

# 19. Assessment of Potential Economic Effects

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## 19.1 INTRODUCTION

This chapter examines the potential adverse economic effects of the proposed Brucejack Gold Mine Project (the Project). The Project's anticipated positive economic effects are discussed in Section 1.9, Project Benefits. The Project is located on provincial Crown land and falls within the Regional District of Kitimat-Stikine (RDKS), approximately 950 kilometres (km) northwest of Vancouver, British Columbia (BC), 65 km north-northwest of Stewart, BC, and approximately 40 km northeast from the BC/Alaska border. The main drivers associated with potential economic effects are associated with direct Project employment and spin-off employment associated with Project procurement of goods and services. The potential adverse economic effects considered in this assessment include effects on the labour market.

This chapter:

- includes a description of the regulatory and policy framework and economic baseline setting, which is informed by the Socio-economic Baseline Report ([Appendix 19-A](#));
- defines spatial and temporal boundaries for the economic effects assessment;
- identifies potential adverse economic effects;
- provides economic effects assessment and proposes mitigation measures;
- describes residual effects of the Project remaining after the implementation of mitigation measures;
- provides characterization and significance of the residual effects, and evaluates the confidence/uncertainty of the residual effects of the Project;
- identifies historical, present, and reasonably foreseeable future projects and activities that impact economic Valued Components (VCs) and that could contribute to potential cumulative effects; and
- assesses cumulative economic effects of the Project and other projects.

## 19.2 REGULATORY AND POLICY FRAMEWORK

This chapter is written pursuant to the *Canadian Environmental Assessment Act, 2012* (2012) and the British Columbia *Environmental Assessment Act* (2002), which requires an assessment of the potential adverse environmental, economic, social, heritage, and health effects of the Project. Of consideration are the regional development plans of the municipalities and communities within the Regional Study Area (RSA) and Local Study Area (LSA).

There is no federal or provincial legislation that broadly applies to economic matters. However, the proposed Project is designed to meet objectives of responsible resource development outlined in the Government of Canada's *Economic Action Plan 2012* by fostering economic development opportunities in the natural resources sector (Government of Canada 2012). The Project will promote economic prosperity in all regions of BC, and will assist the BC Government to meet its target of approving eight new mines by 2015, as described in British Columbia's *Mineral Exploration and Mining Strategy* (BC MEM 2012b) and the *BC Jobs Plan* (Government of British Columbia 2012).

The Cassiar Iskut-Stikine Land and Resource Management Plan (BC ILMB 2000a) represents the consensus reached as a result of a three-year interest-based negotiation process that involved

approximately 25 public, First Nations, and provincial government representatives. The plan, among others, includes an economic strategy to define priorities for future economic development in the plan area. The economic strategy is intended to guide future developments that enhance local opportunities and contribute to economic diversification in the area. The focus is on the following sectors: forestry, tourism, agriculture, mining, fisheries, botanical forest products and medicinal plants, infrastructure and capacity building, and government (BC ILMB 2000a).

The Nass South Sustainable Resource Management Plan (BC ILMB 2012), developed in partnership with the Gitanyow, the Nisga'a Nation as represented by Nisga'a Lisims Government (NLG), key stakeholders, and government agencies, provides long-term sustainability of jobs, communities, and natural resources in the southern portion of the Nass Timber Supply Area (TSA). The plan has five primary objectives: to assist in reaching a broad-based forestry accommodation agreement; to fulfill legal obligations of the Crown; to promote sustainable forest management in the Nass TSA; to assist in streamlining subsequent consultation processes; and to increase certainty for long-term access and sustainable development for the Gitanyow, NLG, and all resource sectors (e.g., forestry, fisheries, tourism, and mining; (BC ILMB 2012).

In addition, among the LSA communities, Official Community Plans (OCPs) for the Town of Smithers, the City of Terrace, and the District of Stewart guide the economic development in the communities (District of Stewart 1996; Town of Smithers 2010a; City of Terrace 2011). Smithers' OCP articulates elements of a strategy for economic growth and diversification, including retaining and strengthening the diversity of business activities, and the provision of support services for the mining sector (Town of Smithers 2010a). Terrace has adopted a set of objectives that focus, among others, on economic development and diversification (City of Terrace 2011). Similarly, the District of Stewart adopted its OCP to enhance the economy through the provision of community growth and development (District of Stewart 1996).

### 19.3 BASELINE CHARACTERIZATION

This section provides an overview of the economic baseline study conducted for the Project ([Appendix 19-A](#), Socio-economic Baseline Report). Income and employment data have been updated in this section to reflect the most recent statistics available.

#### 19.3.1 Regional Overview

The Project is situated in northwest British Columbia in the RDKS, a sparsely populated and relatively undeveloped region of the province. The RSA includes the RDKS and Electoral Area A of the Regional District of Bulkley-Nechako (RDBN). The major communities in the RDKS are Terrace, Stewart, Hazelton, New Hazelton, Dease Lake, Telegraph Creek, and Nisga'a Lands. The major community in the RDBN's Electoral Area A is the Town of Smithers. Communities are generally small and, in many cases, far removed from major populations and governance centres, and from one another. A high percentage of the population is of Aboriginal descent.

##### 19.3.1.1 Population and Demographics

In 2011, there were approximately 4.4 million people living in BC. Of that, the population of the RSA was approximately 42,752 (Statistics Canada 2012b). The provincial population has increased over the past several census periods (Table 19.3-1); however, the population in the RSA has generally decreased due largely to the loss of jobs as a result of the closure of timber processing facilities and the Kemess and Eskay Creek mines. Between 1996 and 2011 the population of the RSA declined about 13%, although the loss of people from the region between 2006 and 2011 was lower than it was in the previous 10 years (Statistics Canada 2002a; BC Stats 2012b; Statistics Canada 2012b). The reduced rate and, in some communities, the potential reversal of population loss may be due to increased economic activity in the RSA over the last five years and development of new energy infrastructure to support resource development.

**Table 19.3-1. Regional Study Area Population (1996 to 2011)**

Region	1996	2001	2006	2011	Aboriginal
		(% change from previous census)	(% change from previous census)	(% change from previous census)	Identity, 2011 (% of pop.)
RDKS	43,618	40,876 (-6.3%)	38,476 (-7.0%)	37,361 (-2.9%)	12,300 (32.9%)
Electoral Area A (RDBN)	5,573	5,696 (+2.2%)	5,290 (-7.1%)	5,391 (+1.9%)	515 (9.5%)
<b>Total Regional (RSA)</b>	<b>49,191</b>	<b>46,572 (-5.4%)</b>	<b>43,766 (-6.1%)</b>	<b>42,752 (-2.4%)</b>	<b>12,745 (30.0%)</b>
British Columbia	3,724,500	3,907,738 (+4.9%)	4,113,487 (+5.3%)	4,400,055 (+6.7%)	267,085(6.1%)

Sources: Statistics Canada (1997, 2002a, 2007, 2012b, 2013a); BC Stats (2011).

Note: Geographic area boundaries for both the RDKS and Electoral Area A of the RDBN changed between 1996 and 2011.

In order to facilitate comparison, Statistics Canada adjusted the census population counts as needed.

In 2011, approximately 30.0% of the regional population identified as Aboriginal (Statistics Canada 2013a); provincially, 6.1% of the population was Aboriginal.

### 19.3.1.2 Economic Activity

In BC, key industries include agriculture, forestry, mining, natural gas, and tourism. The BC economy grew by 1.7% between 2012 and 2011. In 2012, natural resources contributed 7.1% to BC's gross domestic product (GDP); construction contributed 8.1%, transportation and warehousing 5.7%, and wholesale and retail 10.0%. The largest industry sector by contribution (17.4%) was real estate, rental, and leasing (BC Ministry of Finance 2013). Construction had the largest growth by sector over last year (4.5%). In 2012, revenue from natural sources contributed \$2,473 million to the provincial government revenue; of that, \$533.0 million came from forestry; \$1,742 million from the Columbia River Treaty, other energy and minerals, water rental, and other resources; and \$398 million was derived from natural gas royalties (BC Ministry of Finance 2013).

