

RED MOUNTAIN UNDERGROUND GOLD PROJECT

VOLUME 3 | CHAPTER 19

ECONOMIC EFFECTS ASSESSMENT

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19. ECONOMIC EFFECTS ASSESSMENT

19.1 Introduction

IDM Mining Ltd. (IDM, the Proponent) proposes to develop and operate the Red Mountain Underground Gold Project (the Project) located in northwest British Columbia (BC), approximately 15 km northeast of Stewart in the Bitter Creek valley. The mine will extract high-grade gold and silver ore from an underground facility in the high alpine. Ore will be processed at a separate facility, lower down in the middle of the valley at a place known as Bromley Humps. The mine will take approximately 18 months to construct and is currently planned to be in operation for six years. Figure 19.1-1, Figure 19.1-2, and Figure 19.1-3 provide an overview of the Project's components and their locations within the Bitter Creek valley.

This chapter provides an assessment of the potential economic effects of the Project. The purpose of Economic Effects Assessment is to evaluate potential Project effects in relation to a set of valued components (VCs) and intermediate components (ICs) identified during early scoping phases of the Pre-Application process and in response to feedback from provincial and federal regulators, Working Group members, Nisga'a Nation, stakeholders, and the public.

The BC Environmental Assessment Office (EAO) is primarily concerned with the assessment of potential adverse economic effects. Many of the economic effects of the Project are expected to be positive, and local communities, Nisga'a Nation, and other Aboriginal Groups anticipate that the Project will bring potential economic benefits for community members and businesses. Positive economic effects are discussed for context but are not subject to formal assessment. The economic benefits of the Project are presented in the Project Overview (Volume 2, Chapter 1).

The chapter is structured in accordance with guidelines set out by EAO and established practices and includes:

- A summary of the regulatory and policy setting that informs the consideration of economic issues in relation to the Project;
- Description of the overall scope of the economic effects assessment, including information sources, definition of identified VCs and ICs, and the technical and administrative boundaries of the analysis;
- A summary of existing conditions with respect to the selected VCs and ICs based on findings presented in Appendix 20-A (Social and Economic Baseline Report);
- Discussion of the potential economic effects of the Project on each of the identified VCs and ICs;

- Identification of mitigation measures proposed to offset or otherwise account for potential adverse economic effects;
- Description of potential residual effects that remain after mitigation and a determination of the significance of potential residual effects in accordance with established methodology defined by the Canadian Environmental Assessment Agency (the Agency);
- Discussion of potential cumulative economic effects in relation to other projects and developments in the general region of the Project, including reasonably foreseeable future projects; and
- Description of proposed follow-up programs and relevant management plans.

This chapter is linked to the Social Effects Assessment (Volume 3, Chapter 20), Tsetsaut Skii km Lax Ha (Volume 4, Chapter 25), Métis Nation BC (Volume 4, Chapter 26), and Nisga'a Nation (Volume 4, Chapter 27). Linkages to other chapters specific to individual VCs/ICs are discussed in the relevant sections of this chapter.

Figure 19.1-1: Project Overview

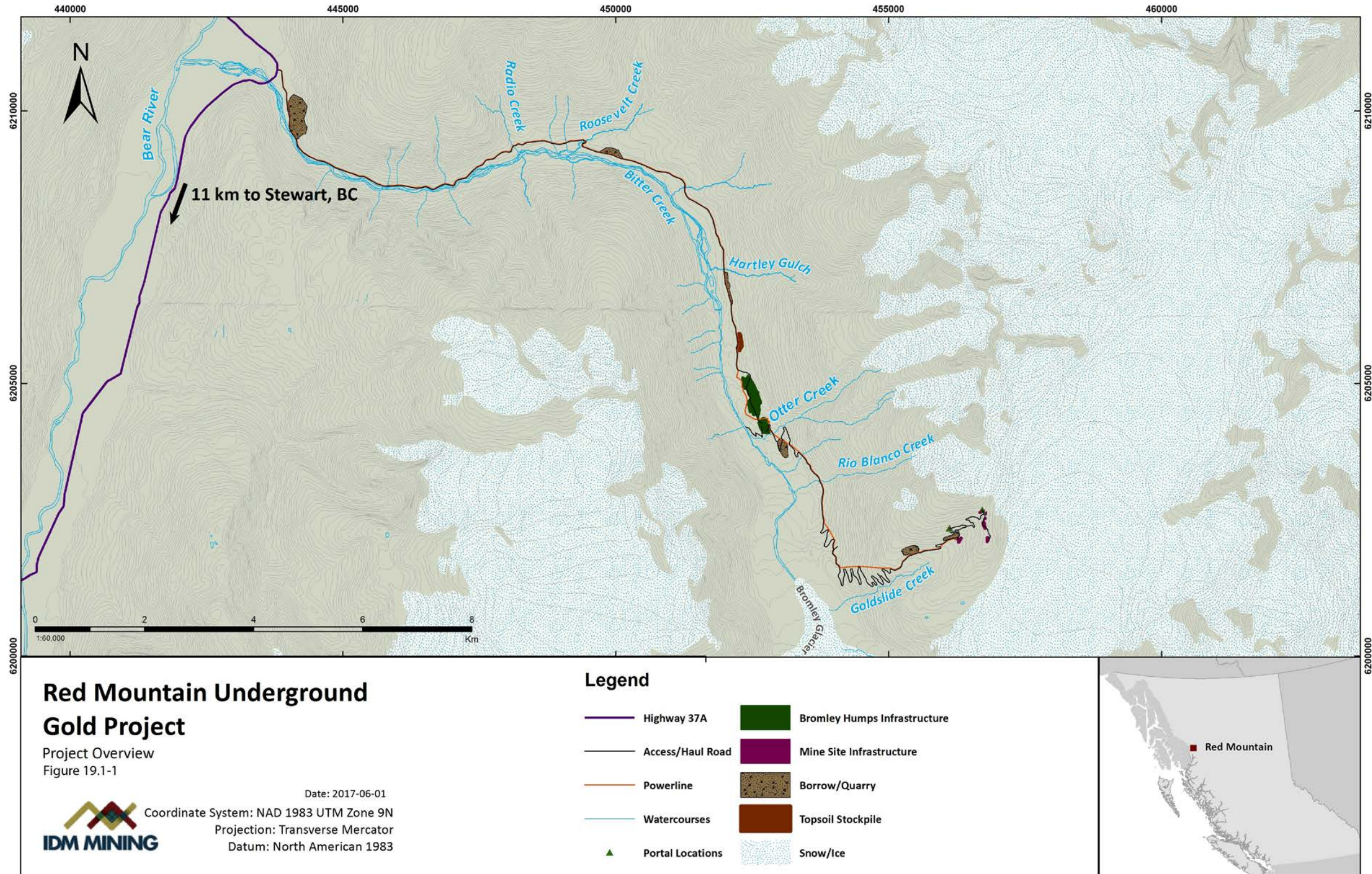


Figure 19.1-2: Project Footprint – Bromley Humps

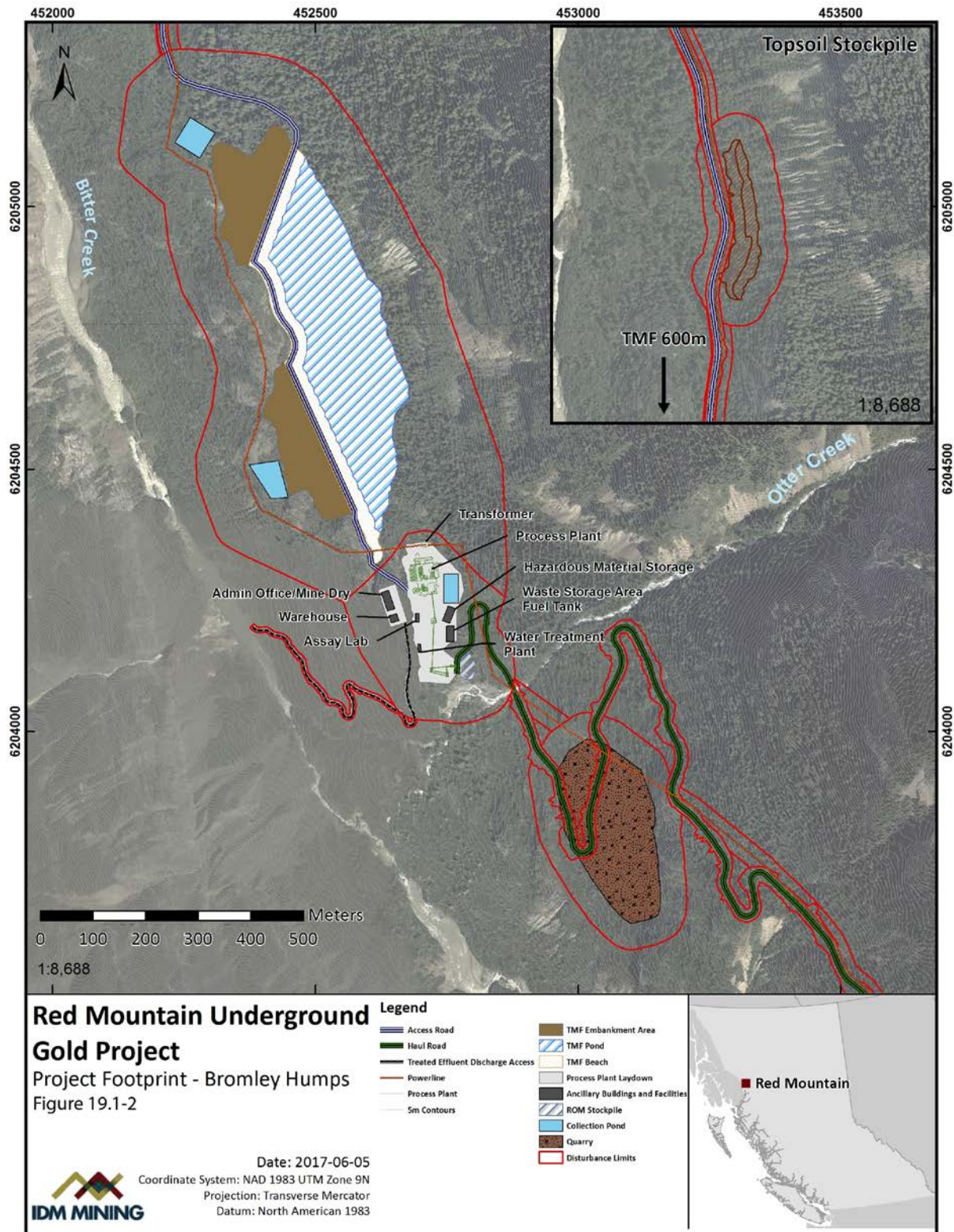
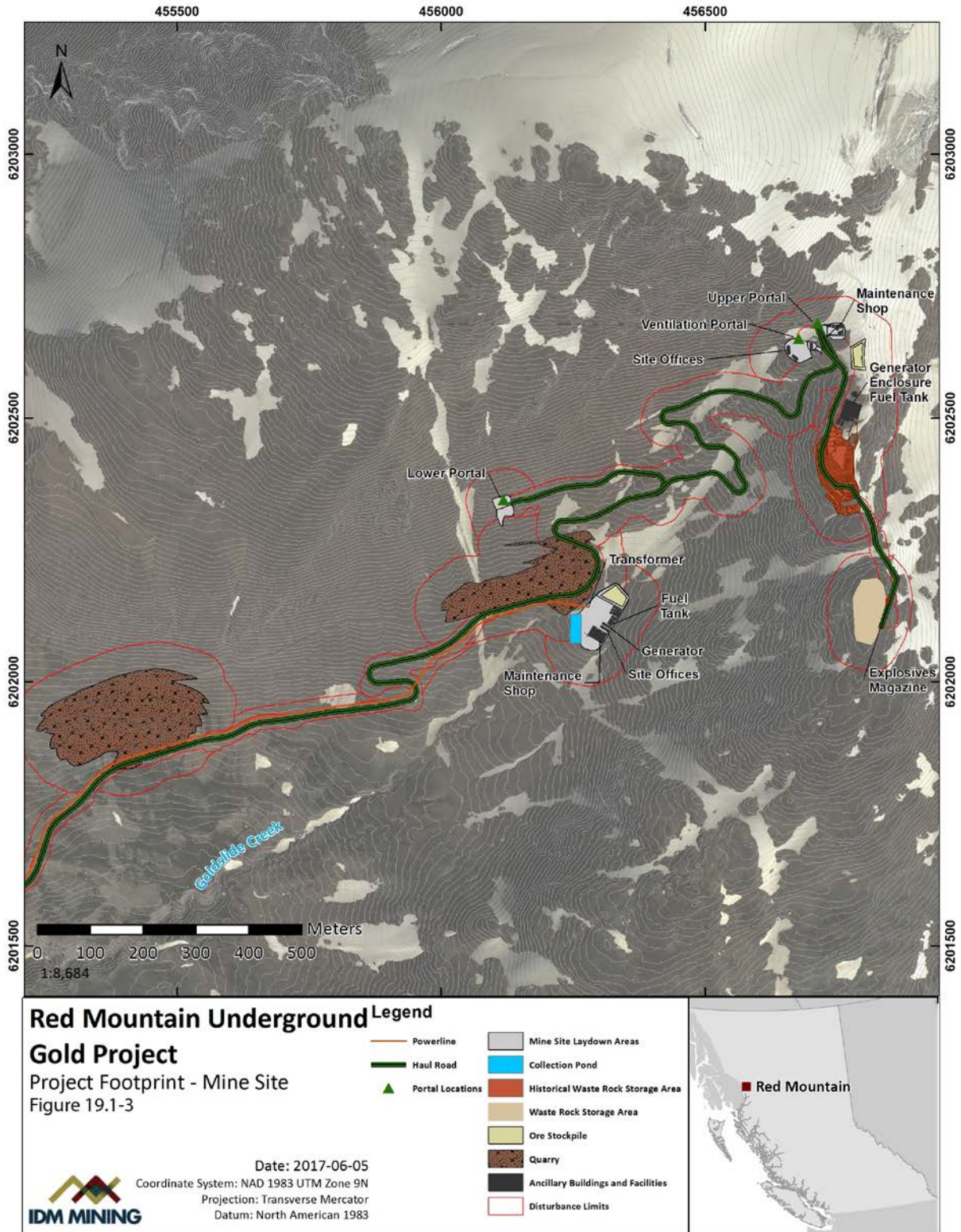


Figure 19.1-3: Project Footprint – Mine Site



19.2 Regulatory and Policy Setting

The Economic Effects Assessment is written in accordance with federal and provincial requirements. Federal requirements to ensure the Project is compliant with the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) are set out in the Guidelines for the Preparation of an Environmental Impact Statement (EIS Guidelines) issued for the Project by the Agency, dated January 2016. Provincial requirements to ensure the Project is compliant with the *British Columbia Environmental Assessment Act* (2002) are set out in the Application Information Requirements (AIR) issued for the Project by EAO, dated March 2017. This chapter also takes into consideration regional development and official community plans for the Regional District of Kitimat-Stikine (RDKS) and selected municipalities within the local and regional study areas (LSA and RSA, respectively).

