22. Assessment of Potential Heritage Effects

22.1 INTRODUCTION

This chapter describes the existing environment for heritage resources for the Brucejack Gold Mine Project (the Project) and assesses the potential effects of the Project on heritage resources in a regional study area (RSA) and a local study area (LSA; Figure 22.1-1). Heritage resources are non-renewable, can be very susceptible to disturbance, and are finite in number. They are considered to be important resources that are protected for their historical, cultural, scientific, and educational value to the general public, local communities, and Aboriginal groups. The Archaeology Baseline Study and the Paleontological Baseline Study undertaken for the Project can be found in Appendices 22-A and 22-B. Additional assessments to address some Project footprint changes were undertaken in 2013; the results are included in this chapter and in the permit report for the *Heritage Conservation Act* (HCA; 1996) Heritage Inspection Permit 2013-0174 (Jollymore, Neuman and Hossain 2014).

For the purposes of this chapter, "heritage resources" are limited to those that are physical in nature, more particularly those that are designated heritage sites under the HCA. Indirect effects to "cultural heritage" are addressed in Chapter 25 (Current Use of Lands and Resources for Traditional Purposes) and cultural heritage is defined specifically as "habitations, trails, burial sites and cultural landscapes". These resources may or may not be protected under the HCA but have been identified by Aboriginal groups having cultural importance.

22.2 REGULATORY AND POLICY FRAMEWORK

The British Columbia (BC) *Environmental Assessment Act* (EAA; 2002) considers effects of a project on heritage resources. Similarly, the *Canadian Environmental Assessment Act, 2012* (2012) considers indirect effects of any change that a project may cause in the environment on any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance. As such, heritage resources are Valued Components (VCs; described further in Section 22.4) in the environmental assessment (EA) process, including protected archaeological, protected heritage, and protected paleontological resources. Applicable legislation, policy, standards, and guidelines pertaining to the protection of heritage resources are presented in this section and are summarized in Table 22.2-1.

In BC, the primary legislation protecting archaeological resources (both recorded and unrecorded) is the HCA (1996), which protects all sites predating 1846 Common Era (CE) on Crown and private land. Sites such as burials and Aboriginal rock art are protected regardless of age. The Archaeology Branch of the Ministry of Forests, Lands and Natural Resource Operations (Archaeology Branch) is the provincial ministry responsible for the administration of the HCA (1996), issuing permits for heritage inspection and site alterations, and maintaining a database of known archaeological sites. Burials and gravesites are also protected in BC by the *Cremation, Interment, and Funeral Services Act* (2004).

Archaeological baseline studies for the Project were conducted under three HCA Heritage Inspection Permits (2010-0255, 2011-0245, and 2013-0174) in accordance with the *British Columbia Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998). The Archaeology Branch forwarded copies of the HCA Heritage Inspection Permit applications and related permit amendments for archaeological assessments conducted during baseline studies for the Project to a number of Aboriginal groups/ organizations for review and comment.

Figure 22.1-1

Regional and Local Study Areas for Heritage Resources in the Brucejack Gold Mine Project

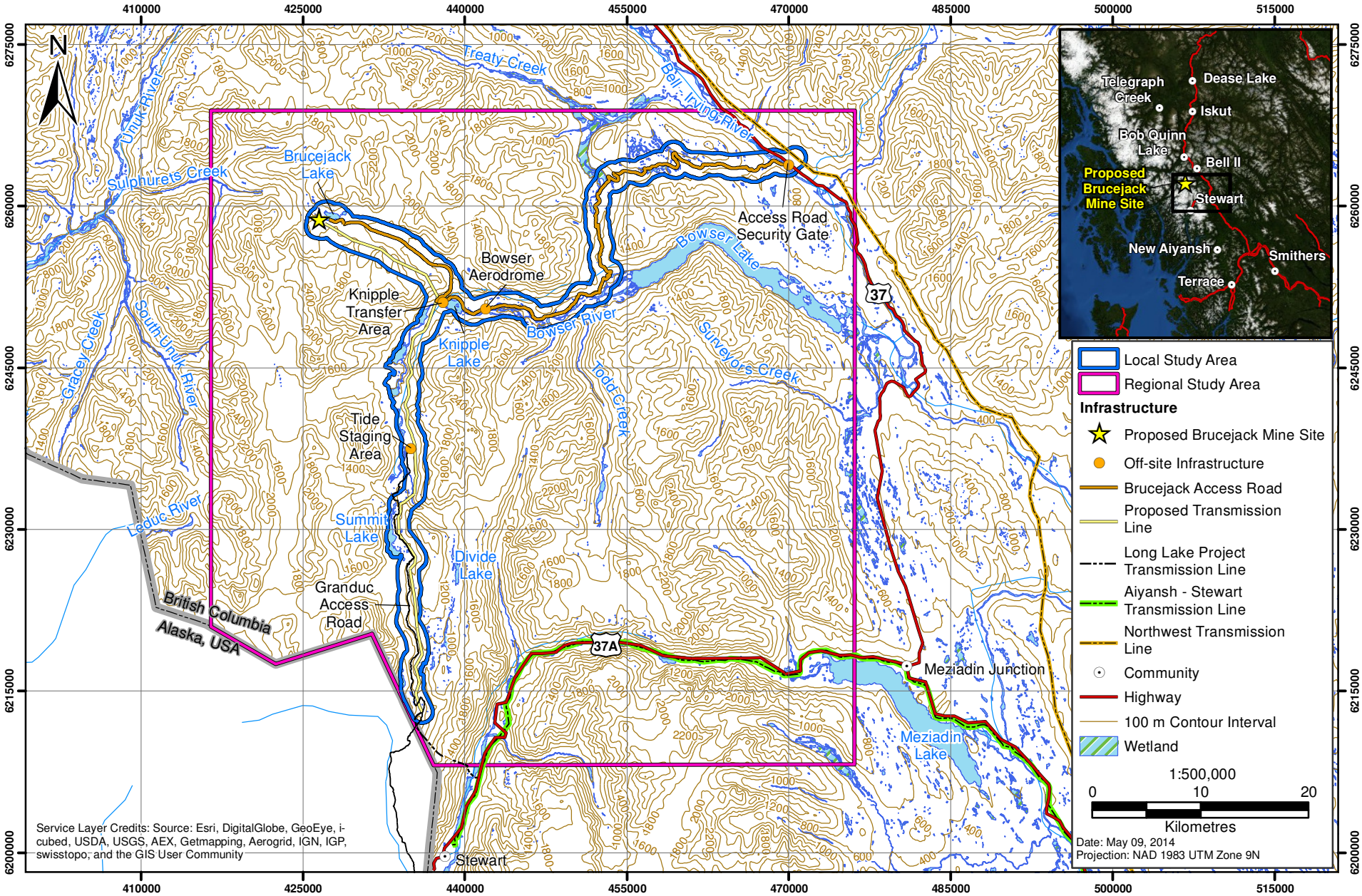

Table 22.2-1. Heritage Resources Legislation, Policy, Standards, and Guidelines

Name	Year	Type	Level of Government	Description
BC Archaeological Impact Assessment Guidelines	1998	Guidelines	Provincial	Document providing guidance pertaining to carrying out archaeological assessments and reporting on findings of work conducted in British Columbia.
Canadian Environmental Assessment Act, 2012	2012	Act	National	Section 5(d) of the act requires a federal environmental assessment of a Project before a federal authority issues a permit or licence, grants an approval or takes any other action for the purpose of enabling a project to be carried out in whole or in part. The act considers indirect effects of any change that a Project may cause in the environment on any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance.
Cassiar-Iskut-Stikine Land and Resource Management Plan	2000	Management Plan	Regional	Management plan that indicates that developments in the region are required to have an archaeological assessment conducted under the HCA (1996).
Cremation, Interment, and Funeral Services Act	2004	Act	Provincial	Legislation that protects burials and gravesites in BC.
Ecological Reserve Act	1996	Act	Provincial	The act can reserve Crown land for ecological purposes, such as areas suitable for scientific research and educational purposes and areas that contain unique and rare specimens. Such legislation can be used to protect paleontological sites.
Environment and Land Use Act	1996	Act	Provincial	The act can be used to make orders respecting environment or land use. Protected areas are created by Orders in Council; over 80 protected areas have been created using this act.
Environmental Assessment Act	2002	Act	Provincial	The act considers the effects of a project on heritage resources.
Fossil Management in British Columbia		Framework	Provincial	Framework that addresses the management and protection of paleontological sites. The framework includes elements that deal with use and protection of the resource, based on existing legislation and policy instruments and related to legislative authority and administration bodies already in place.
Heritage Conservation Act	1996	Act	Provincial	This act protects archaeological, historical, and/or paleontological sites in BC. Archaeological sites predating 1846 are protected by the act, prohibiting the destruction, excavation, or alteration of archaeological sites without a permit. The act allows the minister to issue heritage inspection permits (Section 14) to assess archaeological significance of a given area. The minster can also issue site alteration permits (Section 12) where a site has been mitigated and development will occur. Fossils protected under the act have heritage value based on their scientific and educational worth. Such sites are designated as Provincial Heritage Objects or Sites.

(continued)

Table 22.2-1. Heritage Resources Legislation, Policy, Standards, and Guidelines (completed)

Name	Year	Type	Level of Government	Description
Land Act	1996	Act	Provincial	The act is a flexible statute that can be used to protect public interests, through reservations or designations, for the conservation of natural or heritage resources (such as paleontological sites). Can also prohibit specific use of Crown land in designated areas.
Local Government Act	1996	Act	Provincial	The act can provide protection and/or other conditions for sites listed on a heritage registry that may be established under the act. For this region of the province, the Regional District of Kitimat-Stikine maintains a heritage registry.
Mineral Tenure Act	1996	Act	Provincial	Conditional reserves can be placed over sites that prevent the staking of mineral claims that interfere with paleontological materials. Conditions can also allow for mineral claims as long as the claim holder does not obstruct or endanger paleontological materials.
Nass South Sustainable Resource Management Plan	2012	Management Plan	Regional	Management plan that 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 Act* 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.
Nisga'a Final Agreement Act	2000	Act	Provincial/ National	Appendix F of the agreement lists heritage sites and key geographic features including sites of cultural and historic significance that have be designated as provincial heritage sites.
Park Act	1996	Act	Provincial	Paleontological sites are protected when located within the boundaries of a provincial park.
Tahltan Archaeological Standards	2011	Standards	Local	Developed by the Tahltan Central Council to identify items of archaeological importance for the Tahltan.

The application for Heritage Inspection Permit 2010-0255 was sent to the Gitanyow Hereditary Chiefs' Office; Gitxsan Treaty Office; wilp Skii km Lax Ha; Tahltan Central Council; huwilp Spoowk, Guuhadakw, and Yagosip; and Nisga'a Lisims Government. The application for Heritage Inspection Permit 2011-0245 was sent to the Gitanyow Band Council; Gitxsan Treaty Office; wilp Skii km Lax Ha; Tahltan Central Council; huwilp Spoowk, Guuhadakw, and Yagosip; wilp GwininNitxw; and Nisga'a Lisims Government. The application for Heritage Inspection Permit 2013-0174 was sent to the Gitanyow Hereditary Chiefs' Office; wilp Skii km Lax Ha; Tahltan Central Council; and Nisga'a Lisims Government. Copies of all final permit reports were sent to the respective groups/organizations noted above.

The Cassiar-Iskut-Stikine (CIS) Land and Resource Management Plan (LRMP) and the Nass South Sustainable Resource Management Plan (SRMP) areas overlap Project components. The CIS LRMP and the Nass South SRMP both provide guidance for the preservation of heritage sites (BC ILMB 2000; BC MFLNRO 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 (BC MFLNRO 2012) requires that the management of cultural sites be consistent with the *Gitanyow Policy Manual for Management of Cultural Resources* (Gitanyow Hereditary Chiefs 2009) and

the *Nisga'a Final Agreement Act* (2000) 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. The *Tahltan Archaeological Standards* (THREAT 2011) were also considered during baseline studies for the Project.

Additional legislation that contain sections pertaining to archaeology, or heritage resources generally, include the *Canadian Environmental Assessment Act, 2012* (2012) and the *Local Government Act* (1996). If applicable to a project, the *Canadian Environmental Assessment Act, 2012* includes a requirement to consider the effects of a project on physical or cultural heritage; this act is applicable to the Project. The *Local Government Act* (1996) can also provide protection and/or other conditions for sites listed on a heritage registry that may be established under the act; the Regional District of Kitimat-Stikine maintains a heritage registry for this region of the province.

While there is no specific legislation in BC that protects paleontological sites, the provincial government has developed a Fossil Management Framework (Land Tenures Branch n.d.). The protection of fossil sites may be considered where a site is scientifically significant or threatened by exploitation or development. Such sites must be subject to a paleontological assessment to evaluate their scientific importance, uniqueness, and physical extent. Sites in BC can be protected by a number of existing mechanisms including the *Land Act* (1996), HCA (1996), *Mineral Tenure Act* (1996), *Park Act* (1996), *Ecological Reserve Act* (1996), *Environment and Land Use Act* (1996), and *Environmental Assessment Act* (2002), and are typically considered on a case-by-case basis. In addition, paleontological sites are a resource considered under the *Canadian Environmental Assessment Act, 2012* (2012).

22.3 BASELINE CHARACTERIZATION

Heritage resources for the Project were established during baseline studies. Archaeological baseline data were collected under three HCA Heritage Inspection Permits: 2010-0255, 2011-0245, and 2013-0174 (Walker and McKnight 2011; Jollymore and Walker 2013; Jollymore, Neuman, and Hossain 2014). The scope and methodology for these Archaeological Impact Assessments (AIAs) are consistent with the Project Application Information Requirements (AIR; BC EAO 2014) and federal Environmental Impact Statement Guidelines (EIS Guidelines) for the Project (CEA Agency 2013a).

The results of final permit reports 2010-0255 and 2011-0245 have been compiled in the *2012 Archaeology Baseline Report* (Appendix 22-A) and the findings from all archaeological assessments undertaken for the Project area are summarized below. Additional assessments to address some Project footprint changes were undertaken in 2013; these results are also summarized below and in the permit report for HCA Heritage Inspection Permit 2013-0174 (Jollymore, Neuman, and Hossain 2014). Final permit reports have not been appended to this application due to the sensitive nature of archaeological site locational information. The final permit reports detailing the results of the AIAs are on file with the Archaeology Branch.[1] A desktop review of paleontological potential was also conducted during baseline studies (Appendix 22-B).

22.3.1 Regional Overview

Background research for the heritage resources baseline studies focused on information on paleoenvironmental and current environmental conditions, as well as ethnographic, historic, paleontological, and archaeological studies, reports, and records for the RSA and surrounding region. Data obtained from the BC Archaeological Site Inventory, the Regional District of Kitimat-Stikine

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

Community Heritage registry, and publically available traditional land use and knowledge studies, including those undertaken for the Project, were reviewed. Other literature, including Appendices F and L of the *Nisga'a Final Agreement Act* (2000), were also reviewed. This information provided an understanding of the regional heritage resources setting for the Project.

22.3.1.1 Paleoenvironmental Setting

During the late Wisconsinan glaciation glacial maximum (20,000 to 16,000 BP), the region was covered by the Cordilleran Ice Sheet with small areas of ice-free land (*nunataks*), which may have protruded through the ice sheet. During the early Holocene epoch the warmer climate caused the Cordilleran Ice Sheet to recede. Information from the lower Skeena Valley indicates that rapid glacial recession in the region began about 15,000 years ago. This resulted in the re-deposition of material collected in the glaciers as moraines and outwash. By 9,500 BP, the extent of the remaining glaciers in the region were likely similar to present (Fladmark 2001).

Within the RSA, Bowser Lake was created during the Holocene as the Wisconsinan ice retreated westward from the Bowser River Valley. Alluvial deposits accumulated at the mouth of Surveyors Creek and along the Bell-Irving River and constricted the outflow of Bowser Lake at its eastern end. In addition, thick layers of sediments were deposited in the lake as a result of *jökulhlaups* (glacier outburst floods) from upstream and the Bowser River floodplain advanced into Bowser Lake during the Holocene. Holocene lake levels appear to have been higher than current levels, as sediments were deposited at its western end and the alluvial fan of Surveyors Creek at its eastern end grew and fill accumulated in the Bell-Irving Valley. These alluvial deposits at the lake's eastern end were ultimately incised by the Bowser River, leaving a series of terraces, and led to the eventual lowering of the lake level (Gilbert, Desloges, and Clague 1997).

Following the initial glacial recession, pioneer plant species well adapted to the cool, dry environment thrived (e.g., lodgepole pine, shrubs, willow; Clague 1989). From 8,200 to 3,500 BP the diversity of flora increased with Sitka spruce, mountain and western hemlock, and alder becoming established in new areas (Heusser 1960). A caribou antler dated to approximately 3,760 BP located in a snow patch near the Iskut-Ningunsaw confluence suggests that the winter range of caribou had extended further west during the warmer drier Hypsithermal interval. Increasing snowfall beginning ca. 4,000 BP forced the caribou eastwards (Ryder 1987). Over the past 6,000 years the upper Bowser watershed, which drains into the southeastern portion of the RSA, has experienced several periods of wetter, cooler temperatures, including a major glacial advance (2,800 to 2,200 BP) and the recent "Little Ice Age" that began approximately 500 BP and peaked in the early to mid-seventeenth century (Clague and Mathewes 1996). During this period, the Bowser River was dammed by the Knipple Glacier and the large unnamed glacier between the Knipple and Frank Mackie glaciers. Flooding of the lower Bowser Valley may have been caused by breaches in these ice dams or recession of these glaciers (Clague and Mathews 1992).

