1 Overview of the Proposed Project

1.1 Proponent Description

Seabridge Gold Inc. (the Proponent, or the Issuer, or Seabridge, or Seabridge Gold) was incorporated under the now repealed British Columbia *Company Act* on September 14, 1979 using the name Chopper Mines Ltd. After two subsequent name changes—to Dragoon Resources Ltd. on November 9, 1984 and to Seabridge Resources Inc. on May 20, 1998—the Issuer finally became Seabridge Gold Inc. on June 20, 2002. On October 31 of that year, Seabridge was continued under the *Canada Business Corporations Act* (1985).

Seabridge is a publicly traded company, with common shares trading on the TSX in Canada and on the New York Stock Exchange in the United States. Seabridge has a market capitalization of approximately CAN$650 million as of April 13, 2013.

Seabridge acquired the Kerr-Sulphurets-Mitchell (KSM) mineral claims in 2000. Based on favourable detailed engineering and exploration results carried out on these claims, Seabridge is proposing to develop a metal mine located in the Coast Mountains of northwestern British Columbia (BC). The KSM Project (the Project) will develop four mineralized zones—the KSM and Iron Cap deposits—containing gold, copper, silver, and molybdenum. The estimated initial capital cost of developing the Kerr, Sulphurets, Mitchell and Iron Cap deposits is CAN$5.256 billion.

Seabridge intends to design, and obtain authorizations for, a technically and economically feasible and environmentally responsible operation that will:

- construct, operate, close, and reclaim the Project;
- manage potential adverse environmental, economic, social, heritage, and health effects; and
- implement mitigation measures and monitoring, including closure monitoring.

Seabridge's objective is to sell or joint venture the operation to an established producing company with a proven responsible construction and development record. If a change in ownership occurs, Seabridge will comply with all applicable regulatory requirements with respect to Project authorizations.

This document constitutes an Application for an Environmental Assessment Certificate and an Environmental Impact Statement (Application/EIS) to meet provincial and federal environmental assessment (EA) requirements, respectively, for the KSM Project.

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Seabridge Gold is managed under the direction of:

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Jay S. Layman — Director, President, and Chief Operating Officer

Company representatives specific to the Application/EIS are:

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Elizabeth Miller — Manager, Environmental Affairs

1.2 Guiding Principles

The Proponent is committed to using the EA process as a planning tool to ensure that Project decisions (and related physical activities and components) are considered in a careful and precautionary manner, in order to avoid or minimize the potential for adverse environmental, social, economic, heritage, and health effects. Additionally, the Project is designed to meet objectives of responsible resource development outlined in the Government of Canada's *Economic Action Plan 2012* by fostering economic development opportunities in the natural resources sector (Government of Canada 2012a). The Project will promote economic prosperity in all regions of BC, and will assist the provincial government in meeting their target of approving eight new mines and nine mine project expansions by 2015—as described in *British Columbia's Mineral Exploration and Mining Strategy* (BC MEM 2012) and in the *BC Jobs Plan* (Government of British Columbia 2012).

In addition to meeting the objectives described in the government strategic plans, key principles that will guide the development of the KSM Project are identified below.

Precautionary Principle

The *Rio Declaration on Environment and Development* enshrined the use of the precautionary principle: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation" (United Nations Environment Programme 1992).

The Proponent will use technically and economically feasible mitigation measures to avoid and mitigate adverse effects that may arise from the Project. The lack of full scientific certainty regarding whether significant adverse effects are probable or likely to occur will not be used as justification to postpone the implementation of required mitigation measures. The Proponent is committed to applying the precautionary principle as a strategy in all phases of Project planning and design.

Aboriginal Traditional Knowledge

The integration of community and Aboriginal traditional knowledge is an important consideration during the EA planning process. Communication and cooperation with Aboriginal peoples, including Treaty Nations, First Nations, and the Métis, is required to ensure Project effects on potential or established Aboriginal and treaty rights, and related interests in the Project area, are minimized to the extent possible.

Public Consultation

Meaningful public consultation is a cornerstone of the EA planning process, and is best achieved when all parties have a clear understanding of the proposed Project as early as possible in the review process. The Proponent is required to provide current information about the Project to the public and, in particular, to the communities most likely to be affected by the Project. The Proponent is committed to considering and, where possible, addressing issues or concerns raised by the public throughout all phases of the EA.

1.3 Need for and Purpose of the Project

The *need* for a Project is defined as "the problem or opportunity that the proposed project is intended to solve or satisfy," whereas the *purpose* of a proposed project is defined as "what is to be achieved by carrying out the project" (CEA Agency 2007).

1.3.1 Need for the Project

The prosperity of Canada and, more specifically, of BC, is linked to economic development opportunities in the natural resources sector. Economic stimulus from the natural resources sector (including the induced goods and services that are created to support the sector) is estimated to account for 10% of all employment in Canada and close to 20% of the national Gross Domestic Product (GDP; Government of Canada 2012a).

In 2010, the extractive industry accounted for 4.4% (CAN$54 billion) of Canada's GDP of which the mining sector contributed CAN$35.7 billion of Canada's GDP (Mining Association of Canada 2011a), and 2% (CAN$4.7 billion) of BC's GDP (Pricewaterhouse Coopers 2011a). Revenues from the mining sector are projected to continue an increasing trend due to global demand; in 2011, gross mining revenues increased 25% over 2010 levels to CAN$9.9 billion (Pricewaterhouse Coopers 2011b).

In 2012, both the provincial and federal governments underscored their support for, and commitment to grow, the mining sector, in key action plans. In the *Economic Action Plan 2012*, the Government of Canada noted:

> *Our abundant natural resources have always formed the backbone of Canada's economy. They have fostered the development of whole communities and regions from one end of the country to the other and they have helped shaped Canada's character and identity (Government of Canada 2012b).*

In the same plan, the Government of Canada further committed to support responsible resource development, invest in Canada's natural resources, and expand trade and open new markets for Canadian businesses (Government of Canada 2012b).

Similarly, in *British Columbia's Mineral Exploration and Mining Strategy*, the provincial government stated:

> *British Columbia was built on the strength of our natural resources. And today, with demand for those resources stronger than ever, the province is poised for a new phase of growth, investment and job creation. […] Building on the progress of the past 10 years, we are moving forward to increase investment, expand job creation, develop new economic opportunities, protect the environment and build a better quality of life for future generations (BC MEM 2012).*

The KSM Project is needed to supply precious metals to global markets and Seabridge is committed to developing the Project in a manner that will contribute to the local, provincial, and national economies, and will create employment opportunities locally, regionally, and beyond.

1.3.1.1 Economic Feasibility

The following economic data for the KSM Project is taken from the 2012 Pre-Feasibility Study which can be found in Appendix 4-C (Tetra Tech-Wardrop 2012). Economic feasibility for the KSM Project was estimated using a series of Lerchs-Grossman (LG) pit shell optimizations using resource models provided by Resource Modelling Inc. (RMI; Tetra Tech-Wardrop 2012). The pit optimizations use mining, processing, water treatment, tailing, general and administrative costs, and process metal recoveries. These are derived for each of three separate pit areas, the Mitchell, Sulphurets, and Kerr pits. The RMI resource models classify the mineralization as Measured, Indicated, and Inferred; only Measured and Indicated categories are used in the pit optimization. Cut-off-grade is determined using the Net Smelter Return (NSR) in CAN$/t, which is calculated using Net Smelter Prices (NSP). The NSR (net of offsite concentrate and smelter charges and onsite mill recovery) is used as a cut-off item for break-even ore/waste selection. The NSP includes metal prices, US currency exchange rate, and offsite transportation, smelting, and refining charges. The metal prices from travelling averages, and resultant NSPs used are shown in Table 1.3-1.

Table 1.3-1. Metal Prices and Net Smelter Price

	Metal Price (US$)	NSP (CAN$)
Cu	3.21/lb	2.93/lb
Au	1,244/oz	39.02/g
Ag	22.98/oz	0.649/g
Mo	14.14/lb	9.70/lb

Source: Tetra Tech Wardrop (2012)

LG delineated resources are in-situ and use an NSR cut-off-grade specific to each mining area but do not include any mining dilution or mining loss. Moose Mountain Technical Servies notes that the economic pit limits are based on mining unit costs derived to meet the local conditions for the Project and the specific Project arrangements for waste rock management, water management, environmental, and reclamation within the 2012 Pre-Feasibility Study (Tetra Tech-Wardrop 2012) as well as certain input parameters, such as pit slope angles, process recoveries, environmental considerations, and reclamation requirements. All of these components affect the mining quantities and activities to release the specified ore and, as such, affect the economic pit limits.

As can be expected during normal progressive mine optimization stages for all open pit mines, some further refinements may result from additional detailed data acquisition. Future operational cost projections or metal price changes could affect the projected pit limits, ore reserves, and waste quantities. Because of the difficulty in predicting relevant metal prices over a 51.5 year project life, the ultimate LG pit limits in the 2012 Pre-Feasibility Study (Tetra Tech-Wardrop 2012) for Sulphurets and Kerr are selected where an incremental increase in pit size does not significantly increase the pit resource, or an incremental increase in the pit resource results in only marginal economic return. In other words, rather than selecting an economic ultimate pit based on a fixed price case (even if discounted cash flow considerations are included), the ultimate pits for Sulphurets and Kerr are selected where the economic margins drop off. The ultimate pit for Mitchell is selected where the operating cost per tonne of ore for mining one bench lower by open pit method begins to exceed the unit operating cost of mining incrementally higher with a block cave. This establishes the limits to the mineable resource base for the mine design work. Price and cash flow sensitivities can then be performed within a more robust mine plan. The LG pit delineated resource for each pit area is summarized in Table 1.3-2 and Table 1.3-3.

Table 1.3-2. Measured and Indicated Lerchs-Grossman Pit Resources

Pit Area	In Situ Ore (Mt)	NSR (CAN$/t)	Au (g/t)	Cu (%)	Ag (g/t)	Mo (ppm)	Waste (Mt)	Strip Ratio (t:t)
Mitchell	980	30.3	0.656	0.171	3.05	61	1,342	1.4
Sulphurets	310	27.8	0.599	0.226	0.78	52	859	2.8
Kerr	234	32.0	0.253	0.475	1.23	-	476	2.0
Total	1,524	30.1	0.582	0.229	2.31	50	2,677	1.8

Source: Tetra Tech Wardrop (2012)
Note: NSR cut-offs for each area are: Mitchell CAN$9.57, Sulphurets CAN$10.17, Kerr CAN$9.61. The NSR cut-off for the Mitchell Block Cave Mine is $15.41.

Table 1.3-3. Measured and Indicated Lerchs-Grossman Pit Resources – In Situ Metal

Pit	Au (M oz)	Cu (M lb)	Ag (M oz)	Mo (M lb)
Mitchell	20.7	3,697	96.1	130.8
Sulphurets	6.0	1,544	7.8	35.6
Kerr	1.9	2,444	9.2	0.0
Total	28.5	7,685	113.1	166.4

Source: Tetra Tech Wardrop (2012)

1.3.1.2 Revenues

The Project will develop one of the largest gold resources in the world, with proven and probable reserves totalling 38.2 million oz, as well as 9.9 B lb of copper, 191 million oz of silver, and 213 million lb of molybdenum. The Project will supply gold and copper concentrate to overseas markets to support industrial development needs and growth in China, India, and other emerging markets; China alone accounts for an estimated 37% of global copper demand (Deloitte 2012). Other Asian nations and some eastern European nations that have entered the European Union in recent years are also expected to provide a sustained demand base into the future. The large populations of the developing nations create significant demand for consumer products, such as access to electrical power and general improvements in living standards. Plumbing supplies, telecommunications, electrical appliances, automobiles, and air conditioners are typical consumer products that use significant amounts of copper, and as nations develop, the demand for these commodities will increase. Annual copper consumption per capita in the developing nations is very low by comparison to developed countries but, given their large populations, a modest increase in per capita consumption will inevitably result in a large increase overall.

