RED MOUNTAIN UNDERGROUND GOLD PROJECT
VOLUME 3 | CHAPTER 21
HERITAGE EFFECTS ASSESSMENT

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21 HERITAGE EFFECTS ASSESSMENT

21.1 Introduction

This chapter describes the existing information for heritage resources in the area of the Red Mountain Underground Gold Project (the Project) area and assesses the potential effects of the Project on heritage resources in the local study area (LSA; Section 21.3). Figure 21.2-1, Figure 21.2-2, and Figure 21.2-3 provide an overview of the Project's components and their locations within the Bitter Creek valley.

Heritage resources are resources that are important and protected by the *Heritage Conservation Act* (HCA, 1996) because of their historical, cultural, scientific, and educational value to communities, Aboriginal Groups, and the public. A heritage resource is defined as personal property that has heritage value to BC, a community, or an Aboriginal Group, regardless of whether it has been officially designated (Province of BC, 1996) and may include archaeological resources, which are defined as "the physical remains of past human activity," (FLNRO, 1998). Heritage resources may also include immaterial uses of the Project area for cultural or heritage activities.

The assessment of potential effects of the Project on Tsetsaut Skii km Lax Ha's (TSKLH's) and Métis Nation BC's (MNBC's) Current Use of Land and Resources for Traditional Purposes (CULRTP) is addressed in Chapter 20. The assessment of potential effects of the Project on their Aboriginal interests and on Nisga'a Nation Treaty rights is covered in Chapters 25, 26, and 27 of Part C.

21.2 Regulatory and Policy Setting

The regulatory and policy setting of the Heritage effects assessment is outlined below and summarized in Table 21.2-1.

Table 21.2-1: Summary of Regulatory and Policy Setting for Heritage Effects Assessment

Name	Type	Jurisdiction	Description
British Columbia Archaeological Resource Management Handbook	Guidelines	Provincial	Summarizes the archaeological impact assessment and review process in BC.
Canadian Environmental Assessment Act, 2012	Legislation	Federal	Sets out the requirements for the assessment of effects of changes to the environment on physical and cultural heritage and on any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance.

Name	Type	Jurisdiction	Description
Environmental Assessment Act (2002)	Legislation	Provincial	Sets out the requirements for the assessment of Project effects on environmental, economic, social, health, and heritage issues.
Fossil Management Framework	Framework	Provincial	Provides guidance related to fossil management in BC. Mineral tenure holders who discover fossils during exploration are encouraged to report the discovery to a local museum, university, or paleontology organization.
Heritage Conservation Act (1996)	Legislation	Provincial	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. Sections 12 and 14 allow the minister to issue heritage inspection permits to assess archaeological significance of a given area and to issue site alteration permits where a site has been identified and development will occur. Fossils protected under the HCA have heritage value based on their scientific and educational worth. Such sites are designated as Provincial Heritage Objects or Sites.
Local Government Act (1996)	Legislation	Provincial	Provides 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.
Nisga'a Final Agreement Act (2000)	Legislation	Federal and Provincial	Chapter 17 of the agreement outlines the protection and ownership of cultural artifacts and the protection of heritage sites on Nisga'a Lands.
Nass South Sustainable Resource Management Plan (2012)	Management Plan	Provincial	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 Gitanyow, Nisga'a Lisims Government, and the Archaeology Branch for inclusion in the BC Government's Remote Access to Archaeological Data database.