Neoglacial activity had significant impacts on the landscape, particularly around proglacial Tide and Summit lakes. During the Pleistocene, large proglacial lakes, such as these, had a major influence on ice sheets and climate in the Northern Hemisphere (Clague and Mathews 1992).

Tide Lake was the largest ice-dammed lake in BC; situated between Berendon Glacier and Frank Mackie Glacier. At its peak, the lake was 9 km long, nearly 2 km wide, and approximately 200 m deep at its ice dam at the Frank Mackie Glacier (Plate 22.3-1). Water may have regularly escaped north out of the lake along high bedrock channels at the glacier's eastern edge or seeped through the ice dam draining into Bowser River. The lake was known to periodically drain suddenly during the nineteenth and twentieth centuries due to rapid tunnel enlargement at the base of the ice dam. This caused catastrophic floods downstream in the Bowser Valley. In the late 1800s, a flood was reported to have

completely destroyed an Aboriginal settlement that was never reoccupied (Clague and Mathews 1992). In 1931, the ice dam was breached for the last time due to thinning of the glacier, and Tide Lake emptied. Heavily silted water scoured the Bowser Valley and flowed down the Nass River to Observatory Inlet where it impacted the commercial fishery, sinking fishing nets due to the extra weight of the silty water (McLeod and McNeil 2004). A small lake persisted against the moraine left by the receding toe of Frank Mackie Glacier until 1990. The upper reaches of Bowser River and Betty Creek now flow across what was once the lake bed and have incised channels up to 30 m deep in the sediments left by the proglacial lake (Clague and Mathews 1992).

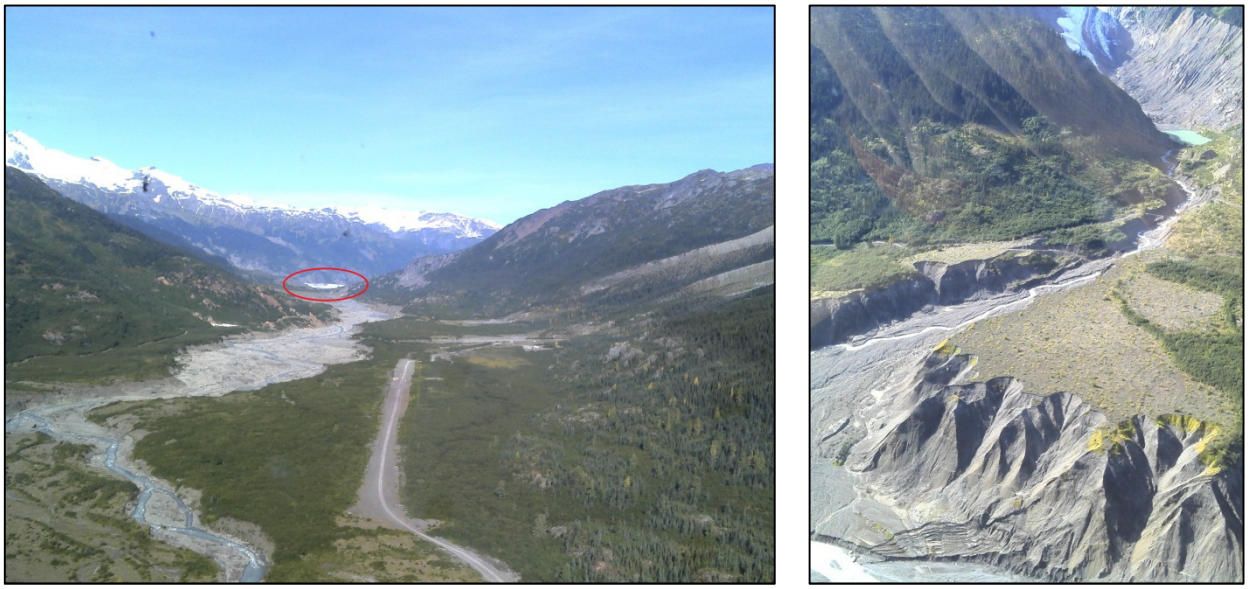

Plate 22.3-1. Tide Lake Flats. Left: View north toward Frank Mackie Glacier (note by red circle). Right: Deeply incised proglacial lake sediments at the northwestern end of the lake basin.

Summit Lake, situated between the northern arm of the Salmon Glacier and just south of the Berendon Glacier, has had a similar, though more recent, history. The lake had drained stably to the north into the Bowser River; however, in 1961, the lake drained suddenly and unexpectedly to the south through a 12-km melt tunnel beneath the Salmon Glacier, due to the glacier's thinning ice. The resulting flood released a huge amount of water into the Salmon River, badly damaging the Granduc Access Road and washing out a bridge. The lake now fills and drains annually, though much less dramatically than the 1961 flood. The reduction of ice pressure now favours the formation of a drainage tunnel that releases water from Summit Lake into the Salmon River, generally during the summer months (Clarke and Holdsworth 2002).

Volcanism associated with the Lava Fork and Second Canyon cones, to the southwest of the RSA, significantly shaped the upper Unuk region during the Holocene. The Lava Fork volcano is believed to be the most recently active volcano in Canada, last erupting approximately 150 years ago. During the Holocene, at least three flows of lava emanated from Lava Fork creating a number of lakes, including Blue Lake in Alaska and Lava Lake in British Columbia. The canyon at the confluence of the Unuk and Blue rivers was created when a flow of lava crossed the valley. Similarly, undated lava flows from the Second Canyon Cone created the second and third canyons on the Unuk River (Hauksdottir, Enegren, and Russell 1994; Oregon State University n.d.).

22.3.1.2 Biophysical Setting

The RSA falls primarily within five biogeoclimatic zones: Coastal Mountain-heather Alpine, Boreal Altai Fescue Alpine, Engelmann Spruce – Subalpine Fir, Mountain Hemlock, and Interior Cedar Hemlock. A brief summary of the biogeoclimatic zones is presented below. For specific information pertaining to the fauna and flora found in the RSA, please refer to Chapters 16 and 18 of this document, Assessment of Potential Terrestrial Ecology Effects and Assessment of Potential Wildlife Effects, respectively, and to the *2012-2013 Terrestrial Ecosystems Baseline Studies* report (Rescan 2013a) and *Wildlife Characterization Baseline Report* (Rescan 2013e), prepared for the Project.

The Interior Cedar Hemlock (ICH) zone is the lowest elevation zone within the RSA located along the Bell-Irving River, around Bowser Lake, along lower Scott Creek, and extending west along lower Wildfire Creek. The ICH zone is characterized by cool wet winters and warm dry summers. The dominant tree species are western hemlock and subalpine fir, though Roche spruce, a hybrid of Sitka and white spruce, are also found. Of the annual precipitation in the ICH zone, 25 to 50% falls as snow. Black and grizzly bears are the most common large animals found in this zone; the bears' diet consists primarily of salmon, as well as the abundant Alaskan blueberries and black huckleberries during the summer and fall (Meidinger and Pojar 1991).

The Engelmann Spruce – Subalpine Fir (ESSF) zone is located around Todedada Lake, upper Scott Creek, and upper Wildfire Creek. The ESSF zone is characterized by long cold winters with a short growing season. Engelmann spruce and subalpine fir are the dominant tree species. More than half of the annual precipitation falls as snow, resulting in a deep snow pack that is often several metres thick. 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 goat and golden eagle are common to the ESSF, but are typically found along south-facing terrain (Meidinger and Pojar 1991).

The Mountain Hemlock (MH) zone is located along the Brucejack Transmission Line and along the western edge of the Knipple Glacier. Mountain hemlock and amablis fir are the dominant tree species, though at higher elevations the forest cover decreases becoming subalpine parkland with a patchy distribution of subalpine fir trees. The MH zone has a short growing season with 700 to 5,000 mm of annual precipitation, 20 to 70% of which falls as snow. Wildlife is less diverse than in other zones due to its typically steep, rugged landforms and glaciers. Large mammals 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 Coastal Mountain-heather Alpine (CMA) zone is located in portions of the RSA around Brucejack Lake and along the Brucejack Transmission Line. The CMA is home to ice fields and glaciers, as well as alpine meadows and tundra. The treeline in this environment is at lower elevations due to the heavy and prolonged winter snow cover. Within the RSA, the treeline consists of stunted mountain hemlock and subalpine fir *krummholz* tree patches. Summer temperatures are cool due to maritime influences and the harsh winter climate limits use of the alpine environment by wildlife in many areas. Within the CMA, areas in the lee of the Coast Mountains are home to some of the densest populations of mountain goat in the world. Caribou and bighorn sheep also occur here. During the summer and fall grizzly bear forage in the alpine meadows (Meidinger and MacKenzie 2006).

The Boreal Altai Fescue Alpine (BAFA) zone is located in the high alpine area of the RSA above the CMA. This zone is largely composed of glaciers and ice patches. The BAFA vegetation consists largely of dwarf willows, grasses, sedges, and lichens. Both small mammals such as the hoary marmot, arctic ground squirrel, and Siberian lemming, and larger mammals including Stone sheep, mountain goat, grizzly bear, gray wolf, and wolverine, spend time in the BAFA zone (Meidinger and MacKenzie 2006).

22.3.1.3 Cultural Setting

The information presented below is provided as a brief overview of the cultural setting of the region.

During the review of the HCA Heritage Inspection Permit applications to conduct AIAs for the Project (permits 2010-0255, 2011-0245, and 2013-0174), the Archaeology Branch identified the following First Nations with an interest in the RSA: Skii km Lax Ha, Gitanyow, Gitxsan, and Tahltan. The AIA study areas also fell within the Nass Area as defined by the *Nisga'a Final Agreement Act* (2000). For more information on current land use, refer to Chapter 20, Assessment of Potential Social Effects, and to the *Non-traditional Land Use Baseline* (Rescan 2013c), *Skii Km Lax Ha Traditional Knowledge and Traditional Use Report* (Rescan 2013d), and *Ethnographic Overview Report* (Rescan 2013b), prepared for the Project.

The history of this part of the province includes people from two broad language groups who utilized the region, the Tsimshian and Athapaskan, both of which are briefly described in this section. The Gitanyow First Nation, Gitxsan Nation, and Nisga'a Nation speak dialects of the Tsimshianic language. The Gitanyow traditional territory is situated in the upper Skeena River watershed and along the Kitwanga River, the Gitxsan traditional territory is also situated in the upper Skeena River watershed, and the Nisga'a Treaty lands are situated in the lower Nass River watershed (YDLI 2006; Rescan 2013b).

The Nisga'a Nation signed a treaty with Canada and BC in 1998, the *Nisga'a Final Agreement* Act (2000), which came into effect on May 1, 2000. Key provisions included in the treaty were the transfer of Crown Land to the Nisga'a Nation, the establishment of a water reservation, the protection of Nisga'a interests (such as fishing and wildlife harvesting) in the Nass Area and Nass Wildlife Area, the establishment of Bear Glacier Provincial Park, and the designation/protection of the Treaty Creek Site (HdTj-1; see Previous Archaeological Studies and Recorded Sites section below), among others.

The Tahltan and Tsetsaut speak (or spoke) dialects of the Athapaskan language. The Tahltan traditional territory is situated in 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). Ethnographic accounts suggest that the population of the Tsetsaut went into decline in the early twentieth century, and the remaining members of this group may have been incorporated into neighbouring groups (Boas 1895, 1896, 1897; Duff 1959, 1981; Sterritt et al. 1998; YDLI 2006). The Tsetsaut occupied the area around Observatory Inlet, Portland and Behm canals, and inland regions around Meziadin Lake and the Nass, Skeena, and Stikine rivers.

The Skii km Lax Ha refer to their traditional territory as Laxwiiyiip or Eastern Tsetsaut and assert that their traditional territory extends from the north side of Cranberry River, along the Nass and Bell-Irving rivers to Ningunsaw Pass with historical and current use extending as far northwest as the Iskut River. The Aboriginal people in this region from the Tsimshianic and Athapaskan language groups share similar social and cultural patterns. These common traits were developed to sustain their lifestyle in the upper Nass, Skeena, and Stikine watersheds with similar demands from climate, resource availability, and movement of large game. Access to the coast, rivers, and mountains in the region had a strong influence on land use patterns for these groups. Salmon fishing played a central role for these groups, which allowed for village sites to develop around important fishing locations, while hunting and trapping in winter months was common. Plant and berry gathering was also an important activity providing food resources, as well as medicinal resources and utilitarian materials (Duff 1981; Halpin and Seguin 1990; MacLachlan 1981; Rescan 2013d).

Detailed ethnographic information on these First Nations and Nisga'a Nation can be found in the following sources: Adams (1973), Albright (1980, 1982, 1983, 1984), Barbeau (1929, 1950a, 1950b), Benyon (1941), Berthiaume (1999), Daly (2005), Dawson (1887), Drucker (1965), Duff (1959, 1964, 1981),

Dunn (1995), Emmons (1911), Friesen (1985), Garfield (1931, 1939), Gitxsan Chiefs' Office (n.d.), Halpin (1973), Halpin and Seguin (1990), Hodge (1912), Inglis, Hudson, Rigsby, and Rigsby (1990), Jenness (1927), MacDonald and Cove (1987), MacLachlan (1981), McDonald (2003, 2006a, 2006b), McIlwraith (2007), McNeary (1976), Menzies (2006), Miller (1997), Miller and Eastman (1984), Morice (1893), People of 'Ksan (1980), Sapir (1915, 1920), Seguin (1984, 1985), Shortridge (1919), Sterritt et al. (1998), Teit (1906, 1912, 1956), Thompson (2007), Thorman (n.d), and White (1913).

22.3.1.4 Historical Setting

This section provides a summary of some of the historical events that have helped shape the history and use of the region. The remoteness of the RSA from early post-contact administrative, missionary, and fur trade centres has resulted in a relatively short and recent period of time being documented by written accounts. As late as 1911, the RSA is shown on maps as a blank area missing key geographic features such as Bowser Lake (British Columbia Department of Mines 1912). However, the region has seen intensive mineral exploration activity through the twentieth century. A summary of the earliest mineral exploration projects is provided here, while a summary of more recent mineral exploration and mining operations is provided in Section 22.2.3.

Communication

With the need for more efficient and expedient communication between North America and Europe, attempts to connect the two continents by telegraph were undertaken in the mid-1860s. Perry McDonough Collins undertook the construction of a telegraph line in 1865, which was expected to cross approximately 1,300 km of BC (beginning in New Westminster), pass across approximately 2,900 km of Russia-America (Alaska), cross under the Bering Strait, and continue across approximately 11,200 km of Russia, terminating in Europe. Construction on the project was started in the summer of 1865 and continued until March of 1867 when the success of the telegraph cable across the Atlantic Ocean rendered the project unnecessary. Despite the short lifespan of the project, significant efforts had been spent to locate and clear a suitable route for the proposed line with crews working from the north and the south (Robb 1966).

By the time the project was abandoned, work on the southern portion of the line was more complete than that of the north. In the south, the telegraph line had been strung and maintenance cabins were established between New Westminster and Kispiox. However, in the north, exploration and surveying were still underway. In January of 1867, James Schaft led a survey crew, which departed from Buck's Bar on the Stikine River, and travelled south to within 20 miles (32 km) of the Bell-Irving River before their provisions ran out. Schaft set up camp and sent two members of his party, Miller and Rankin, south to attempt to purchase salmon from the local Aboriginal people. Miller and Rankin travelled along the Bell-Irving River for seven days, past the RSA, likely reaching Meziadin Lake before they turned back unable to find anyone to trade with. In March and April, P. J. Leech and another survey party retraced Miller and Rankin's path down the Bell-Irving River, passing Bowser Lake, before reaching Grease Harbour at the mouth of the Nass River in May of 1867 (Sterritt et al. 1998).

The need for improved communication to the region was recognized again during the Yukon Gold Rush in 1897. In 1899, the Dominion Government undertook to complete the telegraph line from Quesnel to Atlin, completing the project in 1901 (Newman 1995; Miller 2004). From Hazelton to Telegraph Creek, the route passes through rugged terrain with the line running up the Kispiox and Skeena rivers, crossing the Nass and Bell-Irving rivers, and paralleling the Iskut River until turning northwest where it ran up Raspberry Pass to Mess Creek and on to the Stikine River. Due to the difficult terrain through this section, 13 stations/cabins were established to provide line maintenance.

