IDM MINING LTD.

RED MOUNTAIN UNDERGROUND GOLD PROJECT

Northeast of Stewart, BC CANADA

ENVIRONMENTAL IMPACT STATEMENT SUMMARY

SEPTEMBER 2017

Submitted to:
Canadian Environmental Assessment Agency
Government of Canada
Pacific and Yukon Region

IDM MINING

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1 INTRODUCTION AND CONTEXT

IDM Mining Ltd. (IDM, the Proponent) proposes to develop and operate the Red Mountain Underground Gold Project (the Project), an underground gold mine located in the Bitter Creek valley, approximately 11 kilometres (km) northeast of the District of Stewart, in northwest British Columbia (BC) (Figure 1-1). The Project is a 1,000 tonne per day (tpd) operation that will extract high-grade gold and silver ore.

The overall Project footprint is composed of two main areas of activity with an interconnecting Haul Road: the Mine Site with an underground mine and dual portal access at the upper elevations of Red Mountain (1950 metres above sea level (masl)) and Bromley Humps, situated in the Bitter Creek valley (500 masl), with a Process Plant and Tailings management Facility (TMF) (Figure 1-2).

Ore will be mined using conventional underground methods and trucked to the Process Plant located at Bromley Humps for processing using standard recovery processes. Waste rock will be stored temporarily in a designated Waste Rock Storage Area (WRSA) on the surface and then either backfilled directly or mixed with concrete to form cemented rock fill (CRF) prior to backfilling into mined out workings. Tailings from the Process Plant will be stored permanently in the TMF located at Bromley Humps, adjacent to the Process Plant.

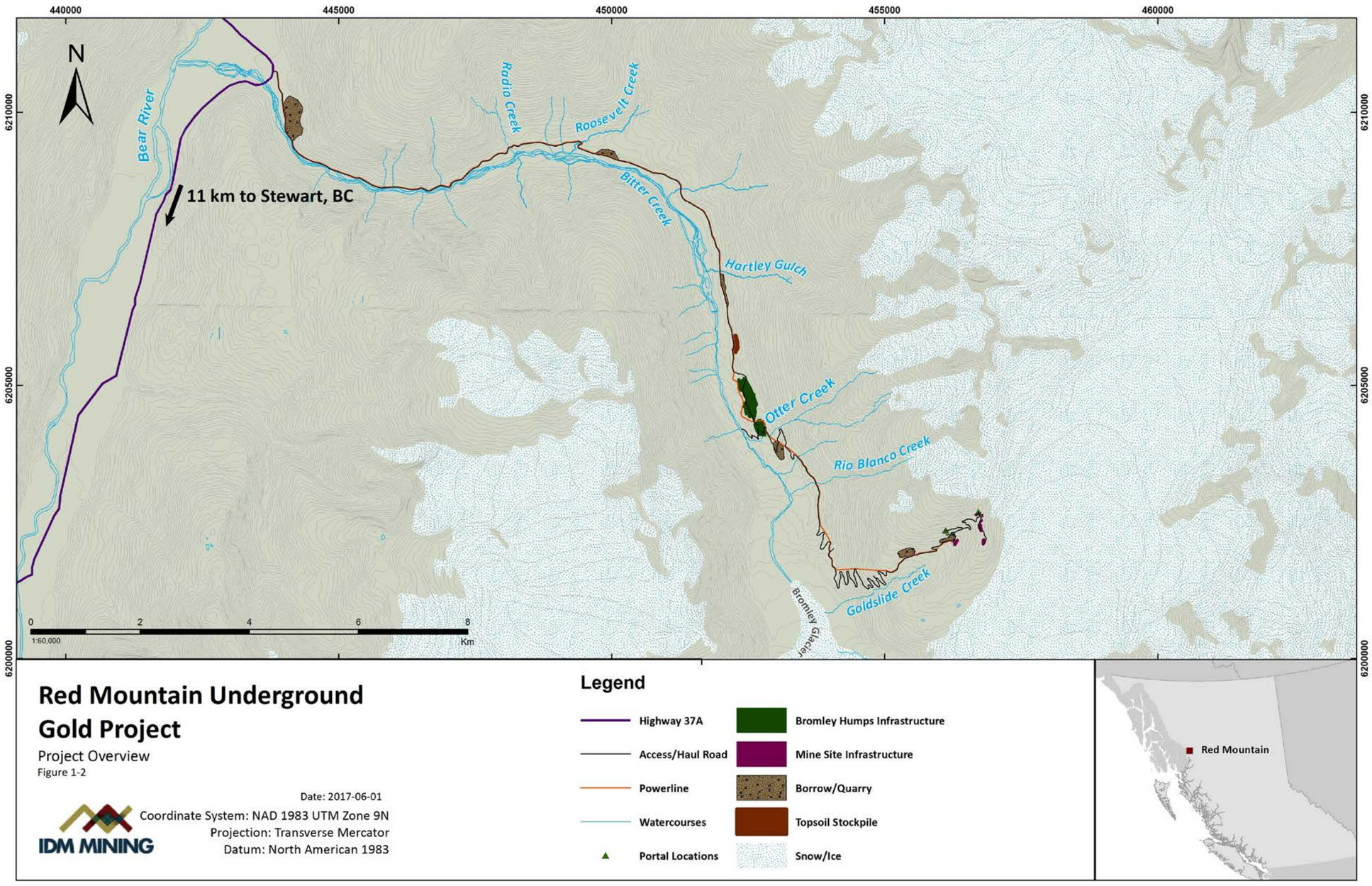
The life of the Project, from mobilization to post-closure monitoring, is approximately 22 years. It is expected that mobilization and construction activities will carry on for approximately 18 months. The Operation Phase will continue for approximately 6 years, based on the mine plan proposed and current reserve base, with a total ore feed to the Process Plant of 2 million tonnes.

It is IDM's intention to develop and operate the Project in a safe and environmentally responsible manner that benefits community members, stakeholders, and the public. IDM understands the importance of balancing good stewardship in the protection of human health and the natural environment with the need for economic growth. The Project will bring much needed training, employment, and commercial opportunities, as well as increased investment in services, to community members in Stewart and northwest BC. The Preliminary Economic Assessment, completed in August 2016, identified the positive economic viability and potential of the Project. A Bankable Feasibility Study of the project authored by JDS Energy and Mining Ltd. in June 2017 further confirmed the economic and technical viability of the project.

The Project is subject to a review under the *BC Environmental Assessment Act* (BCEAA, 2002), and the federal *Canadian Environmental Assessment Act, 2012* (CEAA 2012). This document serves as both the Application for an Environmental Assessment Certificate (EAC) (Application) as per Section 16 of the BCEAA and an Environmental Impact Statement (EIS) as per the CEAA 2012. The Application/EIS has been prepared in accordance with the Application Information Requirements (AIR) issued by the BC Environmental Assessment Office (EAO) on March 30, 2017 (EAO 2017) and the Environmental Impact Statement Guidelines issued by the Canadian Environmental Assessment Agency (the Agency) on January 22, 2016 (Agency 2016).

Figure 1-1: Project Location and Communities

Figure 1-2: Project Overview



2 PROJECT OVERVIEW

2.1 Proponent

IDM is a mineral exploration and development company listed on the Toronto Venture Stock Exchange (TSX-V: IDM) with a registered office in Vancouver, BC. IDM, formerly known as Revolution Resources, underwent a name change and corporate restructuring in early 2014. IDM entered an Option Agreement to acquire the Project from Seabridge Gold in 2014. The gold and silver resources of the Project are IDM's core asset.

IDM is governed by a board of directors with six members, including a chairman. The board of directors is responsible for governance and stewardship of the company. IDM is managed under the direction of:

- Rob McLeod, Chief Executive Officer
- Michael McPhie, Executive Chairman
- Susan Neale, Chief Financial Officer

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2.2 Need and Purpose of the Project

The purpose of the Project is to mine and process ore and deliver gold doré to world markets so there is an economic return on investment while protecting the environment and maximizing the socio-economic benefits to the region.

The need for this Project is as follows:

- To provide a return on investment to the Company's shareholders;
- To provide additional employment and business opportunities for the local and regional communities around the Project;
- To supply gold to the international marketplace, as the reasonably foreseeable international demand for gold has created market conditions that IDM believes are favourable for operating an underground gold mine; and

- To contribute to the development of infrastructure, skills training, employment, and business opportunities in BC. This will help build healthy communities and strengthen partnerships between IDM, stakeholders, and institutions.

2.3 Regional Context

The Project falls within the Regional District of Kitimat-Stikine (RDKS) and the Nass South Sustainable Resource Management Plan (Nass South SRMP) boundary. The closest community to the Project is Stewart, located approximately 11 km to the southwest of the Highway 37A turnoff to the Project site. Other communities in the northwest of the province, including Terrace and Smithers, are likely sources of workers, contractors, goods, and services.

The Bitter Creek valley is characterized by rugged, steep terrain with weather conditions typical of the northern coastal mountains including significant snow accumulation, typically of more than 2 metres (m), in the winter. An existing access road extends for approximately 14 km along Bitter Creek valley, but stops approximately 12 km from the proposed mine site.

The Project is located within the Nass Area and the Nass Wildlife Area, as set out in Nisga'a Final Agreement (NFA). Pursuant to the NFA, Nisga'a Nation, as represented by the Nisga'a Lisims Government (NLG), has Treaty rights to the management and harvesting of fish, wildlife, and migratory birds within the Nass Area and the Nass Wildlife Area. The Project is also within the asserted traditional territory of Tsetsaut Skii km Lax Ha (TSKLH) and is within an area where Métis Nation of BC (MNBC) claims Aboriginal rights.

There are overlapping tenures in the Bitter Creek valley, including hydropower, mineral, a commercial recreation license, a guide outfitting license, and a trapline. Due to the lack of current access infrastructure, it is IDM's understanding that non-tenured land use and activities in the Bitter Creek valley, such as recreational hiking, are infrequent.

2.4 Project History

Placer mining commenced in Bitter Creek at the base of Red Mountain at the turn of the century, but significant work on the current deposit began in 1988 when Wotan Resources Inc. staked claims in 1988 and optioned the property to Bond Gold Canada Inc. (Bond) in 1989. In that year, gold mineralization in the Marc and Brad zones were discovered by drilling. LAC Minerals Ltd. (LAC) acquired Bond in 1991. Surface drilling on the Marc, AV, and JW zones (refer to Section 2.8 for further information on regional and site geology and mineralization) continued in 1991, 1992, 1993, and 1994. Underground exploration of the Marc zone was conducted in 1993 and 1994. In 1995, LAC was acquired by Barrick who subsequently optioned the property to Royal Oak Mines Ltd. (Royal Oak) in 1996. North American Minerals Inc. (NAMC) purchased the property from the receivership sale of Royal Oak in 2000. NAMC subsequently sold the property to Seabridge in 2002 who optioned the property to Banks Island Gold Ltd. (Banks). Banks terminated the option in 2013 and the property reverted to Seabridge. Seabridge subsequently optioned the property to IDM in

2014. IDM has fulfilled the majority of the Option Agreement conditions with Seabridge and title of the property has recently been transferred to IDM.

2.5 Project Phases

The life of the Project is approximately 22 years (from the Construction Phase through to Post-Closure). It is expected that the Construction Phase could begin as early as Spring 2018 and will last approximately 18 months. The Operation Phase will continue for approximately 6 years based on the mine plan proposed and current reserve base.

The mineral resources will ultimately be exhausted, whereupon the mine will enter a staged Closure and Reclamation Phase (up to 5 years). During the first season, immediately at the cessation of production, the mine, equipment, and infrastructure will be decommissioned. Mine backfill and reclamation of mine rock storage facilities will have been mostly completed during the Operation Phase, however the final grading and reclamation will be done at closure. Final reclamation of the TMF will be completed two years after cessation of mining.

The Post-Closure Phase will consist mostly of site monitoring until the site is returned to a stable condition with no significant effect on the environment. The Closure and Reclamation and Post-Closure Phase monitoring will be conducted for a period of approximately 10 years to ensure the area remains both chemically and physically stable. However, Post-Closure monitoring will carry on until closure objectives have been achieved.

2.6 Economic Benefits

Based on the BC Stats Input-Output model, the Project will create significant economic benefits. The total Gross Domestic Product (GDP) impact in BC is estimated to be $81.2 million during the Construction Phase. Construction is estimated to result in a total of about 865 person-years of direct, indirect, and induced employment across BC.

Total GDP effects in BC are predicted at $ 152.9 million over the 6 years of production. Total tax revenue calculated in the most recent Feasibility Study of the Red Mountain Project during the Operation Phase is estimated at $64.6 million, consisting of $22.7 million in federal tax revenue, $16.6 million in provincial tax revenue, $23.9 million in provincial mineral taxes and $1.4 million in local government tax revenue over the life of the mine. The total direct, indirect, and induced employment for BC will be approximately 1,696 person years over the 6-year Operation Phase of the Project.

The economic viability of the Project depends largely on the resource size, precious metal grades delineated to date, and projected metal prices. Low gold prices and rising costs for wages, materials, and supplies could affect IDM’s ability to economically construct and sustain the Project.

2.7 Project Capital and Operating Costs

The total estimated initial capital cost for the design, construction, and commissioning of the Project is estimated at $135.6 million. The Life of Mine (LOM) average operating cost for the Project is estimated at $140/t of ore milled.

2.8 Regional and Site Geology

The Red Mountain Gold Deposit is located in the Skeena Mining Division in northwestern BC, near the western margin of the Stikine Terrane. There are two primary stratigraphic rock packages in the property area: Middle and Upper Triassic clastic rocks of the Stuhini Group and Lower and Middle Jurassic volcanic and clastic rocks of the Hazelton Group. The Stuhini Group mudstone, siltstone, and chert are the oldest rocks in the property area and outcrop over about two thirds of the property. These Triassic rocks grade upward into Lower Jurassic Hazelton Group clastic and volcaniclastic rocks. The Hazelton Group is comprised of mudstone, argillite, siltstone, and tuff, with minor conglomerate.

The Project lies along the western edge of a complex, northwest-southeast trending, doubly-plunging structural culmination, which formed during the Cretaceous. At this time, rocks of the Stuhini and Hazelton groups were folded and faulted, with up to 40% shortening in a northeast-southwest direction. The approximate contact between the Stuhini and the Hazelton groups occurs along the projected trace of the Bitter Creek antiform, a northwest trending structure that has been mapped to the northwest of the Project site. Hazelton Group volcaniclastic rocks on the southwest limb of this structure have been eroded away. The Red Mountain gold deposits occur at the core of the Bitter Creek antiform.

The stratified rocks have been intruded by Early to Middle Jurassic plutons of dioritic composition: the Goldslide Intrusions. Three phases of the Goldslide Intrusions have been identified. The Hillside porphyry, a fine to medium-grained hornblende and plagioclase porphyry, occurs near the summit of Red Mountain and along the ridge to the southeast of the summit. Most of the gold mineralization at Red Mountain is associated with the Hillside porphyry. The Goldslide porphyry is distinguished from the Hillside porphyry by mineralogy and phenocryst size. It is exposed along the Goldslide Creek valley, extending from the surface expression of the Marc Zone southwest for 2 km. Finally, sills of the Biotite porphyry intrude Stuhini Group sediments on the west side of Red Mountain. The Biotite porphyry is distinguished from the Hillside porphyry by the presence of biotite phenocrysts and from the Goldslide porphyry by the small size of hornblende and plagioclase phenocrysts.

The four major mineralized zones are called the Marc, AV, JW, and 141 zones, and are found as crudely tabular gold and silver bearing iron-sulphide stockworks. These are developed primarily in the Hillside Porphyry and to a lesser extent in the rafts of sedimentary and volcaniclastic rocks. Pyrite is the most abundant sulphide associated with the stockwork and as an alteration mineral, although pyrrhotite and sphalerite are both locally important.

The stockwork zones consist of pyrite microveins, coarse-grained pyrite veins, irregular coarse-grained pyrite masses, and breccia matrix pyrite hosted in a pale, strongly sericite altered porphyry. Vein widths vary from 0.1 centimetre (cm) to approximately 80 cm, but widths of 1 to 3 cm are most common.

The pyrite veins typically carry gold grades ranging from ~3 grams per tonne (g/t) to greater than 100 g/t. Gold occurs in grains of native gold, electrum, petzite, and a variety of gold tellurides and sulphosalts (Barnett 1991). The stockwork zones are surrounded by a more widespread zone of disseminated pyrite and pyrrhotite alteration. Each of these sulphides, which also occur as sparsely distributed stringers, comprise about 1.5 to 2.0% of the wall rocks to the stockwork zones. Silver is the only other valuable metal present in the ore.

2.9 Mineral Resource

The proven and probable mineral resources is estimated at 1,946,000 tonnes, containing 471,000 ounces of gold and 1,370,000 ounces of silver. This is based on an average grade of 7.53 g/t for gold and 21.86 g/t for silver.

2.10 Metal Leaching / Acid Rock Drainage

Geochemical characterization studies were completed for waste rock, ore,talus, tailings and construction materials.

The waste rock, ore and talus characterization studies integrated acid-base accounting and laboratory-based kinetic data from historical geochemical characterization programs completed by MDAG (1996) and Frostad (1999) and an extensive site monitoring program that has spanned approximately 20 years.

Results of these studies suggest that, operationally, waste rock and ore are classified as potentially acid generating (PAG). However, site monitoring suggests that the upper bound of onset to acidity for waste rock is twenty years for mudstone and longer for volcanic rocks. Acidic seepages from the legacy waste rock stockpile have been observed, but the source of acidity is likely influenced by the underlying rock and talus.

There are two talus quarries located in proximity to the Mine Site from which backfill material will be sourced. For talus rock, more than half of the samples were classified as PAG, with approximately 1/3 of the fine fraction samples already acidic when tested. Humidity cell testing was conducted on an acidic sample of talus and indicated cadmium, cobalt, copper, nickel, and zinc leaching.

Tailings samples from the AV, JW and Marc zones of the deposit were generated and tested as part of metallurgical studies completed by IDM in 2016/2017. Acid-base accounting on tailings from all three ore zones indicate the tailings are PAG. ARD is not expected to develop during operations because tailings will be rapidly deposited in the TMF and the exposure time of the tailings to atmospheric conditions will be on the order of weeks. Ongoing humidity cell test work will define the time frame to the onset of acidic conditions

for the tailings and metal leaching, if present. Regardless of the outcome of these studies, the TMF has been designed using a conservative approach and assuming the tailings will be acid generating. Analysis of process water samples indicate that treatment will be required to meet discharge limits for ammonia and copper in the tailings water.

A separate report was developed to document the results of the geochemical characterization assessment for materials from potential rock cuts along the Access Road, rock in the Bromley Humps area that may be used as construction material for the TMF dam embankments, and surficial materials that may be used as general borrow sources for construction.

Of the geological units present along the Access Road, approximately one-third of the Hazelton Group sediment and one-half of the Hazelton Group volcanic samples were PAG, with potential for metal leaching under acidic pH conditions. The Hazelton Group sediments also had some samples with anomalously high selenium levels, indicating potential for selenium leaching at neutral pH.

Prior to construction, further geochemical analysis for ML/ARD potential will be undertaken for borrow sites and large cuts, and along the road alignment. If concerns are encountered, management strategies as outlined in the Materials Handling and ML / ARD Management Plan (Volume 5, Chapter 29) will be implemented.

2.11 Construction Overview

Construction will take place over an approximate 18-month period. Most of the environmental protection measures are incorporated in the planning stage of the Project, will be implemented at the onset of construction activities, and carried through for the life of the Project.

The initial phase of construction will be on providing access to the Project and initiating delivery of equipment, materials, and supplies for construction. The next phase will be on constructing processing facilities, underground development, water and waste management infrastructure, support facilities, and the TMF.

Construction activities resulting in surface disturbance are expected to include clearing vegetation and removing topsoil, stockpiling overburden and topsoil, and constructing roads and infrastructure. Sediment and erosion control strategies will include limiting the disturbance areas to the minimum practicable extent, installing sediment controls prior to construction activities, progressively rehabilitating disturbed land, and constructing drainage controls to improve the stability of rehabilitated land.

2.12 Overview of Major Project Infrastructure

Major infrastructure associated with the Project includes the following:

- Access Road (14 km) and Haul Road (12 km);

- 138 kilovolt (kV) and 25 kV Powerlines;
- Bromley Humps infrastructure, including:
  - Process Plant;
  - Process Plant Laydown;
  - Offices, Mine Dry and Warehouse;
  - Fuel Storage;
  - Run of Mine (ROM) Stockpile;
  - Topsoil Stockpile;
  - TMF and associated water management infrastructure; and
  - Water Treatment Plant;
- Mine Site infrastructure, including:
  - Upper and Lower Portals;
  - Mine Site Laydown Areas;
  - WRSA;
  - CRF Plant;
  - Ore Stockpiles; and
  - Water Management Infrastructure; and
- Borrow Pits, Quarries, and associated sediment ponds.

Worker accommodation will be based in Stewart. IDM will provide ground transportation between Stewart and the Project. During construction, IDM may also provide transportation between Northwest Regional Airport and Stewart.

2.12.1 Access Road and Haul Road

During Project the Construction and Operation Phases, Bromley Humps will be accessed via road. Two distinct sections of road will be constructed for the Project: 1) the Access Road, which will involve upgrading the pre-existing resource service road connecting Highway 37A to Bromley Humps and 2) the Haul Road, which will consist of pioneering new access connecting Bromley Humps with the Mine Site.

The Access Road follows a pre-existing road right-of-way through the valley bottom for approximately 14 km from Highway 37A along the North/North-East side of Bitter Creek to Bromley Humps. From Bromley Humps, the Access Road will connect into the Haul Road, approximately 12 km in length, and other site roads. The Access Road and Haul Road will be used to transport processed ore, mine equipment, workers, and other mine traffic to and from Bromley Humps and the Mine Site.

The Access Road and Haul Road will be radio assisted, single-lane, gravel roads with inter-visible turnouts. The roads will be approximately 5 m wide and include adequate drainage and cleared right of way space to accommodate an overhead Powerline.

Road access will lessen the storage infrastructure required at the Project site and shift it to private vendors in Stewart or other supply hubs. Stewart will be the main supply hub to which freight can be delivered via Highway 37A or the Stewart World Port.

2.12.2 Power Supply

The power supply will be installed during the Construction Phase of the Project and will remain in place for the life of the Project.

IDM envisions connecting the Project infrastructure to the BC Hydro electrical transmission system near Stewart, BC. Total average annual power consumption is estimated to be approximately 59 million kilowatt hours per annum (6.8 megawatts on average). It is planned that a 138 kV Powerline would run from the BC Hydro interconnection point near Stewart, across Highway 37A, and then along the Access Road from Highway 37A to Bromley Humps. Power will be delivered from Bromley Humps to the Mine Site via a 25 kV Powerline in a dedicated right of way. Step down transformers will be located at the Process Plant and Mine Site for local distribution.