Figure 21.2-1: Project Overview

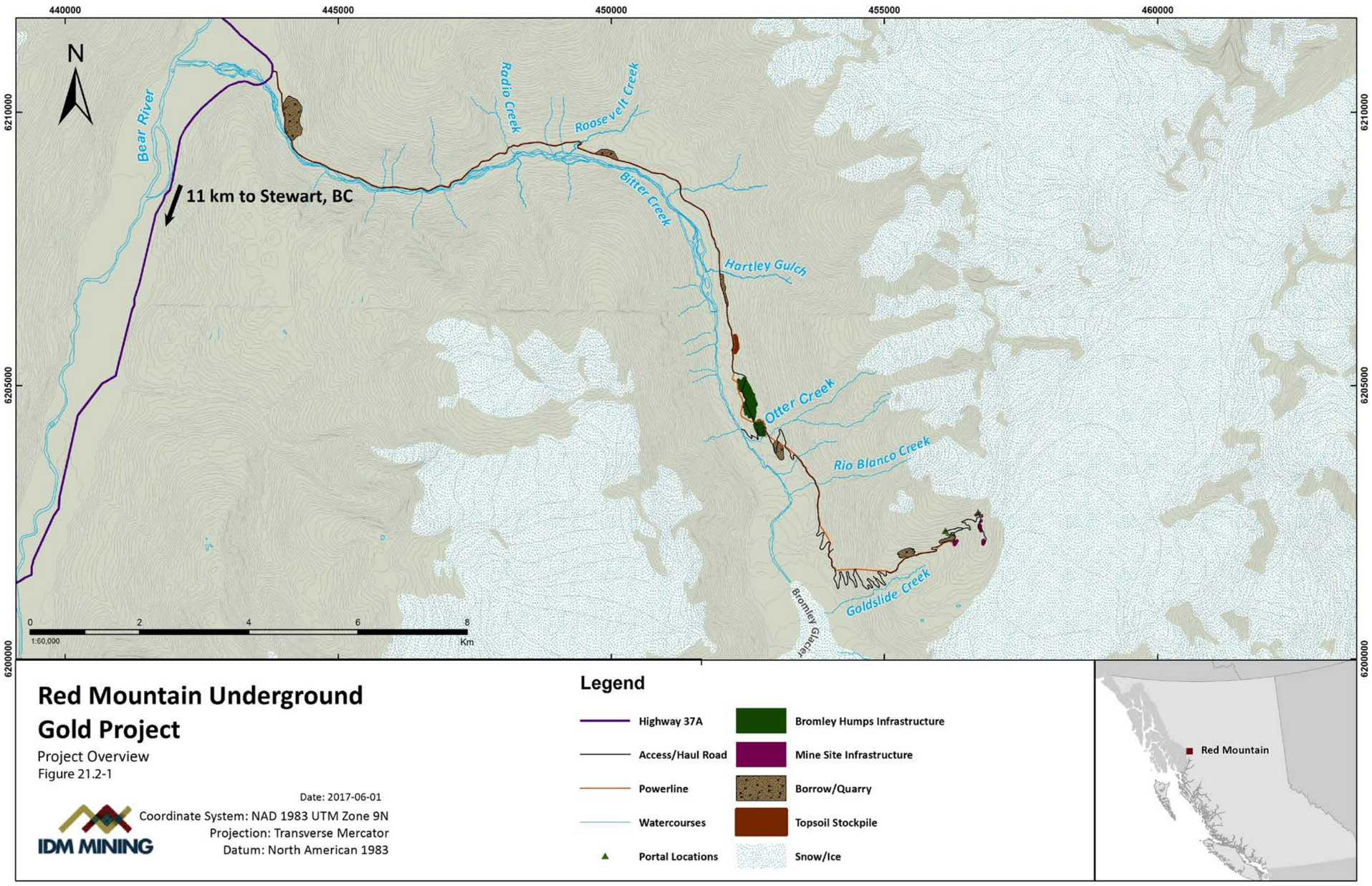


Figure 21.2-2: Project Footprint – Bromley Humps

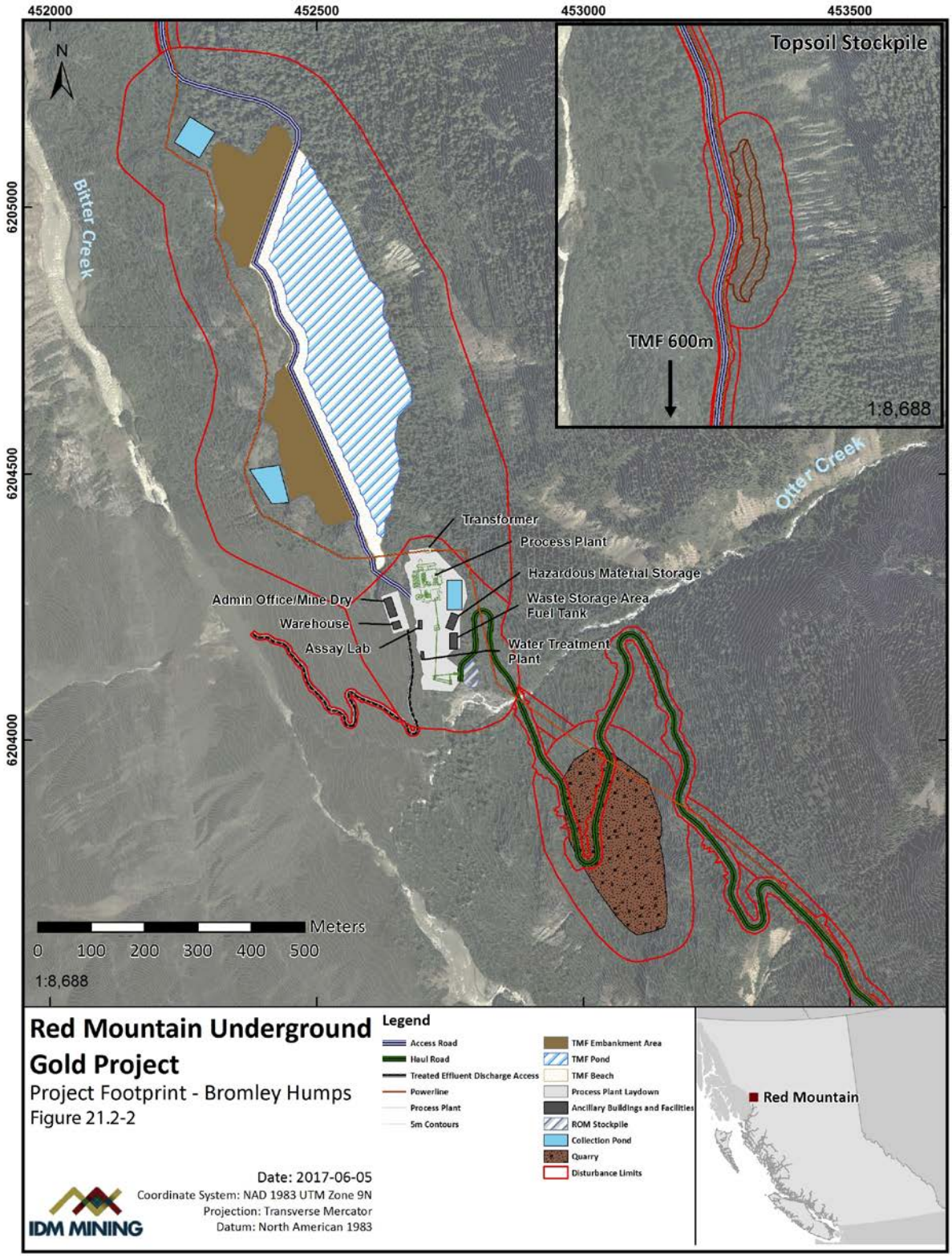
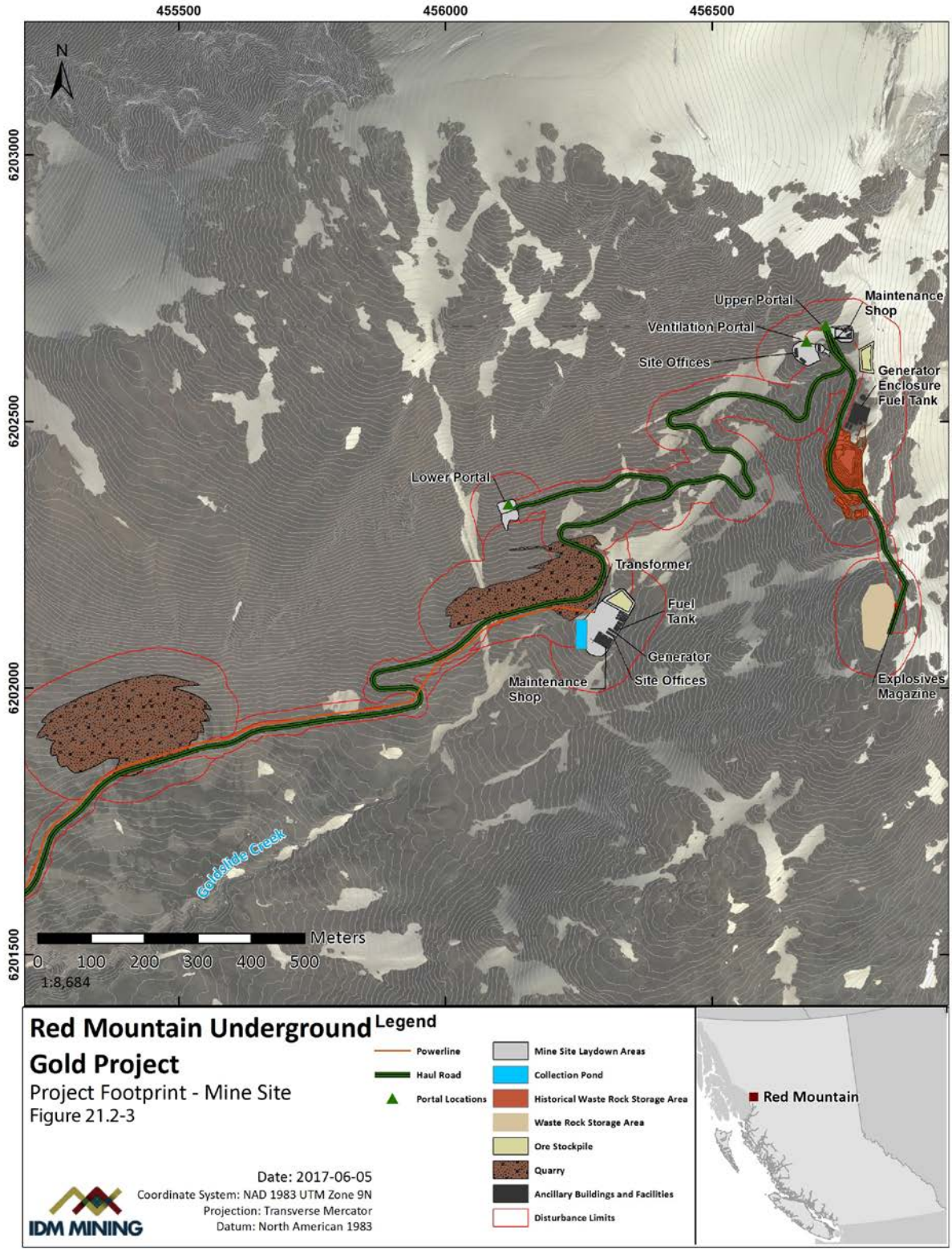


Figure 21.2-3: Project Footprint – Mine Site



21.2.1 Provincial Regulatory Context

Heritage resources are protected by the HCA, the purpose of which is "to encourage and facilitate the protection and conservation of heritage property" in BC, where "heritage value" is defined as "the historical, cultural, aesthetic, scientific or educational worth or usefulness of a site or object," (Province of BC, 1996). Heritage resources are non-renewable, can be susceptible to disturbance, and are finite in number. The HCA protects all sites predating 1846 on Crown and private land. The Archaeology Branch of the Ministry of Forests, Lands and Natural Resource Operations (Archaeology Branch) is the provincial ministry responsible for administering the HCA, issuing permits for heritage inspection and site alterations (as defined under the HCA), and maintaining a database of known archaeological sites.

The BC *Environmental Assessment Act, 2002*, (BCEAA) considers heritage resources to be one of the five pillars of an environmental assessment. If a project may have significant adverse effects on heritage resources, that project must obtain an environmental assessment certificate and may not proceed without one (Province of BC, 2002).

21.2.2 Federal Regulatory Context

Sections 5(1)(c)(ii) and 5(1)(c)(iv) of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and the federal *Guidelines for the Preparation of an Environmental Impact Statement Pursuant to CEAA 2012* (EIS Guidelines, January 2016) issued for the Project also require an assessment of the potential effects of the Project on heritage resources. As outlined in the EIS Guidelines, the assessment must consider physical and cultural heritage, including:

- Any site, structure, or thing of archaeological, paleontological, historical, or architectural significance;
- Burial sites;
- Cultural landscapes;
- Sacred, ceremonial, or culturally important places, objects, or things; and
- Archaeological potential and/or artifacts.

21.2.3 Nisga'a Final Agreement Context

The Project is within the Nass Area and the Nass Wildlife Area, as set out in the Nisga'a Final Agreement (NFA). The NFA is a treaty and land claims agreement, within the meaning of sections 25 and 35 of the *Constitution Act, 1982*, and is a tri-partite agreement between Nisga'a Nation, as represented by the Nisga'a Lisims Government (NLG), Canada, and BC. The NFA confirms Nisga'a Nation's right to self-government, grants NLG the authority to make laws, and grants a number of Treaty rights for Nisga'a Nation and Nisga'a citizens over lands and resources (Nisga'a Lisims Government, no date).

Chapter 10, paragraph 8(f) of the NFA requires an assessment of the "effects of the Project on the existing and future economic, social, and cultural wellbeing of Nisga'a citizens who may be affected by the Project." As outlined in the EIS Guidelines issued for the Project, this assessment includes consideration of Nisga'a Nation's heritage and cultural resources. The 8(f) assessment is contained in Chapter 27 of this document.

Chapter 17 of the NFA addresses the ownership and protection of heritage resources discovered on Nisga'a Lands or on Category A Lands, as defined in the NFA. As the Project is outside of Nisga'a Lands and of Category A Lands, these provisions do not apply.

21.2.4 Regional Regulatory Context

The Regional District of Kitimat-Stikine (RDKS) maintains a Regional District Community Heritage Registry (Regional District of Kitimat-Stikine). The registry is "an official list of historic places, specific to the community of the Regional District of Kitimat-Stikine, which have been identified by the local government as having heritage value or heritage character," (Regional District of Kitimat-Stikine). As of August 2017, there are 11 heritage sites listed in RDKS's registry, as outlined in Table 21.2-2 and as shown in Figure 21.2-4.