Mineral Exploration and Mining

With the onset of the Cassiar Gold Rush in the 1870s, the provincial government sponsored surveys in 1874 and 1875 to identify a land route to the Cassiar gold fields. In 1875, a survey party travelled south from the Stikine River through the Klappan drainage to Gitanyow village. With a Gitanyow guide they travelled north up the Nass and Bell-Irving rivers reaching Bowser Lake on August 14, 1875 (Sterritt et al. 1998).

During the 1880s, prospectors were extracting gold from the gravels of Sulphide (Sulphurets) Creek accessing their claims using a foot trail they had blazed along the north bank of the Unuk River from Burroughs Bay, Alaska (British Columbia Department of Mines 1904, 1936). In 1893, placer gold was found in the region and Ketchikan-based prospectors headed to the area during the 1890s (British Columbia Department of Mines 1936). The 1903 Minister of Mines Report (British Columbia Department of Mines 1904) stated that a prospector who had worked on Sulphurets Creek for the previous eight years had recovered coarse gold deeming the region to be worthy of development if the transportation issue could be solved.

The 1920s and 1930s were the heyday of mineral exploration in the region (Plate 22.3-2). Many exploration and mining projects were underway in the hills around the Salmon River. Some of the more notable projects included: the Big Missouri Mine north of Hyder (responsible for the Long Lake dam); the East Gold Group, which staked claims along the western perimeter of Tide Lake after it drained for the last time in 1931; the Mountain Boy Group on lower American Creek; the Morris Summit Mine just east of Summit Lake (in the 1940s this mine was renamed Scottie Gold); and the Dunwell Mine, which was north of Stewart in the Bear River Valley, among countless other exploration projects that have left their mark on the landscape (McLeod and McNeil 2004).

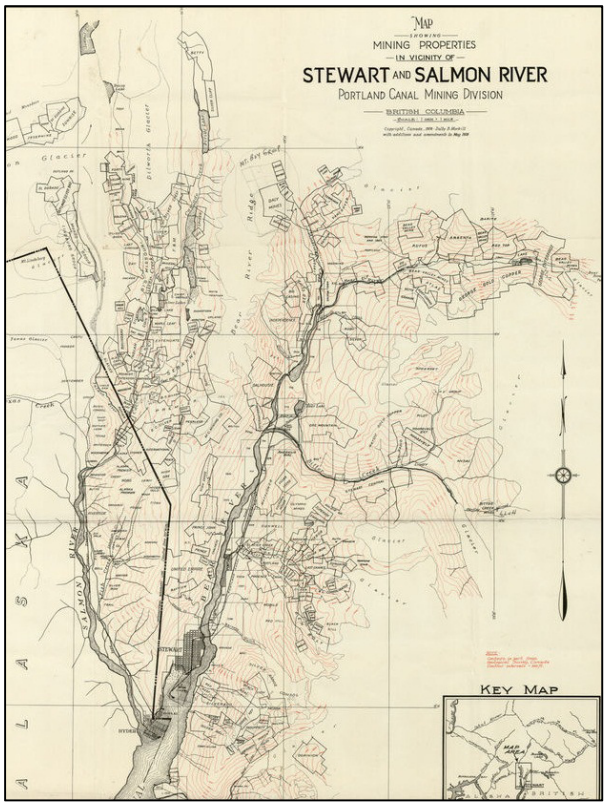

Plate 22.3-2. Portion of a 1929 map of mineral claims in the Stewart and Salmon River area (Morkill 1929).

The Premier Mine has been responsible for much of the prosperity of the towns of Stewart and Hyder since it started mining gold and silver in the early 1900s, and its production record makes it one of the most productive precious metal mines in BC (McLeod and McNeil 2004). The area was first staked in 1910, and after hitting high-grade ore, the property went into production in 1919. By 1921, mine facilities and camps, as well as a tramline, were in place. In the 1930s, the mine had approximately 200 employees and the area around the mine had developed into a small self-contained town. In 1936, ore grades began to deteriorate, but the mine continued to operate until 1952 when it was closed due to low metal prices. The mine was reopened in 1956 and operated sporadically until 1967. In 1987 Westmin Resources reopened the mine and operated it until the mid-1990s (McLeod and McNeil 2004). Currently, the mine is being assessed for redevelopment by Ascot Resources Ltd. (Ascot n.d.).

In the fall of 1928, prospectors staked claims along the north side of Treaty Creek (formerly 20 Mile Creek), with the claims being 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 (British Columbia Department of Mines 1923, 1932). Around the same time, in 1929, interest in the mineral potential of the Unuk River watershed resulted in an influx of prospectors based in Ketchikan and Stewart. Interest in the region continued with prospectors exploring the source of the Bell-Irving River; however, despite reporting encouraging results, there are few records of any further work (British Columbia Department of Mines 1933).

Transportation

The Stewart-Cassiar Highway, Highway 37, roughly parallels the eastern side of the RSA and runs through its northeastern corner. The highway runs north from Hazelton to the Yukon/BC border and has a branch, Highway 37A, from Meziadin Lake to Stewart. The construction of the highway commenced in 1956 and was completed in 1972 (BC MOT 2000; McLeod and McNeil 2004). With the discovery of asbestos in the Cassiar District, the original highway project was intended as an access route to move the asbestos to the shipping port in Stewart, at the head of Portland Canal. The highway joined several other rudimentary logging roads at Meziadin Junction, thereby linking Hazelton to the north and provided a major alternative to the Alaska Highway (Harvey 1999).

Borders, Parks, and Protected Areas

The Alaska-BC border lies to the west of the Project and forms the southwestern corner of the RSA. Until the early 1900s, the location of the boundary line was the cause of much confusion and international dispute. Alaska was once owned by Russia, a right based on their establishment of trading posts along the coast (e.g., Fort Wrangell, later known as Fort Stikine), which was confirmed in a treaty between Great Britain and Russia in 1825. The United States purchased Alaska from Russia in 1867, inheriting maps and generalized boundary definitions that differed from the boundary BC believed to be in place. The dispute was finally settled in 1903 by a tribunal between the United States, Canada, and Great Britain. Preliminary survey work for the boundary established by the tribunal was underway the following year. Between 1907 and 1914 survey crews worked on marking the actual boundary and placed 200 permanent monuments along the boundary line between Mount St. Elias and Demarcation Point on the Arctic Ocean (FitzGerald 1951; Farr n.d.).

The first parks in the region were established in the 1970s, including Misty Fjords National Monument, southwest of the RSA in Alaska (established 1978; National Parks Service 2003) and the Ningunsaw Ecological Reserve in BC (established 1975; BC Parks 2011a). In 2001, the CIS LRMP established Ningunsaw Provincial Park adjacent to the Ningunsaw Ecological Reserve and Border Lake Provincial Park along the Unuk River at the Alaska-BC border (BC Parks 2011b, 2011c).

22.3.1.5 Paleontological Setting

Paleontological studies conducted in this region of northwestern BC have focused on working out regional stratigraphy and chronology (see review from Evenchick et al. 2001), but there have also been a number of discoveries that have expanded known diversity of marine life in both the Paleozoic and Mesozoic eras. The Bowser Basin, in particular, has produced recent finds of dinosaur tracks, turtle fossils, and plant remains (Evenchick et al. 2005). The Geological Survey of Canada; the Geological Branch of the BC Ministry of Energy and Mines; the Royal British Columbia Museum; and Simon Fraser University have undertaken helicopter-supported paleontological field trips into the Bowser and Sustut basins, targeting potential fossils in the region. In addition, reconnaissance was undertaken in the late 1980s in the Unuk River-Salmon River-Anyox Area, during which several fossils were documented on the western side of Mount Dilworth (Grove 1986). To date, no significant fossils have been found within the LSA or RSA.

22.3.1.6 Previous Archaeological Studies

Previous archaeological investigations in the RSA, which took place prior to the AIAs conducted for the Project, included an assessment of the KSM Project located immediately to the north (Farquharson et al. 2012; Seip, McKnight et al. 2012), an assessment for BC Hydro's Northwest Transmission Line (NTL) located immediately east of the RSA (final report still in progress; see documentation for HCA Heritage Inspection Permits 2007-200, 2007-258 on file with the Archaeology Branch), an assessment of a proposed road alignment to the Sulphurets property developed by Newhawk Gold Mines Ltd. (Bussey 1987a, 1987b), an assessment of the Eskay Creek Mine (Rousseau 1990), an assessment of a road alignment to the proposed Iskut River Valley Mine (Brolly 1990), an archaeological overview assessment conducted for the upper Bell-Irving watershed (Pegg and Dodd 2007), and an assessment of Kalum and North Coast District Forestry blocks (Marshall, Marr, and Palmer 2008).

Studies conducted in the broader region were also considered in order to place archaeological sites in the RSA within 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 2007-0200 and 2007-0258; data on the Remote Access to Archaeological Data online application and other publically available information on these projects were reviewed when practicable.

Additionally, there are two locations near Bowser Lake that may have archaeological value. The first is Cache Point, the prominent point of land on the south side of Bowser Lake. The origin of the place name is not known, but the name has been in use since at least 1930 CE, and may relate to the use of this location by surveyors or Aboriginal peoples as a food or supply cache (GeoBC 2011). The second is an ethnographically documented village site located near Bowser Lake. The village is referred to by a number of names including *Aw-wee-zah* (Duff 1959), *Owidza* (Albright 1984), and "Tal Tan village" (Sterritt et al. 1998). The village may have been located near the eastern end of the lake (Albright 1984); however, its location is only roughly known from oral histories and historic accounts.

22.3.1.7 Regional Heritage Sites

In 2008, a Community Heritage Registry was established for the Regional District of Kitimat-Stikine. The registry is an official list of important historic places in the district. For each site, a Statement of Significance detailing the heritage values and defining characteristics has been prepared. The eight sites currently on the Heritage Registry are: Telegraph Creek Townsite, Hagwilget Canyon Bridge, Old

Skeena Bridge, Butedale Cannery, Anyox Powerhouse, Yukon Telegraph Line, Simon Gunanoot Gravesite, and Meziadin River Fish Ladders.

Simon Gunanoot Gravesite, situated at Graveyard Point on the northern shore of Bowser Lake, is the only site on the Community Heritage Registry located within the RSA. This location is recorded under the HCA (1996) as archaeological site HcTj-1. The burials are not in proximity to any current Project components (see Section 22.3.4).

22.3.2 Historical Activities

Several historical and current human activities are within close proximity to the proposed Project area. These include mining exploration and production, hydroelectric power generation, forestry, and road construction and use.

The Granduc Mine was a copper mine located approximately 25 km south of the Project; it operated from 1970 to 1978 and 1980 to 1984. The mine included underground workings, a mill site near Summit Lake and an 18.4-km tunnel connecting them. In addition, a 35-km all-weather access road was built from the communities of Stewart, BC and Hyder, Alaska to the former mill site near Summit Lake. The area of the former mill site near Summit Lake is currently used as staging for several mineral exploration projects in the region. The terminus of the Granduc Access Road is 25 km south of the proposed Brucejack Mine Site and is currently used by mineral exploration traffic and tourists accessing the Salmon Glacier viewpoint.

The Sulphurets Project was an advanced underground exploration project of Newhawk Gold Mines Ltd. located at the currently proposed Brucejack Mine Site. Underground workings were excavated between 1986 and 1990 as part of an advanced exploration and bulk sampling program. Reclamation efforts following the Newhawk Gold Mines Ltd. advanced exploration work included deposition of waste rock and ore within Brucejack Lake.

The exploration phase of the proposed Brucejack Gold Mine Project commenced in 2011 and has included a drilling program, bulk sample program, construction of an exploration access road from Highway 37 to the west end of Bowser Lake, and rehabilitation of an existing access road from the west end of Bowser Lake to the Brucejack Mine Site.

In 2010, construction began on the Long Lake Hydroelectric Project, which is located approximately 42 km south of the Project. It includes redevelopment of a 20-m-high rockfill dam located at the head of Long Lake, and a new 10-km-long 138-kV transmission line.

Historical forestry activities occurred within the immediate Project area between Highway 37 and Bowser Lake, south of the Wildfire Creek and Bell-Irving River confluence. Additional details regarding historic and current human activities nearby the Project are included in Chapter 20, Assessment of Potential Social Effects.

Previous archaeological investigations in northwestern BC have been undertaken for mining, hydroelectric, and other developments. Large-scale research projects focusing primarily on major rivers (e.g., Stikine, Tahltan, Iskut, Nass, and Klappan) and within Mount Edziza Provincial Park have also been undertaken. As a result, several hundred archaeological sites have been recorded in the region; however, prior to the AIAs for the Project, very little archaeological investigation had been conducted in the RSA. Early mineral exploration conducted within the RSA predated heritage protection legislation (see Section 22.3.1.4); however the effects of these activities on heritage

resources are considered to be low based on an understanding of the relatively low density of archaeological materials in the region and the geographic scale of these projects.

22.3.3 Baseline Studies

Archaeological baseline studies were undertaken for the Project during the 2010, 2011, 2012, and 2013 summer field seasons and in early 2014 to determine if additional protected archaeological sites or protected historical sites were present within the LSA. In addition, a desktop paleontological baseline was undertaken in 2013 to determine if protected paleontological sites were present in the LSA.

Archaeological baseline studies were conducted under HCA Heritage inspection Permits 2010-0255, 2011-0245, and 2013-0174, which were issued for the Project (Walker and McKnight 2011; Jollymore, Neuman and Hossain 2014, Jollymore and Walker 2013). The objectives of these studies were consistent with those outlined in the permit applications, which were to:

- identify and evaluate any archaeological sites within and adjacent to the proposed development's footprint;
- identify and assess possible impacts from the proposed developments on any identified archaeological sites;
- provide recommendations regarding the need for and appropriate scope of further archaeological studies before initiating any proposed developments; and
- recommend viable alternatives for managing adverse impacts, if any are identified.

A cumulative archaeology baseline report was also compiled for the Project for archaeological assessments carried out between 2010 and 2012 (Appendix 22-A). The objects of the baseline report were to:

- compile a review of previous archaeological work that may provide a regional context;
- provide a summary of the work conducted during the AIAs carried out for the Project; and
- identify any archaeological sites within or adjacent to the Project footprint.

The objectives of the paleontological baseline study (Appendix 22-B) were to:

- compile a review of the geologic formations within the RSA to provide a regional context for paleontological potential; and
- identify any known, documented, and/or protected paleontological sites with the RSA and LSA.

A summary of the data sources that supported the baseline studies, methods used, and a description of the study area are provided in this section.

22.3.3.1 Data Sources

Prior to conducting the field component of the archaeological baseline studies, background information was first reviewed for the region surrounding the proposed Project, as described in Section 22.3.1. Sources of regional and historical data used to support baseline studies focused on examining documentary data including ethnographic, historic, environmental, and archaeological studies, reports, and records, including a search of the British Columbia Archaeological Site Inventory using the Remote Access to Archaeological Data (RAAD) application. When available, First Nations and Nisga'a Nation land use and knowledge reports were reviewed, and Appendices F and L of the *Nisga'a Final Agreement Act* (2000) were reviewed. Environmental data from a variety of baseline studies conducted for the

Project (including wildlife, fisheries, terrain and ecosystem mapping, water quality, traditional use and knowledge, and land use) helped to inform the heritage study, as well as publically available reports for Seabridge Gold Inc.'s KSM Project, which is situated to the north of the Project (Rescan 2013f).

For the paleontological baseline study, data sources pertaining to the region were reviewed. The review focused on examining documentary data including environmental, geological, and paleontological reports and records.

22.3.3.2 Methods

Baselines studies undertaken for heritage resources included archaeological impact assessments conducted under HCA Heritage Inspection Permits 2010-0255, 2011-0245, and 2013-0174 and a desktop paleontological review. The study area and methods used for these baseline studies are summarized in this section.

Baseline Study Area

Archaeological and paleontological baseline studies for the Project were focused within the LSA while considering relevant information for the RSA to help inform the studies. The LSA included a 1-km buffer on either side of the proposed Project footprint, which included the access road from Highway 37 to the current Brucejack Camp, proposed Project infrastructure related to the development of the Brucejack mineral deposit and the Brucejack Transmission Line, which would provide power from the Long Lake Hydroelectric Project near the Premier Mine. The RSA included an area from Highway 37 to Sulphurets Creek, and included portions of the Bowser River, Sulphurets Creek, and Treaty Creek watersheds. The LSA and RSA are illustrated in Figure 22.1-1.

Archaeological Impact Assessment Methodology

The AIAs undertaken for the Project were conducted in accordance with the *Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998) and the methodology outlined in the permit applications for HCA Heritage Inspection Permits 2010-0255, 2011-0245, and 2013-0174 (Walker and McKnight 2011; Jollymore, Neuman and Hossain 2014; Jollymore and Walker 2013). The general methodology for these permits is described below.

Assessment of Archaeological Potential

The archaeological field survey focused on those areas within the LSA that were identified as having moderate or higher potential for containing archaeological sites. The archaeological potential was assessed 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 micro-environmental 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.

Additionally, an archaeological potential model created for Timber Baron Contracting Ltd. as part of an Archaeological Overview Assessment (AOA) of the upper Bell-Irving watershed, was reviewed, which included the RSA (Pegg and Dodd 2007). The model predates the current Archaeology Branch standards for potential modelling and although it was reviewed, it was not relied upon to assess potential.