2.12.3 Borrow Pits and Quarry Sites

Specific local borrow sources, adjacent to the proposed Access Road and Haul Road alignment, will provide the bulk of crushed rock and aggregate to build roads, laydown areas, provide concrete aggregate, and support other construction and maintenance activities at Bromley Humps. Where feasible, non-PAG waste rock will be used for construction material at the Mine Site.

An estimated 1.15 million m^3 of aggregate will be required for construction.

2.12.4 Process Plant

The Process Plant will be constructed on a pad adjacent to the TMF. The Process Plant building will be a pre-engineered steel building, supported on a concrete spread footing with concrete grade walls along its perimeter. The building floor will be a concrete slab-on-grade, and will be sloped towards sumps for cleanup operation.

A crushing plant will be located adjacent to the Process Plant building and will consist of three stages of crushing and screening. The crushing plant will be covered with a pre-engineered fabric structure on a concrete block foundation.

2.12.5 Ancillary Buildings and Structures

The following is a summary of ancillary buildings and structures that will be constructed at Bromley Humps and the Mine Site:

<u>Bromley Humps</u>

- Hazardous Materials Storage Area;
- Waste Storage Area;
- 100,000 litre (L) Fuel Tank;
- Administration Office and Mine Dry;
- Assay Lab; and
- Warehouse.

Mine Site

- Maintenance Shops (Upper and Lower Portal);
- Offices (Upper and Lower Portal);
- Explosives Magazine (near WRSA);
- 20,000 L Fuel Tank (Lower Portal); and
- Existing facilities near the Upper Portal, including:
  - Fuel tank;
  - Helipad; and
  - Generator enclosure.

The Maintenance Shops will be single-bay, insulated fabric covered structures suitable for preventative maintenance services, basic repairs, and component replacement. More extensive repair work will be conducted off site. Equipment will be washed underground.

The Warehouse will be located within proximity to the Administration Office and Mine Dry. The Warehouse will be a single-bay, uninsulated, fabric-covered structure.

2.13 Mining Method

It was determined that the ore is best extracted via underground mining methods. The deposit will initially be accessed from an existing portal (the Upper Portal) and a new portal (the Ventilation Portal) located near the existing portal will be developed for ventilation and secondary egress. In year 1, a new portal (the Lower Portal) will be developed lower in the mine to be used for haulage. Access ramps will be driven at maximum grade of 15% at a 4.5 m by 4.5 m profile to accommodate 30-tonne haul trucks. The mine plan focusses on accessing and mining higher margin material early in the mine life. As such, the plan commences with the mining of Marc zone, followed by AV, and then JW and 141 zones. The mine production rate is targeted at 1,000 tpd or 365,000 tonnes per year (tpy).

The Red Mountain deposit is proposed to be mined using the following underground mining methods, based on the geometry and the grade of the mineralized zones:

- Longhole stoping for mining blocks dipping steeper than 55° that are continuous, which represents about 64% of the mineable tonnage. This is the preferred mining method from a productivity and operating cost perspective;

- Drift and Fill for mining blocks with dips of less than 55° and zones not amenable to longhole stoping, which is more selective and represents about 33% of mineable tonnage; and

- The remaining 3% of the potentially mineable tonnage comes from access and stope cross-cut development.

Cemented and un-cemented rock fill will be used as backfill to maximize mining recovery.

The vertical extent of the mine is approximately 316 m defined by elevations of the main development drives.

Mining is proposed at 1,000 tpd year round. Mined ore will be transferred at the Portal and trucked to the Process Plant. Excess sterile development rock will be temporarily stockpiled close to the portals until it is relocated back into the mine, as backfill.

Exploration has identified several prospective targets in the general Project area. IDM will continue to explore these during mine construction and operations.

2.14 Mineral Processing

The results of the metallurgical testwork, together with financial evaluation data, were used to develop metallurgical design criteria, which in turn were used to design the process facility for the Project.

The testwork has shown that Red Mountain mineralization can be treated using conventional mineral processing techniques for the recovery of gold and silver. The grinding, leach, and recovery circuits were designed based on the results of the trade-off studies and metallurgical test work. The following processes will be undertaken at the Process Plant during the Operation Phase:

- 3-stage crushing and fine ore storage;
- Primary and secondary grinding;
- Carbon-in-Leach (CIL) recovery processes;
- Acid wash and elution;
- Carbon regeneration;
- Cyanide destruction;
- Recovery and refining; and
- Tailings disposal at the TMF.

The crushing circuit will operate at an availability of 75% while the Process Plant will operate 24 hours per day 365 days per year at an availability of 92%. The primary grinding circuit product size target is approximately 80% passing (P_{80}) 25 microns (µm). The total mass from grinding will be leached in the CIL circuit followed by extraction of the gold from the carbon and recovery of silver and gold to doré. The CIL tailings will undergo cyanide destruction before reporting to the TMF.

2.15 Waste Rock and Tailings Management

Historic storage at the Upper Portal of waste rock mined during the exploration phase amounts to approximately 90,000 tonnes. Testing and monitoring has shown the material to be chemically and physically stable for the 20+ years it has been in place. Additional waste rock generated from the projected development of the underground mine will be stored in a designated temporary WRSA, located south of the historical waste rock storage area. Since the mine will be using waste rock as the primary stope backfill, and the material balance

shows a net deficit over the life of mine, all waste rock stored on surface is planned to be placed underground over the life of mine.

Waste rock will be generated from mine development and consumed as backfill, so the surface storage stockpiles will be live until mine production stabilizes in Year 2. The maximum amount of waste rock stored on surface at any one time is estimated to be in Year -1 and consist of the historic waste rock (90,000 tonnes) and the temporary WRSA (52,000 tonnes). Extensive geochemical studies and monitoring of waste rock stored on surface has been conducted since 1993 and has shown that this material is eventually acid generating. However, the waste rock is chemically stable over the short to medium term and is therefore not anticipated to generate acid during the short time that it is stored on surface.

The TMF is designed to provide safe and secure storage of process tailings while protecting groundwater and surface waters to achieve effective reclamation at mine closure. The TMF capacity is designed to store approximately 1.95 million tonnes of tailings, as well as process water, stormwater, and freeboard, with potential for future expansion.

The site conditions and tailing characteristics dictated a conventional TMF consisting of a lined impoundment that will manage a thickened slurry tailing. Underdrains are designed to monitor and manage any leakage from the facility, promote consolidation during the Operation Phase, and hasten the onset into the Closure and Reclamation Phase.

An initial starter dam will be constructed to contain the first year of tailings and associated water management to minimize capital costs and stage the disturbance. Successive dam raises will keep capacity ahead of needs while maintaining sufficient freeboard to manage contact water runoff, storm storage, and process water. The TMF will operate on a water surplus with periodic releases based on quality standards.

Although the mine operating life is relatively short, progressive reclamation concepts are incorporated into the design, which include waste rock storage underground and progressive reclamation of historic storage areas.

2.16 Water Management

The overall approach to site water management is to divert water around mine workings and infrastructure to minimize contact volumes and other effects. The TMF will be monitored closely to assess water volume and quality, and excess water will be discharged as appropriate, to minimize impounded volume while keeping water available for ore processing and other industrial use.

A water surplus of approximately 380,000 cubic metres per year (m^3/yr) is predicted based on annual precipitation values. However, water will be closely managed at the TMF and discharged as allowable and required to minimize the volume of impounded water.

The average annual water balance indicates sufficient water to meet the envisioned Process Plant requirements without the need for additional make-up water. Approximately 30% of process water is reused and recirculated within the plant. The remaining water is sourced

primarily via reclaim from the TMF, with freshwater required for glands and reagent use to be obtained from Bitter Creek. Permitting will also be sought for sourcing of freshwater from Otter Creek as a contingency option.

Surplus water from the TMF will be discharged to Bitter Creek. The results of water quality prediction modelling indicate that concentrations of ammonia, total suspended solids (TSS), copper, and iron in the tailings pond water could exceed discharge concentration limits proposed for the Project. Therefore, excess water collected in the TMF will require treatment before it can be discharged to Bitter Creek. Based on experience with the treatment of similar mine contact water at other projects and the nature of required treatment at Red Mountain, the following two stage water treatment process is proposed for Red Mountain:

- Stage 1 – Chemical Treatment: Lime precipitation and ferric coagulation followed by clarification for the removal of dissolved metals (including copper, cadmium, and iron) and TSS.

- Stage 2 – Biological Treatment: Moving Bed Biofilm Reactor (MBBR) treatment system for the removal of ammonia.

Biomass sludge generated from the water treatment process will be dewatered in an exfiltration pond and transported offsite to a certified hazardous waste disposal facility.

Freshwater will also be required to supply the underground mine. Since the mine will be a net discharge operation, freshwater will be sourced from within the mine using the mine dewatering system. Volumes required for mine operations are a small fraction of dewatering volumes and requirements will be easily met by inflow volumes, even during low flow periods. Discharge water from the mine is expected to meet discharge criteria with no treatment required.

Dewatering of the underground mine will be achieved using gravity where possible via the lower access ramp. Pumping will be used as needed to assure positive dewatering in decline headings and to route water to settling sumps and holding ponds prior to discharge or for further treatment as required. The portal sites will also contain laydown areas and pads for support equipment and ore stockpiles. Runoff will be diverted from entering these areas by berms and ditches, while contact water will be collected and routed to settling/holding ponds prior to discharge.

Potable water for site personnel will initially be trucked to the site and stored in tanks located around the site, including the Administration Office, Maintenance Shops, Process Plant and in several underground locations. Once the Water Treatment Plant has been constructed, however, potable water will be obtained from Bitter Creek. A firewater tank will be located at Bromley Humps on the hillside above the Process Plant complex and ancillary facilities to provide sufficient hydraulic head for firefighting. The tank will be sized to provide sufficient volume for firefighting at any one of the surface structures for a period of two hours.

2.17 Waste Management

The waste management infrastructure for the Project will be established at the onset of construction activities. The waste management infrastructure at Bromley Humps will consist of:

- A Waste Storage Area; and
- A Hazardous Materials Storage area.

All construction waste will be backhauled from the site to an approved disposal facility.

During the Operation Phase, waste products other than mineral tailings will be sorted at the Process Plant prior to offsite removal. Solid waste (scrap steel, wood, etc.) will be collected in bins; empty chemical totes, lubricant drums, etc. will be collected and compacted. All industrial waste will be back-hauled offsite for disposal or recycling in an appropriate manner. Sewage and grey water from the Mine Dry and Maintenance Shops will be hauled to an appropriate facility for disposal.

2.18 Environmental Management

IDM's Environmental Management System (EMS), discussed in Volume 5, Chapter 29, provides a framework for the environmental and socio-economic management and monitoring activities to be implemented throughout the life of the Project. The EMS incorporates the strategies employed for adaptive management, the precautionary principle, and sustainable development. Within this framework, individual management plans have been drafted to address all aspects of the company's activities and contain the detailed mitigation measures and monitoring programs to be implemented throughout the life of the Project to eliminate or minimize adverse effects. All Project employees and contractors are required to comply with these management plans. It is IDM's intention that the EMS will offer enough flexibility to respond to monitoring results in a timely fashion to reduce or eliminate potential adverse residual effects to the natural and socio-economic environments.

2.19 Closure and Reclamation

TMF closure and reclamation activities will be carried out progressively during the Operation Phase (where possible) and at the end of economically viable mining. Closure and rehabilitation activities will be conducted in accordance with Part 10 of the Health, Safety, and Reclamation Code for Mines in BC (BC MEM 2016). The broad closure objectives include achieving long-term physical and chemical stability and creating final landforms compatible with the surrounding landscape and consistent with the agreed upon post-closure land use.

Key aspects of mine closure include closure of the underground mine and the TMF. There will be no waste rock remaining at surface at closure. Other closure aspects follow typical

mine closure approaches. A more detailed discussion of planned closure and reclamation measures are provided below.

2.19.1 Underground Mine

The following final closure measures will be implemented at the completion of mining:

- All mobile equipment and hazardous materials (fuels, oils, and lubricants) will be removed from the underground;
- All mine openings will be sealed to prevent unauthorized access;
- Hydrostatic concrete plugs will be used to seal the portals; and
- Underground will be flooded to minimize development of ARD/ML.

To restrict the release of mine water from the underground to the environment, and to prevent the infiltration of surface water into the underground workings, all three portals will be sealed with hydrostatic plugs. Given groundwater elevations will reach seasonal maximums of at least 1,875 m, the head applied to the hydrostatic plug on the Lower Portal will be at least 145 m. The heads experienced by the plugs in the upper portals will be much lower (at least 5 m to 15 m).

The hydrostatic plug to be used to seal the portals will be designed through consideration of the Canadian Dam Safety guidelines (Canadian Dam Association 2013). The conceptual design involves a concrete plug that is keyed into the underground portal floor and secured to the tunnel with epoxy dowels. Grouting lines will be employed after plug installation to seal voids.

Post-closure monitoring of the plugs will be accomplished through the installation of instrumentation equipped with telemetry for remote monitoring as well as annual inspections by a qualified geotechnical engineer. An Emergency Response Plan will be developed that outlines contingency measures to be implemented should the hydrostatic plugs not perform as expected. During the next phase of design, a maintenance and rehabilitation schedule will be developed that considers maintenance and/or replacement of the plugs over the long-term.

2.19.2 Tailings Management Facility

Closure and reclamation of the TMF will involve:

- Containing and isolating the tailings so that:
  - Runoff is chemically inert and suitable for discharge to local receiving waters; and
  - Seepage is reduced to negligible quantities; and
- Converting the TMF into a landform that is physically stable in the long term and that is compatible with the land capability of the surrounding area.

Closure and rehabilitation activities will be undertaken consistent with the reclamation standards in Part 10 of the Code (BC MEM 2016).

The Project is located in a wet climate where annual precipitation greatly exceeds the annual evaporation. The supernatant water on the TMF will need to be removed after the Process Plant is shut down and prior to implementing closure measures.

The following reclamation activities will be completed over the closure of the TMF:

- Prior to closure, tailings will be selectively deposited around the TMF to establish a final tailings beach that will facilitate surface water management and reclamation;
- Tailings supernatant will be removed and treated in the water treatment plant to meet effluent discharge limits prior to discharge to the environment;
- Tailings, reclaim delivery systems, and all pipelines, structures, and equipment not required beyond mine closure will be dismantled and removed;
- A permanent spillway will be constructed;
- A geomembrane liner will be installed over the TMF surface;
- A combined rock and soil cover will be placed over the liner that will shed runoff to the permanent spillway;
- Seepage collection pump-back systems will continue to operate and seepage treated until the seepage is suitable for direct discharge, after which the seepage collection systems will be dismantled;
- All access roads, ponds, ditches, and borrow areas associated with the TMF that are not required beyond mine closure will be removed and the areas re-graded; and
- Disturbed areas will be revegetated consistent with the re-vegetation strategy.

Embankment slopes will be constructed at 2H:1V, which are expected to be stable and therefore not requiring modification at closure other than surface preparation with topsoil and re-vegetation.

Reclamation of the TMF will be completed two years after the cessation of mining. The exception is the seepage collection system, which will operate for several additional years until seepage is suitable for direct discharge to the environment.

The groundwater monitoring wells and all other geotechnical instrumentation will be retained for use as long-term dam safety monitoring devices. Post-closure requirements will also include annual inspection of the former TMF and ongoing evaluation of water quality, flow rates, and instrumentation records to confirm design assumptions for closure.

Mine closure will include progressive reclamation activities throughout the mine life in the form of waste rock stockpile removal and pad reclamation. Service facilities and equipment

will be decommissioned and removed at the end of their useful life. Achieving chemical and physical stability will be a key focus of final mine closure. The material balance shows a large deficit of underground backfill, therefore no excess-mined rock will be stockpiled on surface. All waste rock will be stored underground at the completion of mining. Active closure is expected to take two years followed by three years of passive closure and 10 years of post-closure monitoring. Active closure will focus on the bulk of the infrastructure closure activities and sealing of mine openings. Water treatment will continue as required prior to final decommissioning and demobilization of the remaining Project elements.

2.19.3 Other Project Components

Industry standard reclamation methods will be employed to close out the remainder of the Project sites. Hazardous materials will be collected for offsite disposal, including hazardous components of vehicles and equipment (i.e., fuel tanks, gear boxes, and glycol-based coolant). Buildings and equipment stripped of hazardous components will be demolished and disposed in an approved facility. Culverts will be removed from the deactivated roads and the natural drainage restored.

Once all buildings and equipment have been removed, the footprints (whether bedrock or pads) will be re-contoured to allow for sheetflow drainage to the receiving environment.

3 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

The current Project is the product of a series of alternatives analyses. Some of the technical and economic parameters, such as mining method, site access, and production rate, are considered overarching decisions that drive the design of the Project and define other alternatives to be considered. These are Tier 1 alternatives, which outline options for different methods of executing the Project in key areas, for example open-pit versus underground mining. Trade-off analyses are undertaken to choose the best approach.

Once alternatives are determined to be technically and economically feasible, an alternative selection process is undertaken considering one or more of the following criteria:

- Cost implication in terms of initial capital and operating costs as offset by the net economic benefit;
- Technical suitability in consideration of factors such as Project schedule or site conditions;
- Potential environment effects;
- Potential adverse effects on potential or established Aboriginal or Treaty rights or related interests;
- Amenability to reclamation;
- Community acceptability or preference; and
- Enhancing socio-economic effects.

Input received during consultation with provincial, federal, regional, and local regulators, Aboriginal Groups, community members, stakeholders, and the public has been considered in the alternatives assessments.

A summary of the results of the Tier 1 Alternatives Analysis is provided in Table 3-1.

Once the decisions have been made related to Tier 1 alternatives, a second tier of alternatives (i.e., Tier 2 alternatives) are considered with the aim of optimizing performance. These alternatives consider various ways to execute each of the chosen key components. As the Project advances, alternatives will be further refined and assessed. This refinement may alter the final Project plan.

Table 3-1 outlines the list of Tier 1 and Tier 2 alternatives that were assessed.

Table 3-1: Tier 1 and Tier 2 Alternatives Assessed

Tier 1 Alternatives	Tier 2 Alternatives
• Mine rate; • Access and transportation alternatives for the movement of freight and personnel; • Underground mining operations, including underground access and mining method; • Waste rock management; • Mineral processing technology; • Tailings management; and • Power supply.	• Detailed site layouts and location of infrastructure; • Laydown areas within the Project area; • Location and type of explosives; • Location of quarry and borrow sites; • Water supply and water management approaches within the Project Area; and • Waste and wastewater management.

4 ASSESSMENT PROCESS

4.1 Provincial and Federal Environmental Assessment Requirements

The *BC Environmental Assessment Act* (BCEAA) requires that new projects and modifications to existing projects which exceed thresholds defined in the Reviewable Projects Regulation (BC Reg. 370/2002) must undergo an EA and obtain an Environmental Assessment Certificate (EAC) before a project can proceed. Provincial assessments for metal mines are triggered at a throughput of 75,000 tpy. Section 16(c) of the Regulations Designating Physical Activities (SOR/2012-147) under CEAA 2012 specifies that an environmental assessment must be undertaken for a proposed gold mine with a throughput of 600 tpd. The Project exceeds both the provincial and federal thresholds.

4.1.1 Provincial Environmental Assessment Process

The provincial EA process under BCEAA has three phases: Pre-Application, Application Review, and the Decision Phase. The Pre-Application Phase for the Project was initiated on September 2015 with the submission of a Project Description by IDM to EAO. On November 2, 2015, EAO issued an order under Section 10 of the BCEAA indicating the Project was reviewable. A supplemental project description document was submitted by IDM in March 2016 to provide an overview of the updated Project layout and a summary of the implications the updates would have on the information provided in the September 2015 Project Description. EAO issued an order under Section 11 of the BCEAA February 10, 2016, specifying the scope, procedures, and methods by which a review must be conducted.

A draft Application Information Requirements (dAIR) for the Project was submitted by IDM in September 2016, which specified the matters that would be studied and information that would be included in the Application/EIS. Revisions to the dAIR were made by IDM in consideration of comments received from EAO, Aboriginal Groups, community members, stakeholders, the public, and the Working Group. EAO issued an approved AIR on March 30, 2017.

The final step of the Pre-Application Phase is the 30-day evaluation conducted by EAO of the submitted Application/EIS to determine whether the submission provides information on all matters required by the AIR. If the Application/EIS is determined to be sufficient, it will enter the Application Review Phase, and EAO has a maximum of 180 days to complete its review. Working Groups members, Aboriginal Groups, stakeholders, and the public will be asked to provide comment on the Application/EIS. EAO will begin drafting an Assessment Report that documents the findings of the assessment. At the end of the Application Review Phase, EAO will submit its report, as well as recommendations from the Executive Director and the draft EAC, to the Minister of the Environment and the Minister of Energy and Mines. At this point the Ministers have 45 days to make one of three decisions: issue an EAC, refuse to issue an EAC, or require further study or assessment.

4.1.2 Federal Environmental Assessment Process

The Canadian Environmental Assessment Agency (the Agency) commenced an environmental assessment under CEAA 2012 on November 12, 2015, following IDM's submission of the Project Description of a Designated Project on September 28, 2015. Draft EIS guidelines were issued by the Agency on November 12, 2015. The public was invited to comment on the draft EIS guidelines for a period of 30 days. The final EIS Guidelines were issued to IDM on January 22, 2016.

Once the EIS is submitted, the Agency conducts completeness and sufficiency reviews to ensure information required by the EIS guidelines has been provided, and that the information provided is sufficient and accurate, respectively. A draft environmental assessment report is prepared by the Agency, following a comment period on the EIS and any revisions to the EIS by the proponent. A second comment period is held, focused on the Agency's draft report, and the environmental assessment report is then finalized and submitted to the Minister of the Environment to inform his or her decision.

4.2 Nisga'a Final Agreement

The Project is within the Nass Area and the Nass Wildlife Area, as set out in the 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, 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 to Nisga'a Nation and Nisga'a citizens over lands and resources. Nisga'a Nation holds Treaty rights to harvest and manage wildlife, fish, and migratory birds within the Nass Area and the Nass Wildlife Area.

BC and Canada, in undertaking the EA of the Project, are required to comply with Chapter 10 of the NFA. In compliance with Chapter 10 of the NFA, IDM has conducted extensive engagement and consultation efforts with NLG. IDM has also conducted the assessments required under paragraphs 8(e) and 8(f) of Chapter 10 of the NFA.

4.3 Applicable Permits

The Project will require multiple permits, including a provincial *Mine's Act* (1996) permit and *Environmental Management Act* (2003) permit, which can only be issued after the federal and provincial environmental assessment approvals have been successfully obtained. Provincial permitting and licensing is expected to proceed following the completion of the environmental assessment pursuant to BCEAA. It is anticipated that all provincial permit applications for the Project will be coordinated through the BC Major Mines Projects Office of the BC Ministry of Forests, Lands, and Natural Resource Operations (FLNRO). IDM does not intend to request concurrent permitting, pursuant to the Concurrent Approval Regulation (BCEAA), but will apply for these permits using the synchronous permitting approach in concert with the completion of the EA process.

