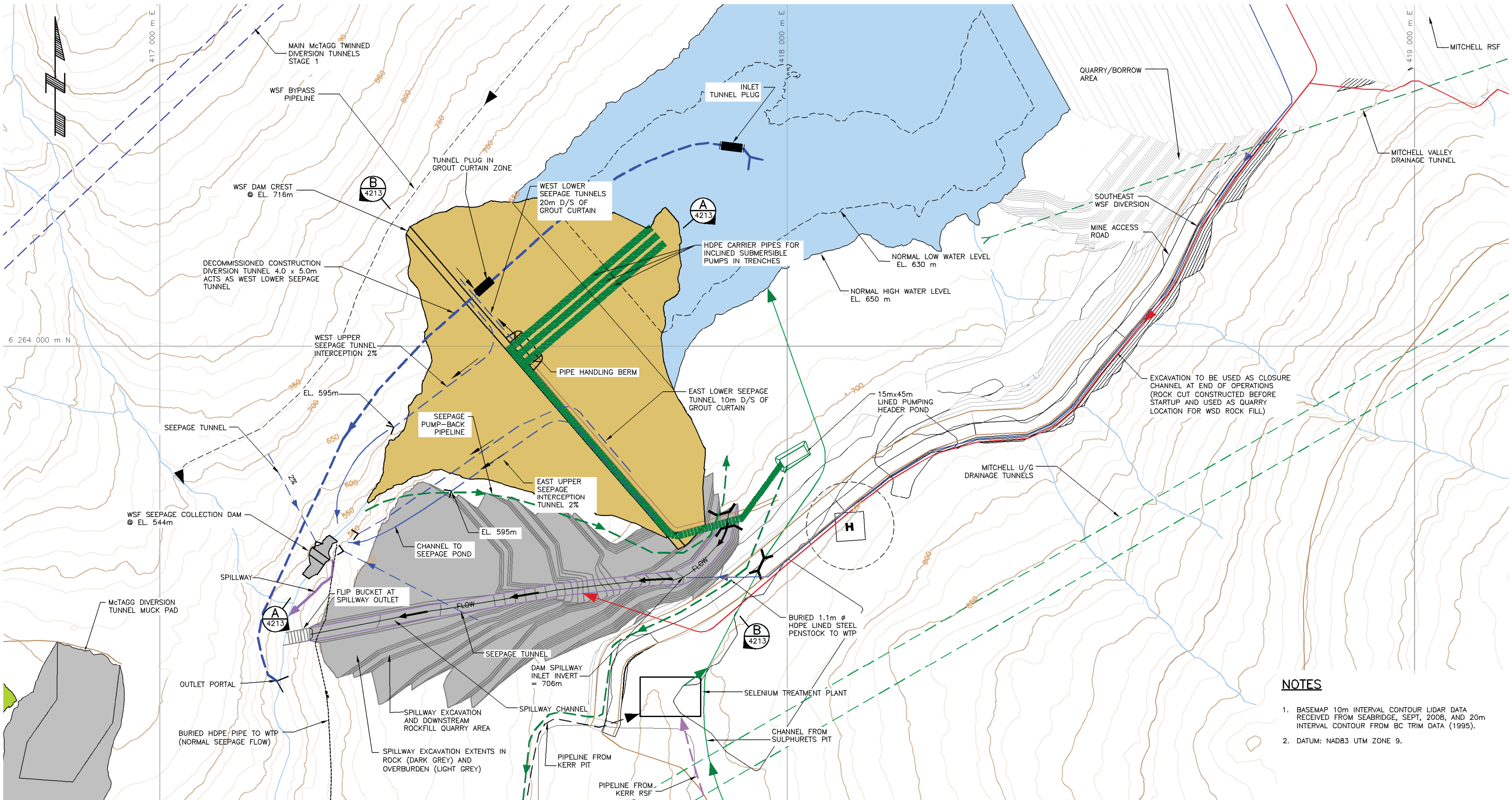
The WSF will have a minimum seasonal volume of 1.0 Mm^3 maintained to settle total suspended solids and reduce turbidity. Sediment from flows entering the WSF will be retained by a pair of interceptor ponds adjacent to the WSF. These ponds will be operated in alternate years and cleaned out when not in use. A suction dredge will be used periodically to remove sediment from the water storage pond.

Figure 1.3-2 shows a layout of the WSF.

Water Storage Dam Design

The following description of the Water Storage Dam design is a summary from the Klohn Crippen Berger (2013) report.

The Water Storage Facility (WSF) will store drainage from existing natural bedrock exposures of the Mitchell deposit as well as contact water from mining activities and the RSFs in the Mitchell and McTagg valleys. The consequence classification of the WSF is “Very High” based on the 2007 Canadian Dam Safety Guidelines. However, in view of the extended life of the facility, the consequence category has been upgraded to “extreme”, which is the highest rating level.



Legend

- WSF SEEPAGE COLLECTION DAM SPILLWAY (purple line)
- WSF DAM SPILLWAY (grey box)
- WTP — WATER TREATMENT PLANT

Source: Klohn Crippen Berger

Figure 1.3-2

Water Storage Facility Layout

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Therefore, the 165 m high Water Storage Dam (WSD) is designed to the following conditions:

- Seismic: dams designed to withstand the 1:10,000 year design earthquake which is associated with a local source of M=7.0 and a peak ground acceleration of 0.14 g.
- Flood: spillways are designed to pass an inflow design flood (IDF) of the probable maximum flood (PMF), which is assessed as the larger of cases with, or without snowmelt.

In addition, to minimize potential release of contact water to the environment, the WSF will store the 200-year wet year runoff. Non-contact water diversion structures are designed for the 200-year peak flow.

The WSD is designed as a zoned rockfill dam with a central asphalt core zone, with filters transitioning between the core and the rockfill shell zones. An asphalt core has been selected on its ability to resist acidic water and in consideration of the lack of large quantities of accessible clay soils in the project area. Asphalt core dams of comparable heights are planned or are under construction and the technology is increasingly being used worldwide. Non-acid generating (NPAG) rockfill for construction of the dam downstream shell will be sourced from quarries in sedimentary rock local to the site and from excavations for site facilities. Sections of the upstream shell of the WSD in contact with the core and drains beneath the dam will be constructed from NPAG rock from the Sulphurets deposit during pre-production. The WSD has slopes of 2.25H:1V upstream and 1.75H:1V downstream.

A low permeability asphalt core is provided within the central core zone of the dam. Asphalt liners are used in industrial acidic water handling applications due to asphalt's acid resistance and long term durability. Asphalt core placement is less disrupted by poor weather conditions than placement of till cores. The plastic, self-healing nature of asphalt cores make this type of dam resistant to leakage from settling of fill or earthquake deformation.

A 25 m high rockfill seepage dam is provided downstream of the WSD to collect seepage from the WSF. Hydrogeological modelling has shown that rising groundwater flow paths are present due to the high terrain surrounding the WSF. These hydraulically confined conditions result in effective collection of seepage by the seepage collection dam. Four seepage interception tunnels are provided within the abutments of the WSD. These tunnels are graded to drain into the seepage pond, and run parallel upstream along to the valley wall to a point 10 m downstream of the core, where they turn into the abutments and parallel the core under the dam. The tunnels purpose is to route seepage within the abutments to the seepage collection dam by lowering water levels in the abutments to reduce seepage bypassing the collection dam via the abutments. The seepage dam will have 3H:1V side slopes with an impervious asphalt central core and grouted foundation. Two seepage collection tunnels are provided immediately upstream of the seepage dam grout curtain. Seepage collected in this dam will be routed directly to the WTP.

The crest elevation of the seepage collection dam is set at 544 m and crest width 12 m. These configurations provide for full storage of the 200-year 24-hour storm runoff event from the local catchment of the dam between the high operating level and the seepage collection dam spillway. The spillway is cut in rock and is designed to pass the IDF (Inflow Design Flood).

The bedrock foundations of the main dam and the seepage dam will be grouted with high performance grout to further reduce seepage. The locations of the WSD seepage interception tunnels have been designed to facilitate construction of the grout curtain by allowing drilling upward or downward along the grout curtain. This will result in greater precision of grout and drain hole location than if longer drill holes were completed from surface. The tunnels can also be used for future additional or remedial grouting along the grout curtain beneath the dam core if required in the future. The seepage interception tunnels also allow monitoring of the locations of seepage inflow paths past the grout curtain in order to target remedial grouting to areas of deficiency if required.