The Project is intended to promote economic prosperity in the LSA, RSA, and in other regions of BC. It will contribute to provincial and federal government revenue and is consistent with sustainable and responsible resource development plans and objectives, such as BC's Mineral Exploration and Mining Strategy (BC MEM 2012), the BC Jobs Plan (Government of British Columbia 2012), and the Minerals and Metals Policy of the Government of Canada (Ministry of Public Works and Government Services Canada 1996).

The Project is located within the Nass Area and the Nass Wildlife Area, as defined in the Nisga'a Final Agreement (NFA), and Nisga'a Nation, as represented by Nisga'a Lisims Government (NLG), holds Treaty rights to manage and harvest fish, wildlife, and migratory birds in the Nass Area and Nass Wildlife Area (SC 2000, c. 7: Nisga'a Final Agreement Act, 2000). The Project is also within the traditional territory of Tsetsaut Skii km Lax Ha (TSKLH) and is within an area where Métis Nation BC (MNBC) claims Aboriginal rights.

At a regional scale, the Nass South Sustainable Resource Management Plan (Nass South SRMP) is a plan to promote and encourage long-term sustainable development in the southern parts of the Nass Timber Supply Area (TSA). The Nass South SRMP has five primary objectives (FLNRO 2012a), including to:

- Assist in reaching a broad-based forestry accommodation agreement;
- Fulfill legal obligations of the Crown;
- Promote sustainable forest management in the Nass TSA;
- Assist in streamlining subsequent consultation processes; and
- Increase certainty for long-term access and sustainable development for the Gitanyow, Nisga'a Nation (as represented by the NLG), and all resource sectors (e.g., forestry, fisheries, tourism, and mining).

The project also aligns with the overall economic development goals of the District of Stewart and City of Terrace (District of Stewart 2014; NDIT 2015).

19.3 Scope of the Assessment

Issues scoping and the selection of VCs and ICs for the Economic Effects Assessment is guided by provincial and federal legislation (see Section 19.2), review and consideration of comparable projects, input from Nisga'a Nation and other Aboriginal Groups, members of the EAO-led Working Group, and stakeholders. Consideration of the scale and location of Project components and activities also plays a prominent role in establishing the scope of the assessment.

19.3.1 Information Sources

Information used in issues scoping and VC/IC selection processes for the Application/EIS includes:

- Recent environmental assessments and related research conducted for comparable projects in northwest BC, including (in particular) the Brucejack Underground Gold Project (Pretivm Resources Inc.), with additional review of environmental assessments conducted for the Kitsault Mine Project (Alloycorp Inc.), Kemess Underground (Aurico Metals Inc.), and the KSM Project (Seabridge Gold Inc.);
- Consultation with provincial and federal regulators, Working Group members, organizations, Nisga'a Nation, local and regional stakeholders, and the public;
- Federal and provincial requirements and guidelines;
- Publicly available reports and databases, especially the Canada Census and a variety of information products from BC Stats; and
- Background technical reports.

Local and regional government documents referenced included: District of Stewart Official Community Plan; Nass South Sustainable Resource Management Plan; District of Stewart: Investment Ready Community Profile; District of Kitimat Housing Action Plan; and City of Terrace: Investment Ready Community Profile.

Sources of spatial data for the figures are noted on the figures themselves. Additional spatial data for traplines, parks, and commercial recreation tenures came from GeoBC Data Discovery.

There was no useful or relevant spatial data available from regional or local sources.

19.3.2 Input from Consultation

IDM is committed to open and honest dialogue with regulators, Aboriginal Groups, community members, stakeholders, and the public.

IDM conducted consultation with regulators and Aboriginal Groups through the EAO-led Working Group. Where more detailed and technical discussions were warranted, IDM and

Working Group members, including sometimes NLG representatives, held topic-focused discussions, the results of which were brought back to EAO and the Working Group as a whole.

Further consultation with Aboriginal Groups, community members, stakeholders, and the public has been conducted as outlined by the Section 11 Order (dated February 2016) and EIS Guidelines issued for the Project. The results of those consultation efforts relevant to the assessment of potential effects of the Project on economic VCs and ICs have been summarized in the table below.

More information on IDM’s consultation efforts with Aboriginal Groups, community members, stakeholders, and the public can be found in Chapter 3 (Information Distribution and Consultation), Part C (Aboriginal Consultation), Part D (Public Consultation), and Appendices 27-A (Aboriginal Consultation Report) and 28-A (Public Consultation Report). A record of the Working Group’s comments and IDM’s responses can be found in the comment-tracking table maintained by EAO.

During consultation with stakeholders, government agencies, Aboriginal Groups, and the public, IDM developed a preliminary list of proposed VCs and ICs based on early drafts of the Project description and its understanding of the local area. A summary of feedback from consultation with NLG, Working Group members, and key stakeholders on the economic VCs and ICs is summarized in Table 19.3-1.

Table 19.3-1: Summary of Consultation Feedback on Economic VCs and ICs

Topic (VC, IC, Sub-Component)	Feedback by*				Consultation Feedback	Response
	NLG	G	P/S	O		
Project-Related Employment	✓				Project Related Employment is important to NLG and to regulators.	IDM has included Project-Related Employment as an economic VC in the Economic Effects Assessment.
Project-Related Employment		✓			Northern Health requested that Project-Related Employment be considered as an IC, rather than a VC, under the Economic pillar.	IDM has made the change requested by Northern Health.
Revenue to the Local Economy		✓			Northern Health requested that Revenue to Local Economy be considered as an IC, rather than a VC, under the Economic pillar.	IDM has made the change requested by Northern Health.
Revenue to the Local Economy			✓		Cumulative effects could be social (influx of temporary worker populations to small communities) or economic (creation of boom-and-bust economy).	IDM has accounted for potential cumulative effects of multiple, large-scale projects in the RSA in the assessment of economic and social VCs.

Topic (VC, IC, Sub-Component)	Feedback by*				Consultation Feedback	Response
	NLG	G	P/S	O		
Revenue to the Local Economy		✓			While industry can bring many positive economic benefits, it can also create income inequity, changes in cost of living, economic diversification, financial mismanagement, food insecurity and changes in employment demand and supply. If present, negative impacts can be experienced by already vulnerable populations.	<p>Potential changes to the economic environment have been assessed through the following ICs and VC:</p> <ul style="list-style-type: none"> • Employment; • Revenue to the Local Economy; and • CRA Fisheries. <p>The IC Employment has also been considered in the assessment of other social and economic VCs:</p> <ul style="list-style-type: none"> • Social and Health Services; • Housing; • Infrastructure; • Recreational Values; and • Current Land and Resource Use. <p>IDM will work with community leaders, Northern Health, and others in the community to develop plans and strategies to mitigate and manage potential adverse economic effects of the Project on vulnerable populations.</p>
Revenue to the Local Economy		✓			<p>Regarding continued contribution to local and regional economies:</p> <ul style="list-style-type: none"> • What is IDM’s commitment to hosting training opportunities in Stewart and surrounding communities (including First Nation communities), which would provide local persons with lasting skills beyond short-term work. • Consider establishing a policy to hire local (and within the northwest region) when possible in order to provide economic opportunity to locals and to help alleviate the sudden influx of foreign/temporary workers 	IDM is committed to providing training opportunities for local residents, including Nisga’a Nation communities. IDM will establish a local hiring policy and a policy to maximize local procurement by both IDM and its contractors. IDM will further assess economic opportunities for locals through the Revenue to Local Economy IC
Contemporary Land and Resource Use	✓				NLG requested that the VC be entitled “Contemporary Land and Resource Use”, instead of “Current Land and Resource Use” to help to distinguish between cultural and other land uses.	IDM has made the change requested by NLG.

Topic (VC, IC, Sub-Component)	Feedback by*				Consultation Feedback	Response
	NLG	G	P/S	O		
Contemporary Land and Resource Use		✓			Although Crown land is outside the Regional District's jurisdiction, we encourage smart land use planning and ask that existing Provincial Land Use Management Plans are consulted and followed.	IDM will work to ensure that the Project supports and is in alignment with existing Provincial Land Use Management Plans.
Contemporary Land and Resource Use	✓				For the Access Road, another example of a potential issue could be increased access to areas within the Nass Wildlife Area that historically have been "inaccessible". Enhanced access can increase hunting and fishing pressure in the area. Will this be addressed in the EA?	Historically, the Bitter Creek valley has been accessed using the Bitter Creek access road, which has not been decommissioned but remains passable to a point. Changes to access have been included in the scope of the assessment of many VCs. IDM will also enforce a no hunting / no fishing policy for the Project workforce. Increased fishing pressure has been assessed under the VC CRA Fisheries.
Contemporary Land and Resource Use	✓				Increased hunting and fishing pressure should be added as a potential issue under workforce.	IDM will enforce a no hunting / no fishing policy for Project workforce.
CRA Fisheries		✓			Work force is a potential effect on Fish through all aspects of the mine life (potential fishing pressure). It is not identified in all cases.	The potential adverse effect of increased fishing pressure has been assessed through the VC CRA Fisheries. IDM will implement a no hunting / no fishing policy for the Project's workforce. IDM will also discuss the appropriate placement of a gate on the Bitter Creek Access Road with NLG and provincial regulators.

Topic (VC, IC, Sub-Component)	Feedback by*				Consultation Feedback	Response
	NLG	G	P/S	O		
CRA Fisheries	✓	✓			Increased hunting and fishing pressure stemming from the Project's workforce and increased access to the Bitter Creek valley should be added as a potential issue.	Historically, the Bitter Creek valley has been accessed using the Bitter Creek access road, which has not been decommissioned but remains passable to a point. Changes to access have been included in the scope of the assessment of economic VCs. IDM will enforce a no hunting / no fishing policy for Project workforce. Increased fishing pressure has been assessed under the VC CRA Fisheries and the Fish and Fish Habitat VC.
CRA Fisheries		✓			DFO requested that IDM construct a model of the potential downstream effects of a catastrophic failure of the TMF.	IDM has conducted a dam breach failure analysis and it is included in the Application/EIS.
CRA Fisheries	✓				NLG requested that the assessment of the Fish VC include the salmon and eulachon in the lower Bear River.	The assessment of potential effects on Bear River salmon and eulachon and their significance has been considered under CRA Fisheries. Salmonid and Eulachon were additionally added to the Fish VC.

*NLG = Nisga'a Lisims Government;

G = Government - Provincial or federal agencies;

P/S = Public/Stakeholder - Local government, interest groups, tenure and license holders, members of the public;

O = Other

19.3.3 Valued/Intermediate Components, Assessment Endpoints, and Measurement Indicators

The VCs, ICs, assessment endpoints, and measurement indicators used in the Economic Effects Assessment on LSA communities and, more generally, in the RSA are summarized in Table 19.3-2. The rationale for their selection was informed by input from Working Group members (including NLG, stakeholders, and government regulators), review of government guidelines, and consideration of other comparable projects, published research, and professional judgment. Ongoing consultation and engagement with local communities and Nisga'a citizens during socio-economic baseline research in Stewart, Terrace, and Gitlaxt'aamiks and the IDM open houses in Gitwinksihlkw and Gitlaxt'aamiks also helped confirm and refine the rationale for inclusion of each VC.

Key considerations in developing the rationale for selection of VCs, ICs, and assessment endpoints included:

- The potential for interactions with Project components or activities and the potential for adverse Project effects arising from these interactions;
- Nisga’a Nation interests as identified in the NFA and/or through ongoing consultation with NLG and Nisga’a citizens;
- Aboriginal Interests;
- Local or community concerns; and
- Social science research into the social and economic effects of similar projects.

Where available, specific measurement indicators are used to focus the assessment on metrics or proxies of economic attributes or activities that might be negatively affected by the Project and that are important to reviewers when considering the economic effects. These are summarized in Table 19.3-2 and Table 19.3-3.

The following economic VCs and ICs are identified for assessment:

- Project-Related Employment (direct and indirect);
- Revenue to the Local Economy;
- Contemporary Land and Resource Use, being existing land and resource users and uses (e.g., overlapping Crown tenures, guide outfitters, trapline holders, etc.); and
- Commercial, Recreational, and Aboriginal (CRA) Fisheries.