For the Brucejack Transmission Line, a portion of the LSA along the upper Bowser and Salmon rivers that is characterized by steep mountainous terrain with numerous steep bedrock outcrops and loose talus

slopes, a GIS slope class model was prepared prior to the field assessment to help inform the study. Areas with greater than 50% slope were considered to have no or low archaeological potential. These steep areas were visually inspected during the field assessment to confirm the assessment of potential.

Field Methods

Field assessments took place during the 2010, 2011, 2012, and 2013 summer field seasons and in the spring of 2014 and included pedestrian surveys and subsurface shovel testing as a means of identifying archaeological sites. Field methods were consistent with those outlined in the permit applications for HCA Heritage inspection Permits 2010-0255, 2011-0245, and 2013-0174 issued for the Project (Walker and McKnight 2011; Jollymore and Walker 2013; Jollymore, Neuman, and Hossain 2014).

In areas identified as having moderate or higher archaeological potential, extensive pedestrian surveying was conducted. Additional areas considered to have low archaeological potential were selected for survey when considered appropriate to confirm the assessment. Examination consisted of a combination of systematic and judgmentally 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 spacing generally between 5 m to 20 m.

Ground surfaces were examined for trails, structures, artifacts, depressions, and other evidence of past human settlement or land use. Tree throws were visually examined for cultural materials. Standing trees, fallen logs and stumps were visually examined for cultural modification. Bedrock exposures and boulders were inspected for pictographs and petroglyphs, as well as for the possible presence of seams of flakeable lithic raw materials. Any talus slopes, caves, or rock crevices within the proposed development area were examined for evidence of burials or other cultural materials. Special attention was paid to examining high-altitude areas, especially along glacial margins, snow and ice patches, and within passes. In 2012, a total of 32 locations along the glacier access road were examined for archaeological materials. This assessment was conducted during the time of year when there was maximum exposure of the glacier ice and focused on the current road surface and the undisturbed glacial surface on either side of the road.

All aboriginally logged Culturally Modified Trees (CMTs) and bark-stripped CMTs encountered within development areas during the field survey were recorded to the standards described in *Culturally Modified Trees of British Columbia - Version 2.0* (Archaeology Branch 2001). All pre-1846 bark-stripped CMTs identified within a site to a count of 40 were fully recorded to Level 2 standards. No sites with more than 40 CMTs were identified and therefore the sampling strategy for large CMT sites recommended in *Sampling Culturally Modified Tree Sites* (Muir and Moon 2000) was not utilized. CMTs were numbered and marked with flagging tape for future identification. Any CMTs that were encountered immediately outside the development areas and not in danger of being impacted by development activities were recorded to Level 1 standards. Increment cores, wedges, or complete stem round samples were taken to identify the year of the cultural modification or to confirm a cultural origin for bark-stripped trees.

During previous archaeological assessments conducted in the region, the majority of prehistoric archaeological sites discovered were small lithic scatters. Therefore, the subsurface testing strategy employed was devised to identify sites consisting of as little as four artifacts per m^2 in a 100 m^2 site. Subsurface testing (shovel testing) was conducted in areas identified during the field assessment as having potential for buried archaeological material. In total, subsurface testing took place at

107 locations with a total of 2,517 shovel tests conducted[2]. Testing was focused on remnant river terraces, prominent knolls, areas along trails, and/or along the banks of streams and lakes. 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 the subsurface deposits.

The number and location of shovel tests was judgementally determined on a case-by-case basis, dependant on ground cover, terrain, and density of bush/forest, and assessment area. Landforms determined to have high archaeological potential were systematically shovel tested in clusters of two to four shovel tests at 5 m to 10 m intervals[3]. For small landforms identified as having moderate to high archaeological potential, cluster testing was implemented at a higher frequency dependent on the size of the landform. Areas of low potential were judgmentally and randomly tested. Quantitative analysis of each shovel test location was conducted taking into account the expected site type (target site area and artifact density) and the test location information (tested area, average individual test size, and artifact density). This information was analyzed to determine the level of confidence in locating a potential site in the area.

Shovel tests were approximately 30 cm by 30 cm in size and penetrated both A and B soil horizons, and depending on the nature of the sediment accumulation and vegetation, continued until unweathered C horizon sediments or bedrock were encountered. Back dirt from tests was examined manually or screened through 6 mm mesh.

Both positive and negative shovel tests were numbered sequentially, and the location of each shovel test was plotted on a site map. Descriptions of the soil matrices in positive shovel tests were recorded in field notes. Each test location was described in terms of its area, terrain, and defining soil characteristics. Artifacts and any other cultural materials encountered in shovel tests were collected. No evaluative subsurface test units were excavated. Artifacts identified on the surface during the pedestrian survey were recorded/photographed and collected. Obsidian artifacts were sent for x-ray fluorescence spectrometry analysis to determine the origin of the raw material.

Archaeological sites identified were recorded in field notes, photographed, and mapped by chain and compass (or equivalent method). UTM coordinates were taken by GPS at the site. The location of all sites was plotted on development plans and on NTS maps. All archaeological sites were recorded on BC Archaeological Site Inventory Forms and submitted to the Archaeology Branch.

Significance Evaluation

The significance of sites recorded during these studies was determined using the criteria for site evaluation found in the *British Columbia Archaeological Impact Assessment Guidelines, Appendix D* (Archaeology Branch 1998). The scientific, ethnic, public, economic, and historic (if applicable) significance of each identified site was addressed where possible. Each identified site was assessed and rated as having a high, moderate, or low significance value. The definitions of each type of significance assessed are as follows:

- *Scientific Significance* — The potential of a site to provide information that could enhance our understanding of BC's heritage resources, particularly its ability to contribute to various scientific disciplines, and its ability to contribute to an understanding of local and regional prehistory. For lithic sites, key considerations are the presence of unique or temporally sensitive artifact types,

[2] Totals for shovel testing include testing conducted under HCA Heritage Inspection Permits 2010-0255, 2011-0245 and 2013-0174.
[3] Cluster testing was not employed for the 2013-0174 field program. However, the same sampling thresholds were used with a goal to identify sites consisting of as little as four artifacts per m^2 in a 100 m^2 site.

density and variety of archaeological material, and the potential for multi-components or datable material. Disturbed sites are generally rated as having low scientific significance.

- *Ethnic Significance* — The importance, significance, or value of a site as perceived by an ethnically distinct community or group.
- *Public Significance* — The potential a site has to enhance public awareness, interest, understanding, or appreciation of BC's prehistoric or historic past, such as its interpretive, educational, and recreational potential.
- *Economic Significance* — The potential for a site to contribute or generate monetary benefits or employment through its development and use as a public recreational or educational facility.
- *Historic Significance* — The degree to which a site represents or relates to important historical individuals or events.

Data Analysis Methods and Techniques

All collected artifacts were catalogued, described, and compared to existing regional typologies. No formed tools were encountered. Appropriate metric attributes of artifacts were recorded. Lithic debitage was quantified and classified according to raw material, stage of manufacture and technological attributes. As no faunal remains or fire-cracked rock were found, the specific methodologies pertaining to these pieces of data will not be described. The extent of sites containing discontinuous buried archaeological deposits was determined with reference to both the distribution of archaeological materials and the extent of associated landforms and areas of potential. The analysis focused on a culture-historical framework, and the functional and seasonal use of a site.

Curation

As per the requirements outlined in HCA Heritage Inspection Permits 2010-0255, 2011-0245, and 2013-0174, all artifacts collected during archaeological baseline studies have been curated by the Royal British Columbia Museum. No increment cores, wedges, or complete stem round samples were collected for dendrochronological analysis.

Paleontological Desktop Review Methodology

The methodology for the desktop paleontological review included a literature review of geological and paleontological resources for the RSA, with a focus on the LSA. This included a review of geological map units and published papers and reports.

22.3.4 Characterization of Heritage Resources Baseline Conditions

Ten archaeological sites were identified within the RSA, four of which are located within the LSA (Table 22.3-1). Due to the sensitive nature of archaeological sites, locational information is not provided in this document.[4] These protected archaeological sites are briefly described below, and additional information is provided in the archaeology baseline report (Appendix 22-A) and the respective permit reports (Walker and McKnight 2011; Jollymore, Neuman and Hossain 2014, Jollymore and Walker 2013). The archaeological baseline studies also included an assessment of the potential for archaeological sites on glaciers and snow patches in the RSA with a field assessment conducted in the LSA; no archaeological sites were found on glaciers or snow patches.

[4] Archaeological site locational data are available upon request from the Archaeology Branch in Victoria, BC.

Table 22.3-1. Protected Archaeological Sites within the Regional Study Area

Borden Number	Antiquity	Site Type	General Location	Overall Site Significance Evaluation	Distance to Closest Project Component
HbTm-1	Pre-contact	Prehistoric lithic scatter	Summit Lake	Low	165 m
HbTm-2	Recent Historic	Aircraft wreckage (associated with a movie production)	Summit Lake	Low	533 m
HcTj-1	Post-contact	Human remains (grave), cabin	Bowser Lake	High	8,927 m
HcTk-1	Post-contact	Culturally Modified Tree	Bowser Lake	Moderate	15 m
HcTn-1	Pre-contact	Prehistoric lithic scatter	Brucejack Lake	Moderate	675 m
HcTo-1	Pre-contact	Prehistoric lithic scatter	Sulphurets Creek	Moderate	9,939 m
HdTj-1	n/a	Treaty Creek Site (*Nisga'a Final Agreement*)	Treaty Creek	High	4,659 m
HdTn-1	Pre-contact	Prehistoric lithic scatter	Mitchell Creek	Low	8,368 m
HdTn-2	Pre-contact	Prehistoric lithic scatter	Mitchell Creek	Low	8,432 m
HdTo-7	Pre-contact	Prehistoric lithic scatter	Sulphurets Creek	Moderate	10,377 m

22.3.4.1 Protected Archaeological Sites within the Regional Study Area

Ten archaeological sites are located within the RSA, six of which are outside of the LSA and are described briefly in this section (Table 22.3-1). Four of these sites (HcTo-1, HdTn-1, HdTn-2, and HdTo-7), found at the northwestern edge of the RSA near the Sulphurets and Mitchell creeks, consist of small subsurface lithic scatters ranging in size from 5 to over 200 obsidian artifacts, some of which have a similar chemical composition to obsidian from Mount Edziza (Seip et al. 2012; Farquharson et al. 2012). HcTj-1, situated on a prominent point on the northern shore of Bowser Lake, consists of two historic graves (documented as the graves of Simon Gunanoot, a historic figure in the area, and his father Nah-Gun), a historic cabin, and associated features (Marshall, Marr, and Palmer 2008); the burials are not near any current Project components. This site is also a designated heritage site (see Section 2.3.4.3). HdTj-1, located on the southern side of the confluence of the Bell-Irving River and Treaty Creek, is a historically significant battle site and commemorative location of a subsequent peace treaty, reportedly between the Nisga'a and Tahltan. The site was listed as a Provincial Heritage Site as part of the *Nisga'a Final Agreement* (2000; Section 22.3.4.3).

22.3.4.2 Protected Archaeological Sites within the Local Study Area

Two prehistoric archaeological sites (HbTm-1 and HcTn-1), one post-contact CMT site (HcTk-1), and an aircraft wreck site (HbTm-2), associated with a movie production were identified within the LSA (Table 22.3-1). These sites are described below; additional information is provided in the archaeology baseline report (Appendix 22-A) and the respective permit reports (Walker and McKnight 2011; Jollymore, Neuman and Hossain 2014, Jollymore and Walker 2013).

HbTm-1

HbTm-1 is a prehistoric subsurface lithic scatter located east of Summit Lake on a small break-in-slope below an old mining road and to the east of a small creek (Plate 22.3-3). The site consists of two small andesite flakes, which were recovered from a single shovel test (Plate 22.3-4). The site boundaries measure 10 m in diameter. Sixty-six shovel tests were conducted on the surrounding landforms with no additional prehistoric cultural materials identified. The site is interpreted as a temporary camp and retooling site. A small historic stone circle identified as a hearth feature was observed in close proximity to the site but is not related to the prehistoric site; the hearth contained a burnt sawn log, determined to be related to historic activity in the area.

Plate 22.3-3. Shovel testing at HbTm-1. View north.

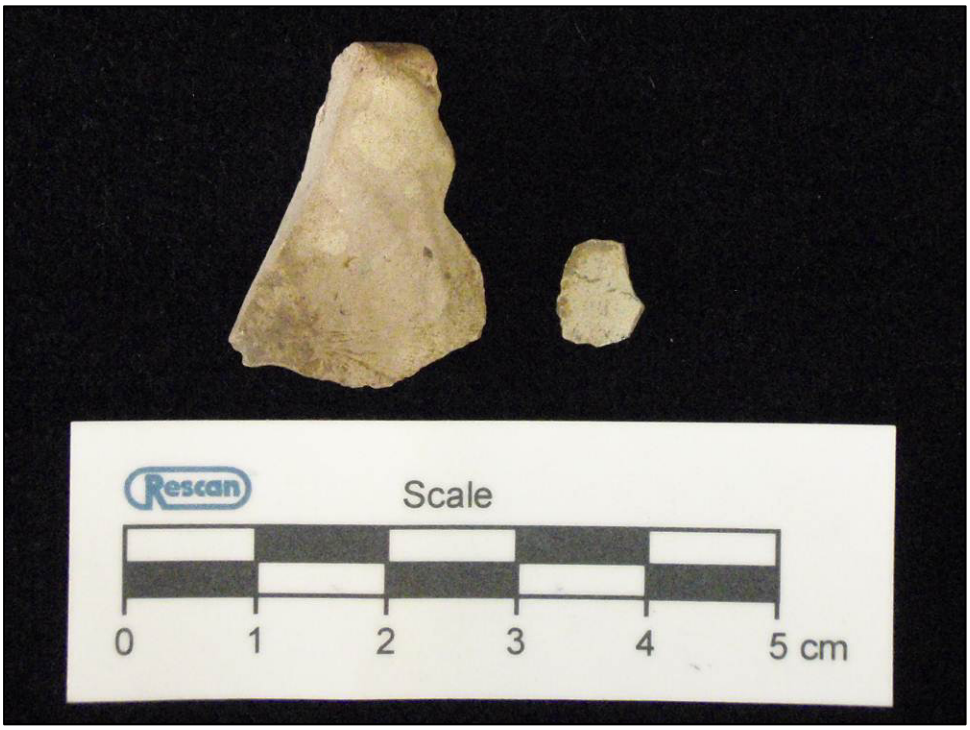

Plate 22.3-4. Andesite flakes recovered from HbTm-1.

HbTm-1 was assessed to have a low overall site significance rating based on the checklist of criteria for site evaluation in the *British Columbia Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998). The site boundary is 165 m northwest of the Granduc Access Road and 346 m west of the centreline for the Brucejack Transmission Line. The site is protected by the HCA (1996).

HbTm-2

HbTm-2 is a historical aircraft wreck site located east of Summit Lake. The site is related to the filming of the movie *The Thing* (1982), which has a helicopter crash scene in it. The site is situated on a man-made, levelled knoll between bedrock outcrops in the centre of a highly disturbed bench area where large amounts of fill were deposited in order to create the film set (Plate 22.3-5). Some of the wreckage from the fictitious crash is still spread across the filming location. The site boundaries measure 150 m in diameter taking in the disturbance area created for the film set where parts of the helicopter wreckage, including the rotor blades, are still present (Plate 22.3-6). In addition, numerous pieces of historic mineral exploration debris are spread across the large bench area. While the site was documented under the HCA (1996), it is not protected by the act.

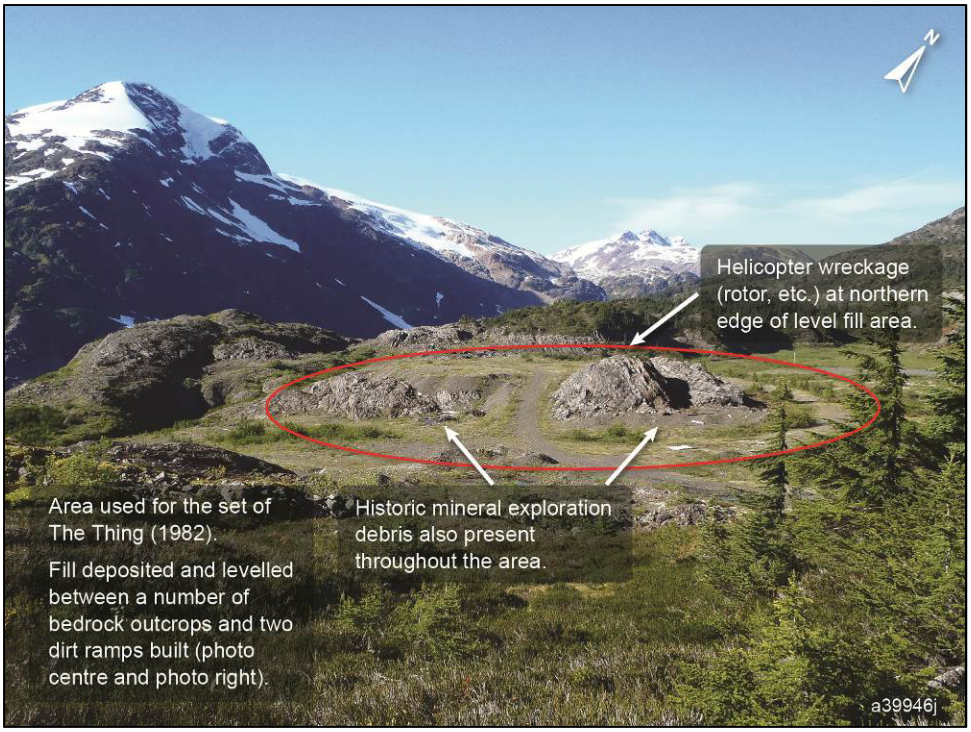

Plate 22.3-5. General layout of HbTm-2, view northwest.