The WSD will be built in a single stage during a two year dam raising period. The WSD is designed to have capacity to attenuate flows from the 200 year wet year to allow treatment of the water. An emergency spillway capable of routing the PMF is provided; cut in the rock on the left dam abutment (southeast side) of the dam. There is appropriate WSD dam crest freeboard provided for waves, flood routing and snow avalanches. Snow avalanche hazards have been assessed for the area and the impact wave modelled from the maximum predicted avalanche in the area can be contained within designed dam freeboard.

Construction of the WSD and its associated seepage dam will be facilitated by prior completion of the WSD Construction Diversion Tunnel. A single 1300 m long, 4.3 m high by 4.0 m wide tunnel will divert Mitchell Creek around the WSD during the construction period. The initial 20 m high upstream toe of rockfill for the WSD will have a till and geomembrane liner to serve as the construction cofferdam. This tunnel has capacity to convey the 25-year flow with no immersion and handles higher flows once dam fill is raised above the initial 20 m high structure.

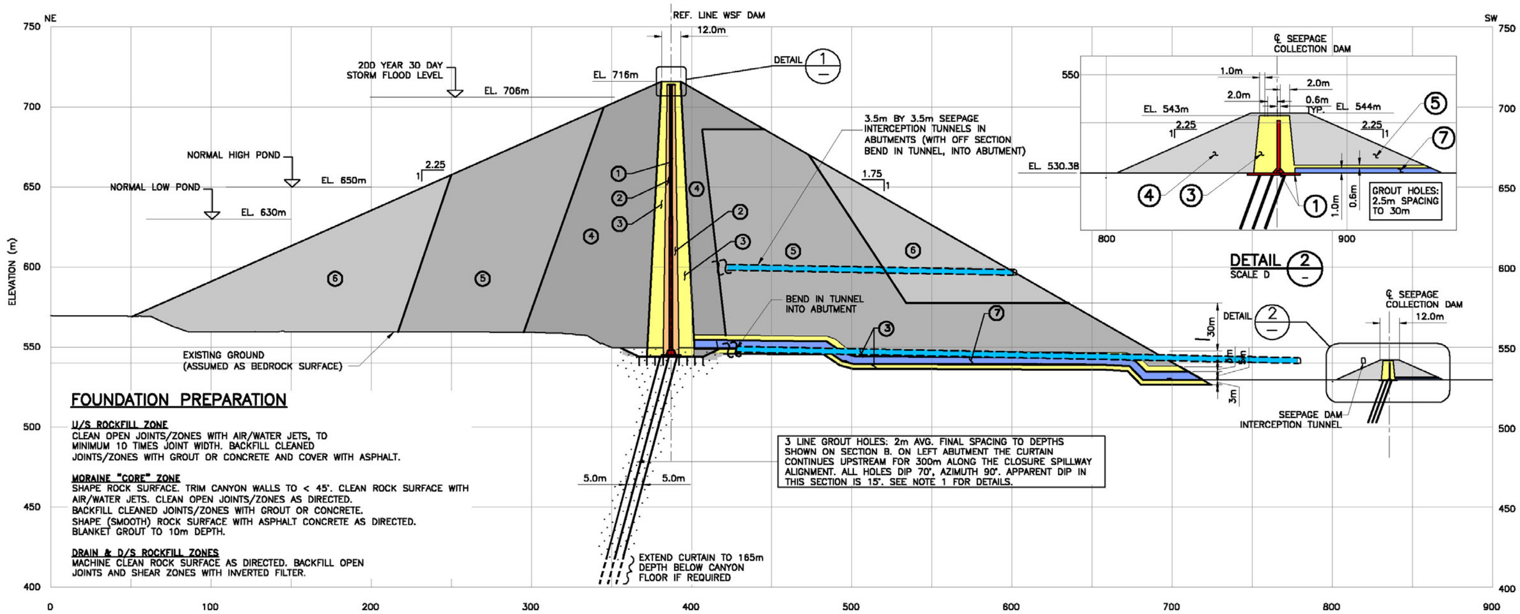
Hydroelectric power will be generated at the WTP from the flow of water from the WSD. Water will be pumped over the dam by inclined submersible pumps housed in HDPE pipe casings on the upstream face of the dam. The pumped water is routed to the WTP for treatment by buried HDPE lined steel penstocks that convey water to the WTP, where recovery of the majority of pumping energy will occur and additional power will be generated by the difference in elevation between the WTP and the dam crest. Figure 1.3-3 shows the WSF Dam details.

The pipes for the over-the-dam pumping system will be buried in trenches along the dam crest and will lead to a lined head pond located above the WSF impoundment near the spillway next to the dam's east abutment. From the header pond a 1.1 m HDPE lined steel penstock pipe will run alongside the mine access road to convey water to the Water Treatment Plant (WTP).

<u>Construction Materials</u>

The major quantities for excavation and fill are summarized in Table 1.3-1. The total volume of the dam fill will be approximately 10.7 million cubic metres, of which approximately 4 million cubic metres will be non- reactive rockfill, transitions, asphalt aggregate and drain rock (KCBL 2013). Table 1.3-1 also summarizes excavation quantities for overburden removal and rock shaping. Components such as grouting are not included.

Much of the rockfill, in particular the non-reactive and random rockfill, will be sourced from required excavation at the mine.



ZONE	MATERIAL
1	ASPHALT CONCRETE CORE
2	TRANSITION ZONE A OF GRAVEL (0–60MM)
3	TRANSITION ZONE B OF CRUSHED ROCK (0–150MM)
4	WELL COMPACTED QUARRIED NON–REACTIVE ROCK (0–700MM)
5	WELL COMPACTED QUARRIED ROCK (0–700MM)
6	WELL COMPACTED NATURAL GRAVEL OR QUARRIED ROCK (0–1000MM)
7	DRAIN