The potential effects of Project activities and components on Aboriginal peoples will be discussed separately, as relevant and appropriate, in accordance with EIS Guidelines Sections 6.1.8, 6.1.9, and 6.1.11 (Agency 2016).

Table 19.3-2: Assessment Endpoints and Measurement Indicators for Economic VCs

Valued Components	Primary Measurement Indicators	Assessment Endpoints
Contemporary Land and Resource Use	Changes to access, such as prohibitions and/or increased numbers of persons wanting access.	Continuity of contemporary land and resource use
Commercial, Recreational and Aboriginal (CRA) Fisheries	Change in access to existing resource uses. Change in quantity of Fish resources and Fish health.	Continuity of CRA Fisheries.

Table 19.3-3: Measurement Indicators for Economic ICs

Intermediate Components	Primary Measurement Indicators
Project-Related Employment (Direct and Indirect)	<ul style="list-style-type: none"> • Predictive model (BCIOM) • Regional and local labour statistics and demographics • Project person-hours of Work • Estimate project work contract values • Education, skills, and training opportunities
Revenue to the Local Economy	<ul style="list-style-type: none"> • Predictive model (BCIOM) • Regional and local economic statistics • Local procurement opportunities • Regional procurement opportunities • Estimate project work contract values

19.3.4 Assessment Boundaries

19.3.4.1 Spatial Boundaries

19.3.4.1.1 Project Employment and Revenue to the Local Economy

The RSA boundary for the ICs Project-related Employment and Revenue to the Local Economy coincides with boundary of the RDKS (Figure 19.3-1). The boundary is selected because of the availability of social and economic data that is typically compiled by areas defined for the Canada Census, which similarly correspond with the boundaries of regional districts in BC. The RSA boundary for CRA fisheries has been adjusted from the one presented in the Project's AIR to be consistent with the RSA for Fish and Fish Habitat (see Section 19.4.4 for more details).

The LSA for the Economic Effects Assessment is defined as falling within a 50 kilometre (km) radius of the Project (see Figure 19.3-1 and Figure 19.3-2). This area encompasses the following communities and settlements:

- District of Stewart;
- Nisga'a Village of Gitlaxt'aamiks;
- Nisga'a Village of Gitwinksihlkw;
- Nisga'a Village of Laxgalts'ap; and
- Nisga'a Village of Gingolx.

The LSA for CRA Fisheries has been reduced from the one presented in the Project's AIR to be consistent with the LSA for Fish and Fish Habitat.

19.3.4.1.2 CRA Fisheries and Contemporary Land and Resource Use

The RSA and LSA boundaries for the VCs CRA Fisheries and Contemporary Land and Resource Use have been selected to be consistent with the RSA and LSA boundaries for the Fish and Fish Habitat Effects Assessment as well as the Wildlife and Wildlife Habitat Effects Assessment. This is a slight change from the Project's AIR to reflect the limited geographic extent of anticipated effects on Fish, Fish Habitat, Wildlife, and Wildlife Habitat.

19.3.4.2 Temporal Boundaries

The temporal boundary for the Economic Effects Assessment encompasses the following phases:

- Construction Phase: 18 months;
- Operation Phase: 6 years; and
- Closure and Reclamation Phase: 5 years.

The Post-Closure Phase is expected to continue for approximately 10 years and includes ongoing reclamation activities and post-closure monitoring. The economic implications of these activities will be very small in both the LSA and RSA and will be almost entirely beneficial, hence this phase of the Project is not considered in the Economic Effects Assessment.

19.3.4.3 Administrative and Technical Boundaries

Regional district, local health area (LHA), municipal, census district, and NFA boundaries are all relevant administrative boundaries in relation to the Economic Effects Assessment. The socio-economic information and data available for use in the Economic Effects Assessment is typically collected and organized according to these boundaries. The jurisdictions of government agencies and organizations are also often aligned with these administrative units.

Technical boundaries are those that limit the ability to predict or measure change. The Economic Effects Assessment is limited by gaps and irregularities in the data or limits on the scale at which data is available. For example, although data might be collected at the community or LHA scale, for areas with very small populations, data is often suppressed to protect individual privacy. Sometimes the only available data is quite dated.

Another technical boundary arises due to the unpredictability of economic outcomes. It is not difficult to gain a general understanding of the potential economic effects of a project and predict a range of possible outcomes and potential effects through analysis of available data, consultation and engagement with local populations, and reference to experience and research from other comparable projects and communities. The sheer number of social and economic variables at play increases the uncertainty of predictions. To help deal with this uncertainty, IDM will seek to work with its partners in the LSA to monitor socio-economic conditions and use that knowledge to inform the development and implementation of mitigation measures and adaptive management strategies.

Figure 19.3-1: Project Employment and Revenue to Local Economy LSA and RSA

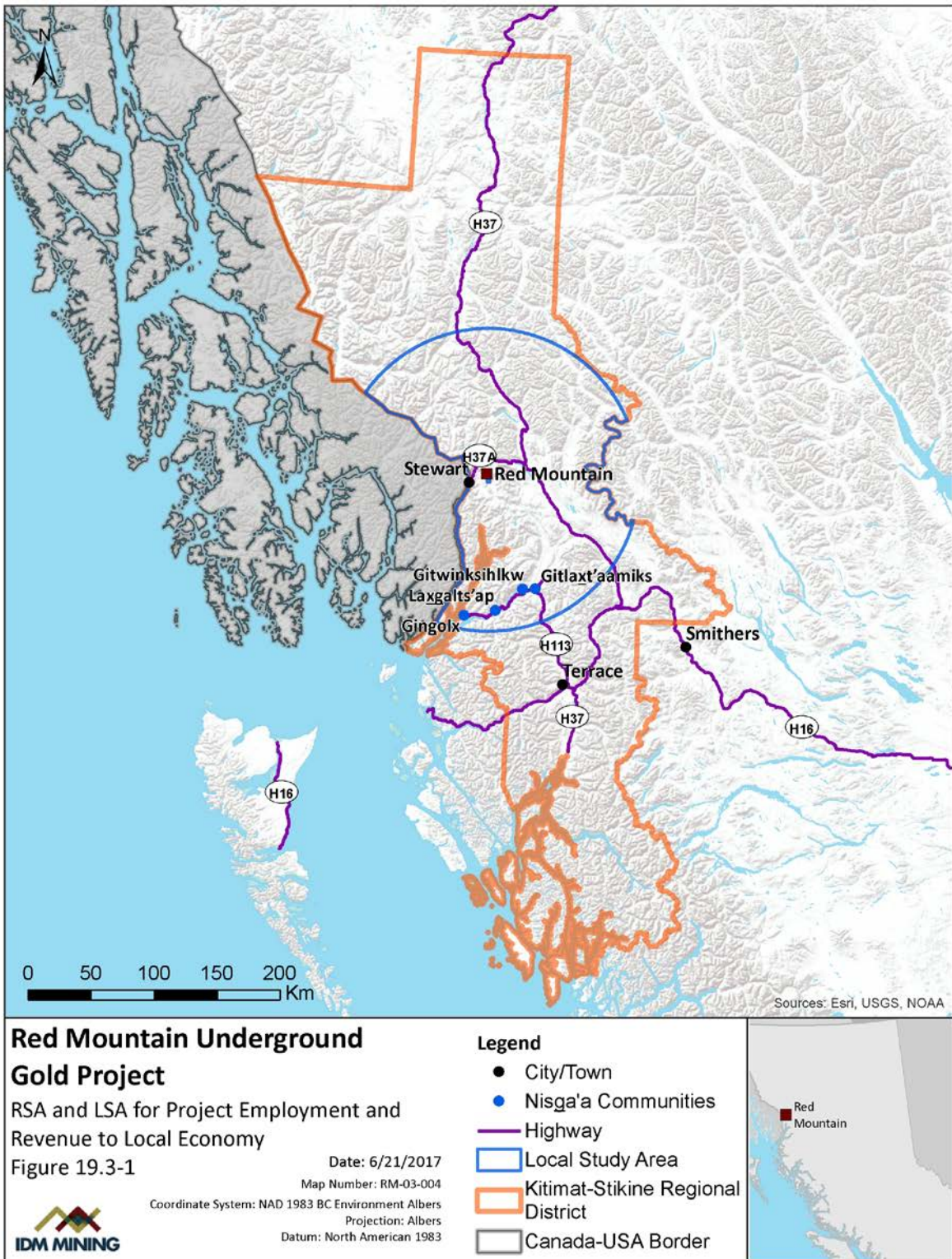
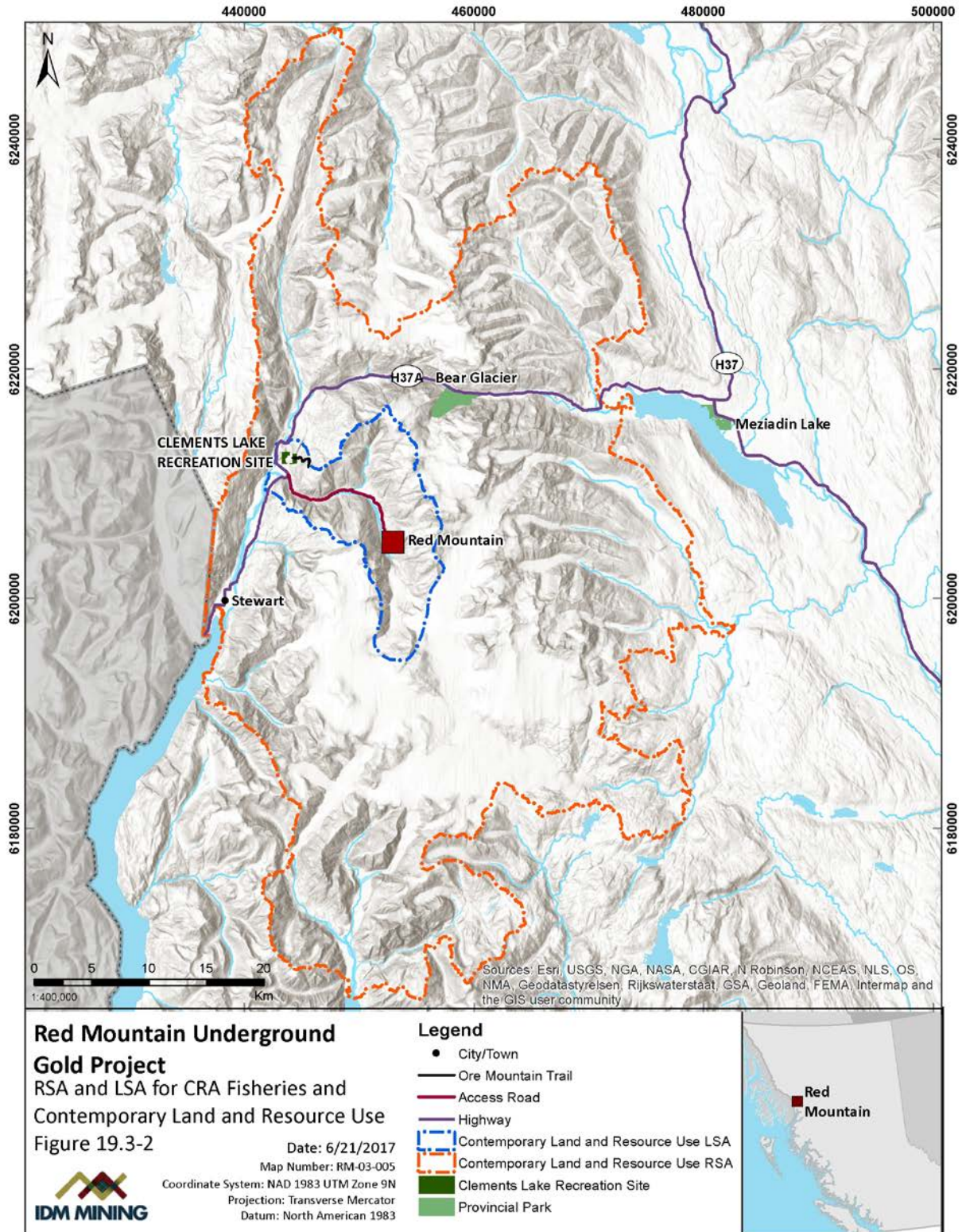


Figure 19.3-2: CRA Fisheries and Contemporary Land and Resource Use LSA and RSA



19.4 Existing Conditions

19.4.1 Overview of Existing Conditions

Economic development in the LSA, RSA, and northwest BC is closely tied to development of the area's abundant natural resources. Forestry, fisheries, and mining all have rich histories in the region. While in recent decades forestry and fishing have waned, mining has enjoyed a prolonged resurgence from the mid-1980s. Mining became a strong component of attempts to rejuvenate the economy and contemporary socio-economic planning in the early 2000s (BC LRMP 2000). Infrastructure limitations, isolated communities, low population density, difficult winter weather, and long distances remain important constraints on development. Communities within the RSA are especially susceptible to changes in global commodity markets. The District of Stewart's fortunes have been closely tied to the expansion and contraction of the global market for minerals for decades (Markey et al. 2011; JDS Energy & Mining Inc. 2014).

Although contemporary economic development in northwest BC remains driven by natural resources (NDIT n.d; NDIT 2015; NDIT), increasingly the majority of employment is found in secondary and tertiary sector jobs (health care and social assistance, public administration, retail trade, manufacturing, educational services, construction, and accommodation and food services), which account for almost two-thirds of total employment in the RSA (Pretivm Resources Inc. 2014).

