21 Heritage

This chapter describes the heritage setting for the KSM Project (the Project) and assesses the potential effects of the Project on heritage resources in the regional study area (RSA) and the local study area (LSA; Figure 21-1).

21.1 Heritage Setting

Heritage resources are valued components (VCs) protected by the British Columbia (BC) *Heritage Conservation Act* (HCA; 1996). In BC, archaeological sites (both recorded and unrecorded) and designated heritage sites are identified as VCs through the protection that may be afforded to them under the HCA (1996) and *Local Government Act* (1996). Alteration to protected heritage sites requires a site alteration permit issued under Section 12 of the HCA (1996).

21.1.1 Legislative Framework

Heritage sites are non-renewable resources, very susceptible to disturbance, and are finite in number. They are an important resource that is protected for their historical, cultural, scientific, and educational value to the general public, local communities, and First Nations. Heritage is one of the effects considered under the BC *Environmental Act* (2002). With respect to Aboriginal peoples, Section 5 of the *Canadian Environmental Assessment Act* (1992) considers the indirect effect of any change that the Project may cause in the environment on any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance. The heritage baseline studies were conducted in accordance with the *British Columbia Archaeological Impact Assessment Guidelines* (1998). In BC, archaeological sites (both recorded and unrecorded) and designated heritage sites are identified as VCs through the protection that may be afforded to them under the HCA (1996) and *Local Government Act* (1996). Alteration to protected heritage sites requires a site alteration permit issued under Section 12 of the HCA (1996).

21.2 Approach

The Archaeology Branch of the British Columbia Ministry of Forests, Lands and Natural Resource Operations (Archaeology Branch) forwarded copies of the HCA permit applications and any related permit amendments for archaeology work associated with the Project to the Gitxsan Treaty Office, Nisga'a Lisims Government, Tahltan Central Council, wilp Skii km Lax Ha, wilp Spookw/ Guuhadakw/Yagosip, and wilp GwininNitzw of the Gitxsan for their review and comments. The original permit application was referred on March 14, 2008 and Heritage Inspection Permit 2008-0128 was issued on April 17, 2008. An amendment to the permit was referred to Aboriginal groups and Nisga'a Lisims Government on August 8, 2011 and issued on October 4. The amendment reflected a change to the RSA boundaries to incorporate changes to the Project footprint. In April 2012, Heritage Inspection Permit 2008-0128 was closed and a new permit was applied for to assess Project revisions. The Archaeology Branch forwarded copies of the new HCA permit application (for HCA Heritage Inspection Permit 2012-0192) to the groups listed above for their review and comments on May 15, 2012, and on June 19, 2012 HCA Heritage Inspection Permit 2012-0192 was issued. A copy of the final permit reports have been sent to the groups listed above. Aboriginal groups were invited to participate in fieldwork.

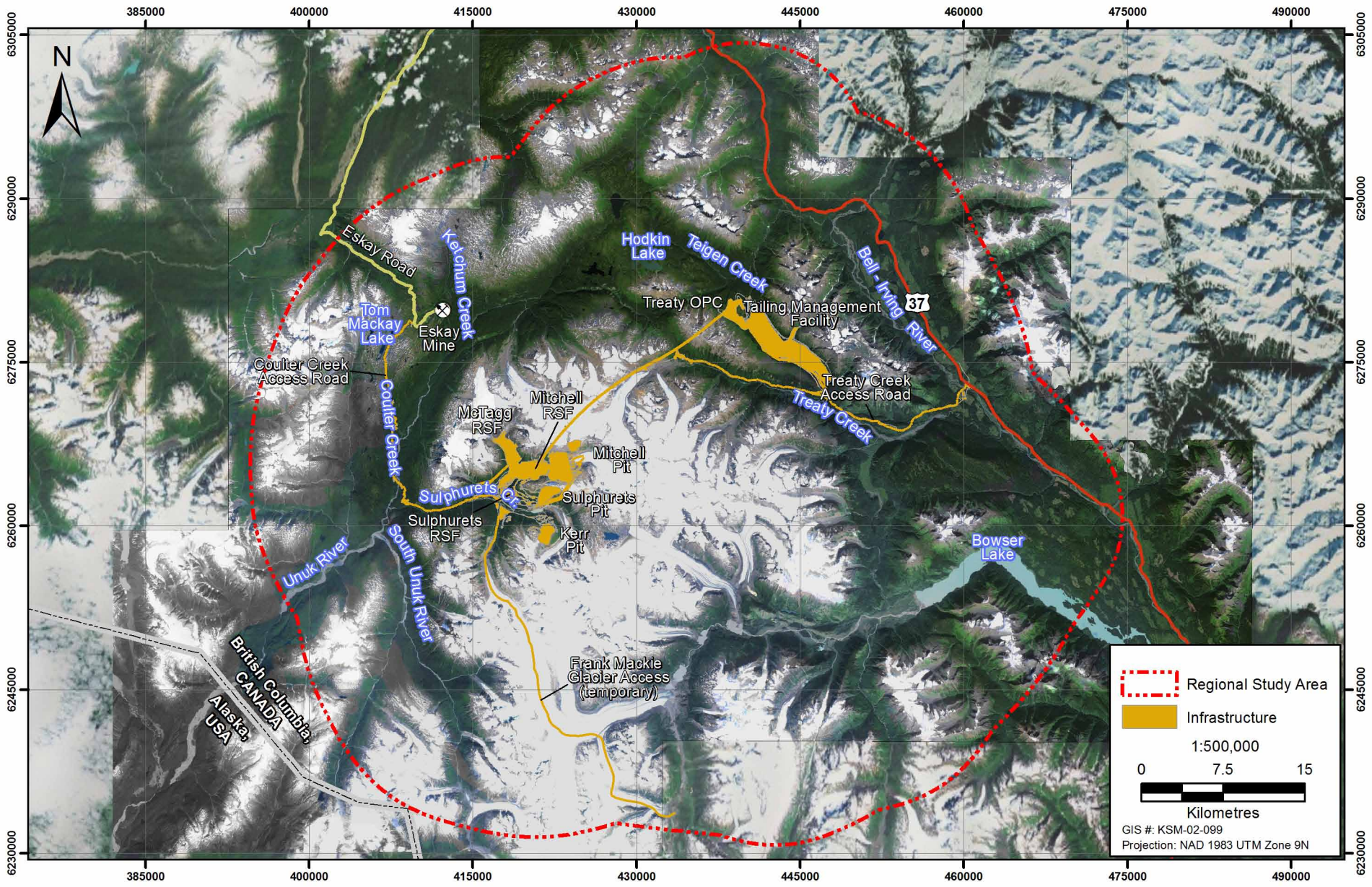

Figure 21-1

SEABRIDGE GOLD
KSM PROJECT

KSM Regional Study Area

Figure 21-1

Rescan
Engineers & Scientists

The baseline heritage setting within the RSA was established through Archaeological Impact Assessments (AIAs) conducted under HCA Heritage Inspection permits 2008-0128 and 2012-0192 issued by the Archaeology Branch. The scope and methodology of the *KSM Project: Archaeological Impact Assessment, Final Report – Heritage Inspection Permit 2008-0128* and *KSM Project: Archaeological Impact Assessment, Final Report – Heritage Inspection Permit 2012-0192* (Appendices 21-A and 21-B) are consistent with the Project Application Information Requirements (AIR; January 2011) and federal Comprehensive Study Scope of Assessment (CEAA, 2010). These are the final permit reports; however, due to the sensitive nature of archaeological site location information, no maps showing the location or potential location of archaeological sites are included in the appendix. Separate AIA permit reports, including the locational information, have been submitted to the Archaeology Branch. [1]

During background research, ethnographic, historic, and archaeological studies, reports, and records for the RSA and the surrounding region were reviewed. Data generated from the British Columbia Archaeological Site Inventory, the Regional District of Kitimat-Stikine Community Heritage Registry, and publicly available traditional land use and knowledge studies, including those undertaken for the Project, were reviewed. Existing archaeological and heritage data, including maps, literature, and Appendices F and L of the *Nisga'a Final Agreement* (NLG, Province of BC, and Government of Canada 1998), were reviewed as part of the archaeology and heritage baseline study.

The Tahltan Archaeological Standards (2011) were also taken into account when conducting the archaeological assessments for the Project. The Tahltan have identified a number of archaeological issues that are considered priorities for archaeological studies conducted in their traditional territory. These issues include (1) ice patch and glacier sites; (2) cave and rock shelter sites; (3) cairns; (4) trails; (5) ancient continental movement of obsidian from Ah zeeth-zaa (Mount Edziza); (6) cultural history, including radiocarbon dating, obsidian hydration, tephra layers; and (7) regional archaeology (Asp 2006; THREAT 2011).

21.2.1 Paleoenvironment

The current ecological environment began to take shape following the Wisconsinan Glaciation of the Late Pleistocene epoch. During the glacial maximum the Cordilleran ice sheet was up to 2 km thick with only small, ice-free islands (nunataks) protruding (Fladmark 2001). As the climate warmed in the early Holocene epoch, deglaciation resulted in a re-deposition of the materials collected by the glaciers as they scoured the landscape. The resulting moraines and outwashes are still evident within the RSA. By 9,500 BP the ice sheets were roughly at their present sizes, and pioneer plant species well-adapted to a cool, dry environment (e.g., lodgepole pine, shrubs, and willow) initially thrived (Clague 1989). This initial advance of vegetation was reinforced between 8,200 and 3,500 BP with the diversity of flora increasing, as Sitka spruce, mountain and western hemlock, and alder became established in new areas (Heusser 1960). The Hypsithermal Interval, 7,000 and 5,000 BP, which saw temperatures rise to approximately 2 to 3ºC warmer than the current climate, led to a further retreat of the glaciers and allowed

[1] Archaeological site location data are available on request from the Archaeology Branch in Victoria, BC.

subalpine parklands to expand to previously treeless higher elevations. Following the Hypsithermal Interval, the Neoglacial Period experienced fluctuating temperatures and an overall cooling trend. This cooling trend culminated with the Little Ice Age (1250 to 1850 AD), which resulted in a major advance of glaciers (Fladmark 2001). There has been a warming trend over the past 150 years which has resulted in glaciers in the region of the Project retreating.