Economic development in northwest BC, including the RSA, stems largely from the development of the area's abundant natural resources. Main economic activities in the region include mining, forestry, energy, fishing, and transportation (Invest in Northwest BC 2014); however, they do not represent key economic industries as determined by employment trends. In 2011, main industries in the region, by employment, included health care and social assistance, public administration, retail trade, manufacturing, educational services, construction, and accommodation and food services; in total, these industries represented 65.7% of the total employment in the RSA (Table 19.3-2; Statistics Canada 2013a). Approximately 6.6% of those employed worked in agriculture, forestry, fishing, and hunting, and only 2.7% worked in mining, quarrying, and oil and gas extraction (Table 19.3-2; Statistics Canada 2013a). To compare, provincially, only 2.7% worked in agriculture, forestry, fishing, and hunting, whereas 1.1% worked in mining, quarrying, and oil and gas extraction (Table 19.3-2). As of 2013, of the 39,900 employed in northwest BC, 27.8% of people worked in the goods-producing sector and the remainder in the service sector (Statistics Canada 2014).

Mining continues to be an important source of employment, although this activity has been concentrated in mineral exploration rather than mine development and operation over the last several years (BC MEM and BC MFLNRO 2012). Currently there are 11 mine sites in the northwest region, either operating or in higher levels of development (Invest in Northwest BC 2014). The Huckleberry Mine, located approximately 360 km from the proposed Brucejack Gold Mine Project, is the only producing mine (Imperial Metals Corp. 2012; BC EAO 2013b; Invest in Northwest BC 2013). The Eskay Creek and Kemess South mines closed in 2008 and 2010, respectively (BC MEM and BC MFLNRO 2012; MABC 2012). Mineral exploration in the RSA has shown substantial growth in recent years, reflecting the trend of global mineral markets; new projects such as KSM and Red Chris mines are developing in the region.

Table 19.3-2. Labour Force by Industry, 2011

Industry	RDBN Electoral			
	RDKS	Area A	Total RSA	BC
In the labour force	18,530	4,300	22,830	2,354,245
All Industries	17,865	3,165	21,030 (100.0%)	2,305,315 (100.0%)
Agriculture, forestry, fishing, and hunting	865	530	1,395 (6.6%)	61,210 (2.7%)
Mining, quarrying, and oil and gas extraction	420	140	560 (2.7%)	25,450 (1.1%)
Utilities	95	0	95 (0.5%)	13,215 (0.6%)
Construction	1,275	305	1,580 (7.5%)	181,510 (7.9%)
Manufacturing	1,755	240	1,995 (9.5%)	148,810 (6.5%)
Wholesale trade	380	55	435 (2.1%)	90,560 (3.9%)
Retail trade	1,955	245	2,200 (10.5%)	266,265 (11.6%)
Transportation and warehousing	965	175	1,140 (5.4%)	118,675 (5.1%)
Information and cultural industries	285	25	310 (1.5%)	62,235 (2.7%)
Finance and insurance	275	80	355 (1.7%)	91,790 (4.0%)
Real estate, and rental and leasing	230	50	280 (1.3%)	54,840 (2.4%)
Professional, scientific, and technical services	625	140	765 (3.6%)	179,355 (7.8%)
Management of companies and enterprises	25	0	25 (0.1%)	2,440 (0.1%)
Administrative and support, waste management, and remediation services	545	40	585 (2.8%)	98,890 (4.3%)
Educational services	1,740	220	1,960 (9.3%)	167,875 (7.3%)
Health care and social assistance	2,105	225	2,330 (11.1%)	249,030 (10.8%)
Arts, entertainment, and recreation	300	50	350 (1.7%)	56,915 (2.5%)
Accommodation and food services	1,285	230	1,515 (7.2%)	179,625 (7.8%)
Other services (except public administration)	765	120	885 (4.2%)	112,745 (4.9%)
Public administration	1,960	270	2,230 (10.6%)	143,875 (6.2%)

Source: Statistics Canada (2013a)

According to the provincial government, the northwest quadrant of BC, including the RSA and adjacent portions of the Stikine Region and areas south of the RDKS, had 89 major, active exploration projects that spent a total of \$220 million on mineral exploration in 2011 (BC MEM and BC MFLNRO 2012). A number of small-scale operators, including jade and placer gold operations, are also present. The Northwest Transmission Line (NTL) is being built to supply anticipated increases in demand for electrical power, particularly from the mining sector.

Since the mid-2000s strong international commodity prices, especially for minerals and energy, driven by strong growth in China and elsewhere, have rejuvenated parts of BC's resource sector industries, although a recently reported drop of almost 25% in natural resource sector employment (principally in mining and oil and gas) between September 2011 and September 2012 may signal a reversal, or at least a slowing, of this trend (Statistics Canada 2013b). In 2013, there were 29,500 people working in the mining sector in BC; of that, 4,200 worked in oil and gas extraction, 14,700 worked in other mining, and 10,600 in support activities for mining and oil and gas extraction (BC Stats 2014).

In 2012, BC produced approximately 4.5 million grams of gold (valued at \$242.8 million), 81,126 kilograms (kg) of silver (\$81.3 million), and 226.8 million kg of copper (\$1.8 billion; BC MEM 2012a). Coal accounted for 28.6 million tonnes, valued at \$5.1 billion. Total mineral production in BC was valued at \$8.3 billion, being 8.1% lower than in 2011 but 13.8% above the 2010 value (BC MEM 2012a). Production data specific to northwest BC is not available.

Forestry in the northwest has been declining over the last decade. Aggregated data for the North Coast and Nechako Development Region (NCNDR)<sup>1</sup> indicates 1,500 people were directly employed in forestry-related jobs in the NCNDR in 2011 (BC Stats 2012a), a decrease of 60% from a peak of 3,800 in 2000. A combination of high operating costs with a low-value timber profile resulted in repeated economic failure in BC's northwest (City of Terrace Forestry Task Force 2009). In the RSA, the main challenge to seeing improvement of the forest industry is the wood itself: 50 to 65% of the timber is lower-valued pulp wood (City of Terrace Forestry Task Force 2009). Overall, in 2013, there were 18,700 people working in the forestry sector in BC (BC Stats 2014).

Fishing and hunting also provide employment in the region. In 2011, fisheries and aquaculture sectors contributed \$667.4 million (0.4%) to the province's GDP, employing approximately 13,900 British Columbians (BC Stats 2013d). In 2013, there were 1,700 people working in fishing and trapping in BC (BC Stats 2014).

Finally, guide outfitting and adventure tourism are important employers in northwest BC. The region offers tourism opportunities that reflect the remote and natural wilderness of the area, such as Aboriginal arts and culture; fresh and saltwater fishing; canoeing, kayaking, white water rafting; skiing, snowmobiling, and other snow sports; and cruise ship tours. In 2012, approximately 6,900 people were employed in the tourism sector in northern BC; there were 1,184 tourism establishments (BC Stats 2013d). Overall, the tourism sector contributed approximately \$7,585 million to BC's GDP in 2012 (BC Stats 2013d).

#### 19.3.1.3 Employment and Income

According to the 2011 National Household Survey (NHS; Statistics Canada 2013a), the RSA had 21,730 people in the labour force with a participation rate of 64.0% and an unemployment rate of 12.1% (Table 19.3-3). The regional participation rate was close to the provincial average (64.6%); however, the regional unemployment rate exceeded the provincial unemployment rate (7.8%). To compare, in 2006, the labour force within the RSA was 22,530, with an unemployment rate of 6.3% in the RDBN's Electoral Area A and 14.0% in the RDKS (Statistics Canada 2007).

**Table 19.3-3. Labour Force Status in the Regional Study Area, 2011**

Labour Force Status	RDBN Electoral			BC
	RDKS	Area A	RSA Total	
Total population age 15 years and over	29,795	4,300	34,095	3,646,840
In the labour force	18,530	3,200	21,730	2,354,245
Employed	16,135	2,960	19,095	2,171,465
Unemployed	2,395	240	2,635	182,775
Participation rate (%)	62.2	74.4	64.01	64.6
Employment rate (%)	54.2	68.8	56.41	59.5
Unemployment rate (%)	12.9	7.5	12.11	7.8

*Notes:*

<sup>1</sup> Calculated as a weighted average based on the proportional size of the labour force in the RSA.