Global mine production is the principal source of world copper supply, with recycling of copper scrap accounting for between only 11 and 13% of the total supply. Mine production in the Americas, Australia, and Indonesia produces about 75% of this copper, with South America, specifically Chile, being the largest contributor at about 40% of global production. Historically, the price of copper has been both volatile and cyclical, a reflection of economic conditions and expectations with respect to future supply and demand. During the 1980s and 1990s, the copper price averaged above US$1.00/lb within a range of US$0.60 to US$1.60. Since the late 1990s, when significant new mine capacity was developed, copper has been in the lower portion of its normal price cycle, until relatively recently. The currently increasing demand for copper, particularly from Asia, together with the slowdown in new mine development, has resulted in a strong increase in the copper price to approximately US$3.66/lb. The copper price is expected to remain strong over at least the next few years, should demand also remain strong. London Metal Exchange inventories have decreased from 900,000 tonnes (t) in December 2002 to a level of about 353,425 t in January 2013 (the lowest inventory levels for the past 13 months); it is anticipated that tightening supply may outweigh a recent slowdown in buying from the top consumer, China.

Similarly, global demand for gold has risen nearly 6% year-over-year since 2007, which has driven gold prices up significantly with a current spot price of approximately CAN$1,413/oz as of June 6, 2013; this trend is expected to continue in 2013 (Pricewaterhouse Coopers 2011b). The appeal of the precious metals market is highlighted by its attractiveness as an investment vehicle. Gold demand in general is apportioned between investment, jewellery, and technology, with India emerging as the strongest performing market, accounting for 30% of total consumer demand (World Gold Council 2012).

Silver prices have also increased, from US$4.50/oz in 2002 to US$35/oz in 2012. Although the demand for silver in 2011 softened slightly, down by 1.5% at 876.6 million oz, silver still reached its second highest level since 2000, driven by growth in China and by its ubiquitous use in household goods, technology, the automotive industry, and jewellery. In 2011, Canada was the eleventh top silver producing country in the world (The Silver Institute 2012).

Molybdenum is a common by-product of copper mining. It has the ability to withstand extreme temperatures and has a high resistance to corrosion. Molybdenum is widely used as an alloy agent in stainless steel making. From 1998, molybdenum prices have increased from a low of approximately CAN$3/lb to a recent spot price of approximately CAN$13/lb. Molybdenum is primarily sourced from Chile and used in the US steel-making industry (International Molybdenum Association 2012).

Although commodity prices may be subject to short-term volatility, it is anticipated that because of increased urbanization around the world (with its concomitant requirements for construction materials and luxury goods), long-term demand for metals will remain robust (Pricewaterhouse Coopers 2012).

In a period of stagnant global economic growth, the revenues generated by the KSM Project will contribute to the economic recovery in Canada and will create export opportunities consistent with strengthening international investment, as outlined in Canada's *Economic Action Plan 2012* (Government of Canada 2012b). Over the construction and operation phases, the Project will contribute an estimated CAN$24.3 billion to BC's GDP and CAN$1.4 billion in tax revenues to BC. Nationally, the Project will generate approximately CAN$48 billion to Canada's GDP and a total of CAN$9.1 billion in tax revenues during the construction and operation phases. The Project is predicted to result in a significant economic benefit to BC and to Canada as a whole.

1.3.1.3 Employment

In addition to positive economic benefits, the Project will provide significant employment, education, and training opportunities to local and regional communities, including Aboriginal peoples. Unemployment rates in some of the communities nearest to the Project—Gingolx (unemployment rate of 47%) and Gitanyow (unemployment rate of 57%), for example—are well above the provincial average of 6%. By creating new employment opportunities, the Project will contribute to the provincial government's strategy for the mining industry (BC MEM 2012) and the *BC Jobs Plan* (Government of British Columbia 2012).

During construction, there will be an estimated average of 1,800 direct (on-site) jobs (full-time equivalent [FTE]). For indirect jobs, there will be an estimated average of about 2,510 FTE jobs in BC and 4,770 in Canada (including BC). Additionally, the number of induced jobs (from workers spending their incomes) will average approximately 4,410 FTE jobs across Canada, with approximately 2,220 of those in BC.

For operation, it is estimated that there will be an average of 1,040 jobs (FTE) on site annually, with an average of an additional 1,840 indirect jobs in BC and 3,780 indirect jobs in Canada (including BC). Induced jobs in BC will average approximately 1,110 (FTE) during operation, with approximately 2,680 jobs in Canada (including BC).

1.3.2 Purpose of the Project

The purpose of the KSM Project is to undertake sustainable mineral extraction activities in alignment with the goals of responsible resource development, as stated in the *Economic Action Plan 2012* (Government of Canada 2012b), and to foster economic growth and prosperity in BC, as outlined in *British Columbia's Mineral Exploration and Mining Strategy* (BC MEM 2012).

As defined in the World Commission on Economic Development's 1987 Brundtland Report, sustainable development denotes "those paths of social, economic and political progress that meet the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987). The Proponent recognizes the interconnectedness of social, economic, and environmental sustainability, and is committed to the safety and well-being of personnel and surrounding communities, environmental stewardship, and community engagement while sustaining a profitable business. The Proponent is also a member of the Mining Association of British Columbia, the first provincial mining association to adopt Towards Sustainable Mining principles, developed by the Mining Association of Canada. Towards Sustainable Mining provides a standard that members must adhere to for good performance in mining, including corporate social responsibility, following and reporting on sustainability performance indicators, and undergoing external verification (Mining Association of Canada 2011b).

The KSM Project is also being developed under strict regulations and best practices guidelines, where performance measures and environmental indicators—such as those relating to wildlife, fisheries, heritage, and water quality—measure and report on the sustainability of the Project. The implementation of standards and objectives is aimed toward maximizing the benefits of the Project while minimizing the costs to environmental and socio-economic systems, so as to ensure responsible resource development.

1.4 Project History

Although sparse, there is evidence to suggest that exploration was undertaken in the area of the Project by prospectors looking for placer gold prior to 1935, likely starting in the late 1800s (BC MEM 1935). In northwestern BC, a series of gold rushes began in the mid-19th century. The Cassiar Gold Rush of the 1870s led to a report of placer gold on the Unuk River, but this did not garner much attention (Mertie Jr. 1921). Then, in the early 1880s, prospectors spent several years extracting gold from the gravels of Sulphide (Sulphurets) Creek. To access their claims, they blazed a foot trail along the north bank of the Unuk River to Burroughs Bay (Wright 1907). The *Minister of Mines Annual Report, 1935* states that a prospector named O'Hara was the first person to find placer gold, in 1893. He was followed by Ketchikan-based prospectors during the 1890s, including John W. Daily (also spelled Daley, Daly), F. E. Gringras, H. W. Ketchum, Lee Brant, and C. W. Mitchell (BC MEMNG 1936).

In response to the Klondike Gold Rush of 1897, a telegraph line from Ashcroft, BC, to the gold fields of the Yukon was constructed by the Dominion Government, partially following the route of the incomplete Collins Telegraph Line, abandoned during the 1860s. The Dominion Yukon Telegraph Line was completed in 1901 and remained in operation until the 1930s (Newman 1995; Miller 2004).

Between 1900 and 1903, the Unuk River Mining and Dredging Co. ran an extensive prospecting and placer mining operation at two claims, located on Sulphurets Creek and on the south fork of the Unuk River. Developments on these properties included a stamping mill, the excavation of tunnels, a camp on the Unuk River near the BC–Alaska border, 35 miles of trail cut, and 30 t of ore prepared for shipment (BC MEMNG 1902, 1904, 1936). Additional work in the Unuk River

and Sulphurets Creek valleys during this period included prospecting and claim staking; excavation of additional tunnels and open cuts; and the construction of cabins, blacksmith shops, and ore bins on the properties. H. W. Ketchum, who had been prospecting the Unuk River annually since the 1890s, also cut a number of trails.

An impediment to the establishment of large-scale operations was the difficulty of transportation into the region. An attempt to establish a wagon road was never finished; it ended several kilometres northeast of the international border and skipped two difficult sections (BC MEMNG 1904, 1920, 1921, 1936). Attempts to import machinery along this trail apparently met with failure, as later reports describe that pieces of equipment were found abandoned along the road and left to rust (BC MEMNG 1936).

In the fall of 1928, claims were staked along the north side of Treaty Creek (formerly 20 Mile Creek), east of the Unuk River. The claims were accessed from the south via trails from Meziadin Lake and the Nass River Valley. However, as the assay results proved to show low-grade ore, the claims were subsequently abandoned (BC MEMNG 1930, 1931).

Beginning in 1929, renewed interest in the mineral potential of the Unuk River watershed resulted in an influx of Ketchikan- and Stewart-based prospectors, including Tom McQuillan, T. Terwilligen, Arthur Skelhorne, and the brothers Bruce and Jack Johnston. By 1932, the old wagon road was brushed out and cable crossings were built to facilitate access (BC MEMNG 1933). The prospectors staged their work from Ketchikan, travelling by boat to Harvey Matney's ranch at the head of Burroughs Bay (Matney Ranch). There they hired flat-bottomed riverboats to travel up the navigable portion of the lower Unuk River. Beyond that point, a series of trails and cable crossings were used to access the claims further up the Unuk River (BC MEMNG 1936).

In 1932, the Mackay Syndicate, based out of the Premier Mine to the south of the Project successfully landed a plane on Tom Mackay Lake near their mineral claims in the region (BC MEMNG 1935, 1936). An assay outfit was flown in, and they began an exploration program that included excavation of open cuts and prospecting, with encouraging results (BC MEMNG 1936). However, for reasons that are not described in the Minister of Mines annual reports, possibly the onset of World War II, prospecting in the region came to a halt in 1940 (BC MEMNG 1941, 1942). Modern exploration of the area began in the 1960s, with brief exploration programs conducted by Newmont Mining Corp. (Newmont), Granduc Mines Ltd. (Granduc), Phelps Dodge Corp. (Phelps Dodge), and the Meridian Syndicate. All of these programs were focused toward gold exploration. Various explorers were attracted to this area due to the numerous large, prominent pyritic gossans that are exposed in the alpine areas. The Sulphurets Zone was first drilled by Esso Minerals in 1969, the Kerr Zone by Brinco Ltd. (Brinco) in 1985, and the Mitchell Zone by Newhawk Gold (Newhawk) in 1991.

In 1989, a 100% interest in the Kerr deposit was acquired from Western Canadian Mines by Placer Dome (Placer), and in the following year Placer acquired the adjacent Sulphurets property from Newhawk. The Sulphurets property also hosts the Mitchell deposit and other mineral occurrences. There is no recorded commercial mineral production, nor evidence of it, from these properties. Regionally, historical commercial mining operations include the recently closed Eskay Creek Mine (located approximately 18 km northwest of the Project), which operated

between 1995 and 2008, and the Granduc Mine (located approximately 30 km south), which operated between 1971 and 1984. Immediately west of the KSM Project, small-scale placer gold mining has occurred in Sulphurets and Mitchell creeks. On the Brucejack property immediately to the east, currently owned by Pretium Resources Inc. (Pretium), advanced underground exploration and test mining was undertaken in the 1990s on narrow, gold/silver–bearing quartz veins in the West Zone.

In 2000, Seabridge acquired a 100% interest in the Kerr and Sulphurets properties from Placer, subject to capped royalties. Noranda Inc. (Noranda) optioned the property in 2002 and carried out further exploration between 2003 and 2005. Noranda subsequently merged with Falconbridge Ltd., and was acquired by Xstrata. The property was reacquired by Seabridge in 2006 after the option agreement expired. Exploration efforts on the property continued to focus on further delineating the Mitchell deposit, expansion of the Sulphurets deposit, re-evaluating the Kerr deposit, and defining the mineral resources at the Iron Cap deposit. Seabridge has carried out a comprehensive drilling program (over 126,000 m) of the Sulphurets and Mitchell properties since 2006. From 2008 to 2011, Seabridge focused on further exploration and development of the four deposits at the KSM Project, and generated successive expansion of resource estimates and three preliminary feasibility studies (PFS), the most recent PFS study being the June 2012 KSM PFS Report. In 2012, Seabridge continued development efforts, including the work required for the submission of its Application/EIS, but changed its exploration focus at KSM to search for higher temperature core zones that typically concentrate high-grade metals within very large porphyry systems. Exploration results in 2012 indicate the presence of two or three core zones, with the Deep Kerr Zone showing the most potential. During this exploration activity, Seabridge also discovered an epithermal deposit, named the Camp Zone. Table 1.4-1 summarizes the more recent exploration history of the Kerr Zone, and Table 1.4-2 summarizes the exploration history of the Sulphurets, Mitchell, and Iron Cap zones.