As the Project is within the Nass Area and the Nass Wildlife Area, the Project's environmental assessment is also subject to the requirements of Chapter 10, paragraphs 8(e) and 8(f) of the NFA.

Table 4-1 presents the principal provincial authorizations, licenses, and permits anticipated for Project construction and operations. The list is not intended to be comprehensive, and as the environmental review continues, the list will be refined to reflect feedback from regulatory agencies throughout the permitting process.

Table 4-1: List of Anticipated Provincial Permits and Authorizations

Permits	Agency	Legislation	Description
Permit Approving the Work System and Reclamation Program (*Mines Act* Permit)	Ministry of Energy and Mines	Government of BC, *Mines Act* (1996)	Authorization to construct, operate, close/decommission and reclaim a mine.
Mining Lease	Ministry of Energy and Mines	Government of BC, *Mineral Tenure Act* (1996)	Authorization for the exploration or development of the mineral resource
Mining Right of Way Permit	Ministry of Energy and Mines	Government of BC, *Mining Right of Way Act* (1996)	Right of way access within Crown or private lands
Licence of Occupation and Statutory Right of way	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Land Act* (1996)	Authorization to occupy crown land for construction of freshwater pipeline
Temporary Use / Work Permits	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Land Act* (1996)	Temporary (short term) use of Crown land portions for construction of fresh water pipeline
Investigative Use Permit	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Land Act* (1996)	
Occupant Licence to Cut – Mine Site	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Forest Act* (1996)	Authorization to harvest timber for site clearing
Liquid Effluent Discharge Permit	Ministry of Environment	Government of BC, Environmental Management Act (2003)	Authorization for discharge from any water storage facility or diversion structure
Air Emissions Discharge Permit	Ministry of Environment	Government of BC, Environmental Management Act (2003)	Authorization for air emissions discharge

Permits	Agency	Legislation	Description
Hazardous Waste Registration	Ministry of Environment	Government of BC, *Environmental Management Act* (2003) - Petroleum Storage and Distribution Facilities Storm Water Regulation	Authorization for temporary storage of hazardous waste
Explosives Storage and Use Permit	Ministry of Energy and Mines	Government of BC, *Mines Act* (1996)	Approval for surface and underground explosive storage and use
Section 9 Notification	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, Water Sustainability Act (2014)	Notifies MFLNRO of plans to conduct works not requiring approval or authorization (e.g. no diversino of water, can be completed within a short period of time, and will have minimal enviromnetal or third party effects)
Section 9 Approval or Authorization for Changes In and About a Stream	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, Water Sustainability Act (2014)	Approval for changes in and about a stream that are of a complex nature
Section 8 Approval, Water Use License	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, Water Sustainability Act (2014)	Authorization to divert and use surface water
Construction Permit	Northern Health Authority	Government of BC, Drinking Water Protection Act (2001)	
Animal Salvage	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Wildlife Act* (1996)	Authorization to trap wildlife for research / scientific purposes, including salvage
Special Use Permit	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Forest Act* (1996)	Approval to build an access road and gravel pits on unencumbered crown land (non-tenure)
Occupant Licence to Cut – Access Road	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Forest Act* (1996)	Authorizes timber harvesting consistent with approved road upgrade and road design.
Occupant Licence to Cut – Powerline	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Forest Act* (1996)	Authorization for timber harvesting for construction of a powerline right of way

Permits	Agency	Legislation	Description
Licence of Occupation and Statutory Right of way	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Land Act* (1996)	Authorization to occupy crown land for powerline right of way
S.9 Approval or Authorization for Changes In and About a Stream	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Water Act* (1996)	Approval for changes in and about a stream that are of a complex nature
S.8 Authorization for Short Term Use of Water	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Water Act* (1996)	Authorization to divert and use surface water
Permit to connect a Powerline	BC Hydro	Government of BC, *Safety Standards Act* (2003) - Electrical Satefy Regulation	Approval of plans to connect a private powerline to the BC Hydro grid
Road Use Permit	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Forest Act* (1996)	Approval for the use of forest service roads
Industrial Access Permit	Ministry of Transportation and Infrastructure	Industrial Roads Act (1996)	Access improvements to Access Road
Highway Access Permit/Provincial Public Highway Permit Application	Ministry of Transportation and Infrastructure	Government of BC, Transportation Act (2004), Motor Vehicle Act (1996)	Approval for industrial access to Highway 37A; Access Road intersection with Highway 37A
Noxious Weed Control Permit	Ministry of Forests, Lands and Natural Resources	Government of BC, Integrated Pest Management Act (2003)	Recently disturbed lands within the Project area where invasive plants have vigorously established
Utility Permit	Ministry of Transportation and Infrastructure	Government of BC, *Transportation Act* (2004)	Approval to construct a utility (i.e. transmission line) within a highway ROW
Burning Reference Number	Ministry of Forests, Lands and Natural Resource Operations	Government of BC, *Wildfire Act* (2004)	Required for any category 3 open burn

A list of anticipated federal permits and authorizations is shown in Table 4-2. These will be addressed through the appropriate government agencies.

Table 4-2: List of Anticipated Federal Permits and Authorizations

Permits	Agency	Legislation	Approval Requirement
Explosives Factory Licence	Natural Resources Canada (NRCan)	Government of Canada, *Explosives Act* (1985)	Authorization for an explosive storage magazine, and for explosives manufacture/mixing
Radio Licences	Industry Canada	Government of Canada, *Radiocommunication Act* (1985)	Establish and operate radio frequencies and related infrastructure
Radio-isotope Licences	NRCan	Government of Canada, Nuclear Safety and Control Act (1997)	Authorization for nuclear devices such as slurry density flow meters

5 INFORMATION DISTRIBUTION AND CONSULTATION OVERVIEW

5.1 Aboriginal Engagement and Consultation

Through the Section 11 Order, EAO has directed IDM to engage and consult with Nisga'a Nation, as represented by Nisga'a Lisims Government (NLG), on the potential effects of the Project on Nisga'a Nation Treaty rights and measures to avoid, minimize, mitigate, or otherwise address those potential effects. The EIS Guidelines issued for the Project by the Canadian Environmental Assessment Agency also identify TSKLH and MNBC as Aboriginal Groups whose Aboriginal Interests may be less affected by the proposed Project. The EIS Guidelines direct IDM to share key EA documents with NLG, TSKLH, and MNBC and to ensure their views on the potential effects of the Project on their Aboriginal Interests and IDM's proposed mitigation measures are heard and recorded.

IDM believes that consultation with Aboriginal Groups should be conducted in the spirit of mutual respect, integrity, and transparency.

IDM has been engaging with NLG on the proposed Project since IDM acquired the Red Mountain Property in May 2014. IDM's engagement and consultation efforts with NLG have included:

- Engagement on Valued Component selection;
- Consultation on the draft Nisga'a Consultation Plan required under the Section 11 Order;
- Providing capacity funding to support NLG's meaningful participation in the EA process;
- Hosting site visits to enable understanding of the Project in context of the existing environment;
- Consultation on the draft Aboriginal Consultation Reports required under the Section 11 Order;
- Consultation on the draft Application Information Requirements (dAIR) through the EAO-led Working Group;
- Hosting community open houses in two Nisga'a villages during the EAO-led public comment period on the dAIR;
- Providing Project information to Nisga'a citizens through newsletters, social media, and the Project website (RedMountainProject.com);

- Providing copies of environmental baseline study reports in order to facilitate NLG's understanding of the potential effects of the Project in context of the current conditions in the Project area;

- Consultation on draft sections of the Application/EIS, including the assessments required under 8(e) and 8(f) of the NFA; and

- Responding to questions, concerns, and issues raised by NLG representatives in a timely and coherent manner.

A summary of the key issues, interests, and concerns raised by NLG (from IDM's perspective) and IDM's responses is provided in Table 5-1.

Table 5-1: Nisga'a Nation Key Issue Executive Summary Table

Topic	Issue, Interest, or Concern Raised	IDM Response
Access	Concern regarding increased access to the Bitter Creek valley and associated increased hunting and fishing pressure. Request that the access road by gated and controlled.	Increased access may increase hunting and fishing pressure on wildlife and fish resources in the Bitter Creek valley. During construction, it is unlikely that transient workers will have time for hunting and fishing while on-shift. They will not remain in the Bitter Creek valley while off shift. During Operation, the number of additional hunters or fishers will likely be minimal. IDM will develop an Access Management Plan, in consultation with Nisga'a Nation, which ensures appropriate access for Nisga'a citizens to exercise Treaty rights and for Nisga'a Nation representatives to carry out their responsibilities. IDM will implement a "no hunting, no fishing" policy for on-shift workers.
Birds	Concern regarding potential adverse effects on migratory birds and habitat.	The Project is not likely to result in significant residual effects on migratory birds. There is a high likelihood that the Project will result in a low magnitude effect on Nisga'a citizens' ability to manage and harvest wildlife and migratory birds in the Nass Area and the Nass Wildlife Area, as applicable. The effect will be local, long-term, continuous, and reversible. The context is high. The confidence of this prediction is high. IDM will implement best management practices and mitigation measures to ensure that the effect to migratory birds and their habitat is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on birds.

Topic	Issue, Interest, or Concern Raised	IDM Response
Economic, Social, and Cultural Values	Concern regarding potential increased drug and alcohol use.	Increased income due to Project employment may result in individuals choosing to increase their drug and/or alcohol consumption. IDM's intention is to consider and/or implement the following measures to help reduce the potential for employment (income and work schedules) to adversely affect family well-being: • A Drug and Alcohol policy, which would apply to all IDM employees and workplaces; • Offering substance misuse prevention, rehabilitation, and aftercare guidance to workers; • Providing onsite counseling services and money-management training to workers; and • Providing transportation for Nisga'a workers to return to the Nisga'a Villages while off shift.
Economic, Social, and Cultural Values	Concern regarding the potential decrease in Nisga'a citizens' ability to participate in cultural activities and practices, such as feasts and funerals.	Increased employment may result in Nisga'a citizens being unable to participate in cultural activities and practices. IDM will work with NLG to identify measures to enable Nisga'a workers to continue to participate in traditional activities and will work with successful contractors to develop human resource policies that recognize and accommodate cultural practices. Such policies may include a cultural leave policy that would operate in much the same way as vacation, bereavement, or sick leave, to enable Nisga'a citizens to book time off for feasts, funerals, and other ceremonies. IDM will also consider developing flexible work schedules or permission to take unpaid leave to accommodate seasonal resource harvesting, where needed. Shift work will also allow Nisga'a citizens some larger blocks of time off, which may allow them to participate in cultural activities and practices.

Topic	Issue, Interest, or Concern Raised	IDM Response
Fish	Concern regarding potential adverse effects on Fish, Fish Habitat, and fish management, including: • CRA Fisheries; • Salmonids; and • Eulachon.	The Project is not likely to result in significant residual effects on fish. No residual effects on Nisga'a citizens' Treaty rights to manage and harvest Nass salmon, Nass steelhead, or eulachon are anticipated. IDM will implement best management practices and mitigation measures to ensure that the effect to fish and their habitat is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on fish.
Fish	Request that the determination of significance of effects for Fish, Fish Habitat, and Water Quality be made inclusive of the lower Bear River.	The Fish and Fish Habitat Effects Assessment, which informed the assessment of potential effects to Nisga'a Nation Treaty rights considered the potential effects of the Project on eulachon in the lower Bear River.
Nisga'a Nation Treaty Rights	Concern regarding full inclusion of Nisga'a Nation Treaty rights in Assessment.	The proposed Project is located within the Nass Wildlife Area, as set out in the NFA, and may have potential effects on Nisga'a Nation Treaty rights. An assessment of these potential effects is provided in the 8(e) and 8(f) assessments. IDM intends to continue ongoing dialogue, consultation, and engagement with Nisga'a Nation, as represented by NLG, during the remainder of the EA process, the permitting process, and throughout the life of the Project.
Transportation	Concern regarding the potential effects of increased traffic along Highway 37.	The Access Management Plan and associated policies to limit speed, cap daily working hours for drivers, and otherwise promote safe driving practices will further reduce the occupational and non-occupational risks related to Project induced traffic.

Topic	Issue, Interest, or Concern Raised	IDM Response
Water Quality	Concern regarding potential effects to Water Quality, particularly considering pathway effects to Fish and Fish Habitat, Nisga'a Nation Treaty interests, and Human Health. Selenium has been raised as a particular concern.	The Project has a low likelihood of having a non-significant, low magnitude, local, permanent, sporadic, and reversible effect on Dolly Varden in Bitter Creek due to changes in water quality, particularly selenium. The Human Health Effects Assessment has not identified any potential effects to Human Health as a result of changes to water quality.
Wildlife	Concern regarding the potential effects of Project-related traffic on wildlife.	Traffic, including mortality risk and disturbance, has been considered a pathway for effects on wildlife. It has been considered in the Wildlife Effects Assessment as well as in the 8(e) assessment.
Wildlife	Concern regarding the potential effects of the Project on Mountain Goats.	The Project is not likely to result in significant residual effects on mountain goats. There is a high likelihood that the Project will result in a low magnitude effect on Nisga'a citizens' ability to manage and harvest wildlife and migratory birds in the Nass Area and the Nass Wildlife Area, as applicable. The effect will be local, long-term, continuous, and reversible. The context is high. The confidence of this prediction is high. IDM will implement best management practices and mitigation measures to ensure that the effect to mountain goats and their habitat is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on mountain goats.
Shipping	Concern regarding the shipping of concentrate from the Port of Stewart and increased marine traffic in the Portland Canal, Portland Inlet, and Observatory Inlet.	The proposed Project does not include the shipping of concentrate; waste rock, ore, and tailings will be processed and stored at site. Certain pieces of equipment or infrastructure may be transported to Stewart by barge; however, this barge use will be incidental and is not anticipated to be a regular occurrence. IDM has provided this information to NLG in a transportation memo, dated March 24, 2016.

IDM will continue to engage with NLG throughout the Application Review Stage of the EA, as outlined in the Nisga'a Consultation Plan, including further consultation on the results of the 8(e) and 8(f) assessments and more open houses in the Nisga'a Villages.

IDM has shared draft sections of the Application/EIS with TSKLH and MNBC to solicit their feedback on IDM's assessment of the potential effects of the Project on their Aboriginal interests and IDM's proposed mitigation measures. Their feedback has been considered, incorporated where appropriate, and summarized in tables outlining IDM's responses.

A summary of the key issues, interests, and concerns raised by TSKLH (from IDM's perspective) and IDM's response is provided in Table 5-2.

Table 5-2: TSKLH Issue Executive Summary Table

Topic	Issues, Interest, or Concern Raised	Proponent Response
Hunting	TSKLH have Aboriginal rights to hunt in the Project area.	The Project is not likely to result in significant adverse effects to wildlife resources. IDM will implement best management practices and mitigation measures to ensure that the effect to wildlife species and their habitat is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on wildlife.
Trapping	TSKLH owns traplines in the Project area.	The Project is not likely to result in significant adverse effects to wildlife resources. IDM will implement best management practices and mitigation measures to ensure that the effect to wildlife species and their habitat is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on wildlife.
Fishing	TSKLH have Aboriginal rights to fish in the Project area.	The Project is not likely to result in significant adverse effects to fish resources. IDM will implement best management practices and mitigation measures to ensure that the effect to fish and their habitat is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on fish.

Topic	Issues, Interest, or Concern Raised	Proponent Response
Mushroom, Plant, and Berry Harvesting	TSKLH harvest, consume, and trade plants, such as berries.	The Project is unlikely to result in significant adverse effects to plant resources. IDM will implement best management practices and mitigation measures to ensure that the effect to vegetation and ecosystems is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on vegetation and ecosystems.
Aboriginal Title	TSKLH claim Aboriginal Title in the Project area. TSKLH are concerned regarding potential effects of the Project on their Aboriginal title and feel that the level of consultation determined by EAO is not appropriate.	IDM defers to the Crown on all matters related to strength of claim, including title, and consultation.

A summary of the key issues, interests, and concerns raised by MNBC, IDM's proposed mitigation measure, and the status of the issue, interest, or concern, from IDM's perspective is provided in Table 5-3.

Table 5-3: MNBC Issue Executive Summary Table

Topic	Issues, Interest, or Concern Raised	Proponent Response
Country foods (Gathering)	Métis citizens in Terrace, Prince Rupert, Smithers, and Stewart harvest country foods for sustenance purposes.	The Project is unlikely to result in significant adverse effects to plant resources. IDM will implement best management practices and mitigation measures to ensure that the effect to vegetation and ecosystems is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on vegetation and ecosystems.

Topic	Issues, Interest, or Concern Raised	Proponent Response
Cultural Sites	MNBC has cultural sites mapped within the Project region.	The Project is unlikely to result in effects to cultural sites due to the lack of currently identified cultural sites in the Bitter Creek valley. IDM will implement a chance find procedure to protect cultural sites should one be identified during the Construction, Operation, or Closure and Reclamation Phases of the Project.
Hunting	Métis citizens have Aboriginal rights to hunt in the Project area.	The Project is unlikely to result in significant adverse effects to wildlife resources. IDM will implement best management practices and mitigation measures to ensure that the effect to wildlife species and their habitat is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on wildlife.
Fishing	Métis citizens have Aboriginal rights to fish in the Project area.	The Project is unlikely to result in significant adverse effects to fish resources. IDM will implement best management practices and mitigation measures to ensure that the effect to fish and their habitat is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on fish.
Trapping	Métis citizens have Aboriginal rights to trap in the Project area.	The Project is unlikely to result in significant adverse effects to wildlife resources. IDM will implement best management practices and mitigation measures to ensure that the effect to wildlife species and their habitat is avoided or minimized. The Environmental Management System will also include provisions for monitoring and adaptively managing the measures in place to mitigate effects on wildlife.

Further information on IDM's consultation and engagement efforts can be found in Volume 4, Chapter 25, 26, and 27 (Tsetsaut Skii km Lax Ha, Métis Nation BC, and Nisga'a Nation, respectively).

5.2 Government Agency Engagement and Consultation

IDM has consulted extensively with government agencies both through the EAO-led Working Group and also through regular correspondence with provincial and federal regulatory agencies. IDM's engagement with government agencies has included:

- Providing Project overview information to Working Group members to facilitate their understanding of the proposed Project and its potential effects;
- Hosting site visits to further enable understanding of the Project in context of the existing environment;
- Engaging in dialogue to better understand government agencies' scope and areas of interest in order to be able to best provide information in response to their needs;
- Responding to questions and feedback received through the Working Group; and
- Participating in Working Group meetings.

Working Group members' comments have focused on IDM's proposed assessment methodology and its methodology for the collection of baseline data to support the effects assessments contained in this Application/EIS. Comments were primarily received during the Working Group's review of the draft Application Information Requirements (dAIR), led by EAO, and during focused discussions between IDM and Working Group members prior to the finalization and submission of this Application/EIS. It is IDM's understanding that the focus on Working Group members' comments is to ensure that a robust and appropriate effects assessment is conducted for the VCs and ICs within each member's mandate.

Written comments received from government agencies and IDM's responses are summarized in comment-tracking tables maintained by EAO. Feedback relevant to specific VCs and the EA methodology is also summarized in the Application/EIS.

IDM will continue to consult with government agencies during the Application/EIS Review Phase, including providing the Working Group with copies of the Application/EIS, providing written responses to comments and questions, and attending Working Group meetings to address questions and present project information.

An overview of IDM's consultation with government agencies is provided in Volume 2, Chapter 3 (Information Distribution and Consultation Overview).

5.3 Public Engagement and Consultation

IDM proactively engages with community members, stakeholders, and the public, in the spirit of respect and integrity, to build and maintain constructive and mutually beneficial relationships. The Section 11 Order, the EIS Guidelines, and the Public Consultation Plan prepared by IDM in compliance with the Section 11 Order guide IDM's consultation efforts with community members, stakeholders, and the public, which have included:

- Introductory letters to key stakeholders providing information about the proposed Project and a point of contact for questions and concerns;
- A community website (RedMountainProject.com) containing Project information and a community email address (community@idmmining.com) for questions and comments;
- Publication of community newsletters to share Project information and development progress;
- A public comment period led by the Agency on the Project Description and potential effects of the Project on the environment;
- A public comment period led by the Agency on the draft EIS Guidelines for the Project;
- A public comment period led by EAO on the dAIR;
- An EAO-led open house in Stewart during the public comment period on the dAIR;
- Discussions with national, provincial, regional, and municipal political leaders regarding the proposed Project; and
- Discussions with overlapping tenure holders on the potential effects of the Project on their tenured interests.

The RDKS has been an active member of the EAO-led Working Group. The District of Stewart was also invited to join the Working Group.

A summary of the key issues brought forward by local community members, stakeholders, and members of the public as well as IDM's response and/or proposed mitigation is provided in Table 5-4. This table does not include IDM's responses to comments received from members of the public during the dAIR public comment period (October 5 to November 4, 2016), which are included in the Project's first Public Consultation Report.

Table 5-4: Community, Stakeholder, and Public Key Issues Executive Summary Table

Stakeholder	Topic	Issue, Interest, or Concern Raised	Proponent Response
District of Stewart	Social and Health Services	Lack of emergency services in Stewart, including ambulance, search and rescue, fire response, and primary medical care.	IDM recognizes that social and health services in Stewart are limited and at or near capacity. IDM has included Social and Health Services as a VC under the Social Pillar. The assessment of potential Project effects on Social and Health Services is included in Chapter 20. IDM has provided a framework for a Health and Social Services Plan in presented Chapter 29 (Management Plans and Monitoring). IDM will work with the District of Stewart and other regulatory agencies to develop and implement a Medical and Health Services Plan prior to the construction of the Project. Throughout the life of the Project, IDM will maintain consistent and open dialogue with the District of Stewart and other regulatory agencies and will support the monitoring of health care demands and occurrences of medical escalations and traumas requiring support from local services. IDM will also initiate an operational group to share information and address issues as they arise and before they lead to chronic effects on services.
District of Stewart	Social Benefits	Social benefits and community revitalization resulting from increased population due to the Project.	IDM looks forward to working with the District of Stewart to maximize social and economic benefits of the Project for the community.
District of Stewart	Economic Benefits	Economic benefits resulting from the Project.	IDM looks forward to working with the District of Stewart to maximize social and economic benefits of the Project for the community.