Table 21.2-2: RDKS Heritage Registry Sites

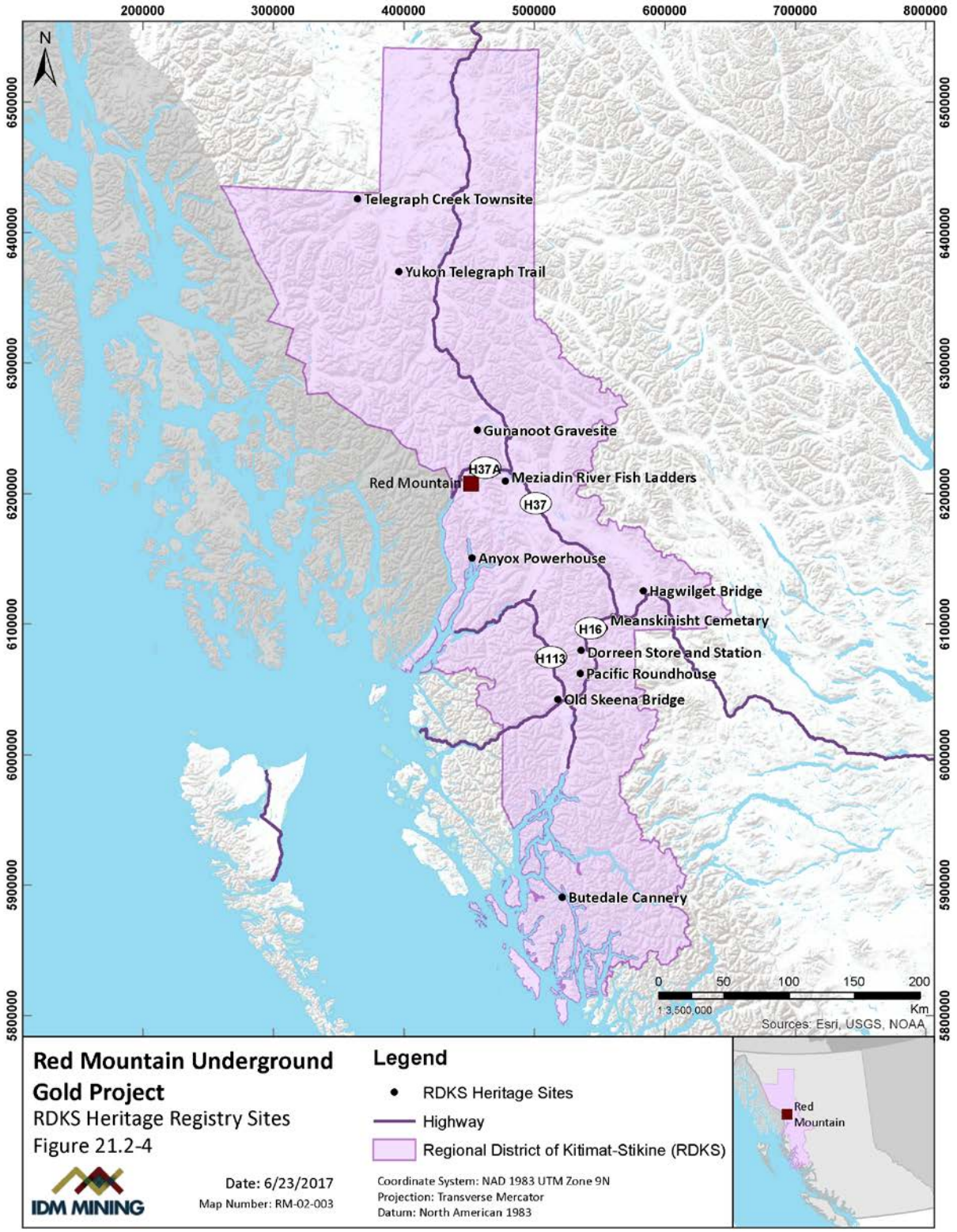
Heritage Site	Location	Distance from Project (kilometers [km])
Telegraph Creek Townsite	Telegraph Creek	229
Yukon Telegraph Trail	Moricetown to Telegraph Creek	166
Gunanoot Gravesite	Bowser Lake	40
Meziadin River Fish Ladders	Meziadin River	22
Anyox Powerhouse	Observatory Inlet	51
Hagwilet Bridge	Hazelton	148
Meanskinisht Cemetery	Cedervale	143
Dorreen Store and Station	Dorreen	146
Pacific Roundhouse	Terrace	161
Old Skeena Bridge	Terrace	171
Butedale Cannery	Princess Royal Island	318

The Project is within the Nass South Sustainable Resource Management Plan (Nass South SRMP) area. The Nass South SRMP defines cultural and heritage resources as both "tangible and intangible resources", including oral histories, family crests and names, place names, traditional knowledge, geographic features, specific cultural sites such as culturally modified trees, trails, and fishing sites, and broader cultural areas, such as hunting, fishing, and berry-picking areas (FLNRO, 2012). The stated goals for heritage resources in the Nass South SRMP are to:

- "Recognize and respect Gitanyow and Nisga'a Nation traditional and cultural areas, values, and activities so that they may exercise their Treaty and Aboriginal rights on the landscape; and

- "Protect key resource values … while allowing for continued traditional use activity and identified economic opportunities to prevail," (FLNRO, 2012).

Figure 21.2-4: RDKS Heritage Registry Sites



21.3 Scope of the Assessment

21.3.1 Information Sources

Information from the following sources was collected and used to support the Heritage Effects Assessment:

- Application for an Environmental Assessment Certificate / Environmental Impact Statement for the KSM Project, Chapter 21 (Heritage), prepared by Rescan Environmental Services Ltd. for Seabridge Gold, dated July 2013;
- Application for an Environmental Assessment Certificate / Environmental Impact Statement for the Brucejack Project, Chapter 22 (Assessment of Potential Heritage Effects), prepared by ERM Rescan for Pretium Resources Inc., dated June 2014;
- Archaeological Overview Assessment (AOA) for the Red Mountain Gold Project, prepared by Terra Archaeology, dated September 2015;
- British Columbia Archaeological Resource Management Handbook (https://www.for.gov.bc.ca/archaeology/docs/resource_management_handbook/index.htm);
- CEAA 2012;
- EIS Guidelines issued for the Project, dated January 2016;
- Preliminary Field Reconnaissance (PFR) for the Red Mountain Underground Gold Project, prepared by Terra Archaeology, dated January 2016;
- Regional District Community Heritage Registry, a database contained regional planning documents and spatial data (http://www.rdks.bc.ca/content/regional-district-community-heritage-registry);
- Nass South SRMP;
- Spatial data from the provincial governments that was incorporated into the AOA and PFR conducted for the Project; and
- Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site or Thing that is of Historical, Archeological, Paleontological or Architectural Significance under the Canadian Environmental Assessment Act, 2012 (http://www.ceaa.gc.ca/default.asp?lang=en&n=536A4CFE-1).

The AOA and PFR are appended to this Application/EIS (Appendix 21-A and 21-B) and are summarized below.

As outlined in Chapter 6 (Effects Assessment Methodology), IDM has not conducted primary traditional use or traditional ecological knowledge (TEK) surveys in support of the Project

due to the preferences of Nisga'a Nation, as represented by the Nisga'a Lisims Government, and EAO's and the Agency's direction for comparatively low levels of engagement with the other Aboriginal Groups potentially affected by the Project. IDM has committed to using TEK where that information is publically available. As no TEK relevant to this effects assessment was publically available at the time of writing, no TEK has been incorporated.

The results of the Heritage assessment have been brought forward to the 8(f) assessment required under Chapter 10 of the NFA in Chapter 27 of this Application/EIS.

21.3.2 Input from Consultation

IDM consulted with Aboriginal Groups, local community members, stakeholders, the public, and regulatory agencies throughout the Pre-Application Phase of the provincial environmental assessment (EA) process. This included a public comment period and open house led by the BC Environmental Assessment Office (EAO) as well as the participation of NLG and regulatory agencies in the EAO-led Working Group.

During consultation with the RDKS, RDKS representatives identified the Regional District Community Heritage Registry as a useful source of information on heritage resources in the Heritage LSA. Information from the Regional District Community Heritage Registry has been incorporated in this effects assessment.

No heritage resources, including sacred, ceremonial, or culturally important places, objects, or things in the LSA, or concerns regarding heritage resources, were identified during the course of IDM's consultation with Aboriginal Groups, community members, stakeholders, and the public.

Detailed information on IDM's consultation efforts in support of the Project are included in Chapter 3 (Information Distribution and Consultation), Part C (Aboriginal Consultation), and Part D (Public Consultation) as well as in the appended Aboriginal and Public Consultation Reports (Appendices 27-A and 28-A, respectively).

Table 21.3-1: Summary of Consultation Feedback on Heritage Effects Assessment

Topic	NLG	TSKLH	MNBC	Feedback by*			Consultation Feedback	Response
				G	P/S	O		
Heritage Effects Assessment					X		RDKS representatives identified the Regional District Community Heritage Registry as a useful source of information on heritage resources in the Heritage LSA.	Information from the Registry has been incorporated into the Heritage Effects Assessment.

Topic	NLG	TSKLH	MNBC	Feedback by*			Consultation Feedback	Response
				G	P/S	O		
Heritage Effects Assessment		X					TSKLH provided information on their ethnographic background and traditional territory.	This information has been incorporated into the Application/EIS.
Heritage Effects Assessment			X				MNBC provided information on their traditional land and resource use within 50 km of the proposed Project.	This information has been incorporated into the Application/EIS.

*NLG = Nisga'a Lisims Government;
TSKLH = Tsetsaut Skii km Lax Ha;
MNBC = Métis Nation BC;
G = Government - Provincial or federal agencies;
P/S = Public/Stakeholder - Local government, interest groups, tenure and license holders, members of the public; and
O = Other

21.3.3 Issues Scoping

As outlined in Chapter 6 of this Application/EIS, IDM has identified the following potential issues that are relevant to the Heritage Effects Assessment:

- Known or unknown heritage resources may be disturbed during earthworks and blasting associated with the construction of the Project;
- Heritage resources of concern to EAO, the Canadian Environmental Assessment Agency (the Agency), and Aboriginal Groups, include:
  - Archaeological potential and/or artifacts;
  - Any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance;
  - Burial sites;
  - Cultural landscapes; and
  - Sacred, ceremonial, or culturally important places, objects, or things.