Source: Statistics Canada (2013a)

<sup>1</sup> The North Coast and Nechako Development Region includes the RDKS, the RDBN, Stikine Region, and the Skeena Queen Charlotte Regional District. Data from this region overlaps and extends beyond the RSA for the economic baseline report but nevertheless illustrates the relative importance of forestry to the economy of northwest BC.

According to the 2011 NHS (Statistics Canada 2013a), the average income in the RDKS was \$35,795, below the provincial average of \$39,415, whereas in the RDBN Electoral Area A the average income was \$44,275, above the provincial average. Average employment income was substantially higher at \$55,590 in RDKS and \$53,470 in the RDBN Electoral Area A; however, both were below the provincial average of \$58,016. Government transfer payments accounted for 73.4% and 68.7% of income in the RDKS and RDBN Electoral Area A, respectively (Table 19.3-4).

**Table 19.3-4. Income in the Regional Study Area, 2011**

Income	RDKS	RDBN Electoral Area A	BC
Median income (\$)	26,752	30,497	28,765
Average income (\$)	35,795	44,275	39,415
Median employment income in 2010 (\$)	49,549	50,637	49,143
Average employment income in 2010 (\$)	55,590	53,470	58,016
Employment income (%)	73.4	68.7	73.7
Government transfer payments (%)	15.3	8.9	11.7
Other money	2.1	3.6	1.7

Source: Statistics Canada (2013a)

#### 19.3.1.4 Regional Government Expenditures and Operating Budgets

For 2012, the RDKS had a total revenue from all sources of \$13.2 million, similar to 2011; of that, approximately \$5.1 million came from tax levy (including parcel tax and rail tax mitigation), \$3.2 million represented revenue from own sources, and \$1.7 million represented surplus from the year before. Other sources of revenue included grants in lieu and other grants, interest earned, transfers from functions and funds, and transfers from member municipalities (\$0.7 million; RDKS 2013). Total RDKS expenditures for 2012 were approximately \$12.4 million, above expenditures in 2011 (\$11.5 million); of that \$2.5 million was on refuse sites, \$1.8 million on MK Bay Marina, and \$1.2 million on general government expenditures. Other substantial expenditures (over \$100,000) included the Feasibility Study Reserve Fund, Skeena Fire Protection, preparation for emergencies, regional 911 emergency telephone system, emergency measures program, Thornhill dog control, Skeena and Terrace Regional Transit, Terrace library cost sharing, planning services, economic development commission, Terrace area recreation and cemetery, South Hazelton Water, Thornhill water system, Terrace rural water system, Queensway sewer utility, and municipal debenture payments (RDKS 2013).

#### 19.3.2 Historical Activities

The economy of northwest BC has traditionally relied on primary resource industries such as forestry, fisheries, and mining, all of which have rich histories in the region. Increasingly tourism and outdoor recreation opportunities, such as guided hunting and fishing, heli-skiing, and other backcountry activities, have increased in the region.

Historically, forestry has been the most prominent contributor to the economic fortunes of the region, especially in communities along the Highway 16 corridor between Terrace and Stewart. The Hazeltons and neighbouring Gitxsan communities were dependent upon forest industry-related jobs throughout much of the latter half of the twentieth century ([Appendix 19-A](#), Socio-economic Baseline Report).

Mineral exploration and mining has made important contributions to the regional economy and in recent decades has enjoyed a prolonged resurgence (BC ILMB 2000b, 2004), although the sector is frequently affected by ‘boom and bust’ cycles that typify resource-dependent economies. Since World War I,

no fewer than eight mines operated within the area (Table 19.3-5). The Huckleberry copper/molybdenum mine in west central BC is the closest operating mine to the Project. Mineral exploration in the region has increased sharply in recent years, and it is expected to continue to be an important contributor to the regional and local economies in the short- and medium-term (BC MEM and BC MFLNRO 2012).

**Table 19.3-5. Timeline of Selected Past and Current Mines in the Vicinity of the Project**

Project	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Eskay Creek Mine (1995 to 2008)										
Granduc Mine (1971 to 1984)										
Johnny Mountain Mine (1988 to 1993)										
Kitsault Mine (1967 to 1972; 1981 to 1982)										
Silbak Premier Mine (1919 to 1996)										
Snip Mine (1991 to 1999)										
Swamp Point Mine (2006 to 2008)										
Red Chris Mine (2014 to present <sup>1</sup> )										

Notes:

<sup>1</sup> Under construction.

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

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

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

In 2010, construction began on the Long Lake Hydroelectric Project, which is located approximately 42 km south of the Project (CEA Agency 2012). It includes redevelopment of a 20-m high rockfill dam located at the head of Long Lake, and a new 10-km-long 138-kV transmission line.

Infrastructure development such as the NTL, and the Forest Kerr and Long Lake hydro projects, has provided some employment opportunities and economic activity during their respective Construction phases (CEA Agency 2012). These projects are expected to support additional, long-term investment in resource development.

Provincial and federal governments play an important role in the regional economy through public sector employment and various forms of government transfer or support payments. Household incomes, especially in Aboriginal communities, rely heavily on the public sector (2009).

Further information on the socio-economic history of the region is presented in the Brucejack Gold Mine Project: Socio-economic Baseline Report ([Appendix 19-A](#)).

### 19.3.3 Baseline Studies

Social and economic baseline research was carried out and the results presented in a Socio-economic Baseline Report ([Appendix 19-A](#)). This report provides a detailed description of the social and economic context of the people and communities located in the region that surrounds the proposed Project. The specific objectives of the socio-economic baseline study were to:

- present information about past and present social and economic conditions including characterization of local and regional contexts;
- build understanding of current community dynamics and trends to inform projections of future effects and change, especially with regard to changes and impacts related to the Project; and
- identify community interests, values, issues, and concerns about current and future social conditions, challenges, and opportunities.

The findings of baseline research inform several stages of the environmental assessment (EA) process and analysis, including the description of the economic setting, the definition of spatial and temporal boundaries of the study areas, the selection of economic VCs, the assessment of potentially beneficial and/or adverse economic effects, the development of mitigation and/or enhancement measures, and the development and implementation of mitigation and management plans. Provided below is a description of the provincial study area, RSA and LSA, data sources, methodology, and the characterization of the economic environment.

The region and the communities that make up the RSA and LSA, respectively, were selected based on proximity to the Project and related haul routes, port location, potential downstream effects, and each community's potential socio-economic interaction with Project development and Operation. In addition, the Project lies within or adjacent to the traditional territories of several First Nations and a Treaty Nation. There is some overlap in the claimed or asserted territories of these groups. Aboriginal rights and other issues are addressed in Chapter 26, Assessment of Effects on Asserted or Established Aboriginal Rights and Interests, and Chapter 27, Assessment of Nisga'a Nation Treaty Rights, Interests, and Information Requirements.

#### 19.3.3.1 Data Sources

Primary and secondary research was undertaken to gather economic information between May 2012 and April 2014. Primary research included meetings and interviews with knowledge holders in Smithers, Terrace, and the Hazelton area (see Section 19.3.3.2 below). Secondary research included accessing and compiling information from a number of sources:

- Statistics Canada 2001, 2006, and 2011 census data provided statistical data related to population and demographics;



- National Household Survey (NHS) 2011 data provided statistical data related to Aboriginal population, employment and income, and industry;
- Aboriginal Affairs and Northern Development Canada (AANDC 2012) provided data on First Nations Profiles;
- BC Stats provided data related to: Development Regions (2007), Community Facts (2007), Regional Employment Projections (2010), College Regions (2011), GDP (2011), the RDKS (2011), Employment, Unemployment and Related Rates (2012a), Socio-Economic Profiles (2012b), Fisheries and Aquatics (2013a), Earnings and Employment Trends (2013b), Labour Force Statistics (2013c), Tourism (2013d), and Business Indicators Data (2014);
- The RDKS website provided information on regional spending and expenditures, as well as the main economic activities in the region;
- The City of Terrace, District of Stewart, Town of Smithers, and other websites for communities provided general information on the communities;
- Invest in Northwest BC (Invest in Northwest BC 2013, 2014) provided information on the RDKS and mining in the region; and
- Mining Industry Human Resources Council (MIHR) provided information on the BC Labour Market Demand Projections (2008), Canadian Mining Industry Employment and Hiring Forecast (2011), BC Hiring Requirements and Available Talent Forecast (2012b) and Mining's Available Talent and the Skills Gap Exacerbating the Sector's Labour Shortage (2013b).