Stakeholder	Topic	Issue, Interest, or Concern Raised	Proponent Response
Regional District of Kitimat-Stikine	Housing	Inquiry about the quality and quantity of housing currently available in Stewart.	Housing has been included as a VC under the Social pillar. An assessment of the potential Project effects on Housing is included in Chapter 20. IDM will work closely with the District of Stewart to develop a housing plan with a comprehensive description of housing availability, quality, and affordability. A range of housing options may be implemented including construction of apartments, houses, and neighbourhoods, restoration of row-houses and apartment buildings, and use of modular units, RVs, barges, or floatels. While the operation workforce will gradually increase, the construction work camp will also be available during the transition period to reduce adverse pressure on housing. IDM and the District of Stewart will consult with other jurisdictions in northwest BC who have completed Housing Action Plans to solicit advice on good practices for housing policies and measures to ensure housing remains affordable in Stewart. IDM is committed to ensuring that the Project maximizes positive effects for community health and well-being through population growth. Housing options that maintain housing availability and affordability while allowing for permanent in-migration and population growth will be implemented with negligible adverse effects anticipated on Housing and the Housing VC assessment endpoint.
Regional District of Kitimat-Stikine	Waste Management	Planning for appropriate waste disposal during the Project's construction and operation.	IDM will continue to communicate with RDKS regarding waste disposal plans for the Project's construction and operation.
Regional District of Kitimat-Stikine	Economic Benefits	Economic benefits for community members within RDKS.	IDM looks forward to working with RDKS to maximize social and economic benefits of the Project for the region.
Nisga'a Guide Outfitters (formerly Coast Mountain Outfitters)	Access	Request for continued access to a decommissioned road near Ore Mountain and offer of support for the Project.	IDM is appreciative of the support of local businesses such as Coast Mountain Outfitters and looks forward to working with them to ensure that appropriate access is maintained.

Stakeholder	Topic	Issue, Interest, or Concern Raised	Proponent Response
Nisga'a Guide Outfitters	Mountain Goats	Potential adverse effects on mountain goats in the Bitter Creek valley could adversely affect NGO's potential revenues.	Based on the Wildlife and Wildlife Habitat Effects Assessment (Chapter 16), the Project will not have significant adverse effects on mountain goats in the Bitter Creek valley, therefore IDM does not anticipate an adverse effect on NGO's revenue based on effects to mountain goats.
Trapline Holder	Right to Continue Trapping	Concern that Project activities in the Bitter Creek valley would prohibit access to the trapline holder.	IDM will work with all relevant parties to ensure that the Project's Access Management Plan has minimal effect on stakeholders' access to the valley.
Trapline Holder	Right to Continue Trapping	Concern that, as employees of IDM, they would be subject to the proposed "no hunting, no fishing" policy.	IDM will communicate with the relevant individuals regarding this potential conflict.
Last Frontier Heliskiing	Communication	Comment that the Project may result in the loss of one or two ski runs but that the impact to LFH would be small. Request for information updates as the Project progressed.	IDM is appreciative of the support of local businesses such as LFH and has continued to communicate with LFH in order to organize an in-person meeting and provide Project updates.
Last Frontier Heliskiing	Access to Ski Runs	Concern that, depending on its elevation, the Powerline might prevent helicopter access to certain runs.	IDM will continue to communicate with LFH regarding the design and location of the Powerline right of way. Based on the relative size of LFH's commercial recreation tenure, changes to access due to the location of the Powerline right of way are unlikely to result in significant effects to LFH's revenues.
Last Frontier Heliskiing	Communication	Request to ensure that helicopters are on the same radio channel to ensure they area aware of each other's presence in the Bitter Creek valley.	IDM will continue to communicate with LFH regarding helicopter use in the Bitter Creek valley. This will include discussion regarding a Transportation Management Plan for construction and operations.

Stakeholder	Topic	Issue, Interest, or Concern Raised	Proponent Response
Last Frontier Heliskiing	Communication	Request that IDM communicate regarding planned avalanche control to ensure guides and clients are not in the valley at the same time.	IDM will continue to communicate with LFH regarding its activities in the valley to minimize or avoid any potential conflicts with their use.
Last Frontier Heliskiing	Cumulative Visual and Noise Effects	Cumulative Noise and Visual Quality effects from industrial development in the region reduce the "wilderness" atmosphere LFH's clients are seeking.	Some visual and noise effects on LFH's clients in the Bitter Creek valley are unavoidable. Based on the relative size of LFH's commercial recreation tenure, Project changes to Visual Quality and Noise are unlikely to result in significant effects to LFH's revenues. Measures to reduce the effects of changes to Visual Quality on Contemporary Land and Resource Use in the Bitter Creek valley will include attempts to retain existing vegetation, where possible, to screen Project components from view. Embankments disturbed for road construction are expected to green-up naturally over time as will the right of way for the Powerline. Measures to avoid, minimize, or mitigate Noise effects will also be implemented.

A full summary of IDM's consultation activities with community members, stakeholders, and the public can be found in IDM's Public Consultation Reports. The Public Consultation Reports also contain a summary of comments received from the public and IDM's responses.

A summary of key issues raised by the public is provided in Volume 4, Chapter 28 (Public Consultation).

6 ASSESSMENT METHODOLOGY

The effects assessment methodology (Chapter 7) employed for the Project follows recommended guidelines and legislated requirements, pursuant to BCEAA and CEAA 2012 and is consistent with the requirements of the AIR for the Project issued by EAO. The key steps in the Project effects assessment were: issues scoping, selection of valued components (VC) and intermediate components (IC), definition of spatial and temporal boundaries, description of existing conditions, determination of potential effects, identification of mitigation measures, evaluation of residual effects (including significance determination for VCs), and assessment of cumulative effects.

Issues scoping is intended to ensure that the Application/EIS focuses on the issues of greatest importance to government regulators, Aboriginal Groups, and the public and with the greatest potential to cause significant adverse effects. IDM conducted the issues scoping utilizing research, literature review, and consultation with interested parties (e.g., EAO, the Agency, Working Group members, NLG, stakeholders, community members, and the public).

During the issues scoping process, candidate VCs and ICs were identified based on EAO guidance (BCEAO 2013) and key criteria (e.g., presence of the VC in the Project area or concern expressed by key stakeholder). The proposed candidate VCs and ICs were discussed with the Working Group and NLG and were finalized in the Project AIR (BCEAO 2017).

Assessment boundaries define the maximum spatial limits and time frames within which the effects assessment and supporting technical studies were conducted. Boundaries encompass areas and periods of time during which the Project is expected to interact with the selected VCs and ICs. The assessment boundaries account for constraints due to temporal, political, social, and economic circumstances and technical limitations. Each effects assessment chapter describes the selected spatial and temporal boundaries, the rationale for their selection, and any administrative or technical boundaries that may be applicable.

The foundation of an effective effects assessment is the documentation and description of existing conditions within the assessment boundaries. The strength of this foundation is dependent on data quality (e.g., were the data collected at an appropriate resolution) and reliability (e.g., were the data collected using appropriate methodology by suitably qualified professionals). All technical reports that were relied upon during the effects assessment are provided as Appendices to this Application/EIS. For some VCs, long-term data were available and were incorporated into the effects assessment where relevant.

A summary of the overall process and methodologies used to identify and assess the potential effects of the proposed Project on the identified VCs and ICs is presented in each effects assessment chapter. A Project interaction matrix (Chapter 7) identifies the physical works and activities to be implemented during the Project as it relates to each VC or IC. The interaction matrix applies a likelihood of interaction to filter the Project components and activities that will or will not result in potential effects. The matrix allowed the assessment

to focus on Project-VC and -IC interactions that are of higher likelihood of occurring and that present the greatest potential risk.

Once Project-VC and Project-IC interactions and potential effects were identified, appropriate mitigation measures were selected following provincial guidance (MOE 2012). Proposed mitigation measures are detailed in each effects assessment chapter and were considered in the following order of preference: avoidance, minimization, restoration, and compensation (i.e., offset). The cumulative mitigation measures have been additionally summarized in a diversity of environmental management and/or monitoring plans (Volume 5, Chapter 29)

If the implementation of appropriate mitigation measures could be reasonably expected to eliminate or avoid a potential Project effect on a VC or IC, the potential effect was not analyzed further. Project-related effects that have the potential to remain after the implementation of appropriate mitigation measures are referred to as residual effects. Once identified, residual effects were characterized by eight criteria:

- Context (i.e., sensitivity and resilience of VC/IC);
- Magnitude (i.e., intensity or degree of change);
- Geographic extent (i.e., spatial scale);
- Duration (i.e., persistence of residual effect evaluated relative to Project phases);
- Frequency (i.e., how often the residual effect is predicted to last);
- Reversibility (i.e., probability that a residual effect will persist upon removal of Project activity or stressor); and
- Likelihood (i.e., probability of the predicted residual effect occurring).

For VCs, following the characterization, the potential significance of a predicted residual effect was evaluated in the context of the current state of the VC if the Project does not proceed. Different combinations of criteria that best fit the needs of each residual effects assessment were used to determine significance. Each assessment chapter clearly defines how the terms “Significant” and “Not Significant” were considered in relation to each VC and provides a detailed rationale for the significance determination.

Magnitude, context, geographic extent, and duration (combined with reversibility) were the primary criteria used to determine significance. Frequency and likelihood were considered as modifiers when determining significance, where applicable. However, likelihood was not used to determine significance; the predicted significance of an effect was not altered by the likelihood of its occurrence.

The final step in the significance determination process was an assessment of confidence that was based on the understanding of the cause-effect relationship between the Project and a VC, the predicted effectiveness of proposed mitigation measures, and the quality of the data that provided the foundation for the assessment. Confidence assessments were

provided to assist decision makers and stakeholders in the evaluation of risk associated with the Project.

A cumulative effects assessment was conducted according to Agency guidance (2014) for all predicted residual effects, regardless of significance. The first step of the cumulative effects assessment involved asking two questions:

- Is there any spatial or temporal overlap of Project-related residual effects with the effects from other past, present, or reasonably foreseeable projects or activities?

- Is there potential for Project-related residual effects to interact cumulatively with past, present, or reasonably foreseeable projects or activities?

If the answer to both of these questions was yes, an evaluation of the potential cumulative effect was conducted following the same methodology as the residual effects assessment (i.e., identification of mitigation, effect characterization, and significance determination). A list and descriptions of projects included in the cumulative effects assessment are provided in Chapter 7. VC/IC-specific cumulative effects assessments are provided in the individual effects assessment chapters.

Where a residual adverse effect or cumulative effect has been identified for a VC/IC, the Application/EIS includes a description of a follow-up strategy, where appropriate, that:

- Identifies the measures to evaluate the accuracy of the original effects prediction;

- Identifies the measures to evaluate the effectiveness of proposed mitigation measures; and

- Proposes an appropriate strategy to apply in the event that original predictions of effects and mitigation effectiveness are not as expected. This includes reference to further mitigation, involvement of key stakeholders, Aboriginal Groups, government agencies, and any other measures deemed necessary to manage the issue.

7 POTENTIAL EFFECTS, MITIGATION, AND SIGNIFICANCE OF RESIDUAL EFFECTS

7.1 Air Quality Effects Assessment

Air Quality is considered an Intermediate Component (IC). Effects on Air Quality caused by Project-related components and activities have the potential to affect VCs, including Surface Water Quality, Vegetation and Ecosystems, Wildlife and Wildlife Habitat, Aquatic Resources, Fish and Fish Habitat, Social VCs, and Human Health.

7.1.1 Setting

Air Quality effects were assessed for a Local Study Area (LSA) that included consideration of topographical features that are expected to limit dispersion of air emissions by the Project. The LSA also included the nearest community, Stewart, located approximately 15 km southwest of the Project. A regional study area was not established as the LSA was considered sufficiently large to include pollutant isopleths representing 10% of the BC Ambient Air Quality Objectives, as recommended in the Guidelines for Air Quality Dispersion Modelling in British Columbia (MOE 2015).

The Project is located in an area of complex terrain with steep valleys dominated by forest cover at lower elevations and rock, snow, and ice at higher elevations. The area is remote and there are no specific anthropogenic sources of air emissions, except for occasional recreational and commercial activities along the Access Road. Baseline air quality is likely to be influenced by natural sources or long-range pollutant transport by regional or continental airflow.

7.1.2 Assessment

The temporal boundaries for the Air Quality Effects Assessment considered those periods when the highest levels of air emissions are expected: the 18-month Construction Phase and the 6-year Operation Phase. During the Construction Phase, Year -1 was selected as it will include site development and construction of the TMF. During the Operation Phase, Year +3 was selected as it will have the highest throughput levels and is considered to be the 'worst-case' scenario for air emissions.

Project activities will generate fugitive dust, exhaust emissions from mine equipment, and air emissions from the Process Plant. The primary measurement indicators for Air Quality are dustfall rates and concentrations of criteria air contaminants, such as particulate matter, SO_2, and NO_2.

Baseline air quality was modelled using data from air quality monitoring stations that are representative of remote areas typical of mine locations in northwestern BC, that are in the same biogeoclimatic zone, and that are subject to similar seasonal climatic regimes. Dustfall

rates have been modelled to support other VC assessments. Baseline dustfall data have been collected at five mine projects within an approximate 180-km radius of the Project.

The Air Quality Effects Assessment used predictive methods to quantify the air pollutant concentrations at receptor sites within the LSA. Potential effects were quantified based on the following:

- A review of Project data to identify potential air emission sources;
- Collection and identification of potential sensitive receptors or receptors of interest identified for other VC assessments;
- Dispersion modelling used to predict potential pollutant concentrations levels from mining activities; and
- Comparison of predicted pollutant concentration levels with provincial ambient air quality objective thresholds to identify the magnitude and spatial extent of potential effects.

Measures to mitigate the effects on Air Quality are focused on reducing emissions from point or equipment sources and controlling fugitive dust from mining-related activities. Most of the mitigation measures are relevant for the Construction, Operation, and Closure and Reclamation Phases of the Project and rely on mitigation by design, best available technologies, and best management practices. The measures include:

- Reducing the number of Project-related vehicles on roads, the amount of time vehicles operate, and distance travelled;
- Ensuring all equipment is properly maintained and turned off when not in use;
- Using vapour-recovery units at fuel and chemical storage tanks;
- Ensuring roads are maintained and kept in good repair;
- Designing the underground ventilation systems to dilute and remove dust, diesel emissions, and blasting fumes;
- Designing the TMF to reduce dust sources, generation, and dispersal; and
- Training all on-site equipment operators in ways to reduce generation of dust and emissions and to optimize dust and emission controls.

Residual effects on Air Quality include increased criteria air contaminants and fugitive dust that will affect a local geographical extent within the LSA. The magnitude of these effects is expected to be low and the effects are reversible; levels are expected to return to baseline levels after mine closure.

There are three proposed or currently operating projects within the LSA that have the potential to cumulatively affect Air Quality: Stewart Bulk Terminal, Stewart World Port, and

the proposed Bitter Creek Hydro Project. Cumulative effects are predicted to be of low magnitude (i.e., below provincial ambient air quality objectives), reversible, and affect a local geographical extent within the LSA.

7.2 Noise Effects Assessment

Noise is an aspect of the environment that may be altered by the Project. Noise is an IC that may have an effect on identified VCs, such as Wildlife and Wildlife Habitat, Cultural and Heritage Resources, Human Health, and Social VCs including Recreational Values and Current Use of Lands and Resources for Traditional Purposes.

7.2.1 Setting

The Project is located in a relatively remote area, and noise levels are typically due to natural sources, such as wildlife or wind, and incidental anthropogenic sources, such as mine exploration and recreational activities.

The LSA for the Noise Effects Assessment was selected to include the extent of changes in background noise levels and includes a 3-km buffer around the proposed Project footprint. This distance is twice that required to limit the effects of noise from industrial development, as recommended in BC Oil and Gas Commission guidelines (OGC 2009).

As noise effects dissipate relatively quickly and are not predicted to occur beyond the area identified in the LSA, a RSA was not selected.

7.2.2 Assessment

The primary measurement indicators for noise were: A-weighted sound pressure level (in dBA) at potentially affected wildlife and human receptors; and peak noise levels and vibration from blasting events.

Project-specific baseline noise studies were not conducted. Baseline noise levels were characterized based on existing data, methods, and assumptions used to define baseline conditions for oil and gas activities in similar remote locations. Existing data from previous mine environmental assessments in the region were also used; these relied on recommended baseline ambient sound levels referenced in the Alberta Energy and Utilities Board Noise Control Directive 38 (EUB 2007) and the BC Oil and Gas Commission Noise Control Best Practices Guideline (OGC 2009).

The Noise Effects Assessment used the following sources to identify and quantify potential noise and blasting-related effects of the Project;

- A review of Project data and information to identify potential noise sources and blasting locations;
- Collection and identification of potential sensitive receptors or receptors of interest related to other VC assessments;

- Noise model runs to calculate potential noise levels from construction and mining activities and to account for potential effects from blasting; and

- A comparison of predicted noise and blast effect levels to applicable Project thresholds at specific receptors.

Blasting along the Access Road will only take place during the Construction Phase, so blasting effects are limited to that phase.

Vibration levels from blasting were predicted to be below noise criteria thresholds identified for effects at fish habitat and spawning areas, which were considered as possible receptors. Therefore, further assessment of vibration effects was not undertaken.

Noise effects will occur throughout the Construction, Operation, and Closure and Reclamation Phases. Key noise mitigation measures rely on design mitigation and BMPs and are primarily focused on controlling noise at the source and controlling the noise pathway. The measures include:

- Limiting impulse events, such as blasting, during the Operation Phase to certain times of the day. Instantaneous charge per delay will be minimized to suit blast.;

- Optimizing the design of the Access Road and Haul Road to minimize distance travelled;

- Ensuring equipment is turned off when not in use; and

- Conducting regular servicing of all mobile and stationary engines to maintain efficiency.

Mitigation measures typically reduce noise rather than eliminate it. Therefore, a residual effect will occur, resulting in measurable changes in noise levels during the Project's Construction, Operation, and Closure and Reclamation Phases. The magnitude of residual effects is expected to be moderate, and the effects are reversible; levels are expected to return to baseline levels after mine closure.

In conclusion, there is the potential for the Project and the proposed Bitter Creek Hydro Project to cumulatively affect Noise. Cumulative effects are predicted to be of moderate magnitude, reversible, and affect a local geographical extent within the LSA. Furthermore, the Bitter Creek Hydro Project remains in concept form only at this time and its future as a viable project is uncertain.

7.3 Landforms and Natural Landscapes Effects Assessment

7.3.1 Setting

Landforms and Natural Landscapes is an IC of the Project that can have potential impacts on valued components such as soil quantity, soil quality, and terrain stability.

Landforms and Natural Landscapes effects were assessed for a LSA, RSA, and Project Footprint Study Area (PFSA). The LSA was established to provide a study area boundary for assessing the effects of the Project at the local watershed level, and encompasses the full extent of the Bitter Creek watershed including the height of the land surrounding Bitter Creek, the Roosevelt Creek drainage, and part of Bromley Glacier. The LSA is 15,860 hectares (ha) in size and contains four Old-Growth Management Areas, of which three are located within 150 m of proposed Project infrastructure.

The RSA includes the Project and extends to the height of land of several watersheds within the region. The RSA boundary provides context for the type, distribution, extent, and prevalence of ecosystems within the region and takes into consideration the predicted habitat of select wildlife such as grizzly bears, mountain goats, martens and wolverine, over a season and/or over a lifetime. The RSA is 211,570 ha in size and contains one protected area (Bear Glacier Provincial Park).

The PFSA comprises the area in which development of temporary and permanent infrastructure is expected to occur. The 247 ha of the PFSA includes the Mine Site (48 ha); Access Road (35 ha); Powerline (27 ha); Tailings Management Facility (48 ha); Process Plant (9 ha); and quarries, borrows, and stockpiles (81 ha). The PFSA includes a 150-metre buffer consisting of an additional 714 ha outside the Project footprint to allow for assessment of impacts including dust effects.

7.3.2 Assessment

Project interactions were determined through a screening evaluation of proposed physical works and activities within the LSA, RSA, and PFSA. The spatial layers of the Project footprint were overlaid on terrain and soils maps to determine where terrain stability and soil loss and alteration effects were likely to occur. Potential effects were identified through reviews of relevant literature including baseline assessments, information from public consultations, scientific literature, government documents, and publicly available documents related to adjacent projects and other mines in northwestern BC.

The Project is expected to interact with Landforms and Natural Landscapes throughout the approximate 22-year life of the mine and during all phases of the Project. Potential effects include loss and alteration of soil quality and quantity, destabilization of terrain, sediment discharge into waterbodies, and metal leaching and acid rock drainage due to exposure of potentially acid-generating material.

Key effects include soil alteration through compaction and contamination, direct loss of soil through erosion and terrain instability, changes in background rates of sedimentation of waterbodies, and changes in intensity and frequency of snow avalanches.

Mitigation measures focused on avoiding and minimizing adverse effects to soil quality and quantity, and terrain stability include:

- Developing soil-handling procedures specific to alpine and parkland soils, including minimizing deposition of fugitive dust;

- Preventing soil contamination from fuels and chemicals;
- Establishing setback and buffer distances form surface waterbodies and riparian features;
- Restricting vehicle and machinery use to designated road surfaces;
- Minimizing cut-and-fill in areas with potential for metal leaching and acid-rock generation,
- Re-routing the Access Road to avoid sensitive soils
- Revegetating with seeds and plants suitable for the local area and ecosystems, and
- Designing plans for reclaimed areas to establish conditions that take into consideration ecosystem function and wildlife habitat objectives.

Some residual effects remain after mitigation measures are implemented, but project design and mitigation will alleviate most potential residual effects. A loss of approximately 146.5 ha of soil is predicted to occur from erosion, site clearing, road construction, and potential minor slumping caused by road construction on steep slopes. The loss will primarily occur during Project development and during Closure and Reclamation. The geographic extent of this effect is limited to the immediate area of the Project surface facilities, and it is expected that the duration of the land loss will be permanent, lasting more than 22 years.

Cumulative effects are the result of a Project-related residual effect interacting with the effects of other past, present, and foreseeable future projects or activities to produce a combined effect. Other projects within the RSA that could potentially result in cumulative effects include the Stewart World Port, Long Lake Hydroelectric Project, Bitter Creek Hydroelectric Project, ongoing forestry projects, public transmission lines, urban development, and transportation along highways including Highway 37A.

Two cumulative effects were identified: 1) Nibbling loss, attributable to the incremental loss and alteration of soils due to development of infrastructure; and 2) Growth-inducing, attributable to infrastructure development, primarily roads.

7.4 Hydrogeology Effects Assessment

Hydrogeology (groundwater flow system) is an IC. Effects on Hydrogeology caused by the proposed Project can potentially affect related VCs of the aquatic environment such as Surface Hydrology, Surface Water Quality, Aquatic Resources, and Fish and Fish Habitat.

7.4.1 Setting

For the hydrogeology assessment, four spatial boundaries were considered: a LSA, RSA, and two Technical Study Areas (TSAs). The LSA includes the Bitter Creek watershed up to the

glacial extent, including Goldslide and Otter Creeks. The RSA includes the Bitter Creek watershed including the glacial extent and the Bear River watershed from American Creek to Stewart and the northern end of the Portland Canal. The Technical Study Areas delineate the areas of the LSA where the Mine Site and Bromley Humps are anticipated to affect the hydrogeological system. The Mine Site TSA includes the proposed underground mine, the temporary waste rock pile footprint, and the areas where water originates, at or near the Project, to where it drains or discharges. The Bromley Humps TSA comprises the physical structures and mine activities of the Project around Bromley Humps and surface waters that could be affected by seepage of mine contact water.