21.3.4 Valued Component, Measurement Indicators, and Assessment Endpoint

Based on IDM's methodology for valued component (VC) selection, selected VCs should have the following attributes:

- **Relevant** to at least one of EAO's five pillars (i.e., environment, social, economic, heritage, and health) and clearly linked to the values reflected in the issues raised in respect of the Project;
- **Comprehensive**, so that taken together, the VCs selected for an assessment should enable a full understanding of the important potential effects of the Project (including all five pillars);
- **Representative** of the important features of the natural and human environment likely to be affected by the Project;
- **Responsive** to the potential effects of the Project; and
- **Concise**, so that the nature of the Project-VC interaction and the resulting effects pathway can be clearly articulated and understood, and redundant analysis is avoided.

21.3.4.1 Archaeological Resources

The AOA and supporting PFR found that there are no known archaeological resources in the Project area, including burials (Appendices 21-A and 21-B). Further, these two reports conclude that the Project area has a low potential of producing previously undiscovered archaeological resources due to the physical constraints of the landscape (steeply sloping terrain and absence of old growth tree stands), previous human disturbances (mining, logging, power line, and road construction), and natural disturbances of the soil (floods, landslides, and avalanches). There is also evidence that the valley was fully glaciated until relatively recently.

While archaeological resources, including burial sites, are relevant to the Heritage Pillar, they do not meet IDM's criteria to be representative, responsive, concise, or comprehensive in relation to the proposed Project.

- **Not representative**: As recent archaeological studies have determined that there are no known archeological resources in the Project area, archaeological resources cannot be considered representative of the important features of the natural and human environment likely to be affected by the Project.
- **Not responsive**: As there are no archaeological resources within the Project area, archaeological resources cannot be considered responsive to the potential effects of the Project.
- **Not concise**: As there are no archaeological resources within the Project area, the nature of the Project-VC interaction and resulting effects pathway cannot be clearly articulated. The analysis of potential effects to archaeological resources would be redundant.

- **Not comprehensive**: An assessment of potential effects on archaeological resources would not contribute to a full understanding of the important potential effects of the proposed Project.

For these reasons, IDM has not selected archaeological resources as a VC.

21.3.4.2 Historical Resources

IDM has determined that there are no historical resources in the Project area based on its review of historical information. Further, due to the remote location of the Project, it is highly unlikely previously unidentified historical resources exist in the Project area.

Historical resources do not meet IDM's criteria to be representative, responsive, concise, or comprehensive in relation to the Project.

- **Not representative**: As historical resources do not exist in the Project area, they cannot be considered representative of the important features of the natural and human environment likely to be affected by the Project.

- **Not responsive**: As historical resources do not exist in the Project area, they cannot be considered to be responsive to the potential effects of the Project.

- **Not concise**: As historical resources do not exist in the Project area, the nature of the Project-VC interaction and resulting effects pathway cannot be clearly articulated. The analysis of potential effects to heritage resources would be redundant.

- **Not comprehensive**: An assessment of potential effects on historical resources would not contribute to a full understanding of the important potential effects of the proposed Project.

For these reasons, IDM has not selected historical resources as a VC.

21.3.4.3 Paleontological Resources

Due to the geological setting of the Project, it is very unlikely paleontological resources would be found during the Project's Construction, Operation, or Closure and Reclamation Phases. Paleontological resources are most often found in sedimentary rock that has not been heated to extreme temperatures and that has not undergone a significant degree of change. The geology of the Project area is primarily volcanic and intrusive rock that has been strongly altered and deformed. This alteration and deformation would have destroyed any paleontological resources. Therefore, there is a low likelihood of disturbing paleontological resources at the Project site.

Paleontological resources do not meet IDM's criteria to be representative, responsive, concise, or comprehensive in relation to the Project.

- **Not representative**: As paleontological resources are unlikely to exist in the Project area, they cannot be considered representative of the important features of the natural and human environment likely to be affected by the Project.

- **Not responsive**: As paleontological resources are unlikely to exist in the Project area, they cannot be considered to be responsive to the potential effects of the Project.

- **Not concise**: As paleontological resources are unlikely to exist in the Project area, the nature of the Project-VC interaction and resulting effects pathway cannot be clearly articulated. The analysis of potential effects to paleontological resources would be redundant.

- **Not comprehensive**: An assessment of potential effects on paleontological resources would not contribute to a full understanding of the important potential effects of the proposed Project.

For these reasons, IDM has not selected paleontological resources as a VC.

21.3.4.4 Architectural Resources

No architectural resources have been identified in the Project area. Further, due to the remote and alpine location of the Project, it is very unlikely that previously unidentified architectural resources exist in the Project area.

Architectural resources do not meet IDM's criteria to be representative, responsive, concise, or comprehensive in relation to the Project.

- **Not representative**: As architectural resources do not exist in the Project area, they cannot be considered representative of the important features of the natural and human environment likely to be affected by the Project.

- **Not responsive**: As architectural resources do not exist in the Project area, they cannot be considered to be responsive to the potential effects of the Project.

- **Not concise**: As architectural resources do not exist in the Project area, the nature of the Project-VC interaction and resulting effects pathway cannot be clearly articulated. The analysis of potential effects to architectural resources would be redundant.

- **Not comprehensive**: An assessment of potential effects on architectural resources would not contribute to a full understanding of the important potential effects of the proposed Project.

For these reasons, IDM has not selected architectural resources as a VC.

21.3.4.5 Cultural and Heritage Resources

In recognition of the importance of cultural and heritage resources to Aboriginal Groups, regulators, and the public, IDM has included Cultural and Heritage Resources as a VC and conduct an assessment of the potential effects of the Project on that VC. The Cultural and Heritage Resources VC includes cultural landscapes and sacred, ceremonial, or culturally important places, objects, or things.

The structure of the assessment of potential Project effects on Cultural and Heritage Resources is summarized in Table 21.3-2.

Table 21.3-2: Primary Measurement Indicators and Assessment Endpoint for the Heritage Effects Assessment

Primary Measurement Indicators	Assessment Endpoints
• Loss, alteration, and/or degradation of physical objects, structures, human works, sites, or places and their attributes; • Changes to access; • Changes to value or importance; • Changes to abundance; and • Changes to distribution.	Continued protection of Cultural and Heritage Resources.

21.3.4.6 Pathways

The Intermediate Components (ICs) that are considered in the Cultural and Heritage Resources Effects Assessment are Air Quality, Visual Quality, and Noise. IDM recognizes that changes in these pathways may indirectly affect Cultural and Heritage Resources, such as a cultural landscape or a culturally important place, even if the landscape or site itself is not directly affected by the Project.

21.3.4.7 Primary Measurement Indicators

The assessment of potential Project effects on Cultural and Heritage Resources has been assessed through the following primary measurement indicators:

- Loss, alteration, and/or degradation of physical objects, structures, human works, sites, or places and their attributes;
- Changes to access;
- Changes to value or importance;
- Changes to abundance; and
- Changes to distribution.

21.3.4.8 Assessment Endpoint

IDM will conduct all Project planning and mitigation measures with the goal of continuing the protection of Cultural and Heritage Resources.

21.3.5 Assessment Boundaries

The following sections identify the spatial, temporal, administrative, and technical study area boundaries, as applicable to the VC, in a manner consistent with Chapter 6.

21.3.5.1 Spatial Boundaries

The spatial boundary of the Heritage effects assessment is an LSA corresponding to the footprint of the proposed Project components with a 30 metre (m) buffer around all components. The LSA is slightly different than the one presented in the Application Information Requirements (AIR) issued for the Project by EAO to account for the refinement of Project component locations during the time since the AIR was issued.

No regional study area (RSA) has been used in the Heritage Effects Assessment as Cultural and Heritage Resources are potentially affected by only direct disturbance. A comparison between direct potential disturbance and the regional area is not appropriate.

The LSA for the Heritage Effects Assessment is shown in Figure 21.3-1.