Table 1.4-1. Exploration History of the Kerr Zone

Date	Activity
1982 – 1983	Alpha Joint Venture began prospecting and conducting soil geochemical surveys of the Kerr gossan, focusing on gold
1984 – 1985	Brinco optioned the Kerr Project, completed some geologic surveys, and drilled 3 holes
1987 – 1989	Western Canadian Mines optioned Kerr and completed 58 drill holes, and recognized the existence of a copper-gold porphyry deposit
1989	Placer acquired the Kerr property
1990 – 1992	Placer began delineating the Kerr deposit by drilling 83 holes
1992 – 1996	Placer completed resource estimates (not NI 43-101 compliant), metallurgical test work, and scoping studies
1996 – 2000	Placer Dome, no field work
2000	Seabridge acquired a 100% interest in Kerr from Placer
2002	Noranda acquired an option from Seabridge with the right to earn up to a 65% interest in Kerr
2003 – 2004	Noranda undertook various exploration surveys
2006	Seabridge purchased the option back from Falconbridge Ltd. (formerly Noranda)

(continued)

Table 1.4-1. Exploration History of the Kerr Zone (completed)

Date	Activity
2009	Seabridge drilled 7 holes totalling 1,159 m and conducted metallurgical testing
2010	Seabridge drilled 4 holes totalling 1,453 m and conducted metallurgical testing
2011	Seabridge drilled 4 resource definition holes totalling 2,338 m and continued with prefeasibility studies
2012	Seabridge drilled 5 holes totaling 5,371 m and continued with prefeasibility studies

Table 1.4-2. Exploration History of the Sulphurets, Mitchell, and Iron Cap Zones

Date	Activity
1880 – 1933	Limited placer gold exploration and mining
1935 – 1959	Various syndicates conducted gold prospecting activities and staking of mining claims
1959 – 1960	Newmont and Granduc conducted surveys, including airborne electromagnetic surveys. Mineralization at Sulphurets and Iron Cap Au zones was explored. D. Ross, S. Bishop, and W. Dawson prospected and staked claims in the area
1961 – 1968	Granduc conducted geological and geochemical surveys and drilled 9 holes into the Sulphurets Zone. Ross-Bishop-Dawson claims were optioned by Phelps Dodge in 1962, Meridian Syndicate in 1965, and Granduc in 1968
1963	R. Kirkham completed a M.Sc. thesis on the geology of the Mitchell and Sulphurets area
1981	T. Simpson completed a M.Sc. thesis on the geology of the Sulphurets gold zone
1971 – 1977	Granduc conducted additional exploration surveys targeting molybdenum, and drilled 6 holes into the Snowfield Zone east of the KSM Project
1979 – 1984	Esso optioned the Sulphurets property and completed early stage exploration, including drilling 19 holes (3,326 m)
1985 – 1991	Granduc optioned Sulphurets to Lacana (later Corona) and Newhawk. Lacana-Newhawk Joint Venture spent about CAN$21 million developing the West Zone and other smaller precious metal veins on the Brucejack property; drilled 7 holes totaling 1,306 m at Sulphurets and 4 holes totaling 647 m at or near Mitchell. Homestake undertook exploration after acquiring Corona
1991	An adjacent Sulphurets property, the Arbee prospect, was optioned by Newhawk from D. Ross
1992	The Arbee prospect was optioned by Placer from Newhawk
1991 – 1992	Newhawk commissioned an airborne geophysical survey over the Sulphurets property. Newhawk sub-divided the Sulphurets property into Sulphside and Bruceside. Placer acquired Sulphside (Sulphurets, Mitchell, Iron Cap, and other prospects)
1992	Placer undertook delineation drilling of the Sulphurets deposit at 50-m centres (23 holes totaling 6,175 m)
1993	J. Margolis completed a Ph.D. thesis on the Sulphurets district. Newhawk-Corona drilled 3 holes in the Snowfields and Josephine zones east of Sulphurets
1992 – 1996	Placer completed geological modelling and resource estimation (not NI 43-101 compliant), preliminary metallurgical test work, and scoping studies
1999	Silver Standard acquired Newhawk
1996 – 2000	Sulphurets Project was dormant

(continued)

Table 1.4-2. Exploration History of the Sulphurets, Mitchell, and Iron Cap Zones (completed)

Date	Activity
2000	Seabridge acquired a 100% interest in the Sulphurets-Mitchell properties from Placer
2002	Noranda acquired an option to earn up to 65% from Seabridge
2003 – 2004	Noranda undertook various exploration surveys
2005	Falconbridge (formerly Noranda) drilled 16 holes totaling 4,092 m of diamond drilling in 16 holes
2006	Seabridge purchased Falconbridge's option back and drilled 29 holes totalling 9,369 m at the Sulphurets and Mitchell zones
2007	Seabridge drilled 36 holes totaling 15,053 m. Seabridge purchased the Arbee prospect from D. Ross
2008	Seabridge drilled 40 holes totalling 17,328 m, started metallurgical testing, obtained new topographic data, and initiated permit-related activities
2009	Seabridge drilled 51 holes totaling 13,003 m (resource definition, geotechnical, and water monitoring), conducted metallurgical testing, and intensified permit data collection
2010	Seabridge drilled 90 holes totalling 28,209 m (resource definition and geotechnical), conducted metallurgical testing, and intensified permit data collection
2011	Seabridge drilled 63 holes totalling 20,718 m and continued prefeasibility-level work
2012	Seabridge drilled 46 holes totalling 22,321 m (resource definition an geotechnical); updated PFS studies and advanced the EA process

1.5 Project Tenure

Surface rights in the Project area are held by the Crown, while the Proponent holds subsurface rights in the form of mineral tenures granted under the BC *Mineral Tenure Act* (1996). The KSM Project property comprises three discontinuous claim blocks. These claim blocks are referred to as the KSM/BJ claim group, the Seabee/Tina claims, and the KSM placer claim block (see Appendix 4-B). The first two claim blocks (KSM and Seabee/Tina) contain 117 mineral claims, consisting of both cell and legacy claims; the total area of these two blocks is 52,133.26 ha. The Seabee/Tina claim block is approximately 19 km northeast of the KSM claim group.

The KSM claim group includes:

- 30 contiguous mineral cell claims covering an area of 6,726.42 ha, within which the mineral deposits lie;
- 16 mineral legacy "BJ" claims covering approximately 6,225 ha, within which certain infrastructure for the proposed Project will be located; and
- 18 mineral legacy "New BJ" claims covering approximately 6,026.2 ha, which are adjacent to the "BJ" claims described above.

The Seabee/Tina claims include 47 mineral cell claims (the Seabee Property) and 6 mineral legacy claims (the Tina Property) covering approximately 21,478 ha, which are situated where certain components of the Project (e.g., the Process Plant and the Tailing Management Facility [TMF]) are proposed to be located.

The KSM placer claims include 21 placer cell claims covering an area of 5,749.2 ha, which are coincident in land area with most of the mineral cell claims within the KSM claim group.

The claims held by the Proponent are summarized in Tables 1.5-1 to 1.5-3. The locations of these claims and the surrounding mineral tenures are illustrated in Figures 1.5-1 and 1.5-2.

Table 1.5-1. KSM Claim Block

Claim No.	Claim Name	Cells/ Units	Area (ha)	TRIM Map No.	Mining Division	Expiry Date
254756	ARBEE #35		25.0	104B059	Skeena	June 16, 2018
254757	ARBEE #39		25.0	104B059	Skeena	June 16, 2018
254758	ARBEE #54		25.0	104B059	Skeena	June 14, 2018
254759	ARBEE #55		25.0	104B059	Skeena	June 16, 2018
516236	ICE 4	17	303.3	104B059	Skeena	June 30, 2018
516237	ICE 2	4	71.4	104B059	Skeena	June 30, 2018
516238	OK #1	35	624.5	104B059	Skeena	December 10, 2018
516239	OK #2	30	535.5	104B059	Skeena	December 10, 2018
516240	ICE 1	6	107.0	104B059	Skeena	June 30, 2018
516241	IRON CAP 4	8	142.7	104B059	Skeena	June 30, 2018
516242	IRON CAP 6	1	71.4	104B059	Skeena	September 23, 2018
516245	XRAY 1	20	356.9	104B059	Skeena	October 12, 2018
516248	TEDRAY NO. 1	8	142.7	104B059	Skeena	August 26, 2018
516251	TEDRAY NO. 6	18	321.3	104B059	Skeena	August 26, 2018
516252	ED NO. 1	7	125.0	104B059	Skeena	August 26, 2018
516253	ED NO. 2	10	178.6	104B059	Skeena	August 26, 2018
516254	TEDRAY NO. 9	16	285.8	104B059	Skeena	August 26, 2018
516255	TEDRAY 15	12	214.3	104B049	Skeena	September 23, 2018
516256	TEDRAY NO. 11	3	53.6	104B049	Skeena	August 26, 2018
516258	TEDRAY 16	6	178.6	104B059	Skeena	November 3, 2018
516259	TEDRAY 17	10	107.2	104B049	Skeena	November 3, 2018
516260	TEDRAY 18	6	107.2	104B049	Skeena	November 3, 2018
516261	KERR 41	26	464.6	104B049	Skeena	December 20, 2018
516262	KERR 10	19	339.5	104B049	Skeena	December 17, 2018
516263	KERR 15	36	643.9	104B049	Skeena	December 17, 2018
516264	KERR 99	22	393.3	104B049	Skeena	October 30, 2018
516266	KERR 8	10	178.8	104B049	Skeena	December 17, 2018
516267	KERR 9	1	250.2	104B049	Skeena	December 17, 2018
516268	KERR 12	18	321.8	104B049	Skeena	December 17, 2018
516269	TEDRAY 13	6	107.2	104B049	Skeena	August 26, 2018
394782	BJ 7	25	500.0	104B059	Skeena	December 11, 2020
394783	BJ 8	25	500.0	104B059	Skeena	December 11, 2020
394784	BJ 9	20	400.0	104B059	Skeena	December 11, 2020

(continued)

Table 1.5-1. KSM Claim Block (completed)

Claim No.	Claim Name	Cells/ Units	Area (ha)	TRIM Map No.	Mining Division	Expiry Date
394792	BJ 16	25	500.0	104B059	Skeena	December 11, 2020
394793	BJ 17	20	400.0	104B059	Skeena	December 11, 2020
394795	BJ 19	25	500.0	104B059	Skeena	December 11, 2020
394796	BJ 20	18.75	375.0	104B059	Skeena	December 11, 2020
394799	BJ 23	25	500.0	104B059	Skeena	December 11, 2020
394800	BJ 24	15	300.0	104B059	Skeena	December 11, 2020
394801	BJ 25	25	500.0	104B059	Skeena	December 11, 2020
394802	BJ 26	12.5	250.0	104B059	Skeena	December 11, 2020
394803	BJ 27	10	200.0	104B059	Skeena	December 11, 2020
394804	BJ 28	5	100.0	104B059	Skeena	December 11, 2020
394805	BJ 29	15	300.0	104B049	Skeena	December 11, 2020
394806	BJ 30	20	400.0	104B049	Skeena	December 11, 2020
394807	BJ 31	25	500.0	104B049	Skeena	December 11, 2020
394780	BJ5		100.0	104B059	Skeena	November 30, 2021
394781	BJ6		100.0	104B059	Skeena	November 30, 2021
394786	BJ 11		500.0	104B059	Skeena	November 30, 2021
394787	BJ 12		500.0	104B059	Skeena	November 30, 2021
394788	BJ 13		100.0	104B059	Skeena	November 30, 2021
394789	BJ 13A		25.0	104B059	Skeena	November 30, 2021
394790	BJ 14		100.0	104B059	Skeena	November 30, 2021
394791	BJ 15		250.0	104B059	Skeena	November 30, 2021
394794	BJ 18		300.0	104B059	Skeena	November 30, 2021
394808	BJ 31A		375.0	104B049	Skeena	December 31, 2012
394809	BJ 32		150.0	104B049	Skeena	December 31, 2021
394810	BJ 33		450.0	104B049	Skeena	December 31, 2021
394811	BJ 34		150.0	104B049	Skeena	December 31, 2021
394812	BJ 35		450.0	104B049	Skeena	December 31, 2021
705591	BJ GAP1		231.6	104B059	Skeena	February 5, 2021
705592	BJ GAP2		160.5	104B059	Skeena	February 5, 2021
383463			1247	104B	Skeena	November 30, 2021
383483			838	104B	Skeena	November 30, 2021

Table 1.5-2. Seabee/Tina Claim Block

Claim No.	Claim Name	Cells/ Units	Area (ha)	TRIM Map No.	Mining Division	Expiry Date
566467	BRIDGE1	25	445.8	104A052	Skeena	February 8, 2017
566468	BRIDGE2	25	445.6	104A052	Skeena	February 8, 2017
566469	BRIDGE3	24	427.8	104A052	Skeena	February 8, 2017