The mountainous terrain associated with the Project area has a major influence on the groundwater flow system, causing steep hydraulic gradients that drives groundwater flow from higher to lower elevations. The water table is generally a subdued replica of topography, with depths to groundwater typically greater in the uplands relative to the valley bottoms.

In addition to review of existing information, the methods used to characterize the hydrogeological conditions included the following activities:

- Borehole drilling and logging;
- Installation and development of groundwater monitoring wells;
- Hydraulic conductivity testing (packer tests and slug tests);
- Measurements of groundwater level in boreholes and wells;
- Measurements of inflow rates and water levels in the existing decline, and pressure heads in underground boreholes.

7.4.2 Assessment

The Project is expected to affect hydrogeological processes throughout the life of mine, from the Construction Phase through to the Post-Closure Phase. However, post-closure changes to groundwater will continue to occur beyond that period, until water levels in the flooded mine reach steady-state conditions.

Potential effects on hydrogeology include changes to site drainage patterns and subsurface characteristics due to construction of infrastructure during the Construction and Operation Phases, changes to groundwater flow caused by mining and dewatering, and changes to groundwater flow when the underground mine is flooded during the Closure and Post-Closure Phases.

Activities likely to influence groundwater flows include development, dewatering, and re-flooding of the underground mine resulting from modifications to the subsurface characteristics and groundwater flow. The quantity of groundwater discharged into nearby creeks is a key issue and is likely to be affected by specific activities such as excavation of the lower portal entrance and tunnel, lateral development of the mine, installation of bulkheads

in the declines and ventilation exhaust raise, and flooding of the underground mine at closure.

During mining operations, potential effects on groundwater flow are associated with drilling, blasting, excavation, and backfilling activities, and by underground water management.

During the Closure and Reclamation Phase, a hydraulic bulkhead will be constructed in the lower access ramp, and pumps/drains will be shut off to allow re-flooding of the mine. As the mine floods, the drawdown induced during operations will decrease, and the reductions in base flow to nearby streams will diminish over time. During the Post-Closure Phase, the groundwater system at the Mine Site will return to near baseline conditions.

During the Construction and Operation Phases, no specific mitigation measures are proposed or currently planned to limit inflows to the mine workings. The mining and backfilling will be designed to minimize interaction with the hydraulic regime. If inflows are greater than expected as determined by monitoring, additional measures may be needed: potential mitigation measures include the application of shotcrete to seal exposures of materials, the construction of additional plugs and seals in the underground workings, or barriers to limit the movement of groundwater.

The residual effect associated with the Hydrogeology intermediate component relates to changes to subsurface characteristics and groundwater flow caused by the mine development and dewatering. Overall, at the scale of the LSA and RSA, the residual effect on Hydrogeology is expected to be limited to a negligible reduction in base flow in Goldslide Creek, Rio Blanco Creek, and Bitter Creek during the Operation Phase, which will be offset by the discharges to these streams. For the Post-Closure Phase, the effect on base flow will be reversed and will consist of a negligible increase in base flow in Goldslide Creek, Rio Blanco Creek, and Bitter Creek.

Cumulative effects could result from activities related to current or proposed projects in the defined boundaries. The Bitter Creek Hydroelectric Project involves the construction of an intake and diversion structure in the Bitter Creek valley, overlapping the Red Mountain and Bromley Humps TSAs, and could affect changes in base flow near Bitter Creek. However, even if the Bitter Creek Hydro Project is in operation when mining starts which is highly unlikely, the combined effect of these two projects to the groundwater base flow in Bitter Creek would be expected to be negligible during the Operation and Post-Closure Phases.

7.5 Groundwater Quality Effects Assessment

Groundwater is water that is held within soil and rocks and is an aspect of the environment that may be altered by the Project. Groundwater Quality is considered an IC and is linked to VCs such as Surface Water Quality, Vegetation and Ecosystems, Wildlife and Wildlife Habitat, Fish and Fish Habitat, and Health Effects.

7.5.1 Setting

Groundwater Quality effects were assessed for four study areas: the LSA, RSA, and two TSAs, the Mine Site TSA and Bromley Humps TSA.

The LSA encompasses the Project footprint and extends to include an area where there is potential for adverse effects to occur. It corresponds to the Bitter Creek watershed up to the glacial extent and includes Goldslide and Otter creeks. The RSA is a larger area in which Project-related effects could occur, and corresponds to the Bitter Creek and Bear River valleys, Stewart, and the northern end of the Portland Canal.

The TSAs delineate areas of the LSA where Project components are expected to affect the hydrogeological system, and include areas where water originates at or near the Project to where it drains or discharges; the proposed underground mine; temporary WRSA; TMF; Process Plant; and ROM stockpile.

Baseline conditions for groundwater quality were characterized through consideration of historical datasets, as well as through the baseline groundwater monitoring locations established at and around the key mining areas (i.e., Mine Site and Bromley Humps), adjacent and downgradient to the areas that could be impacted by mining operations.

7.5.2 Assessment

Information for the Groundwater Quality assessment was derived from baseline data collection, ongoing monitoring, technical reports, hydrogeologic modelling, and consultation with government, community members, Aboriginal Groups, stakeholders, and the public.

The Project will influence Groundwater Quality throughout the 22-year life of the mine, and will extend beyond the Post-Closure Phase as changes to groundwater will continue until water levels in the mine reach steady-state.

The primary measurement indicator for Groundwater Quality is changes in concentrations of water quality parameters compared to baseline and provincial or federal guidelines for freshwater aquatic life. Parameters include dissolved metals, anions, nutrients, alkalinity and acidity, pH, conductivity, and temperature.

Potential Project effects on Groundwater Quality include changes to groundwater quality resulting from metal leaching and acid rock drainage, blasting, and dewatering; changes to groundwater quality as a result of flooding at mine closure (Mine Site TSA); and changes caused by infiltration through water management features (Bromley Humps TSA).

During mining operations, the interaction of groundwater with waste rock backfill is the dominant effect on Groundwater Quality. At closure, a hydraulic bulkhead will be constructed in the lower access ramp, and pumps and drains will be shut off to allow re-flooding of the mine. Groundwater and water infiltrating through unflooded portions of the mine will mix with water in the re-flooded mine pool, which will contain soluble oxidation products generated during mine operations. The TMF will be lined but some seepage of tailings process water into groundwater is expected to occur due to potential imperfections

in the liner. The TMF seepage will have significantly elevated concentrations compared to baseline groundwater concentrations.

Key mitigation approaches involve minimizing potential changes to Groundwater Quality as a result of ML/ARD during blasting, dewatering, and flooding of the underground mine. These include cementing some of the waste rock, mixing talus with lime to reduce metals and acidity loading from the backfill, restricting the use of uncemented waste rock backfill in the upper levels of the mine to limit metal loadings, and ultimately, installation of a hydraulic bulkhead to allow the mine to flood at closure – which will greatly limit the rates of ML/ARD from the backfilled mine

To limit seepage, the TMF will be fully lined and on closure it will be capped; these measures will limit infiltration and ingress of oxygen, and limit acidic conditions and release of sulphate and metals during the re-flooding period.

After mitigation measures are implemented, two residual effects are expected:

- Changes to Groundwater Quality as a result of ML/ARD, blasting, and dewatering (Mine Site TSA): effect of backfill on Groundwater Quality during Construction and Operation; and

- Changes to Groundwater Quality as a result of flooding (Mine Site TSA): effect of backfill on Groundwater Quality during Closure and Reclamation and Post-Closure.

The magnitude of the effect from ML/ARD, blasting and dewatering is considered low for all parameters except cadmium, which exceeds BC Contaminated Sites Regulation (CSR) standards for freshwater aquatic life. Overall, the magnitude for this effect was rated as moderate.

The magnitude of the effect to Groundwater Quality due to flooding was rated as moderate for alkalinity, calcium, cobalt, magnesium, manganese, mercury, and selenium, and rated high for cadmium and chromium. Overall, the magnitude for this effect was rated as high.

Of the two residual effects, only the interaction between groundwater and the mine backfill is considered to have the potential for cumulative effects.

The Bitter Creek Hydro Project, which is a proposed future project in close proximity to the Project, is not expected to have any effect on Groundwater Quality and thus the residual cumulative effects assessment is the same as the residual effects assessment conducted for the Project alone.

7.6 Hydrology Effects Assessment

Hydrology describes the movement of water in relation to land and is an aspect of the environment that may be altered by the Project. Hydrology was selected as a VC as it will provide an understanding of the change in flow regime from the Project footprint. Hydrology is linked to other components of the aquatic environment including

Hydrogeology, Groundwater Quality, Surface Water Quality, Fish and Fish Habitat, and Aquatic Resources.

7.6.1 Setting

Hydrology effects were assessed for a LSA and RSA. The LSA encompasses the Project footprint and extends to include an area where there is potential for adverse effects to occur. It corresponds to the Bitter Creek watershed up to the glacial extent and includes Goldslide and Otter creeks. The RSA is a larger area in which Project-related effects could occur, and corresponds to the Bitter Creek watershed including the glacial extent, the Bear River watershed, from American Creek to Stewart, and the northern end of the Portland Canal.

Baseline surface water quantities in the Project area have been characterized from historical data, local meteorological and hydrometric stations that were established as monitoring locations in the summer of 2014, and are supported by regional climatic and hydrometric data analysis.

The hydrology for the LSA can be represented by two runoff models: (1) Bitter-Otter for watersheds with more than 10% glacial cover (i.e., all creeks except for Goldslide) and (2) Goldslide for watersheds with less than 10% glacial cover (i.e., Goldslide Creek only). The mean annual runoff (MAR) for Bitter and Otter Creeks is 2,828 mm/yr and the MAR for Goldslide Creek is 1,555 mm/yr.

For glacially-influenced watersheds like Bitter and Otter Creeks, the peak flow is during July due to glacial melt. For watersheds that are not glacially-influenced like Goldslide Creek, the peak flow is in June due to freshet.

7.6.2 Assessment

The Project will influence the area's hydrology throughout the 22-year life of the mine, and will extend beyond the Post-Closure Phase.

Sources of information for the Hydrology assessment include baseline hydrometric and meteorological data, recent monitoring data, regional meteorological records, climatic and hydrologic modelling, and technical reports.

The primary measurement indicators used for the assessment are average annual flows, average monthly flows, peak flows, low flows, and base flows for Bitter Creek, Otter Creek, and Goldslide Creek. Assessment endpoints are maintenance of the quantity of stream flows in the receiving environment, and maintenance of other VCs that are influenced by Hydrology.

Potential Project effects on Hydrology include changes to surface characteristics and surface water flow, changes to stream flows from water withdrawal, and changes to stream flows due to water discharge.

Key mitigation measures to reduce or avoid these effects include constructing site water management infrastructure, limiting water withdrawal to no more than 10% of stream flows, and matching water discharge from the TMF to the receiving environment hydrographic rates.

The TMF will be fully lined and will be covered during the Closure and Reclamation Phase to reduce infiltration through the tailings and restoring flows to the environment. The Process Plant will use water reclaimed from the TMF, reducing the need for water from local natural surface waters. A bulkhead will be constructed on the mine at closure to limit water discharges.

During all Project phases, clean, non-contact water will be diverted away from Project infrastructure to maintain water quality and natural drainage as much as possible. Water discharge from the TMF will match the receiving environment hydrograph to the extent possible. Water withdrawal will follow standard best practices and provincial regulatory requirements in order to avoid adverse impacts to fish, fish habitat, and stream flows.

Following mitigation measures, one potential residual effect was identified. Changes to stream flows from water discharge are predicted during the Construction, Operation, Closure and Reclamation, and Post-Closure Phases. Contributions include discharges from the underground mine, from the TMF, and flows of mine contact water during and after closure of the mine.

Residual effects analyses using modelled flow results predicted that flow decreases from baseline conditions would occur in one month during the Construction Phase at Goldslide Creek, and during the Construction and Operation Phases for Bear River and Bitter and Rio Blanco creeks. Flow increases from summer high flow conditions were predicted during the Operation and Post-Closure Phases for Goldslide and Rio Blanco creeks and during the Post-Closure Phase for Bitter Creek and Bear River.

The conclusion of the assessment on Hydrology is Not Significant as the magnitude of the residual effect was considered to be negligible outside of the mine LSA as changes in flows to Bitter Creek and Bear River are predicted to be within -10% to +5% of baseline flows.

One other project that could contribute to cumulative effects on Hydrology is the proposed Bitter Creek Hydroelectric Project, which will involve construction of an intake and diversion structure in the Bitter Creek valley. As the Bitter Creek Hydro Project is predicted to have negligible effects on hydrology, the residual cumulative effect from the Red Mountain Project is considered to be Not Significant.

7.7 Surface Water Quality Effects Assessment

Surface Water Quality is an aspect of the environment that may be altered by the Project. Surface Water Quality is a VC that may have an effect on other identified VCs, such as Sediment Quality, Aquatic Resources, Fish and Fish Habitat, Wildlife and Human Health.

7.7.1 Setting

The Project is located in a relatively remote area, and is characterized by rugged, steep terrain with weather conditions typical of the northern coastal mountains.

The LSA for the Surface Water Quality Effects Assessment was selected to encompass the zone of influence of the Project, and includes the Bitter Creek watershed up to the Bromley glacier. The RSA surrounds the LSA, and also covers portions of the Bear River watershed, from American Creek to Stewart and the northern end of the Portland Canal.

Surface Water Quality sampling has been completed in the watercourses in the Project area since 1990, with the more recent baseline program completed between 2014 and 2017 (and ongoing). Suspended sediment is elevated in Bitter Creek due to the presence of Bromley Glacier in the headwaters. Elevated background concentrations of some metals are evident in the Bitter Creek, Goldslide Creek, and Bear River receiving environments as well as in the reference sites in Roosevelt Creek, Otter Creek and American Creek.

7.7.2 Assessment

The primary measurement indicators for Surface Water Quality are: a change in parameter concentrations compared to baseline (background), and provincial and/or federal guidelines for freshwater aquatic life.

Effects on Surface Water Quality were generally discussed for three Project areas: the Mine Site (underground mine and portals), Bromley Humps (Process Plant, supporting infrastructure and TMF), and the Access and Haul Roads.

Effects from the Access Road and Haul Road are generally from road runoff during the Construction and Operation Phases. Effects from the Mine Site are from the dewatering of the underground mine and the subsequent discharge into Goldslide Creek. Effects from Bromley Humps area are primarily from construction activities of the mine infrastructure and discharge of water from the TMF into Bitter Creek. A Water Treatment Plant will be brought to site to treat the water to federal requirements prior to release to the Bitter Creek receiving environment.

Key Surface Water Quality mitigation measures rely on design mitigation, BMPs and monitoring, and are primarily focused on the collection of all contact water for monitoring and treatment (if required) before release to the aquatic environment. Other measures include:

- Diverting non-contact water to the natural environment so that it does not mix with contact water;
- Limiting instream works and their duration to minimize erosion and sedimentation in watercourses;
- Intercepting seepage from the TMF and pumping it back to the TMF;

- Covering the TMF at closure to keep runoff clean; and
- Employing dust suppression measures to minimize aerial deposition and runoff into nearby watercourses.

Mitigation measures typically minimize the change in Surface Water Quality rather than eliminate it. Therefore, a residual effect will occur, resulting in measurable changes in Surface Water Quality concentrations during the Project's Operation, Closure and Reclamation, and Post-Closure Phases. All residual effects were concluded to be Not Significant as the magnitude of residual effects is expected to be low to moderate .

There is the potential for the Project and the proposed Bitter Creek Hydro Project to cumulatively affect Surface Water Quality. Although the Bitter Creek Hydro Project remains very early stage and in a proposal only, the Cumulative effects, should it proceed, are predicted to be of low to moderate magnitude, reversible, and affect a discrete geographical extent within the LSA. All cumulative residual effects were concluded to be Not Significant.

The Aquatic Effects Management and Response Plan (AEMRP), in conjunction with several other management plans, has been developed to monitor the effects of the Project on aquatic ecosystem components, and to confirm the predictions of the Application/EIS effects assessments. Monitoring will also assess the efficacy of the implemented mitigation measures, and ensure regulatory compliance. In the event that original predictions of effects and mitigation effectiveness are not as expected, adaptive management principles and strategies will be implemented.

7.8 Sediment Quality Effects Assessment

Sediment Quality is an aspect of the environment that may be altered by the Project. Sediment Quality is a VC that may an influence on other identified VCs, such as Aquatic Resources, and Fish and Fish Habitat.

7.8.1 Setting

The Project is located in a relatively remote area, and is characterized by rugged, steep terrain with weather conditions typical of the northern coastal mountains.

The LSA for the Sediment Quality Effects Assessment was selected to encompass the zone of influence of the Project, and includes the Bitter Creek watershed up to the Bromley Glacier. The RSA surrounds the LSA, and also covers portions of the Bear River watershed, from American Creek to Stewart and the northern end of the Portland Canal.

Recent baseline sampling of Sediment Quality has been completed in watercourses in the Project area in 2014 and 2016. Elevated background concentrations of some metals are evident in the Bitter Creek, Goldslide Creek, and Bear River receiving environments as well as in the reference sites in Otter Creek and American Creek.

7.8.2 Assessment

The primary measurement indicators for Sediment Quality are: a change in parameter concentrations compared provincial and/or federal guidelines for freshwater aquatic life.

Effects on Sediment Quality were generally discussed for three Project areas: the Mine Site (underground mine and portals), Bromley Humps (Process Plant, supporting infrastructure and TMF), and the Access and Haul Roads.

Effects from the Access Road and Haul Road are generally from road runoff during the Construction and Operation Phases. Effects from the Mine Site are from the dewatering of the underground mine and the subsequent discharge into Goldslide Creek. Effects from Bromley Humps area are primarily from construction activities of the mine infrastructure and discharge of water from the TMF into Bitter Creek. A Water Treatment Plant will be constructed on-site to treat the water to federal requirements prior to release to the Bitter Creek receiving environment.

Key Sediment Quality mitigation measures rely on design mitigation, BMPs, and monitoring and are primarily focused minimizing the potential for erosion in runoff and on the collection of all contact water for monitoring and treatment (if required) before release to the aquatic environment. Other measures include:

- Diverting non-contact water to the natural environment so that it does not mix with contact water;
- Limiting instream works and their duration to minimize erosion and sedimentation in watercourses; and
- Employing dust suppression measures to minimize aerial deposition and runoff into nearby watercourses.

Mitigation measures typically minimize the change in Sediment Quality rather than eliminate it. Therefore, a residual effect will occur, resulting in measurable changes in Sediment Quality concentrations during the Project's Operation, Closure and Reclamation and Post-Closure Phases. All residual effects were concluded to be Not Significant as the magnitude of residual effects is expected to be low, restricted to the LSA, and although likely irreversible, Sediment Quality in the Project watercourses have high natural resilience to changes in water chemistry.

There is the potential for the Project and the proposed Bitter Creek Hydro Project to cumulatively affect Sediment Quality. Cumulative effects are predicted to be of low magnitude, reversible, and affect a discrete geographical extent within the LSA. All cumulative residual effects were concluded to be Not Significant.

The Aquatic Effects Management and Response Plan, in conjunction with several other management plans, has been developed to monitor the effects of the Project on aquatic ecosystem components, and to confirm the predictions of the Application/EIS effects assessments. Monitoring will also assess the efficacy of the implemented mitigation

measures, and ensure regulatory compliance. In the event that original predictions of effects and mitigation effectiveness are not as expected, adaptive management principles and strategies will be implemented.

7.9 Vegetation and Ecosystems Effects Assessment

Vegetation and Ecosystems are aspects of the environment that may be altered by the proposed Project. The Vegetation and Ecosystems VCs included in the assessment are:

- Ecologically Valuable soils;
- Alpine and Parkland Ecosystems;
- Old Growth and Mature Forested Ecosystems;
- Floodplain and Wetland Ecosystems;
- BC CDC-listed Ecosystems; and
- Rare Plants, Lichens, and Associated Habitat.

The Vegetation and Ecosystems VCs are linked to Terrain and Soils, Wildlife and Wildlife Habitat, Fish and Fish Habitat, Air Quality, and Aboriginal interests of TSKLH, MNBC, and Nisga'a Nation.

7.9.1 Setting

Vegetation and Ecosystem effects were assessed for a LSA, RSA, and PFSA.

The LSA was established to provide a study area boundary for assessing the effects of the Project at the local watershed level and encompasses the full extent of the Bitter Creek watershed, including the height of the land surrounding Bitter Creek, the Roosevelt Creek drainage, and part of Bromley Glacier. The LSA is 15,860 hectares (ha) in size.

The RSA includes the Project and extends to the height of land of several watersheds within the region. The RSA boundary provides context for the type, distribution, extent, and prevalence of ecosystems within the region and takes into consideration the predicted habitat of select wildlife, such as grizzly bears, mountain goats, martens, and wolverine, over a season and/or over a lifetime. The RSA is 211,570 ha in size.

The PFSA comprises the area in which development of temporary and permanent infrastructure is expected to occur. The 247 ha of the PFSA includes the Mine Site (48 ha); Access Road (35 ha); Powerline (27 ha); Tailings Management Facility (48 ha); Process Plant (9 ha); and quarries, borrows, and stockpiles (81 ha). The PFSA includes a 150-metre buffer consisting of an additional 714 ha outside the Project footprint to allow for assessment of impacts including dust effects.

7.9.2 Assessment

The Project will interact with Ecologically Valuable Soils, Alpine and Parkland Ecosystems, Floodplain and Wetland Ecosystems, BC CDC-listed ecosystems, and Rare Plants, Lichens and

Associated Habitat during the Construction, Operation, Closure and Reclamation, and Post-Closure phases of the Project.

Potential effects of Project interactions with Vegetation and Ecosystems include:

- Loss and alteration of soil quality and quantity through soil stripping, handling, stockpiling, and dust effects;
- Loss of ecosystem function, abundance, and/or distribution through surface clearing;
- Alteration of ecosystem function through edge effects and fragmentation, alteration of hydrological connectivity; dust effects, and introduction and/or spread of invasive plant species;
- Loss of known occurrences of rare plant and/or lichen habitat through surface clearing; and
- Alteration of rare plant/lichen habitat edge effects and fragmentation, alteration of hydrological connectivity;
- Dust effects; and
- Introduction and/or spread of invasive plant species.