All information sources are referenced where used. Additional primary and secondary data was also obtained through an agreement with Seabridge Gold Inc. (KSM Project) and the Proponent, which enables the two parties to share information and data collected on each project.

#### 19.3.3.2 *Methods*

The Socio-economic Baseline Report ([Appendix 19-A](#)) is based on review and analysis of multiple secondary sources of data and information, including official government statistics and other data from provincial, regional, and local organizations and government agencies. Some baseline data was updated based on the recent release of the 2011 National Household Survey (NHS). Published economic science literature, public and unpublished reports, media analyses, and the results of public involvement activities were also considered. The Proponent has a data sharing agreement in place with Seabridge Gold Inc. with respect to their proposed KSM Project, which allows for this report to build upon the data gathered during KSM Project baseline efforts carried out between 2008 and 2012.

Field work was carried out in Smithers, the Hazelton area, including several Gitksan communities, and Terrace in June of 2012. Research included meetings and interviews with community managers and leaders, regional representatives, First Nations leaders and administrators, government agencies and service providers, community organizations, and other knowledge holders. Interviews were transcribed and used primarily to supplement statistical information and contextualize understanding of existing issues and concerns in the communities. Interview data is primarily qualitative and particularly helpful to identify issues and to provide additional context, and for verification of statistical and secondary source data.

Census information for 2001, 2006, and 2011 from Statistics Canada as well as the 2011 NHS are the key source of quantitative data used both directly and indirectly for the baseline report. BC Stats, Aboriginal Affairs and Northern Development Canada, regional districts, and numerous other provincial, municipal, and private organizations typically base some or all of their analysis on official census data. However, the census is not without its limitations. BC Stats produces community profile analyses of a wide range of economic indicators. The economic effects assessment makes use of census data that was publically available up to and including April 2014.

### Data Limitations

Statistics Canada 2001, 2006, and 2011 census data is the primary source of quantitative data used in the socio-economic baseline report. The baseline data was also updated with the recently released 2011 National Household Survey. Information and data from BC Stats, Aboriginal Affairs and Northern Development Canada, and other government organizations is typically based on census data. For example, not all of the 2011 census data is publically available. BC Stats produces community profiles that consider a range of social and economic indicators; however, the profiles reported on in the socio-economic baseline report do not include 2011 census data, as the information was not available until the first quarter of 2014. The economic effects assessment is, however, based on census data that was publically available up to and including April 30, 2014.

Caution is required when drawing conclusions about current economic conditions from census data as this data can become quickly outdated, especially with respect to smaller communities. Another caution relates to the availability of information as it can vary by community. In some cases, information that is typically available for larger communities does not exist for smaller communities. These data gaps are filled by the primary research. It is also difficult to compare data from different sources and time periods due to the use of different geographic boundaries and statistical definitions.

### Baseline Study Area

#### *Province of BC*

Resource development makes an important contribution to the BC economy by providing tax revenue to the governments, and providing direct and spin-off employment and business benefits. The Project will provide positive economic benefits to the province as described in Section 1.9, Project Benefits.

#### *Regional Study Area*

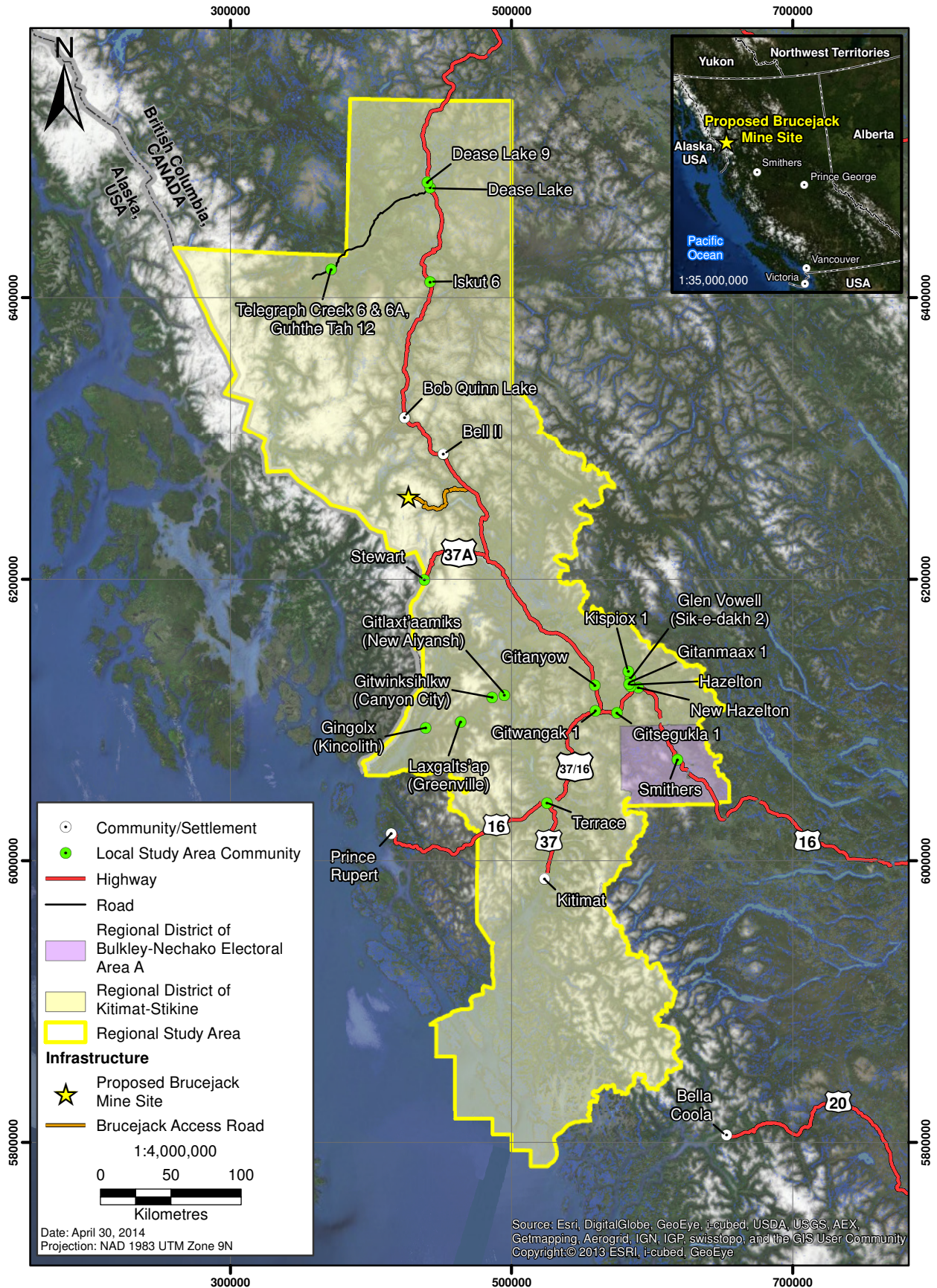
The economic RSA (Figure 19.3-1) coincides with the boundaries of the RDKS and Electoral Area A of the RDBN. The RDKS provides regional planning and local government services to rural and unincorporated settlements within a 100,000 km<sup>2</sup> area in northwestern BC. Electoral Area A of the RDBN comprises 3,688 km<sup>2</sup>, including the Town of Smithers and the rural areas surrounding the municipality (NDIT 2010).

#### *Local Study Area*

The economic LSA is not a contiguous area *per se* as it only includes the communities within the economic RSA that may directly and indirectly interact with the Project (Figure 19.3-1). For example, these communities may provide labour, and/or goods and services for the proposed Project. The communities in the economic LSA include incorporated municipalities and unincorporated towns, Treaty lands, and Indian Reserves (IRs). The rationale for the inclusion of each community is provided in the Socio-economic Baseline Report ([Appendix 19-A](#)). The communities include:

- The unincorporated Town of Dease Lake;
- Tahltan IRs (populated) of Dease Lake 9, Telegraph Creek 6 and 6A, Guhthe Tah 12, and Iskut 6;
- District of Stewart;
- Nisga'a villages – Gitlaxt'aamiks (New Aiyansh), Gitwinksihlkw (Canyon City), Laxgalts'ap (Greenville), and Gingolx (Kincolith);
- Hazelton;
- New Hazelton;
- Gitxsan IRs of Gitanmaax 1, Kispiox 1, Glen Vowell (Sik-e-dakh 2), Gitsegukla 1, and Gitwangak 1;
- Town of Smithers; and
- City of Terrace.