19.4.2 Past and Current Projects and Activities

The District of Stewart is very familiar with the mining and mine exploration sectors that have played a prominent role in its history throughout most of the 20th century. The closing of the Granduc Mine in 1984 marked the end of an era and was the last mine to provide significant employment in the town. Other contemporary mines in the region that recently reached the end of their productive lives include the Eskay Creek Mine (closed in 2008) and Kemess South Mine (closed in 2010), which were both important regional employers (Heisler and Markey 2010).

The Huckleberry Mine, until recently the only operating mine in the RSA, suspended operations in August 2016 (Imperial Metals Inc. 2017). The Red Chris Mine is outside the RSA, but the project ships concentrate through Stewart and provides some economic benefit to the community (Imperial Metals Inc. 2015 Mar; Arrow Transportation Systems Inc. 2015 Jun).

Hydro-electric projects in the LSA include the recently completed Long Lake Hydro project, which commenced commercial production at the end of 2013. Three hydro projects farther north in the Iskut River watershed have recently come on line: Forest Kerr (195 MW), Volcano Creek (16 MW), and McLymont Creek (66 MW) (AltaGas Ltd 2017).

19.4.3 Project-Specific Baseline Studies

19.4.3.1 Data Sources

Baseline information used to develop the Economic Effects Assessment is derived from the Socio-Economic Baseline Report (Appendix 20-A), which is based on a variety of published and unpublished sources, including: technical reports, official statistics, peer reviewed research, minutes or notes from Working Group meetings, baseline reports, and effects assessments developed for other comparable projects (i.e., Brucejack Underground Gold Project, Kitsault Mine Project, Kemess Underground, and the KSM Project).

Most statistical data is developed from the Canada Census and, for the 2011 census year, from the National Household Survey (NHS), which replaced the long-form census in 2011. The long-form census was reinstated for 2016; however, most of the data from the latest census was not yet released at the time of writing. Official data is therefore limited to the 2011 census and NHS and is complimented by a variety of statistics and data generated by BC Stats. Although not recent, data from the 2006 and earlier censuses are occasionally used to help build a picture of social and economic trends over time in the region.

Caution is necessary when drawing conclusions based on census data about current social and economic conditions, as these data may be outdated, especially in the case of smaller communities. The availability and/or reliability of data may vary between communities; often information typically available for larger communities does not exist for smaller communities or it may be deliberately suppressed by Statistics Canada to protect personal privacy. Where possible these data gaps are filled through primary research. Caution is also required when comparing data from different sources and time periods that may be based on different geographic boundaries and statistical definitions.

Notwithstanding these gaps and limitations, the data is sufficiently accurate and consistent with professional practice for the purposes of describing a socio-economic baseline and the subsequent assessment of potential economic effects.

As outlined in Chapter 6 (Effects Assessment Methodology), IDM has not conducted primary traditional use or traditional ecological knowledge (TEK) surveys in support of the Project due to the preferences of Nisga'a Nation, as represented by the Nisga'a Lisims Government (NLG), and EAO's and the Agency's direction for comparatively low levels of engagement with the other Aboriginal Groups potentially affected by the Project. IDM has committed to using TEK where that information is publically available. As no TEK relevant to this effects assessment was publically available at the time of writing, no TEK has been incorporated.

All sources are identified in the list of references at the end of this report.

19.4.3.2 Primary Data Collection

To supplement secondary sources material, a brief field visit to Stewart and Terrace was undertaken between November 28 and December 1, 2016. The purpose of the fieldwork was to meet with key informants to gather additional information on social and economic conditions. Interviews were semi-structured and focused on corroboration and updating of

information gathered from secondary sources and identifying additional sources and gaps in understanding.

Interviews were held with several staff members of RDKS, provincial agency representatives, staff and council of the District of Stewart, business owners in Stewart, community organizations, health, social service, and education professionals, and the Royal Canadian Mounted Police (RCMP). A meeting with Nisga'a Pacific Ventures LP was held in Gitlaxt'aamiks in December 1, 2017. Several follow-up calls were also made by telephone with selected key informants to fact-check and verify certain assumption and conclusions.

19.4.4 Baseline Characterization

The following sections provide a summary description of existing conditions in the economic RSAs and LSAs. More detailed background information on social and economic conditions, including those conditions related to contemporary land use and planning, is presented in Appendix 20-A (Socio-Economic Baseline Report).

19.4.4.1 Context for Project-Related Employment

The population within the RDKS was in decline from the mid-1990s, although the rate of decline slowed between 2006 and 2011. 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 (Appendix 20-A). While the labour participation rate for the RDKS at 60-65% is comparable to the province, un- and under-employment in the region are both above provincial averages (Appendix 20-A).

Income data is difficult to obtain for the smaller communities in the LSA because data is typically suppressed for privacy reasons. The latest socio-economic profiles for the region encompassing the RSA were produced in 2012 and include profiles for School District 82 and Health Services Delivery Area 51 (Appendix 20-A).

Resource industries drive the economy and employment in the region. Although only about 7% of the workforce in the RSA are directly employed in mining, forestry, oil and gas, or other primary activities (Appendix 20-A) 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 (Appendix 20-A).

Guide outfitting and adventure tourism are important employers in northwest BC, building off the region's ample opportunities for traditional backcountry pursuits such as hunting, fishing, and more contemporary nature-based activities, including kayaking, white water rafting, skiing, snowmobiling, and other snow sports, cruise ship tours, and Aboriginal arts and culture (NDIT 2015). In 2012, approximately 6,900 people were employed in the tourism sector in northern BC (Pretivm Resources Inc. 2014).

According to BC Stats analyses (BC Stats 2012b; BC Stats 2012d), 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. On the other hand, only 18% of households in northwest BC pay more than 30% of family income on

housing costs, compared to 29% for the province and over 37% in Vancouver. Not surprisingly, approximately one-third of household incomes were dependent on forestry, mining, and fishing in 2005 compared to 11% for the province (Appendix 20-A; Pretivm Resources Inc. 2014).

19.4.4.2 Context for Revenue to the Local Economy

Until recently, mining supplied an estimated 30% of jobs within the communities along Highway 37 (Bridges and Robinson 2005; Halseth et al. 2010). The larger population centers of Smithers and Terrace have provided the mining industry with an available labour force as well as a service and supply base. Mining continues to be an important source of employment, although over the last several years this has been mainly mineral exploration rather than development and operation (Bridges and Robinson 2005; Halseth et al. 2006; Halseth et al. 2010).

Mining has played a significant role in Stewart's economy since it was settled and continues to do so today although at a reduced scale. Since the closure of the Granduc Mine in 1984, Stewart has been economically depressed and many residents have left the area in search of work. The local economy is susceptible to resource industry cycles in the region and is one of the least diversified in the province (Markey et al. 2011; JDS Energy & Mining Inc. 2014). The Eskay Creek Mine was an important economic contributor and employer until its closure in April 2008. The Red Chris Mine supports employment in Stewart by shipping its ore concentrate through Stewart Bulk Terminals. Other mines in the area that have contributed to the socio-economic well-being of Stewart include the Premier, Jumbo, Red Cliff, and Porter-Idaho projects (JDS Energy & Mining Inc. 2014; Arrow Transportation Systems Inc. 2015 Jun). Other industries in Stewart include tourism, forestry, retail, and accommodation and food services (NDIT n.d).

In the Nisga'a Villages, the predominance of forestry and fishing sectors has declined in recent years, while tourism, construction, and mining-related activities have provided more jobs. The current Nisga'a economy remains especially dependent on the public sector (Rescan Environmental Services 2012).

The LSA communities generally have a narrow economic base with limited investment opportunities and, as noted, a historical dependence on extractive industries. For some communities, tourism provides an element of diversity. For others, resource dependence remains the dominant feature underpinning the economy. Since the mid-1990s many of these communities have experienced depopulation (13% on average across the RSA) and economic contraction due to a decline in resource based industries and broader social, economic, and political trends (Matthews and Young 2007).

19.4.4.3 Context for Contemporary Land and Resource Use

The Project falls within the boundary of the Nass South SRMP (FLNRO 2012a). The Nass South SRMP was written in partnership with NLG, Gitanyow First Nation, the public, and private stakeholders to address sustainable management of land, water, and resources in the southern portion of the TSA and to foster and improve consultation and collaboration processes between the province, Nisga'a Nation, and Gitanyow First Nation. The overall goal

is to enhance cooperation and promote strategic and sustainable land use planning and resource development (FLNRO 2012a).

The Nass South SRMP provides management direction and objectives for each of seven areas: water, biodiversity, botanical forest products, wildlife, fisheries, cultural heritage resources, and timber; however, it does not prescribe how these objectives are to be achieved.

The two closest provincial protected areas, Bear Glacier Provincial Park and Meziadin Lake Provincial Park, are 37 and 67 km northeast of the Project, respectively.

The LSA for Contemporary Land and Resource Use falls within West Central Wildlife Management Unit (WMU) 6-14. The LSA accounts for just over one per cent of the total area of WMU 6-14. The RSA overlaps both WMU 6-14 (<9%) and WMU 6-16 (>13%). WMU 6-14 is the most relevant as it overlaps the Bitter Creek watershed. Reported kills throughout WMU 6-14 from resident and non-resident hunters for the period 2000-2012, as recorded by the BC Ministry of Forests, Lands, and Natural Resource Operations (FLNRO), includes 4 moose, 76 mountain goats (<6/year.), and 19 grizzly bear (Appendix 20-A). It is uncertain if any of these animals were taken from the Bitter Creek valley.

Non-resident hunters are required to use a registered guide outfitter when hunting in BC. The Project and Bitter Creek valley fall within the boundary of guide outfitting license no. 601084, held by Nisga'a Guide Outfitting LP, a wholly owned subsidiary Nisga'a Pacific Ventures Limited Partnership (NVP). The license was recently sold to NPV by Bob Milligan, owner of Milligan Guide Outfitting. The license was in the Milligan family for two generations. Bob Milligan has been retained by Nisga'a Guide Outfitting as an advisor (R. Milligan, pers. comm. 2016; NLG).

Although there are several trapline licenses within the RSA, the one of real relevance to the Economic Effects Assessment is trapline no. TR0614T101 because approximately one fifth of the trapline overlaps with the LSA (i.e., the Bitter Creek valley). The trapline is not intensively used for trapping pelts largely due to poor market prices in recent years. Six hundred and thirty pelts were reportedly taken from the trapline between 1985 and 2000, the most recent year for which a fur harvest was reported.

The Bitter Creek valley also falls within the boundaries of one heli-ski operator, Last Frontier Heli-skiing (LFH), which owns the rights to commercial recreation license no. 6406136. The license grants exclusive rights to LFH to operate in an 8,900 km² area that encompasses more than 600 ski runs. The company has three A-Star helicopters and can accommodate up to 35 guests. LFH has an international clientele and an annual volume target of almost 4,000 skier-days per season (C. Umpleby. Pers Comm. 2016). Most clients are European and approximately 25-30% of clients are repeat customers (C. Umpleby. Pers Comm. 2016).

The Project falls within the Kalum Forest District and Nass TSA (FLNRO 2012a). Table 19.4-1 summarizes the forest license holders in the Contemporary Land and Resource Use LSA and RSA. Currently, active logging operations are only taking place on license L50477.

Figure 19.4-1: Contemporary Land and Resource Use (selected)