Mitigation approaches were focused on reducing or avoiding disturbance of ecosystems, including Wetland and Floodplain Ecosystems, Alpine and Parkland ecosystems, Old Growth and Mature Forested Ecosystems, and Rare Plants, Lichens, and Associated Habitat. Some of these measures include:

- Implementing ecosystem-based revegetation and progressive reclamation promptly to minimize erosion potential and to facilitate initiation of successional ecological processes;
- Developing soil-handling procedures specific to alpine and parkland soils;
- Conducting construction activities to ensure minimal risk to Old Growth and Mature Forested Ecosystem wildlife habitat during sensitive periods;
- Avoiding surface disturbance in areas with known rare plant and lichen populations and avoiding use of all herbicide sprays within 200 m of rare plant and lichen populations;
- Surveying and removing existing invasive plant populations to prevent the spread to adjacent areas;
- Reducing effects to terrestrial ecosystems that depend on hydrological connectivity and flow through management by ensuring free passage of water through fill materials; and
- Ensuring that setback and buffer distances from surface water bodies and riparian features are implemented and maintained.

Potential residual effects include:

- Loss and degradation of Ecologically Valuable Soils due to fugitive dust, declining stockpile soil quality, compaction, erosion, degradation of soil structure due to soil handling, and changes in soil moisture and nutrient regimes within reclaimed soils. Approximately 580 ha of Ecologically Valuable Soils may be subject to degradation, mainly due to fugitive dust. The amount of Ecologically Valuable Soils predicted to be permanently lost is 139.5 ha;

- Loss of Alpine and Parkland Ecosystems and Old Growth and Mature Forested Ecosystems because of the time required to restore ecosystem function and extent to a level similar to that of baseline conditions;

- Loss of BC CDC-listed ecosystems (Blue-listed) due to clearing activities associated with construction; and

- Loss of Rare Plants and Lichens due to clearing activities at he proposed Process Plant and Access and Haul Roads.

The effects on Ecologically Valuable Soils are expected to last more than 22 years as the soils under the footprint of roads and infrastructure remaining after Closure will be permanently lost. These effects are limited in nature, occurring within and adjacent to proposed infrastructure.

Loss of Alpine and Parkland Ecosystems is considered to be of moderate magnitude and are concluded to be Not Significant as Project effects are limited, occurring within and immediately adjacent to the footprint of the Haul Road and Quarry. Loss of Old Growth and Mature Forested Ecosystems is considered to be of high magnitude but Not Significant. The Project is not expected to result in considerable changes to the distribution, abundance, or function of ecosystems or the ecological conditions that support Old Growth and Mature Forested Ecosystems within the LSA.

The magnitude of loss of BC CDC-listed Ecosystems ranges from negligible to high depending on the specific effect. Residual effects occur predominantly within the footprint and adjacent areas of the Quarry, Borrow and Access Road. The effect is concluded as Not Significant based on the extent of loss, the discrete nature of the effect, and the absence of guidelines or threshold values.

The magnitude of potential loss or alteration of rare mosses, lichens, vascular plants and liverworts, and their habitat ranges from negligible to high depending on the final design and activities of the Project and on the effectiveness of prevention measures.

Past, present, and potential projects and activities occurring in the RSA have the potential to cause cumulative effects on Vegetation and Ecosystems affected by the Project.

Cumulative effects on rare plants and lichens are not expected to occur as there is no overlap between the relevant species and projects within the RSA.

Cumulative effects on Ecologically Valuable Soils are considered to be Not Significant as effects are not expected to influence the ecological conditions of other VCs. Cumulative effects on Alpine and Parkland Ecosystems are considered Not Significant as they are not expected to influence ecological conditions that support alpine and parkland vegetation. Cumulative effects on Old Growth and Mature Forested Ecosystems are considered Not Significant as effects fall within a range of natural variation that could be remediated over time. Cumulative effects on two BC CDC-listed Ecosystems are considered Not Significant: the CD listed ecosystem in the RSA occurs in 13 BEC subzones across a large geographic area and represents only about 2% of the known provincial abundance. The SS-listed ecosystem will be affected mainly along Highway 37A, where dust impacts are lower than would occur on forest roads. There is no information available to determine how the Project will affect the ecosystem province-wide.

7.10 Wildlife and Wildlife Habitat Effects Assessment

7.10.1 Setting

Individual wildlife species were selected as Valued Components (VCs) for the Project because of their potential for interactions with the Project. Project interactions considered spatial or temporal overlap with project activities, legislative or regulatory requirements (e.g., species at risk), and consultation with the public, Aboriginal Groups, government agencies, and other stakeholders. Selected Wildlife VCs included Mountain Goat, Grizzly Bear, Moose, Furbearers, Hoary Marmot, Bats, Migratory Breeding Birds, Migratory Bird Species at Risk, Raptors, Non-Migratory Game Birds, and Amphibians.

In gathering data to support an effects assessment, IDM assessed existing data, conducted surveys to complete required baseline data, and compiled all data that was relevant to the effects assessment for this Project. Knowledge of existing conditions within the Project area was augmented through field investigations conducted from 2015 to 2017. Field surveys were conducted based on provincial inventory standard protocols and other published documents pertaining to data collection and analysis methods. Depending on the focal species, field surveys were conducted included species-specific and opportunistic surveys using a combination of ground and aerial methods. Field investigations were primarily focused on the LSA for all Wildlife VCs with the exception of Mountain Goat. Aerial surveys were conducted in the RSA for Mountain Goat in summer 2016 and March 2017.

Habitat suitability models were developed to describe distribution and availability of suitable habitats. Habitat modeling was used to assess potential Project effects on identified Wildlife VCs within the regional study area. Habitat models were developed for all Wildlife VCs following the provincial standard for wildlife habitat ratings and were based on Terrestrial Ecosystem Mapping (TEM) in the LSA and Predictive Ecosystem Mapping (PEM) in the RSA. PEM and TEM mapping was completed as part of baseline studies for the Project and is also used in the vegetation analysis in Chapter 15, Volume 3 of this Application/EIS. The Vegetation and Ecosystems VC was one of several pathways identified for the Wildlife VCs. Wildlife habitat ratings that were based on Vegetation and Ecosystems forms the main basis for the Wildlife effects assessment. In total, wildlife habitat ratings were completed for 19 species and four guilds of migratory bird habitat.

Habitat modelling results were validated by field survey findings within the study areas. Alpine areas provided suitable habitat for Mountain Goat, Grizzly Bear, Hoary Marmot, and Non-Migratory Game Birds. Low elevation areas within Bitter Creek valley were primarily forested providing suitable habitat for Furbearers, Grizzly Bear, Bats, Migratory Breeding Birds, Migratory Bird Species at Risk, and Raptors. Lake, wetland, and riparian habitat were limited within LSA. The only lake within the LSA was Clements Lake, situated at the northwest corner of the LSA near the confluence of Bitter Creek and Bear River. Few wetlands exist beyond the margins of Clements Lake and the floodplains of Bitter Creek.

7.10.2 Assessment

The assessment considered potential Project-related effects on habitat availability, habitat distribution, mortality, chemical hazards, and attractants. Potential effects on habitat availability included those occurring through direct habitat loss or alteration as well as sensory disturbances (e.g., noise). Habitat distribution included disruption to movement on habitat connectivity by creating physical or sensory barriers or filters to movement between daily or seasonal habitats. Mortality included the potential direct effects of Project activities and infrastructure on wildlife mortality and potential effects of entrapment in Project facilities. Indirect mortality included the potential indirect effects of Project activities and infrastructure on wildlife mortality caused by increased hunting pressure due to improved access or new travel corridors that may facilitate predator access. Chemical hazards included the potential effects of any Project-related chemicals that may cause adverse health effects on Wildlife VCs. Attractants included the potential effects of any Project-related features or materials that may interest or provide resources for Wildlife VCs, which could lead to behavioral changes and potential human-wildlife conflicts.

Numerous mitigation measures were used to reduce potential effects on wildlife and wildlife habitat. These measures followed the provincial mitigation hierarchy (i.e., avoid, minimize, restore and offset) and all feasibly practicable measures have been considered and applied prior to moving to the next level. Many mitigation measures were implemented during the planning stages of the project. These included project design such as site and route selection, selection of best available technologies to-date for project infrastructure and mining equipment, and a commitment to progressive reclamation. Other mitigation strategies focus on the implementation of widely recognized Best Management Practices (BMPs) and development of procedural mitigation measures. These include a wildlife education program and wildlife protection measures designed to minimize disturbance; reduce barriers; prevent entrapment; and manage vehicle traffic, chemicals and attractants.

The potential effects habitat availability, habitat distribution, and mortality risk were predicted as residual effects within the assessment. All residual effects were concluded as Not Significant. In general, residual effects were expected to be low to moderate in magnitude and occurring at either a discrete or local level. Residual effects were identified as being mainly long-term in duration, occurring from Construction to Post-Closure Phases, and primarily as reversible or partially reversible. Confidence in the effects assessment was high or moderate.

A cumulative effects assessment was conducted for Wildlife VCs where residual effects were predicted. The cumulative effects assessment considered past projects such as Highway

37A, Stewart Bulk Terminal and World Port, and Long Lake Hydro Project. Past, present and future forestry activities, mineral exploration, parks and protected areas, and recreational/commercial/subsistence harvest were also included. Bitter Creek Hydro project was the only reasonably foreseeable future project with potential to interact with the project effects. Three effects, habitat availability, habitat distribution, and mortality were predicted as residual cumulative effects within the assessment. All were concluded as Not Significant. Residual cumulative effects were expected to be low to moderate in magnitude within the regional study area. Residual cumulative effects were identified as being long-term in duration, occurring from Construction through Post-Closure Phases, and primarily as reversible or partially reversible. Confidence in the assessment was moderate and high.

The Wildlife Management Plan (WMP), in conjunction with several other management plans, has been developed to minimize potential effects on wildlife and wildlife habitat as a result of interactions with Project components or activities. While describing mitigation strategies in detail, the WMP also outlines the development of monitoring programs to evaluate certain environmental assessment predictions and assess effectiveness of mitigation measures, and supports an adaptive management approach to mitigating potential effects resulting from the Project. Monitoring programs are intended to assess the effectiveness of the mitigation and to detect unanticipated effects. The information from the monitoring program will be used to guide adaptive management protocols. In the event that original predictions of effects and mitigation effectiveness are not as expected, adaptive management principles and strategies will be implemented.

7.11 Aquatic Resources Effects Assessment

The Aquatic Resources VC, represented by periphyton and benthic invertebrates, are components of the environment that may be altered by the Project. Aquatic Resources are important in the aquatic food web, namely as food sources for high trophic levels (e.g., fish and birds), their usefulness as indicators of overall aquatic health, and their inherent value.

7.11.1 Setting

The Project is located in a relatively remote area, and is characterized by rugged, steep terrain with weather conditions typical of the northern coastal mountains.

The LSA for the Aquatic Resources Effects Assessment was selected to encompass the zone of influence of the Project, and includes the Bitter Creek watershed up to the Bromley Glacier. The RSA surrounds the LSA, and also covers portions of the Bear River watershed, from American Creek to Stewart and the northern end of the Portland Canal.

Recent (2014 to 2016) baseline studies found that the dominant taxa within the Bitter Creek watershed are comprised of organisms from the order Plecoptera. Goldslide Creek was shown to support high benthic invertebrate abundance (thousands of individuals in the baseline samples), compared to mainstem Bitter Creek (typically less than a hundred individuals per sample). Bear River and American Creek benthic invertebrate samples also had abundance in the range of hundreds, rather than thousands, of organisms per sample.

Generally, periphyton samples were composed of taxa that thrive in clean, cool, and fast-flowing water.

7.11.2 Assessment

The primary measurement indicators for Aquatic Resources are: Abundance and diversity of periphyton and benthic invertebrates, water quality, sediment quality, and hydrology (flows and flow timing).

Potential effects were identified based on key interactions between the project and Aquatic Resources. The potential effects were assessed from habitat loss, changes in surface water quality, sediment quality and streamflows, and blasting activities.

Habitat loss and direct mortality of benthic invertebrates is anticipated under the TMF, at road crossings, and in Bitter Creek where the Access Road will encroach on the stream channel. Changes from sediment and surface water quality are primarily limited to exceedance of provincial and/or federal guidelines of parameters in Goldslide Creek. Changes in streamflows are also limited to Goldslide Creek during the winter period.

Key Aquatic Resources mitigation rely on design mitigation, BMPs and monitoring, and are primarily focused minimizing the potential for erosion in runoff and on the collection of all contact water for monitoring and treatment (if required) before release to the aquatic environment. Other measures include:

- Diverting non-contact water to the natural environment so that it does not mix with contact water;
- Minimizing footprint of disturbance from mine infrastructure;
- Matching, to the extent possible, the discharge from the TMF to the receiving environment hydrograph;
- Limiting instream works and their duration to minimize erosion and sedimentation in watercourses; and
- Employing dust suppression measures to minimize aerial deposition and runoff into nearby watercourses.

Mitigation measures typically minimizes the effects to Aquatic Resources rather than eliminate it. Therefore, a residual effect will occur, resulting in measurable changes in Aquatic Resources abundance and diversity during the Project's Construction, Operation, Closure and Reclamation, and Post-Closure Phases. The magnitude of residual effects is expected to be low to moderate, with discrete or local extent and partially reversible. All residual effects were concluded to be Not Significant.

There is the potential for the Project and the proposed Bitter Creek Hydro Project to cumulatively affect Aquatic Resources. Cumulative effects are predicted to be of low magnitude, partially reversible, and affect a discrete geographical extent within the LSA. All cumulative residual effects were concluded to be Not Significant.

The Aquatic Effects Management and Response Plan, in conjunction with several other management plans, has been developed to monitor the effects of the Project on aquatic ecosystem components, and to confirm the predictions of the Application/EIS effects assessments. Monitoring will also assess the efficacy of the implemented mitigation measures, and ensure regulatory compliance. In the event that original predictions of effects and mitigation effectiveness are not as expected, adaptive management principles and strategies will be implemented.

7.12 Fish and Fish Habitat Effects Assessment

Fish and Fish Habitat are components of the environment that may be altered by the Project. Rationale for selection of this VC include the importance of fish to the Nisga'a, the role of fish in the aquatic food-web, their potential as a food sources for humans and wildlife, and federal and provincial requirements. The Fish and Fish Habitat V is represented by the following species found within the Project area: Dolly Varden (*Salvelinus malma*), Bull Trout (*Salvelinus malma*), Eulachon (*Thaleichthys pacificus*), and Salmonid Species (*Oncorhynchus* spp.).

7.12.1 Setting

The Project is located in a relatively remote area, and is characterized by rugged, steep terrain with weather conditions typical of the northern coastal mountains.

The LSA for the Fish and Fish Habitat Effects Assessment was selected to encompass the zone of influence of the Project, and includes the Bitter Creek watershed up to the Bromley Glacier. The RSA surrounds the LSA, and also covers portions of the Bear River watershed, from American Creek to Stewart and the northern end of the Portland Canal.

Recent (2014 to 2016) baseline studies indicate Dolly Varden are present in Bitter Creek. Their distribution covers the entire fish-bearing section of Bitter Creek. Coastrange sculpin have been documented in Bitter Creek near the mouth. Bear River has a much more diverse fish community, with salmon species (Coho, Chinook, Chum, and Pink salmon), Steelhead/Rainbow Trout, Dolly Varden, Eulachon, and Coastrange Sculpin. Bitter Creek is a confined, heavily turbid mainstem comprising predominantly strong riffle habitat through steep valleys. Bitter Creek is fish bearing up to the first of seven physical barriers, located 13.8 km upstream from the confluence with Bear River. Bitter Creek has multiple tributaries, two of which are fish bearing within the lower reaches: Hartley Gulch and Roosevelt Creek.

7.12.2 Assessment

The primary measurement indicators for Fish are: habitat loss and alteration, fish species presence or absence; fish population metrics; growth, survival, and reproduction of fish, and water quality. The primary measurement indicators for Fish Habitat are: water quality; flows and flow timing; sediment quality; periphyton and benthic invertebrate community metrics; and channel morphology.

Potential effects were identified based on key interactions between the Project and Fish and Fish Habitat. The potential effects were assessed from habitat loss, increased fishing pressure, changes in aquatic resources, surface water quality, sediment quality and streamflows, and blasting activities.

Key Fish and Fish Habitat mitigation rely on design mitigation, BMPs and monitoring, and are primarily focused on minimizing the potential for erosion in runoff and on the collection of all contact water for monitoring and treatment (if required) before release to the aquatic environment. Other measures include:

- Diverting non-contact water to the natural environment so that it does not mix with contact water;
- Matching, to the extent possible, the discharge from the TMF to the receiving environment hydrograph;
- Limiting instream works and their duration to minimize erosion and sedimentation in watercourses; and
- Employing dust suppression measures to minimize aerial deposition and runoff into nearby watercourses.

Mitigation measures typically minimize the effects to Fish and Fish Habitat rather than eliminate it. Therefore, a residual effect will occur, resulting in measurable changes in Fish and Fish Habitat during the Project's Construction, Operation, Closure and Reclamation, and Post-Closure Phases.

Fish Habitat loss is expected along a short section of the Access Road that will be placed within the Bitter Creek high water mark. Effects are concluded to be Not Significant as the magnitude is low, restricted to a discrete area, and is a one-time loss of habitat.

Residual effects from changes in Surface Water Quality are expected in Bitter Creek; no residual effects are predicted in Bear River. This effect was concluded to be Not Significant, because potential effects on Fish (Dolly Varden) will be localized and have no far-reaching effects on regional productivity or diversity. The effect is low in magnitude, non-continuous and reversible.

Changes in streamflow are predicted in Bitter Creek during the winter period. This effect was concluded to be Not Significant; any effects on Fish (Dolly Varden) will be localized and have no far-reaching effects on regional productivity or diversity. The effect is also low in magnitude, seasonal (winter only), short-term (operations), and reversible.

There are no anticipated interactions between the Fish and Fish Habitat residual effects and reasonably foreseeable future projects and activities, therefore there are no cumulative effects.

The Aquatic Effects Management and Response Plan, in conjunction with several other management plans, has been developed to monitor the effects of the Project on aquatic ecosystem components, and to confirm the predictions of the Application/EIS effects

assessments. Monitoring will also assess the efficacy of the implemented mitigation measures, and ensure regulatory compliance. In the event that original predictions of effects and mitigation effectiveness are not as expected, adaptive management principles and strategies will be implemented.

7.13 Economic Effects Assessment

The following is a summary of the effects assessment completed for Project-related Employment, Revenue to the Local Economy, Contemporary Land and Resource Use, and CRA Fisheries VCs / ICs.

7.13.1 Setting

The Project is located approximately 15 km northeast of Stewart, BC, a small (population 600), isolated, and resource-based town whose closest neighbour is Hyder, Alaska. The Project is within the RDKS and is approximately 100 km (measured directly) from the Nisga'a Villages in the Nass Valley. Both Stewart and the Nisga'a Villages are included in the LSA for the Economic Effects Assessment. The RSA for the Economic Effects Assessment coincides with the boundary of the RDKS, which includes Terrace. For the Contemporary Land and Resource Use and Commercial, Recreational, and Aboriginal (CRA) Fisheries VCs, the RSA boundary has been adjusted to reflect the input of the biophysical effects assessments on these economic VCs.

Of the more than 37,000 people who live in the RDKS, a third self-identify as Aboriginal (compared to about 6% provincially). The active labour force in the RDKS is 17,865 persons. While the labour participation rate for the RDKS at 60-65% is comparable to the province, under-employment in the region are both above provincial averages.

Average family income in the RSA hovers around 15% below the provincial average, while the percentage of the population receiving income assistance is about double that of the province. Approximately one-third of household incomes were dependent on forestry, mining, and fishing in 2005 compared to 11% for the province. Income data for the smaller communities in the LSA is typically suppressed for privacy reasons.

Resource industries drive the economy and employment in the region. Although only about 7% of the workforce in the RSA is directly employed in mining, forestry, oil and gas, or other primary activities, the indirect and induced employment that is a spin-off of the resource sector is substantial. Other important sectors include tourism and the public sector, which accounts for about a third of jobs in the RSA.

Guide outfitting and adventure tourism are important employers in northwest BC, building off the region's ample opportunities for traditional backcountry pursuits and more contemporary nature-based activities. In 2012, approximately 6,900 people were employed in the tourism sector in northern BC. Contemporary Land and Resource Use near the Bitter Creek valley includes trapping, guide outfitting, and heli-skiing. There are no commercial timber or fishing operations in the Bitter Creek valley.

7.13.2 Assessment

The economic effects of the Project are related primarily to Project employment, procurement of goods and services, and the influx of people (e.g., workers and, potentially, their families) associated with Project. Evaluation of the economic effects of the Project relied on a qualitative process supported by quantitative modeling provided by the BC Input Output Model. The model provides estimates of direct, indirect, and induced employment at provincial and regional scales, which provides a basis for estimating employment induced migration to or within the LSA and RSA.

During the scoping phase, selection of VC and ICs, and consideration of feedback generated through consultation and engagement with Working Group members, Nisga'a Nation, stakeholders, and the public, key potential interactions between proposed Project components or activities with the economy and economic features of the RSA and LSA were identified. The main drivers of economic effects due to Project components and activities are ultimately related to the influx of people and money into local and regional economies.

Two VCs and two ICs were identified for the Economic Effects Assessment: Project-related Employment, Revenue to the Local Economy, CRA Fisheries, and Contemporary Land and Resource Use. The results of the Economic Effects Assessment for each VC and IC are summarized here.

- Project-related Employment: The Project is anticipated to have net positive or beneficial effect on employment. Over the course of the 18-month Construction Phase, it is estimated that the Project will generate approximately 754 person-years (PY) of direct and indirect employment and a further 111 PY of induced employment. The Operation Phase is currently expected to generate 1476 PY of direct and indirect employment and a further 220 PY of induced employment. The Stewart area is estimated to benefit from a total of approximately 544 PY of direct employment or approximately 91 jobs per year. Direct and indirect Project-related employment, including jobs created by contractors and sub-contractors during Project construction and operations, will interact with the local and regional labour markets. Peak employment levels during construction will amount to less than 2% of the active RSA workforce. Average annual direct and indirect employment for the Project during operations will be approximately one percent of the active workforce in the RSA.

- Revenue to the Local Economy: Revenue to the Local Economy includes personal income in the form of wages and salaries, business revenue, and government tax revenues generated by Project spending on goods, services, and labour. The Project may positively affect median incomes within the RSA and LSA. The Project is expected to result in direct, indirect, and induced benefits to the economy as indicated by increased employment, growth in gross domestic product, business opportunities, and government tax revenues.

- Contemporary Land and Resource Use: No adverse effects are anticipated on Contemporary Land and Resource Use due to the small and limited footprint of the Project. Potential issues resulting through increased access to the Bitter Creek valley will be managed through the Access Management Plan.

- CRA Fisheries: No adverse effects are anticipated on CRA Fisheries. The Fish and Fish Habitat Effects Assessment found that there will be no significant adverse effects to Fish and Fish Habitat through changes in water quality, aquatic resources, and the health of fish. The potential for increased fishing pressure that may result from increased population in Stewart or as a result of increased accessibility to the Bitter Creek valley will be managed through the Access Management Plan and IDM's "no hunting/no fishing" policy.