**Figure 19.3-1**  
**Brucejack Gold Mine Project**  
**Economic Regional and Local Study Area Communities**



## 19.3.3.3 Characterization of Economic Baseline Conditions

Population and Demographics

The economic LSA is populated by a number of small First Nations and Nisga'a communities and several larger centres (Table 19.3-6), which primarily rely on resource industries such as mining and forestry. Some of the key communities that might experience population and demographic effects as a result of the Project are listed in Table 19.3-6; the table also provides population estimates for 1996 to 2011. As evident, population in most of the smaller communities decreased over the investigated time period.

**Table 19.3-6. Local Study Area Community Population Trends, 1996 to 2011**

Community <sup>1</sup>	1996	2001	2006	2011	% Change (1996 to 2011)
<b>Dease Lake</b>	n/a	318	384	303	-5%
Dease Lake IR 9	104	66	68	58	-44%
Iskut IR 6	271	238	335	207	-24%
Telegraph Creek IR 6 <sup>2</sup>	96	63	62	51	-99%
Telegraph Creek IR 6A <sup>2,4</sup>	138	20	162	1	-100.0% <sup>4</sup>
Guhthe Tah IR 12 (Telegraph Creek) <sup>3,4</sup>	0 <sup>3</sup>	140	173	157	100.0% <sup>4</sup>
<b>Subtotal: Tahltan Nation reserves</b>	<b>609</b>	<b>527</b>	<b>654</b>	<b>427</b>	<b>-30%</b>
<b>Stewart</b>	<b>858</b>	<b>661</b>	<b>496</b>	<b>494</b>	<b>-42%</b>
Gitlaxt'aamiks <sup>5,6</sup>	739	716	806	758	3%
Gitwinksihlkw <sup>5</sup>	231	212	201	184	-20%
Laxgalts'ap <sup>5</sup>	598	467	474	378	-37%
Gingolx <sup>5</sup>	318	339	341	408	28%
<b>Subtotal: Nisga'a Lands<sup>5</sup></b>	<b>1,886</b>	<b>1,734</b>	<b>1,822</b>	<b>1,728</b>	<b>-8%</b>
<b>Hazelton</b>	<b>347</b>	<b>345</b>	<b>293</b>	<b>270</b>	<b>-22%</b>
<b>New Hazelton</b>	<b>822</b>	<b>750</b>	<b>627</b>	<b>666</b>	<b>-19%</b>
Gitanmaax	638	693	723	627	-2%
Gitsegukla	506	432	721	448	-11%
Gitwangak	481	475	465	500	4%
Glen Vowell <sup>2</sup>	177	171	225	222	25%
Kispiox	553	651	617	536	-3%
<b>Subtotal: Gitxsan Nation reserves</b>	<b>2,355</b>	<b>2,422</b>	<b>2,751</b>	<b>2,333</b>	<b>-1%</b>
<b>Gitanyow</b>	<b>408</b>	<b>369</b>	<b>387</b>	<b>383</b>	<b>-6%</b>
<b>Smithers</b>	<b>5,624</b>	<b>5,414</b>	<b>5,217</b>	<b>5,404</b>	<b>-4%</b>
<b>Terrace<sup>5</sup></b>	<b>12,783</b>	<b>12,109</b>	<b>11,320</b>	<b>11,486</b>	<b>-10%</b>

Source: Statistics Canada (2002b, 2012b); AANDC (2012) ; BC Stats (BC Stats 2007).

## Notes:

<sup>1</sup> To ensure confidentiality and protect the privacy of individuals, Statistics Canada employs a method called random rounding in which values, including totals, are randomly rounded either up or down to a multiple of five.

<sup>2</sup> To enable comparison between census years, Statistics Canada has adjusted 2006 census data as needed to take into account boundary changes that occurred between 2006 and 2011.

<sup>3</sup> Statistics Canada notes an adjusted population count for 1996.

<sup>4</sup> A percentage change from zero to any number represents an increase of 100% or infinity.

<sup>5</sup> Statistics Canada notes adjusted 1996 census data, to account for a census boundary change between 1996 and 2001.

<sup>6</sup> Statistics Canada has adjusted 2006 census data to account for a census boundary change between 2006 and 2011.

*Dease Lake, Telegraph Creek and Iskut*

In 2011, the population in Dease Lake IR 9, Telegraph Creek, and Iskut IR 6 was 474, a decrease from 2006 (Table 19.3-6; Statistics Canada 2007, 2012a).

*Stewart*

The District of Stewart had 494 residents in 2011, two residents less as compared to 2006 (Table 19.3-6; Statistics Canada 2007, 2012a).

*Nisga'a Villages*

The four Nisga'a villages (Gitlaxt'aamiks, Gitwinksihlkw, Laxgalts'ap, and Gingolx) had 1,728 residents in 2011, 5% less as compared to 2006; all villages with the exception of Gingolx experienced a decrease in the population (Table 19.3-6; Statistics Canada 2007, 2012a).

*The Hazeltons*

The population in the Hazeltons, which include Hazelton and New Hazelton, was 936 in 2011, 2% higher as compared to 2006; this represents an increase in the population in New Hazelton but a decrease in Hazelton (Table 19.3-6; Statistics Canada 2007, 2012a).

*Gitxsan Nation*

In 2011, the Gitxsan Nation reserves had a population of 2,333, a 17.9% decrease from 2006 (Statistics Canada 2007, 2012a).

*Smithers*

In 2011, the population in Smithers was 5,404, 4% higher as compared to 2006 (Table 19.3-6; Statistics Canada 2007, 2012a).

*Terrace*

The population in the City of Terrace was 11,486, which represented an increase from 2006 (Table 19.3-6; Statistics Canada 2007, 2012a).

Economic Activity*Dease Lake, Telegraph Creek, and Iskut*

Tahltan communities rely primarily on the public sector and natural resource industries for economic opportunities and employment. In 2011, in Dease Lake (IR 9), of the approximately 20 people in the labour force, 10 worked in public administration. In Iskut, of the approximately 80 people in the labour force, 20 worked in mining, quarrying, and oil and gas extraction, 10 in construction, and 25 in public administration. The data for Telegraph Creek for 2011 is unavailable (Statistics Canada 2013a).

Mining has been an important source of employment for members of the Tahltan Nation who have worked in various capacities at the former Eskay Creek, Cassiar, and Golden Bear mines. Tahltan also find employment during exploration and in conjunction with environmental impact assessment work ([Appendix 19-A](#)).

*Stewart*

Stewart has been economically depressed in recent years and many residents have left the area in search of work (Table 19.3-6). The local economy is susceptible to resource industry cycles in the region and is one of the least diversified in the province (Horne 2009). Mining has played a role in

Stewart's economy since it was settled and continues to do so today. The Huckleberry Mine supports employment within the community, as it trucks ore concentrate from its mill near Houston to the Port of Stewart. The Eskay Creek Mine was also an important economic contributor and employer until its closure in April 2008 (Rescan 2009). Other mines in the area that have contributed to the socio-economic well-being of Stewart include the Premier, Granduc, Jumbo, Red Cliff, and Porter-Idaho projects (StewartBC.com 2011). Other industries in Stewart include tourism, forestry, retail, and accommodation and food services. Industry data for 2011 is not available (Statistics Canada 2013a).

#### *Nisga'a Villages*

In 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. The data for employment by industry is, however, not available for 2011 (Statistics Canada 2013a).

#### *The Hazeltons*

Mining and businesses offering support to the mining sector are important in the Hazeltons, with education and health sectors providing some employment. In 2011, in Hazelton, there were approximately 145 people in the labour force (all industries), of that, 50 worked in educational services, 20 in health care and social assistance, and 15 in public administration. In New Hazelton, of the approximately 290 people in the labour force (280 all industries), 15 worked in mining, quarrying, and oil and gas extraction, 20 in construction, 20 in retail trade, 70 in education services, 25 in health care and social assistance, 30 in accommodation and food services, 25 in public administration, and 15 in other industries (Statistics Canada 2013a).