21.2.2 Biogeoclimatic Zones

The RSA falls primarily within three biogeoclimatic zones: Coastal Western Hemlock, Mountain Hemlock, and Engelmann Spruce – Subalpine Fir. A brief summary of the biogeoclimatic zones are presented below. For specific information on the flora and fauna in the RSA, please refer to Chapters 17 and 18, and to the *2009 Vegetation and Ecosystems Mapping Baseline Report* (Appendix 17-A) and *2009 Wildlife Characterization Baseline Report* (Appendix 18-A), prepared for the Project.

Lower elevations of the Mine Site area along the Unuk River, Sulphurets Creek, and the adjacent valley-bottoms fall within the Coastal Western Hemlock (CWH) zone. The CWH zone is characterized by a dense canopy of western hemlock, with black cottonwood present in poorly drained areas and floodplains. This canopy keeps the forest floor relatively clear of snow most of the year. Wildlife in this zone is diverse and may include black-tailed deer, black bears, grizzly bears, mountain goats, and grey wolves, as well as a large variety of birds such as owls, Steller's jays, woodpeckers, grouse, and common ravens. Both fresh and anadromous fish species are present in the region, including chinook and sockeye salmon, rainbow and bull trout, and Dolly Varden (Meidinger and Pojar 1991).

The Mountain Hemlock (MH) zone is found in the Mine Site area of the Project southwest of Tom Mackay Lake and along the Unuk River and Sulphurets Creek Valley walls. Mountain hemlock, amablis fir, and yellow cedar are the dominant tree species, with some subalpine fir. With increasing elevation, the forest cover decreases, and subalpine parkland with patchy distribution of trees becomes common. Wildlife is less diverse than in other zones due to its typically steep rugged landforms and glaciers. Large mammals are generally restricted to south facing outcrops or subalpine parklands, and may include grizzly bear and mountain goat. Birds in the MH zone include golden eagles, ptarmigans, owls, woodpeckers, and various other smaller species (Meidinger and Pojar 1991).

The Engelmann Spruce – Subalpine Fir (ESSF) zone is found in the Mine Site area on the slopes of the Unuk River Valley upstream of Eskay Creek and in the Processing and Tailing Management Area (PTMA) along the valleys of the upper Nass watershed (e.g., Treaty and Teigen creeks). This zone covers a similar elevation range as the MH zone, but because it is located further inland, the climate is drier and more continental. The ESSF zone is characterized by long cold winters with a short growing season. Engelmann spruce and subalpine fir are the dominant tree species. Black bear, grizzly bear, and moose are common in this zone, especially in subalpine parkland areas, and some fur-bearing species such as marten, fisher, wolverine, and red squirrel are also found here. Additionally, mountain goats and golden eagles are common to the ESSF but are typically found along south-facing terrain (Meidinger and Pojar 1991).

21.2.3 Ethnographic Background

The information presented below is provided as a brief overview and is not intended to address issues of traditional Aboriginal use and does not constitute a traditional use study.

The Archaeology Branch identified the following First Nations with an interest in the AIA study area: Tahltan Nation, Gitxsan Nation, and the Skii km Lax Ha. The Project also falls within the Nass Area as defined by the *Nisga'a Final Agreement Act* (1998; see Appendix F). For more information on current land use, refer to Chapter 23 Land Use.

21.2.3.1 Gitxsan

The Gitxsan, centred on the Skeena River, practiced a subsistence pattern focused on intense salmon harvesting during the summer months. Being located in a transitional area between coast and interior, Gitxsan subsistence strategies differed from coastal groups, with an increased reliance on hunting and trapping of inland game (e.g., moose, mountain goat, marmot, grizzly bear, black bear, and beaver) and the intensive gathering of plant resources (Halpin and Seguin 1990).

Gitxsan oral history describes their origins at a village called *Temlaxam*, reportedly located near the confluence of the Skeena and Bulkley rivers. The Gitxsan abandoned *Temlaxam* and dispersed after a series of environmental catastrophes befell the village. Early historical accounts and oral histories describe that the Gitxsan organized into seven tribes, each having a different winter village, most located along the banks of the upper Skeena River. These villages were *Gitwangak* (*Kitwanga*), *Gitanyow* (*Kitwancool*),[2] *Kitsegyukla* (*Gitksigyukla*), *Gitanmaax* (Hazleton), *Kispiox*, *Kuldo*, and *Kisgaga'as* (Halpin and Seguin 1990).

Additional information can be found in the following sources: Adams (1973), Barbeau (1929, 1950a, 1950b), Benyon (2000), Berthiaume (1999), Daly (2005), Drucker (1965), Duff (1964), Garfield (1931, 1939), Gitxsan Chiefs Office (2012), Halpin (1973), Halpin and Seguin (1990), Inglis et al. (1990), MacDonald and Cove (1987), Miller (1997), Miller and Eastman (1984), People of 'Ksan (1980), Seguin (1984, 1985), Shortridge (1919), and Sterritt et al. (1998).

21.2.3.2 Ski km Lax Ha

The *Xskiigmlaxha* (Skii km Lax Ha) are described in many historic and ethnographic accounts as a northern house of the Gitxsan (Sterritt et al. 1998). These accounts indicate that wilp Skii km Lax Ha belongs to the *Lax Ganeda* (Frog Clan), whose descendants trace their lineage to the village of *Ts'imanluuskeexs* near Bowser Lake and later the village of Kuldo (Sterritt et al. 1998). However, the Skii km Lax Ha claim a Tset'saut ancestry (described below), and consider themselves as a vestige of the Tset'saut Raven clan (Rescan 2009). See Section 21.2.3.5 below for further information on the Tset'saut peoples.

21.2.3.3 Nisga'a

Nisga'a traditionally inhabited the Nass River watershed (Marsden, Seguin Anderson, and Nyce 2002). The annual eulachon fishery on the Nass River allowed Nisga'a to produce eulachon oil, a

[2] The Gitanyow First Nation and Gitxsan Nation are politically distinct groups.

highly valued trade item, which in historic times was moved inland along "grease trails" and exchanged with interior peoples. In addition to the eulachon fishery Nisga'a seasonal round included salmon harvesting, hunting and trapping large and small game animals, and the gathering of plant resources (Halpin and Seguin 1990).

In historical times, Nisga'a villages consisted of rows of small longhouses situated along the Nass River. Today, there are four main Nisga'a villages: *Gingolx* (Kincolith), *Laxgaltsap* (Greenville), *Gitwinksihlkw* (Canyon City), and *Gitlaxt'aamiks* (New Aiyansh; Marsden, Seguin Anderson, and Nyce 2002).

Additional information can be found in the following sources: Barbeau (1950a, 1950b), Drucker (1965), Duff (1964), Garfield (1931, 1939), Halpin (1973), Halpin and Seguin (1990), Inglis et al. (1990), MacDonald and Cove (1987), McNeary (1976), Miller (1997), Miller and Eastman (1984), Sapir (1915, 1920), Seguin (1984, 1985), and Sterritt et al. (1998).

21.2.3.4 Tahltan

In the early historical period the Tahltan, an Athapaskan speaking people, were organized as seasonally mobile bands with a seasonal round adapted to the abundant and predictable food resources the Stikine River afforded them; in particular, five species of salmon. The traditional territory of the Tahltan encompasses the upper Stikine River watershed, including the Spatsizi Plateau, the Dease Lake basin, and portions of the Tuya, Tahltan, Klappan, and Iskut watersheds (MacLachlan 1981). Many Tahltan lived along the banks of the Stikine River during the summer months, harvesting and drying the fish. Salmon cannot proceed past the Stikine Canyon upstream from Telegraph Creek, and as a result, the Stikine-Tahltan River confluence was a focal point of the Tahltan seasonal round. Following a September trading visit by the Tlingit, Tahltan families would disperse to the highlands to hunt and trap a variety of game and to gather plant resources. Winters were spent at established winter camps, usually situated within sheltered valleys (Albright 1982, 1984).

Additional information can be found in the following sources: Dawson (1887), Emmons (1911), Freisen (1985), Hodge (1912), Jenness (1927), McIlwraith (2007), Morice (1893), Teit (1906, 1912, 1956), Thompson (2007), Thorman (n.d.), and White (1913).

21.2.3.5 Tset'saut

During the early historic period, an Aboriginal group known as the Tset'saut occupied portions of the RSA. The Tset'saut were an Athapaskan-speaking people who once occupied the area "in and around the headwaters of the Nass, Skeena, and Stikine Rivers, at Meziadin Lake, and on the Unuk River, Observatory Inlet, Portland Canal, and Behm Canal" (Sterritt et al. 1998). Alternatively, Duff (1981), describes the Tset'saut as occupying the land east of Behm Canal, the upper half of Portland Canal, and most of the Unuk River watershed, but not the Bowser and Meziadin lakes area.

The Tset'saut practiced a highly mobile subsistence strategy focused on inland game, primarily marmot (Duff 1981). Travel was on foot or snowshoe, with men often travelling alone away from the main camps to hunt and trap. The Tset'saut were reportedly attacked and exploited by their neighbours in early historic times. The demise of the Tset'saut during the 1800s also

roughly coincides with the most recent eruption of the Lava Forks volcano on the Unuk River. Due to the rapid population loss during the nineteenth century, comparatively little ethnographic information was recorded about the Tset'saut. Ethnographic information on the Tset'saut can be found summarized in the following sources: Boas (1895, 1896, and 1897), Dangeli (1999), Duff (1959, 1981), Emmons (1911), Sterritt et al. (1998), and Rescan (2009).