HbTm-2 was assessed to have a low overall site significance rating based on the checklist of criteria for site evaluation in the *British Columbia Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998). The site boundary is 290 m southwest of the Granduc Access Road and 533 m west of the centreline for the Brucejack Transmission Line. The site is not protected by the HCA (1996); however, it has been assigned Legacy Status by the Archaeology Branch. The record will serve to document the aircraft wreckage, so it is not confused at some later date as a genuine helicopter crash site.

Plate 22.3-6. Helicopter wreckage from the filming of The Thing *(1982) at HbTm-2.*

HcTn-1

HcTn-1 is a prehistoric single artifact find located west of Brucejack Lake on a surface exposure of decaying bedrock on a game trail at the edge of an alpine terrace (Plates 22.3-7 and 22.3-8). The site boundaries measure 5 m in diameter. Fifty-six shovel tests were conducted on the surrounding landforms, and the extensive surface exposures in the area were examined. No additional cultural materials were identified. The artifact is an obsidian utilized flake that has a similar chemical composition to obsidian sourced to Mount Edziza Flow 3, approximately 115 km north-northwest of the site. The site is interpreted as a temporary camp and/or retooling site.

HcTn-1 was assessed to have a low overall site significance rating based on the checklist of criteria for site evaluation in the *British Columbia Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998). The site boundary is 675 m west of the Brucejack Mine Site. The site has been assigned Legacy Status by the Archaeology Branch; it is no longer protected by the HCA (1996) as the site has been mitigated through surface collection. The record will serve to document the site.

HcTk-1

HcTk-1 is a post-contact CMT site located west of the northwestern corner of Bowser Lake and east of Scott Creek. The site consists of two large culturally modified Douglas fir trees. CMT1 has five observed modifications: tapered bark strip, deep notch removed from stripped area, a blaze on the lobe, a “W” cut into the bark, and numerous broken/cut branches creating an open sheltered area under the canopy (Plate 22.3-9). CMT2 has two observed modifications: tapered bark strip and a notch removed from the stripped area. All cuts appear to be made with a metal tool (likely an axe). The site boundaries measure 15 m by 25 m. Cores were taken to determine the age of the modifications; however, both trees show signs of extensive internal decay, though both are living, so dating the trees was not possible. No subsurface testing was conducted at the time of assessment as the ground was frozen. The site is interpreted as a temporary camp and trapping site.

Plate 22.3-7. Location of artifact find on a surface exposure of decaying bedrock at HcTn-1.

Plate 22.3-8. A utilized obsidian flake recovered from HcTn-1.

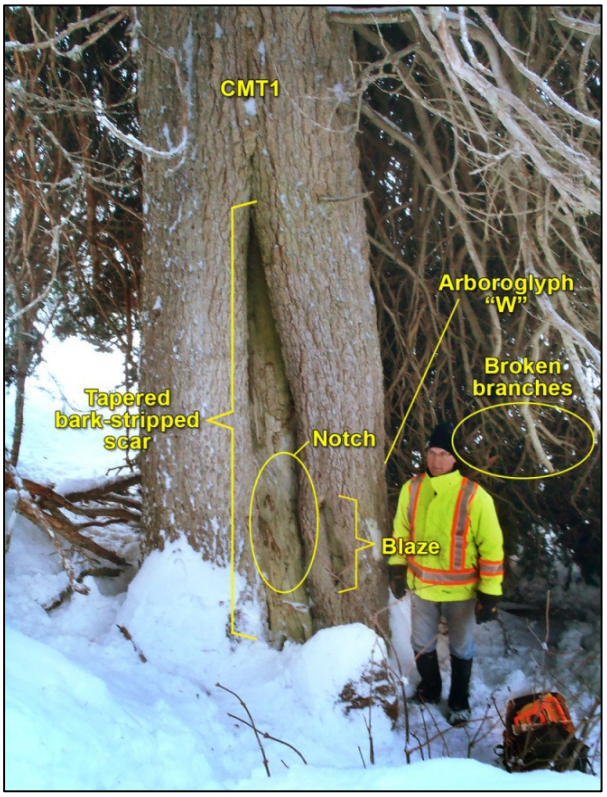

Plate 22.3-9. Modifications observed on CMT1 at HcTk-1.

HcTk-1 was assessed to have a moderate overall site significance rating based on the checklist of criteria for site evaluation in the *British Columbia Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998). The site boundary is 15 m south of the Brucejack Access Road. The site is protected by the HCA (1996).

22.3.4.3 Protected Historical Sites

There are two protected historical sites located within the RSA: Simon Gunanoot Gravesite (HcTj-1) and Treaty Creek Site (HdTj-1). Both have been documented in the Archaeological Site Inventory maintained by the Archaeology Branch and have been assigned Borden Numbers (see Section 2.3.4.1; see Glossary). Both sites are also protected by other legislation and guidelines. The Simon Gunanoot Gravesite (HcTj-1) has been documented in the Community Heritage Registry maintained by the Regional District of Kitimat-Stikine (see Section 22.3.1.7) and is also protected by the BC *Cremation, Interment, and Funeral Services Act* (2004). The burials are not near any current Project components. The Treaty Creek Site (HdTj-1), a historically significant battle site and commemorative location of a subsequent peace treaty, reportedly between the Nisga'a and Tahltan, is listed as a Provincial Heritage Site as part of the *Nisga'a Final Agreement* (2000). This site is not in proximity to any current Project components.

Numerous historic and recent land use features, generally associated with mineral exploration and extraction, have also been observed within the LSA, including, but are not limited to, cabins, claim stakes, recently blazed trees, coreboxes, etc. (Appendix 22-A, 2012 Archaeology Baseline Report). These sites are not protected by the HCA (1996) or other means and are not considered further.

22.3.4.4 Protected Paleontological Sites

Paleontology in the region is not well known; however, reconnaissance conducted in the region has identified dinosaur footprints, turtle shells, and fern and gingko leaves in the sediments of the Bowser Basin and fossils on the western side of Mount Dilworth (see Section 22.3.1.5; Appendix 22-B, 2012 Paleontology Baseline Report). While these paleontological resources have been documented, there are no records of significant protected paleontological finds within the RSA or LSA.

22.4 ESTABLISHING THE SCOPE OF THE EFFECTS ASSESSMENT FOR HERITAGE RESOURCES

This section of the assessment for heritage resources includes a description of the scoping process used to identify potentially affected VCs, select assessment boundaries, and identify the potential effects of the Project that are likely to arise from the Project's interaction with a receptor VC. Scoping is fundamental to focusing the Application for an Environmental Assessment Certificate/Environmental Impact Statement (Application/EIS) on those issues where there is the greatest potential to cause significant adverse effects. The scoping process for the assessment of heritage resources consisted of the following four steps:

- *Step 1:* undertaking an issues scoping process to select heritage resources VCs and sub-components based on a consideration of the Project's potential to interact with Heritage Resources;
- *Step 2:* consideration of feedback on the results of the scoping process from technical experts and the EA Working Group[5];

[5] The EA Working Group is a forum for discussion and resolution of technical issues associated with the proposed Project, as well as providing technical advice to the BC EAO and CEA Agency, which remain ultimately responsible for determining significance. It comprises representatives of provincial, federal, and local government, and Aboriginal groups.

- *Step 3:* defining assessment boundaries for heritage resources VCs and sub-components; and
- *Step 4:* identification of key potential effects on heritage resources VCs and/or sub-components.

These steps are described in detail below.

22.4.1 Selecting Receptor Valued Components

Valued components are used to focus the Application/EIS on the issues of highest concern. VCs are specific attributes of the biophysical and socio-economic environments that have environmental, social, economic, heritage, or health significance. To be considered for assessment, a component 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 proposed Project. VCs are scoped during consultation with key stakeholders, including Aboriginal communities and the EA Working Group. Consideration of certain VCs may also be a legislated requirement or known to be a concern because of previous Project experience.

Heritage resources are non-renewable, can be very susceptible to disturbance, and are finite in number. They are considered to be important resources that are protected for their historical, cultural, scientific, and educational value to the general public, local communities, and Aboriginal groups. Heritage resources can be protected by provincial legislation, as described in Section 22.2.

As described in Section 6.4.1.1, a VC-scoping exercise was conducted between the Proponent and the BC EAO during the development of a draft AIR to explore potential Project interactions with candidate VCs and to identify the key potential adverse effects associated with that interaction. The results of the scoping exercise were circulated for review and approval by the EA Working Group, and feedback from that process and from additional comments received have been integrated into the EA.

Subject areas are classified as either an intermediate component or receptor VC and are further refined into sub-components as described in Section 6.4.1. Heritage resources were identified as receptor VCs as a result of the scoping process and are further refined into the following sub-components:

- protected archaeological resources;
- protected historical resources; and
- protected paleontological resources.

The heritage resources VCs were identified by evaluating the results of the baseline studies (Appendices 22-A and 22-B) as well as the protection status of identified heritage resources. Interest in heritage resources and issues that governments (Aboriginal and non-Aboriginal), local interest groups, and the public identified during the engagement process were also considered.

22.4.1.1 Potential Interactions between the Project and Heritage Resources

Table 22.4-1 provides an impact scoping matrix of heritage resources VCs that includes Project components and activities that have a possible or likely interaction with heritage resources VCs. A complete impact scoping matrix for the Project is provided in Table 6.7-1. Interactions between the Project and the heritage resources VCs were assigned a colour code as follows:

- not expected (white);
- possible (grey); and
- likely (black).

Table 22.4-1. Interaction of Project Components and Physical Activities with Heritage Resources

Project Components and Physical Activities by Phase	Heritage Resources		
	Protected Archaeological Resources	Protected Historical Resources	Protected Paleontological Resources
Construction Phase			
Activities at existing adit	■		
Air transport of personnel and goods			
Avalanche control	■		
Chemical and hazardous material storage, management, and handling			
Construction of back-up diesel power plant	■		
Construction of Bowser Aerodrome	■		
Construction of detonator storage area			
Construction of electrical tie-in to BC Hydro grid	■		
Construction of electrical substation at mine site	■		
Construction of equipment laydown areas	■		
Construction of helicopter pad(s)	■		
Construction of incinerators	■		
Construction of Knipple Transfer Area	■		
Construction of local site roads	■		
Construction of Mill Building (electrical induction furnace, backfill paste plant, warehouse, mill/concentrator)	■		
Construction of mine portal and ventilation shafts	■		
Construction of Brucejack Operations Camp	■		
Construction of ore conveyer	■		
Construction of tailings pipeline	■		
Construction and decommissioning of Tide Staging Area construction camp	■		
Construction of truck shop	■		
Construction and use of sewage treatment plant and discharge	■		
Construction and use of surface water diversions	■		
Construction and decommissioning of Tide Staging Area construction camp	■		
Construction of water treatment plant	■		
Development of the underground portal and facilities			
Employment and labour			
Equipment maintenance/machinery and vehicle refuelling/fuel storage and handling			
Explosives storage and handling			
Grading of the mine site area	■		
Helicopter use			
Installation and use of Project lighting	■		
Installation of surface and underground crushers	■		
Installation of the transmission line and associated towers	■		

(continued)

Table 22.4-1. Interaction of Project Components and Physical Activities with Heritage Resources (continued)

Project Components and Physical Activities by Phase	Heritage Resources		
	Protected Archaeological Resources	Protected Historical Resources	Protected Paleontological Resources
Construction Phase (cont'd)			
Solid waste management			
Machinery and vehicle emissions			
Potable water treatment and use			
Pre-production ore stockpile construction			
Procurement of goods and services			
Quarry construction			
Transportation of workers and materials			
Underground water management			
Upgrade and use of exploration access road			
Use of Granduc Access Road			
Operation Phase			
Air transport of personnel and goods and use of aerodrome			
Avalanche control			
Backfill paste plant			
Back-up diesel power plant			
Bowser Aerodrome			
Brucejack Access Road use and maintenance			
Brucejack Operations Camp			
Chemical and hazardous material storage, management, and handling			
Concentrate storage and handling			
Contact water management			
Detonator storage			
Discharge from Brucejack Lake			
Electrical induction furnace			
Electrical substation			
Employment and Labour			
Equipment laydown areas			
Equipment maintenance/machine and vehicle refuelling/fuel storage and handling			
Explosives storage and handling			
Helicopter pad(s)			
Helicopter use			
Knipple Transfer Area			
Machine and vehicle emissions			
Mill building/concentrators			
Non-contact water management			

(continued)

Table 22.4-1. Interaction of Project Components and Physical Activities with Heritage Resources (continued)

Project Components and Physical Activities by Phase	Heritage Resources		
	Protected Archaeological Resources	Protected Historical Resources	Protected Paleontological Resources
Operation Phase *(cont'd)*			
Ore conveyer			
Potable water treatment and use			
Pre-production ore storage			
Procurement of goods and services			
Project lighting			
Quarry operation			
Sewage treatment and discharge			
Solid waste management/incinerators			
Subaqueous tailings disposal			
Subaqueous waste rock disposal			
Surface crushers			
Tailings pipeline			
Transmission line operation and maintenance			
Truck shop			
Underground backfill tailings storage			
Underground backfill waste rock storage			
Underground explosives storage			
Underground crushers			
Underground: drilling, blasting, excavation			
Underground mine ventilation			
Underground water management			
Use of mine site haul roads			
Use of portals			
Ventilation shafts			
Warehouse			
Waste rock transfer pad			
Water treatment plant			
Closure Phase			
Air transport of personnel and goods			
Avalanche control			
Chemical and hazardous material storage, management, and handling			
Closure of mine portals			
Closure of quarry			
Closure of subaqueous tailings and waste rock storage (Brucejack Lake)			
Decommissioning of Bowser Aerodrome			
Decommissioning of back-up power plant			

(continued)

Table 22.4-1. Interaction of Project Components and Physical Activities with Heritage Resources (completed)

Project Components and Physical Activities by Phase	Heritage Resources		
	Protected Archaeological Resources	Protected Historical Resources	Protected Paleontological Resources
Closure Phase (cont'd)			
Decommissioning of Brucejack Access Road			
Decommissioning of camps			
Decommissioning of diversion channels			
Decommissioning of equipment laydown			
Decommissioning of fuel storage tanks			
Decommissioning of helicopter pad(s)			
Decommissioning of incinerator			
Decommissioning of local site roads			
Decommissioning of Mill Building			
Decommissioning of surface crushers			
Decommissioning of underground crushers			
Decommissioning of ore conveyer			
Decommissioning of Project lighting			
Decommissioning of sewage treatment plant and discharge			
Decommissioning of surface explosives storage			
Decommissioning of transmission line and ancillary structures			
Decommissioning of waste rock transfer pad			
Decommissioning of water treatment plant			
Decommissioning of tailings pipeline			
Helicopter use			
Machine and vehicle emissions			
Procurement of goods and services			
Removal or treatment of contaminated soils			
Solid waste management			
Transportation of workers and materials (mine site and access roads)			
Post-closure Phase			
Underground mine			
Discharge from Brucejack Lake			
Subaqueous tailings and waste rock storage			
Environmental monitoring			
Employment and labour			
Procurement of goods and services			

Notes:
White = unexpected interaction between project components/physical activities and a receptor VC
Grey = possible interaction between project components/physical activities and a receptor VC
Black = likely interaction between project components/physical activities and a receptor VC

Interactions coded as not expected (white) are considered to have no potential for adverse effects on a VC/sub-component and are not considered further.

22.4.1.2 Consultation Feedback on Valued Components

During the draft AIR review, comments were received pertaining to the use of the terms "protected historical" and "protect paleontological" resources as opposed to simply using the terms "historical" and "paleontological" resources.

The phrase "protected historical resources" was used as the area has been subject to many years of exploration activity and as a result numerous pieces of historic debris are present in the region, many of which were observed during the course of baseline studies. However, these exploration-related sites are not protected by the HCA (1996) as they postdate 1846 AD (see Section 22.2).

Similarly, the phrase "protected paleontological resources" was used to describe only paleontological sites that are protected by legislation (see Section 22.2).

Identification of protected resources allowed for the assessment to focus on heritage resources that are known as valuable and protected under provincial legislation.