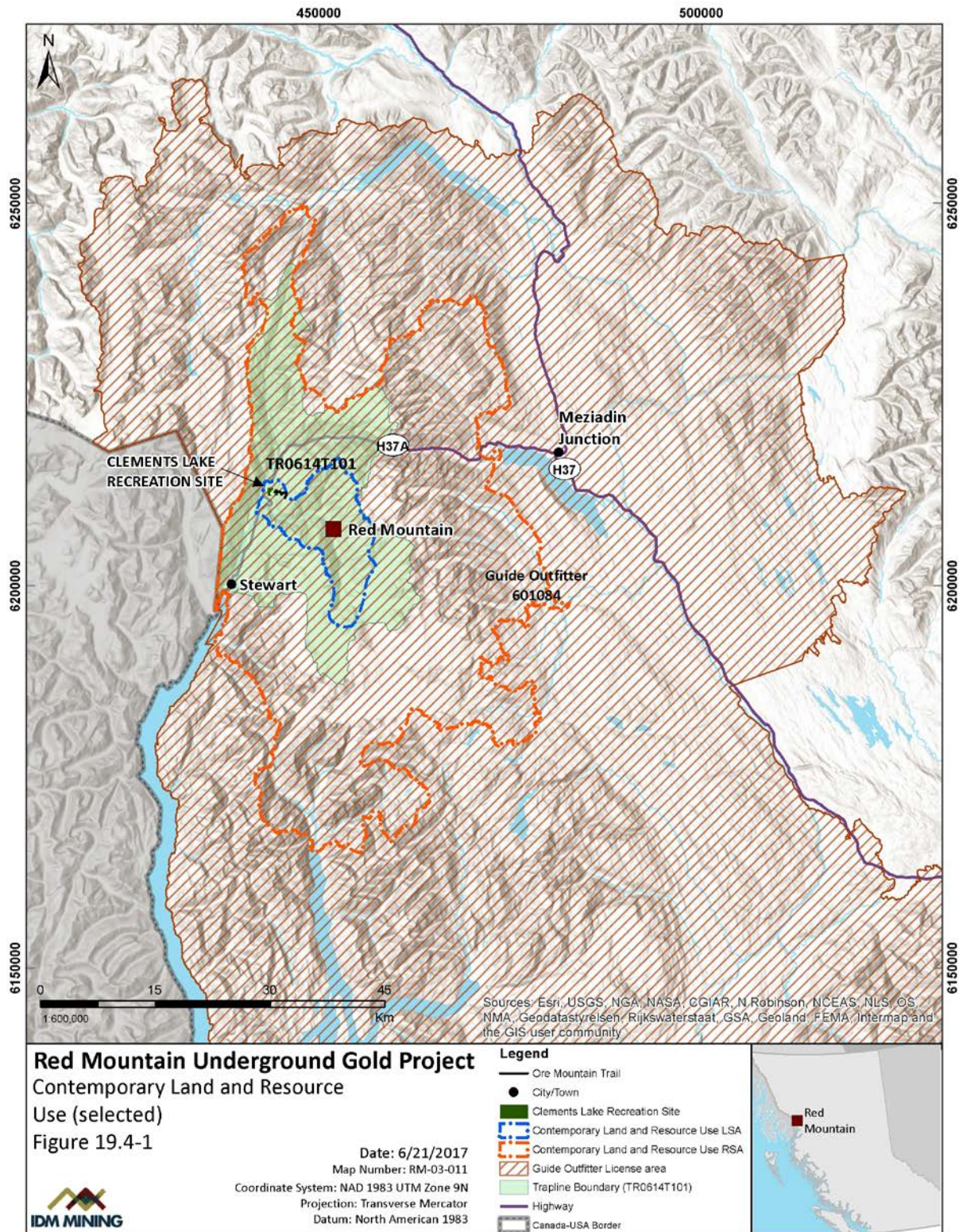


Table 19.4-1: Summary of Forest License Holders in the LSA and RSA

Licensee	License Number	TSA	License Location
LSA			
Long Lake Hydro Inc.	L50477	Nass	Two locations: (1) northwest portion of the LSA at the confluence of Bitter and Bear Creek; and (2) most westerly portion of RSA towards the USA border.
Yellowhead Helicopters Ltd.	L50537	Nass	Most northwest portion of the LSA, at the confluence of Bitter and Bear Creek.
RSA			
District of Stewart	L49460	Nass	In the municipality of Stewart, in the southwest portion of the RSA.
Shane Partridge	L49545	Nass	5 km north of Stewart, along Highway 37, and along the west portion of the RSA.
Stewart World Post Services	L50406	Nass	4.5 km north of Stewart, along Highway 37, and along the west portion of the RSA.
DJ & J Enterprises Ltd.	L50278	Nass	North of Stewart, along Highway 37 running east along Glacier Creek, and within the west edge of the RSA.

Source: (FLNRO 2012a)

Tourism is an important part of the local economy in Stewart. Outdoor recreation and opportunities to experience the area's scenic and wilderness environment are important draws for visitors (District of Stewart 2014).

There are several hiking trails in and around the community that are maintained by the District of Stewart. These trails provide accessible outdoor recreation opportunities for residents and tourists alike.

There are several lakes and rivers in the area for fishing, boating, and water skiing. Snowmobiling starts in November and can continue through to July. Events are held by the Stewart Bordertown Snowmobile Club. The area around Long Lake, 25 km north of Stewart and Summit Lake, close to the old Granduc Mine site, are two especially popular snowmobiling areas.

Clements Lake Recreation Area provides swimming, camping, canoeing, and hiking opportunities. It is located approximately 13 km from Stewart, along Highway 37A, and not far from the proposed turn-off to the Project near the mouth of Bitter Creek. Clements Lake is the trailhead for a hiking trail that leads to Ore Mountain on the eastern flank of the Bitter Creek valley. The trail is a difficult 4 km hike to a small alpine lake. An analysis of available maps and online sources indicates that the trail ends before Bitter Creek valley would come into view.

19.4.4.4 Context for CRA Fisheries

The Nass South SRMP (FLNRO, 2012), which includes the Bear River watershed, has very high fish values, including critical habitats for Pacific salmon species and steelhead. According to the Red Mountain Project Baseline Fisheries and Aquatic Resources Study, the Bear River watershed has valuable fish habitat and salmonid spawning and rearing areas (Appendix 18-A) Fish species documented in Bear River include Dolly Varden, Coho, Chum, Pink and Chinook salmon, Steelhead, Eulachon, and Coastrange Sculpin. The Bitter Creek main stem channel has minimal fish habitat due to elevated turbidity, high velocities, and negligible refugia; however, two fish species were documented: Dolly Varden and Coastrange Sculpin (Appendix 18-A). Dolly Varden is considered a sport fish that is widespread in river, lake, and stream habitat throughout much of northern BC.

19.4.4.4.1 Commercial Fisheries

There has not been a commercial fishing fleet in the Stewart area since at least approximately 2000/2001 (Stoffels 2001). Given the decline of commercial fishing along the BC coast over the past 20 years and changes in the technology and economics of commercial fishing in general, it is unlikely that that a commercial fleet will return to area in the foreseeable future.

19.4.4.4.2 Recreational Fisheries

The RSA for CRA Fisheries falls entirely within BC's Fish and Wildlife Region 6 – Skeena and waterbody management units 6-14 and 6-16 (FLNRO 2015). There is no fishing permitted in the Bear River watershed, including Bitter Creek. The nearest recreational fishing is Meziadin Lake and the Nass River main stem (FLNRO 2015).

In the Stewart area, recreational fishing is limited to the upper reaches of Portland Canal. Recreational fishing enthusiasts must be well prepared and self-sufficient if they want to fish in the Stewart area, as there is little in the way of supplies and services. Two to three recreational fishing charterers operate out of Stewart, but only during the summer months (District of Stewart 2016). The only accessible boat launch is in neighbouring Hyder, Alaska. From a tourism standpoint, saltwater recreational fishing in and around Prince Rupert offer the same, if not better, fishing experience with the benefit of a full range of support services and amenities that are not available Stewart.

19.4.4.4.3 Aboriginal Fisheries

The Bear River watershed provides habitat for all five species of Pacific salmon, steelhead, and, in the lower reaches of the Bear River and its estuary, eulachon, all of which are extremely important to Nisga'a citizens for food, social, and ceremonial purposes (FLNRO, 2012).

Eulachon were not documented in the Fisheries Inventory Summary System (FISS) records; however, they have been reported in the upper estuary and in lower parts of the Bear River, downstream of the Bitter Creek Bridge (Cleugh, 1979; Noble and Challenger, 2015). Cleugh (1979) reported recovering adult Eulachon at three sampling locations in the upper estuary of the Bear River. Noble and Challenger (2015) report the occurrence of adult spawners only

downstream of the highway bridge. Although anecdotal information indicates large eulachon runs up until the mid-2000s, there has been a substantial decline in the past decade which some suspect is a result of gravel extraction and beaver activity on the Bear and Rainy rivers, respectively (Noble and Challenger 2015).

According to comments received during consultation with NLG, Nisga'a citizens are not known to currently pursue salmon or eulachon in the lower parts of the Bear River watershed, nor in the estuary or upper reaches of Portland Canal. The reason is largely to do with location because the Nisga'a Villages are all situated along or near the Nass River, which has abundant runs of salmon and eulachon actively harvested for food, social, and ceremonial purposes. There is also a commercial Nisga'a salmon fishery on the Nass and several well-established eulachon camps, where families gather on a seasonal basis to harvest and process eulachon grease.

Given the relative abundance of Nass fisheries that continue to support Nisga'a food, social, and ceremonial fishery needs, there is little incentive to travel to the Bear River watershed. Nevertheless, the Bear River lies within the Nass Wildlife Area where Nisga'a Nation retains Treaty rights to harvest and manage fish; hence NLG is concerned for the future wellbeing of fish and fish habitat.

Currently there is no evidence to suggest that there are any Aboriginal fisheries on the lower reaches of the Bear River. Anecdotally it was reported in conversations during social field work that there are currently only one or two Aboriginal families living in Stewart, but this was not confirmed, and it is not known how actively they may or may not pursue their Aboriginal right to fish.

19.5 Potential Economic Effects

This section identifies how each economic VC and IC may be affected by interactions with Project components and activities. 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.

The assessment notes interactions that were excluded from further assessment, including the methods and criteria used to justify the exclusion and inputs received from EAO, government agencies, Nisga'a Nation, and the public regarding the exclusion.

Project effects on the socio-economic conditions of Aboriginal Groups resulting from changes in the environment are covered in Chapters 25 (Tsetsaut Skii km Lax Ha), 26 (Métis Nation BC), and 27 (Nisga'a Nation).

19.5.1 Methods

Evaluation of the economic effects of the Project relied on a qualitative process supported by quantitative modeling provided by Appendix 19-A (BC Input Output Model (BCIOM)). 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.

Subjective analysis is based on professional experience, consideration of peer-reviewed research, and other analyses that have examined the economic effects of mining projects on local economies and communities.

Building on the context provided in Section 19.4 and Appendix 20-A (Socio-Economic Baseline Report), a narrative is developed that examines the interactions of Project components and activities on the selected VCs and ICs.

19.5.2 Project Interactions

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. The key economic interactions identified are summarized as follows:

- The employment of a workforce, contractors, and sub-contractors during the Construction, Operation, and Closure and Reclamation Phases of the Project will interact with the local and regional labour markets. Project-related employment may create upward pressure on local wages and potentially other changes in demand for labour, goods, and services in the regional economy. Labour supply and other economic resources may be diverted from other pursuits to the Project. The opportunity for employment with the Project will attract people to the LSA and, potentially, to the RSA leading to changes in population.
- Increased revenue to the local and regional economies from business and employment opportunities related to the Construction, Operation, and Closure and Reclamation of the Project is expected. The Project itself, its workforce, contractors, and subcontractors will spend money on goods and services in the RSA and LSA. The revenue generated will have direct, indirect, and induced economic effects.
- The Construction, Operation, and Closure and Reclamation of the Project will potentially interact with Contemporary Land and Resource Uses and users, including existing Crown land tenure holders and the public, because of changes to access to the Bitter Creek valley, increased population, and the development of Project components and activities.
- CRA Fisheries could be affected by potential changes to fish or fish habitat due to Project components and activities or from increased fishing pressure due to potentially increased access and population increase related to the Project workforce.

No interactions between proposed Project components or activities and the selected economic VCs or ICs identified by IDM, Working Group members, or through consultation were excluded during this scoping phase.

Table 19.5-1: Potential Project Interactions and Economic Effects

Project Component or Activity	Valued Components / Intermediate Components	Potential Effect or Pathway of Interaction
Workforce	Project-related Employment (IC)	Change in demand for labour, goods, and services in the regional economy. Employment of workforce, particularly during construction and operations. Upward pressure on wages.
Project and workforce spending	Revenue to the Local Economy (IC)	Changes to economic activity in the regional economy. Increased revenue to the local and regional economy from business and employment opportunities. Opportunity costs related to workforce and resources being diverted from previous contracts to the proposed Project.
Workforce	Contemporary Land & Resource Use (VC)	Increased and improved access to the Bitter Creek valley.
Construction, operation, and reclamation and closure of mine-site components and activities	Contemporary Land & Resource Use (VC)	Environmental effects to Contemporary Land and Resource Use and users. Effects to Visual Quality.
Workforce	CRA Fisheries (VC)	Increased access to CRA Fisheries. Increased population leading to increased pressure and competition for CRA Fisheries.
Construction, operation, and closure and reclamation of mine-site components and activities	CRA Fisheries (VC)	Changes to Fish and Fish Habitat. Environmental effects to Fish and Fish Habitat.

19.5.3 Discussion of Potential Effects

The following sections provide a detailed description of key potential effects summarized in Table 19.5-1. Key assumptions and uncertainty regarding the potential effects are discussed for each economic VC and IC.

19.5.3.1 Effects of Project-Related Employment (Direct and Indirect)

Project-Related Employment, both direct and indirect, is considered an IC for the purposes of this assessment. Federal, provincial, and local levels of government, communities, Nisga'a

Nation, and stakeholders see employment as a significant social and economic benefit of the Project. The net positive or beneficial effects of the Project related to employment are not assessed in this chapter of the Application/EIS but are described in the Project Overview (Volume 2, Chapter 1, Section 5.3). Measures to monitor and manage Project-Related Employment such that LSA and RSA communities benefit from the Project to the greatest extent possible are described in Chapter 29 management plans including the Human Resources Plan and the Social and Economic Management Plan.

19.5.3.1.1 Effects on Local and Regional Labour Markets

The specific effects of Project-Related Employment on local and regional labour markets are very difficult to predict, as there are many complex factors at play. The availability of labour, availability of certain skill levels and types, and the amount and timing of competition for labour from other projects, will interact with the Project in different ways during different phases of the Project and across different scales (i.e., across local, regional, or provincial labour markets).

Over the course of the 18-month Construction Phase, it is estimated that the Project will generate approximately 754 person-years of direct and indirect employment and a further 111 person-years of induced employment (Appendix 19-A).

The Operation Phase is currently planned to last six years and is expected that the total direct, indirect and induced employment for British Columbia is 1227 jobs (Volume 2, Chapter 1, Section 5.3.2). The Kitimat Stikine Regional District is estimate to benefit from a total of approximately 266 direct employment opportunities over the lifetime of the Project. Further details of the Project's projected direct, indirect, and induced employment and other economic effects are provided in Appendix 19-A.

Direct and indirect Project-related employment, including jobs created by contractors and sub-contractors during Project construction and operation, will interact with the local and regional labour markets. Peak employment levels during construction will amount to less than 2% of active RSA workforce. Average annual direct and indirect employment for the Project during operation will be approximately one percent of the active workforce in the RSA. Note that not all the indirect employment will occur within the RSA, as many of these jobs are in supplier industries that could be located throughout the province.

Most construction work packages are likely to be undertaken by contactors and businesses located outside the RSA due to the specialized experience and expertise required. For those jobs that require highly specialized or specific skills, the pool of qualified individuals in the LSA communities is likely to be quite small. For other job categories, including labourers, catering, equipment operators, truck drivers, mechanics, and millwrights, it is expected that there will be a supply of qualified individual in the LSA and RSA communities.¹

¹ Data on the actual numbers of qualified individuals in specific mine-related job categories is not readily available on a regional basis. The level of local hiring is an outcome of several factors, including availability and targeted efforts of the Project to recruit locally.