21.2.4 Historic Background and Built Heritage

21.2.4.1 Early European Contact

Initial European exploration of British Columbia was conducted by Russian, Spanish, and English maritime expeditions along the west coast during the 1700s (Hayes 1999; Bown 2008). In 1799 the Russians established Novo Archangelesk near the present-day town of Sitka, Alaska. This trading post served first as the headquarters of the Russian-American Company and later as the capital of Russian America. In 1833, Fort Dionysius was established near the mouth of the Stikine River and became a major fur trading centre. In 1834, the Hudson's Bay Company (HBC) established a trading post, Port Simpson (Lax Kw'alaams), north of Prince Rupert. Nearby Aboriginal people congregated around the fort, and the population soon numbered in the thousands (Large 1957). With Russian influence on the fur trade waning in 1840, the operation of Fort Dionysius was taken over by the HBC and renamed Fort Stikine. It was renamed Fort Wrangell following the American purchase of Alaska from Russia in 1867. In 1914, the HBC post at Port Simpson burned to the ground, and, as the heyday of the fur trade had passed, the fort was not rebuilt (Meilleur 1980).

21.2.4.2 History of Mineral Exploration in the Regional Study Area

In northwestern British Columbia, a series of gold rushes began in the mid-nineteenth 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 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 1935 *Minister of Mines Annual Report* 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 1936).

In response to the Klondike Gold Rush of 1897, a telegraph line from Ashcroft, British Columbia, 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 British Columbia-Alaska border, and 35 miles of trail cut and 30 tonnes of ore prepared for shipment (BC 1902, 1904, 1936). Additional work in

the Unuk and Sulphurets 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 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 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 be low grade ore, the claims were subsequently abandoned (BC 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 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 river boats to travel up the navigable portion of 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 1936).

In 1932, the Mackay Syndicate, based out of the Premier Mine to the south of the RSA, successfully landed a plane on Tom Mackay Lake, near their mineral claims in the region (BC 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 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 1941, 1942).

21.2.5 Previous Archaeological Studies

Previous investigations in the RSA prior to the AIAs conducted for the Project included an assessment of a proposed road alignment to the Sulphurets property being developed by Newhawk Gold Mines Limited (Bussey 1987a, 1987b), an assessment of the then-proposed Eskay Creek Mine (Rousseau 1990), an assessment of the road alignment to the proposed Iskut River Valley Mine Road (Brolly 1990), an assessment of Kalum and North Coast District Forestry blocks (Marshall, Marr, and Palmer 2008), and post-Impact Assessment for BP Canada of the Amoco Dome Ritchie Wellsite reclamation development (Hrychuk, Zoffman, and Butte 2008). Concurrent with the KSM Project a study was conducted for Pretium Resources' Snowfield Project (Walker and McKnight 2011).

Studies conducted in the broader region were considered in order to place the heritage sites in the RSA in context. Studies consulted include Albright (1980, 1982, 1983, 1984); Apland (1980); Balcom (1986); Bussey (1985); Engisch and Bible (2009); Engisch, et al. (2008); Engisch, et al.

(2011); Fladmark (1984, 1985); French (1980); Friesen (1983, 1985); Hall and Prager (2004, 2006); Ham (1987, 1988); Jackman and Craig (2011); Magne (1982); Marshall and Palmer (2010); Pegg and Dodd (2007); Seip, Farquharson, and McKnight (2009); Seip and McKnight (2009); Seip, McKnight, et al. (2011); Seip, Farquharson, et al. (2012); Seip, Walker, et al. (2012); Warner and Magne (1983); Wilson (1984); and Wilson et al. (1982). Additional unpublished archaeological work near the RSA has been conducted under permits 2006-0223, 2007-0163, 2007-0200, 2007-0258, and 2011-0245, and data on the Remote Access to Archaeological Data online application and other publically available information on these projects were reviewed when practicable.

21.2.6 Assessment of Archaeological Site Potential

The assessment of archaeological potential was based primarily on the following factors: proximity to water sources or relict water courses, slope and aspect, food resource values (i.e., ungulate ranges, fish, berries), forest cover, local and traditional knowledge (when available), proximity to previously recorded archaeological or traditional land use sites, the possible use of an area as a travel corridor, the presence of ice patches, and the presence of microenvironmental features that are often associated with archaeological sites (such as terraces, hillocks/knolls, and breaks-in-slope). Factors thought to constrain archaeological potential include unbroken slope, steep or rough terrain, poorly drained ground, and massive disturbance areas, such as avalanche chutes.

The RSA is characterized by steep topography with areas of loose talus resulting from rockslides and slumps. Large portions of the Project are located on steep slopes. Slope class mapping generated from Light Detection and Ranging (LiDAR) and TRIM data was reviewed for the RSA to assist in the assessment of archaeological potential. The study area was divided into six slope classes. Slope Class 4 (moderately sloping) is the most common slope class, representing 35% of the RSA. Classes 5 and 6, described as moderately steep and steep slope classes, respectively, represent approximately 26% and 17% of the study area, respectively. These three slope classes make up about 78% of the RSA. Approximately 45% of the slopes in the RSA are greater than 50%. Only a small portion of the RSA (approximately 1%), is classified as level to very gentle slope (Class 1; Appendix 8-A).

A variety of fish, game animals, and edible plants are present in the RSA, including salmon, anadromous steelhead, and cutthroat and rainbow trout. More information on fish species in the RSA can be found in Chapter 15. Wildlife within the RSA that may have been utilized by prehistoric hunters and trappers include moose, mountain goat, grizzly and black bear, fisher, marten, and wolverine. Waterfowl are also present. More detailed information on the wildlife in the RSA can be found in Chapter 18. Edible plants in the RSA include blueberry/huckleberry, soapberry, and thimbleberry amongst others. More detailed information on plants within the RSA can be found in Chapter 17. Additional information that assisted in the assessment of archaeological potential can be found the *2009 Soils and Terrain Baseline Report* (Appendix 8-A), the *2011 Fish and Fish Habitat Baseline Report* (Appendix 15-G), the *2009 Vegetation and Ecosystems Mapping Baseline Report* (Appendix 17-A), and the *2008 and 2009 Wildlife Characterization Baseline Report* (Appendix 18-A).

The RSA is a heavily glaciated, mountainous region with numerous snow and ice patches. To address whether there is potential for “ice patch” archaeological sites in the RSA, snow and

ice patches were inspected by pedestrian survey during the period when there was maximum snow melt. Survey areas were selected based on their proximity to the Project footprint and the assessed archaeological potential of the areas.

A Geographic Information System-based model of the upper Bell-Irving Watershed (Pegg and Dodd 2007) covers a portion of the RSA. This model was reviewed and informed the assessment of archaeological potential for the Project; however, the model was not relied upon exclusively, and the archaeological potential of the Project was ground-truthed using the methodology described above.

21.2.7 Field Survey

Field methods employed during the AIA were consistent with those outlined in the permit applications. Assessments of proposed Project components included pedestrian surveys and subsurface shovel testing as a means of identifying archaeological sites.

Pedestrian archaeological surveys focused primarily on areas within proposed Project components that were identified as having moderate or high potential for the presence of archaeological resources. Examination consisted of a combination of systematic and preferentially selected pedestrian survey traverses. Crew spacing during the pedestrian survey was determined based on terrain and visibility constraints, as well as the assessed archaeological potential of the area being examined, with crew spacing being generally 5 to 20 m apart. When considered appropriate, additional preferentially selected survey routes followed spatially restricted topographic features.

Ground surfaces were examined for trails, structures, artifacts, depressions, and other evidence of past human settlement and land use. Tree throws and snow/ice patches were also visually examined for such evidence. Standing trees, fallen logs, and stumps were examined for cultural modification. Bedrock exposures and boulders were inspected for pictographs and petroglyphs, as well as for the possible presence of seams of flakable lithic raw materials. Talus slopes, caves, or rock crevices encountered during surveys were also examined for the possible presence of burials or other cultural materials. A total of 43 snow and ice patches were inspected by pedestrian survey during maximum snow melt. No evidence of prehistoric or historic use of the ice patches was located.

A subsurface testing strategy was created to identify sites consisting of as little as four artifacts per m in a 100 m^2 site. Subsurface testing (shovel testing) took place at 470 locations in areas identified during the field assessment as having potential for buried archaeological material with a total of 7,968 shovel tests conducted (Figure 21.2-1)[3]. Testing focused on remnant river terraces, prominent knolls, near trails, and/or along the banks of streams. Shovel testing was also conducted to determine the vertical and horizontal extent of any identified archaeological deposits and to identify the nature, composition, and integrity of subsurface deposits. Areas within the Project footprint that were not subject to pedestrian survey were considered to have low archaeological potential and likely consist of steep slopes or recent flood plains.

[3] While the entire Project footprint was assessed this figure only shows the location of pedestrian survey and shovel testing.