#### *Gitxsan Nation*

In Gitxsan Nation, public administration, education, and the health sector provide the majority of employment opportunities, with other sectors having a lesser impact. In 2011 in Gitanmaax, of the approximately 270 people in the labour force (240 all industries), 80 people worked in public administration, 30 worked in health care and social assistance, 25 in educational services, 20 in retail trade, 15 in accommodation and food services, and 10 people each work in agriculture, forestry, fishing, and hunting; mining, quarrying, and oil and gas; construction; professional; arts and recreation; and other. In Gitwangak, of the 160 people in the labour force (110 all industries, 45 not industry applicable), 35 worked in public administration, 20 worked in health care and social assistance, and 10 people each worked in education services, administrative, transportation and warehousing, and retail trade. In Kispiox, of the approximately 190 people in the labour force (165 all industries), 45 worked in public administration, 25 in educational services, 15 in health care and social assistance, 15 in agriculture, forestry, fishing, and hunting, and 10 each in construction, manufacturing, retail trade, arts and recreation, and other (Statistics Canada 2013a).

#### *Smithers*

Smithers provides a range of commercial, business, administrative, recreational, and cultural services (Town of Smithers 2010b). There has been increased economic diversification over recent years, although the town continues to be dominated by the forestry and public service sectors. In 2011, of the approximately 3,025 people in the labour force, 390 (12.9%) worked in retail trade, 305 (10.1%) worked in accommodation and food services, 290 (9.6%) in construction, 290 (9.6%) in education services, 195 (6.5%) in transportation and warehousing, 185 (6.1%) in mining, quarrying, and oil and gas, 125 (4.1%) in agriculture, forestry, fishing and hunting, and the remaining in other industries (Statistics Canada 2013a). The regional tourism sector is also growing, largely based on wilderness and backcountry recreation activities. Smithers' role as a service centre is enhanced by its transportation facilities and business services (Town of Smithers 2010b).

## Terrace

The economy of Terrace is diversifying with expanding tourism and service-based sectors. The city's strategic location and relatively large population give it a critical mass that enhances its capacity to fulfill its emerging role as a key supply-and-service centre for much of northwest BC. Based on the 2011 NHS data, of the approximately 8,145 people in the labour force (7,955 all industries), 1,215 (15.3%) worked in retail trade, 1,050 (13.2%) worked in health and social assistance, 785 (9.9%) in education services, 705 (8.9%) and 665 (8.4%) respectively in accommodation and foods services and public administration, 365 (4.6%) in agriculture, forestry, fishing and hunting, and only 90 (1.1%) in mining, quarrying, oil and gas. The remaining worked in other industries (Statistics Canada 2013a).

## Employment and Income

Recent employment and income data is not available for several LSA communities; data from the 2011 NHS and the 2011 census is provided in Table 19.3-7 and Table 19.3-8 (Statistics Canada 2013a). Additional data on employment and income for the LSA communities is available in [Appendix 19-A](#).

**Table 19.3-7. Labour Force Status in the Local Study Area, 2011**

Community	Population 15+	In the Labour Force	Employed	Unemployed	Participation Rate (%)	Employment Rate (%)	Unemployment Rate (%)
<b>Dease Lake</b>	<b>230</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
Dease Lake IR 9	40	20	15	10	50.0	37.5	50.5
Iskut IR 6	160	80	60	15	50.0	37.5	18.8
Telegraph Creek IR 6	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Telegraph Creek IR 6A	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Guhthe Tah IR 12 (Telegraph Creek)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Subtotal: Tahltan Nation reserves</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Stewart</b>	<b>405</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
Gitlaxt'aamiks	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gitwinksihlkw	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Laxgalts'ap	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gingolx	310	n/a	n/a	n/a	n/a	n/a	n/a
<b>Subtotal: Nisga'a Lands</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Hazelton</b>	<b>195</b>	<b>145</b>	<b>145</b>	<b>0</b>	<b>74.4</b>	<b>74.4</b>	<b>0.0</b>
<b>New Hazelton</b>	<b>485</b>	<b>295</b>	<b>215</b>	<b>80</b>	<b>60.8</b>	<b>44.3</b>	<b>27.1</b>
Gitanmaax	495	265	185	80	53.5	37.4	30.2
Gitsegukla	320	n/a	n/a	n/a	n/a	n/a	n/a
Gitwangak	365	160	70	90	43.8	19.2	56.2
Glen Vowell	165	n/a	n/a	n/a	n/a	n/a	n/a
Kispiox	405	190	125	60	46.9	30.9	31.6
<b>Subtotal: Gitxsan Nation reserves</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Gitanyow</b>	<b>275</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Smithers</b>	<b>4,215</b>	<b>3,025</b>	<b>2,790</b>	<b>235</b>	<b>71.8</b>	<b>66.2</b>	<b>7.8</b>
<b>Terrace</b>	<b>12,320</b>	<b>8,145</b>	<b>7,495</b>	<b>650</b>	<b>66.1</b>	<b>60.8</b>	<b>8.0</b>
<b>BC</b>	<b>3,646,840</b>	<b>2,354,245</b>	<b>2,171,465</b>	<b>182,775</b>	<b>64.6</b>	<b>59.5</b>	<b>7.8</b>

Notes:

Source: (Statistics Canada 2012a, 2013a).

n/a indicates that data for the area was suppressed for data quality or confidentiality reasons.

Table 19.3-8. Income in the Local Study Area, 2011

Community	Individual Income				Share of Total Income by Source		
	Median Income (\$)	Average Income (\$)	Median Employment Income (\$)	Average Employment Income (\$)	Employment Income (%)	Other Money (%)	Government Transfer Payments (%)
<b>Dease Lake</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dease Lake IR 9	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Iskut IR 6	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Telegraph Creek IR 6	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Telegraph Creek IR 6A	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Guhthe Tah IR 12 (Telegraph Creek)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Subtotal: Tahltan Nation reserves</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Stewart</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gitlaxt'aamiks	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gitwinksihlkw	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Laxgalts'ap	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gingolx	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Subtotal: Nisga'a Lands</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Hazelton</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>New Hazelton</b>	<b>22,561</b>	<b>34,131</b>	<b>52,937</b>	<b>51,384</b>	<b>71.7</b>	<b>0.8</b>	<b>17.2</b>
Gitanmaax	14,382	19,045	33,185	34,846	70.4	0.3	26.3
Gitsegukla	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gitwangak	8,286	13,028	25,935	29,294	56.1	0	41.2
Glen Vowell	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kispiox	9,824	15,194	31,759	34,668	58.6	3.7	36.1
<b>Subtotal: Gitxsan Nation reserves</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Gitanyow</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Smithers</b>	<b>30,586</b>	<b>37,516</b>	<b>47,042</b>	<b>51,329</b>	<b>76.2</b>	<b>0.8</b>	<b>13</b>
<b>Terrace</b>	<b>29,433</b>	<b>36,985</b>	<b>47,038</b>	<b>53,028</b>	<b>74.6</b>	<b>1.5</b>	<b>14.8</b>
<b>BC</b>	<b>28,765</b>	<b>39,415</b>	<b>49,143</b>	<b>58,016</b>	<b>73.7</b>	<b>1.7</b>	<b>11.7</b>

Notes:

Source: Statistics Canada (2013a)

n/a indicates that data for the area was suppressed for data quality or confidentiality reasons.

The majority of the LSA communities, in comparison with Smithers and Terrace, had a relatively small labour force. Based on the available data, in 2011 there were approximately 20,385 people aged 15 years old and older in the LSA; of that 12,325 were in the labour force. Based on the 2006 census, Nisga'a villages had approximately 973 people in the labour force. For the Tahltan communities, the figures from both the Skeena Native Development Society (SNDS) and Statistics Canada indicated a 2006 active labour force of comparable size at 251 and 260 persons, respectively (SNDS 2007; Statistics Canada 2007). Therefore, in 2011, there were approximately 21,000 people aged 15 and over in the LSA; assuming an approximated participation rate of 60% translates to a total labour force at around 12,600.