22.4.1.3 Summary of Valued Components Included/Excluded in the Application for an Environmental Assessment Certificate/Environmental Impact Statement

During the VC-scoping exercise, three VC sub-components were identified for heritage resources: protected archaeological resources, protected historical resources, and protected paleontological resources.

Protected archaeological resources were identified as a sub-component that could potentially have interactions with the Project and therefore has been included in the Application/EIS (Table 22.4-2). These resources include archaeological sites that are designated and protected by the HCA (1996).

Table 22.4-2. Heritage Resources Valued Sub-component Included in the Application for an Environmental Assessment Certificate / Environmental Impact Statement

Valued Sub-component	Identified by*				Rationale for Inclusion
	AG	G	P/S	IM	
Protected Archaeological Resources	X	X	X	X	Archaeological sites, both known and as-yet unknown, are protected by the HCA (1996).

**AG = Aboriginal Group; G = Government; P/S = Public/Stakeholder; IM = Impact Matrix*

Protected historical resources and protected paleontological resources were identified as VC sub-components that would not have interactions with the Project as there are none found within the RSA or LSA. Therefore, these have been screened out and excluded from the Application/EIS (Table 22.4-3).

Changes to the environment as a result of the Project has the potential to affect physical heritage, including archaeological sites of importance to Aboriginal people. The Project is not expected to impact other types of physical heritage (e.g., sites, structures, or things of historical, paleontological, or architectural significance) as these resources are not present within the Heritage RSA. For the purposes of this chapter, "physical heritage" is synonymous with "sites, structures or things of archaeological significance", which in turn is synonymous with "protected archaeological sites".

Table 22.4-3. Heritage Resources Valued Components Excluded from the Application for an Environmental Assessment Certificate / Environmental Impact Statement

Valued Sub-component	Identified by*				Rationale for Exclusion
	AG	G	P/S	IM	
Protected Historical Resources		X			There are no protected historical resources within the LSA or RSA.
Protected Paleontological Resources		X			There are no protected paleontological resources within the LSA or RSA.

**AG = Aboriginal Group; G = Government; P/S = Public/Stakeholder; IM = Impact Matrix*

Consequently, indirect effects of the Project on sites, structures or things of historical, paleontological or architectural significance to Aboriginal people are scoped out of the effects assessment (Section 22.4.1). Changes to protected archaeological sites are considered in the assessment.

22.4.2 Assessment Boundaries for Heritage Resources

Assessment boundaries define the maximum limit within which the effects assessment is conducted. They encompass the areas within, and times during which, the Project is expected to interact with the VCs, as well as the constraints that may be placed on the assessment of those interactions due to political, social, and economic realities (administrative boundaries), and limitations in predicting or measuring changes (technical boundaries). The definition of these assessment boundaries is an integral part of the assessment process for heritage resources and encompasses possible direct, indirect, and induced effects of the Project on heritage resources, inclusive of Project effects on relevant cause-effect pathway VCs, as well as the trends in processes that may be relevant.

22.4.2.1 Spatial Boundaries

Spatial boundaries used for this heritage resources effects assessment were the same as those used during baseline studies, as outlined in Section 22.3.3.2. A summary of the local and regional studies areas used for the effects assessment is provided in this section.

Local Study Area

The LSA included a 1-km buffer on either side of the proposed Project footprint. The LSA is illustrated in Figure 22.1-1.

Regional Study Area

The RSA is an area from Highway 37 to Sulphurets Creek, and includes portions of the Bowser River, Sulphurets Creek, and Treaty Creek watersheds. See Figure 22.1-1 for the RSA boundary. This area was based on the permitted area for HCA Heritage Inspection Permit for 2013-0174.

22.4.2.2 Temporal Boundaries

The temporal boundaries for the assessment of archaeology and heritage effects are based on the temporal phases of the Project:

- **Construction** — 2 years;
- **Operation** — 22-year run-of-mine life;
- **Closure** — 2 years (includes decommissioning, abandonment and reclamation activities); and

- **Post-closure** — minimum of 3 years (includes ongoing reclamation activities and post-closure monitoring).

22.4.3 Identifying Potential Effects on Heritage Resources

While three VC sub-components were identified for heritage resources, two have been screened out and excluded from the Application/EIS as no interactions are anticipated between them and the Project (see Section 22.4.1.3). These two excluded heritage resources VC indicators are protected historical resources and protected paleontological resources; they will not be discussed further.

Protected archaeological resources is the only VC indicator that may potentially be affected by the Project. Project activities associated with the movement, excavation, or disturbance of soil have the highest potential for interactions between the Project and protected archaeological resources. Therefore, these types of activities undertaken during the Construction, Operation, and Closure phases of the Project were identified as having possible interactions and are discussed further in Sections 22.4.3.1 through 22.4.3.4.

During baselines studies, ten archaeological sites were identified within the RSA (Section 22.3.4.1), four of which fall within the LSA (Section 22.3.4.2). Sites within the RSA, but outside of the LSA are not anticipated to have interactions with the Project as these sites are over 1 km from anticipated impact areas. These sites will not be discussed further in the Application/EIS.

Of the four sites that fall within the LSA (HbTm-1, HbTm-2, HcTn-1, HcTk-1), two are no longer protected by the HCA (1996). Archaeological site HcTn-1 is a prehistoric archaeological site that was mitigated through surface collection during the site visit. HbTm-2 is an aircraft wreck related to a movie production; the site was documented, so it will not be confused with a genuine aircraft wreck in the future. Both sites, HbTm-2 and HcTn-1, have been designated as legacy sites (see Section 22.3.4.2) and will not be discussed further.

Only two sites protected by the HCA (1996) are located within the LSA. HbTm-1 is a prehistoric archaeological site. Its site boundaries are approximately 165 m northwest of the Granduc Access Road and 346 m west of the centreline for the Brucejack Transmission Line. HcTk-1 is a post-contact archaeological CMT site. Its site boundaries are approximately 15 m from the Brucejack Access Road. Of the Project components identified in Table 22.4-1, which may have interactions with protected archaeological sites, the following sections summarize the key Project effects expected for protected archaeological sites HbTm-1 and HcTk-1.

While it was the objective of the baseline studies to identify heritage resources within the LSA, even the most thorough study may not identify all archaeological resources that may be present. As all archaeological sites, both known and as-yet unknown, are protected by the HCA (1996), the discovery of chance archaeological finds during Project activities is therefore a key Project effect.

22.4.3.1 Construction

Project activities associated with the movement, excavation, or disturbance of soil have the highest potential for interactions between the Project and archaeological sites. Numerous Project components and activities were identified during the Construction Phase in Table 22.4-1, which may involve ground disturbance that could impact protected archaeological resources. However, only three of the Project components and activities identified in Table 22.4-1 may involve ground disturbance that could impact known protected archaeological resources: impacts from avalanche control, installation of the transmission line and associated towers, and use of the Granduc Access Road. Only the latter two project components noted above are considered to have potential effects on protected archaeological site HbTm-1 during the Project construction phase.

While impacts from avalanche control were identified as a potential key effect during the VC-scoping exercise for the Project, the potential effects this project component may cause are considered to be low to negligible. Effects from avalanche control could be related to disturbance of trees and vegetation at a site should an avalanche pass through the area. Trees being pushed over and uprooted as a result of avalanche movement could disturb intact cultural deposits at a site and bring cultural deposits to the surface. HbTm-1 is not located within a known avalanche chute nor is it anticipated that avalanche control would trigger a large enough avalanche to cause significant disturbance to a site. Therefore, this project component will not be considered further.

The two key effects identified above, installation of the transmission line and associated towers and use of the Granduc Access Road, will be discussed further in Section 22.5. All other Project components and activities outlined in Table 22.4-1 will not be discussed further.

22.4.3.2 Operation

Project activities associated with the movement, excavation, or disturbance of soil have the highest potential for interactions between the Project and protected archaeological resources. Two Project components and activities were identified during the Operation Phase in Table 22.4-1: avalanche control, and Brucejack Access Road use and maintenance.

As described in Section 22.4.3.1, HbTm-1 is not located within a known avalanche chute and no impacts are anticipated from this project component. Therefore, this project component will not be considered further. Brucejack Access Road use and maintenance could have potential direct effects to HcTk-1 which is located within the road right of way.

Only one key effect identified above, Brucejack Access Road use and maintenance, will be discussed further in Section 22.5. All other Project components and activities outlined in Table 22.4-1 will not be discussed further.

22.4.3.3 Closure

Project activities associated with the movement, excavation, or disturbance of soil have the highest potential for interactions between the Project and archaeological sites. One Project component was identified during the Closure Phase in Table 22.4-1: avalanche control. As described in Section 22.4.3.1, HbTm-1 is not located within a known avalanche chute and no impacts are anticipated from this project component. Therefore, this project component will not be considered further.

22.4.3.4 Post-closure

No interactions are anticipated.

22.5 EFFECTS ASSESSMENT AND MITIGATION FOR HERITAGE RESOURCES

22.5.1 Key Effects on Heritage Resources

The heritage resources effects assessment considered potential effects during all four temporal phases outlined in Section 22.4.2.2. Protected archaeological sites are most at risk of direct Project-related effects during Construction and Operation and are at risk of indirect effects during Construction, Operation, and Closure. Accordingly, identification of effects and mitigation measures focus on potential direct and indirect effects during Construction, Operation, and Closure. Mitigation measures would be timed to occur prior to and/or during Construction and Operation. The Post-closure phase is not expected to result in any significant effects.

22.5.1.1 Identifying Key Effects on Heritage Resources

Project activities associated with the movement, excavation, or disturbance of soil have the potential to cause direct and/or indirect effects to protected archaeological sites within the LSA, if present. Protected archaeological resources is the only VC identified for inclusion in the heritage resources effects assessment. Potential key effects from Project components and activities on protected archaeological resources are discussed in Sections 22.4.3.1 through 22.4.3.4, which have been carried forward to this section, are outlined in Table 22.5-1, and are discussed further below.

Table 22.5-1. Ranking Potential Effects on Heritage Resources

Project Components / Physical Activities	Potential Effects on Protected Archaeological Resources		
	Direct Effects within 0 - 50 m	Indirect Effects within 50 - 500 m	Indirect Effects within 500 – 1,000 m
Construction			
Installation of the transmission line and associated towers	●	●	○
Use of Granduc Access Road	●	●	○
Operation			
Brucejack Access Road use and maintenance	●	○	○

Notes:
○ = *No interaction anticipated.*
● = *Negligible to minor adverse effect expected; implementation of best practices, standard mitigation, and management measures; no monitoring required, no further consideration warranted.*
● = *Potential moderate adverse effect requiring unique active management/monitoring/mitigation; warrants further consideration.*
● = *Key interaction resulting in potential significant major adverse effect or significant concern; warrants further consideration.*

Direct Effects within 0 to 50 m of Protected Archaeological Resources

Protected archaeological resources located between 0 and 50 m of ground-altering activities have the potential to be directly affected by construction and operation activities with a high potential for adverse impacts if disturbed.

As described in Section 22.4.3, there is one protected archaeological resource (HcTk-1) that falls within 0 to 50 m from Project components. One project component, Brucejack Access Road use and maintenance, was identified in the AIR document (BC EAO 2014), and outlined in Table 22.5-1, which may directly affect this heritage resource during Operation.

While ground disturbance related to the use and maintenance of the Brucejack Access Road is anticipated, it is expected to be localized to the road bed and those areas immediately adjacent to the road. This potential effect is analyzed further, and mitigation measures that could offset adverse impacts are described, in Section 22.5.1.2.

As-yet unknown protected archaeological resources, if present, may be directly affected by the installation of the transmission line and associated towers, and use of the Granduc Access Road. Effects from the installation of the transmission line and associated towers would be related to ground disturbance for tower foundations, clearing, and grubbing of vegetation along the transmission line right-of-way, and other related ground-altering activities. Use of the Granduc Access Road will not have a direct effect on as-yet unknown protected archaeological resources as no new ground

disturbance is anticipated. This potential effect will be analyzed further and mitigation measures that could offset adverse impacts are described below in Section 22.5.1.2.

Indirect Effects within 50 to 500 m of Protected Archaeological Resources

Protected archaeological resources located between 50 and 500 m from Project components may be indirectly affected through increased human presence during Construction, Operation, and Closure with a moderate potential for adverse effects.

As described in Section 22.4.3, there is one protected archaeological resource (HbTm-1) that falls within 50 to 500 m from Project components; this site may be indirectly affected by increased human presence during Construction, Operation, and Closure. Two different project components were identified in the AIR document (BC EAO 2014) and outlined in Table 22.5-1, which may have potential effects, including the installation of the transmission line and associated towers, and the use of the Granduc Access Road.

While ground disturbance related to the installation of transmission line towers is anticipated to be localized to the area immediately around each tower, increased human presence in the area as a result of the construction of the transmission line could result in indirect effects on the protected archaeological resource. This potential effect will be analyzed further and mitigation measures that could offset adverse impacts are described below in Section 22.5.1.2.

Indirect Effects within 500 to 1,000 m of Protected Archaeological Resources

Protected archaeological resources between 500 and 1,000 m from Project components may be indirectly affected through increased human presence during Construction, Operation, and Closure with a minor potential for adverse effects. Archaeological sites beyond 1,000 m from Project components are not anticipated to be affected by the Project, and potential impacts are not considered.

No protected archaeological resources are located within 500 and 1,000 m of ground-altering activities. Therefore, there will be no indirect affects by the Project, and this potential effect will not be discussed further.

22.5.1.2 Mitigation Measures for Heritage Resources

Implementing mitigation and management strategies for the protected archaeological resources discussed in Section 22.5.1.1 will minimize and/or eliminate adverse and residual effects. Two protected archaeological resource, HbTm-1 and HcTk-1, were identified within the LSA. Mitigation measures for these sites are summarized below. Mitigation measures to address Project-related effects to as-yet unknown protected archaeological resources, if discovered, are also addressed.

Mitigation Measures for Protected Archaeological Sites HbTm-1 and HcTk-1

Archaeological site HbTm-1 is located 165 m northwest of the Granduc Access Road and 346 m west of the centreline for the Brucejack Transmission Line. The site falls between 50 to 500 m from Project developments and therefore may be subject to potential indirect effects due to increased human presence during the installation of the transmission line and associated towers, and the use of the Granduc Access Road.

To protect HbTm-1 from impacts associated with increased human presence related to the installation of the transmission line and associated towers, and use of the Granduc Access Road, the site will be marked as a “No Work Zone” on development maps. In addition, Project personnel will be educated on the protections afforded to archaeological sites. Therefore, it is anticipated that increased human

presence associated with the installation of the transmission line, associated towers, and use of the Granduc Access Road will have a negligible adverse effect such that no further consideration is believed to be warranted.

Archaeological site HcTk-1 is located 15 m south of the Brucejack Access Road. The site falls between 0 to 50 m from Project developments and therefore may be subject to potential direct effects due to use and maintenance of the road during Operation.

To protect HcTk-1 from impacts associated with use and maintenance of the Brucejack Access Road during operation, continued avoidance of the site is recommended. In addition, the area should be marked as a "No Work Zone" on maintenance maps/documents and the trees marked/flagged as such. If avoidance is not possible and/or if the trees become a safety hazard, mitigation of the site should be conducted. Mitigation measures will be determined in consultation with the British Columbia Archaeological Branch and carried out by a Project Archaeologist under a *Heritage Conservation Act* Permit. Mitigation may involve detailed mapping and photography. Once mitigation and associated reporting are completed, approval to proceed will be given by the BC Archaeology Branch to allow for impacts within the site boundaries.

A Heritage Management Plan (Section 29.8) has been developed to guide the management and protection of archaeological sites HbTm-1 and HcTk-1. Following the above described mitigation and management strategies, and implementing the Heritage Management Plan, will reduce the potential for adverse effects to a negligible level.

Mitigation Measures for As-yet-unknown Protected Archaeological Sites

As-yet unknown protected archaeological resources, if present, may be directly affected by avalanche control, installation of transmission lines and associated towers, and use of the Granduc Access Road. A Heritage Management Plan (Section 29.8) and a Chance Find Procedure have been developed for the Project to address the discovery and management of as-yet unknown protected archaeological sites during Project activities; the Chance Find Procedure has been briefly described in the Heritage Management Plan.

The protection of as-yet unknown protected archaeological resources, if present, from impacts related to avalanche control will involve implementation of the Chance Find Procedure and education of Project personnel regarding protections afforded archaeological sites. Therefore, it is anticipated that avalanche control will have a negligible adverse effect and will not be considered further in this assessment.

The protection of as-yet unknown protected archaeological resources, if present, from adverse effects related to installation of transmission lines and associated towers, would involve the implementation of the Chance Find Procedure and education of Project personnel on the protections afforded to archaeological sites. The potential of encountering as-yet unknown protected archaeological resources is considered to be low based on an understanding of the relatively low density of archaeological materials in the region. When following the above described mitigation and management strategies and implementing the Heritage Management Plan and Chance Find Procedure, it is anticipated that potential adverse effects will be reduced to a negligible level.