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410000 420000 430000 440000 450000 460000

6280000 6270000 6260000

Eskay Creek Mine Road
Eskay Creek Mine
Tom Mackay Lake
Coulter Creek Access Road
Coulter Creek
Telgen Creek
Tailing Management Facility
Bell - Irving River
37
Treaty Creek
Treaty Creek Access Road
Sulphurets Cr.
Unuk River
South Unuk River
Ted Morris Cr.
Frank Mackie Glacier Access (temporary)

N

Ice Patch Survey Location
Shovel Test Location
Highway
Survey Area
Infrastructure

1:150,000
0 2.5 5
Kilometres

GIS #: KSM-02-103
Projection: NAD 1983 UTM Zone 9N

Figure 21.2-1

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Overview of Survey and Shovel Test Locations

21.2.8 AIA Results

The AIAs identified 37 heritage sites within the RSA (Table 21.2-1). Due to the sensitive nature of archaeological sites, locational information is not shown in the Application/EIS. The majority of the heritage sites within the RSA are prehistoric subsurface lithic scatters or single artifact finds (n = 28). Three of the sites are historic cabins: HcTp-1 is 1.6 km outside of the LSA, HeTk-3 is 11.9 km outside of the LSA, and HeTl-2 is 9.6 km outside of the LSA. Two of the sites are historic burials; HcTj-1 is 18 km outside of the LSA and HdTk-2 is 2.4 km from the LSA. There is also a petroform, HdTo-4, which is 1.9 km outside of the LSA. A possible village site, HdTk-1, is 2.7 km outside of LSA, and a culturally modified tree, site HeTl-1, is 9.2 km outside of the LSA. The Treaty Creek Site, HdTj-1, is 4.4 km outside of the LSA, which was designated a heritage site pursuant to the HCA on the effective date of the *Nisga'a Final Agreement Act* (2000). Of the 37 sites in the RSA, only seven sites are located in the LSA and all of those sites are small lithic scatter sites.

Table 21.2-1. Archaeological Sites within the Regional Study Area

Archaeological Site	Site Type	Nearest Project Component	Distance between Project Component and Archaeological Site (m)
HcTj-1	Historic burial	Treaty Creek Transmission Line	18,365
HcTn-1	Artifact find	Kerr Pit Access Road	3,112
HcTo-1	Lithic scatter	Water Treatment Plant	1
HcTp-1	Historic trapline cabin	Coulter Creek access road	1,583
HdTj-1	Treaty Creek Site (*Nisga'a Final Agreement Act* [2000])*	Camp 11: Treaty Road Marshalling Yard	4,425
HdTk-1	Village site	Treaty Creek Switching Station	2,741
HdTk-2	Historic burial	Treaty Creek Switching Station	2,428
HdTk-3	Lithic scatter	Laydown Area - Log Landing	762
HdTk-4	Artifact find	Treaty Creek Transmission Line	9
HdTl-1	Lithic scatter	Treaty Creek Transmission Line	348
HdTm-1	Lithic scatter	Saddle Car Wash	3,861
HdTm-10	Lithic scatter	Saddle Car Wash	817
HdTm-11	Lithic scatter	Saddle Car Wash	4,197
HdTm-2	Lithic scatter	Saddle Car Wash	3,820
HdTm-3	Lithic scatter	Saddle Car Wash	3,960
HdTm-4	Lithic scatter	Saddle Car Wash	2,374
HdTm-5	Lithic scatter	Saddle Car Wash	2,655
HdTm-6	Lithic scatter	Saddle Car Wash	889
HdTm-7	Lithic scatter	Saddle Car Wash	2,437
HdTm-8	Lithic scatter	Saddle Car Wash	1,022
HdTm-9	Lithic scatter	Saddle Car Wash	959
HdTn-1	Lithic scatter	Mitchell Pit	0
HdTn-2	Lithic scatter	Mitchell Pit	0
HdTo-1	Lithic scatter	Coulter Creek access road	2,121
HdTo-2	Lithic scatter	Coulter Creek access road	2,242
HdTo-3	Lithic scatter	Coulter Creek access road	1,926
HdTo-4	Petroform	Coulter Creek access road	1,917

(continued)

Table 21.2-1. Archaeological Sites within the Regional Study Area (completed)

Archaeological Site	Site Type	Nearest Project Component	Distance between Project Component and Archaeological Site (m)
HdTo-5	Lithic scatter	McTagg Phase 3 Flood Outlet	1,134
HdTo-6	Lithic scatter	Coulter Creek access road	316
HdTo-7	Lithic scatter	Coulter Creek access road	0
HeTk-1	Lithic scatter	Treaty Creek Switching Station	7,439
HeTk-2	Lithic scatter	East Diversion Pond	12,019
HeTk-3	Bell-Irving Telegraph Cabin	East Diversion Dam Spillway	11,886
HeTl-1	Culturally modified trees	Ultimate North Dam Closure Spillway	9,283
HeTl-2	Snowbank Creek Telegraph Cabin	Ultimate North Dam Closure Spillway	9,681
HfTm-2	Lithic scatter	Diversion Tunnel Portal Access Road	22,475
HfTm-3	Lithic scatter	Diversion Tunnel Portal Access Road	22,587

*** HdTj-1 was added to the Archaeological Site Register as a requirement of the *Nisga'a Final Agreement Act* (2000) not due to the identification of archaeological materials at the site. It is a historically significant battle site and the location of a subsequent peace treaty between Nisga'a and Tahltan.**

There are no records of significant paleontological finds within the Project footprint. While paleontological finds have been made within the Bowser Basin (Evenchick et al. 2005; Alldrick et al. 2006), it is unlikely that undisturbed macrofossils of significant size will be located within the Project footprint due to the tectonic events that have occurred in the area (G. Jacob, pers. comm.).

Recent land use sites, largely associated with mineral exploration or trapping, were recorded during the AIAs including but not limited to cabins, claim stakes, recently blazed trees, and coreboxes; however, as these are not designated heritage sites and are not protected by the HCA (1996), they are not discussed in this chapter. For further information on recent land use sites see the *Non-traditional Land Use Baseline Report* (Appendix 23-A) and the AIA Permit Reports (Appendices 21-A and 21-B).

21.3 Historical Activities

Previous archaeological investigations in northwestern British Columbia have been undertaken for mining, hydroelectric, and other developments. Several large-scale research projects that primarily focus on major rivers (Stikine, Tahltan, Iskut, Nass, and Klappan) and within Mount Edziza Provincial Park have also been undertaken. As a result, hundreds of archaeological sites have been recorded in the region; however, prior to the AIAs for the KSM Project very little archaeological investigation had been conducted in the RSA.

While some early mineral exploration in the RSA may have pre-dated heritage protection legislation, the effects of these activities are considered to be minimal based on an understanding of the geographic scale of these activities and the low density of archaeological materials in the

area. All ground altering activity that has taken place since the introduction of the HCA (1996) must have been conducted in compliance with the HCA (1996) and therefore damage to heritage sites is considered to be negligible.

21.4 Land Use Planning Objectives

The Cassiar Iskut-Stikine (CIS) Land and Resource Management Plan (LRMP) and the Nass South Sustainable Resource Management Plan (SRMP) areas overlap the RSA. The Nass South SRMP and the CIS LRMP both provide guidance for the preservation of heritage sites (BC ILMB 2000, 2012).

The CIS LRMP (BC ILMB 2000) indicates that prior to project approval, developments require assessment to determine the level of study required under the HCA (1996). The Nass South SRMP requires that the management of cultural sites be consistent with the *Gitanyow Policy Manual for Management of Cultural Resources* and the *Nisga'a Final Agreement* and that any cultural heritage sites identified should be reported to the Gitanyow, Nisga'a Lisims Government, and the Archaeology Branch for inclusion in the BC Government's Remote Access to Archaeological Data database (BC MFLNRO 2012).

21.5 Spatial and Temporal Boundaries

21.5.1 Spatial Boundaries

The spatial boundary of the heritage effects assessment is the RSA identified in Heritage Inspection Permits 2008-0128 and 2012-0192. The boundary encompasses the current Project footprint, previously proposed KSM Project development areas, and areas immediately adjacent to the proposed developments where Project infrastructure construction could have unintended direct or indirect effects (Figure 21-1.1). The spatial boundary of the LSA includes the current Project footprint buffered by 500 m. A desk-based assessment of archaeological baseline conditions was conducted for the entire RSA. Fieldwork focused on proposed Project developments.

21.5.2 Temporal Boundaries

The temporal boundaries include the following four phases:

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

Although this heritage effects assessment considers potential effects during all four phases, heritage sites are most at risk of direct Project-related effects during construction and are at risk of indirect effects during both construction and operation. Accordingly, effects identification and mitigation measures focus on potential direct and indirect construction effects and indirect operation effects. Mitigation measures are timed to occur prior to and/or during construction. The closure and post-closure phases are not expected to result in any significant effects.

21.6 Valued Components

VCs are used to focus the environmental assessment on the issues of highest concern. To be considered a VC for assessment purposes, a component must meet the following criteria:

- it must be known to occur in, or be applicable to, the LSA;
- it must be of recognized importance to society, the local community, or the environmental system; and
- there must be a perceived likelihood that the VC will be affected by the Project.

The potential heritage VCs were screened for inclusion in the effects assessment by evaluating AIA study results and protection status. Interests and issues that governments (Aboriginal and non-Aboriginal), local interest groups, and the public identified during the engagement process were also considered.

The two VCs considered for the heritage effects assessment are:

1. archaeological sites protected by the *Heritage Conservation Act* (1996); and
2. designated heritage sites (significant historic, paleontological, and architectural sites) protected by the *Local Government Act* (1996).

The Project could directly affect heritage sites during construction and operation. Any heritage feature considered as a VC is known to occur in the LSA and is reasonably likely to be affected by the Project. The following sections review the selection criteria used and identify selected VCs and potential VCs that were considered but not included in the effects assessment.