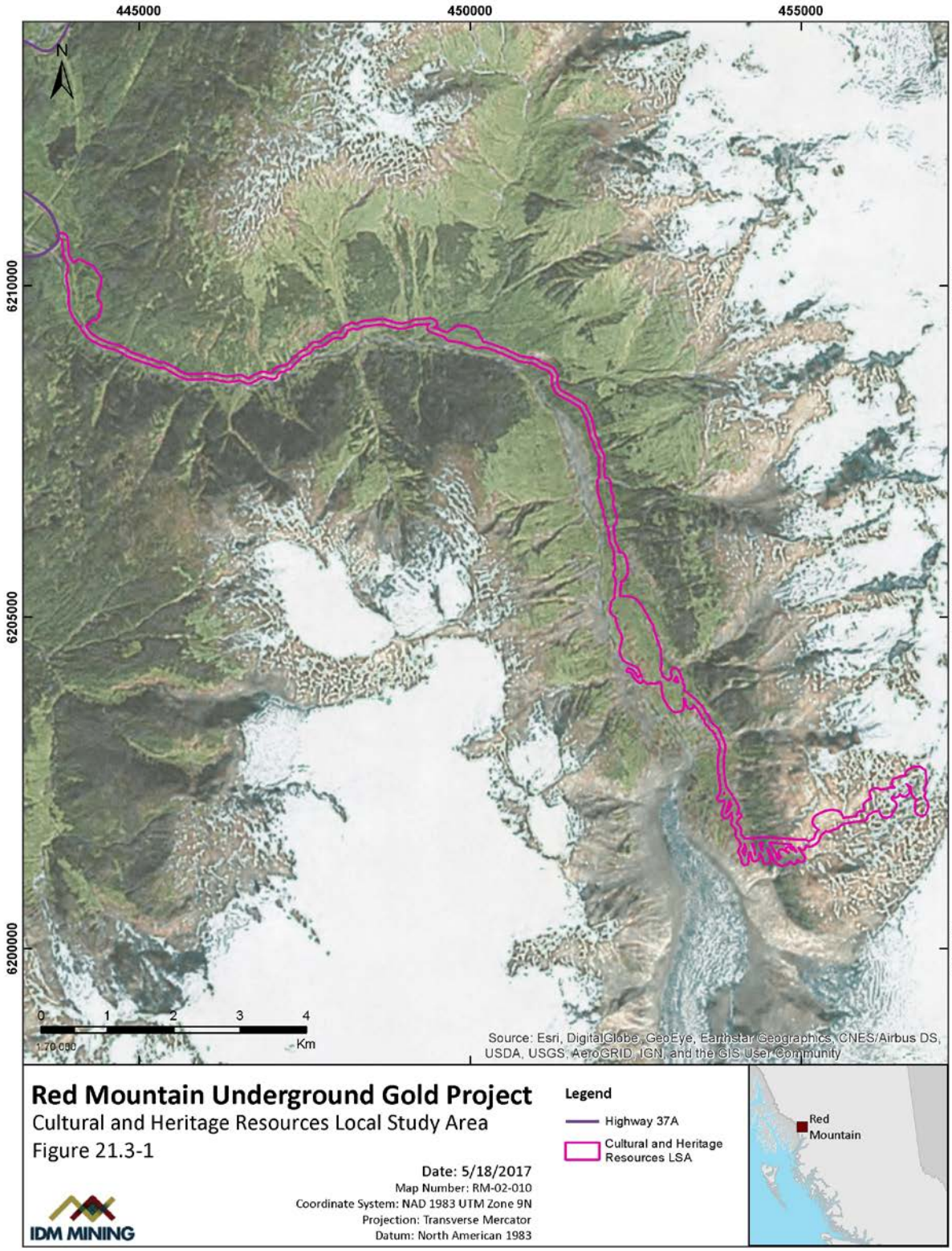
21.3.5.2 Temporal Boundaries

Cultural and Heritage Resources are potentially affected by Project activities during the Construction, Operation, and Closure and Reclamation Phases of the Project, as outlined in Table 21.3-3. Interactions with Cultural and Heritage Resources during the Post-Closure Phase will be unlikely due to the lack of earthworks and excavation.

Table 21.3-3: Spatial and Temporal Boundaries for Selected Heritage VC

VC	Temporal Boundary	Spatial Boundary
Cultural and Heritage Resources	Construction Operation Closure and Reclamation	**LSA**: Footprint of Project components with 30 m buffer (Figure 21.3-1). **RSA**: Not Applicable.

Figure 21.3-1: Cultural and Heritage Resources Local Study Area



21.3.5.3 Administrative and Technical Boundaries

There are no administrative or technical boundaries relevant to the Heritage Effects Assessment.

21.4 Existing Conditions

This section provides a high-level summary of the existing conditions of Cultural and Heritage Resources. The overview is intended to provide the reader with a brief introduction to the baseline setting and major components associated with the VC in the Project area.

21.4.1 Past and Current Projects and Activities

The Project area has been the site of mineral exploration and development for nearly a century. Initial exploration took place in the early 1900s in the form of placer mining on Bitter Creek, at the base of Red Mountain (IDM Mining Ltd., 2015). Later, in the 1970s, Red Mountain was the subject of a limited molybdenum exploration program (IDM Mining Ltd., 2015). The area has also seen active forestry operations; the lower portions of the Bitter Creek and nearby Roosevelt Creek valleys were commercially logged in the 1960s (IDM Mining Ltd., 2015).

In 1988, interest was renewed in Red Mountain for potential gold and silver deposits and the area was staked. Between 1989 and 1996, previous proponents undertook surface and underground drilling programs that led to the discovery of the Marc, Brad, JV, and JW mineral deposit zones (IDM Mining Ltd., 2015). In 1989 and 1990, 3,623 m and 11,615 m of drilling, respectively, took place in the Marc Zone and its vicinity. In 1991, 2,400 m of drilling was conducted in the Marc and AV zones, followed by 4,000 m of drilling in 1992. In 1993, the Marc, AV, and JW zones were defined by 28,800 m of surface drilling. That same year, an exploration adit was developed and 8,600 m of underground drilling took place in the Marc Zone. In 1994, the main decline was extended by 350 m and 30,000 m of underground and 16,000 m of surface drilling was conducted. In 1996, the underground drift was extended by 304 m and was accompanied by 26,966 m of surface and underground drilling. Between 1996 and 2011, no exploration activities took place at the Property, however two surface drill holes were completed from 2012-2013 (IDM Mining Ltd., 2015).

IDM commenced exploration activities in 2014, shortly after acquiring the Red Mountain Property. These activities have consisted of a small exploration camp, underground and surface diamond drilling, dewatering and rehabilitation of the underground adit, and geotechnical investigations to support permitting and feasibility studies.

The mineral exploration activities and forestry operations described above have resulted in a landscape that is influenced by modern industrial activity. These activities may have disturbed or destroyed undiscovered heritage resources.

21.4.2 Project-Specific Baseline Studies

21.4.2.1 Data Sources

Data sources that have been used to compile the baseline information listed below are summarized in Table 21.4-1.

Table 21.4-1: Data Sources for the Heritage Effects Assessment

Data Source	Quality, Reliability, and Applicability of Data
Archaeological Overview Assessment (2015)	AOA conducted for the Project in 2015
Preliminary Field Reconnaissance (2015)	PFR conducted for the Project in 2015
Application for an Environmental Assessment Certificate / Environmental Impact Statement for the KSM Project, Chapter 21 (Heritage), prepared by Rescan Environmental Services Ltd. for Seabridge Gold, dated July 2013	High quality effects assessment chapter for heritage resources. Effects assessment focuses on area slightly to the north of the Project, but regional area is the same.
Application for an Environmental Assessment Certificate / Environmental Impact Statement for the Brucejack Project, Chapter 22 (Assessment of Potential Heritage Effects), prepared by ERM Rescan for Pretium Resources Inc., dated June 2014	High quality effects assessment chapter for heritage resources. Effects assessment focuses on area slightly to the north of the Project, but regional area is the same.
Regional District Community Heritage Registry	High quality information on RDKS Heritage Registry sites. Specifically covers the Project area.

Data sources for the other disciplines that inform the Heritage Effects Assessment (i.e., Air Quality, Visual Quality, and Noise) are listed in their respective chapters.

21.4.2.2 Primary Data Collection and Analysis Methods

The AOA and PFR conducted for the Project are described below.

21.4.2.2.1 Archaeological Overview Assessment Summary

IDM's knowledge of the potential heritage resources in the Project area was very limited following its acquisition of the Project in May 2014. Because the Project area was until very recently covered with glacial ice, it seemed unlikely that there were previously undiscovered heritage resources in the Project area. No official survey had ever been conducted. In order to gain a better understanding of heritage resources in the Project area, including known heritage resources and the potential for discovering previously unidentified heritage resources, IDM engaged a qualified professional archaeologist, Ewan Anderson of Terra Archaeology Ltd., to conduct an Archaeological Overview Assessment (AOA) of the Project area in September 2015.

Terra Archaeology's review consisted of a desktop-based assessment following the standards of an AOA as described in the BC Archaeological Impact Assessment Guidelines (Apland & Kenny, 1998). According to Section 3.4 of the Guidelines, an AOA consists of:

- Background library and records search of ethnographic, archaeological, and historical documents pertinent to the study area;
- A statement of archaeological resource potential and distribution in the study area;
- A preliminary assessment of anticipated effects in light of proposed development plans; and
- Recommendations concerning the need for further archaeological impact assessment studies.

The methodology for the AOA consisted of:

- A search of the Provincial Archaeological Report Library for the results of previous archaeological studies in the region;
- A search for previously recorded sites in or near the Project area using the Remote Access to Archaeological Data application;
- A review of mining industry documents related to mining and mineral exploration in the region using EAO's Project Information Centre (EPIC) and the Ministry of Energy and Mines' Annual Report Catalog and MINFILE Mineral Inventory;
- A review of high resolution aerial photographs provided by IDM; and
- Creation of a slope model of the entire Project footprint.

The Project area assessed in the AOA included the proposed locations of the mineral processing facility, waste dump area, tailings management facility (TMF), and the right-of-way for both the powerline and access road.

The AOA found that there are no known archaeological sites within the Project area. Five known archaeological sites exist between 18 and 25 km of the Bitter Creek valley (Appendices 21-A and 21-B).

Due to the physical constraints of the landscape (steeply sloping terrain and absence of old-growth tree stands), previous human disturbances (mining, logging, and road construction), and natural disturbances of the soil (floods, landslides, and avalanches), the AOA concluded that Project area has a low potential of producing undiscovered archaeological resources (Appendix 21-A).

The recommendation of the AOA was that IDM perform a PFR over the Project area to further strengthen the prediction that the Project area has low archaeological potential (Appendix 21-A). IDM engaged Terra Archaeology to conduct the PFR in January 2016, as summarized below.