While it is possible and desirable that contractors engaged from outside the region will hire local people with appropriate skills for construction related positions, IDM recognizes the need to work proactively with local communities, contractors, and sub-contractors to maximize employment opportunities for qualified personnel in LSA communities.

Project operation will generate longer-term employment than construction and will afford a greater opportunity to develop and train potential workers within LSA communities and the RSA more generally. Nevertheless, maximizing local employment will require similarly proactive management measures.²

Mine sector employment generally provides higher-than-average incomes when compared to other sectors of the BC economy (Bridges and Robinson 2005; ERM Rescan 2014; Pretivm Resources Inc. 2014). Notwithstanding these benefits of local employment that will be generated by the Project, such employment can have potentially adverse effects on local wage rates and other changes in demand for labour, goods, and services in the regional economy.

The higher earning potential of direct Project employment and procurement may increase competition for local labour and inflate wage expectations within the LSA and RSA. Project employment may attract skilled workers who are currently employed in non-mining sectors. Employers in other sectors may have to increase wages to retain existing employees and/or attract replacements. Local businesses may have to either devote a greater share of revenue to wages and/or elevate those with lesser skills to fill vacancies in higher skilled occupations. An assessment of the potential effects of the Project on Potential Social Issues Related to Project and Project Workforce is provided in Chapter 20 (Social Effects Assessment).

The upward pressure on wages is most likely to have the greatest effect in the LSA and RSA labour markets for semi-skilled labour and certain skilled professions and trades with specialized training or industry certifications (including millwrights, heavy truck and equipment operators, welders, mechanics, and electricians) that have the greatest potential to fill mine-related positions occupations (Pretivm Resources Inc. 2014).

Highly specialized, high-skill, and professional occupations that are typically filled by people from outside the region are less likely to affect the local labour market because they will be less likely to be competing with local businesses for such specialized personnel. Some individuals employed with the Project during construction may continue their employment with the Project into the Operation Phase.

² When speaking about potential labour supply in the RSA, it is to a large degree a reference to Terrace where about one third of the RSA workforce reside, and where it is reasonable to assume that the majority of skilled and semi-skilled labour, especially those with prior mining experience, are most likely to reside.

Broader trends in the labour market in northwest BC may overshadow the incremental effects of the Project on local and regional labour markets. Before the onset of the current down-cycle in the BC mining sector, there was heightened concern about a trend towards a long-term shortage of skilled labour in the province, especially for the mining sector (Price Waterhouse Coopers 2013). Mining sector employment increased 15% from 9,310 jobs in 2011 to 10,720 jobs in 2013 and then fell off dramatically to 8,726 jobs in 2015, an 18% decline in two years (Price Waterhouse Coopers 2013; Price Waterhouse Coopers 2015). Notwithstanding this apparent volatility in labour demand, long-term projections forecast ongoing demand as older, experienced workers retire. According to the Mining Industry and Human Resource Council, the Canadian mining industry will need more than 145,000 workers by 2023 to fill new positions and to replace individuals leaving the sector (MIHR 2013; MIHR 2016). Within BC, the BC mining industry forecasted a need for over 15,000 new workers over the next decade. The Project's ability to attract skilled labour to Stewart will depend on its ability to compete against other projects and the point in the mining cycle at which the Project comes on line.

In summary, while there may be some upward pressure on wages created by Project hiring, which could negatively affect individual LSA businesses in the short term, it is equally likely that the general increase in economic activity expected to be generated by Project spending will have beneficial effect on local businesses (for example, induced demand created by mine employees spending their incomes on goods and services) that will offset most, if not all, of the adverse effects of potential wage inflation.

The residual effect on local and regional labour markets when considered in the context of local and regional support for, and offsetting benefits of, economic development and employment opportunities, is negligible and is therefore not carried forward for further assessment.

Regardless, during the Project's Closure and Reclamation Phase, any adverse effect due to the competition for local labour and associated wage inflation pressures will come to an end.

19.5.3.1.2 Effect on LSA and RSA Population

It is expected that the opportunity for employment with the Project will attract people to the LSA and RSA, leading to changes in population. Economic model projections suggest a peak workforce of 334 during Construction and about 133 workers per year employed during Operation.

During the Construction Phase, the work force is likely to be housed in a self-contained work camp within the District of Stewart, and the effect on population is expected to be temporary and transient.

During the Operation Phase, IDM hopes to attract workers and their families to move to Stewart on a full-time basis. IDM's plan is to rely on a range of housing arrangements to accommodate workers in the town (Volume 3, Chapter 20, Social Effects Assessment). IDM is not planning the sort of onsite work camp that is typical of most contemporary mining projects in Canada. Rather, IDM's plan is for workers to be transported to and from the

Project from Stewart (Chapter 20; JDS Energy & Mining Inc. 2014). During the transition period between construction and operation, the camp may continue operate.

The Operation Phase is expected to generate an increase in Stewart's population, but it is not expected to have a noticeable effect on population levels in the rest of the LSA, specifically in the Nisga'a Villages, or in the RSA.

The challenge in attempting to predict actual levels of Project-induced in-migration to Stewart arises due to the uncertainty in trying to anticipate (a) how many current Stewart residents are able to secure mine employment, (b) how many Operation Phase workers decide to move to Stewart to live, and (c) the number of dependents that move with each employee moving in to town from elsewhere.

The population could potentially double if the entire operation workforce came to Stewart with three dependents. For a variety of social and economic reasons, it is unlikely that whole workforce will elect to move on a full-time basis to Stewart. It is also unlikely that every employee who does move will move with three dependents. Therefore, for the purposes of estimation, it is assumed that half of the annualized workforce of 133 will opt to move from their current location elsewhere in BC to live in Stewart the duration of the Operation Phase. It is further assumed that, on average, each incoming employee will have one dependent. Under these conditions Stewart could expect about a 25% increase in its population.³

For further comparison, an alternative scenario could imagine three-quarters of the workforce emigrating to Stewart with an average of two dependents each. Under these circumstances, the community would grow by 60%. Additional population growth may also result from induced employment gains and general improvements in economic opportunity in the town, which may attract others to move to (or back to) the community.

The potential increase in population in the LSA, in the District of Stewart specifically, is identified as a pathway effect for the economic VCs CRA Fisheries and Contemporary Land and Resource Use and is addressed in Sections 19.5.3.3 and 19.5.3.4, respectively. Potential Project induced population growth is also an important factor in consideration of several social effects assessed in the Social Effects Assessment (Chapter 20).

19.5.3.1.3 Effects due to Loss of Employment at Closure

At closure, there will be a transition of employment opportunities as the mine and processing facility are decommissioned and IDM begins preparations for closure and post-closure activities. Gradually the Project will require fewer employees.

Currently, the origin of employees and their specific circumstances is unknown. Some employees will likely be ready to move on to their next opportunity and will not be adversely affected by the closure of the mine. The experience and skills gained while working at the mine will enhance the ability of employees of the Project to find alternate

³ The population of Stewart has hovered around 500 for the past several years.

employment on other projects that may have come on line in northwest BC or elsewhere in the province.

Others may have moved to Stewart to start a new life or will have been longtime residents of the community. This latter group is likely to experience some social and economic hardship as former workers and their families adjust to the loss of a key source of household income. Some job losses will be offset by IDM's personnel needs to carry out closure, reclamation, and post-closure the activities. There will be some portion of the Project workforce that will potentially be adversely affected by mine closure.

Chapter 29 of the Application/EIS includes plans such as the Skills, Training and Employment Plan and the Social and Economic Management Plan that outline measures to assist workers to prepare for and plan their transition to find new employment. IDM is committed to working with employees, the District of Stewart, and Nisga'a Nation to mitigate and manage adverse employment effects potentially brought about by the end of active mining at the Project. With these measures and partnerships in place, it is expected that the potential adverse effects of mine closure on the Project workforce will be reduced to negligible levels. The effect is not carried forward for further assessment.

19.5.3.2 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 (Appendix 19-A).

There are no adverse economic effects expected due to an increase in Revenue to the Local Economy, and therefore it is not considered for further assessment. Revenue to the Local Economy is an IC with potential pathway effects on various social VCs; these are addressed in the Social Effects Assessment (Chapter 20). The Project's economic benefits in terms of increased revenue to the local economy are described in the Project Overview (Volume 2, Chapter 1, Section 5.3).

19.5.3.3 Contemporary Land and Resource Use

The economic effects of Project activities and components on Contemporary Land and Resource Use are focused on the three commercial tenures that overlap the Bitter Creek valley. These activities include trapping, guide outfitting, and heli-skiing.

Outdoor recreation has a commercial dimension that is important to the District of Stewart economy, however, for the purposes of this Application/EIS the economic aspects of outdoor recreation are considered in conjunction with the VC Recreational Values, which is assessed under the Social Effects Assessment (Chapter 20).

Other contemporary land and resource uses in the LSA, such as forestry, mining, and mine exploration are industrial in nature and not considered vulnerable to the economic effects of this Project.

19.5.3.3.1 Effects to Guide Outfitting

There is one guide outfitting license, no. 601084 currently held by Nisga'a Pacific Ventures LP, that is expected to interact with Project activities and components.

The license territory covers approximately 27,000 km², of which the Wildlife RSA, the area where direct effects to Wildlife are anticipated, covers 2,117 km² or about eight percent. The Bitter Creek valley itself overlaps about one percent of the license area. The scale of the Bitter Creek valley in relation to the license area is exceptionally small. Nevertheless, potential adverse effects resulting from limitations on hunting opportunities due to Project components or activities could occur along three potential pathways of effect: (i) increased competition for game due to increased population, (ii) reduced availability of hunting resources due environmental effects of the Project, and (iii) changes in Visual Quality due to Project-related changes to the visual landscape.

Increased Hunting Pressure

The Project could lead to an increase in hunting pressure on Mountain Goat in the Bitter Creek valley due to improved accessibility because of improvements to the Access Road. The Access Road, however, will be an active industrial roadway. For safety reasons the entrance to the road will be gated and use of the road will be monitored and controlled to avoid unauthorized use.

The expected increase in population that will be concentrated in the District of Stewart could lead to an increase in the number of resident hunters who might be interested in hunting in the Bitter Creek valley. Mountain goat is the primary game species known by hunters to occupy the Bitter Creek valley (R. Milligan, pers. comm. 2016). There are several reasons why newcomers to Stewart employed by the Project are unlikely to put pressure on the mountain goat population in the Wildlife LSA (i.e., the Bitter Creek valley).

During the Construction Phase, the workforce will be composed primarily of transient workers, accommodated in a work camp situated in Stewart. There will be a shift rotation typical of mine construction projects wherein employees spend two to three weeks working seven days a week, followed by a similar rotation back in their home community. Workers in these camps typically have no time while on shift to engage in activities such as mountain goat hunting, which requires considerable time and organization. Furthermore, IDM will implement a no-hunting policy that prohibits hunting by anyone while at the mine site or any of the Project facilities in the Bitter Creek valley, including the Access Road.

During the Operation Phase, employees that are new residents to Stewart would conceivably have time to hunt on their days off. The Bitter Creek valley, however, would be off-limits to legal hunting because it will be an active industrial area with strict access controls in place for safety reasons and to control unauthorized access to the valley.

Added pressure on hunting resources elsewhere in the Bear River valley (i.e., the Wildlife RSA) due to an influx of 'new' resident hunters is likely to be quite limited as well. An important factor is how many Operation workers ultimately end up moving to and residing in Stewart (see Section 19.5.3.1.2) and, of these new residents, how many are hunting enthusiasts. Second, any new residents would have to be experienced hunters to undertake

hunting in the backcountry around Stewart and in the Bitter Creek valley, as illustrated by one guide outfitter operating in the Coast Mountains on their website about the rigours of mountain goat hunting:

Mountain goat hunting can be very physically demanding, so anyone planning to hunt goats ... should be in good physical condition and able to spend long strenuous days backpacking the steep and rugged terrain of the Coast Mountains (Fraser River Outfitters 2017).

It is not known how many Project employees would be interested in hunting in the Bear River watershed. By way of comparison, 97,000 hunting licenses were issued province-wide in 2013 (Vancouver Sun 2013 Apr 12), suggesting that the proportion of resident hunters compared to the general population aged between 15 and 65 years is approximately 2.5%. It is likely that in a rural setting, such as Stewart, the proportion of hunters will be greater than when averaged across the entire BC population, which includes large urban populations where hunting is less common. If the proportion of hunters is assumed to be two to four times greater than the provincial average, it follows that approximately 5 to 10 percent of new Stewart residents would be hunters. Depending on the quantity of people to move to Stewart, this may mean the introduction of 6 to 12 new resident hunters, many of whom would likely not be mountain goat hunters.

In summary, the following suggest that any Project-related increase in pressure on wild game resources throughout the Wildlife RSA will be quite limited:

- A relatively small number of newcomers with a strong interest in hunting are expected to move to Stewart on a full-time basis;
- The area's inherent physical and geographical barriers;
- The restrictions that will be imposed on access to the Bitter Creek valley itself; and
- Existing provincial hunting regulations designed to manage wild game resources for conservation purposes.

There are no adverse residual economic effects anticipated due to increased competition from the Project workforce on the operation or viability of the Nisga'a guide outfitting license, therefore the effect is not carried forward for further assessment.

Reduced Availability of Hunting Resources

The Project will not have significant adverse environmental effects on hunting resources across the Wildlife RSA (Chapter 16: Wildlife and Wildlife Habitat Effects Assessment).