21.6.1 Valued Components Included in Assessment

The AIA studies identified 37 heritage sites within the RSA (Appendices 21-A and 21-B). Of these 37 archaeological sites, seven are located within the LSA, five are in direct conflict with Project developments and two may be indirectly affected. Archaeological sites and designated heritage sites are protected by the HCA (1996) and avoidance is the preferred option. However, if avoidance is not possible, mitigation measures will be determined in consultation with the Archaeology Branch. A Site Alteration Permit under Section 12 of the HCA will be applied for, and mitigation measures will be instituted prior to disturbance. This will reduce or remove the loss of scientific data resulting from site destruction to negligible levels.

Archaeological sites were selected as a VC because they are legally protected in British Columbia by the HCA (1996), are present in the LSA, and cannot be altered in any way without a permit from the Archaeology Branch (Table 21.6-1).

21.6.2 Valued Components Excluded from Assessment

There are no designated built heritages sites, significant architectural sites, or significant paleontological sites within the LSA and they are therefore excluded as VCs (Table 21.6-2).

Table 21.6-1. Identification and Rationale for Heritage Valued Component Selection

Valued Component	Identified By*				Rationale for Inclusion
	F	G	P/S	O	
Archaeological Sites	X	X			Protected by the *Heritage Conservation Act* (1996) and found within the LSA

Table 21.6-2. Rationale for Heritage Valued Components Considered and Excluded from Further Analysis

Valued Component	Identified By*				Rationale for Exclusion
	F	G	P/S	O	
Designated Built Heritage Site		X			None within the LSA
Significant Architectural Sites		X			None within LSA
Significant Paleontological Sites		X			None anticipated within LSA

*** F = First Nation and/or Nisga'a Nation; G = Government; P/S = Public/Stakeholder; O = Other.**

21.7 Scoping of Potential Effects for Heritage

Project activities associated with the movement, excavation, or disturbance of soil have the potential to cause direct effects on archaeological material, if present. Direct effects on archaeological sites will potentially occur during construction and will be mitigated prior to or during construction. Therefore, no direct effects are anticipated during operation, closure, or post-closure. Archaeological sites located within 50 m of ground altering activity are anticipated to be directly affected by construction. Archaeological sites located between 50 and 500 m from Project components are anticipated to be indirectly affected through increased human presence during construction and operation (Table 21.7-1). Archaeological sites beyond 500 m (outside the LSA) are not anticipated to be affected by the Project.

21.7.1 Construction

During construction, Project activities that could have potential adverse effects on archaeological sites include: clearing and grading for roads and transmission line rights-of-way; clearing, grading, and excavation for foundations and building footings; earth moving and blasting for mine construction; and tailing deposition for the Tailing Management Facility (TMF). For a summary of the construction effects please see Appendix 21-C.

Potential construction effects have been assessed within the proposed Project footprint. Five known archaeological sites (HcTo-1, HdTk-4, HdTn-1, HdTn-2, and HdTo-7) located within 50 m of the Project footprint have a high probability of being directly affected from disturbance due to ground altering activity by construction. Based on the checklist of criteria for site evaluation in the *British Columbia Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998), sites HcTo-1 and HdTo-7 have a moderate overall significance and sites HdTk-4, HdTn-1 and HdTn-2 have a low overall significance. None of the sites within the LSA provided diagnostic artifacts associated with a particular prehistoric culture.

Table 21.7-1. Potential Effects from Project on Archaeological Sites

Project Region	Project Area	Disturbance of Known Archaeological Sites	Disturbance of Unknown Archaeological Sites
Mine Site	Camp 3: Eskay Staging Camp		Direct or indirect effect if present
	Camp 7: Unuk North Camp		Direct or indirect effect if present
	Camp 8: Unuk South Camp		Direct or indirect effect if present
	Coulter Creek access road	Direct effect from ground altering activity HdTo-7 and potential indirect effect from disturbance through increased human presence HdTo-6	Direct or indirect effect if present
	Mitchell Operating Camp		Direct or indirect effect if present
	McTagg Rock Storage Facility		Direct or indirect effect if present
	McTagg Twinned Diversion Tunnels		Direct or indirect effect if present
	McTagg Power Plant		Direct or indirect effect if present
	Mitchell Rock Storage Facility		Direct or indirect effect if present
	Camp 4: Mitchell North Camp (for MTT construction)		Direct or indirect effect if present
	Mitchell Ore Preparation Complex		Direct or indirect effect if present
	Mine Site Avalanche Control		Direct or indirect effect if present
	Iron Cap Block Cave Mine		Direct or indirect effect if present
	Mitchell Pit	Direct effect on HdTn-1 and HdTn-2 from ground altering activity.	Direct or indirect effect if present
	Mitchell Block Cave Mine		Direct or indirect effect if present
	Mitchell Diversion Tunnels (MDT)		Direct or indirect effect if present
	Upper Sulphurets Power Plant		Direct or indirect effect if present
	Mitchell Truck Shop		Direct or indirect effect if present

(continued)

Table 21.7-1. Potential Effects from Project on Archaeological Sites (continued)

Project Region	Project Area	Disturbance of Known Archaeological Sites	Disturbance of Unknown Archaeological Sites
Mine Site *(cont'd)*	Water Storage Facility		Direct or indirect effect if present
	Camp 9: Mitchell Initial Camp		Direct or indirect effect if present
	Camp 10: Mitchell Secondary Camp		Direct or indirect effect if present
	Water Treatment Plant	Direct effect on HcTo-1 from ground altering activity	Direct or indirect effect if present
	Sludge Management Facilities		Direct or indirect effect if present
	Sulphurets Laydown Area		Direct or indirect effect if present
	Sulphurets-Mitchell Conveyor Tunnel		Direct or indirect effect if present
	Sulphurets Pit		Direct or indirect effect if present
	Kerr Rope Conveyor		Direct or indirect effect if present
	Kerr Pit		Direct or indirect effect if present
	Camp 2: Ted Morris Camp		Direct or indirect effect if present
	Explosives Manufacturing Facility		Direct or indirect effect if present
	Temporary Frank Mackie Glacier access route		Direct or indirect effect if present
	Camp 1: Granduc Staging Camp		Direct or indirect effect if present
Processing and Tailing Management Area	Mitchell-Treaty Twinned Tunnels		Direct or indirect effect if present
	Construction Access Adit		Direct or indirect effect if present
	Mitchell-Treaty Saddle Area		Direct or indirect effect if present
	Camp 6: Treaty Saddle Camp		Direct or indirect effect if present
	Camp 5: Treaty Plant Camp		Direct or indirect effect if present

(continued)

Table 21.7-1. Potential Effects from Project on Archaeological Sites (completed)

Project Region	Project Area	Disturbance of Known Archaeological Sites	Disturbance of Unknown Archaeological Sites
Processing and Tailing Management Area *(cont'd)*	Treaty Operating Camp		Direct or indirect effect if present
	Treaty Ore Preparation Complex		Direct or indirect effect if present
	Concentrate Storage and Loadout		Direct or indirect effect if present
	North Cell Tailing Management Facility		Direct or indirect effect if present
	East Catchment Diversion		Direct or indirect effect if present
	Centre Cell Tailing Management Facility		Direct or indirect effect if present
	South Cell Tailing Management Facility		Direct or indirect effect if present
	Treaty Creek access road	Direct effect on HdTk-4 from ground altering activity and potential indirect effect on HdTl-1 from increased human presence.	Direct or indirect effect if present
	Camp 11: Treaty Marshalling Yard Camp		Direct or indirect effect if present
	Camp 12: Hwy 37 Construction Camp		Direct or indirect effect if present

X = interaction between component and effect.

21.7.1.1 HcTo-1

HcTo-1 is a subsurface lithic scatter situated on a terrace north of Sulphurets Creek. The site measures 85 m (northwest to southeast) by 15 m (northeast to southwest) and is interpreted as a temporary camp and retooling site, with an assemblage consisting largely of utilized flakes and late-stage reduction flakes (Plates 21.7-1 and 21.7-2). It is located within the proposed Water Treatment Plant. If no mitigation measures were put in place it would be completely disturbed due to clearing, grading, and excavation activity during construction.

21.7.1.2 HdTk-4

HdTk-4 is a subsurface lithic find, consisting of a single tertiary obsidian flake, interpreted as a retooling site (Plate 21.7-3). This site is located within the proposed Treaty Creek Transmission Line corridor. It would be entirely or partially disturbed due to ground disturbance from clearing, or excavation activity during construction of the transmission line if no mitigation measures were put in place.

Plate 21.7-1. Terrain at site HcTo-1, looking northwest from shovel test 29.

Plate 21.7-2. Tools recovered during shovel testing at HcTo-1.

Plate 21.7-3. Terrain at site HdTk-4, looking northwest across the site.

21.7.1.3 HdTn-1

HdTn-1 is a 5 m × 5 m subsurface lithic scatter, located on the north side of the Mitchell Creek Valley (Plate 21.7-4). A total of 27 pieces of obsidian debitage were recovered. It may have served as a lookout over Mitchell Creek Valley or as a staging area for fall mountain goat or marmot hunting. Based on the limited archaeological materials, it may only represent a single use event. An obsidian artifact from the site was sourced to Mount Edziza Flow No. 3, located approximately 115 km northwest of the site. The site is located within the proposed Mitchell Pit and would be completely disturbed during excavation of the pit if no mitigation measures were put in place.

21.7.1.4 HdTn-2

HdTn-2 is a small (5 m × 5 m) subsurface lithic scatter, situated on a small subalpine plateau (Plate 21.7-5). A total of five pieces of obsidian artifacts (flakes) were recovered from the site, which suggests that it was likely used as a single use retooling site and may have served as a lookout over Mitchell Creek Valley. Based on the limited archaeological materials, it may only represent a single use event. It is located on the north side of the Mitchell Creek Valley within the proposed Mitchell Pit and would be completely disturbed during excavation of the pit, if no mitigation measures were put in place.

Plate 21.7-4. View south of archaeological site HdTn-1.