21.4.2.2.2 Preliminary Field Reconnaissance Summary

IDM engaged Terra Archaeology to conduct a PFR of the Project area in order to confirm the results of the AOA conducted by Terra Archaeology in 2015. The PFR was conducted on September 15 and 16, 2015, by two archaeologists from Terra Archaeology and one Nisga'a Nation citizen.

The PFR consisted of a helicopter survey of the entire powerline and access road right-of-way, a vehicle survey of the original proposed powerline route south of the Bitter Creek-Bear River confluence, and a ground-based survey of proposed mine site facilities and portions of the proposed right-of-way in the Bitter Creek valley (Appendix 21-B). The PFR was conducted in accordance with the standards of a PFR as described in the BC Archaeological Impact Assessment Guidelines (Apland & Kenny, 1998):

- "To confirm or refute the existence of archaeological sites reported or predicted from documentary research;
- To allow further predictions to be made about the distribution, density, and potential significance of archaeological sites within the study area;
- To identify areas where sites are apparently absent, implying low, or no potential; and
- To verify, wherever possible, potential impacts imposed by the development project," (Apland & Kenny, 1998).

No archaeological sites or other cultural heritage resources were identified during the PFR. Archaeological potential of the Project area is low due to steeply sloping or heavily disturbed terrain (due to past land use or natural processes). The PFR also found that there are no old-growth stands of cedar or lodgepole pine within the Project area so there is a low potential for culturally modified trees. In the alpine, the negative results of the thorough search for exposed archaeological remains that may have been preserved in snow or ice indicates that there is a low potential for these remains within the Project area. Based on the findings, the PFR recommends that no further archaeological work be conducted prior to construction of the Project (Appendix 21-B).

21.4.3 Baseline Characterization

21.4.3.1 Regional Overview

The proposed Project is located on Crown land in the Bitter Creek valley, approximately 18 km northeast of Stewart and within the RDKS in northwest BC.

Project components occupy two distinct biogeoclimatic zones within the Bitter Creek valley:

- The Mine Site with an underground mine and dual portal access at the upper elevations of Red Mountain at 1,950 meters above sea level (masl); and
- Bromley Humps, situated in the Bitter Creek valley (500 masl), with a Process Plant and TMF.

There are two primary stratigraphic assemblages present in the Stewart area and Bitter Creek valley. From oldest to youngest they are: Middle and Upper Triassic clastic rocks (mudstones, siltstones, sandstones, and conglomerates) of the Stuhini Group and the Lower and Middle Jurassic volcanic and clastic rocks (pyroclastic rock, lapilli, tuff, and conglomerates) of the Hazelton Group. A series of younger intrusive rocks are present in the Bitter Creek valley. These younger intrusive rocks were intruded up through the older sedimentary rocks. The intrusive rocks range from granite and diorite assemblages to gabbros; these include the Goldslide Intrusion, Bromley Glacier Pluton, and the Bitter Creek Pluton (IDM Mining Ltd., 2015).

The terrain in the Project area is characterized by high relief glaciated valleys, with the Cambria ice field on the east, west, and southern flanks of Bitter Creek valley. The Bromley glacier extends down from the ice field into the Bitter Creek valley to just below the Project area. In the last decade, the Bromley glacier and the Cambria ice field have retreated several hundred metres leaving the whole lower and upper valley slopes nearly completely ice-free (IDM Mining Ltd., 2015).

The surficial geology of the Bitter Creek valley consists of unconsolidated glacial (moraine/till) deposits, colluvium (rubble, slide debris, rockfall, and talus slopes), glaciofluvial (glacial meltwater deposits), and fluvial (mostly coarse gravel) sediments of varying thickness. Soil development is very thin and sparse due to the steep slopes, high precipitation, and relatively recent exposure to weathering. Evidence of past slope movements are common within the valley from rockfall areas, exposed raveling slopes, gullying, translational failures, and rotational slides in the thick unconsolidated materials (IDM Mining Ltd., 2015).

Debris flows and debris floods are known to have occurred within the tributary creeks flowing into Bitter Creek resulting in washouts of the pre-existing road at the valley bottom and increased sediment supply to Bitter Creek. Similarly, flooding is common in the valley and has recently resulted in the scouring and widening of the active channel as well as destroying the Highway 37A bridge downstream. Like all of the mountainous valleys in the area, the valley is prone to avalanches throughout the fall, winter, and spring months. Multiple avalanche tracks are visible down to the valley bottom on the main slopes and on slopes funneling into the area drainages. The Bitter Creek valley is a very dynamic terrain with multiple slope and fluvial processes that are ongoing (IDM Mining Ltd., 2015).

21.4.3.2 Cultural Setting

The following sections provide brief overviews of the cultural setting within the Cultural and Heritage Resources LSA. More detailed ethnographic and cultural use information can be found in Chapter 20 (Section 10, Current Use of Land and Resources for Traditional Purposes), Chapter 25 (Tsetsaut Skii km Lax Ha), Chapter 26 (Métis Nation BC), and Chapter 27 (Nisga’a Nation).

21.4.3.2.1 Nisga’a Nation

The Cultural and Heritage Resources LSA is within the Nass Wildlife Area, as set out in the NFA. Nisga’a Nation holds Treaty rights to harvest and manage fish and wildlife in the Nass

Wildlife Area. Nisga'a citizens live throughout BC, including the northwest, and are politically represented in the four Nisga'a Villages (Gitlaxt'aamiks, Gitwinksihlkw, Laxgalts'ap, and Gingolx) in the Nass Valley. There are also many citizens located within the urban areas of Terrace, Prince Rupert, and Vancouver (Nisga'a Lisims Government). The Nass Valley, the heart of Nisga'a Nation's cultural identity, is approximately 100 km southeast of the Project.

During consultation with Nisga'a Nation, NLG representatives did not identify any cultural or heritage resources within the Project area.

Nisga'a Nation is related through general linguistic, economic, and geographic ties to other Tsimshian peoples living along the Skeena River and coast between the Skeena and Nass Rivers (Appendix 21-A).

21.4.3.2.2 Tsetsaut Skii km Lax Ha

"Tsetsaut" refers to an ethnolinguistic group who occupied the territory around the headwaters of the Nass, Stikine, Unuk, and Skeena Rivers, around Meziadin Lake, and on Portland Canal, Observatory Inlet, and Behm Canal (Sterritt, 1998). Tsetsaut describes two culturally related groups: the Western Tsetsaut and the Eastern Tsetsaut (Sterritt, 1998). TSKLH are the descendants of the Raven Clan of the Eastern Tsetsaut (Rescan, 2013; Ming, 2016). The Eastern Tsetsaut are also known as *Laxwiiyiip,* and themselves refer to their territory with the same name (Sterritt, 1998). Eastern Tsetsaut were never encountered by ethnographers; their existence was documented through Franz Boas' and George T. Emmons' meetings with Western Tsetsaut and through Gitxsan oral histories (Sterritt, 1998; Duff, 1981).

In 2017, TSKLH estimate there are approximately 35 members (Chief D. Simpson, 2017). TSKLH's traditional territory extends from Ningunsaw Pass in the north to Cranberry River in the south, with Stewart at the western extent and the Groundhog range in the east (ERM Rescan, 2014), and is more thoroughly described in Chapter 25. TSKLH's traditional activities include fishing, hunting, trapping, and plant harvesting throughout their territory and in particular at Meziadin Lake, Bowser Lake, and the Oweegee area (ERM / Rescan, 2014; ERM Rescan, 2014).

21.4.3.2.3 Métis Nation BC

Métis citizens in northwest BC are represented by MNBC through the Northwest Métis Association, located in Terrace. In 2014, the Northwest Métis Association had approximately 164 members (ERM / Rescan, 2014). According to the 2011 National Household Survey, 835 self-identified Métis lived in the RDKS. Of those, 305 lived in Terrace and 170 lived in Kitimat, suggesting that at least 360 Métis citizens are living in the small communities and rural areas of the RDKS, outside of the population centers of Terrace and Kitimat (Statistics Canada, 2011). According to a submission made by MNBC to the Agency in October 2016, Métis citizens in Terrace, Prince Rupert, Smithers, and Stewart harvest country foods for sustenance purposes and hunt, fish, trap, and gather in the Project area (Metis Nation BC, 2016). MNBC also noted that they have cultural sites mapped within the Project region (Metis Nation BC, 2016). According to the map of use and occupancy sites within a 50 km radius of the Project provided to IDM from MNBC (see Chapter 26), there are no fixed

cultural sites, cabins, burials, gathering places, heritage habitations, old settlements, or "other cultural" sites, or sacred sites near the Project.

21.4.3.3 Historical Setting

The town of Stewart was founded around 1910, and the populating of the town was fueled by the mining industry (McLeod & McNeil, 2004). DJ Rainey staked the first mineral claims in the area: the Grizzly Claim in the Bitter Creek valley (McLeod & McNeil, 2004). Brothers John and Robert Stewart, the founders of the town, arrived in 1902, staked and surveyed the land east of Rainey's claims, and began selling lots (McLeod & McNeil, 2004). The formal District of Stewart was incorporated on May 16, 1930 (BC Ministry of Communities, Sport, and Cultural Development).