Within the Wildlife LSA, interactions are expected between Project activities and components and mountain goats. The mountain goat population in the Bitter Creek valley is known to the previous owner of guide outfitter license, and the Bitter Creek valley is a valuable part of the license (see Section 19.4.4.3).

From the results of the Wildlife and Wildlife Habitat Effects Assessment (Chapter 16), there are no significant residual adverse environmental effects expected on mountain goat habitat in the Wildlife LSA. Mountain goats are thought by some to be sensitive to noise and may change their seasonal movements in response to the Project activities and components (R. Milligan, pers. comm. 2016). Such movement could make mountain goats in the Bitter Creek valley less accessible to Nisga'a Guide Outfitting hunting expeditions, but it could just as easily make them more accessible.

The economic effect on the guide outfitting license is expected to be neutral and no residual adverse economic effects are predicted due to environmental effects on mountain goats or mountain goat habitat. The effect is not carried forward for further assessment.

Changes in Visual Quality

It is possible that the guide outfitter's clients will see parts of the Access Road, Powerline, and various Project facilities and components if they choose to hunt in the Bitter Creek watershed (Appendix 20-B). This will likely detract from their experience insofar as it is assumed that part of the experience of hunting in the backcountry is to be in a natural wilderness setting, remote from human developments. Non-resident hunters could be especially affected because they are likely to have come to this part of BC precisely because of its reputation as a remote and pristine wilderness area. It is a subjective point of view based in personal environmental values, which suggests that it is also possible that some clients will be completely unaffected by the presence of the Project nor be bothered by being able to see the Project while on a guided hunting trip.

There is no measureable economic effect on the outfitting license due to changes in Visual Quality, therefore the effect is not carried forward for further assessment.

19.5.3.3.2 Effects to Commercial Recreation Tenure

Last Frontier Heli-skiing (LFH) holds the commercial recreation tenure, license no. 6406136, which encompasses the Project area (Appendix 20-A; Figure 19.5-1). The upper reaches of Bitter Creek valley contain several prime ski areas that are valuable to LFH because of their ski-ability when weather conditions make other parts of the license area unsafe (C. Umpleby. Pers Comm. 2016; M. Hyslop. Pers Comm. 2017).

During discussions with IDM representatives, LFH identified two potential interactions that could affect their heli-skiing operations. First, the location of the Project's Access Road and Powerline. LFH explained that the helicopter flightpaths used to access runs within their license area are already constrained by sensitive Mountain Goat habitat in the Bitter Creek valley (C. Umpleby. Pers Comm. 2016). According to the Wilderness Tourism Association of BC, helicopters are required to fly outside a 1,500 m horizontal and 500 m vertical buffer zone of known mountain goat habitat areas (Wilderness Tourism Association of BC). Depending on the height of the Powerline towers and the exact alignment, LFH anticipates some additional constraints on where they can land a helicopter to pick up skiers at the end of their run and the flight path necessary to safely avoid the Powerline enroute to the next run. Concerns include safety and additional fuel costs if avoidance extends the length of flight paths.

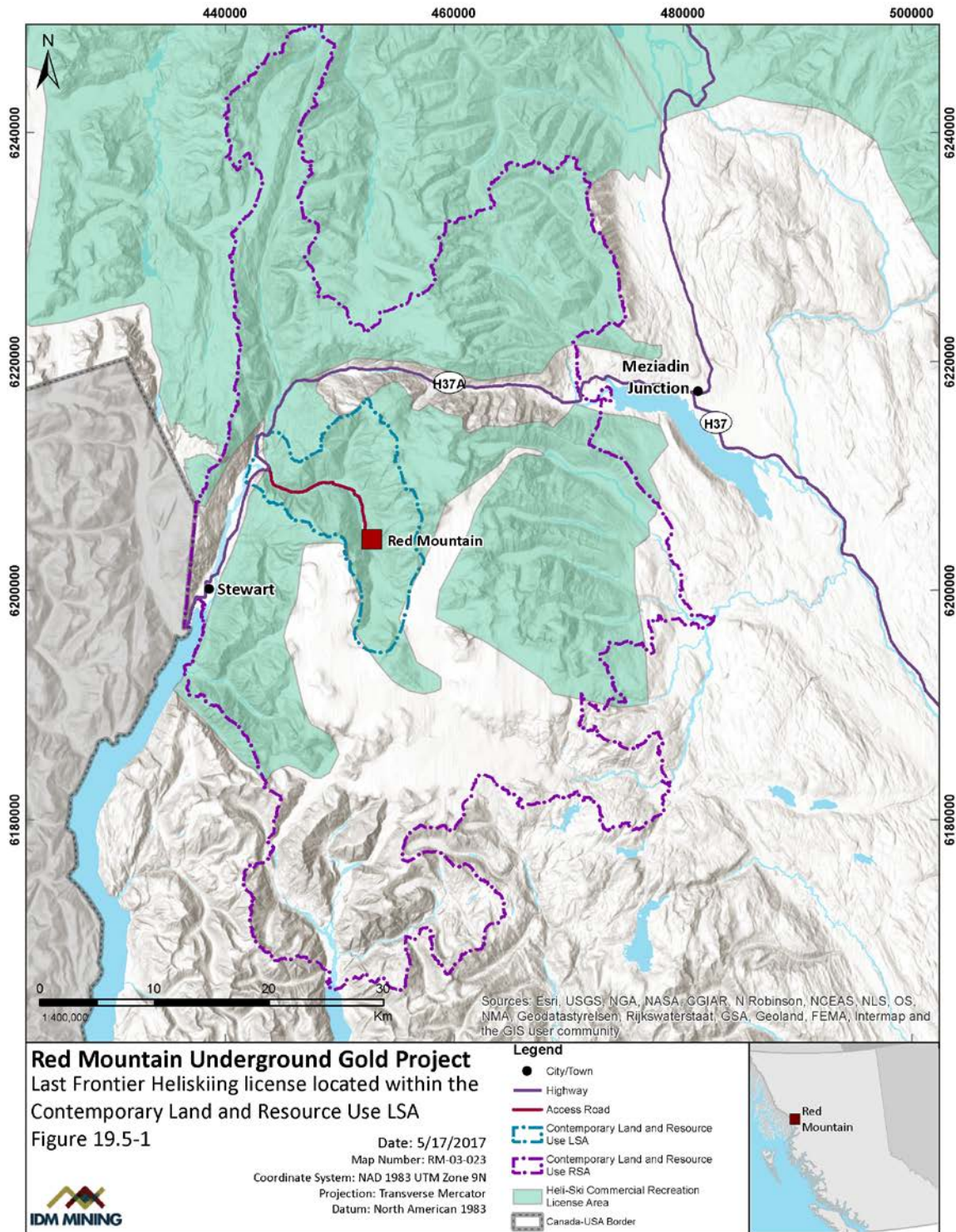
Second, the value of wilderness and absence of human activity across much of the license area creates an aesthetic that is important to the heli-skiing business, as it creates a unique experience for the clientele (C. Umpleby. Pers Comm. 2016). Heli-skiers will likely to be able to see certain parts of Project infrastructure either from the helicopter or on certain ski runs. In general, Project activities and components will be in the distance and, during the ski season, much of it will be concealed by snow and generally less visible to the naked eye. LFH notes that clients, many of who come from Europe, value what they perceive and expect to be a pristine mountain landscape in northwest BC. The Project will, to some degree detract from this experience for LFH clientele (C. Umpleby. Pers Comm. 2016).

Notwithstanding these potential constraints on the heli-skiing operation, the Project is unlikely to have a tangible economic effect on LFH's bottom line. The license is the largest in the province and heli-skiing in the region is world-renowned. In recent years, LFH has had few gaps in its bookings during the ski season, which suggests that demand is strong (C. Umpleby. Pers Comm. 2016). Furthermore, it is reasonable to assume that the business is far more susceptible to global economic forces that might affect the willingness or ability of potential clientele to come to the region for heli-skiing than it is to the potential effects of the Project on its operations.

LFH did note that mine exploration has dramatically increased in the past twenty years throughout much of the license area (LFH 2015; C. Umpleby. Pers Comm. 2016). This expansion is a growing concern as more and more runs are being infringed and, in some cases, potentially lost to heli-skiing. The loss of ski terrain is a concern for LFH, although this does not appear to be a likely outcome in the Bitter Creek valley. Nevertheless, LFH expressed a strong desire to work with IDM to minimize the potential effects of the Project on its heli-skiing operations, especially to avoid the outright loss of accessible ski runs. LFH is keen to work with IDM to manage any potential interactions, noting in particular the need to plan for and manage helicopter flyways and landing areas and the potential interaction these might have with the Powerline right-of-way (C. Umpleby. Pers Comm. 2016).

Overall the effects of the Project on LFH operations are considered to be manageable issues (C. Umpleby. Pers Comm. 2016). Therefore, no residual adverse economic effects on the commercial recreation license are expected, and the effect is not carried forward for further assessment.

Figure 19.5-1: Last Frontier Heli-skiing Commercial Recreation License



19.5.3.3.3 Effects to Trapline License No. TR0614T101

The only trapline that will potentially interact with the Project is trapline no. TR0614T101, approximately one fifth of which overlaps the Bitter Creek valley. Dave Green, a longtime resident of Stewart leases the trapline from the registered owner. Mr. Green was interviewed during the socio-economic fieldwork carried out in November 2016.

According to provincial figures, there were a total of 630 reported trappings on the line between 1985 and 2015, although the last time harvest data was reported for this trapline was 2000. Only wolverine and fisher harvests are required to be reported, all others are voluntary. The most valuable pelts at 2016 market prices were lynx (\$341) and wolverine (\$260), and the least valuable were squirrel and weasel, at \$0.30 and \$1.50 respectively (NAFA 2016). The average price per pelt is \$96, which is probably a generous estimate of the economic value of trapping to the trapline license holder. Although difficult to verify, a crude estimate would put the annual income taken from this trapline over the past 30 years to be between \$2,000 and \$4,000. The market for pelts has been low for many years, although more recently it has been showing some signs of recovery (D. Green. Pers Comm. 2016).

Given that approximately one fifth of trapline no. TR0614T101 overlaps the Bitter Creek valley, one way to assess the potential effect of the Project on the trapline is by simple spatial comparison. If it is assumed that the entire Bitter Creek valley would become unavailable for trapping due to the Project, then potential economic effects on the trapline could be assumed to amount to about one-fifth of the average annual revenue, equivalent to approximately \$400 to \$800 per year.

However, although the Bitter Creek valley overlaps twenty percent of the trapline license area, the layout of Project activities and components is such that it is unlikely to eliminate trapping opportunities throughout the entire watershed. Hence the potential economic effect is likely to be considerably lower than the figure calculated above.

The potential economic effect of the Project on trapline no. TR0614T101 is exceptionally low. No adverse residual economic effects are expected, and therefore it is not carried forward for further assessment.

19.5.3.4 CRA Fisheries

There are two pathways by which the Project may affect CRA Fisheries: potential environmental effects to Fish and Fish Habitat through changes in water quality, aquatic resources, and the health of fish; and by the potential for increased fishing pressure that may result from increased population in Stewart related to Project workforce, contractors, and sub-contractors and/or as a result of increased accessibility due to improvements to the Bitter Creek Access Road. There is also the possibility that CRA Fisheries would be affected by the catastrophic failure of the Project's tailings dam.

The LSA and RSA for CRA Fisheries correspond to those used in the Fish and Fish Habitat Effects Assessment (Volume 3, Chapter 18). The LSA is the Bitter Creek watershed, and the RSA includes the Bear River watershed from American Creek to Stewart and the northern end of the Portland Canal.

19.5.3.4.1 Effects on Fish and Fish Habitat

The potential effects of Project components and activities during the life of the Project on Fish and Fish Habitat are assessed in detail in the Fish and Fish Habitat Effects Assessment (Volume 3, Chapter 18). Mitigation and ongoing management to reduce or eliminate Project effects on Fish and Fish Habitat are described in Chapter 29, particularly the Aquatic Effects Management and Response Plan.

The only fish species of potential value to CRA Fisheries identified in Bitter Creek is Dolly Varden. No known fisheries exist for this species in Bitter Creek, and no adverse effects are anticipated to the Dolly Varden population from mine activities.

No effects are anticipated in the RSA for the VC CRA fisheries as this is outside the area of influence from direct mine activities. Water quality will be monitored and managed to appropriate federal and provincial standards at the mine site and tailings management facility. There are no deleterious changes in water quality predicted in Bear River and, therefore, no pathways of effects that would adversely affect Fish and Fish Habitat in Bear River.

Residual adverse effects on CRA Fisheries due to potential environmental effects on Fish and Fish Habitat are not expected, therefore the pathway is not carried forward for further assessment.

19.5.3.4.2 Effects on CRA Fisheries due to Increased Fishing Pressure

Project workers or their families, including contractors and sub-contractors, living in Stewart may choose to engage in recreational fishing, which might result in increased pressure on CRA Fisheries resources. Increased fishing pressure could also arise due to greater accessibility provided by a restored Access Road in the Bitter Creek valley, although use of this industrial road will be tightly controlled for safety reasons. Unauthorized use will not be permitted.

Any individuals that might engage in recreational fishing in the LSA would be subject to Department of Fisheries and Oceans (DFO) regulations that apply to all Canadians. The regulations include the requirement for appropriate licenses and compliance with established limits on fishing gear, methods, and catch limits that are in place to manage and conserve recreational fisheries resources. Currently, recreational fishing in the Bear River and its tributaries is not permitted. No adverse effect is expected on recreational fisheries due to increased fishing pressure.