Measures to avoid, minimize, mitigate, or otherwise address potential economic effects will be implemented, managed, and monitored through a variety of interrelated socio-economic management plans, including:

- Community Involvement Plan;
- Human Resources Plan;
- Local Procurement Plan;
- Skills, Training, and Employment Plan; and
- Social and Economic Management Plan.

In addition, IDM is committed ongoing dialogue with stakeholders and overlapping tenure holders to adaptively manage potential effects on their interests.

Residual adverse economic effects are concluded to be Not Significant as they are anticipated to be negligible, manageable, and likely offset by the beneficial economic effects of the Project. Therefore, a cumulative effects assessment has not been conducted.

7.14 Social Effects Assessment

The following is a summary of the effects assessment completed for Potential Social Issues related to the Project and the Project workforce, Social and Health Services, Housing, Infrastructure, Recreational Values, Project-related Traffic, and Visual Quality VCs / ICs. Although the effects assessment for Current Use of Land and Resources for Traditional Purposes (CULRTP) can also be found in the social effects assessment chapter of the Application / EIS (Volume 3, Chapter 20), in the Executive Summary this information is provided under Section 8.4, below.

7.14.1 Setting

The Project is located approximately 15 km northeast of Stewart, BC, a small (population 600), isolated, and resource-based town whose closest neighbour is Hyder, Alaska. The Project is within the RDKS and is approximately 100 km (measured directly) from the Nisga'a Villages in the Nass Valley. Both Stewart and the Nisga'a Villages are included in the LSA for the Social Effects Assessment. The RSA for the Social Effects Assessment coincides with the boundary of the RDKS, which includes Terrace. For the VC Social and Health Services, Terrace has also been included in the LSA to reflect the potential effect on services there.

The RDKS provides regional government services to approximately 36,000 residents within an area of approximately 100,000 km^2 in northwestern BC, including Terrace, District of

Kitimat, Stewart, Village of Hazelton, and District of New Hazelton as well as six Electoral Areas: A (Nass Valley, Meziadin), B (Hazeltons rural areas, Kispiox Valley, Moricetown through Cedarvale), D (Telegraph Creek, Iskut, Bob Quinn), E (Thornhill), F (Dease Lake), and C (Rural Terrace area, south coast) (Statistics Canada 2012).

Population in the RDKS has been steadily declining since the mid-1990s, having reached a peak of approximately 45,000 people in 1996. The RSA, in general terms, has a high proportion of working age people, low population growth, and an ageing workforce. A quarter of the population is below the age of 19 and approximately 10% is above the age of 65. The majority of the RDKS population is third generation Canadians with European ancestry. Approximately 4% of the population self-identifies as visible minorities, predominantly South Asian and Filipino. The RDKS also has a higher proportion of people who identify as Aboriginal compared to the province (34% of RDKS; 5.3% of Province).

The community of Stewart began to develop in 1902 during the gold rush and has a long history of weathering the up- and down-swings of resource development. Since 1990, the population of Stewart has fallen from 1,400 residents to 401 in 2016. The decline coincided with the closure of the Granduc and Premier mines in 1984 and 1998, respectively, and was slowed by an upturn in the forestry sector. The forestry sector waned after 1995, particularly with the closure of Skeena Cellulose in 2001.

Stewart is working to diversify its economy, which to-date includes tourism, logging, transportation, and mining. Local employment is often seasonal and associated with the tourism or resource industry. The largest employers in Stewart are Ascot Resources, Mountain Boy Minerals, Billabong Highway Maintenance, the King Edward Hotel, School District 82, Granmac Services, the Ripley Creek Hotel, and Arrow Transportation Systems Inc.

The Nisga'a Villages of Gitlaxt'aamiks, Gitwinksihlkw, Laxgalts'ap, and Gingolx are also included in the LSA. Nisga'a Nation consists of approximately 6,066 members, almost 2,050 of whom reside in one of the four Nisga'a Villages located within Nisga'a Lands, along the Nass River. Nisga'a citizens also live in Terrace, Prince Rupert/Port Edward, Vancouver, and elsewhere.

Terrace is the largest and closest service centre for the LSA communities and is considered part of the LSA for the discussion on Social and Health Services. In 2016, the population of Terrace was 15,000 people, which grew from a small sawmill community of 350 people in 1951. The city has developed into a strategic regional centre for business, retail, medical, and government services and has a developed transportation network including air, sea, railways, and roadways. Terrace is located on a key freight corridor at the junction of three highways: Highway 16 (Yellowhead Highway), Highway 37 (Stewart-Cassiar Highway), and Highway 113 (the Nisga'a Highway).

In general, Stewart, Terrace, and the Nisga'a Villages meet or are below provincial averages for health indicators and educational attainment.

7.14.2 Assessment

The potential social effects of the Project are primarily related to Project employment, procurement of goods and services, and the influx of people (e.g., workers and, potentially, their families, and induced migration) associated with the Project. In addition, visual disturbances to the landscape or changes in fish and fish habitat may detract from Stewart and Bear Valley recreational values. The Social Effects Assessment is based on consideration of potential interaction of Project activities and components with social VCs and ICs informed by research that has examined *ex post* the social effects of other mining projects, including both theoretical and case-based research. The Social Effects Assessments provides a narrative to explore how individuals, families, and communities might react to, perceive, or experience change in relation to Project activities and components.

During the scoping phase, selection of VCs and ICs, and consideration of feedback generated through consultation and engagement with Working Group members, Nisga'a Nation, stakeholders, and the public, key potential interactions between proposed Project components or activities with the social features of the RSA and LSA were identified. The main drivers of social effects due to the proposed Project components and activities are population in-migration, employment and income, and changes in view-scape or the environment.

Five VCs and two ICs were identified for the Social Effects Assessment, and the results of the Social Effects Assessment for each VC and IC are summarized here.

- Potential Social Issues related to the Project and the Project workforce: Due to the nature of the resource-based economy in the LSA, the social issues commonly associated with mining projects are already present. IDM intends to work closely with Stewart, Nisga'a Nation, Northern Health, and stakeholders to minimize, monitor, and manage the potential social issues related to the Project's workforce. During Project Construction, this will include policies and behaviour expectations for workers living in the construction-phase camp in Stewart. During operations, it is anticipated that most employees and their families will relocate to Stewart and become part of the Stewart community.

- Social and Health Services: The existing level of available social and health services in the LSA is low and increased demand on those services during the construction of the Project will require proactive and regular communication and management between IDM and service providers. During operations, it is anticipated that the increased number of residents in Stewart will increase the regulated per capita funding for social and health services. No adverse effects are anticipated on education services as the current school in Stewart has an excess of capacity to welcome new students.

- Housing: During the Construction Phase, potential Project effects are predicted to be minimal, as IDM will provide a camp with adequate capacity and ensure the work camp is in place prior to construction. IDM will work closely with Stewart to develop a housing plan with a comprehensive description of housing availability, quality, and affordability. In collaboration with the District, community groups, and the Ministry of Children and

Family Development consultant, IDM will determine Stewart's low-income and vulnerable population and ensure that plans address their specific needs.

- Infrastructure: The assessment of Stewart's infrastructure found that the water supply system is in need of repair but does have the capacity to support an increase in demand, while the solid waste landfills available are at capacity. The Project is anticipated to result in a positive effect on the water supply infrastructure as the increase in population and tax-base will facilitate repairs. IDM will also work with Stewart to achieve improvements in the system to attract and to retain workers and families to the town. Stewart and RDKS are in the midst of establishing options for waste disposal, and IDM will support the development of these options. Overall, no residual adverse effects are anticipated on Infrastructure in the LSA as a result of the Project.

- Recreational Values: Low to negligible effects are anticipated on Recreational Values within the LSA. IDM will work closely with Stewart, Tourism BC, and stakeholders to establish and promote recreational opportunities as a means of attracting tourist and permanent residents. An Access Management Plan will be developed to limit pressure on the natural resources due to improved access. This will include installation of a locked gate with appropriate signage and company policies prohibiting employees, contractors, and sub-contractors from entering the valley for any activities other than work-related.

- Project-related Traffic: Highway 37 (Kitwanga to Meziadin Junction) and Highway 37A (Meziadin Junction to Stewart) typically have low traffic volumes because of low population densities. The average annual daily traffic between 2004 and 2016 was 759 trips per day on Highway 37 and 256 trips per day on Highway 37A. The Project is not likely to result in substantial increase in traffic or collision frequency along Highways 37 and 37A. Workers will primarily reside in Stewart and IDM will prioritize the procurement of goods and services from Stewart.

- Visual Quality: Negligible adverse social effects are anticipated due to the Project's effect on Visual Quality. Project infrastructure including the Access Road, Powerline, and buildings do have a physical presence on the land and will be visible by recreationists accessing these areas. The number of users of the Bitter Creek valley is extremely low, and visibility of the Access Road, gate, and Powerline were determined to have minimal adverse effects on Recreational Values in the LSA.

Measures to avoid, minimize, mitigate, or otherwise address potential social effects will be implemented, managed, and monitored through a variety of interrelated socio-economic management plans, including:

- Community Involvement Plan;
- Health and Social Services Plan;
- Human Resources Plan;
- Local Procurement Plan;
- Skills, Training, and Employment Plan; and
- Social and Economic Management Plan.

In addition, IDM is committed ongoing dialogue with Stewart, Nisga'a Nation, Northern Health, and stakeholders to adaptively manage potential socio-economic effects.

Residual adverse social effects are concluded to be Not Significant as they are anticipated to be negligible, manageable, and likely offset by the beneficial social effects of the Project. Therefore, a cumulative effects assessment has not been conducted.

7.15 Heritage Effects Assessment

7.15.1 Setting

The Heritage LSA is the footprint of the proposed Project components with a 30 m buffer, all of which are contained within the Bitter Creek valley and the alpine area of Red Mountain. The Bitter Creek valley is a remote wilderness area with steeply sloping terrain and an absence of old growth tree stands. The valley was, until very recently, covered with glacial ice. It has been exposed to human disturbances (mining, logging, power line, and road construction) and natural disturbances of the soil (floods, landslides, and avalanches). An Archaeological Overview Assessment and a Preliminary Field Reconnaissance found that there are no known archaeological, historical, paleontological, or architectural resources in the LSA, and that the likelihood of discovering unidentified archaeological resources is low. In addition, IDM has not been made aware of any existing cultural resources in the valley.

IDM found no interactions between proposed Project components and activities and archaeological, historical, paleontological, and architectural resources due to their absence from the Bitter Creek valley. Therefore, archaeological, historical, paleontological, and architectural resources were not brought forward through the effects assessment.

7.15.2 Assessment

In recognition of the importance of cultural and heritage resources to Aboriginal Groups, regulators, and the public, IDM conducted an assessment of the potential adverse effects on Cultural and Heritage Resources, which included cultural landscapes and sacred, ceremonial, or culturally important places, objects, or things. The assessment considered the potential 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 of Cultural and Heritage Resources.

The assessment found there would be no potential adverse effects on Cultural and Heritage Resources as a result of changes to air quality, noise, or visual quality due to construction, operations, or closure. Therefore, no mitigation measures have been identified. The assessment determined that it was unlikely, but not impossible, that Project construction may disturb unidentified archaeological, paleontological, cultural, or heritage resources. To mitigate this potential adverse effect, a Chance Find Procedure has been developed as part of the Cultural and Heritage Resources Protection Plan for the Project. The assessment determined the development of the Project may limit access to cultural and heritage resources within the Project area due to safety considerations and disturbance. The

potential adverse effect will be mitigated through the development of an Access Management Plan.

In conclusion, once mitigation measures have been implemented, any potential adverse effects on Cultural and Heritage Resources will be reduced to negligible and not significant. Therefore, no residual or cumulative adverse effects are anticipated on Cultural and Heritage Resources in the Project area.

7.16 Health Effects Assessment

7.16.1 Setting

The Health LSA was established to provide a study area boundary for assessing the effects of the Project at the local watershed level. The LSA encompasses the full extent of the Bitter Creek watershed. It extends beyond the height of land on all sides of Bitter Creek, including the Roosevelt Creek drainage, and a portion of Bromley Glacier to the south. The northwest end of the LSA includes the mouth of Bitter Creek where it passes Highway 37A and drains into Bear River, including an area of floodplain forest and Clements Lake. It also considers nearby communities such as Stewart as people from these communities are more likely to hunt, fish and recreate in the LSA. Stewart is not directly affected by Project activities and releases.

7.16.2 Assessment

IDM completed an assessment of the potential adverse effects on Human Health, in recognition of the importance of human health to our society including Aboriginal Groups, governments, and the public, and to meet federal and provincial regulatory requirements.

The Human Health effects assessment evaluated physical determinants of health associated with the Project including exposure to electromagnetic fields (EMFs), lighting, and exposure to constituents of concern in air, soil, groundwater, surface water, sediment, and country foods. Potential Human Health effects associated with exposure to noise were evaluated in the Noise effects assessment chapter.

Potential Human Health effects associated with exposure to EMFs were determined to be below applicable guidelines, and thus no residual effect was associated with exposure to EMFs. As no residents are present in the Bitter Creek watershed, and no camp is planned for the Project, physical effects to Human Health associated with lighting were also assumed to be negligible, and no residual effect was associated with lighting.

A Human Health Risk Assessment (HHRA) was completed (Volume 8, Appendix 22-A) to assess potential effects to the Human Health VC resulting from release of chemicals to the environment. Baseline sampling data for soil, surface water, sediment, fish tissue residue, plant tissue residue, and acquisition of air quality baseline data from other locations in British Columbia were used to assess baseline Human Health risk. Predictive models were developed to estimate concentrations of COPCs in air, soil, surface water, sediment, groundwater, vegetation, fish, terrestrial mammals, and birds at baseline and predicted

conditions. Chemicals with the potential to be released to the environment at concentrations that may be harmful to Human Health were identified and are referred to as chemicals of potential concern (COPCs). Potential exposure pathways from COPC sources to receptors were evaluated, and hazard indices (HIs) and incremental lifetime cancer risks (ILCR) were calculated for complete exposure pathways. Mitigation measures were incorporated into the predictive modelling.

Baseline and predicted HIs for all receptors were greater than the non-cancer Health Canada threshold of 0.6 to 1, and the MOE non-cancer threshold of 1, for all age groups. Baseline and predicted ILCRs for the Hunter/Trapper/Fisher, recreational receptor, and the Country Food consumer, were also greater than the Health Canada and MOE threshold of 1x10-5. However, the project related HIs and ILCRs, which is the difference between the baseline and predicted risk, was less than the applicable Health Canada HIs and ILCRs.

Once mitigation measures are considered, any potential effects on Human Health will be reduced such that the difference in HIs and ILCRs between the baseline and predicted estimates can be attributed to the inherent margin of error experienced in developing the analytical results alone. Therefore, the effects assessment concludes that no residual effects on Human Health are anticipated.

7.17 Accidents and Malfunctions and Effects of the Environment on the Project

7.17.1 Effects of the Environment on the Project

The identification and mitigation of the inherent risks in the development and operation of a mine is a fundamental part of today's modern mining practices; this process is first initiated during the planning and permitting stage of the mine life cycle. In certain regions, including northwest BC, one of the most significant risks is the environment itself. Environmental conditions determine the location of the mineral deposit, as well as access mining methods, design and management strategies. Where it is impossible or impractical to eliminate an identified risk, the focus turns to mitigation of the effects/consequences of the identified risk to minimize likelihood and potential consequences. This mitigation can take multiple forms, including project design and layout, process design, equipment selection, operational procedures, employee training, and management plans.

The following potential effects of the environment were assessed for the Project:

- Precipitation;
- Air Temperatures;
- Wind;
- Surface Water Flow;
- Geophysical Environment (Geohazards);
- Wildfire; and
- Climate Change.

The likelihood (probability) and consequences (severity) of the effects of the environment on the Project were evaluated. In this assessment, IDM evaluated the likelihood that a condition would occur to produce a risk, the likelihood that an incident will occur given design and mitigation measures, and the consequence to the Project should the event occur.

Effects of the environment evaluated as having higher risk to the Project related to the TMF (e.g. flood / high flows, high precipitation) and to geohazards. Effects of the environment on the TMF are mitigated by design and through implementation of various management plans, such as the Site Water Management, Tailings Management and Emergency Response Plan. Mitigations for addressing geohazard risks include the following:

- Limit construction in areas of high risk;
- Implement engineering improvements in areas of concern;
- Implementation of avalanche-management procedures
- Follow relevant management plans (e.g. Emergency Response Plan); and
- Worker safety and awareness training.

7.17.2 Accidents and Malfunctions

Despite an ongoing effort to identify and manage risks, major accidents and malfunctions may occur through natural events, breakdown of mitigation measures, or human error. Understanding the factors that govern whether such risks are likely is essential to a proactive environmental management approach. IDM will seek to minimize the risk of accidents and malfunctions, along with ensuing consequences to people and the environment. Management systems will mitigate most risks and limit consequences through:

- Prevention of accidents and malfunctions via training, awareness, education and equipment maintenance;

- Assessment of the risk of accidents and malfunctions throughout the design phase;

- Employment of adaptive management procedures to ensure continual appraisal of risks; and

- Design and implementation of effective emergency response plans and contingency plans.

IDM's risk assessment methodology involved a rating system derived from: identification of environmental aspects that could impact the site; determination of likelihood and consequence of a worst credible mishap on personnel, environment and facilities, if emergency planning and management controls are in place; identification of additional management measures and controls, and applying risk category for each hazard based on probability and consequences. This was followed by an evaluation of residual risk, monitoring, and review.

Accidents and/or malfunction events assessed include, but are not limited to:

- Breach or failure of tailings dam or other containment structure;
- Spills of hazardous substances stored on site (e.g., reagents, fuels, contained liquid waste);
- Leakage or spill of materials with potential risks to the environment (including petroleum products, chemicals and other materials) as a result of road transportation;
- Accidental release of sediments and contaminants from ore/waste rock stockpiles;
- Accidental discharge of off-specification effluent from treatment plants;
- Sediment releases into watercourses;
- Accidents related to construction and operation of underground facilities;
- Fires or explosions;
- Failure of permanent and temporary waste rock dumps or stockpiles;
- Safety to personnel resulting from in-rushes to the underground mine;
- Safety to personnel resulting from fly rock from blasting; and
- Failure of the lower adit plug, installed on closure of the mine.

Management controls for treating risk were assessed considering: personnel safety; potential benefits; effectiveness; implementation cost; and stakeholder objectives.

Overall, the risk and consequence of accidents/malfunctions were assessed Moderate or Low. The confidence in the result ranged from medium to high for all intermediate components or receptor VCs. Given that the most common potential accident/malfunction involves a spill of materials into water or on land, the most commonly affected sub-components were surface water quality and/or soil quality. The second most commonly affected sub-components were wetlands, aquatic resources, and fish and fish habitat. The key management measures were safe travel routes, vehicle maintenance, and driver training, and mitigation including rapid detection, containment, and recovery of spilled materials.

8 TREATY AND ABORIGINAL INTERESTS EFFECTS ASSESSMENT

The Application/EIS provides an assessment of the potential adverse effects of the Project on Nisg̲a'a Nation Treaty rights and interests and on the Aboriginal Interests of TSKLH and MNBC. The Application/EIS includes ethnographic summaries of each Aboriginal Group, including a description of each group's use of land and resources, and identifies measures to avoid, minimize, mitigate, or otherwise address the potential adverse effects identified.

Nisg̲a'a Nation, as represented by the NLG, TSKLH, and MNBC were provided with the opportunity to review and provide comment on the information used to characterize their Treaty rights or Aboriginal Interests, the effects assessments, and proposed mitigation measures. Their feedback has been considered in the finalization of the Application/EIS, and IDM has provided a table summarizing the feedback received and IDM's response.

8.1 Nisga'a Nation

8.1.1 Setting

Nisg̲a'a Nation is part of the Tsimshian ethno-linguistic group, along with the Gitxsan First Nation, Coast Tsimshian (Kitselas and Kitsumkalum First Nations), and Southern Tsimshian (Lax Kw'alaams Band, Metlakatla First Nation, Haisla Nation, Gitga'at First Nation, and Gitxaala Nation).

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

The Project is located within the Nass Area and the Nass Wildlife Area, as set out in the NFA.

Under the NFA, Nisg̲a'a Nation holds Treaty rights to manage and harvest fish species in the Nass Wildlife Area, including Salmon species, Steelhead, and Eulachon; to manage and harvest wildlife in the Nass Wildlife Area, including Grizzly Bear, Moose, and Mountain Goat; and to manage and harvest migratory birds for domestic purposes in the Nass Area.

Nisg̲a'a Nation manages land and resources in accordance with the Common Bowl philosophy (*sayt k'il'hl wo'osihl Nisg̲a'a*). The Common Bowl is the principle that Nisg̲a'a lands and resources are common property. The Common Bowl is a concept that has existed in Nisg̲a'a culture since time immemorial and has adapted over time to form the basis the modern NLG administration. The traditional concept is based partly on a collective acknowledgement that some property and resources are shared, while others are owned by individual houses and managed by the house chief for the benefit of the family.

The concept has evolved over time to meet the changing needs of Nisga'a citizens. In order to move forward with the treaty process Nisga'a citizens and leaders recognized that the collective ownership of lands and resources by the Nisga'a Nation were more important than traditional house territories. Today, the Common Bowl is the land under the jurisdiction of the Nisga'a Nation.

8.1.2 Assessment

The Application/EIS contains the assessments required under Chapter 10, paragraphs 8(e) and 8(f) of the NFA.

The 8(e) assessment considers the potential environmental effects of the Project, as described in the Application/EIS, on residents of Nisga'a Lands, Nisga'a Lands, or Nisga'a interests. The specific 8(e) interests considered include:

- Nisga'a Nation Treaty right to manage and harvest fish;
- Nisga'a Nation Treaty right to harvest non-salmon species of fish and aquatic plants, including marine mammals, for domestic purposes;
- Nisga'a Nation Treaty right to manage and harvest wildlife, including wildlife fish, for domestic purposes;
- Nisga'a Nation Treaty right to manage and harvest migratory birds for domestic purpose;
- The guide outfitting license held by Nisga'a Guide Outfitters (NGO); and
- The Treaty right of Nisga'a representatives to access the Nass Wildlife Area to carry out their duties and the Treaty right of Nisga'a citizens to access Crown lands for the exercise of their Treaty rights.