(continued)

Table 1.5-2. Seabee/Tina Claim Block (continued)

Claim No.	Claim Name	Cells/ Units	Area (ha)	TRIM Map No.	Mining Division	Expiry Date
566470	BRIDGE4	24	428.0	104A052	Skeena	February 8, 2017
566471	BRIDGE5	25	445.7	104A052	Skeena	February 8, 2017
566472	BRIDGE6	25	445.6	104A052	Skeena	February 8, 2017
566473	BRIDGE7	24	427.9	104A052	Skeena	February 8, 2017
566474	BRIDGE8	24	427.8	104A052	Skeena	February 8, 2017
566475	BRIDGE9	24	427.6	104A052	Skeena	February 8, 2017
566476	BRIDGE10	25	445.5	104A052/053	Skeena	February 8, 2017
566477	BRIDGE11	17	302.9	104A052/053	Skeena	February 8, 2017
566478	BRIDGE12	24	427.4	104A061	Skeena	February 8, 2017
566479	BRIDGE13	25	445.2	104A061	Skeena	February 8, 2017
566481	BRIDGE14	25	445.1	104A061	Skeena	February 8, 2017
566482	BRIDGE15	25	444.8	104A061	Skeena	February 8, 2017
566484	BRIDGE16	25	444.6	104A061	Skeena	February 8, 2017
566485	BRIDGE17	24	426.7	104A061	Skeena	February 8, 2017
566487	BRIDGE18	25	444.7	104A061	Skeena	February 8, 2017
566488	BRIDGE19	25	444.8	104A061	Skeena	February 8, 2017
566489	BRIDGE20	25	445.0	104A061	Skeena	February 8, 2017
566490	BRIDGE21	24	427.3	104A061	Skeena	February 8, 2017
566491	BRIDGE22	25	445.2	104A061	Skeena	February 8, 2017
566492	BRIDGE23	24	427.3	104A061/104B070	Skeena	February 8, 2017
566493	BRIDGE24	24	427.9	104A052	Skeena	February 8, 2017
566494	BRIDGE25	24	427.9	104A052/053	Skeena	February 8, 2017
566495	BRIDGE26	25	444.9	104A061/104B070	Skeena	February 8, 2017
566496	BRIDGE27	22	391.3	104B070	Skeena	February 8, 2017
566497	BRIDGE28	25	444.5	104A061/104B070	Skeena	February 8, 2017
566567	BRIDGE29	24	427.5	104A052/062	Skeena	February 8, 2017
571582	SEABEE1	23	408.8	104A061	Skeena	February 8, 2017
571583	SEABEE2	21	373.1	104A061	Skeena	February 8, 2017
571584	SEABEE3	25	444.1	104A061,071	Skeena	February 8, 2017
571585	SEABEE4	24	426.1	104A071	Skeena	February 8, 2017
571586	SEABEE5	21	372.6	104A071	Skeena	February 8, 2017
571587	SEABEE6	9	159.6	104A071	Skeena	February 8, 2017
573813	SEABEE7	12	213.3	104A071	Skeena	February 8, 2017
575633	SEA1	25	445.2	104A051	Skeena	February 8, 2017
575635	SEA2	25	445.3	104A061	Skeena	February 8, 2017
575636	SEA3	25	445.4	104A061	Skeena	February 8, 2017
575638	SEA4	25	445.4	104A061	Skeena	February 8, 2017
575639	SEA5	25	445.3	104A061	Skeena	February 8, 2017

(continued)

Table 1.5-2. Seabee/Tina Claim Block (completed)

Claim No.	Claim Name	Cells/ Units	Area (ha)	TRIM Map No.	Mining Division	Expiry Date
575642	SEA6	25	445.1	104A051	Skeena	February 8, 2017
575643	SEA7	12	213.4	104A051	Skeena	February 8, 2017
575645	SEA8	24	427.1	104B070	Skeena	February 8, 2017
575646	SEA9	2	35.6	104B070	Skeena	February 8, 2017
603133	SEABEE8	24	426.6	104B070	Skeena	February 8, 2017
603134	SEABEE9	3	53.4	104B070	Skeena	February 28, 2018
401548	TINA1	25	500.0	104B070	Skeena	February 28, 2018
401549	TINA2	25	500.0	104B070	Skeena	February 28, 2018
401550	TINA3	25	500.0	104B070	Skeena	February 28, 2018
401551	TINA4	25	500.0	104B070	Skeena	February 28, 2018
401552	TINA5	25	500.0	104B070	Skeena	February 28, 2018
401553	TINA6	13	250.0	104B070	Skeena	February 28, 2018

Table 1.5-3. KSM Placer Tenure Blocks

Claim No.	Claim Name	Cells/ Units	Area (ha)	TRIM Map No.	Mining Division	Expiry Date
516323	PLACER CLAIM	6	107.2	104B049	Skeena	September 30, 2013
516325	PLACER CLAIM	7	125.0	104B049	Skeena	September 30, 2013
516328	PLACER CLAIM	4	71.5	104B049	Skeena	September 28, 2013
516330	PLACER CLAIM	6	107.2	104B049	Skeena	September 28, 2013
516332	PLACER CLAIM	6	107.2	104B049	Skeena	September 28, 2013
516333	PLACER CLAIM	5	89.3	104B049	Skeena	September 28, 2013
516375	PLACER CLAIM	7	125.0	104B049	Skeena	September 30, 2013
516676	PLACER CLAIM	1	17.9	104B059	Skeena	September 30, 2013
516677	PLACER CLAIM	1	17.9	104B059	Skeena	July 11, 2013
576658	KERR PL1	25	446.9	104B049	Skeena	February 20, 2014
576659	KERR PL2	25	446.6	104B049	Skeena	February 20, 2014
576660	KERR PL3	25	446.4	104B059	Skeena	February 20, 2014
576661	KERR PL4	25	446.2	104B059	Skeena	February 20, 2014
576662	KERR PL5	25	446.0	104B059	Skeena	February 20, 2014
576663	KERR PL6	25	446.0	104B059	Skeena	February 20, 2014
576664	KERR PL7	8	142.7	104B059	Skeena	February 20, 2014
576665	KERR PL8	18	321.4	104B059	Skeena	February 20, 2014
576666	KERR PL9	16	285.7	104B059	Skeena	February 20, 2014
576667	KERR PL10	20	357.4	104B049	Skeena	February 20, 2014
694483	KSM P1	20	357.4	104B049	Skeena	January 5, 2014
694543	KSM P2	23	410.5	104B059	Skeena	January 5, 2014
694683	KSM P3	24	427.9	104B059	Skeena	January 5, 2014

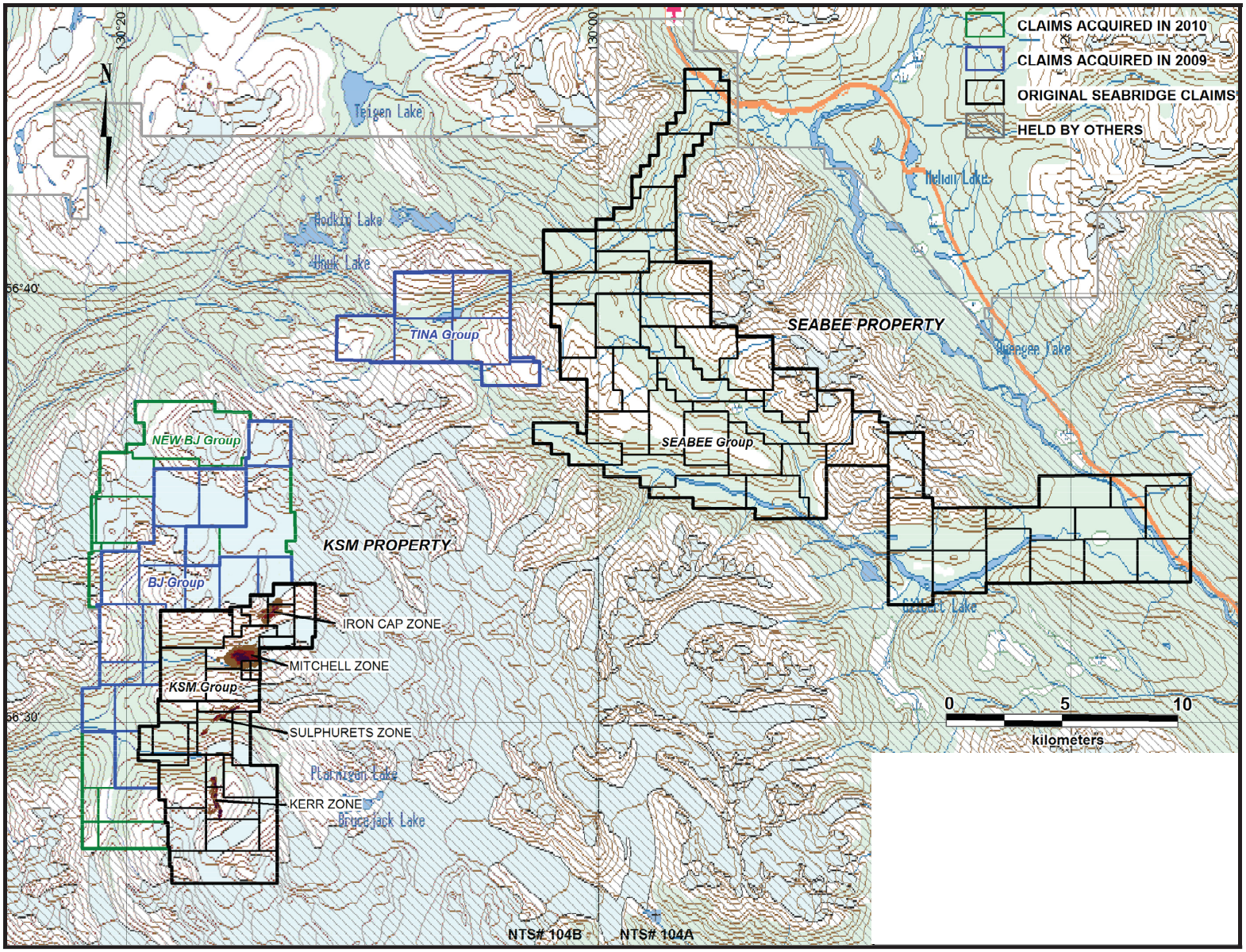

Figure 1.5-1

SEABRIDGE GOLD
KSM PROJECT

Mineral Claims in the Project Area

Figure 1.5-1

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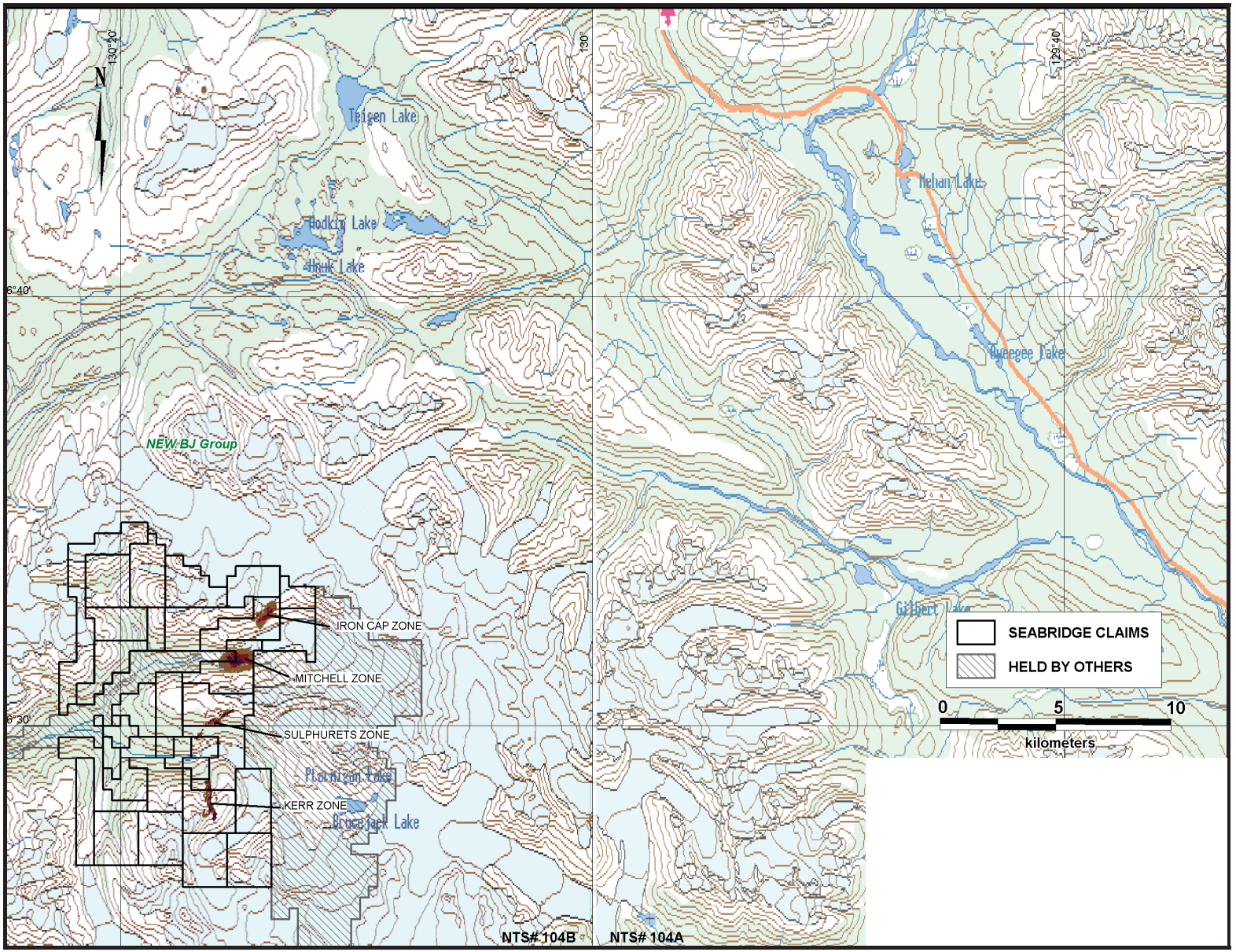