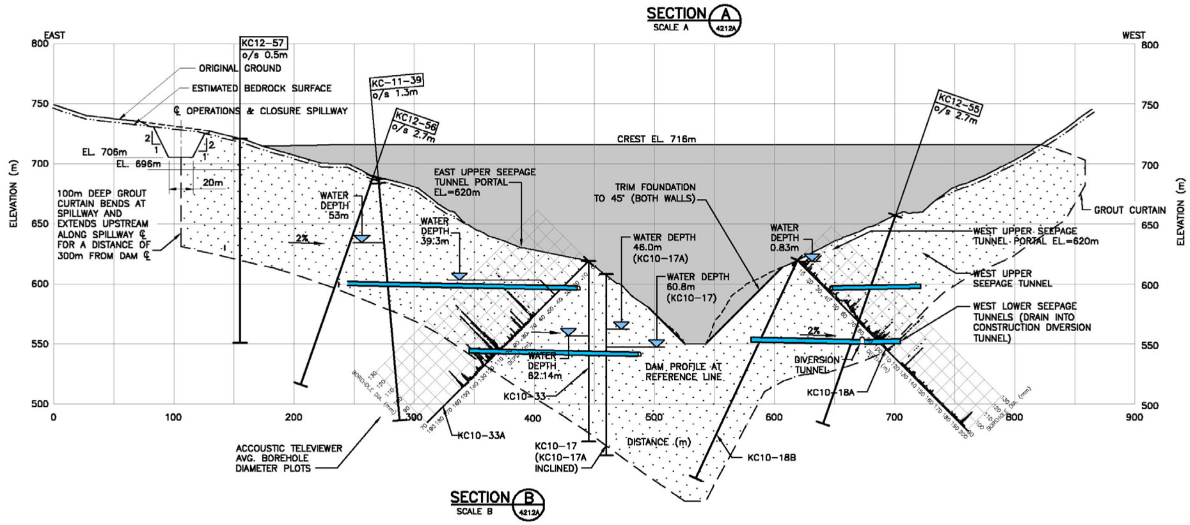
NOTES

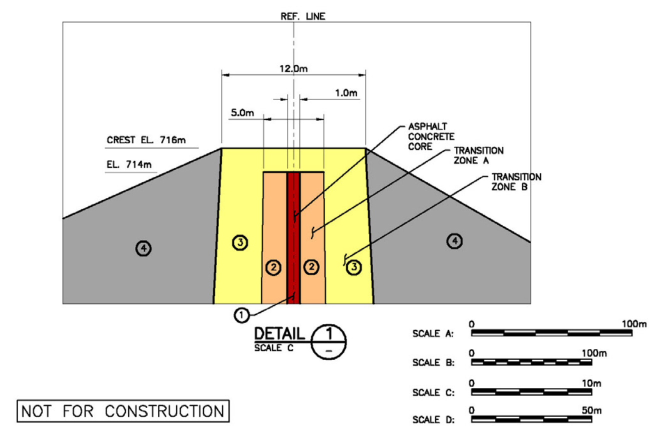
1. GROUT HOLES ON EACH ROW WILL BE DRILLED AND GROUTED USING SPLIT–SPACING TECHNIQUE. THE OUTER ROWS WILL BE GROUTED FIRST; THE CENTRE ROW LAST. PRIMARY HOLES WILL BE AT 8M SPACING. SPLIT–SPACING WITH SECONDARIES AND TERTIARIES WILL RESULT IN A FINAL HOLE SPACING ON EACH ROW OF 2 M. ADDITIONAL HOLES MAY BE REQUIRED LOCALLY IN HIGH TAKE AREAS.

GROUTING WILL BEGIN ON THE OUTER ROW PRIMARIES WITH HIGH MOBILITY GROUT (HMG). WHERE GROUT TAKES ARE HIGH, PROGRESSIVELY THICKER GROUTS WILL BE APPLIED UNTIL REFUSAL IS OBTAINED. THICKER GROUTS INCLUDE HIGHER VISCOSITY HMG'S AND SANDED HMG.

HMG MIX WILL COMPRISE:
- HIGH SULPHATE RESISTANT CEMENT
- BENTONITE (TO MINIMIZE BLEED)
- SILICA FUME (TO FILL SMALL VOIDS AND THUS REDUCE PERMEABILITY)
- SUPERPLASTICIZER (TO REDUCE WATER CONTENT, REDUCE BLEED AND INCREASE STRENGTH WHILE PROVIDING DESIRED VISCOSITY)
- WHELAN GUM (TO BIND EXCESS WATER AND REDUCE WASHOUT OF CEMENT AND FINES)
- CLEAN WATER

QUALITY CONTROL INCLUDES:
- GROUT QUALITY BY MARSH CONE VISCOSITY OR VISCOMETER AND API PRESSURE FILTER BLEED RESISTANCE, AND
- PERFORMANCE BY LUGEON WATER PRESSURE TESTS IN VERIFICATION DRILLHOLES ALONG THE CENTRE ROW. MAX. ALLOWABLE = 1 LUGEON (1 LUGEON ≈ 6×10^{-8} m/s)





NOT FOR CONSTRUCTION

Source: Klohn Crippen Berger (2012).

Figure 1.3-3

Water Storage Facility Dam Details

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Table 1.3-1. Quantities for Construction of the Water Storage Dam

Item		Description	Quantity	Unit
1	**Foundation Preparation**			
	1.1	Logging, grubbing, clearing and stripping		LS
	1.2	Foundation overburden and sub-excavation for grout curtain and consolidation grouting	407,000	m^3
	1.3	Bedrock shaping and trimming	10,000	m^3
2	**Dam**			
	2.1	Asphalt concrete (bitumen and aggregate)	66.000	m^3
	2.2	Gravel transition zone A	263,000	m^3
	2.3	Crushed rock transition zone B	802,000	m^3
	2.4	Compacted quarried non-reactive rock (0 – 700 mm)	2,800,000	m^3
	2.5	Compacted quarried random rockfill (0 – 1,000 mm)	6,362,000)	m^3
	2.6	Blanket drain	358,000	m^3

Seepage Analysis

The dam will minimize seepage and be resistant to low pH water. Seepage will be controlled by a central asphalt core zone and grout curtain in the foundation bedrock. Drainage galleries will be constructed in the downstream abutments of the dam to intercept water that may bypass the seepage mitigation works. Two dimensional seepage analyses have been completed for the maximum dam height at the end of mine operation. Analyses were carried out for both the base case and upper bound case (KCBL 2010b). The upper bound case considers the bedrock to be more pervious than assumed in the base case.

The results of the analyses indicate seepage of about three litres per second for the base case and 16 L/sec for the upper bound case.

Seepage Collection

A Seepage Dam (SCD), located downstream of the dam, will collect seepage water that bypasses the drainage galleries and the collected water will be routed to the WTP. It is expected that most of the seepage flow from the WSF will be intercepted by the SCD as a result of the seepage control grout curtain and strong upward groundwater flows caused by recharge from the surrounding area (KCBL 2010b). The SCD will be constructed to a height of about 25 m. The dam will be constructed of rock fill with 3H:1V side slopes and with a compacted moraine and asphalt core. A two metre thick drainage blanket will be constructed below the downstream portion of the dam to maintain a low phreatic surface for stability. The foundation and abutments will be grouted along the centreline to reduce seepage under the dam.

The SCD is designed based on criteria specified for a dam classified as “Significant” in accordance with the Canadian Dam Association, dam safety guidelines. The dam is designed to resist a 1:1,000 year return period earthquake and a 1:500 year return IDF that will be discharged through a spillway around the dam.

Spillway

Spillways will be constructed for both the WSD and the SCD. The spillway channel for the WSD will be excavated in bedrock on the southeast abutment for the starter dam. A new spillway will be constructed when the dam is raised to final elevation. The SCD spillway will also be constructed on the Southeast Dam abutment.

Diversions

The WSF bypass buried pipeline will be constructed to intercept runoff from the northwest valley slope above the WSF. It will also divert water collected in the McTagg west diversion ditch around the WSF, into Mitchell Creek below the WSF. The southeast WSF diversion will intercept runoff from the southeast slope.

Stability Analysis

Two dimensional limit equilibrium analyses have been completed for the WSD to analyse planar and circular slip surfaces using the Morgenstern-Price method of slices. Pore pressures in the dam and foundation were based on the results of seepage analyses. A conservative phreatic surface was used in the stability analyses based on the seepage analyses.

The stability analyses indicate that the WSD design meets or exceeds the minimum criteria for static (FoS 1.5), pseudo-static (FoS >1.0), and yield acceleration (FoS 1.0) for both the upstream and downstream slopes (KCBL 2013).

An operation, maintenance and surveillance manual will be prepared for the WSF including associated dams and water diversions. The WSD will be monitored by slope inclinometers installed to detect horizontal deformation of the dam, piezometers to measure phreatic levels within the dam structures, and survey monuments to measure settlement and displacement. Monitoring wells will be installed to monitor water quality and quantity.

A review and evaluation of the monitoring data will be carried out as part of the annual performance review and a report will be submitted to the regulatory agencies as required by the operating permit. The report will identify if any corrective action or contingency plans are required.

Geohazards

A snow avalanche path is located on the northwest slope above the WSF. Avalanche control will be implemented to remove accumulations of snow during operation. The maximum possible wave height and wave run-up resulting from the impact of a maximum probable avalanche has been modelled (KCBL 2013).

The freeboard criterion for the WSD considers the potential for a snow avalanche wave. Under normal operating conditions, over 60 m of freeboard is available. Under the design 200 year wet year, when water levels reach the spillway inlet level for a short period of time in the fall, the available freeboard is 10 m. Most major avalanches could be expected to occur in the spring when larger snowpacks are present.

<u>Operations and Closure Phase</u>

For the last two years of the construction period (Year -2 and Year -1), and during the operations and closure periods, seepage and contact surface runoff from the Mine Site and the Mitchell, McTagg, and Sulphurets Ridge Laydown Area will be collected and stored by the WSF for treatment at the WTP.

Flow from the WSF is pumped over the dam and then directed by gravity through pipelines to the WTP where hydropower energy expended in pumping will be recovered along with additional energy gained by the drop to the WTP.

The Water Storage Facility impoundment is sized to store the total runoff accumulated during the 200-year wet year.

The WSF and WTP will remain in operation after the end of mining operations. The dam and associated facilities will require ongoing monitoring and maintenance to ensure dam safety.