Plate 21.7-5. View southwest of archaeological site HdTn-2. The positive shovel tests are located near the surveyor's vest (photo left).

21.7.1.5 HdTo-7

HdTo-7 is a small (8 m × 15 m) subsurface lithic scatter, situated on a terrace near the confluence of Mitchell and Sulphurets creeks. One unifacial end-scraper, three utilized flakes, and 11 pieces of debitage (all black obsidian), and 18 pieces of reddish-brown material (possibly ochre) were recovered (Plates 21.7-6 and 21.7-7). Two artifacts from this site were sent for XRF analysis and were determined to have originated from Flow 3, an obsidian quarry within the Mount Edziza Volcanic Complex, approximately 110 km to the northwest. Based on the types of material recovered the site is interpreted as a temporary camp and/or retooling site. The site is located along the proposed Coulter Creek access road (CCAR) and it would be partly or completely disturbed through clearing, excavation, and grading activity during road construction, if no mitigation measures were put in place.

Plate 21.7-6. Shovel testing at HdTo-7, looking east toward the helicopter pad. Shovel test 1 in foreground.

21.7.2 Operation

No direct effects are anticipated during operation because any known archaeological sites in conflict with the footprint will have been identified and the effects mitigated prior to or during construction. Any revisions to the Mine Site footprint will be subject to archaeological review and, if necessary, an AIA will be conducted prior to disturbance. Archaeological sites may be indirectly affected during operation through increased human presence.

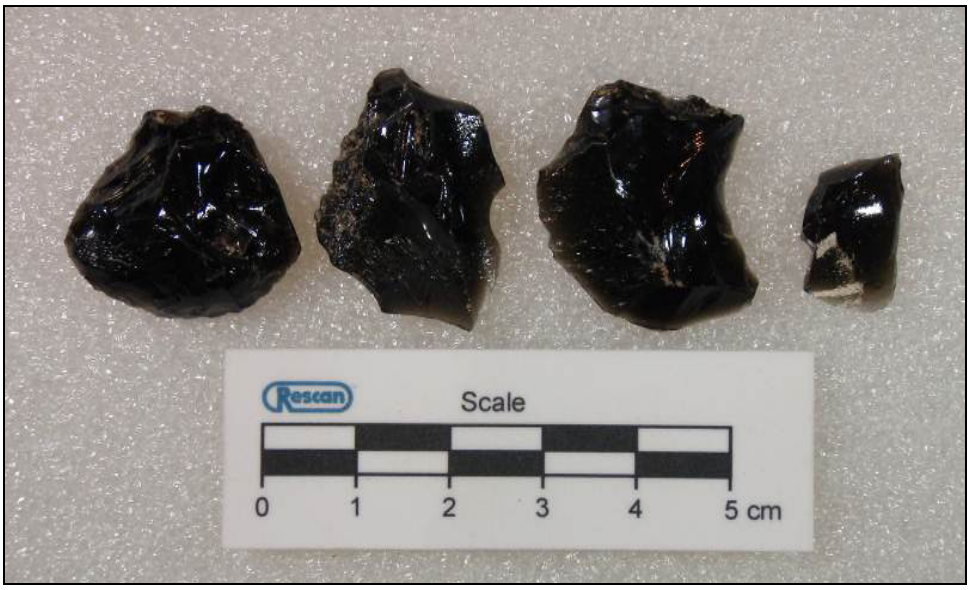

Plate 21.7-7. Tools recovered during shovel testing at HdTo-7.

Two archaeological sites (HdTl-1 and HdTo-6) located within 500 m of the Project footprint may be indirectly affected by disturbance through increased human presence. Both of these sites were rated as having a low overall significance based on the checklist of criteria for site evaluation presented in the *British Columbia Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998).

21.7.2.1 HdTl-1

HdTl-1, a subsurface lithic scatter, is situated on a bench directly north of a marsh and just downslope from the tree line on the north face of this mountain (Plate 21.7-8). The site is interpreted as a temporary camp site and/or retooling area. Its location just below the tree line provides shelter and easy access to firewood, as well as game like marmots and mountain goats in the subalpine meadows upslope of the site. One obsidian artifact from HdTl-1 was sent for XRF analysis and was sourced to Mount Edziza Flow No. 3, located approximately 110 km to the northwest. The site is located within 500 m of the TCAR. It is possible that the site may be partially disturbed during operation by fortuitous discovery and potential collection of artifacts during operation with increased human presence in the area. However, due to the distance of the site from the road and the buried nature of site it is unlikely that this would occur.

21.7.2.2 HdTo-6

HdTo-6 is a subsurface lithic scatter, located on a knoll overlooking a creek and a marsh (Plate 21.7-9). It is interpreted as a seasonal hunting site or temporary camp site. The position offered by the ridge over the marsh and lake below make it a favourable location from which to hunt moose and waterfowl. The site is located within 500 m of the CCAR. It is possible that the site may be partially disturbed by fortuitous discovery and potential collection of artifacts during operation due to increased human presence in the area. However, due to the distance of the site from the road and the buried nature of site it is unlikely that this would occur.

Plate 21.7-8. Looking southeast at archaeological site HdTl-1.

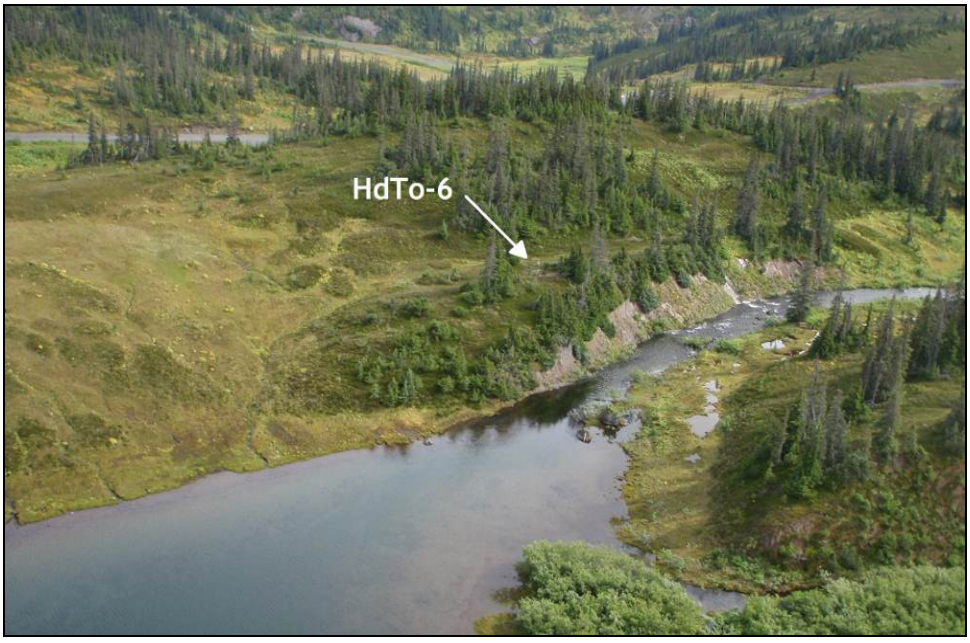

Plate 21.7-9. View of archaeological site HdTo-6, Tom Mackay Creek and the surrounding area, looking southeast.

21.7.3 Closure

No direct effects are anticipated during closure because any known archaeological sites in potential conflict with the Project footprint will have been identified and the effects mitigated prior to or during construction.

21.7.4 Post-closure

No direct effects are anticipated during post-closure because known archaeological sites in conflict with the Project footprint will have been identified and the effects mitigated prior to or during construction.

21.8 Potential for Residual Effects for Heritage

The assessment of potential for residual heritage effects is based on an assessment of VCs with a focus on archaeological sites. Archaeological sites are considered a heritage VC as they are protected under the HCA (1996). The assessment of potential for residual effects on archaeological sites takes into account that mitigation measures will be conducted prior to disturbance.

21.8.1 Disturbance of Archaeological Sites

During construction and operation, excavation, clearing, and grading within the Project footprint will result in irreversible alteration of archaeological sites that have been identified in areas where the Project footprint and archaeological sites occupy the same space or are in close proximity. No impacts are anticipated to the 30 archaeological sites within the RSA that are beyond 500 m from the Project footprint. There are seven archaeological sites that could be directly or indirectly affected by the Project during construction and operation. Where possible, these sites will be avoided. However, if these sites cannot be avoided, impacts will be mitigated by collecting information contained within the sites. Prior to a site being impacted, an HCA Section 12 Site Alteration Permit must be obtained. Mitigation by data recovery, monitoring, and/or site protection of archaeological sites that will be directly affected by Project-related activities in compliance with a HCA Section 12 Site Alteration Permit will reduce cumulative and residual effects to not significant (minor).

21.8.1.1 Mitigation for Disturbance of Known Archaeological Sites

Avoidance of archaeological sites is the preferred approach to mitigating impacts. Seabridge has made several changes to the Project, which have helped reduce or avoid impact on archaeological sites. These changes are summarized below.

- Changing the access to the PTMA from Hwy 37 to follow the Treaty Creek Valley instead of the Teigen Creek Valley has avoided effects to 11 archaeological sites (HdTm-1 to HdTm-11).
- Relocating Construction Camp 3 avoided impacts to HdTo-6 site..
- Changing the transmission line route from Treaty Creek to Teigen Creek avoided impacts to HeTl-2 site.

It is anticipated that it will be possible to avoid sites HdTl-1 and HdTo-6, which are located within the LSA but are over 50 m from Project developments, and also HdTk-4 located within 50 m of the Treaty Creek Transmission Line corridor.