Figure 1.5-2

SEABRIDGE GOLD
KSM PROJECT

Placer Claims in the KSM Project Area

Figure 1.5-2

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Mineral tenures surrounding the Project are held by other tenure holders, including:

- Teuton Resources Corp. — claims abut the Proponent's tenures to the north in the Treaty Creek area, along parts of the proposed Project infrastructure;
- Kenrich-Eskay Mining — claims are held near the Sulphurets Creek–Unuk River confluence; and
- Lyncorp Mining Services Inc. — placer claims are held along Mitchell and Sulphurets creeks.

Silver Standard Resources Inc. carried out exploration work on the Snowfields property located immediately east of the Mitchell deposit and at the Brucejack deposit located east of the Kerr deposit. In 2010, Pretium purchased these two properties. The Brucejack deposit has since been consolidated into two recognized mineralized zones: Valley of the Kings and West Zone. Pretium has released a Preliminary Economic Assessment for the Brucejack Project and has started a feasibility study.

1.6 Project Setting

The KSM Project is located 65 km northwest of Stewart and 30 km northeast of the BC–Alaska border, at 56.52^{o} degrees north latitude and 130.25^{o} degrees west longitude (Figure 1.6-1). The KSM and Iron Cap deposits are located in the drainage basin of Sulphurets Creek, a tributary of the Unuk River, which is a transboundary river, draining into the Pacific Ocean through the Behm Canal in Burroughs Bay, Alaska.

Topography varies from an elevation of 240 masl to over 2,300 masl at the highest peak. A large portion of the terrain is situated at, or above, the treeline and in alpine areas. Glaciers and icefields dominate the terrain to the north, east, and south of the Project area. Glaciers in the area have been receding in the last several decades.

The Project is situated in the Regional District of Kitimat-Stikine and in Electoral Area A of the Regional District of Bulkley-Nechako (Figure 1.6-2). Local communities (Figure 1.6-3) include Telegraph Creek, Dease Lake, Iskut, Stewart, Hazelton, New Hazelton, South Hazelton, Nisga'a Nation communities (i.e., Gitlaxt'aamiks, Gitwinksihlkw, Laxgalts'ap, and Gingolx), Gitanyow, Smithers, Terrace, and Gitxsan Nation communities (Gitwangak, Gitsegukla, Gitanmaax, Glen Vowell, and Kispiox). The Project area is divided approximately in half between two land and resource management plans: the Cassiar Iskut-Stikine Land Resource Management Plan (BC ILMB 2000) and the Nass South Sustainable Resource Management Plan (BC MFLNRO 2102).

1.7 Environmental Assessment Planning Process

Through discussion and review of the proposed Project with all levels of government, Aboriginal peoples, stakeholders, and the public, major components of the KSM Project design have changed as a result of the EA process initiated in 2008. Key benefits that have accrued to the Project because of the EA process include further reduction of the potential for adverse effects, technological innovations related to water treatment, protection of Aboriginal interests and rights, increased socio-economic benefits, and advances in scientific knowledge. Key design changes to the Project are summarized below, followed by a description of the revised scope of the proposed Project.

Figure 1.6-1

Location of the Project

SEABRIDGE GOLD
KSM PROJECT

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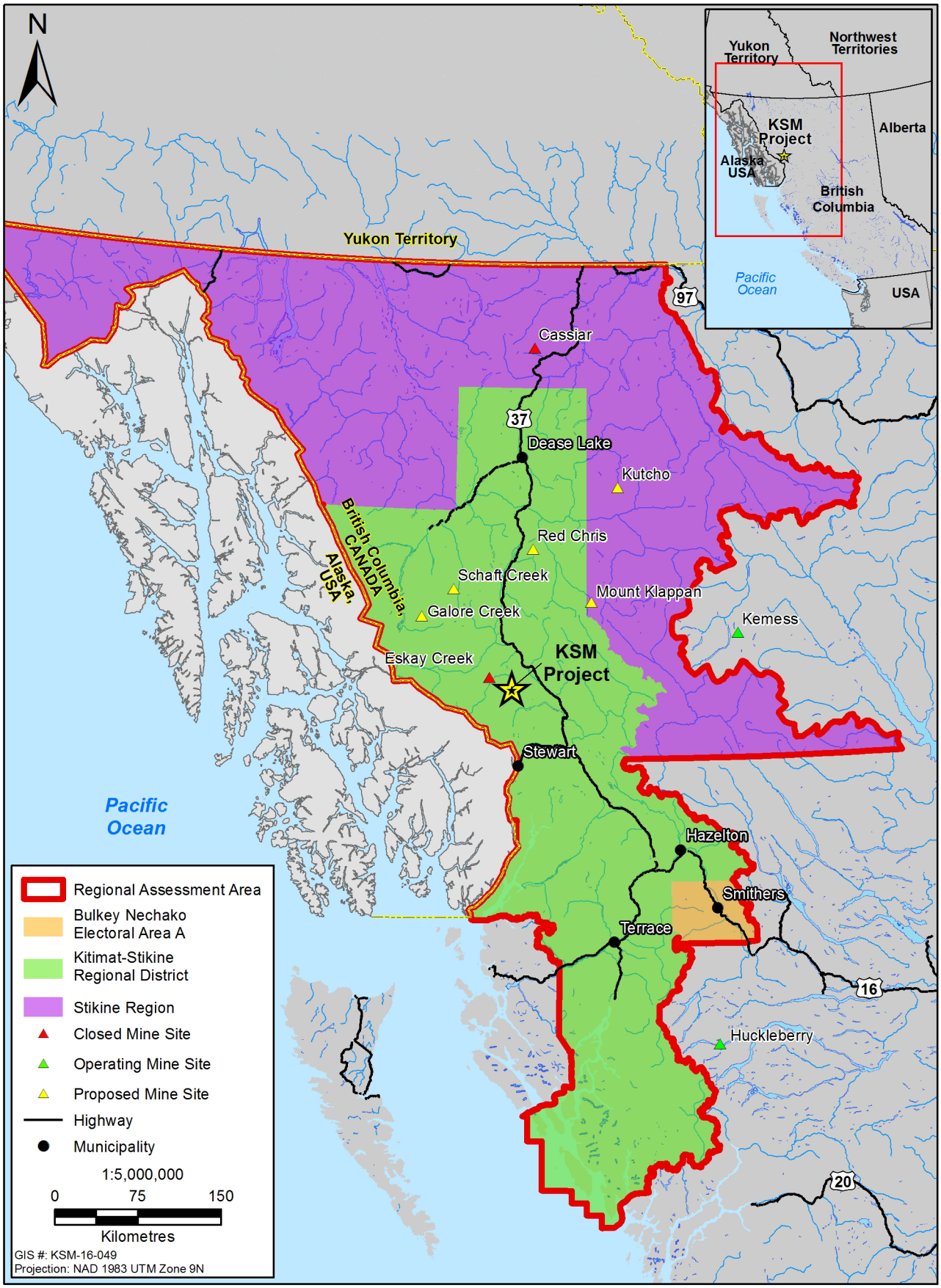

Figure 1.6-2

Regional Setting

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KSM PROJECT

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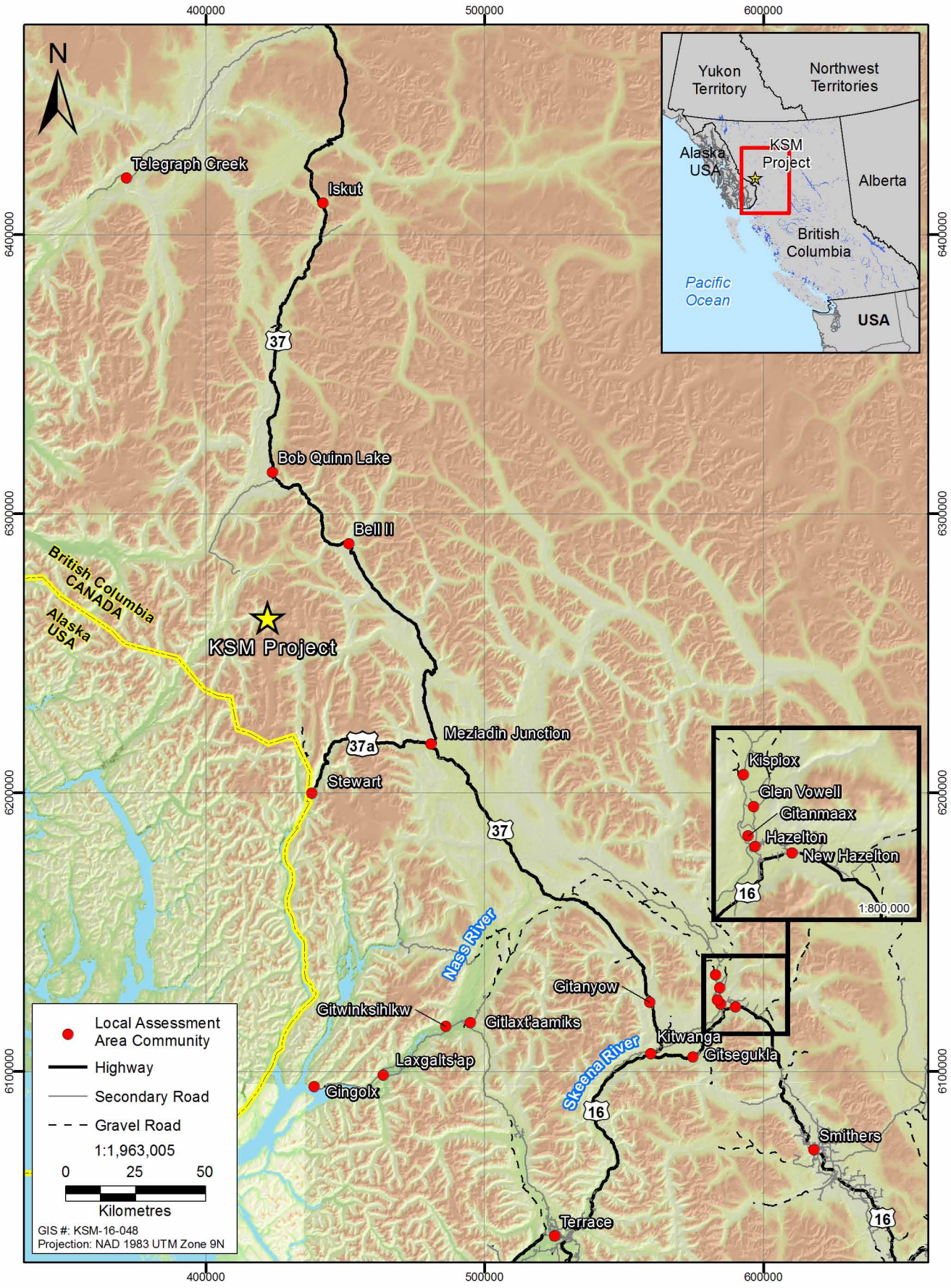

Figure 1.6-3

Local Community Setting

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1.7.1 Changes in Project Design

Table 1.7-1 provides an overview of the changes in Project design that have resulted throughout the EA planning process, from April 2008 to the current date.