Temporary mine closure for periods longer than one year will require that measures be implemented to mitigate environmental impacts of the project and a plan has been developed and will be reviewed and approved during the project approval and permitting.

1.3.2.2 McTagg Creek Inlet Dams

The McTagg Creek inlet dams will be located on a tributary of Mitchell Creek within the natural capture area of the WSF. The improvements are necessary to divert clean water that does not require treatment, around the WSF, to where the water can be discharged into Sulphurets Creek at a suitable downstream location. Diversion of flows from the McTagg Creek Valley will require construction of staged inlet dams. There will be three stages. The Stage 1 dam will be designed to be in operation between years 2 and 10. The dam will be about 10 m high and will be constructed with quarried rockfill or other fill with a moraine core. The dam will be located at 688 m elevation. By about Year 10, the expanding Rock Storage Facility (RSF) will have plugged the inlets and so the dam will be abandoned (KCBL 2013).

1.4 Regulation S6(D): Effect of the Improvement on the Level or Flow of the Unuk River at the Canada-US Border

Flows downstream of the improvement will be primarily affected by the retention of water in the WSF upstream water storage pond, and its controlled release by the Water Treatment Plant. Water retention within the WSF will vary with the time of year as described in section 1.3.2, and will also vary with the phase of the Project. KSM Project will involve the development and operation of several open pit and underground mines over the 52year mine life. For the analysis the operating period of the mine has been broken down into: Baseline; year 0-24; 25-30; 30-45; 45-50; and 51-2; Year 57+ represents the post-closure period.

The analysis looked at the simulated flow volumes and change in percentage, from the conditions modelled (baseline, peak flood, and low flow) for the Unuk River (UR2) at the Water Survey of Canada (WSC) stream gauging station 08DD001 (Unuk River north of Stewart). This station is located at Latitude 56° 21'05" N; Longitude 130° 41' 30" West, approximately 5 km upstream of the Canada – United States boundary.

1.4.1 Downstream Effects under Normal Flow Conditions

The simulated annual flow volumes for the baseline condition are summarized in Table 1.4-1. The effect of the Project on the annual average flow volume for operation through post-closure ranges from a reduction of 0.01% in years 25-30 of operations, to a reduction of 2.07% during years 51-56. The increase in the reduction of flows during years 51-56 is due to the flooding of the Mitchell pit which diverts surface flows from the mine site into the pit. Once the pit fills about year 56, the more normal mine site flow regime is re-established, The effect on flow volumes is less than a 0.2% reduction in flows for the entire life of mine excepting the years 51-56. The result of the analysis is shown graphically in Figure 1.4-1. The licence threshold for the Act is only triggered during the years 51-56 during the Mitchell pit infill.

Table 1.4-1. Simulated Annual Flow Volumes for the Unuk River Baseline Condition and during different Phases of the Project.

		Baseline	Years 0.-24	Years 25-30	Years 30-45	Years 45-50	Years 51-56	Years 57+
UR2	Annual Flow (m3/s)	105.39	105.37	105.38	105.30	105.13	103.21	105.22
	Change from Baseline (%)	n/a	-0.02%	-0.01%	-0.09%	-0.25%	-2.07%	-0.16%

1.4.2 Downstream Effects under Peak/Flood Flow Conditions

The estimated peak flow values at UR2 for the baseline condition and during different phases of the project for Q_2 through Q_{200} for a low estimate and high estimate was simulated. The low estimates use the total area of sub-catchments, and use it in the regional equation; whereas the high estimates use the regional equation for each sub-catchment and then sum up the calculated flows of all the catchments. Table 1.4-2 lists the results of the simulation, and Figure 1.4-2 graphically depicts the changes to peak flow from baseline peak flow conditions. The greatest deviation in peak flow from operations is estimated for Q_2 at reduction of 1.8 %, declining to a reduction of about 0.6% for > Q_{20}. Through all conditions the effect of operations and post-closure to baseline peak flows is negligible.

1.4.3 Downstream Effects under Low Flow Conditions

The estimated annual 7-day low flow values at UR2 for the baseline condition and during different phases of the project for Q_2 through Q_{200} for a low estimate and high estimate was simulated. The low estimates use the total area of subcatchments, and use it in the regional equation; whereas the high estimates use the regional equation for each sub-catchment and then sum up the calculated flows of all the catchments. Table 1.4-3 lists the results of the simulation, and Figure 1.4-3 graphically depicts the changes to peak flow from baseline peak flow conditions. The greatest deviation in low flow from operations is estimated for Q_{200} at reduction of 0.64%, declining to a reduction of about 0.28% for > Q_2. Through all conditions the effect of operations and post-closure to baseline 7-day low flows is negligible.

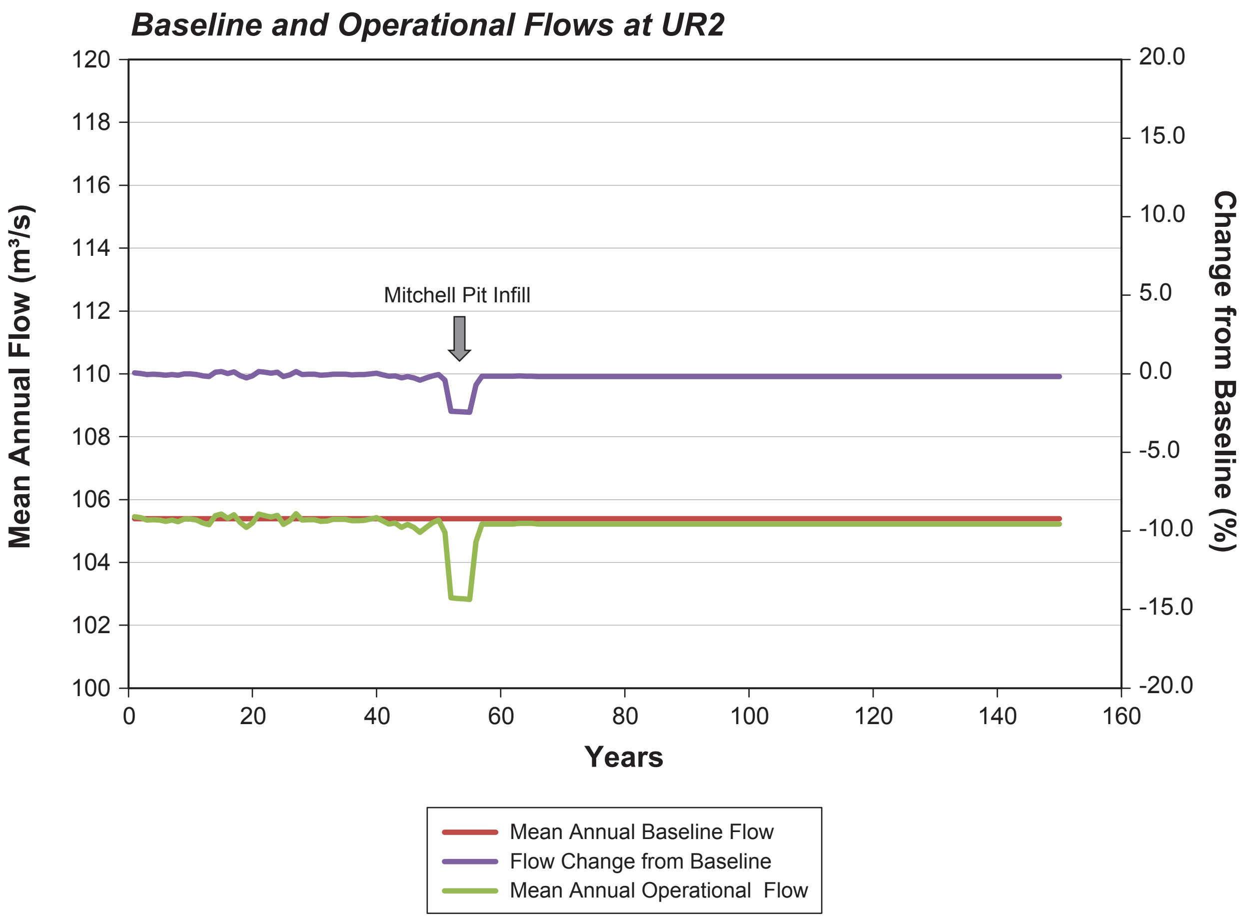
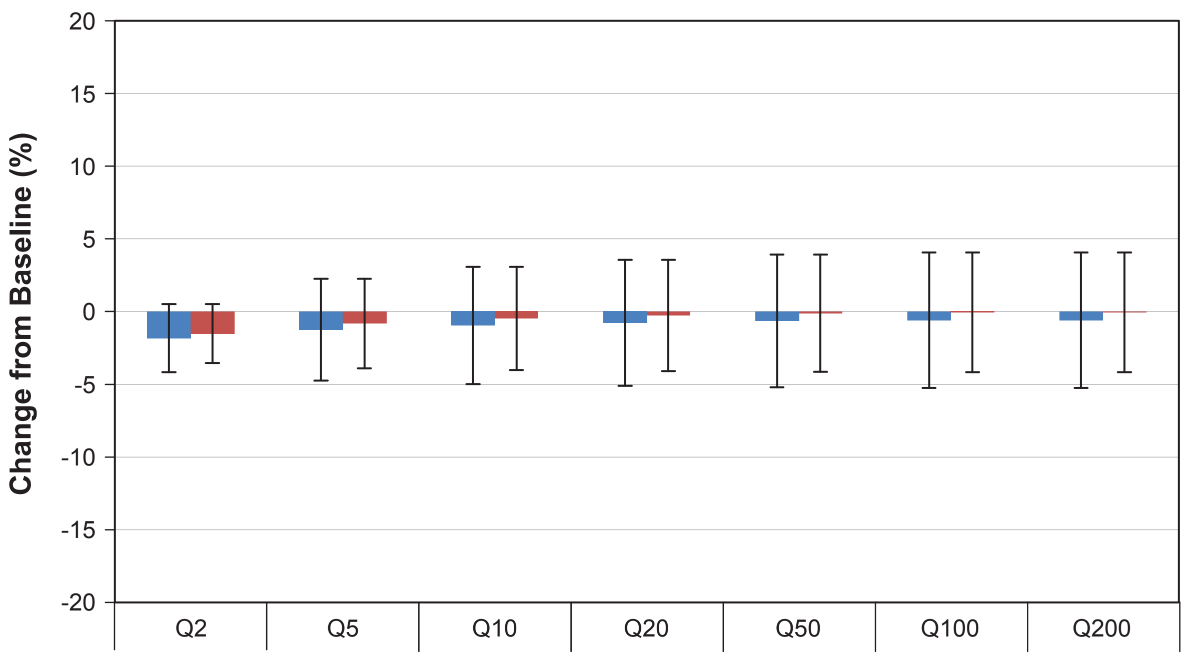