To protect archaeological sites within the LSA, mine employees and contractors will be educated about site avoidance, and sites within the LSA will be marked as "no work zones" on Project construction maps. Additional mitigation measures, to be determined in consultation with the Archaeology Branch, may be required to facilitate avoidance of HdTk-4. These measures may include fencing or site capping. For archaeological sites HcTo-1, HdTn-1, HdTn-2, and HdTo-7, where avoidance is not feasible, mitigation measures determined in consultation with the Archaeology Branch will be used to reduce residual effects to not significant (minor). It is anticipated that mitigation measures at these sites will include systematic data recovery or preservation through site capping.

21.8.1.2 Mitigation for the Disturbance of Unknown Archaeological Sites

Any revisions to the currently proposed Project footprint will be reviewed by a qualified professional archaeologist. A Chance Find Procedure will be implemented to provide a framework for the avoidance or mitigation of archaeological sites, if present, that were not identified during the AIA. To protect archaeological sites within the LSA, mine employees and contractors will be educated about the Chance Find Procedure. Where avoidance is not possible, any alteration to an archaeological site protected under the HCA (1996) will require a Section 12 Site Alteration Permit from the Archaeology Branch. Additional mitigation measures may be required. These measures will be determined in consultation with the Archaeology Branch prior to disturbance of the archaeological sites. During closure, roads will be decommissioned to limit the indirect adverse effects on archaeological sites that may occur due to increased human presence in the area during post-closure.

21.8.1.3 Potential for Residual Effects

The Project will result in residual effects on archaeological sites due to the potential disturbance of archaeological sites within the LSA (Table 21.8-1).

21.8.1.4 Residual Effects due to Disturbance of Archaeological Sites

During the construction phase of the Project, residual effects on archaeological sites will occur if mitigation measures are not taken. An adverse effect will result if a ground altering activity impacts an archaeological site at which adequate data recovery, to be determined in consultation with the Archaeology Branch, has not taken place. With proper mitigation measures in place, including avoidance or mitigation of known archaeological sites and a Chance Find Procedure for the preservation of unknown archaeological sites, residual effects are reduced. The disturbance of archaeological sites through ground altering activity is expected to result in a residual effect, though with mitigation the archaeological sites, while no longer *in situ*, will have been effectively curated.

Table 21.8-1. Definition of Significance Criteria for Heritage Residual Effects

Valued Component	Timing Start	Project Area(s)	Project Component(s)	Description of Effect due to Project Component(s)	Type of Project Mitigation	Project Mitigation Description	Potential Residual Effect	Description of Residuals
Archaeological sites	Construction	CCAR	Haul Road	Potential disturbance of archaeological site HdTo-6 through increased human presence	Avoidance	Mark as No Work Zone	Yes	Disturbance of known archaeological site
	Construction	CCAR	Haul Road	Potential disturbance of archaeological site HdTo-7 through construction activity	Mitigation measures to be determined in consultation with the Archaeology Branch	Mitigation to be determined in consultation with the Archaeology Branch carried out in accordance with Section 12 Site Alteration Permit	Yes	Disturbance of known archaeological site
	Construction	Mitchell Pit	Mine area water treatment and and energy recovery facility	Potential disturbance of archaeological site HcTo-1 through construction activity	Mitigation measures to be determined in consultation with the Archaeology	Mitigation to be determined in consultation with the Archaeology Branch carried out in accordance with Section 12 Site Alteration Permit	Yes	Disturbance of known archaeological site
	Construction	TCAR	Transmission Line	Potential disturbance of archaeological site HdTk-4 through construction activity	Mitigation measures to be determined in consultation with the Archaeology Branch	Mitigation to be determined in consultation with the Archaeology Branch carried out in accordance with Section 12 Site Alteration Permit	Yes	Disturbance of known archaeological site
	Construction	TCAR	Transmission Line	Potential disturbance of archaeological site HdTl-1 through increased human presence	Avoidance	Mark as No Work Zone	Yes	Disturbance of known archaeological site
	Construction	Mitchell Pit	Mitchell Pit	Potential disturbance of archaeological site HdTn-1 through construction activity	Mitigation measures to be determined in consultation with the Archaeology Branch	Mitigation to be determined in consultation with the Archaeology Branch carried out in accordance with Section 12 Site Alteration Permit	Yes	Disturbance of known archaeological site

(continued)

Table 21.8-1. Definition of Significance Criteria for Heritage Residual Effects (completed)

Valued Component	Timing Start	Project Area(s)	Project Component(s)	Description of Effect due to Project Component(s)	Type of Project Mitigation	Project Mitigation Description	Potential Residual Effect	Description of Residuals
Archaeological sites	Construction	Mitchell Pit	Mitchell Pit	Potential disturbance of archaeological site HdTn-2 through construction activity	Mitigation measures to be determined in consultation with the Archaeology Branch	Mitigation to be determined in consultation with the Archaeology Branch carried out in accordance with Section 12 Site Alteration Permit	Yes	Disturbance of known archaeological site
	Construction and Operations	All	All	Potential disturbance of unknown archaeological sites	Implementation of a Chance Find Procedure	Follow Chance Find Procedure	Yes	Disturbance of known archaeological site

21.9 Significance of Residual Effects for Heritage

The significance of residual effects resulting from the disturbance of known and unknown archaeological sites is described below.

21.9.1 Residual Effect Descriptors for Heritage

Standard residual effects descriptors based on Appendix F of the *Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998) are used to describe aspects of the potential residual effects resulting from the disturbance of archaeological sites (Table 21.9-1).

The magnitude of the effect is determined through professional judgment taking into account the types of affected sites, the significance of affected sites, and the number of similar sites in the area. The assessment of magnitude also accounts for Project commitments and the legislative framework provided by the HCA (1996). The geographic extent is determined by the size of the expected scope of the change. The duration and frequency are determined by how long and how often the effect will occur. Reversibility is a measure of how quickly the effect can be returned to the baseline condition, and context is a measure of how the effect will change the population of unaffected sites. Probability is a determination of the likelihood of the event occurring and confidence is a measure of the certainty of the preceding analysis of effects. Table 21.9-2 provides a summary of the significance analysis for residual effects associated with the construction and operation of the Project, that causes direct and indirect disturbance to both known and unknown archaeological sites (Table 21.9-2).

21.9.1.1 Disturbance of Known Archaeological Sites

The magnitude of change to known sites was assessed to be low, as only seven small lithic scatters within the LSA will be potentially impacted out of the 37 known sites within the RSA. The five lithic scatters potentially directly affected by the Project are all small, non-stratified sites; mitigation through data recovery and/or monitoring will acceptably offset any potential loss of archaeological data; and the geographic extent of the effect was determined to be local as the disturbance of an archaeological site has no effect on other archaeological sites in the area. The duration and frequency and reversibility of the effect is considered to be far future, one time, and irreversible, as once the site has been mitigated, it has been effectively curated, there are no additional effects to the site through Project activity, and it cannot be rebuilt or reconstituted. The context or resiliency of the environment or population has been determined to be neutral as the disturbance to the site will be offset by the data collected during mitigation. Disturbance to archaeological sites is highly likely to occur as there are archaeological sites in direct conflict with the proposed developments, and it is anticipated that archaeological sites HcTo-1, HdTn-1, HdTn-2, and HdTo-7 cannot be avoided. The confidence level in the assessment is high as the requirements of the HCA (1996) to conduct site investigations provides a rigorous approach to understanding the effect of the Project on archaeological sites.

21.9.1.2 Disturbance of Unknown Archaeological Sites

The magnitude of change to unknown sites was assessed to be low as the AIAs conducted for the Project were exhaustive and covered the moderate to high potential areas within the Project footprint, and any currently unknown sites in direct conflict with the Project are expected to be

small, low-density lithic scatters in unstratified deposits. The processes outlined in a Chance Find Procedure, including mitigation, will acceptably offset any potential loss of archaeological data.

The geographic extent of the effect to unknown archaeological sites was determined to be local as the disturbance of an archaeological site has no effect on other archaeological sites in the area. The duration, frequency, and reversibility of the effect is considered to be far future, one time, and irreversible, as once the site has been mitigated it has been effectively curated, there are no additional effects to the site through Project activity, and it cannot be rebuilt or reconstituted. The context or resiliency of heritage valued components has been determined to be neutral as the disturbance to the site will be offset by the data and knowledge collected during mitigation.

The probability of disturbance to unknown archaeological sites is low as AIAs were conducted; however, there is always a possibility that currently unrecorded archaeological sites may be discovered during ground altering activity. However, as the effort expended during the AIAs for the Project met the expectations of the Archaeology Branch, there is a high level of confidence that there is low probability of any disturbance to unknown archaeological sites.

21.9.1.3 Overall Effect on Archaeological Sites

By committing to site avoidance or mitigation through data recovery and/or monitoring, the archaeological sites for which effects are anticipated will be avoided or adequately curated (see detailed commitments in subsection 21.8.1). Residual effects of the Project on heritage VCs are anticipated to be not significant (minor; Table 21.9-2).

21.10 Potential Cumulative Effects for Heritage

21.10.1 Scoping of Cumulative Effects

The residual effects assessment of the Heritage VC archaeological sites determined that the effect would be not significant (minor). The potential for cumulative effects is discussed below.

21.10.1.1 Spatial Linkages with other Projects and Human Actions

The development of additional projects, both present and future, and other human land use within the region (Figures 5.3-1 and 5.3-2) that involves ground disturbance have the potential to disturb or destroy additional archaeological sites. Present projects include Forrest-Kerr Hydroelectric, Long Lake Hydroelectric, Northwest Transmission Line, Red Chris Mine, and Wolverine Mine. Reasonably foreseeable future projects include Arctos Anthracite Coal Mine, Bear River Gravel, Bronson Slope Mine, Brucejack Mine, Galore Creek Mine, Granduc Copper Mine, Kitsault Mine, Kutcho Mine, McLymont Creek Hydroelectric, Schaft Creek Mine, Snowfield Project, Storie Moly Mine, Treaty Creek Hydroelectric, and Turnagain Mine (see Section 5.3 for detailed descriptions of these projects and activities). Current land use activities considered include mineral and energy resource exploration, timber harvesting, and resource access roads.