1.7.2 Scope of the Proposed Project

The Project will be developed in two geographical areas: the Mine Site, and the Processing and Tailing Management Area (PTMA; Figures 1.7-1 to 1.7-3). At the Mine Site, the Kerr, Sulphurets, and part of the Mitchell deposit will be mined using open pit mining methods. The remainder of the Mitchell deposit and the Iron Cap deposit will be mined using block cave underground mining methods. Ore from the mine will be crushed and conveyed through the Mitchell-Treaty Twinned Tunnels (MTT)—two parallel, 23-km long tunnels—to the PTMA, for processing in the Treaty Ore Preparation Complex (OPC). Waste rock from open pit operation will be stored in rock storage facilities (RSFs) situated in the Mitchell Creek and McTagg Creek valleys and as backfill in the Sulphurets Pit. Underground mining will produce some waste rock, primarily during initial access development. Surface water that contacts disturbed areas in the Mine Site will be collected through a series of diversion tunnels and ditches and stored in the Water Storage Facility (WSF) for treatment at the Water Treatment Plant (WTP) prior to release to the receiving environment.

The PTMA is located near the upper tributaries of Teigen and Treaty creeks, in the Bell-Irving watershed; the Bell-Irving River discharges into the Nass River, approximately 70 km downstream of the confluence. Key components in the PTMA include the Treaty OPC (which consists of mill and crushing facilities), the Treaty Process Plant and carbon-in-leach (CIL) Plant, and the TMF. The Treaty Process Plant will process an average of 130,000 tonnes per day (tpd) of ore, to produce an average of 800 to 1,000 tpd of gold-copper concentrate. Ore concentrate will be trucked from the PTMA for a distance of 140 km on highways 37 and 37A to the Port of Stewart, BC. Tailing from the Treaty Process Plant will be pumped to the TMF for storage.

Both the Mine Site and the PTMA are currently accessed by helicopter. The Project will require two new access roads to transport equipment, materials, and supplies: the Coulter Creek access road (CCAR) will provide access to the Mine Site from the existing Eskay Creek Mine road, which connects to Highway 37 at Bob Quinn Lake; and the Treaty Creek access road (TCAR) will provide access to the PTMA from Highway 37, 19 km south of Bell II.

The Project requires approximately 177 megawatts (MW) of electricity (Tetra Tech-Wardrop 2012). Electrical power will be provided from the provincial electricity grid (171 MW) following completion of the construction of the 287-kV Northwest Transmission Line (NTL) from the Skeena Substation near Terrace to the Bob Quinn substation. Supply of electricity to the Project will require a switching station (constructed, owned, and operated by BC Hydro) on the NTL right-of-way near the junction of the proposed TCAR and Highway 37, and the construction of a 287-kV, 28.5-km spur line to the Treaty Process Plant. Additional hydroelectric power (approximately 5.5 MW) will be generated on site to augment the expected peak demand of 171 MW.

The development of the Project and related activities will occur over four phases:

- construction (5 years);
- operation (51.5 years);
- closure (3 years); and
- post-closure (250 years).

During construction, 12 temporary camps will be set up at both the Mine Site and PTMA construction and marshalling yard areas. Camp capacity will be sized to accommodate from 40 to 800 people. During the operation phase of the Project, the Treaty operating camp (sized to accommodate 250 people) will be established in the PTMA, and the Mitchell operating camp will accommodate an estimated 350 people at the Mine Site.

Reclamation will be an ongoing activity over the life of the mine where possible, with the greater portion occurring during the closure phase. Exceptions will be facilities (e.g., the WSF and WTP) that will operate until water quality is acceptable for discharge without treatment. Diversion structures, related hydroelectric plants, and support infrastructure such as the TCAR, MTT, transmission line, and camps will be maintained as long as required.

While a more detailed description of the Project is presented in Chapter 4, the primary components and activities associated with the construction, operation, closure, and post-closure phases of the Project as proposed by the Proponent include:

- open pit mine production from the Kerr, Sulphurets, and Mitchell deposits, and underground mine production from the Iron Cap and part of the Mitchell deposits, of an average of 130,000 tpd of ore, over a mine life of up to 51.5 years;
- underground and surface works (e.g., access ramps, ventilation tunnels, ore stockpiles, diversion ditches, haul roads, and surface access roads) within the Mine Site;
- a primary crushing facility at the Mitchell OPC to reduce the size of ore for conveying to the Treaty OPC;
- the storage of potentially acid generating (PAG) and not potentially acid generating (NPAG) waste rock in the Mitchell and McTagg RSFs, and as backfill in the Sulphurets Pit, including associated works (e.g., diversion and collection system);
- the 23-km long MTT (a pair of parallel tunnels, one for conveying ore to the PTMA and bringing power and fuel to the Mitchell Creek Valley, and the second for transportation purposes) between the Mine Site and the PTMA;
- processing of an average of 130,000 tpd of ore with two mill circuits (a floatation/grinding circuit, and a CIL gold recovery circuit) at the Treaty Process Plant located near south Teigen Creek;
- tailing slurry and return water pipelines between the Treaty Process Plant site and the TMF;
- a TMF comprising a North Cell, CIL Centre Cell, and South Cell, including containment dams, seepage collection dams, spillways, discharge pipelines, diversion channels, and other associated works, in south Teigen and north Treaty creeks;

Table 1.7-1. Key Changes to the Project Design Resulting from the Envrionmental Assessment Planning Process

Redesigned Project Component	EA Benefits Category	Description
1. Adopting a different access road corridor from Highway 37 to the Processing and Tailing Management Area	• Prevention or reduction of environmental effects • Protection of treaty and non-treaty interests	During the EA process, Nisga'a and First Nations identified concerns related to wildlife, fish and fish habitat, and wetlands. Seabridge committed to minimizing environmental effects by ensuring facilities were located in previously logged areas along Treaty Creek, and adopted a differnent access road corridor from Highway 37 to the PTMA, following the Treaty Creek Valley rather than the Teigen Creek Valley. Access options were examined in detail in the Assessment of Alternatives for the KSM Project TMF (February 2012). Results showed a net environmental benefit by moving the access road alignment from the Teigen Creek Valley to the Treaty Creek Valley. <u>Fish habitat</u> • Number of road crossings affecting fish-bearing streams: a) Teigen – **24** crossings b) Treaty – **13** crossings <u>Fish</u> • Number of fish species affected: a) Teigen – **8** species (Dolly Varden, rainbow trout/steelhead, coastal cutthroat trout, bull trout, Chinook salmon, sockeye salmon, coho salmon, and whitefish) b) Treaty – **1** species (Dolly Varden) <u>Wildlife habitat</u> • Area of affected mountain goat habitat: a) Teigen – **279** ha b) Treaty – **97** ha <u>Western toad habitat</u> • Number of potential breeding ponds affected: a) Teigen – more than **30** b) Treaty – **7** <u>Wetlands</u> • Area of wetland affected: a) Teigen – **42.6** ha b) Treaty – **22.6** ha <u>Heritage</u> • Effects to **11** archaeological sites have been avoided by changing the access road to Treaty Creek
2. Elimination of the Sulphurets Rock Storage Facility	• Prevention or reduction of environmental impacts • Reduction in Project costs • Protection of Aboriginal interests • Protection of public health and safety	The temporary Sulphurets laydown area was initially proposed as a short-term option to store 107 M t of NPAG material from the Sulphurets Pit. Between Years 21 and 30 of the operation phase, the material was scheduled to be re-handled and placed on the Mitchell RSF. Using the bottom-up construction method, material was to be placed in the Sulphurets laydown area in lifts, maintaining an overall slope angle of 26 degrees. During EA working group discussions in 2012, Seabridge was informed by the British Columbia Ministry of Energy, Mines and Natural Gas (BC MEMNG) that the Sulphurets laydown area would be assessed as a long-term, low-grade ore stockpile by BC MEMNG. Low-grade ore stockpiles without drainage containment are considered a high-liability risk to the Crown. As a result, reclamation bonding required by BC MEMNG to reduce the liability would be very high. The Project was redesigned to eliminate the temporary Sulphurets laydown area, and it has been removed from the Project production schedule. From Years -2 to 6, 167 M t of quarried NPAG rock from Sulphurets Pit will be used as construction material to build the haul road from Sulphurets Pit to the Mitchell Truck Shop, and to construct the Water Storage dam. Benefits of this redesign include: • cost-savings of CAN$198.1 million in reduced re-handling costs during Years 21 to 30; and • reduced metals loading to Sulphurets Creek, by removing a potential source of acid rock drainage (ARD) from the Sulphurets laydown area.
3. Choice of mining method - open pit - underground	• Prevention or reduction of environmental effects • Protection of treaty and non-treaty interests • Technological innovations	<u>Mitchell Deposit</u> The Mitchell deposit was initially proposed to be developed using solely open pit mining methods. Through the EA process, concerns were expressed regarding the height of the Mitchell Pit highwall and the amount of waste rock material that would be generated. The mine production schedule was amended to start underground block cave mining in the Mitchell deposit in Year 25.The following environmental improvements were achieved: • 30.5% reduction in height of Mitchell Pit highwall (decrease from 1,815 m to 1,260 m); and • 21% reduction in Mitchell waste rock volumes (decrease from 1,935 M t to 1,519 M t). <u>Iron Cap Deposit</u> The Iron Cap deposit was initially proposed to be developed using open pit mining methods. The design was modified to develop the Iron Cap deposit underground. Environmental improvements that resulted are: 99% reduction in waste rock (reduction of 638.9 M t).

(continued)

Table 1.7-1. Key Changes to the Project Design Resulting from the Environmental Assessment Planning Process (completed)