From its very beginnings, Stewart's fortunes rose and fell with the mining operations around it. In 1917, the population of Stewart was 52 (McLeod & McNeil, 2004); however, with the operation of the Premier Mines from 1919, the population boomed to about 1,000 people in 1930 (McLeod & McNeil, 2004). The Big Missouri, Granduc, Scottie Gold, Dunwell, and Eskay Creek mines all fueled population growth in Stewart throughout the 20th century, peaking at 2,000 people in 1970 (McLeod & McNeil, 2004). When the Granduc Mine closed in 1983, the population of Stewart began to dwindle, dropping to fewer than 600 people in 2003 (McLeod & McNeil, 2004) and to 494 people in 2011 (Statistics Canada, 2011). IDM understands that of the current population, a significant portion comprises seasonal residents.

The area is characterized by its isolation and frontier spirit. The road to Stewart was completed in 1971 and the Nass River bridge was completed a year later (McLeod & McNeil, 2004). Black-and-white television was made available in Stewart in 1968 (McLeod & McNeil, 2004). Cell phone service arrived in the early 2010s.

The Bitter Creek valley and surrounding areas have been the site of mineral exploration activities since 1902 (McLeod & McNeil, 2004). Placer mining commenced in Bitter Creek, at the base of Red Mountain, at the turn of the century (IDM Mining Ltd., 2015).

The Project area's isolation and wilderness have been utilized by filmmakers. The films The Thing (1982), Insomnia (2002), Eight Below (2006), Iceman (1984), and Bear Island (1979) were filmed in and around Stewart (IMDB.com Inc.). The staged helicopter wreckage created during the filming of The Thing has been assigned Legacy Status by the Archaeology Branch (HbTm-2) in order to document the fake aircraft wreckage and ensure it is not confused at some later date as a genuine helicopter crash site (ERM / Rescan, 2014). It is located approximately 19 km from the Project.

21.5 Potential Effects

The purpose of this section is to identify how Cultural and Heritage Resources may be affected by interactions with the Project's components and activities.

21.5.1 Methods

A standardized effects assessment methodology has been applied to all assessment topics. This methodology follows recommended provincial and federal guidelines and legislated requirements, pursuant to BCEAA and CEAA 2012.

21.5.2 Project Interactions

The following describes the potential interactions between proposed Project components or activities and Cultural and Heritage Resources within the LSA:

- Changes to cultural landscapes resulting from changes in Air Quality, Visual Quality, and Noise in the Project area resulting in changes to the value or importance of sites;
- Loss, alteration, and/or degradation of physical objects, structures, human works, sites or places, and their attributes caused by direct disturbance from Project components;
- Changes to access as a result of the construction of Project components and the management of the access road;
- Changes to the abundance of Cultural and Heritage Resources; and
- Changes the distribution of Cultural and Heritage Resources.

These anticipated interactions are summarized in Table 21.5-1.

Table 21.5-1: Potential Project Interactions: Cultural and Heritage Resources

Project Component or Activity	Potential Effect Pathway / Interaction with Cultural and Heritage Resources
Construction Phase	
Construct facilities, including offices, workshop, stores, emergency accommodation, backup diesel generators, and water supply	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Construct mine site access/haul road from Hwy 37a to portal entrance	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.

Project Component or Activity	Potential Effect Pathway / Interaction with Cultural and Heritage Resources
Install powerline from substation tie-in to portal entrance	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Excavate and secure lower portal entrance and access tunnel	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Construct portal facilities, including cut and fill, organics stockpiles, laydown areas, concrete batch plant, offices, workshop, and stores	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Install tank farm platform and fill with fuel	• Potential changes to the value or cultural importance of cultural and heritage resources.
Construct cap and powder magazines and stock with cap and explosive supplies	• Potential changes to the value or cultural importance of cultural and heritage resources.
Construct portal area water management infrastructure including sedimentation pond, pumphouse, runoff collection ditches, and clean water discharge ditch	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Initiate underground lateral development and cave gallery excavation	• Potential changes to the value or cultural importance of cultural and heritage resources.
Construct mine site and portal area diversion ditches and swales	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Temporarily stockpile waste and ore in portal area	• Potential changes to the value or cultural importance of cultural and heritage resources.
Install construction and permanent ventilation systems and underground water pumps	• Potential changes to the value or cultural importance of cultural and heritage resources.

Project Component or Activity	Potential Effect Pathway / Interaction with Cultural and Heritage Resources
Construct water treatment facilities and test facilities	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Transport and deposit waste rock to Waste Rock Storage Area (s)	• Potential changes to the value or cultural importance of cultural and heritage resources.
Clear and prepare the TMF basin and plant site pad	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Establish diversion ditches for the TMF and Process Plant	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Construct the Process Plant and Ore Stockpile area	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Excavate rock and till from the TMF basin and local borrows for construction activities (e.g., dam construction for the TMF)	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Construct the TMF and supporting infrastructure	• Potential disturbance of identified or unidentified archaeological, paleontological, cultural, and heritage resources in the Project area; • Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Commence milling to ramp up to full production	• Potential changes to the value or cultural importance of cultural and heritage resources.
Operation Phase	
Use Access Road for personnel transport, haulage, and delivery of goods	• Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.

Project Component or Activity	Potential Effect Pathway / Interaction with Cultural and Heritage Resources
Maintain Access Road and Haul Road, including grading and plowing as necessary	• Potential changes to the value or cultural importance of cultural and heritage resources.
Continue underground lateral development, including dewatering	• Potential changes to the value or cultural importance of cultural and heritage resources.
Haul waste rock from the declines to the Waste Rock Storage Area(s) for disposal (waste rock transport and storage)	• Potential changes to the value or cultural importance of cultural and heritage resources.
Extract ore from the underground load-haul-dump transport to Bromley Humps to ore stockpile (ore transport and storage)	• Potential changes to the value or cultural importance of cultural and heritage resources.
Process ore to gold doré	• Potential changes to the value or cultural importance of cultural and heritage resources.
Pump process water from the TMF to supply the mill	• Potential changes to the value or cultural importance of cultural and heritage resources.
Pump tailings and waste water to the TMF for disposal	• Potential changes to the value or cultural importance of cultural and heritage resources.
Closure and Reclamation Phase	
Use and maintain Access Road for personnel transport, haulage, and removal of decommissioned components until road is decommissioned and reclaimed.	• Potential changes to access of cultural and heritage resources; and • Potential changes to the value or cultural importance of cultural and heritage resources.
Install bulkhead(s) in the declines and ventilation exhaust raise	• Potential changes to the value or cultural importance of cultural and heritage resources.
Relocate the portal area dewatering line, power distribution, and pumphouse to within the service road corridor	• Potential changes to the value or cultural importance of cultural and heritage resources.
Decommission and reclaim lower portal area and power line	• Potential changes to the value or cultural importance of cultural and heritage resources.
Decommission and reclaim Haul Road	• Potential changes to the value or cultural importance of cultural and heritage resources.
Decommission and reclaim all remaining mine infrastructure (Mine Site and Bromley Humps, except TMF) in accordance with Closure Plan	• Potential changes to the value or cultural importance of cultural and heritage resources.

Project Component or Activity	Potential Effect Pathway / Interaction with Cultural and Heritage Resources
Construct the closure spillway	• Potential changes to the value or cultural importance of cultural and heritage resources.
Decommission and reclaim Access Road	• Potential changes to the value or cultural importance of cultural and heritage resources.

As there are no known Cultural or Heritage Resources within the Project area, there is no potential for:

- Loss, alteration, and/or degradation of physical objects, structures, human works, sites or places, and their attributes;
- Changes to abundance; or
- Changes to distribution.

21.5.3 Discussion of Potential Effects

This section provides a more detailed description of the potential effects listed in Table 21.5-1. Assumptions regarding the potential effects are documented in each effect subsection below, and margins of error or degrees of uncertainty are provided.

Effects of any change to the environment directly linked or necessarily incidental to federal decisions on physical and cultural heritage are not anticipated.

21.5.3.1 Potential Disturbance of Unidentified Archaeological, Paleontological, Cultural, and Heritage Resources

Project activities related to earthworks or excavation may disturb previously unidentified archaeological, paleontological, cultural, or heritage resources. Based on the AOA and PFR conducted in 2015, it is unlikely that such resources will be discovered during earthworks and excavation; however, this cannot be ruled out entirely. This effect will be limited to the Construction Phase of the Project as earthworks and excavation during the other phases of the Project will be minimal.

21.5.3.2 Potential Changes to Access

The development of the Project may limit access to Cultural and Heritage Resources within the Project area due to safety considerations and disturbance. This effect is anticipated to occur during the Construction and Operation Phases of the Project.

21.5.3.3 Potential Changes to the Value or Cultural Importance of Cultural and Heritage Resources

21.5.3.3.1 Air Quality

Proposed Project activities will result in air emissions to the ambient environment. This includes the generation and airborne transport of fugitive dust particles and exhaust emissions from surface and underground equipment. The Air Quality Effects Assessment conducted for the Project characterized ambient air quality by these indicators: nitrogen oxide, sulphur dioxide, carbon monoxide, total suspended particulate matter, respirable particulate matter, and dust deposition. An air dispersion model was used to predict the potential Air Quality effects of the Project against provincial and federal ambient air quality objectives. The model was prepared based on guidance stipulated in the BC Model Guideline and in consultation with the BC Ministry of Environment. The full Air Quality effects assessment is available in Chapter 7 (Air Quality Effects Assessment).

In order to perform Air Quality dispersion modeling as part of this Application/EIS, ambient background concentrations of air contaminants are considered. A regional air-emission inventory was prepared for the major sources associated with the Project.