22.6 RESIDUAL EFFECTS ON HERITAGE RESOURCES

The assessment of potential for residual effects on heritage resources is based on the effects assessment described in Section 22.5 and takes into account mitigation and management measures that will be conducted prior to anticipated impacts. Such mitigations and management measures include

site avoidance, Project personnel education, and implementation of the Heritage Management Plan and Chance Find Procedure. Once mitigation and management measures have been conducted and/or established prior to anticipated Project effects, the potential for residual effects on heritage resources are not anticipated and as a result will be reduced to negligible and not significant. Therefore residual effects on heritage resources are not discussed further.

22.7 CUMULATIVE EFFECTS ASSESSMENT FOR HERITAGE RESOURCES

Cumulative effects are defined in this EA as "effects that are likely to result from the designated project in combination with other projects and activities that have been or will be carried out." This definition follows that in section 19(1) of *Canadian Environmental Assessment Act, 2012* (2012) and is consistent with the International Finance Corporation Good Practice Note on Cumulative Impact Assessment, which refers to consideration of other existing, planned and/or reasonably foreseeable future projects and developments. Cumulative effects assessment is a requirement of the AIR and the EIS Guidelines and is necessary for the proponent to comply with Canadian Environmental Assessment Agency (CEA Agency; (2013a) and the BC EAA (2002).

The CEA Agency issued an Operational Policy Statement in May 2013 entitled *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012*, which provides a method for undertaking a cumulative effects assessment (CEA Agency 2013b). Recently the BC EAO also released the updated *Guideline for the Selection of Valued Components and the Assessment of Potential Effects* (BC EAO 2013), which includes advice for determining the need for a cumulative impact assessment. The cumulative effects assessment methodology adopted in this Application/EIS therefore follows the guidance of the CEA Agency as outlined above, as well as the selection criteria in BC EAO (2013).

The potential for residual effects on heritage resources has been determined to be negligible and not significant as mitigation and management measures, including site avoidance, Project personnel education, and implementation of the Heritage Management Plan and Chance Find Procedure will be conducted/established prior to anticipated Project impacts. Therefore, the potential for cumulative effects on heritage resources is not anticipated and as a result will be reduced to negligible and not significant.

22.8 EFFECTS ASSESSMENT CONCLUSIONS FOR HERITAGE RESOURCES

Heritage resources are non-renewable, can be very susceptible to disturbance, and are finite in number. They are considered to be important resources that are protected for their historical, cultural, scientific, and educational value to the general public, local communities, and Aboriginal groups. In BC, both recorded and as-yet unrecorded archaeological sites are protected by the HCA (1996), and such sites may be affected by the Project.

Potential effects of the Project on protected archaeological resources will be mitigated and managed through site avoidance, Project personnel education, and implementation of the Heritage Management Plan and Chance Find Procedure. With the application of site avoidance and/or other mitigation and management measures prior to Project impacts, residual effects on known protected archaeological resources are not anticipated and as a result will be negligible and not significant. Similarly, implementation of the Project's Chance Find Procedure and Heritage Management Plan will facilitate the protection of any as-yet undiscovered protected heritage resources within the Project footprint, which may be identified during Construction and/or Operation. Therefore, as-yet undiscovered protected heritage resources will be avoided and/or properly mitigated and managed, and residual

effects are not anticipated (Table 22.8-1). As residual effects to protected archaeological sites are not anticipated, cumulative effects to protected archaeological sites are also not anticipated.

Table 22.8-1. Summary of Assessment of Potential Environmental Effects for Heritage Resources

Valued Component	Project Phase(s)	Potential Effect	Mitigation Measures	Significance of Residual Effects	
				Project	Cumulative
Known and as-yet unknown Protected Archaeological Sites	Construction, Operation, Closure	Disturbance of archaeological sites protected by the HCA (1996)	Avoidance, education, mitigation, Heritage Management Plan	Not anticipated	Not anticipated

REFERENCES

Definitions of the acronyms and abbreviations used in this reference list can be found in the Glossary and Abbreviations section.

1996. *Ecological Reserve Act,* RSBC. C. 103.

1996. *Environment and Land Use Act*, RSBC. C. 117.

1996. *Heritage Conservation Act,* RSBC. C. 187.

1996. *Land Act*, RSBC. C. 245.

1996. *Local Government Act,* RSBC. C. 323.

1996. *Mineral Tenure Act*, RSBC. C. 292.

1996. *Park Act*, RSBC. C. 344.

2000. *Nisga'a Final Agreement Act,* SC. C. 7.

2002. *Environmental Assessment Act,* SBC. C. 43.

2004. *Cremation, Interment, and Funeral Services Act*, SBC. C. 35.

2012. *Canadian Environmental Assessment Act,* 2012, SC. C. 19. s. 52.

Adams, J. 1973. *The Gitksan Potlatch: Population flux, resource ownership and reciprocity*. Toronto, ON: Holt, Rinehart and Winston of Canada.

Albright, S. L. 1980. *Preliminary report on ethno-archaeological investigations of Tahltan fish camps on the Stikine River, Heritage Conservation Act Permit 1979-26*. Report on file with the Ministry of Tourism, Culture and the Arts, Archaeology Branch: Victoria, BC.

Albright, S. L. 1982. *An ethnoarchaeological study of Tahltan subsistence and settlement patterns*. MA diss., Simon Fraser University.

Albright, S. L. 1983. *Report on heritage resources in the Stikine River area of Northern British Columbia: Non-permit*. Report on file with the Ministry of Tourism, Culture and the Arts, Archaeology Branch: Victoria, BC.

Albright, S. L. 1984. *Tahltan ethnoarchaeology*. Burnaby: Department of Archaeology, Simon Fraser University, Publication Number 15.

Apland, B. 1980. *Preliminary Archaeological Study of the Proposed Stikine/Iskut Hydro-Electric Development*. Report on file at the Archaeology Branch, Victoria, BC.

Archaeology Branch. 1998. *British Columbia Archaeological Impact Assessment Guidelines*. Archaeology Branch: Victoria, BC. http://www.for.gov.bc.ca/archaeology/docs/impact_assessment_ guidelines/index.htm (accessed May 2013).

Archaeology Branch. 2001. *Culturally Modified Trees of British Columbia, Version 2.0*. Report on file at the Archaeology Branch, Victoria.

Ascot Resources Ltd. n.d. *Premier/Dilworth Project*. http://www.ascotresources.ca/s/Premier.asp (accessed January 2013).

Balcom, R. 1986. *Heritage Resources Impact Assessment, Mount Klappan Coal Property*. Permit 1985-008. Report on file at the Archaeology Branch: Victoria, BC.

Barbeau, M. 1929. *Totem Poles of the Gitksan, Upper Skeena River, British Columbia*. Ottawa, ON: National Museums of Canada.

Barbeau, M. 1950a. *Totem poles: According to crests and topics*. Ottawa, ON: Anthropological Series, Vol. 1, Bulletin no. 119, National Museum of Canada.

Barbeau, M. 1950b. *Totem poles: According to location*. Ottawa, ON: Anthropological Series, Vol. 2, Bulletin no. 119, National Museum of Canada.

BC EAO. 2013. *Guidelines for the Selection of Valued Components and Assessment of Potential Effects*. British Columbia Environmental Assessment Office: Victoria, BC.

BC EAO. 2014. *Brucejack Gold Mine Project: Application Information Requirements for Pretium Resources Inc.'s Application for an Environmental Assessment Certificate*. Prepared by the British Columbia Environmental Assessment Office: Victoria, BC.

BC ILMB. 2000. *Cassiar Iskut-Stikine Land and Resource Management Plan*. British Columbia Integrated Land Management Bureau. http://ilmbwww.gov.bc.ca/slrp/lrmp/smithers/cassiar/index.html (accessed May 2013).

BC MFLNRO. 2012. *Nass South Sustainable Resource Management Plan*. http://www.ilmb.gov.bc.ca/slrp/srmp/south/nass/index.html (accessed May 2013).

BC MOT (Ministry of Transportation and Infrastructure). 2000. *Frontier to Freeway – A Short Illustrated History of the Roads in British Columbia*. http://www.th.gov.bc.ca/publications/frontiertofreeway/frontiertofreeway.pdf (accessed January 2013).

BC Parks. 2011a. *Ningunsaw River Ecological Reserve*. http://www.env.gov.bc.ca/bcparks/eco_reserve/ningunsaw_er.html (accessed January 2013).

BC Parks. 2011b. *Ningunsaw Provincial Park*. http://www.env.gov.bc.ca/bcparks/explore/parkpgs/ningunsaw/ (accessed January 2013).

BC Parks. 2011c. *Border Lake Provincial Park*. http://www.env.gov.bc.ca/bcparks/explore/parkpgs/border_lk/ (accessed January 2013).

Benyon, W. 1941. The Tsimshians of Metlakatla, Alaska. *American Anthropology* Vol 43: 83–88.

Berthiaume, R. 1999. *The Gitselasu: The People of Kitselas Canyon*. Terrace, BC: First Nations Education Centre.

Boas, F. 1895. *Tenth Report on the North-Western Tribes of Canada*. Committee on North-Western Tribes of the Dominion of Canada. British Association for the Advancement of Science: London, UK.

Boas, F. 1896. Traditions of the Ts'ets'aut. *Journal of American Folklore,* 9 (35):257-268.

Boas, F. 1897. Traditions of the Ts'ets'aut II. *Journal of American Folklore,* 10 (36):35-48.

British Columbia Department of Mines. 1904. *Report of the Minister of Mines for the year ending 1903*. Victoria, BC: British Columbia Department of Mines.

British Columbia Department of Mines. 1912. *Annual Report of the Minister of Mines for the year ending 1911*. Victoria, BC: BC Geological Survey, Ministry of Energy, Mines & Petroleum Resources.

British Columbia Department of Mines. 1923. *Report of the Minister of Mines for the year ending 1922*. Victoria, BC: British Columbia Department of Mines.

British Columbia Department of Mines. 1932. *Report of the Minister of Mines for the year ending 1931*. Victoria, BC: British Columbia Department of Mines.

British Columbia Department of Mines. 1933. *Annual Report of the Minister of Mines for the year ending 1932*. Victoria, BC: BC Geological Survey, Ministry of Energy, Mines & Petroleum Resources.

British Columbia Department of Mines. 1936. *Annual Report of the Minister of Mines for the year ending 1935*. Victoria, BC: BC Geological Survey, Ministry of Energy, Mines & Petroleum Resources.

Brolly, R. 1990. *Heritage site overview assessment proposed Iskut mine access road, northwestern British Columbia, Heritage Conservation Act Permit 1990-102*. Report on file with the Ministry of Tourism, Culture and the Arts, Archaeology Branch: Victoria, BC.

Bussey, J. 1985. *Heritage Resource Overview Assessment, Mount Klappan Access Study.* Report submitted to the British Columbia Ministry of Environment: Victoria, BC.

Bussey, J. 1987a. *Heritage resource overview assessment: Sulphurets Property access road, Northwestern British Columbia (HCA Permit 1987-039).* Report on file with the Ministry of Tourism, Culture and the Arts, Archaeology Branch: Victoria, BC.

Bussey, J. 1987b. *Heritage resource overview assessment: Additional corridor evaluation for the Sulphurets Property access road, Non-permit report*. Appended to *HCA* Heritage Inspection Permit Report 1987-039. Report on file with the Ministry of Tourism, Culture and the Arts, Archaeology Branch: Victoria, BC.

CEA Agency. 2013a. *Environmental Impact Statement Guidelines:Guidelines for the Preparation of an Environmental Impact Statement for an Environmental Assessment Conducted Pursuant to the Canadian Environmental Assessment Act,* 2012. *Brucejack Gold Mine Project. Pretium Resources Inc.* Prepared by the Canadian Environmental Assessment Agency. Vancouver, BC.

CEA Agency. 2013b. *Operational Policy Statement Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012*. http://www.ceaa-acee.gc.ca/Content /1/D/A/1DA9E048-4B72-49FA-B585-B340E81DD6AE/CEA_OPS_May_2013-eng.pdf (accessed October 2013).

Clague, J. J. 1989. Quaternary geology of the Canadian Cordillera. In: *Geology of Canada and Greenland*. Ed. R. J. Fulton. Ottawa, ON: Geological Survey of Canada, Geology of Canada 1.

Clague, J. J. and R. W. Mathewes. 1996. Neoglaciation, Glacier-Dammed Lakes, and Vegetation Change in Northwestern British Columbia, Canada. *Arctic and Alpine Research,* 28 (1): 10-24.

Clague, J. J. and W. H. Mathews. 1992. The Sedimentary Record and Neoglacial History of Tide Lake, Northwestern British Columbia. *Canadian Journal of Earth Science,* 29: 2383-2396.

Clarke, G., and G. Holdsworth. 2002. Glaciers of the Coast Mountains. In *Satellite Image Atlas of Glaciers of the World: U.S. Geological Survey Professional Paper 1386-J*. Ed. R. Williams, Jr. and J. Ferrigno. J291–J300. Denver, CO: US Geological Survey Information Services.

Daly, R. 2005. *Our box was full: An ethnography for the Delgamuukw Plaintiffs*. Vancouver, BC: UBC Press.

Dawson, G. M. 1887. *Notes on the Indian tribes of the Yukon district and adjacent northern portion of British Columbia*. Annual Report of the Geological Survey of Canada. Ottawa, ON: Geological Survey of Canada.

Drucker, P. 1965. *Cultures of the north Pacific Coast*. San Francisco, CA: Chandler Publishing Company.

Duff, W., ed. 1959. *Histories, territories, and laws of the Kitwancool*. Anthropology in British Columbia Memoir no. 4. Victoria, BC: Royal British Columbia Museum.

Duff, W. 1964. Contributions of Marius Barbeau to west coast ethnology. *Anthropologica*, 6 (1): 63–96.

Duff. W. 1981 Tsetsaut. In *Handbook of North American Indians, Vol. 6, Subarctic*. Ed. J. Helm. Washington, DC: Smithsonian Institution.

Dunn, J. A. 1995. *Sm'algyax: A reference dictionary and grammar for the Coast Tsimshian language*. Seattle, WA: University of Washington Press.

Emmons, G. T. 1911. *The Tahltan Indians*. Vol. 1 of Anthropological Publications IV. Philadelphia, PA: University of Phildelphia Museum.

Engisch, C. and A. Bible. 2009. *Interim Report on Archaeological Impact Assessment of the Red Chris Development*. Heritage Conservation Act Permit 2008-221. Report on file at the Archaeology Branch: Victoria, BC.

Engisch, C., A. Bible, D. Mathews, and D. Cullon. 2008. *Final Report for the Archaeological Impact Assessment of the Mount Klappan Coal Project, Northwest BC. Heritage Inspection Permit 2005-286.* Prepared for Fortune Minerals Ltd. Report on file with the Archaeology Branch: Victoria, BC.

Engisch, C., A. Bible, H. Pratt, S. Dawe, B. Endo. 2011. *Final Report for the Archaeology Impact Assessment of the Red Chris Mine Project, Northwest BC*. In Partial Fulfillment of Heritage Inspection Permit 2008-0211. Report on file at the Archaeology Branch: Victoria, BC.

Evenchick, C. A., F. Ferri, P.S. Mustard, M. E. McMechan, D. Ritcey, V. J. McNicoll, K. G. Osadetz, P. B. O'Sullivan, L. D. Stasiuk, N. S. F Wilson, J. Waldron, D. B. Snyder, R. J. W. Turner, G. Nowlan, and M. Boddy. 2005. *Highlights of recent research in the Bowser and Sustut basins project, British Columbia*. Current Research 2005-A1. Geological Survey of Canada: n.p.

Evenchick, C. A., T. P. Poulton, H. W. Tipper, and I. Braidek. 2001. Fossils and facies of the Northern two-thirds of the Bowser Basin, British Columbia. *Geological Survey of Canada, Open File 3956*.

Farr, D. n.d. Alaska Boundary Dispute. *The Canadian Encyclopedia*. http://www.thecanadianencyclopedia.com/articles/alaska-boundary-dispute (accessed January 2013).

Farquharson, K., M. Campbell, D. Walker, S. McKnight, and L. Seip. 2012. *KSM Project: Archaeological Impact Assessment, Final Report – Heritage Inspection Permit 2012-0192*. Prepared for Seabridge Gold Inc. by Rescan Environmental Services Ltd.: Vancouver, BC.

FitzGerald, G. 1951. *Surveying and Mapping In Alaska*. Geological Survey Circular 101, United States Department of the Interior: Washington, DC.

Fladmark, K. R. 1984. Mountain of Glass: Archaeology of the Mount Edziza Obsidian Source, British Columbia Canada. *World Archaeology*, 16(2):139-156.

Fladmark, K. R. 1985. *Glass and Ice: The Archaeology of Mt. Edziza*. Publication Number 14. Burnaby, BC: SFU Archaeology Press.

Fladmark, K. 2001. From land to sea: Late quaternary environments of the Northern Northwest Coast. In: *Perspectives on Northern Northwest Coast Prehistory Mercury Series Paper 160*. Ed. J. Cybulski. 25–48. Hull, QC: Canadian Museum of Civilization.

French, D. 1980. *Preliminary Assessment of the Heritage Resources in the Telegraph Creek Land Management Area of Northwestern British Columbia.* Report on file at Archaeology Branch: Victoria, BC.