Redesigned Project Component	EA Benefits Category	Description
4. Cyanide disposal into the TMF	• Technological innovations • Prevention or reduction of environmental effects • Protection of treaty and non-treaty interests	The proposed mill throughput of 130,000 tpd and the process flowsheet including both flotation and precious metal recovery, incorporates a number of treatment mitigation measures into the operating management plan. The sulphide minerals in the flotation tailing will be separated to generate a not potentially acid generating (NPAG) tailing (90% of tailing material). The sulphide enriched tailing (10% of volume) will be further processed to extract precious metals. A carbon-in-leach (CIL) circuit will use cyanide to leach the gold and silver. Cyanide is used safely around the world for precious metal recovery. Leached gold and silver is absorbed on to carbon and then stripped on to iron filings prior to being liquified at high temperature and cooled as a gold and silver doré bar. A cyanide and copper recovery process (SART and AVR) has been included in the circuit to minimize the amount of cyanide used. Free and weak acid dissociable (WAD) cyanide concentrations will be reduced (target < 0.5 mg/L) prior to tailing discharge to the TMF. In order to comply with the International Cyanide Management Code, the tailing from the CIL circuit will be stored in an HDPE-lined facility strategically located between the North and South TMF. The sulphide-rich tailing will be discharged subaqueously in the lined pond in order to control acid generation. Surplus water from the CIL lined facility will be subjected, if required, to a further polishing treatment step (H_2O_2 process) to oxidize any residual cyanide and any potential thiosalts prior to discharge into the large flotation tailing pond. There will be no direct discharge from the CIL tailing pond to the receiving environment. Discharge from the flotation pond will be treated with a clarifier to control total suspended solids in order to comply with the federal MMER discharge criteria and the EMA permit for effluent discharge to the receiving environment. The discharge from the active flotation tailing pond will be staged with Treaty Creek flows from May 15 to October 15 of each year to minimize the physical and chemical effect on the receiving environment.
5. Backfill of Kerr waste rock into mined-out Sulphurets Pit	• Prevention or reduction of environmental effects • Technological innovations • Protection of Aboriginal interests • Increases in scientific knowledge	Metal leaching/acid rock drainage acid base accounting analyses and pit block modelling, combined with predictive surface water quality modelling, identified Kerr waste rock as higher in selenium (Se) than other deposits. The crushing of the Kerr waste rock (required to transport waste rock over the rope conveyor to the Sulphurets laydown area), was predicted to increase Se concentrations in the WSF. The EA working group recommended that Kerr waste rock be backfilled into the mined-out Sulphurets Pit to reduce Se loading to the WSF, which resulted in the following changes: • liners will be installed on the top and on the benches of the backfilled Sulphurets Pit to reduce infiltration of runoff; and • drainage from the Sulphurets Pit will be collected and directed to a Selenium Treatment Plant.
6. Selenium ion-exchange WTP	• Prevention or reduction of environmental effects • Technological innovations • Protection of Aboriginal interests • Increases in scientific knowledge	The Proponent is committed to meeting receiving environment water quality standards in BC and Alaska. Naturally elevated concentrations of Se are higher than guideline values in the Sulphurets watershed, and initial predictive water quality modelling results showed Se guidelines would be exceeded, particularly between Years 35 and 45. The EA working group identified potential effects on water quality as a significant concern. The Project was redesigned to include a Selenium Treatment Plant to minimize Se loadings to the receiving environment from the KSM Project.
7. Saddle portal	• Prevention or reduction of environmental impacts • Protection of treaty and non-treaty interests	The 23-km long MTT are planned with a Saddle portal at approximately the 16-km mark, where the MTT pass close to the surface. The preliminary design for the Saddle portal included a 120-m cut-and-cover approach with significant surface disturbance, a permanent stream diversion, and potential barriers and/or long-term impacts to wildlife at the site. The EA working group identified effects on wildlife as a key concern. The Saddle portal cut-and-cover design (1.1 ha surface disturbance) was revised to a completely underground facility with only the portal remaining at surface after construction. The MTT slope was altered slightly to maintain the tunnels completely underground at the Saddle portal, and the tunnel drive stations are planned as excavated caverns underground. The only surface expression after construction will be the seasonal access portal and vent raise.
8. Re-alignment of the TMF discharge location	• Prevention or reduction of environmental impacts • Protection of treaty and non-treaty interests	Based on input from Nisga'a and First Nations, the TMF discharge was initially designed to drain into south Teigen Creek to avoid fisheries values present in the Treaty Creek watershed. During the collection of fish and fish habitat data from 2008 to 2012, Teigen Creek was confirmed as having high salmonid values. In consultation with Nisga'a and First Nations, Seabridge revised the design of the TMF in several ways: • non-contact diversion ditches on both valley walls were redesigned to flow north into the Teigen Creek watershed to supplement altered flows as a result of the TMF footprint; • TMF discharge is now designed to flow south into Treaty Creek; and • a discharge schedule was developed to mimic the natural hydrograph of Treaty Creek, to avoid low-flow periods and to ensure that receiving environment water quality standards will be met.
9. Re-alignment of the transmission line within the existing the TCAR right-of-way	• Prevention or reduction of environmental impacts • Protection of treaty and non-treaty interests	The Project requires a 28.5-km transmission line (287 kV) to connect to the NTL with an associated 40-m right-of- way and an additional 15-m vegetation management zone on either side. Additional select hazard tree falling may be required along steep hillsides for protection of the transmission line. The EA working group suggested that the transmission line be co-located within the existing right-of-way for the TCAR to minimize environmental effects. The Project design was revised to address this concern.

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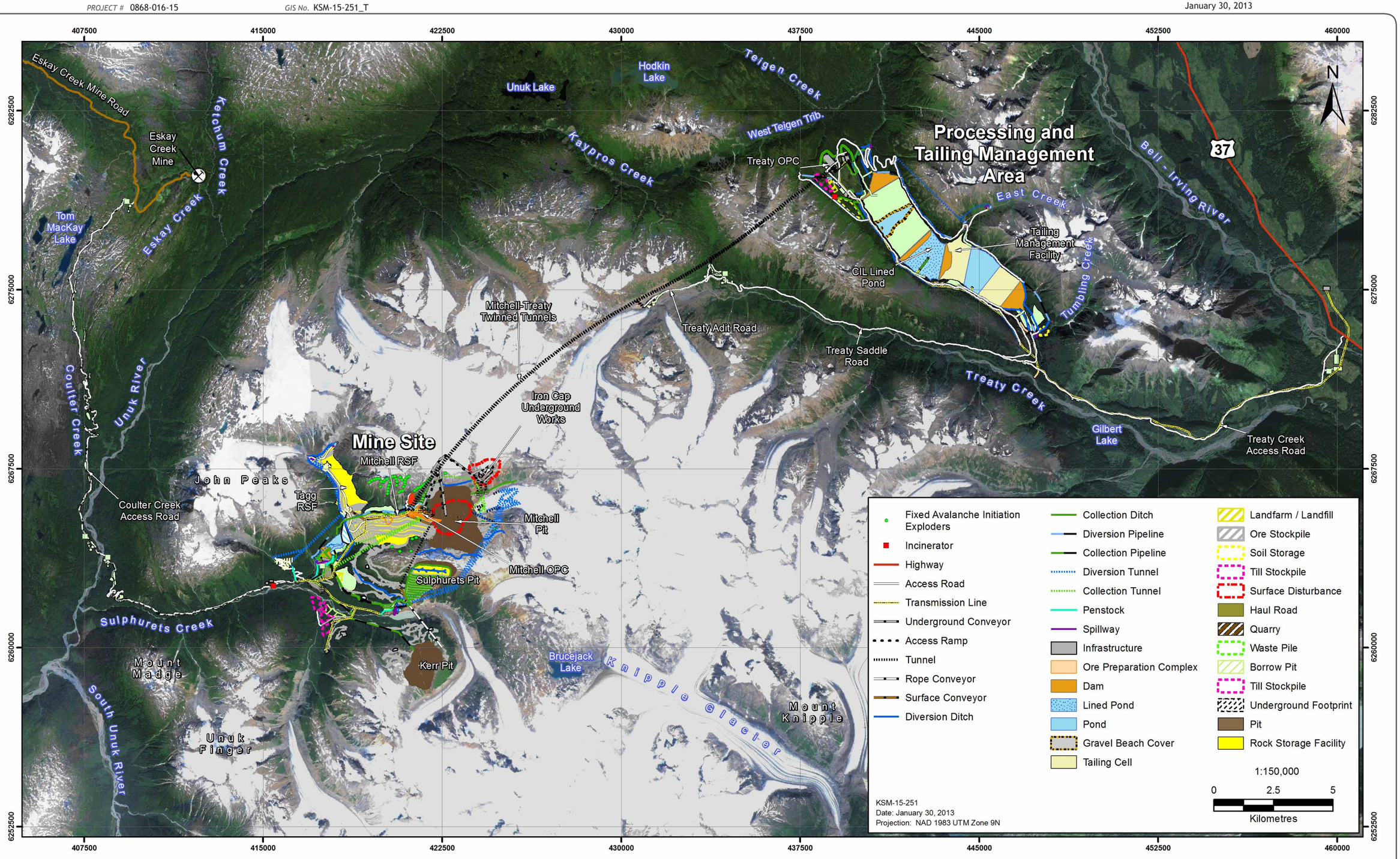
KSM Project Layout: End of Operation

Figure 1.7-1



SEABRIDGE GOLD
KSM PROJECT

Rescan
Engineers & Scientists

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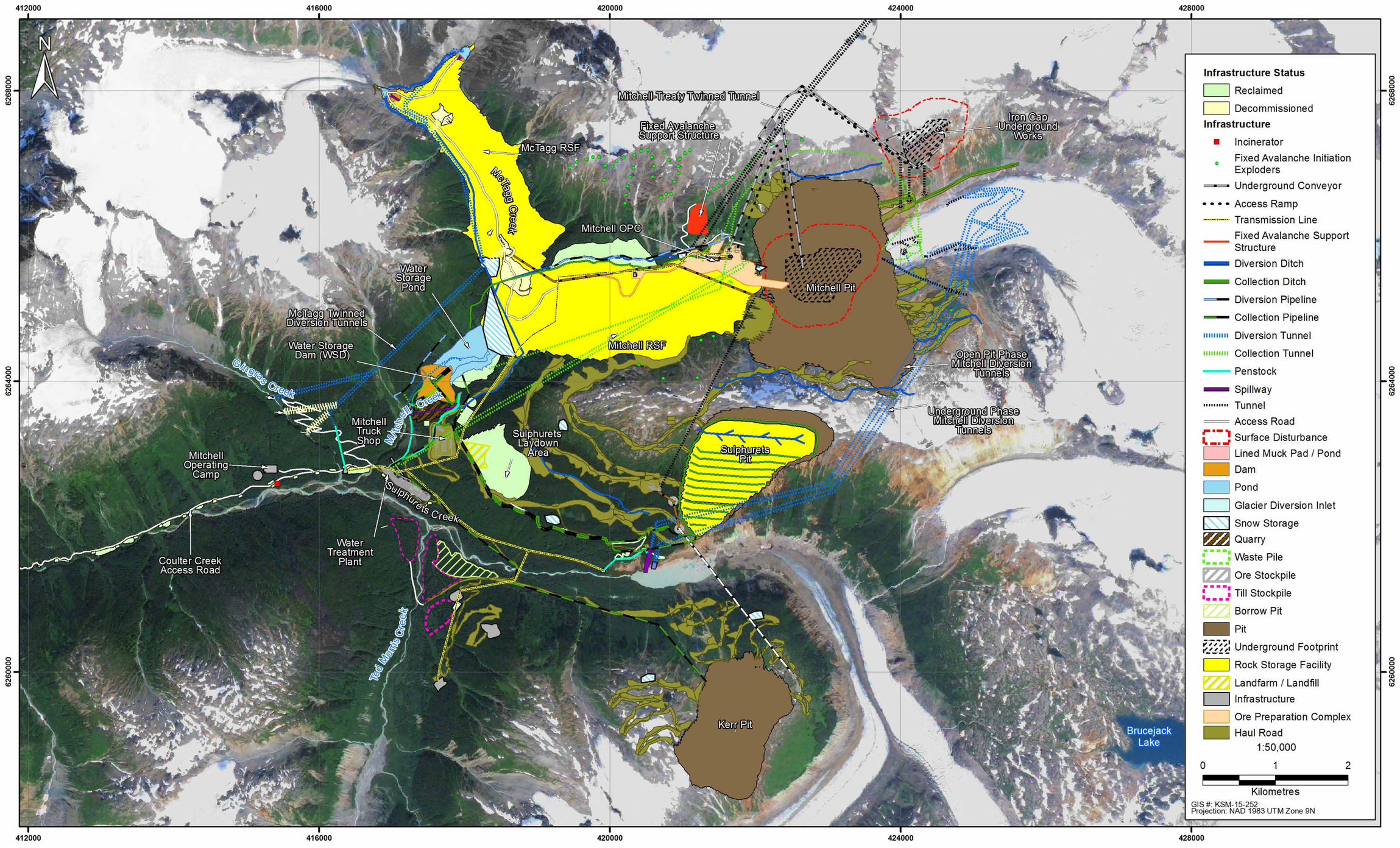

Figure 1.7-2

SEABRIDGE GOLD
KSM PROJECT

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Mine Site Plan: End of Operation