The unemployment rate for most LSA communities was substantially above the provincial unemployment rate of 7.8%. Based on the available data for 2011, Hazelton had the lowest unemployment rate of 0.0% whereas the highest unemployment rate was in Gitwangak (56.2%; Table 19.3-7; Statistics Canada 2013a). The participation rate varied between 43.8% and 74.4% in the LSA.

In 2011, the average individual income was below the provincial average income of \$39,415 (Table 19.3-8); the lowest average income was reported in Gitwangak. The average employment income for the LSA communities was also below the provincial average employment income of \$58,016; average employment income varied between \$34,668 and \$53,028 (Statistics Canada 2013a).

### Municipal Expenditures and Operating Budgets

#### *Dease Lake, Telegraph Creek and Iskut*

Information on the operating revenue and expenses for Dease Lake and the Tahltan Nation is not available.

#### *Stewart*

In 2012, the District of Stewart had operating revenue of \$2.6 million; of that, \$1.0 million came from grants, \$0.6 million was derived from municipal taxation and grants in lieu of taxes, \$0.8 million was from the provision of services, and \$0.2 million from other sources (District of Stewart 2013). The total expenses for 2012 were \$2.1 million, consisting mostly of general municipal expenses, amortization, and interest on debt (District of Stewart 2013).

#### *Nisga'a Villages*

In 2012, NLG had revenue of \$90.2 million; of that \$54.1 million was derived from Fiscal Financial Agreement and related funding, \$14.2 million was from other revenue, \$7.8 million came from investment income, \$6.2 million from targeted funding, \$3.3 million from interest income on the Nisga'a Final Agreement, and \$1.5 million from government business income. Some income also came from Lisims Fisheries Conservation Trust and government business enterprise income (NLG 2013). NLG expenses for 2012 totaled \$75.8 million; of that, \$22.9 million was for government-related expenses, such as administration or the provision of various programs and services, and \$52.9 million was spent on transfers and operating grants (Nisga'a Village Governments, Nisga'a Valley Health Authority, Nisga'a School Board, Nisga'a Urban Locals, and Wilp Wilxo'oskwahl Nisga'a; (NLG 2013).

#### *The Hazeltons*

In 2012, the operating revenue for New Hazelton was \$1.8 million, with \$0.6 million coming from net taxes available for municipal purposes, \$0.7 million from government grants and services, \$0.3 million from ICBC commissions, with the remaining derived from utility usage, investment income, fees and the sale of goods and services (New Hazelton 2013). The total expenses for 2012 were \$1.4 million, including expenses on government and protective services, transportation, community development, and other (New Hazelton 2013). Financial data for the Village of Hazelton is unavailable.

#### *Gitxsan Nation*

Information on the operating revenue and expenses for the Gitxsan Nation is not available.

#### *Smithers*

In 2012, the Town of Smithers' revenue was \$11.7 million; of that \$5.6 million came from property taxes and grants in lieu, \$1.9 million was derived from government transfers and grants, \$3.9 million from service charges, and the remainder from investment income and other revenue (Town of Smithers 2013). Total expenses for the town were \$11.9 million, with \$1.4 million spent on general government

services, \$2.2 million spent on protective services, \$1.9 million on transportation and transit, \$2.1 million on the airport, with the remaining expenses including utility services, economic development, and provision of other services (Town of Smithers 2013).

#### *Terrace*

In 2012, the total revenue for the City of Terrace was \$21.5 million, of which \$12.5 came from net taxes available for municipal purposes. \$4.6 million was derived from government grants and transfers, with the remaining derived from user fees and the sale of goods and services, investment and other income (City of Terrace 2013). Expenses for 2012 totaled \$19.3 million, of that \$4.7 million was spent on protective services, \$3.5 million on leisure services, \$3.2 million on amortization, \$2.6 million on transportation and transit, and \$1.7 million on development services, with the remaining expenses including general government services, the provision of utility services, interest, and others (City of Terrace 2013).

#### **19.3.4 Summary of Baseline Characterization**

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 from a decline in forestry and closure of operating mines.

Notably, it appears that some of these trends may be changing. The RSA has been the focus of significant investment in infrastructure projects, utilities, and mineral exploration over the last five years. Construction of the NTL project and Long Lake and Forest Kerr Hydro projects have provided construction jobs and are expected to support resource development in the region, particularly mining. Port expansion and plant modernization projects within and just outside of the RSA are also anticipated to produce long-term economic benefits for LSA communities, the region, and the province. This activity and investment is, in part, the reason behind why population numbers appear to be stabilizing in many LSA communities and for the notable decrease in the unemployment rate, particularly among youth. With its historical dependence on resource sector opportunities, and familiarity with seasonal and shift-based work, the regional population is potentially a valuable source of labour for the anticipated growth of mining activity in the region in the coming years.

### **19.4 ESTABLISHING THE SCOPE OF THE ECONOMIC EFFECTS ASSESSMENT**

Establishing the scope of the assessment involved a number of steps, including the development of an impact-scoping matrix, selecting economic VCs, setting the boundaries for the assessment and identifying potential effects. Provided below is a description of each of these steps.

#### **19.4.1 Selecting Receptor Valued Components**

The scoping of potential VCs followed the process outlined in the Assessment Methodology (Chapter 6). The determination of economic VCs involved a review of the AIR (April 2014), review of the issues identified by stakeholders and the public from consultation activities, socio-economic interviews with individuals within communities, and engagement with Aboriginal groups.

VCs were identified based on consideration of the information and issues communicated by the Nisga'a Nation, First Nations, local communities, government agencies, and the public during the consultation conducted as part of Project planning and in support of the environmental assessment. Consultation activities focused on those communities that comprise the economic LSA (Figure 19.3-1), although potential regional- and provincial-level issues were also taken into account. Professional judgement was used to focus the assessment on relevant economic VCs. The selected economic VCs are generally

consistent with the VCs identified in the AIR issued in April 2014 by the BC Environmental Assessment Office (BC EAO). Commercial land use is considered in Chapter 24 (Assessment of Potential Commercial and Non-Commercial Land Uses).

Each VC included in the assessment meets the following three criteria:

1. There is a spatial and temporal overlap between the Project and the VC such that interactions may occur.
2. There is a suitable knowledge base and measurable parameters for the VC that can be used to characterize the Project interactions and serve as the basis for assessing the potential effects of the Project.
3. There is a perceived, reasonable likelihood (i.e., as assessed by stakeholders or discipline specialists) that the VC could be affected by the Project.

The AIR requires that the Application for an Environmental Assessment Certificate / Environmental Impact Statement (Application/EIS) focus on themes that have the potential to be adversely affected by Project components and/or physical activities. Three economic VCs were identified in the AIR for inclusion in this assessment including:

- o labour market;
- o income production and revenue; and
- o economic activity.

Labour Market refers to the available labour within the economic RSA, as compared to the labour requirements of the Project and business activity due to spin-off economic impacts. The Project has the potential to result in changes to the labour market due to employment opportunities, contracting, and the procurement of goods and services. The Project may increase the demand for skilled labour within the economic RSA, which may create pressure on wages as it is expected that the average wage offered by the Project and its direct suppliers will be on average higher as compared to the current median income in the affected communities. Consequently, local and regional businesses may be required to increase wages to retain skilled workers.

Income Production and Revenue refers to personal and household income, GDP, and government tax revenues. The Project has the potential to result in changes to median incomes within the economic RSA. The Project is expected to result in direct and spin-off (indirect and induced) benefits to the economy as indicated by GDP impacts, as well as increases to government tax revenues. As directed by the AIR, the Project's economic benefits are considered in Section 1.9, Project Benefits.

Economic Activity refers to business opportunities and economic diversification. The Project has the potential to result in changes to local and regional economics within the economic RSA. The economy of the RSA is predominantly resource-based and this will continue with the development of this Project. The viability of the mining industry in BC is cyclical and subject to global factors including commodity prices, market demand, and relative mineral potential. Economic activity is considered to be an economic benefit and these benefits are considered in Section 1.9, Project Benefits.