Table 21.9-1. Significance Determination Criteria of Residual Effects

Timing *What phase of the Project is the effect associated with?*	**Magnitude** *(negligible, low, medium, high)*	**Geographic Extent** *(local, landscape, regional, beyond regional)*	**Duration** *(short-term, medium-term, long-term, far future)*	**Frequency** *(once, sporadic, regular, continuous)*	**Reversibility** *(reversible short-term, reversible long-term, or irreversible)*	**Context** *(ecological resilience and/or unique attributes) (low, neutral, high)*	**Probability** *(low, medium, high)*	**Confidence** *(low, medium, high)*	**Significance** *(Not Significant: minor, moderate; Significant: major)*	**Follow-up Monitoring** *(not required, required)*
Construction	**Negligible.** There is no detectable change from baseline conditions.	**Local.** The effect is limited to the project footprint.	**Short-term**. The effect lasts approximately 1 year or less.	**Once.** The effect occurs once during any phase of the project.	**Reversible short-term.** An effect that can be reversed relatively quickly.	**Low**. The valued component is considered to have little to no unique attributes and/or there is high resilience to imposed stresses.	**Low.** An effect is unlikely but could occur.	**Low** (< 50% confidence). The cause-effect relationship between the project and its interaction with the environment is poorly understood; data for the project area may be incomplete; uncertainty associated with synergistic and/or additive interactions between environmental effects may exist. High degree of uncertainty.	**Not Significant (minor).** Residual effects have no or low magnitude, local geographical extent, short or medium-term duration, and occur intermittently, if at all. There is a high level of confidence in the conclusions. The effects on the VC (at a population or species level) are indistinguishable from background conditions (i.e., occur within the range of natural variation as influenced by physical, chemical, and biological processes). Land use management objectives will be met. Follow-up monitoring is optional.	**(not required, required)**
Operations	**Low.** The magnitude of effect differs from the average value for baseline conditions, but is within the range of natural variation and well below a guideline or threshold value.	**Landscape.** An effect extends beyond the project footprint to a broader watershed area.	**Medium-term.** The effect lasts from 1 – 11 years.	**Sporadic.** The effect occurs at sporadic or intermittent, intervals during any phase of the project.	**Reversible long-term.** An effect that can be reversed after many years.	**Neutral.** The valued component is considered to have some unique attributes, and/or there is neutral (moderate) resilience to imposed stresses.	**Medium.** An effect is likely but may not occur.	**Medium. (**50 – 80% confidence). The cause-effect relationship between the project and its interaction with the environment is not fully understood, or data for the project area is incomplete: moderate degree of uncertainty.	**Not Significant (moderate).** Residual effects have medium magnitude, local, landscape or regional geographic extent, are short-term to chronic (i.e., may persist into the far future), and occur at all frequencies. Residual effects on VCs are distinguishable at the population, community, and/or ecosystem level. Ability of meeting land use management objectives may be impaired. Confidence in the conclusions is medium or low. The probability of the effect occurring is low or medium. Follow-up monitoring of these effects may be required.	**(not required, required)**
Closure	**Medium.** The magnitude of effect differs from the average value for baseline conditions and approaches the limits of natural variation, but below or equal to a guideline or threshold value.	**Regional.** The effect extends across the Regional Study Area.	**Long-term.** The effect lasts between 12 and 70 years.	**Regular.** The effect occurs on a regular basis during, any phase of the project.	**Irreversible.** The effect cannot be reversed.	**High.** The valued component is considered to be unique, and/or there is low resilience to imposed stresses.	**High**. An effect is highly likely to occur.	**High**. There is greater than 80% confidence in understanding the cause-effect relationship between the project and its interaction with the environment, and all necessary data is available for the project area. There is a low degree of uncertainty.	**Significant (Major).** Residual effects have high magnitude, regional or beyond regional geographic extent, are chronic (i.e., persist into the far future), and occur at all frequencies. Residual effects on VCs are consequential (i.e., structural and functional changes in populations, communities and ecosystems are predicted). Ability to meet land use management objectives is impaired. Probability of the effect occurring is medium or high. Confidence in the conclusions can be high, medium, or low. Follow-up monitoring is required.	**Required**
Post-closure	**High.** The magnitude of effect is predicted to differ from baseline conditions and exceed guideline or threshold values so that there will be a detectable change beyond the range of natural variation (i.e., change of state from baseline conditions).	**Beyond Regional**: The effect extends possibly across or beyond the province.	**Far Future: The** effect lasts more than 70 years.	**Continuous.** An effect occurs constantly during any phase of the Project.						

Table 21.9-2. Summary of Residual Effects on Archaeological Sites

Description of Residual Effect	Project Component(s)	Timing of Effect	Magnitude	Extent	Duration	Frequency	Reversibility	Context	Likelihood of Effects		Significance Determination	Follow-up Monitoring
									Probability	Confidence Level		
Disturbance of known archaeological sites	Coulter Creek Access Road, Mitchell Pit, Water Treatment and Energy Recovery Area, and Treaty Creek Access Road	Construction	Low	Local	Far future	One-time	Irreversible	Neutral	Low	High	Not Significant (Minor)	Not required
		Operations	Low	Local	Far future	One-time	Irreversible	Neutral	Low	High	Not Significant (Minor)	Not required
Disturbance of unknown archaeological sites	All	Construction	Low	Local	Far future	One-time	Irreversible	Neutral	Low	High	Not Significant (Minor)	Not required
		Operations	Low	Local	Far future	One-time	Irreversible	Neutral	Low	High	Not Significant (Minor)	Not required

21.10.1.2 Project-specific Residual Effects on Archaeological Sites that Are Not Likely to Result in Cumulative Effects

Disturbance of the small lithic scatter archaeological sites that will be impacted by the Project are a spatially localized event that will not result in a negative effect on the condition of other archaeological sites in the region (Table 21.10-1). Further, due to the legal requirements of the HCA (1996), it is assumed that residual effects from other projects in the area will also be reduced to not significant through appropriated mitigation measures. Mitigation measures developed in consultation with the Archaeology Branch, Nisga'a Lisims Government, and affected First Nations are designed to offset the disturbance of the archaeological site through the recovery of scientific data that may not otherwise have been gathered. Therefore, no cumulative effects are anticipated due to disturbance of the VC archaeological sites by the Project or others in the area.

Table 21.10-1. Summary of Potential Linkages between KSM Project and Other Human Activities that May Affect Heritage

Action/Project		Past, Present, and Future
Past Projects	Eskay Creek Mine	NL
	Granduc Mine	NL
	Johnny Mountain Mine	NL
	Kitsault Mine (Closed)	NL
	Snip Mine	NL
	Sulphurets Project	NL
	Swamp Point Aggregate Mine	NL
Present Projects	Forrest Kerr Hydroelectric	NL
	Long Lake Hydroelectric	NL
	Northwest Transmission Line	NL
	Red Chris Mine	NL
	Wolverine Mine	NL
Reasonably Foreseeable Future Projects	Bear River Gravel	NL
	Bronson Slope Mine	NL
	Brucejack Mine	NL
	Galore Creek Mine	NL
	Granduc Copper Mine	NL
	Kitsault Mine	NL
	Kutcho Mine	NL
	McLymont Creek Hydroelectric	NL
	Arctos Anthracite Coal Project	NL
	Schaft Creek Mine	NL
	Snowfield Project	NL
	Storie Moly Mine	NL
	Turnagain Mine	NL
	Treaty Creek Hydroelectric	NL

(continued)

Table 21.10-1. Summary of Potential Linkages between KSM Project and Other Human Activities that May Affect Heritage (completed)

Action/Project		Past, Present, and Future
Land Use Activities	Agricultural Resources	NL
	Fishing	NL
	Guide Outfitting	NL
	Resident and Aboriginal Harvest	NL
	Mineral and Energy Resource Exploration	NL
	Recreation and Tourism	NL
	Timber Harvesting	NL
	Traffic and Roads	NL

NL = No Linkage (no spatial and temporal overlap, or potential effects do not act in combination)
X = Potential spatial and temporal linkage with project or action

21.11 Heritage Conclusions

Both recorded and unrecorded archaeological sites are protected by the HCA (1996) and may be directly affected during construction. Effects on archaeological sites that cannot be avoided will be mitigated through measures to be developed in consultation with the Archaeology Branch and will be carried out under a HCA permit. With avoidance and/or mitigation implemented, residual effects on known archaeological sites are anticipated to be not significant (minor). The implementation of a Chance Find Procedure prior to construction will facilitate the protection of any archaeological sites within the Project footprint not identified during the AIAs, if present, will be avoided and/or properly mitigated, and no significant adverse residual effects will result (Table 21.11-1). Due to the spatially localized nature of archaeological sites there are no cumulative effects from the Project on heritage.

Table 21.11-1. Summary of Assessment of Potential Environmental Effects: Heritage

Valued Component	Phase of Project	Potential Effect	Key Mitigation Measures	Significance Analysis of Project Residual Effects	Significance Analysis of Cumulative Residual Effects
Archaeological sites	Construction	Disturbance of archaeological sites protected by HCA.	Avoidance or mitigation approved by Archaeology Branch.	Not significant (minor)	No cumulative effects.
	Operation	Disturbance of archaeological sites protected by HCA through increased human presence.	Avoidance or mitigation during construction approved by Archaeology Branch.	Not significant (minor)	No cumulative effects.

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