Figure 1.4-1

Unuk River Baseline Flows and Flows during KSM Life of Mine

Seabridge Gold KSM Project

Rescan Engineers & Scientists



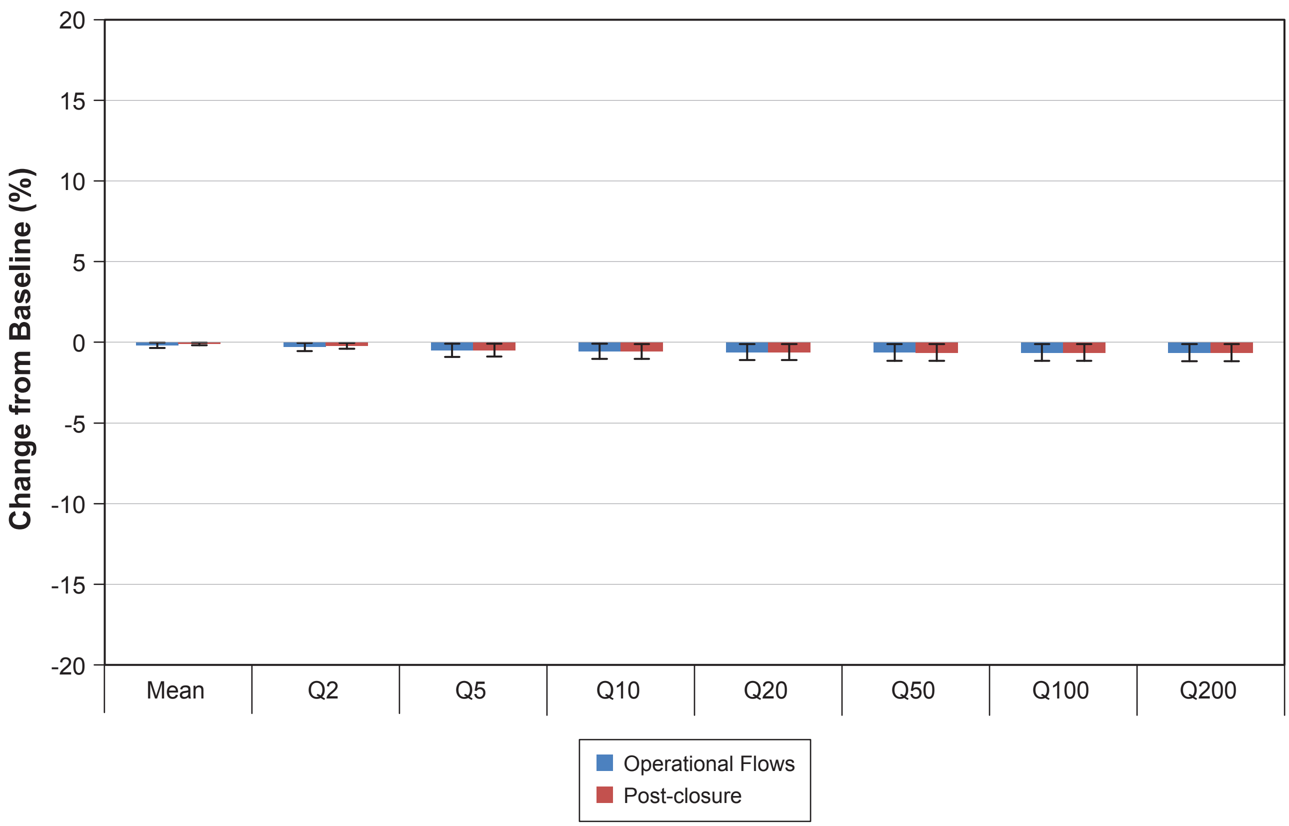
Note: Clustered columns show the average estimated effect, and error bars show the range of high and low estimates.

SEABRIDGE GOLD
KSM PROJECT

Unuk River (UR2) Peak Flow Changes from Baseline Conditions

Figure 1.4-2

Rescan
Engineers & Scientists



Note: Clustered columns show the average estimated effect, and error bars show the range of high and low estimates.

Figure 1.4-3

Unuk River (UR2) Annual 7-day Low Flow Changes from Baseline Conditions

SEABRIDGE GOLD
KSM PROJECT

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Table 1.4-2. Estimated Peak Flow Values at UR2 for the Baseline Condition during different Project Phases

		Estimated Peak Flow based on Regional Analysis (m3/s)						
		Q2	Q5	Q10	Q20	Q50	Q100	Q200
Baseline		**526.59**	**746.98**	**903.07**	**1059.45**	**1272.01**	**1439.08**	**1612.87**
Years 0-10	Low estimate	504.78	711.52	858.06	1005.22	1205.69	1363.55	1528.16
	High estimate	519.72	742.86	901.27	1059.60	1274.18	1442.40	1616.67
Years 10-25	Low estimate	504.69	712.50	859.83	1007.71	1209.03	1367.48	1532.59
	High estimate	518.96	742.75	901.72	1060.56	1275.71	1444.28	1618.80
Years 25-32	Low estimate	504.98	713.16	860.76	1008.89	1210.52	1369.20	1534.51
	High estimate	521.17	747.89	909.06	1069.96	1287.71	1458.16	1634.38
Years 32-51.5	Low estimate	504.97	713.01	860.50	1008.54	1210.06	1368.66	1533.91
	High estimate	523.64	753.03	916.14	1078.88	1298.94	1471.10	1648.90
Years 51.5-56	Low estimate	507.89	717.86	866.71	1016.04	1219.26	1379.14	1545.66
	High estimate	529.25	763.89	930.82	1097.18	1321.86	1497.43	1678.45
Years 57+	Low estimate	507.89	717.86	866.71	1016.04	1219.26	1379.14	1545.66
	High estimate	529.25	763.89	930.82	1097.18	1321.86	1497.43	1678.45