Friesen, D. E. 1983. *Archaeological Investigations of the Upper Stikine River Basin and Spatsizi Plateau Region, Northwestern British Columbia.* Report on file at Archaeology Branch: Victoria, BC.

Friesen, D. E. 1985. *Aboriginal settlement patterns in the Upper Stikine River Drainage, northwestern British Columbia Permit 1983-15*. MSc diss. University of Calgary.

Garfield, V. 1931. *Change in the marriage customs of the Tsimshian*. MA diss. University of Washington.

Garfield, V. 1939. Tsimshian clan and society. *University of Washington Publications in Anthropology* 7 (3): 167–340.

GeoBC. 2011. *BC Geographical Names – Cache Point*. http://apps.gov.bc.ca/pub/bcgnws/names/54469.html (accessed January 2013).

Gilbert, R., J. R. Desloges, and J. J. Clague. 1997. The glacialacustrine sedimentary environment of Bowser Lake in the northern Coast Mountains of British Columbia, Canada. *Journal of Paleolimnology*, 17 (3): 331-346.

Gitanyow Hereditary Chiefs. 2009. *Gitanyow Policy Manual for Management of Cultural Heritage Resources*. Gitanyow Hereditary Chiefs, Kitwanga.

Gitxsan Chiefs' Office. n.d. *Our History*. http://www.gitxsan.com/culture/history.html (accessed January 2013).

Grove, E. 1986. *Bulletin 63: Geology and Mineral Deposits of the Unuk River-Salmon River-Anyox Area, British Columbia*. Province of British Columbia, Ministry of Energy, Mines, and Petroleum Resources: Victoria, BC.

Hall, D., and G. Prager. 2004. *Galore Creek Archaeological Overview Assessment 2004*. Prepared for NovaGold Canada Inc. by Rescan Environmental Services Ltd. Report on file at the Archaeology Branch: Victoria, BC.

Hall, D., and G. Prager. 2006. *Galore Creek Project Archaeological Impact Assessment, 2005*. Heritage Inspection Permit 2005-269. Report on file at the Archaeology Branch: Victoria, BC.

Halpin, M. M. 1973. *The Tsimshian crest system: A study based on museum specimens and the Marius Barbeau and William Benyon field notes*. PhD diss., University of British Columbia.

Halpin, M., and M. Seguin. 1990. Tshimshian peoples: Southern Tshimshian, Coast Tshimshian, Nishga, and Gitksan. In *Handbook of North American Indians, Vol. 7, Northwest Coast*. Ed. W. Suttles. 267-84. Washington, DC: Smithsonian Institution.

Ham, L. 1987. *Detailed Heritage Resource Impact Assessment of the Golden Bear Project Access Road, Telegraph Creek Area, Northwestern British Columbia*. Heritage Inspection Permit 1987-0027. Report on file at the Archaeology Branch: Victoria, BC.

Ham, L. 1988. *Heritage Overview and Impact Assessment of the SNIP Project, Iskut River, Northwestern British Columbia*. Heritage Inspection Permit 1988-49. Report on file at the Archaeology Branch: Victoria, BC.

Harvey, R. G. 1999. *Carving the Western Path: By river, rail and road through Central and Northern B.C*. Surrey, BC: Heritage House Publishing Company.

Hauksdottir, S., E. G. Enegren, and J. K. Russell. 1994. *Recent basaltic volcanism in the Iskut-Unuk rivers area, northwestern British Columbia*. Current Research 1994-A. Ottawa, ON: Geological Survey of Canada.

Heusser, C. J. 1960. *Late Pleistocene environments of North Pacific North America*. New York, NY: American Geological Society, Special Publication No. 35.

Hodge, F. W. 1912. Tahltan. *Bureau of Ethnology Bulletin,* 30 (11): 670–761.

Inglis, G. B., D. R. Hudson, B. R. Rigsby, and B. Rigsby. 1990. Tsimshians of British Columbia since 1900. In: *Handbook of North American Indians, Vol. 7 Northwest Coast*. Ed. W. Suttles. 285-293. Washington, DC: Smithsonian Institute.

Jackman, N. and F. Craig. 2011. *Archaeological Assessments of Ministry of Transportation and Infrastructure Developments in Service Areas Lakes (24), Bulkley-Nass (25), and Stikine (28).* BC HCA Permit Report 2008-0181. Report on file at the Archaeology Branch: Victoria, BC.

Jenness, D. 1927. *Indians of Canada*. Anthropological Series 15, Bulletin 65. Ottawa, ON: National Museum of Canada.

Jollymore, K., V. Neuman, and S. Hossain. 2014. *Brucejack Project: Archaeological Impact Assessment, Final Report, Heritage Inspection Permit 2013-0174.* Prepared for Pretium Resources Inc. by Rescan Environmental Services Ltd.: Vancouver, BC. Report on file at the Archaeology Branch, Victoria, BC. (In progress).

Jollymore, K. and D. Walker. 2013. *Brucejack Project: Archaeological Impact Assessment, Final Report, Heritage Inspection Permit 2011-0245.* Prepared for Pretium Resources Inc. by Rescan Environmental Services Ltd.: Vancouver. Report on file at the Archaeology Branch: Victoria, BC.

Land Tenures Branch. n.d. *Fossil Management in British Columbia – Fossil Protection.* http://www.for.gov.bc.ca/land_tenures/fossil_management/fossil_protection/index.html (accessed July 2013).

MacDonald, G. F. and J. J. Cove, eds. 1987. *Tsimshian Narratives*. Collected by Marius Barbeau and William Benyon. Mercury Series, Directorate Paper No. 3. 2 vols. Canadian Museum of Civilization: Ottawa, ON.

MacLachlan, B. 1981. Tahltan. In *Handbook of North American Indians, Vol. 6, Subarctic*. Ed. J. Helm. Washington, DC: Smithsonian Institute.

Magne, M. 1982. *Stikine-Iskut Ancillary Developments Heritage Resource Overview*. Report on file at the Archaeology Branch: Victoria, BC.

Marshall, A., A. Marr, and A. Palmer. 2008. A*rchaeological Impact Assessments of Forestry Blocks and Roads Proposed by Clients within the Kalum and North Coast Forest Districts, BC*. Heritage Inspection Permit 2006-193. Report on file at the Archaeology Branch, Victoria, BC.

Marshall, A. and A. Palmer. 2010. *Archaeological Impact Assessment of the Forrest Kerr Hydroelectric Project Amendment*. Heritage Inspection Permit 2009-0363. Report on file at the Archaeology Branch: Victoria, BC.

McDonald, J. A. 2003. *People of the robin: The Tsimshian of Kitsumkalum*. A resource book for the Kitsumkalum education committee and the Coast Mountain School District 82 (Terrace). Edmonton, AB: Canadian Circumpolar Press, University of Alberta.

McDonald, J. A. 2006a. *The beautiful town: An ethnohistorical return to Robin Town on the Kitsumkalum Canyon.* n.p.: Kitsumkalum Social History Research Projects, Book Series #2.

McDonald, J. A. 2006b. *Robin Town: A return to Robin Town on the Kitsumkalum Canyon.* Royal BC Museum Living Landscapes Project. http://www.livinglandscapes.bc.ca/northwest/robin_town/index.html (accessed January 2013).

McIlwraith, T. F. 2007. *"But we are still native people": Talking about hunting and history in a northern Athapaskan village*. PhD diss., University of New Mexico.

McLeod, I. and H. McNeil. 2004. *Prospectors, Promoters, and Hard Rock Miners: Tales of Stewart, B.C. and Hyder, Alaska Camps.* Kelowna, BC: S.H. Co. Ltd.

McNeary, S. 1976. *Where fire came down: Social and economic life of the Niska*. PhD diss., Bryn Mawr College.

Meidinger, D. and W. MacKenzie, eds. 2006. *The Ecology of the Alpine Zones*. Victoria: Research Branch, BC Ministry of Forests and Range.

Meidinger, D. and J. Pojar, eds. 1991. *Ecosystems of British Columbia*. Victoria: Research Branch, BC Ministry of Forests.

Menzies, C. R., ed. 2006. *Traditional ecological knowledge and natural resource management*. Lincoln, NE: University of Nebraska Press.

Miller, B. 2004. *Wires in the Wilderness: the Story of the Yukon Telegraph Line*. Surrey, BC: Heritage House.

Miller, J. 1997. *Tsimshian culture: A light through the ages*. Lincoln, NE: University of Nebraska Press.

Miller, J. and C. Eastman, eds. 1984. *The Tsimshian and their neighbors of the North Pacific Coast*. Seattle, WA: University of Washington Press.

Morkill, D.B. 1929. *Map showing Mining Properties in Vicinity of Stewart and Salmon River Portland Canal Mining Division -- British Columbia -- 1926 . . . with additions and amendments to May 1929*. Map. Stewart: D.B. Morkill, 1929. From Barry Lawrence Ruderman Antique Maps Inc. https://www.raremaps.com/gallery/detail/21791 (accessed January 2013).

Morice, A. G. 1893. *Notes archaeological, industrial and sociological on the Western Denes*. Transactions of the Canadian Institute.

Muir, R. and H. Moon. 2000. Sampling culturally modified tree sites. Victoria: Ministry of Forests, Aboriginal Affairs Branch.

National Parks Service. 2003. *National Monument Proclamations under the Antiquities Act*. http://www.nps.gov/history/history/hisnps/NPSHistory/monuments.htm (accessed January 2013).

Newman, K. 1995. *The Yukon Telegraph Line/Line in the Kalum Forest Distrcit*. Unpublished manuscript on file with the Stikine-Kitimat Regional District, Terrace, B.C.

Oregon State University. n.d. *Canada's Volcanoes*. http://volcano.oregonstate.edu/vwdocs/volc_images/north_america/canada/Canada.html (accessed May 2013).

Pegg, B. and C. Dodd. 2007. *Archaeological Overview Assessment: Upper Bell Irving Watershed*. Heritage Inspection Permit 2006-0193. Report on file with the Archaeology Branch, Victoria.

People of 'Ksan. 1980. *Gathering what the great nature provided: Food traditions of the Gitksan*. Vancouver: Douglas and McIntyre.

Rescan. 2013a. *Brucejack Gold Mine Project: 2012-2013 Terrestrial Ecosystems Baseline Studies*. Prepared for Pretium Resources Inc. by Rescan Environmental Services Ltd.: Vancouver, BC.

Rescan. 2013b. *Brucejack Gold Mine Project: Ethnographic Overview Report*. Prepared for Pretium Resources Inc. by Rescan Environmental Services Ltd.: Vancouver, BC.

Rescan. 2013c. *Brucejack Gold Mine Project: Non-traditional Land Use Baseline*. Prepared for Pretium Resources Inc. by Rescan Environmental Services Ltd.: Vancouver, BC.

Rescan. 2013d. *Brucejack Gold Mine Project: Skii km Lax Ha Traditional Knowledge and Traditional Use Report*. Prepared for Pretium Resources Inc. by Rescan Environmental Services Ltd.: Vancouver, BC.

Rescan. 2013e. *Brucejack Gold Mine Project: Wildlife Characterization Baseline Report*. Prepared for Pretium Resources Inc. by Rescan Environmental Services Ltd.: Vancouver, BC.

Rescan. 2013f. *KSM Project: Application for an Environmental Assessment Certificate / Environmental Impact Statement*. Prepared for Seabridge Gold Inc. by Rescan Environmental Services Ltd.: Vancouver, BC.

Robb, S. A. 1966. *The Collins Overland or Russian Extension Telegraph Project: A Pioneer Attempt to Establish Telegraph Communications between North America and Europe*. MA diss, University of British Columbia.

Rousseau, M. K. 1990. *Results of the 1990 heritage resource study conducted within the Eskay Creek Mine development area near Stewart, northwestern British Columbia, Heritage Conservation Act Permit 1990-81*. Report on file with the Ministry of Tourism, Culture and the Arts, Archaeology Branch: Victoria, BC.

Ryder, J. M. 1987. Neoglacial history of the Stikine-Iskut area, northern Coast Mountains, British Columbia. *Canadian Journal of Earth Science*, Vol 24:1294-1301.

Sapir, E. 1915. *A Sketch of the social organization of the Nass River Indians*. Anthropological Series. Ottawa, ON: Canada Geological Survey.

Sapir, E. 1920. Nass River Terms of Relationship. *American Anthropology,* 23 (3): 261–71.

Seguin, M., ed. 1984. *The Tsimshian: Images of the past, views for the present*. Vancouver, BC: UBC Press.

Seguin, M. 1985. *Interpretive contexts for traditional and current Coast Tsimshian Feasts*. Ottawa, ON: National Museums of Canada.

Seip, L., K. Farquharson, and S. McKnight. 2009. *Kutcho Project Archeological Impact Assessment Final Report*. Heritage Inspection Permit 2006-253. Report on file at the Archaeology Branch, Victoria, BC.

Seip, L., K. Farquharson, D. Walker, M. Will, S. McKnight. 2012. *Galore Creek Project Final Report for Archaeological Impact Assessments: HCA Permit 2006-230*. Prepared for Galore Creek Mining Corporation by Rescan Tahltan Environmental Consultants: Dease Lake, BC.

Seip, L. and S. McKnight. 2009. *Archaeological Overview and Impact Assessment of the Klappan Coalbed Methane Access Road Corridor, 2008*. Heritage Inspection Permit 2008-0176. Report on file at the Archaeology Branch: Victoria, BC.

Seip L., S. McKnight, V. Neuman, K. Farquharson, J. Ardanaz. 2011. *Schaft Creek Project: Archaeological Impact Assessment Final Report*. Heritage Inspection Permit 2066-0223. Report on file with the Archaeology Branch: Victoria, BC.

Seip, L., S. McKnight, D. Walker, M. Campbell, and K. Farquharson. 2012. *KSM Project: Archaeological Impact Assessment, Final Report – Heritage Inspection Permit 2008-128*. Prepared for Seabridge Gold Inc. by Rescan Environmental Services Ltd.: Vancouver, BC.

Seip. L, D. Walker, K. Farquharson, M. Will, J. Ardanaz, V. Neuman, and S. McKnight. 2012. *Galore Creek Project: Final Report for Archaeological Monitoring and Data Recovery – Heritage Inspection permit 2007-163*. Prepared for Galore Creek Mining Corporation by Rescan Tahltan Environmental Consultants: Vancouver, British Columbia. Report on file at the Archaeology Branch: Victoria, BC.

Shortridge, L. 1919. A visit to the Tshimshian Indians: The Skeena River (continued). *Museum of the University of Pennsylvania Museum Journal,* 10(3): 49–67 and 117–48.

Sterritt, N. J., S. Marsden, R. Galois, P. R. Grant, and R. Overstall. 1998. *Tribal boundaries in the Nass Watershed*. Vancouver, BC: UBC Press.

The Thing. 1982. Directed by John Carpenter. Universal Pictures Film.

THREAT. 2011. *Tahltan Archaeological Standards*. Prepared by THREAT for the Tahltan Central Council. On file with Rescan Environmental Services Ltd.

Teit, J. A. 1906. Notes on the Tahltan Indians of British Columbia. In: *Boas Anniversary Volume*. 337-49. New York.

Teit, J. A. 1912. On Tahltan (Athapaskan) work, 1912. In *Summary Report for 1912*. 484–87. Ottawa: Geological Survey of Canada, Department of Mines, Geological Survey.

Teit, J. A. 1956. Field notes on the Tahltan and Kaska Indians: 1912-15. *Anthropoligica*: 40-171.

Thompson, J. 2007. *Recording their story: James Teit and the Tahltan*. Vancouver: Douglas & McIntyre.

Thorman, T. P. n.d. *Miscellaneous material relating to the Tahltan Indians*. Unpublished letters and notes. Victoria: BC Provincial Archives.

Walker, D., and S. McKnight. 2011. *Snowfield and Brucejack Project: Archaeological Impact Assessment Final Report, Heritage Conservation Permit 2010-0255*. Prepared for Pretium Resources Inc. by Rescan Environmental Services Ltd. Report on file at the Archaeology Branch: Victoria, BC.

Warner, J. and M. Magne. 1983. *Heritage Resource Inventory: Construction Material Exploration Areas and Selected Ancillary Facilities, Stikine-Iskut Development*. Permit 1982-16. On file at the Archaeology Branch: Victoria, BC.

Wilson, I. R. 1984. *Stikine-Iskut Development Heritage Resources Impact Assessment Summary Volume*. Permit 1983-35. On file at the Archaeology Branch: Victoria, BC.

Wilson, I. R., D. Friesen, M. Magne, and J. Williams. 1982. *Stikine-Iskut Hydroelectric Project Heritage Resource Impact Assessment 1980-81*. On file at the Archaeology Branch: Victoria, BC.

White, J. 1913. *Handbook of Indians of Canada*. Ottawa, ON: Appendix to the 10th annual report of the Geographic Board of Canada.

YDLI. 2006. *Language and Dialect by Community*. The First Nations Languages of British Columbia. Yinka Dene Language Institute. http://www.ydli.org/fnlgsbc.htm (accessed February 2013).