There are six main mining or development activities that are air emissions sources:

- Heaters and fans;
- Vented mining equipment tailpipe emissions from underground;
- Mining equipment and vehicle tailpipe emissions from surface;
- Unpaved road dust;
- Material handling, such as material drop onto stockpiles; and
- Other mining activities, such as earthworks, grading, and stockpiling.

As outlined in the Air Quality Effects Assessment (Chapter 7), air contaminant concentrations are not anticipated to be above ambient air quality objectives within 500 m of Project infrastructure and within 50 m of the Access Road. These objectives are meant to be protective of human and environmental health.

Due to the lack of Project effects on Air Quality, it is unlikely that changes to Air Quality will affect the value or cultural importance of Cultural and Heritage Resources. As no potential effects on Cultural and Heritage Resources have been identified due to changes in Air Quality, no mitigation measures for this pathway have been identified in this chapter. Mitigation measures relating to Air Quality in general can be found in Chapter 7.

21.5.3.3.2 Visual Quality

The Bitter Creek valley is a steep-sided, mountainous valley, heavily forested in the lower and middle reaches, gradually giving way to a treeless, alpine landscape dominated by glaciers in the higher regions. Access to the valley is limited due to rugged terrain and lack of infrastructure. The existing access road, including the bridge at Hartley Gulch, was decommissioned in the mid- to late-nineties. The area where the Project might affect Visual

Quality is restricted to the Bitter Creek watershed and adjacent areas from where Project components or activities might be observed.

Project components, including the Access Road, transmission line, and TMF, will be visible to individuals who enter the Bitter Creek valley. Given the steepness and narrowness of the valley, those individuals are likely only to access the valley using the Access Road.

Due to the low level of usage of the Bitter Creek valley for Cultural and Heritage Resources (i.e., there are very few sensitive receptors), it is unlikely that changes to Visual Quality will affect the value or cultural importance of the Bitter Creek valley.

The Access Road and transmission line will be visible to motorists passing the entrance to the Bitter Creek valley along Highway 37A. The Visual Quality Assessment conducted for the Project estimates that due to the speed of motorists passing and the curvature of the highway, the Access Road and transmission line will not be in motorists' line of sight for more than a few seconds. This potential interaction between motorists and Visual Quality has no potential effect on Cultural and Heritage Resources.

As no potential effects on Cultural and Heritage Resources have been identified due to changes in Visual Quality, no mitigation measures for this pathway have been identified.

21.5.3.3.3 Noise

Activities associated with the proposed Project may introduce noise to the surrounding environment, potentially creating adverse noise effects to receptors located in the Project area. Project-related noise levels (including blasting) have therefore been assessed to allow for comparison to relevant benchmarks and guidance levels for the protection of wildlife and human health. Noise modeling followed the protocols outlined in the International Organization for Standardization. The full assessment is available in Chapter 8 (Noise Effects Assessment).

Due to the relatively remote location of the Project, it is expected that regional noise levels are low and existing noise emissions sources would normally include natural sounds, such as wind-blown vegetation, animal noises, running water, etc., but may extend to include other intermittent or infrequent sources, such as overflying aircraft.

As baseline noise levels have not been measured in the Project area, an estimated baseline nighttime noise level of 35 dBA (L_n) was adopted. Daytime ambient sound levels (L_d) are commonly 10 dBA L_{eq} higher than nighttime levels. For the purpose of assessing the Project effects on Cultural and Heritage Resources as a result of Noise, only daytime noise levels have been considered, as it is unlikely individuals would use the valley during the nighttime.

Predictions regarding noise in the Bitter Creek valley are well below applicable limits. During the Construction Phase, areas where noise will exceed 55 dBA (approximately the noise level of conversational speech or an air-conditioning unit) are generally limited to the immediate area around the proposed TMF. During the Operation Phase, the immediate area around the road from the TMF to the portal and the area around the portal will also exceed 55 dBA.

Due to the very limited extent of Noise effects and to the low level of usage of the Bitter Creek valley for Cultural and Heritage Resources (i.e., there are very few sensitive receptors), it is unlikely that Project noise will affect the value or cultural importance of the Bitter Creek valley. As no potential effects on Cultural and Heritage Resources have been identified due to changes in Noise, no mitigation measures for this pathway have been identified.

21.6 Mitigation Measures

21.6.1 Key Mitigation Approaches

IDM has identified two key mitigation measures to manage, mitigate, and/or monitor potential adverse effects to Cultural and Heritage Resources:

- Implementation of a Chance Find Procedure during the Construction, Operation, and Closure and Reclamation Phases of the Project; and
- Managing access to the Project footprint.

These are discussed in more detail below.

21.6.1.1 Chance Find Procedure

IDM has developed a preliminary Chance Find Procedure for archaeological, paleontological, heritage, and cultural resources to be implemented during the Construction, Operation, and Closure and Reclamation Phases of the Project. The key aspects of the Chance Find Procedure are:

- Identifying personnel responsible for identifying previously undiscovered archaeological, paleontological, heritage, and cultural resources that may be uncovered and ensuring that those personnel are provided with adequate training to do so; and
- Outlining the procedure that will be followed should previously undiscovered archaeological, paleontological, heritage, and cultural resources be identified. The procedure includes stopping work at the location, ensuring the protection of the resource, and promptly notifying the appropriate parties (including Nisga'a Nation and the BC Archaeology Branch of the Ministry of Forests, Lands, and Natural Resource Operations).

21.6.1.2 Access Management

IDM will develop, in consultation with the appropriate parties, an access management plan to limit people's access to the Project area. The access management plan will consider:

- Individuals' safety with respect to an active mining project;
- Individuals' Aboriginal and Treaty rights in the Project area;
- Existing tenured or licensed activities in the Project area; and
- Existing recreational values in the Project area.

21.6.2 Environmental Management and Monitoring Plans

There are no management or monitoring plans being developed to specifically address the effects of the Project on Cultural and Heritage Resources.

21.6.3 Effectiveness of Mitigation Measures

The anticipated effectiveness of mitigation measures to minimize the potential for significant adverse effects is evaluated and classified within this section. Mitigation measures are classified based on the following effectiveness descriptions:

- Low effectiveness: After implementation of the mitigation measure, the effect is largely unchanged (i.e., little to no improvement in the condition of the VC or indicator).
- Moderate effectiveness: After implementation of the mitigation measure, the effect is moderately changed (i.e., a moderate improvement in the condition of the VC or indicator).
- High effectiveness: After implementation of the mitigation measure, the effect is significantly improved (i.e., major improvement in the condition of the VC or indicator), or the effect is completely eliminated.
- Unknown effectiveness: The mitigation measure has not been tried elsewhere in similar circumstances and its effectiveness is unknown.

The potential effects, proposed mitigation measures, and their effectiveness are summarized in Table 21.6-1. This table also identifies the residual effects that will be carried forward for residual effects characterization and significance determination.

Table 21.6-1: Proposed Mitigation Measures and Their Effectiveness

IC/VC	Potential Effects	Mitigation Measures	Rationale	Applicable Phase[1]	Effectiveness[2]	Uncertainty[3]	Residual Effect
Cultural and Heritage Resources	Potential disturbance of unidentified archaeological, paleontological, cultural, and heritage resources	Chance Find Procedure in Cultural and Heritage Resources Protection Plan	IDM is committed to developing the Project in a culturally sensitive manner.	C,O,CR	Moderate (All industrial activities have the potential to affect undocumented cultural resources)	Low	N
	Potential change to access	Development of and adherence to Access Management Plan (e.g., controlling public access to Access Road).					N
		Chance Find Procedure in Cultural and Heritage Resources Protection Plan					

[1]Applicaple Phase(s): C - construction; O = operation; CR = closure and reclamation; PC = post-closure

[2]Effectiveness: Low = measure unlikely to result in effect reduction; Moderate = measure has a proven track record of partially reducing effects; High = measure has documented success (e.g., industry standard; use in similar projects) in substantial effect reduction

[3]Uncertainty: Low = proposed measure has been successfully applied in similar situations; Moderate = proposed measure has been successfully implemented, but perhaps not in a directly comparable situation; High = proposed measure is experimental, or has not been applied in similar circumstances.

21.7 Residual Effects Characterization

The assessment of potential for residual effects on Cultural and Heritage Resources is based on the effects assessment described in Section 21.5 and takes into account mitigation measures, as described in Section 21.6, which will be used to avoid, minimize, or otherwise manage potential Project effects.

Once mitigation measures have been implemented, any potential effects on Cultural and Heritage Resources will be reduced to negligible and not significant. Therefore, no residual effects on Cultural and Heritage Resources are anticipated.

21.8 Cumulative Effects

As no residual effects on Cultural and Heritage Resources have been identified, there is no potential for cumulative effects on Cultural and Heritage Resources in the Project area.

21.9 Follow-up Program

As no residual or cumulative effects have been identified, there is no follow-up strategy for Cultural and Heritage Resources.

21.10 Summary Table

Table 21.10-1 summarizes:

- Potential effects of the Project on the VC Cultural and Heritage Resources;
- Proposed mitigation measures to address the effects identified; and
- Characterization of potential residual effects.

Table 21.10-1: Cultural and Heritage Resources Summary Table

Potential Effect	Applicable Phase(s)	Mitigation Measures	Effectiveness (Low/Moderate/High /Unknown)	Residual Effect (Y/N)
Potential Disturbance of Unidentified Archaeological, Paleontological, Cultural, and Heritage Resources	Construction Operation Closure and Reclamation	• Chance Find Procedure	High	N
Potential Changes to Access	Construction Operation Closure and Reclamation	• Access Management Plan • Chance Find Procedure	High	N

21.11 References

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