While Aboriginal fisheries are not known to take place currently on the Bear River or Bitter Creek, Nisga'a citizens and other Aboriginal Groups could potentially exercise their Treaty or Aboriginal right to fish, particularly for eulachon on the lower reaches of the Bear River, in the future. The eulachon fishery is a culturally and historically significant fishery for many west coast Aboriginal cultures. Eulachon are not widely sought after by non-Aboriginal fishers and, while the number of Aboriginal people who might choose to move to Stewart because of business and employment opportunities is not known, it is not expected to be large. Subsequently, there is no evidence to suggest that there will be additional pressure on the eulachon fishery due to population increase in Stewart.

Residual adverse effects on CRA Fisheries due to population increase and greater access are not expected, and therefore the pathway is not carried forward for further assessment.

19.5.3.4.3 Effects on CRA Fisheries due to Catastrophic Failure of the Tailings Dam

A catastrophic failure of the tailings dam, however unlikely due to steps taken in the design, construction, and operation of the facility to avoid such events, is a potential occurrence of concern to Nisga'a Nation and stakeholders. An analysis of a hypothetical catastrophic failure of the tailings dam on Fish and Fish Habitat downstream from the Project is assessed in a separate Dam Inundation Study, the results of which are summarized in Appendix 23-A.

19.6 Mitigation Measures

The potential economic effects of the Project do not lend themselves to the same sorts of technical mitigation measures that are often available to mitigate environmental effects. Economic effects are generally less predictable in their precise outcomes and are often subject to much variation. There is rarely a linear relationship between socio-economic effects and the mitigation measures applied to reduce those effects. There is much less certainty about the outcome of mitigation measures, which is why it is important to monitor social and economic changes to provide a basis for ongoing adaptive management of effects.

Often there is not a clear distinction between what defines mitigation versus management measures, therefore, the two terms are often used synonymously in this chapter and in the Social Effects Assessment (Chapter 20).

19.6.1 Mitigation, Management, and Monitoring of Economic VCs and ICs

19.6.1.1 Project-Related Employment

As noted above (Section 19.5.3.1.1) Project-Related Employment may increase competition for skilled workers and create upward pressure on wages in the LSA labour market. Many of the beneficial and adverse effects of Project-Related Employment on the local economy are part of the normal dynamics of a market-based economy such as Canada's. Attempts to mitigate or manage these sorts of effects are limited in what they can and should do. Management measures will be focused on trying to ensure that the Project does not unnecessarily distort the local market, for example, by paying excessively high wages or providing large housing allowances to employees.⁴

In general, the Project should have a beneficial economic effect on the LSA, although there is some risk of disappointment and reduced support for the Project within LSA communities if there is a perception that too many employment and business opportunities are going to outsiders. To help avoid the problem of unrealized benefits, IDM will develop a series of

⁴ The use of a "living out allowance" by project proponents during the recent boom in resource development and infrastructure projects in northwest BC has had the unintended consequence of dramatically inflating rental rates in Kitimat and Terrace where many workers chose to live (NDIT 2014; CBC News 2014 Feb 26)

plans as frameworks to help engage and support LSA communities and individuals in pursuit of Project opportunities. Framework plans included the following Chapter 29 management plans:

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

19.6.1.2 Revenue to the Local Economy

There are no adverse economic effects anticipated due to the Project's injection of money into the LSA and RSA economy. Revenue to the Local Economy is also an IC related to certain social effects that are assessed in the Social Effects Assessment (Chapter 20).

19.6.1.3 Contemporary Land and Resource Use

Overall, there are no residual adverse economic effects anticipated for Contemporary Land and Resource Use, including guide outfitting, heli-skiing, and trapping. Potential effects include changes in access due to the re-development of the Access Road, environmental effects linked to Contemporary Land and Resource Use, and effects to Visual Quality.

19.6.1.3.1 Increased Access

Potential pressure on Contemporary Land and Resource Use anticipated from increased access due to the re-development of the access road could affect the guide outfitting license. To mitigate this potential effect, IDM will develop and implement an Access Management Plan in collaboration with Nisga'a Nation and stakeholders that will include:

- Installation of a locked gate with appropriate signage to warn unauthorized personnel that the access road is an active industrial road; and
- Company policies prohibiting employees, contractors, and sub-contractors of the Project from entering the Bitter Creek valley for anything other than Project-sanctioned activities.

IDM will also undertake measures to discourage unofficial use of the Access Road through community education, as outlined in Chapter 29 such as the: Access Management Plan, Community Involvement Plan, and Social and Economic Management Plan.

19.6.1.3.2 Increased Population

Increased population is linked to a potential increase in pressure on wildlife resources due to a potential increase in resident hunters. Management measures will include a "no-hunting /no fishing" policy that will apply to all employees, contractors, and sub-contractors that will prohibit hunting by anyone while at the mine site or any of the Project facilities in the Bitter Creek valley, including the Access Road.

During Operation, employees that are new residents to Stewart might choose to hunt on their days off. Existing provincial hunting regulations designed to manage wild game resources for conservation purposes will be sufficient to manage this modest additional pressure on hunting resources in the LSA.

19.6.1.3.3 Environmental Effects

Environmental effects that could affect Contemporary Land and Resource Use will be mitigated and managed through appropriate disciplines and their associated Chapter 29 management plans including:

- Wildlife Management and Monitoring Plan;
- Aquatic Effects Management and Response Plan; and
- Vegetation and Ecosystems Management Plan.

19.6.1.3.4 Visual Quality

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.

19.6.1.4 CRA Fisheries

The potential for increased fishing pressure brought on by improved accessibility and/or increased population in Stewart related to the Project's workforce, contractors, and sub-contractors, was assessed as a very low-level effect that requires minimal direct management or mitigation measures. The Project will have a no fishing policy in place. During operations, new residents to Stewart associated with the Project will be bound by existing FLNRO and DFO regulations, which include a ban on recreational fishing on the Bear River and Bitter Creek. Furthermore, access along the Access Road will be tightly monitored and controlled, including a gate at the entrance. IDM will work closely with Nisga'a Nation to monitor any effects to Aboriginal fisheries, especially with respect to eulachon in the Bear River.

CRA Fisheries potentially affected by environmental changes to Fish and Fish Habitat due to Project components and activities will be monitored and mitigated per the Aquatic Effects Management and Response Plan. This plan is supported by the following Chapter 29 management plans:

- Surface and Groundwater Management Plan;
- Erosion and Sediment Control Plan;
- Emergency Response Plan;
- Environmental Management Plan; and
- Spill Prevention and Response Plan.

19.6.2 Effectiveness of Mitigation Measures

The anticipated effectiveness of mitigation measures to minimize the potential for adverse effects is evaluated and classified against the following criteria:

- Low effectiveness: Proposed measure is experimental, or has not been applied in similar circumstances.
- Moderate effectiveness: Proposed measure has been successfully implemented, but perhaps not in a directly comparable situation.
- High effectiveness: Proposed measure has been successfully applied in similar situations.
- Unknown effectiveness: Proposed measure has unknown effectiveness because it has not been implemented elsewhere in a comparable project or environment.

The potential economic effects, proposed mitigation measures, and their effectiveness are summarized using Table 19.6-1. This table also identifies any residual effects that, if identified, will be carried forward for cumulative effects characterization and significance determination.

Table 19.6-1: Proposed Mitigation Measures and Their Effectiveness

VC/IC	Potential Effects	Mitigation Measures	Rationale	Applicable Phase(s)	Effectiveness ¹	Uncertainty ²	Residual Effect
Contemporary Land and Resource Use	Increased access to Bitter Creek valley	Strict adherence to Access Management Plan, including closing access roads to public	Staff training and public awareness are key components of many of IDM's management plans.	Construction, Operation, Closure and Reclamation	Moderate (Providing round-the-clock monitoring of activity on the roads is not feasible)	Moderate (Difficult to predict how many individuals will ignore signage and rules)	No
		No hunting policy for Project employees and guests			High	Low	
	Environmental effects on land and resource use and users	Strict adherence to Wildlife Management Plan, including closing access roads to public	Staff training and public awareness are key components of many of IDM's management plans.		Moderate (Providing round-the-clock monitoring of activity on the roads is not feasible)	Moderate (Providing round-the-clock monitoring of activity on the roads is not feasible)	No
	Effects on visual quality	Project designed with smallest practical footprint	Reducing the source of the potential effect minimizes the potential effect		Moderate (Some visual quality effects will occur)	Low	No
	Project interferes with commercial recreation tenure	Managed through coordination, cooperation, and consultation between IDM and Last Frontier Heli-skiing.	Early and frequent communication will be key to avoidance and minimizing effects		Construction, Operation	High	Low

VC/IC	Potential Effects	Mitigation Measures	Rationale	Applicable Phase(s)	Effectiveness ¹	Uncertainty ²	Residual Effect
Commercial, Recreational and Aboriginal (CRA) Fisheries	Increased fishing pressure	No fishing policy for Project employees and guests	Staff training and awareness are key components of many of IDM's management plans.	Construction, Operation, Closure and Reclamation	High	Low	No
		Project terms of employment establish high standards to respect community and environment					
	Environmental effects to fish and fish habitat	All implemented mitigation measures for Fish and Fish Habitat will serve as mitigation for Economic VC relative to this effect (see Chapter 18, Section 18.6).				No	
	All implemented mitigation measures for Aquatic Resources will serve as mitigation for Economic VC relative to this effect (see Chapter 17, Section 17.6).						
Project-related Employment	Effect on local and regional labour markets	Avoid excessive compensation packages, employment incentives, and wages	IDM is committed to developing the Project in a socially sensitive and responsible manner.	Construction, Operation, Closure and Reclamation	Moderate (No plan, regardless of how comprehensive, will eliminate all potential employment concerns)	Low	No
	Loss of employment at closure	Development of and adherence to Social and Economic Management Plan		Closure and Reclamation			No
		Development of and adherence to Skills, Training and Employment Plan					
Revenue to the Local Economy IC	No potential adverse effects identified						

¹Effectiveness: Low = measure unlikely to result in effect reduction; Moderate = measure has a proven track record of partially reducing effects; High = measure has documented success (e.g., industry standard; use in similar projects) in substantial effect reduction.

²Uncertainty: ; Low = proposed measure has been successfully applied in similar situations; Moderate = proposed measure has been successfully implemented, but perhaps not in a directly comparable situation; High = proposed measure is experimental, or has not been applied in similar circumstances.

19.7 Characterization of Residual Effects

EAO guidance states that, “...further analysis may not be warranted for project-VC interactions that are known (or found) to have no or negligible adverse effects” (EAO 2013). It is impossible to say with certainty that there will be no adverse residual economic effects at all, but the preceding discussion (Section 19.5) demonstrates that those economic effects that may occur would generally be considered negligible. In all cases, economic effects are expected to be manageable and, in some cases, they may be offset by beneficial economic effects.

Further analysis or assessment of these economic effects would not add any value to the understanding of the Project’s potential effects on the identified economic VCs and ICs. IDM does recognize, however, that social and economic circumstances can and do change. Through its Social and Economic Management Plan, IDM proposes to work with NLG, the District of Stewart, Working Group members, and with other interested stakeholders to identify and implement appropriate means to monitor the Project’s social and economic effects. A well-constructed monitoring program will enable IDM and others to identify (and in some cases anticipate) potential adverse changes in economic VCs and ICs that will help to inform adaptive management responses. Monitoring will also allow other, potentially unforeseen, social and economic changes to be identified, which is the first, vital step in being able to craft an effective response.

19.7.1 Residual Project Effects Analyses

There are no residual adverse economic effects that are subject to further analysis.

19.7.2 Characterizing Residual Effects

There are no residual adverse economic effects to be characterized.

19.7.3 Potential Residual Effects Assessment

There are no residual adverse economic effects to be assessed.

19.7.4 Summary of Residual Effects Assessment

There are no residual adverse economic effects to be summarized.

19.8 Cumulative Effects

Generally speaking, cumulative effects are the result of a Project-related effect interacting with the effects of other projects or activities to produce a combined effect. The potential for cumulative effects arises when residual effects of the Project affect the same VC or IC that is affected by the effects of other past, existing, or reasonably foreseeable projects or

activities. Cumulative effects are assessed as required by EAO (2013). The method for assessing cumulative effects generally follows the same approach as for the assessment of the Project's incremental effects.

According to the Agency (Agency 2014) a cumulative effects assessment is carried out where residual effects are predicted after consideration of mitigation measures, regardless of their significance.

The need for a cumulative effects assessment is established by addressing two key 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.

According to these criteria the Project is not expected to contribute to cumulative adverse economic effects on communities in the LSA or RSA.

19.8.1 Cumulative Effects Assessment Boundaries

In the absence of residual adverse economic effects, cumulative effects are not expected and therefore, no assessment boundaries are defined.

19.8.2 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities

Not applicable.

19.8.3 Cumulative Effects Assessment

In the absence of residual adverse economic effects, a cumulative effects assessment is not provided in accordance with EAO and Agency requirements.

19.9 Follow-up Program

The purpose of the follow-up program is to monitor the accuracy of predictions of effects assessments and the effectiveness of mitigation measures. In the event that effects are not as predicted and the mitigations in place are not appropriate for addressing them, the follow-up program provides strategies to adaptively manage unforeseen conditions. Adaptive management strategies potentially include additional mitigations and involvement of key stakeholders, Aboriginal Groups, and government agencies to identify and develop other measures deemed necessary to manage the issue.

In the absence of potential residual adverse economic effects, and subsequently a cumulative effects assessment, a formal follow-up program is not presented here. However, contained within the relevant management plans are provisions to monitor a range of inter-related social and economic issues that will help IDM identify any problem areas and respond appropriately. Relevant management plans are included in the following sections of Chapter 29:

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

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