Low estimates: use the total area of subcatchments, and use it in the regional equation
High estimates: use the regional equation for each sub-catchment; then sum up the calculated flows of all subcatchments

Table 1.4-3. Estimated Annual 7-day Low Flow Values at UR2 for the Baseline Condition During Different Project Phases

		Estimated June to September 7-Day Low Flow based on Regional Analysis (m3/s)							
		mean	Q2	Q5	Q10	Q20	Q50	Q100	Q200
Baseline		**7.03**	**6.64**	**5.15**	**4.47**	**3.89**	**3.74**	**3.45**	**3.13**
Years 0-10	Low estimate	7.00	6.60	5.10	4.43	3.85	3.70	3.42	3.10
	High estimate	7.01	6.62	5.13	4.46	3.88	3.73	3.44	3.12
Years 10-25	Low estimate	7.00	6.60	5.10	4.42	3.85	3.70	3.41	3.10
	High estimate	7.01	6.62	5.13	4.46	3.88	3.73	3.44	3.12
Years 25-32	Low estimate	7.02	6.61	5.10	4.42	3.85	3.70	3.41	3.10
	High estimate	7.03	6.64	5.14	4.46	3.88	3.74	3.45	3.13
Years 32-51.5	Low estimate	7.01	6.61	5.10	4.42	3.84	3.70	3.41	3.10
	High estimate	7.03	6.64	5.14	4.46	3.88	3.74	3.45	3.13
Years 51.5-56	Low estimate	7.01	6.61	5.10	4.42	3.84	3.70	3.41	3.10
	High estimate	7.03	6.64	5.14	4.46	3.88	3.74	3.45	3.13
Years 57+	Low estimate	7.01	6.61	5.10	4.42	3.84	3.70	3.41	3.10
	High estimate	7.03	6.64	5.14	4.46	3.88	3.74	3.45	3.13

Low estimates: use the total area of subcatchments, and use it in the regional equation
High estimates: use the regional equation for each sub-catchment; then sum up the calculated flows of all subcatchments

1.4.4 Downstream Effects under Dam Break and Inundation Conditions

Seabridge engaged Klohn Crippen Berger to undertake an analysis of the downstream effects predicted to occur under the scenario involving a hypothetical failure of the main WSF Water Storage Dam and the implications for inundation due to released water flows on the Unuk River (Klohn Crippen Berger, 2012). Releases from the Dam would flow down Mitchell Creek, Sulphurets Creek, and the Unuk River and eventually discharge into Burroughs Bay in Alaska approximately 77 km downstream of the dam. Thirty-seven kilometeres would flow downstream in Canada, and the remaining, lower 40 km in the United States. The Dam break and inundation study was undertaken as a consequence of dam failure as defined in the Canadian Dam Safety Guidelines.

Several failure conditions were considered, including: flood-induced dam failure (e.g. overtopping of the Dam); sunny-day dam failure (e.g., piping); sunny-day dam failure during winter conditions where ice jam formation is possible; and failure induced by failure of an upstream structure.

The HEC-RAS hydrodynamic computer model, developed by the US Army Corps of Engineers, was used to simulate the dam failure and to estimate flood inundation limits along streams and rivers downstream of the Dam. The model covered the entire reach from the dam to Burroughs Bay.

The conclusions based on the results of the dam break and inundation study are as follows:

- The Dam break and inundation analyses are based on hypothetical modes of failure under extreme and highly unlikely events. For example, for the Dam to be overtopped, not only would the flood storage capacity and the large freeboard have to be used up, but the overflow spillway would also have to be not functioning and the treatment rate overwhelmed. This is a highly unlikely scenario. The results of the analyses in no way reflect upon the structural integrity or safety of the Dam.

The modelling consequences of a Dam breach are summarized as follows:

- Overtopping of the Dam during a 200-year flood (Rainy-day Dam break) results in a flood wave that varies from approximately 9 m high at the Sulphurets / Unuk confluence to 3.5 m high at the Canada/US border, decreasing to near zero at Burroughs Bay. The extent of the flood wave is similar to the 200 year flood levels on the Unuk River. The incremental consequences of a rainy-day overtopping failure in terms of life safety and potential damage to property along the lower reaches of the Unuk River (i.e. in Alaska), as defined in the CDA Dam Safety Guidelines, is considered to be negligible in terms of the extent of flooding.
- Piping failure of the Dam during normal operations (Sunny-day Dam break) results in a flood wave that varies from approximately 8.5 m high at the Sulphurets / Unuk confluence to 2 m high at the Canada/US border, decreasing to zero at Burroughs Bay. Inundation for the failure would be similar to the rainy-day failure except the flood depths are smaller. A sunny-day failure of the Dam may have more noticeable incremental consequences as it could include flooding slightly above the annual average levels and as a result some cabins / guide-outfitter locations could be flooded and there is some increased risk to personal safety.

- The rate of rise of the water at a location near the dam is estimated to be about 20m/hour. The rate of rise along the lower reaches of the Unuk River, where most of the cabins and outfitter facilities are located, is indicated by the model to be on the order of 2m/hour to 4 m/hour.

1.5 Regulation S6(E): Effect of the Use of the Water Outside Canada

Public available information on the use of water from the Unuk River outside Canada indicate that the primary use relates to maintenance of natural flows to support fish and aquatic habitat values within the Unuk River and its estuary where it discharges into Burroughs Bay. A number of guide outfitter and recreational cabins may exist alongside the Unuk River in locations generally assumed to be above average or recent flow conditions.

The KSM Project Mitchell Creek WSF and McTagg Creek inlet dams and upstream diversion ponds will have no measurable change on flows outside of Canada. Hence, there will be no effect on the use of water from the Unuk River outside of Canada.

1.6 Regulation S6(F): Adverse Effects of the Improvement

1.6.1 Flood Control Works

The Unuk River both within and outside of Canada has no constructed flood control works, hence the KSM Project improvements will not affect any flood control works.

The KSM Project proposes to construct the Coulter Creek access road (CCAR) from the Eskay Creek Mine Road to the KSM Mine Site. At approximately km 21, the CCAR crosses the Unuk River with a 89m long bridge. The bridge will be designed to safely pass a 1:100 year Unuk River flow event and would be unaffected by the International River improvements as the bridge is located approximately 2 km upstream of the confluence of Sulphurets Creek and the Unuk River.

1.6.2 Other Water Uses

Alaska residents and tourists use the lower Unuk River in Alaska on an intermittent and seasonal basis for recreational salmon fishing and wildlife viewing. A number of guide outfitter and recreational cabins may exist but their current status and level of use is unknown. A mining exploration camp is located in BC near the confluence of Sulphurets Creek and the Unuk River, where it is presumed the location is safe from annual and moderate high flows of these watercourses. The camp has been used intermittently since 1980. The KSM Project improvements will not affect the enjoyment of these uses.

1.6.3 Plans to Minimize Adverse Effects

It is not expected that the proposed improvements will have any adverse effect on flood control or other uses of water. The construction of dams along Mitchell and McTagg Creeks and the proposed water management of the dams and the WTP will result in slightly lower flood peaks downstream of the dams. However, any effects are likely to be immeasurable at the US/Canadian border under all conditions except a dam failure which is considered a highly unlikely and improbable event. The dams will be designed to comply with all Canadian dam safety requirements and will be constructed with a spillway capable of passing the possible maximum flood (PMF) without overtopping.

The WSF pond level will rise each spring during freshet, and levels will fall over the remainder of the year as water is removed for treatment. The WSF will typically operate between a low pond elevation of 610 m in spring and a high pond elevation of 650 m in fall. During a 200 year wet year, the pond level may reach an elevation of 706 m.

The WSF is designed to store the 200 year wet year flood without discharge and will be constructed with a flood control spillway designed to route the inflow design flood (IDF) cut into rock on the southeast side of the dam for each stage. Wave generation from potential snow avalanches into the reservoir has been modelled and an allowance has been made in the design freeboard. The maximum wave run-up is approximately 8 m for the ultimate dam (KCBL 2013).