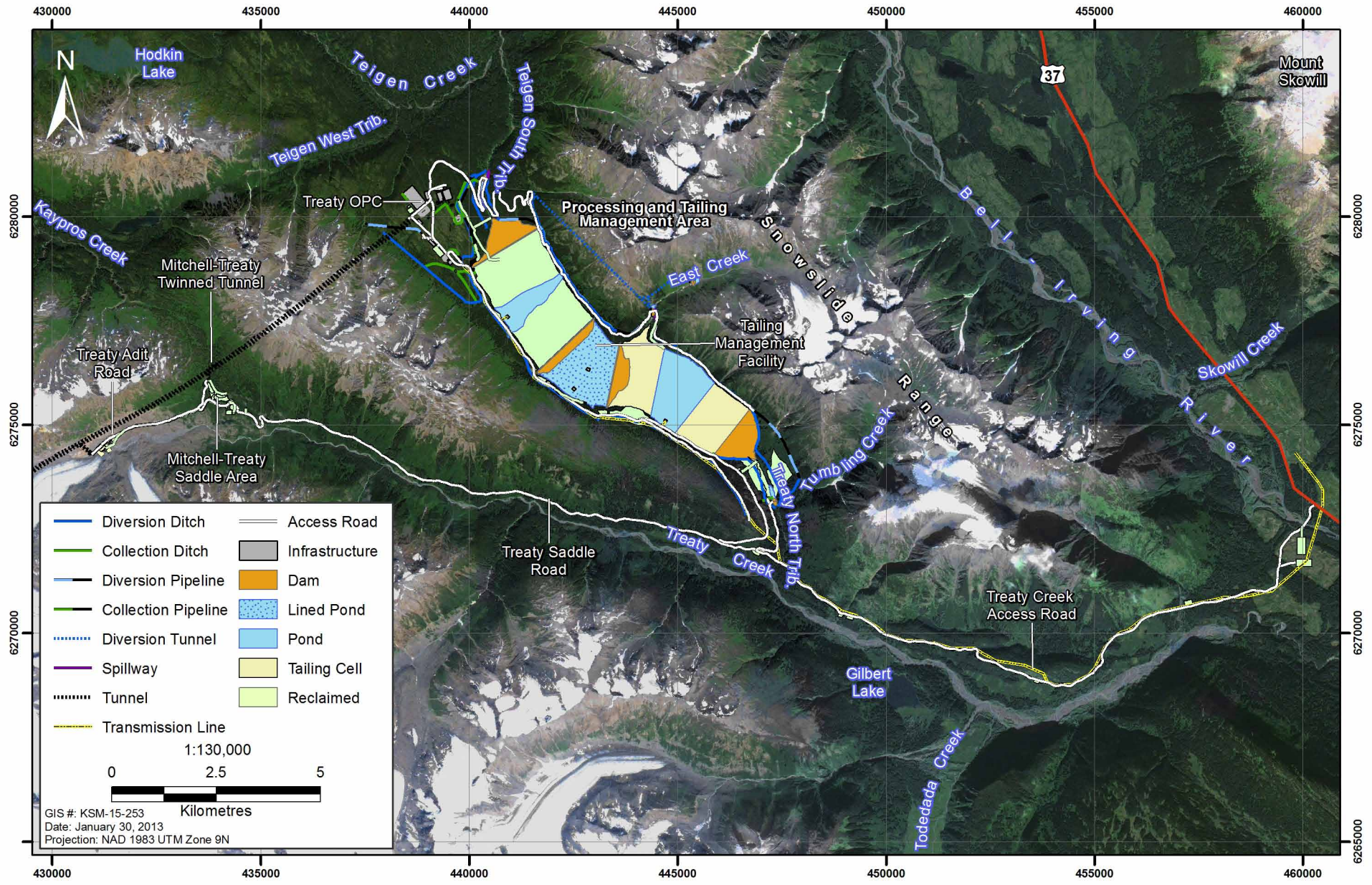

Figure 1.7-3

SEABRIDGE GOLD
KSM PROJECT

KSM Project Processing and Tailing Management Area: Location and Main Infrastructure

Figure 1.7-3

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- Mitchell Diversion Tunnels and Mitchell Pit north wall dewatering adits to divert Mitchell Glacier meltwater and Mitchell Creek away from the Mitchell Pit;
- McTagg Twinned Diversion Tunnels and associated works to conduct the flow of McTagg Creek away from the McTagg RSF;
- both surface and underground water diversion and sediment control structures, including tunnels;
- ore, gravel, and concentrate stockpiles as required at both the Mine Site and the PTMA;
- the Mitchell OPC, which includes facilities for rock crushing, ore storage, fuel storage, and an electrical substation;
- a WSF, containment dam, and reservoir located on Mitchell Creek, and a WTP situated near the confluence of Mitchell and Sulphurets creeks to collect contact water from the Mitchell and McTagg RSFs, and any other water collection, storage, and treatment facilities;
- quarries and borrow pits for construction materials;
- overburden and topsoil storage;
- explosives manufacturing plants and storage facilities;
- access roads, including:
  - from the Eskay Creek Mine road across the Unuk River Valley and along the Sulphurets Creek Valley to the Mine Site (i.e., the CCAR);
  - the TCAR from Highway 37, along Treaty Creek Valley to the PTMA;
  - from the PTMA to the tunnel portals in the vicinity of the pass between the Treaty Creek and Unuk River drainages; and
  - the Temporary Frank Mackie Glacier access route from the existing Granduc Mine road;
- construction camp facilities and associated works;
- operating camp facilities at both the Mine Site and PTMA including administration facilities, maintenance facilities, and fuel and other materials storage;
- domestic sewage treatment and disposal;
- the Upper Sulphurets and McTagg power plants and associated penstocks located in Sulphurets and Gingras creeks;
- a pipeline to transport diesel fuel through the MTT from the PTMA to the Mine Site, and diesel storage facilities at both the PTMA and Mine Site;
- a transmission line from Highway 37 along Treaty Creek Valley following the TCAR right-of-way to the PTMA, and then continuing via the ore transport tunnel to the Mine Site, with related substations, temporary and permanent access roads, stream crossings, and activities associated with constructing and maintaining these facilities;
- an ore concentrate storage facility and truck load-out at the PTMA and trucking along highways 37 and 37A to the deep sea port at Stewart, BC, for offshore shipment;

- transportation of ore processing reagents, lime, and other hazardous chemicals to the Process Plant site, and of explosives to the Mine Site, along the access roads and MTT;
- construction of any habitat compensation required for the proposed Project and associated access; and
- any ancillary works or activities associated with the proposed Project.

1.8 Comparison with Other Projects

With an average ore production capacity of 130,000 tpd, the size and scope of the KSM Project is on par with other operating mines, both in Canada and globally. Components of the Project—e.g., open pits, RSFs, processing plants, and tailing management facilities—are not unique to the KSM Project, and represent standardized methods necessary to develop and produce mineral products. Brief descriptions of other mines comparable to the size of KSM Project are provided below.

1.8.1 Mines in British Columbia

Highland Valley Copper, located near Logan Lake in central BC, is Canada's largest base metal mining operation. The nominal capacity of the mill is 133,000 tpd, but it has exceeded 160,000 tpd while mining in softer rock. In 2006, three pits provided 50.7 Mt of ore (138,800 tpd) to the plant, producing 179 t of copper and 6.3 million lb of molybdenum in concentrate. The 7 km-long tailing slurry pipeline flows by gravity from the mill to the upstream end of the 2-km by 10-km tailing impoundment area (TIA), near the H-H Dam, where the tailing disperses over the surface of the TIA; the TIA covers an area of approximately 11,000 ha. The L-L Dam (2.5 km long and 145 m in height) is one of the largest compacted, earthfill tailing dam structures in Canada. The core of the dam was constructed with till, and cycloned coarse tailing were used as construction material for the dam; the size and selected method of construction of the L-L Dam is similar to that proposed for the KSM Project.

The **Schaft Creek Project**, located approximately 60 km east of Dease Lake, BC, is currently in the provincial and federal EA processes. The proposed Schaft Creek Project includes an open pit with an estimated production rate of 150,000 tpd. Over the 15-year life of the mine, the Schaft Creek Project will generate approximately 812 Mt of tailing for disposal into a tailing storage facility, and 1.5 Bt of waste rock, which will be managed in multiple waste rock storage facilities.

In 2007, the **Galore Creek Project** received federal and provincial EA approvals to construct and operate five open pits with an ore production capacity of 65,000 tpd. The Galore Creek Project is expected to produce 6.2 billion lb of copper, 4 million oz of gold, and 65.8 million oz of silver, over a 20-year run-of-mine life. A 13.6 km tunnel was proposed to access the Galore Creek property, which is located in mountainous, glaciated geography.

Near Dease Lake, BC, Imperial Metals Corporation is constructing the **Red Chris Mine,** a 30,000 tpd open pit mine, to commence operations in 2014 for a 28-year run-of-mine life. The planned pit is approximately 1.8 km long and up to 1 km wide with two main zones: the Main Zone and the East Zone.

1.8.2 International Mines

The **Escondida Copper-Gold-Silver Mine** in Chile, located about 160 km from Antofagasta, is a joint venture between BHP-Billiton (57.5%), Rio Tinto (30%), a Japanese consortium (10%), and the International Finance Corporation (2.5%). The Escondida Mine started producing in 1990, and its capacity has increased by phased expansions to 230,000 tpd of ore throughput.

Los Pelambres, located approximately 200 km north of Santiago, Chile, is the world's fifth-largest producing copper mine. Antofagasta plc now owns 60% and manages the operation, which employs 521 people. The mine is a 2.5 km by 2.2 km open pit with an average mill throughput of 170,000 tpd. Los Pelambres is located in the upper regions of the Andes, in glaciated terrain. The TMF is located 40 km away from the open pit, and a 16 km tunnel connects the mining operations to the processing plant facilities, as ore is conveyed through the tunnel.

Andina, a Chilean copper mine owned by state giant Codelco, is located about 50 km northeast of Santiago. It consists of the Rio Blanco underground (block cave) mine and the Sur Sur open pit. Andina is undergoing a major expansion to increase mill capacity to 92,000 tpd, with an eventual plan to expand mill capacity to over 200,000 tpd by 2014.

Chuquicamata, or "Chuqui," is a copper mine in northern Chile, which was owned by the Chilean national company Codelco until it was taken over by Escondida. For many years, it was the world's largest annual copper producer with the world's largest copper mining excavations, yielding over 29 Mt of copper in total. Currently, Chuqui is a conventional truck and shovel operation with a production capacity of 182,000 tpd, and future plans to develop an underground block cave mine.

Batu Hijau is an open pit copper-gold mine operated by Newmont Mining Corporation's subsidiary company PT Newmont Nusa Tenggara (PT Newmont). The mine is located 1,530 km east of Jakarta, on an island in the Indonesian archipelago. The mine opened in 2000, and production averages 600,000 tpd of ore and waste combined.

The **Grasberg Mine** in Indonesia, operated by Freeport McMoran Copper and Gold Inc., is the largest gold mine and third largest copper mine in the world. In 2006, the mill rate was estimated at an average of 240,000 tpd.

In 2009, Newmont's **Boddington** operation poured its first gold and shipped its first batch of copper concentrate to a port in Bunbury, in western Australia. At full production, Boddington will be Australia's largest gold producer, with an estimated annual production of 1 million oz for the first five years.

Table 1.8-1 provides a comparison of engineered structures and technology proposed for the KSM Project to other mines using similar design and technology. The data demonstrate that KSM Project components are standard features of contemporary mines, and that the Project will be developed using technically proven engineering and treatment design concepts.

Table 1.8-1. Comparison of Key Design Features for the KSM Project to Other Mining Projects

Mine Component	KSM Project Design	Other Mine Projects
Production capacity (tpd)	• 130,000	• Highland Valley Copper – 133,000 • Schaft Creek – 150, 000 • Galore Creek – 65,000 • Red Chris – 30,000 • Escondida – 230,000 • Los Pelambres – 170,000 • Andina – 92,000 • Chuquicamata – 182,000 • Batu Hijau – 600,000 (combined waste and ore) • Grasberg – 240,000
Open pits	• Mitchell Pit – 1,260 m • Sulphurets Pit – 650 m	• Bingham Canyon Mine – 1,200 m • Chuquicamata – 850 m • Udachnaya Mine – 600 m • Mir Diamond Mine – 525 m
Selenium treatment plant	• ion exchange	• Elk Valley – biological reactor
TIA	• TMF – 5 km by 1 km	• Highland Valley Copper – 10 km by 2 km
Dams	<u>Tailing Dams</u> • North Dam – max. height 218 m, crest length 1,900 m • Splitter Dam – max. height 194 m, crest length 1,930 m • Saddle Dam – max. height 168 m, crest length 1,600 m • Southeast Dam – max. height 239 m, crest length 1,400 m <u>Water Storage Dam</u> • Water Storage Dam: max. height 165 m	• Highland Valley Copper, L-L Dam – max. height 145 m, length 2,500 m • Brenda Mines – max. height 137 m, crest length 1,600 m
Tunnels	• MTT – 23 km	• Granduc Mine – 17.9 km • Galore Creek Mine – 13.6 km • Los Pelambres – 16 km
RSFs	• Mitchell and McTagg RSFs – 440 m	• Toquepala Mine – 400 m • Grasberg mine – 400 m

(continued)

Table 1.8-1. Comparison of Key Design Features for the KSM Project to Other Mining Projects (completed)

Mine Component	KSM Project Design	Other Mine Projects
Cyanide recovery process	• SART • AVR • SO_2/Air Cyanide Destruction	SART • Telfer Gold Mine • Maricunga Mine AVR • Golden Cross Mine • Delamar Silver Mine SO_2/Air Cyanide Destruction • Equity Silver Mine • Henty Gold Mine • Ovacik Gold Mine
Water treatment	• HDS for the WTP	• Britannia Mine - HDS • Equity Silver Mine – HDS
Cyanide leach ponds	• CIL liner for the TMF	• Golden Sunlight Mine – CIL liner

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