For each 8(e) interest, the Application/EIS:

- Identifies the geographic extent of the Treaty right as set out in the NFA, and establishes whether or not the geographic extent of the Treaty right differs in any way from the spatial boundaries applicable to any related VC or indicator discussed elsewhere in the Application/EIS. If a difference is identified, determine the relevance to assessing potential adverse environmental effects to the Nisga'a Nation Treaty right;
- Provides a narrative that clearly describes assumptions and limitations in understanding the full extent of potential adverse environmental effects on residents of Nisga'a Lands, Nisga'a Lands, and Nisga'a interests, as set out in the NFA, and identifies any empirical evidence or professional opinion that has been relied upon;
- Describes the measurable parameters by which IDM has quantified or described the potential effect(s);

- Identifies any additional information being used to inform the assessment of potential adverse environmental effects on the Nisg̲a'a Nation Treaty right;

- Determines whether there is the potential for an adverse environmental effect on the Nisg̲a'a Nation Treaty right;

- Provides descriptions of any actions proposed for the purpose of effect prevention or mitigation of potential adverse environmental effects on the Nisg̲a'a Nation Treaty right;

- Determines whether a residual adverse environmental effect, after mitigation, is reasonably expected, having a regard to the likelihood of an impact on the Nisg̲a'a Nation Treaty right and confidence level of such predictions;

- Describe any residual adverse environmental effect on the Nisg̲a'a Nation Treaty right in terms of its magnitude, duration, frequency, reversibility, context, and confidence level of such predictions;

- Describes any follow-up or monitoring measures IDM has proposed to ensure that mitigation measures are implemented and managed; and

- Provides a summary of NLG's views, if provided, on any of the above-noted information requirements.

In addition, for each 8(e) interest, the Application/EIS includes consideration of the ecological effects, treaty right to use, and human health aspects, as outlined in the EIS Guidelines.

The Project is anticipated to have no significant residual adverse effects on Nisg̲a'a Nation's 8(e) interests. The mitigation measures IDM proposes to avoid, minimize, mitigate, or otherwise address potential adverse effects to Nisg̲a'a Nation's 8(e) interests are the same as those proposed for the biophysical valued components, including Wildlife and Wildlife Habitat and Fish and Fish Habitat.

The Application/EIS also assesses the potential effects of the Project on the existing and future economic, social, and cultural wellbeing of Nisg̲a'a citizens pursuant to Chapter 10, paragraph 8(f) of the NFA. The economic, social, and cultural aspects considered in the 8(f) assessment are based on the ones listed in the Nisg̲a'a Economic, Social, and Cultural Impact Assessment Guidelines (2010):

- Economic wellbeing:
  - Nisg̲a'a citizens' employment and income;
  - Nisg̲a'a citizens' business activities;
  - Natural resource activities and related earnings or values; and
  - Future Nisg̲a'a citizens' economic opportunities and economic development.

- Social wellbeing:
  - Migration and population effects in Nisg̲a'a Nation communities;

- Infrastructure and services in the Nisga'a Nation communities;
- Occupational and non-occupational health and accident risks;
- Crime; and
- Family and community wellbeing.

- Cultural wellbeing:
  - Effects of environmental effects (including those resulting from accidents and malfunctions) on the cultural activities and practices of Nisga'a citizens;
  - Effects of changing work patterns on Nisga'a cultural activities and practices; and
  - Effects on Nisga'a language.

NLG requested that no primary data be collected from NLG, the Nisga'a Village governments, or Nisga'a citizens given the existence of multiple, similar reports completed in recent years for comparable proposed projects in northwest BC. Further to this request, 8(f) reports from five recently assessed natural resource projects in Nisga'a Nation's Treaty territory were reviewed. The review of these 8(f) reports was complemented by review and consideration of relevant published and unpublished research and reports (including peer-reviewed journals, 'grey' literature, and online resources), international impact assessment standards, and professional judgment.

The Project is anticipated to have no significant residual adverse effects on the economic, social, and cultural wellbeing of Nisga'a citizens. This is primarily due to the distance of the Project from the Nisga'a Villages: as no significant in-migration to the Nisga'a Villages is anticipated, there is a lack of interaction between Project effects and the majority of Nisga'a citizens' economic, social, and cultural wellbeing. The Project is also anticipated to result in beneficial economic effects through employment and contracting opportunities. Beneficial economic effects may have related beneficial social and cultural effects and may act to counter-balance potential negative economic, social, or cultural effects.

IDM recognizes that economic, social, and cultural effects are difficult to predict with accuracy due to the range of interrelated factors and the unpredictability of individuals' and communities' responses. IDM is committed to working with NLG to develop and implement appropriate mitigation, management, and monitoring measures to minimize the potential adverse effects of the Project.

8.2 Tsetsaut Skii km Lax Ha

8.2.1 Setting

"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 *et al.* 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 2016, TSKLH estimated they have approximately 15 members (Simpson 2016). 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). 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).

8.2.2 Assessment

The following describe the potential interactions between proposed Project components or activities and TSKLH's Aboriginal Interests:

- Potential changes to TSKLH's ability to hunt, fish, trap, and harvest plants resulting from environmental effects on fish, fish habitat, wildlife, wildlife habitat, or vegetation and ecosystems;
- Potential changes to TSKLH's ability to hunt, fish, trap, and harvest plants resulting from changes in access to the Bitter Creek valley;
- Potential changes to TSKLH's traditional travel routes as a result of Project activities;
- Potential changes to TSKLH's traditional occupation sites as a result of Project activities; and
- Potential changes to the cultural value of the Bitter Creek valley, including avoidance, resulting from changes in Air Quality, Visual Quality, and Noise.

In addition, the Application/EIS provides an analysis of how changes to the environment caused by the Project will affect:

- TSKLH's socio-economic conditions, including:
  - The use of navigable waters;
  - Forestry and logging operations;
  - Commercial fishing, hunting, trapping, and gathering activities;
  - Commercial outfitters; and
  - Recreational use.
- TSKLH's health, including consideration of Air Quality, Country Foods, Drinking Water Quality, and Noise exposure.

The mitigation measures IDM proposes to avoid, minimize, mitigate, or otherwise address potential adverse effects to TSKLH's Aboriginal Interests are the same as those proposed for

the biophysical valued components, including Wildlife and Wildlife Habitat, Fish and Fish Habitat, and Vegetation and Ecosystems.

IDM anticipates that the Project will have no significant adverse residual effects on TSKLH's Aboriginal Interests or health due to TSKLH's low current use of the Bitter Creek valley (based on IDM's understanding) and the lack of significant residual adverse effects on Wildlife and Wildlife Habitat, Fish and Fish Habitat, Vegetation and Ecosystems, and Human Health VCs.

Also, IDM understands that there is a lack of interaction between Project components and activities and TSKLH's socio-economic conditions as TSKLH have no use of navigable waters, forestry or logging operations, commercial fishing, hunting, trapping, and gathering activities, commercial outfitters, or recreational use that will be affected by the proposed Project.

8.3 Métis Nation BC

8.3.1 Setting

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. 305 of those 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). After researching MNBC's cultural and traditional use, IDM has not been able to identify any cultural sites within the Project area.

8.3.2 Assessment

The following describe the potential interactions between proposed Project components or activities and MNBC's Aboriginal Interests:

- Potential effects on cultural sites in the Project region that have been mapped by MNBC;
- Potential changes to Métis citizens' ability to hunt, fish, trap, and harvest plants resulting from environmental effects on fish, fish habitat, wildlife, wildlife habitat, or vegetation and ecosystems;
- Potential changes to Métis citizens' ability to hunt, fish, trap, and harvest plants resulting from changes in access to the Bitter Creek valley; and

- Potential changes to the cultural value of the Bitter Creek valley, including avoidance, resulting from changes in Air Quality, Visual Quality, and Noise.

In addition, the Application/EIS provides an analysis of how changes to the environment caused by the Project will affect:

- Métis citizens' socio-economic conditions, including:
  - The use of navigable waters;
  - Forestry and logging operations;
  - Commercial fishing, hunting, trapping, and gathering activities;
  - Commercial outfitters; and
  - Recreational use.

- Métis citizens' health, including consideration of Air Quality, Country Foods, Drinking Water Quality, and Noise exposure.

The mitigation measures IDM proposes to avoid, minimize, mitigate, or otherwise address potential adverse effects to MNBC' Aboriginal Interests are the same as those proposed for the biophysical valued components, including Wildlife and Wildlife Habitat, Fish and Fish Habitat, and Vegetation and Ecosystems.

IDM anticipates that the Project will have no significant adverse residual effects on MNBC's Aboriginal Interests or health due to Métis citizens' low current use of the Bitter Creek valley (based on IDM's understanding) and the lack of significant residual adverse effects on Wildlife and Wildlife Habitat, Fish and Fish Habitat, Vegetation and Ecosystems, and Human Health VCs.

Also, IDM understands that there is a lack of interaction between Project components and activities and Métis citizens' socio-economic conditions as Métis citizens have no use of navigable waters, forestry or logging operations, commercial fishing, hunting, trapping, and gathering activities, commercial outfitters, or recreational use that will be affected by the proposed Project.

8.4 Assessment of Potential Effects to Current Use of Lands and Resources for Traditional Purposes

8.4.1 Setting

CULRTP by TSKLH and MNBC includes fishing, hunting, trapping, plant harvesting, travel routes, and occupation sites. As outlined in the EIS Guidelines, it does not apply to Nisga'a Nation. The CULRTP effects assessment was based on a review of secondary source materials, including the EA Applications/EISs of other projects in the region.

TSKLH provided IDM with some information on its traditional use of the Project area. Based on information provided and publically available, it is IDM's understanding that TSKLH hunts, fishes, traps, and harvests plants in the area to the north and west of the Project,

around Meziadin and Bowser Lakes and the Bell-Irving River as well as the area south of the Project along the Highway 37 corridor.

As stated by MNBC in their submission to the Agency, Métis citizens in Terrace, Rupert, Smithers, and Stewart harvest country foods for sustenance purposes and hunt, fish, and trap in the area (Métis Nation BC 2016). MNBC provided IDM with further information on the locations of the cultural sites and the proximity of MNBC's CULRTP activities to the Project.

8.4.2 Assessment

The assessment focused on potential effects of the Project on the environment resulting in:

- Changes to TSKLH's or MNBC's ability to harvest fish, wildlife, birds, or plants resulting from effects on fish, fish habitat, wildlife, wildlife habitat, or vegetation and ecosystems;
- Changes to TSKLH's or MNBC's ability to harvest fish, wildlife, birds, or plants resulting from changes in access to the Bitter Creek valley; and
- Changes to the cultural value of the Bitter Creek valley, including avoidance, resulting from changes in Air Quality, Visual Quality, and Noise.

The effects were assessed for the life of the Project.

Measures proposed to avoid, minimize, mitigate, or otherwise address the potential effects of the Project on TSKLH and MNBC's CULRTP include:

- An Access Management Plan to control access to the Bitter Creek valley and ensure appropriate access for CULRTP activities;
- Implementing a "no hunting, no fishing" policy for Project employees to reduce hunting and fishing pressure on resources in the Bitter Creek valley;
- Minimizing vegetation clearing; and
- Implementation of an EMS, Wildlife Management Plan, Aquatic Effects Management and Response Plan, Noise Abatement Plan, Vegetation and Ecosystems Management Plan, and other plan and monitoring systems designed to minimize the effects of the Project on the environment.

There are three residual effects that might cumulatively affect TSKLH's and MNBC's CULRTP within the CULRTP RSA:

- Potential residual effects to wildlife resources (including mountain goat, moose, grizzly bear, furbearers, and migratory breeding birds) resulting in changes to TSKLH's and MNBC's ability to trap and hunt for traditional purposes;
- Potential residual effects to fish resources resulting in changes to TSKLH's and MNBC's ability to fish for traditional purposes; and

- Potential residual effects to plant resources resulting in changes to TSKLH's and MNBC's ability to harvest plants for traditional purposes.

The Project has a low likelihood of resulting in non-significant, low magnitude residual effects to TSKLH's and MNBC's CULRTP due to potential changes to wildlife, fish, and plant resources. These residual effects have a discreet extent, are of long-term duration, continuous frequency, are reversible, and have a high context. No residual effects are anticipated regarding potential changes to access or potential changes to cultural value based on changes to Air Quality, Visual Quality, and Noise.

The potential environmental effects of the proposed Project are generally confined to the Bitter Creek valley. Due to the isolation and size of the valley, very few other projects have the potential to cumulatively interact with the potential residual effects of the Project. The few potential cumulative effects on TSKLH's and MNBC's CULRTP that have been identified due to potential cumulative effects to wildlife, fish, and plant resources have been determined to be Not Significant. Therefore, the Project is not anticipated to result in significant residual or cumulative adverse effects on TSKLH's and MNBC's CULRTP.

9 ENVIRONMENTAL MANAGEMENT, MONITORING AND FOLLOW-UP

As noted in Section 2.18 above, IDM will implement an EMS that includes twenty-five management plans as well as monitoring and follow up programs. The Environmental Management System forms the basis of how IDM intends to implement a range of environmental management and monitoring measures throughout the life of the Project. These measures demonstrate how IDM will avoid, or minimize to an acceptable level, the potential negative environmental effects during all phases.

The Environmental Management Plans (EMPs) outline the relevant scope and objectives; applicable legislation, best management practices, and industry standards; anticipated relevant Project activities; key protection and mitigation measures; and the monitoring, reporting, and responsibilities of implementing the EMPs. Each EMP is focused on a specific activity. These plans will be used to provide the overarching direction for environmental, safety, and socio-economic management for the Project and form the basis for the ongoing development of further detailed environmental documentation through permitting and the different phases of the Project.

The EMS offers flexibility for each EMP to respond to changes in the regulatory regime, the mine execution plan, the biophysical and socio-economic environments, technology, research results, and the understanding of traditional knowledge or any other situations that may arise. Objectives and or threshold values and indicators will be established prior to the Construction Phase, incorporated into each EMP, and will be used to trigger management actions. A system of accountability will also be established and implemented.

IDM is committed to operating the Project in a safe and environmentally-responsible manner. Change is continual; therefore, an adaptive management approach is essential. The strategies and measures that form part of the EMS have been developed and anchored on an effective adaptive management philosophy. As part of a continual improvement process, the management plans herein will be revised periodically to accommodate new and amended legislation, evolving industry standards, emerging community concerns, changes to the Project's design or schedule, or necessary changes to mitigations and management based on monitoring results. By taking an adaptive management approach, rigorous plans can be developed early, based on the best available information, prior to detailed project engineering and construction. After the detailed engineering design phase, these plans can be adjusted, as needed, and monitoring implemented to measure whether the actions in the management plans are working as intended.

The EMS is based on a continuous improvement framework, defined as a Plan-Do-Check-Act (PDCA) model in alignment with the internationally-recognized International Standards Organization (ISO) 14000 series of standards for environmental management:

- Plan: objectives and targets are set, plans for implementation are developed to address risks, and performance requirements are established;

- Do: utilize controls to operate in a systematic manner to manage risk;

- Check: provides for auditing and review to ensure the ongoing applicability of the EMS is performing to expectations; and

- Act: ensure that opportunities identified during the assessment are incorporated in the EMS and relevant supporting documents.

IDM will implement, through the EMS, a precautionary approach. For the Project that means that a lack of certainty regarding a threat of environmental harm should not be used as a rationalization for not acting to avoid that threat. This approach also acknowledges that delaying action until there is compelling evidence of harm will often lead to actions that are too costly or impossible to avoid. The use of the precautionary approach promotes action to avoid risks of serious or irreversible harm to the environment.

The EMS applies to the following EMPs for the Project, including the:

- Adaptive Management Plan;
- Access Management Plan;
- Air Quality and Dust Management Plan;
- Aquatic Effects Management and Response Plan;
- Community Involvement Plan;
- Cultural and Heritage Resources Protection Plan;
- Emergency Response Plan;
- Erosion and Sediment Control Plan;
- Explosives Management Plan;
- Fuel Management Plan;
- Hazardous Materials Management Plan;
- Health and Social Services Plan;
- Local Procurement Plan;
- Material Handling and Metal Leaching/Acid Rock Drainage (ML/ARD) Plan;
- Noise Abatement Plan;
- Occupational Health and Safety Plan;
- Site Water Management Plan;
- Skills, Training and Employment Plan;
- Social and Economic Management Plan;
- Spill Contingency Plan;
- Tailings Management Plan;
- Terrain and Soil Management Plan;
- Vegetation and Ecosystems Management Plan;
- Waste Management Plan; and
- Wildlife Management Plan.

10 CONCLUSIONS

10.1 Introduction

IDM Mining Ltd. (IDM) has prepared an Application/Environmental Impact Statement (EIS) to identify and assess potential environmental and social effects resulting from the Project. The Application/EIS follows recommended guidelines and legislated requirements, pursuant to the provincial *Environmental Assessment Act* (BCEAA; 2002) and the federal *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and is consistent with the requirements of the Application Information Requirements (AIR; EAO 2016) for the Project issued by the British Columbia EAO. VCs/ICs were identified during early scoping phases of the Pre-Application process and in response to feedback from provincial and federal regulators, Working Group members, Aboriginal Groups, and the public.

10.2 Summary of Aboriginal and Public Consultation

IDM believes that consultation with Aboriginal Groups should be conducted in the spirit of mutual respect, integrity, and transparency. Consultation has been undertaken as directed by the Section 11 Order issued by the EAO on February 10, 2016, and Section 13 Order issued on April 13, 2016.

IDM has been engaging with the Nisga'a Lisims Government (NLG) on the proposed Project since IDM acquired the Red Mountain Property in May 2014. IDM will continue to engage with NLG throughout the Application Review Stage of the environmental assessment, as outlined in the Nisga'a Consultation Plan, including further consultation on the results of the 8(e) and 8(f) assessments and more open houses in the Nisga'a Villages.

IDM has shared draft sections of the Application/EIS with TSKLH and MNBC to solicit their feedback on IDM's assessment of the potential effects of the Project on their Aboriginal interests and IDM's proposed mitigation measures. Their feedback has been considered, incorporated, where appropriate, and summarized in tables outlining IDM's responses.

IDM proactively engages with community members, stakeholders, and the public, in the spirit of respect and integrity, to build and maintain constructive and mutually beneficial relationships. The Section 11 Order, the EIS Guidelines, and the Public Consultation Plan prepared by IDM, guide IDM's consultation efforts with community members, stakeholders, and the public.

Comments provided by Aboriginal groups, and IDM's responses to the comments, are captured in Appendix 27-A, Aboriginal Consultation Report #2. Comments provided by the public and stakeholders are captured in Appendix 28-A, Public Consultation Report #2.

10.3 Summary of Residual and Cumulative Effects

The Application/EIS provides a detailed assessment of potential environmental, social, economic, health and heritage effects, and the steps taken to mitigate the identified potential effects. Effects expected to occur despite mitigation efforts are considered residual effects. Once identified, the Application/EIS characterized the residual effects based on magnitude, geographic extent, duration, frequency, reversibility, context, and likelihood. The significance of a potential residual effect was assessment based on a combination of the effects criteria relevant to a given VC, and different combinations of criteria appropriate to a given VC were used to determine significance.

All identified adverse residual effects resulting from the Construction, Operation, Closure and Reclamation Phases of the Project are predicted to be Not Significant (Table 31.5-1). Potential cumulative effects were evaluated for each VC/IC that had an identified Project-related residual effect. The Project's cumulative effects assessment identified non-significant residual cumulative effects, but no significant residual cumulative effects (Table 31.5-1).

10.4 Summary of Proposed Mitigation

IDM has implemented three broad categories of mitigation and management for this Application/EIS include to address potential adverse Project effects:

- Mitigation by Project Design (including optimizing alternatives);
- Best Management Practices (BMPs); and
- Monitoring and Adaptive Management

Using this approach, IDM has identified mitigation measures designed to avoid, minimize or mitigate potential adverse effects of the Project (Table 31.5-1), thereby maximizing the probability that the Project will not have significant adverse residual effects.

As part of the overall Project mitigation planning, IDM has developed a comprehensive suite of management plans:

- Adaptive Management Plan;
- Access Management Plan;
- Air Quality and Dust Management Plan;
- Aquatic Effects Management and Response Plan;
- Community Involvement Plan;
- Cultural and Heritage Resources Protection Plan;
- Emergency Response Plan;
- Erosion and Sediment Control Plan;
- Explosives Management Plan;
- Fuel Management Plan;
- Hazardous Materials Management Plan;
- Health and Social Services Plan;

- Local Procurement Plan;
- Material Handling and Metal Leaching/Acid Rock Drainage (ML/ARD) Plan;
- Noise Abatement Plan;
- Occupational Health and Safety Plan;
- Site Water Management Plan;
- Skills, Training and Employment Plan;
- Social and Economic Management Plan;
- Spill Contingency Plan;
- Tailings Management Plan;
- Terrain and Soil Management Plan;
- Vegetation and Ecosystems Management Plan;
- Waste Management Plan; and
- Wildlife Management Plan.

10.5 Summary of Human Health Effects Assessment

In order to assess Project-related effects to the VC Human Health, a Human Health Risk Assessment (HHRA) was conducted (Volume 8, Appendix 22A).

The HHRA evaluated physical determinants of health associated with the Project, including exposure to electromagnetic fields (EMFs), lighting, and exposure to constituents of concern in air, soil, groundwater, surface water, sediment, and country foods. Potential Human Health effects associated with exposure to EMFs were determined to be below applicable guidelines, and thus no residual effect was associated with exposure to EMFs. As no residents are present in the Bitter Creek watershed, and no camp is planned for the Project, physical effects to Human Health associated with lighting were assumed to be negligible and were not evaluated. No residual effect was associated with lighting.

Baseline sampling data for soil, surface water, sediment, fish tissue residue, plant tissue residue, and acquisition of air quality baseline data from other locations in British Columbia were used to assess baseline Human Health risk.

The analysis concluded that once mitigation measures are implemented, any potential effects on Human Health will be reduced such that the difference in hazard indices and incremental lifetime cancer risks from baseline to predicted estimates can be attributed to the inherent margin of error experienced in developing the analytical results alone. Thus, the effects assessment concludes that no residual effects on Human Health are anticipated.

10.6 Conclusion

This Application/EIS for an Environmental Assessment Certificate (EAC) represents the application made by IDM under the BC EAA and CEAA 2012. After consideration of the content provided in the Application/EIS, IDM requests that the federal Minister of the Environment issue a decision statement under Section 52 of CEAA 2012, and that the Province of BC issue an EA certificate for the Project to proceed. Successful completion of

subsequent permitting processes is required prior to IDM constructing, operating, and decommissioning the Project.

IDM is committed to conducting business in an environmentally and socially sustainable manner, consistent with the intention of the BC EA process to promote sustainable development, while minimizing adverse environmental, economic, social, heritage, and health effects.

IDM believes that the Project offers regional, provincial, and federal economic benefits over the short- and long-term. During the Construction and Operation Phases, the Project will:

- Create up to 2,561 person-years of employment (direct, indirect and induced), primarily in British Columbia;
- Contribute approximately $234 million to GDP in British Columbia; and
- Bring federal, provincial and local government revenues of approximately $57 million.

IDM is committed to meaningful and respectful engagement with Aboriginal Groups and local communities to better understand and integrate communities' feedback and concerns into its project planning and implementation, where feasible. It is IDM's goal to maximize local benefits from the Project for the Nisga'a Nation and local communities nearest the Project.

For all potential effects, IDM has successfully avoided adverse effects entirely, or reduced them to be considered Not Significant through the establishment of responsible design and mitigation measures. IDM is committed to working with Aboriginal Groups, local communities, and regulatory agencies throughout all phases of the Project to ensure unavoidable effects are minimized.

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