The McTagg Creek inlet dam upstream ponds will rise each spring or after heavy rainfall and runoff events behind the 10 m high dams along with instantaneous diversion of water into the McTagg Diversion Tunnels, and thereafter pond levels will decline immediately as freshet or high runoff conditions abate. In the remote and unlikely event of a breach or the overtopping of the McTagg Creek inlet dam, the downstream effects of the water flow has been accommodated into the design of the WSF.

An operation, maintenance and surveillance manual will be prepared for the WSF including associated dams and water diversions. A review and evaluation of the monitoring data will be carried out as part of the annual performance review and a report will be submitted to the regulatory agencies as required by the operating permit. The report will identify if any corrective action or contingency plans are required.

1.7 Regulation S6(G): Economic Analysis of the Benefits and Costs of the Improvement

The proposed improvement is a key component of a $5.256 billion project that will provide jobs and business opportunities for residents of northwestern British Columbia during the 5 year construction period and 55 year mine production period. The geology, terrain, and natural hydrology of the Mine Area dictate the need for the proposed improvements, without which the mine could not be developed and the effects of the project on the environment managed in a manner that is in compliance with all government regulatory requirements. Development and infrastructure associated with the KSM Project will affect local communities, as well as key service centres such as Smithers, Terrace and Stewart that will supply employees and goods and services.

Direct (on-site) Project employment is estimated to be an average of approximately 314 person-years for the first year of Construction in 2014, increasing to a peak of 2,260 in 2018. Direct employment is predicted to be approximately 1,066 person-years for the first year of Operation in the year 2020, remaining at that approximate level for four years then falling moderately to a low of 866 by 2030. Employment is expected to increase again starting in the year 2039, reaching a peak of approximately 1,709 in 2052; this increase is mainly attributed to a move to underground mining. Employment is projected to then decrease moderately until the estimated end of Operation in 2071 (Table 1.7-1).

Table 1.7-1. KSM Project Capital and Operating Employment, 2014 to 2071

Year	Annual Average Employment (Person-years)		
	Construction	Operation	Total
2014	314	-	314
2015	1,048	-	1,048
2016	1,923	-	1,923
2017	2,059	-	2,059
2018	2,260	-	2,260
2019	1,710	-	1,710
2020	-	1,066	1,066
2021	-	1,061	1,061
2022	-	1,075	1,075
2023	-	1,074	1,074
2024	-	972	972
2025	-	979	979
2026	-	977	977
2027	-	967	967
2028	-	937	937
2029	-	865	865
2030	-	866	866
2031	-	866	866
2032	-	866	866
2033	-	866	866
2034	-	866	866
2035	-	866	866
2036	-	866	866
2037	-	866	866
2038	-	866	866
2039	-	985	985
2040	-	1,035	1,035
2041	-	1,097	1,097
2042	-	1,197	1,197
2043	-	1,205	1,205
2044	-	1,205	1,205
2045	-	1,418	1,418
2046	-	1,451	1,451
2047	-	1,500	1,500
2049	-	1,628	1,628
2050	-	1,684	1,684
2051	-	1,442	1,442

(continued)

Table 1.7-1. KSM Project Capital and Operating Employment, 2014 to 2071 (completed)

Year	Annual Average Employment (Person-years)		
	Construction	Operation	Total
2052	-	1,709	1,709
2053	-	1,709	1,709
2054	-	1,544	1,544
2055	-	1,451	1,451
2056	-	1,464	1,464
2057	-	1,477	1,477
2058	-	1,485	1,485
2059	-	1,485	1,485
2060	-	1,485	1,485
2061	-	1,407	1,407
2062	-	1,268	1,268
2063	-	1,225	1,225
2064	-	1,191	1,191
2065	-	1,191	1,191
2066	-	1,182	1,182
2067	-	1,114	1,114
2068	-	932	932
2069	-	907	907
2070	-	878	878
2071	-	732	732
Total	**9,314**	**59,450**	**68,764**

There is considerable operating and technical expertise, services, and support for the proposed KSM Project both in western Canada and in the local area. The contracting strategy has been developed to provide opportunities to local communities, contractors, and labourers located in the area. Seabridge will structure its contracting policy to provide preference to contractors hiring local employees.

Construction expenditures are estimated to occur over a 5-year period (starting in 2014 and ending in 2019) for the open pit phase of construction. The underground phase starting in approximately 2039 has continuous construction (including sustaining capital expenditures) through to the end of the project in 2071, but with expenditures and construction-related employment highest through the initial years of underground mining (Table 1.7-2). The required goods and services are expected to be procured within the region and elsewhere in the province, as well as from suppliers across Canada and internationally. This is expected to result in positive economic impacts on these businesses and contribute to an increase in provincial and national employment, income, and GDP.

An average of approximately 1,800 workers is expected to be on-site during the 5-year Construction phase, residing within dedicated camp accommodation. The origins of the

Construction workers is not yet known, but will likely come from a variety of communities within the Local Study Area (LSA), the Regional Study Area (RSA), and across the province and elsewhere. It is predicted that approximately 80% of workers will be sourced within BC. This employment will provide a source of income to be spent within local and home communities. This, in turn, is expected to result in induced positive economic impacts within these communities.

Table 1.7-2. KSM Project Capital and Operating Expenditures, 2014 to 2071

	Annual Average Expenditures (Million Current Dollars)		
Year	**Construction**	**Operation**	**Total**
2014	$213.4	-	$213.4
2015	$662.6	-	$662.6
2016	$949.6	-	$949.6
2017	$991.6	-	$991.6
2018	$1,114.4	-	$1,114.4
2019	$681.1	-	$681.1
2020	-	$851.6	$851.6
2021	-	$732.9	$732.9
2022	-	$751.5	$751.5
2023	-	$781.5	$781.5
2024	-	$742.4	$742.4
2025	-	$667.8	$667.8
2026	-	$738.5	$738.5
2027	-	$669.0	$669.0
2028	-	$655.3	$655.3
2029	-	$687.2	$687.2
2030-2039	$49.8	$5,656.5	$5,706.2
2040-2049	$1,461.1	$7,366.2	$8,827.2
2050-2059	$1,304.4	$6,628.5	$7,932.9
2060-2069	$255.6	$6,137.8	$6,393.5
2070-2071	$21.1	$1,190.3	$1,211.3
Total	**$7,704.8**	**$34,256.9**	**$41,961.7**

The long construction period will afford ample time for training initiatives for local people. Seabridge will support training and apprenticeship programs by its contractors and in its own facilities as a means of improving the skills of local workers in order for them to advance on the job. Skilled workers may initially be brought onto the Project from other locations in BC or Canada while local people are being trained, but the objective will be to hire as many local people as possible once skills reach the required levels. Highly specialized skills may have to be imported from other jurisdictions for such tasks as installation of proprietary technology.

The Project is predicted to be in operation for approximately 51.5 years. An average of approximately 1,040 workers (full-time equivalent, FTE) will be working directly on the Project through Operation. As with Construction, workers will be housed within a permanent camp on-site. The origins of the Operation workers are not yet known, although it is likely that a greater proportion of workers will come from local and regional communities than during Construction. On average, it is predicted that approximately 65% of workers will be BC residents, with the remainder being from other provinces in Canada. It is expected that only a relatively minor component of the Operation labour force will be from outside of Canada (an estimated 3% of the total direct workforce), being individuals with specialized skillsets and qualifications (Table 1.7-3).

Table 1.7-3. Total Employment and GDP Impacts of Construction (Open Pit and Underground) by Province or Territory

Province or Territory	Employment (Person-years)				GDP (Millions of Dollars)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Newfoundland and Labrador	5	28	33	66	$0.2	$2.5	$3.1	$5.8
Prince Edward Island	0	31	31	61	$0	$1.5	$2.1	$3.6
Nova Scotia	5	115	129	249	$0.2	$8.1	$11.1	$19.4
New Brunswick	5	93	109	208	$0.2	$7.3	$9.3	$16.8
Quebec	5	2,843	4,304	7,152	$0.4	$224.3	$348.2	$572.9
Ontario	5	7,674	7,489	15,168	$3.7	$697.1	$762.8	$1,463.7
Manitoba	5	723	625	1,353	$0.3	$57.5	$57.3	$115.0
Saskatchewan	5	482	408	895	$0.3	$44.6	$41.5	$86.4
Alberta	3,019	6,391	4,218	13,628	$482.7	$768.5	$612.2	$1,863.4
British Columbia	12,071	17,256	16,834	46,160	$1,967.9	$1,436.2	$1,865.7	$5,269.8
Territories	0	155	86	241	$0	$12.1	$9.1	$21.2
Total Canada	15,125	35,790	34,265	85,181	$2,455.8	3,259.6	$3,722.5	$9,437.9

During Operation, there are expected to be substantial economic benefits to businesses directly and indirectly supplying to the Project. There will be opportunities to local and Aboriginal owned businesses. This, in turn, is expected to contribute positively to employment, income, and GDP. The long duration of Operation will support the economic development of local and regional communities (Tables 1.7-3 and 1.7-4).

Table 1.7-4. Annual Economic Impacts of Operation in Canada, 2020 to 2079

Year	Employment (Person-years)	GDP (Millions of Dollars)	Tax Revenue (Millions of Dollars)		
			Federal	Provincial	Total
2020	3,710	$378.1	$48.2	$23.8	$72.1
2021	5,982	$615.7	$81.3	$40.1	$121.5
2022	7,128	$728.6	$96.4	$47.6	$144.0

(continued)

Table 1.7-4. Annual Economic Impacts of Operation in Canada, 2020 to 2079 (completed)

Year	Employment (Person-years)	GDP (Millions of Dollars)	Tax Revenue (Millions of Dollars)		
			Federal	Provincial	Total
2023	8,076	$805.1	$106.2	$52.4	$158.7
2024	8,056	$811.8	$106.8	$52.7	$159.5
2025	7,624	$784.3	$95.4	$47.1	$142.5
2026	8,325	$814.9	$98.6	$48.7	$147.3
2027	7,906	$797.4	$96.8	$47.8	$144.6
2028	7,663	$774.3	$93.8	$46.3	$140.2
2029	7,660	$764.7	$92.7	$45.7	$138.4
2030-2039	33,270	$3,582.0	$452.0	$223.1	$675.0
2040-2049	51,915	$5,467.6	$714.1	$352.5	$1,066.6
2050-2059	63,574	$6,923.4	$892.7	$440.6	$1,333.3
2060-2069	65,306	$7,003.8	$912.5	$450.4	$1,362.8
2070-2079	78,720	$7,907.2	$1,041.7	$514.1	$1,555.8
Total	**365,934**	**$38,256.7**	**$4,943.0**	**$2,439.6**	**$7,382.6**

1.8 Regulation S6(H): Additional Details Concerning the Improvement

The development is consistent with the Cassiar Iskut-Stikine Land and Resource Management Plan and the principles of sound and sustainable development of the resources and economy of BC and Canada.

1.8.1 Project Certification

Seabridge is submitting this application along with the Application for an Environmental Assessment Certificate under the *BC Environmental Assessment Act.* At the conclusion of the EA review and a provincial and federal government course of action decision on project approval, Seabridge would obtain applicable provincial and federal permits and authorizations enabling the commencement of the construction of improvements in accordance with the project development schedule.

1.8.2 Other Federal Licences or Authorizations

Seabridge is seeking additional federal (Government of Canada) licences or authorizations under the *Fisheries Act, Navigable Waters Protection Act,* and *Explosives Act.*

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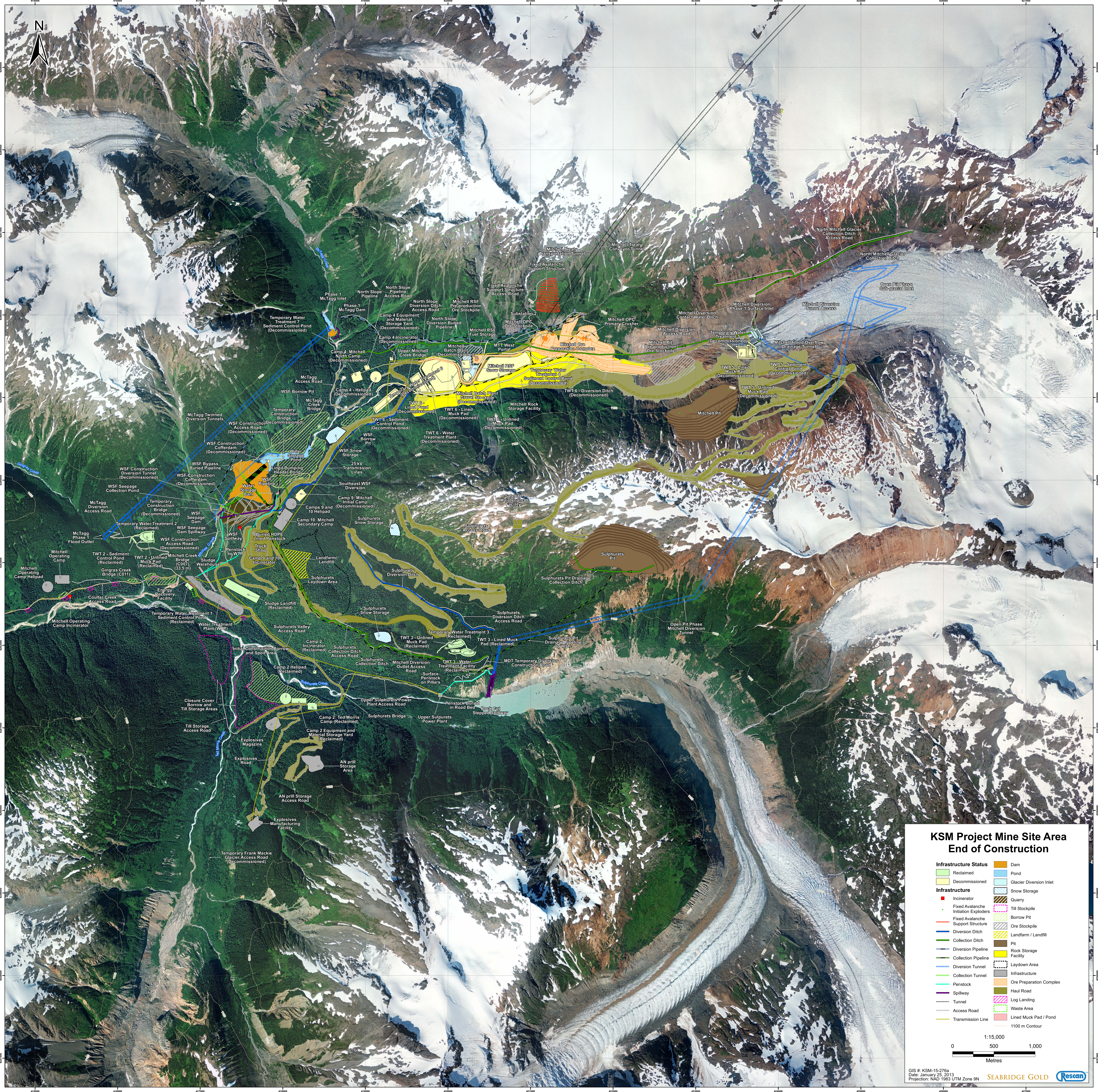
MAP POCKET



KSM Project Mine Site Area
End of Construction
Infrastructure Status
Reclaimed
Decommissioned
Infrastructure
Incinerator
Fixed Avalanche Initiation Exploders
Fixed Avalanche Support Structure
Diversion Ditch
Collection Ditch
Diversion Pipeline
Collection Pipeline
Diversion Tunnel
Collection Tunnel
Penstock
Spillway
Tunnel
Access Road
Transmission Line
Dam
Pond
Glacier Diversion Inlet
Snow Storage
Quarry
Till Stockpile
Borrow Pit
Ore Stockpile
Landfarm / Landfill
Pit
Rock Storage Facility
Laydown Area
Infrastructure
Ore Preparation Complex
Haul Road
Log Landing
Waste Area
Lined Muck Pad / Pond
1100 m Contour
1:15,000
0
500
1,000
Metres
GIS #: KSM-15-276a
Date: January 25, 2013
Projection: NAD 1983 UTM Zone 9N
SEABRIDGE GOLD
Rescan