#### *19.4.1.1 Potential Interactions between the Project and Economic Conditions*

As described in Section 6.4.1, Selecting Candidate Components, a VC scoping exercise was conducted during the development of the draft AIR to explore potential Project interactions with candidate VCs, and to identify the key potential adverse effects associated with that interaction. The results of the

scoping exercise were circulated for review and approval by the EA Working Group and feedback from that process and from additional comments received has been integrated into the EA.

Table 19.4-1 provides an impact scoping matrix of economic VCs that have a possible or likely interaction with Project components and projects and activities. A full impact scoping matrix for all intermediate and receptor VCs is provided in Table 6.4-1 (see Chapter 6, Assessment Methodology). Interactions between the Project and the economy were assigned a colour code as follows:

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

**Table 19.4-1. Interaction of Project Components and Physical Activities with Economic Valued Components**

Project Components and Physical Activities by Phase	Labour Market
<b>Construction Phase</b>	
Employment and labour	
Procurement of goods and services	
<b>Operation Phase</b>	
Employment and labour	
Procurement of goods and services	
<b>Closure Phase</b>	
Employment and labour	
Procurement of goods and services	
<b>Post-closure Phase</b>	
Employment and labour	
Procurement of goods and services	

*Interactions coded as not expected (white) are considered to have no potential for adverse effects on a VC, and are not considered further.*

The scoping exercise informed that the Project has the potential to result in adverse effects related to one economic VC: labour market. Two VCs – income production and revenue, and economic activity – are related to providing economic benefits and are discussed in Chapter 1, Project Overview (as directed by the approved AIR).

**19.4.1.2 Consultation Feedback on Receptor Valued Components**

Determination of economic VCs involved several steps, including review of the issues identified by stakeholders and the public from consultation activities. VCs were identified based on consideration of the information and issues communicated by the Nisga’a Nation, First Nations, local communities, government agencies, other organizations and the public during the socio-economic baseline study and consultations conducted as part of Project planning and in support of the EA process. Activities focused on communities within the LSA. Issues related to potential adverse economic effects raised during consultation and engagement activities are summarized in Section 19.5.

Nisga’a, Skii km Lax Ha, Tahltan, and Gitksan expressed interest in skills training in order to take advantage of mine-related training opportunities. Communities and businesses identified the

importance of keeping communities apprised of project activities and business opportunities. For example, the City of Terrace would like to see the Proponent regularly inform the local business community about the Project and development schedule so that businesses can be in a position to respond to potential opportunities. The Gitanyow Hereditary Chiefs' Office indicated they have the capacity to provide a range of services such as wildlife and fish surveys, and environmental monitoring and, therefore, would be interested in opportunities to provide these services.

#### 19.4.1.3 Summary of Receptor Valued Components Included/Excluded in the Application/EIS

For the economic effects assessment, indicators were identified from which to assess impacts. One indicator was selected for the Labour Market VC to fully characterize the Project's adverse effect on that VC. The rationale for the inclusion of the VC is described in Table 19.4-2. The Project's effects on Income Production and Revenue, and Economic Activity are considered to be positive and, therefore, are described in Section 1.9, Project Benefits, and not assessed further here.

**Table 19.4-2. Economic Valued Components Included in the Application/EIS**

Valued Component/ Indicator	Identified by*				Rationale for Inclusion
	AG	G	P/S	IM	
Labour market	✓	✓	✓	✓	Direct and indirect Project employment is expected to result in increased demand for skilled labour in the economic RSA due to competition for skilled workers; the competition for skilled workers in turn may induce wage inflation, potentially across a number of sectors that compete in the labour market. Further, it is expected that there will be a decrease in employment at Project Closure.

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

#### 19.4.2 Assessment Boundaries for the Economic Effects Assessment

Assessment boundaries define the maximum geographic extent within which the effects assessment is conducted. They encompass spatial boundaries and temporal boundaries. The definition of these assessment boundaries is an integral part of the assessment process.

##### 19.4.2.1 Spatial Boundaries

The spatial boundaries for the effects assessment includes an LSA and RSA, as well as a provincial study area, which are defined below.

##### Local Study Area

The LSA communities include Nisga'a villages (Gitlaxt'aamiks, Gitwinksihlkw, Laxgalts'ap, and Gingolx); the Tahltan IR communities of Telegraph Creek (Telegraph Creek 6 and 6A, and Guhthe Tah 12), Iskut 6, and Dease Lake 9; Hazelton and New Hazelton; Skii km Lax Ha and the Gitxsan Nation communities, which include Gitanmaax 1, Kispiox 1, Glen Vowell (Sik-e-dakh 2), Gitsegukla 1, and Gitwangak 1; the District of Stewart; the Town of Smithers; and the City of Terrace; as well as the unincorporated communities of Dease Lake (Figure 19.3-1).

##### Regional and Provincial Study Areas

The RSA is defined as the northwestern BC region and it includes the RDKS and Electoral Area A of the RDBN (Figure 19.3-1). The province of BC as a whole is considered as it relates to the impacts on the provincial economy and natural resource development.

#### 19.4.2.2 *Temporal Boundaries*

The temporal boundaries of the Project are:

- **Construction:** 2 years;
- **Operation:** 22 year run-of-mine life;
- **Closure:** 2 years (includes Project decommissioning, abandonment, and reclamation activities); and
- **Post-closure:** minimum of 3 years (includes ongoing reclamation activities and Post-closure monitoring).

#### 19.4.2.3 *Administrative Boundaries*

Regional district, LHA, IR and NFA boundaries are the most relevant administrative boundaries in relation to the economic effects assessment. The organization of socio-economic information and data available for use in the economic effects assessment is according to these boundaries and the populations that reside within and, therefore, can place constraints on the assessment. In addition, the government agencies and organizations that operate according to these administrative units provide services and have management responsibilities that are the backdrop for the assessment of potential economic effects, and the mitigation and management of any adverse economic effects of the Project.

#### 19.4.2.4 *Technical Boundaries*

Technical boundaries apply to those boundaries that may limit the ability to predict or measure change. Relevant to the economic effects assessment, technical boundaries of the province can include those boundaries for which economic data is collected. These are defined by regional districts, municipalities, First Nations reserves, and economic development zones. However, often economic data might not be collected, or it could be dated or suppressed for smaller communities (population less than 250), which might consequently affect or constrain the assessment of some VCs.

### 19.4.3 **Identifying Potential Effects on Economic Conditions**

The selection of Project effects for inclusion in the economic effects assessment of the Project was based on an effect-scoping exercise that explored the potential Project interactions with selected economic VCs. The identification of key potential effects associated with each interaction was classified as either positive or negative. Only the potential adverse economic effects of the Project are discussed and considered in the effects assessment.

#### 19.4.3.1 *Effects Included in the Assessment of Potential Project Effects*

Currently, there is a relatively high level of unemployment within Aboriginal communities within the LSA. The engagement and participation of economically disadvantaged segments of the population is important in the achievement of economic development within the LSA and across the region. The Project has the potential to provide employment and income opportunities for Nisga'a Nation and other Aboriginal communities, as well as Nisga'a Nation- and First Nation-owned businesses. However, such opportunities will require mine-related skills that are often less prevalent within the Aboriginal labour force. This might limit the accessibility of employment opportunities for particular groups of people. Therefore, in order to take advantage of opportunities, it is expected that some training of Aboriginal people will be required.

During the Construction and Operation phases, employment opportunities may also increase the demand for skilled labour and create potential labour shortages for local and regional businesses that rely on a

labour force with similar skills. This increased demand may create wage inflation pressure as it is expected that the average wage offered by the Project will be higher compared to the median income in the affected communities. As a result, some skilled workers may leave their current jobs in order to work at the mine or with a direct supplier. This can have “knock-on” effects through the labour force as those currently in less skilled, lower-paying positions take advantage of opportunities to advance. Local and regional businesses may be required to either increase wages to retain skilled workers, or hire less experienced workers and dedicate resources towards training and developing employees.

With the Closure of the Project, there will be a loss of employment and, therefore, a decrease in household income, unless workers can find other employment. Approximately 431 to 619 full-time positions will be lost. Overall economic value-added (GDP), tax, and resource revenue will also decrease. Businesses supplying the Project will also be impacted. These impacts may occur within the LSA, RSA, across the province and Canada, depending on where the workforce comes from and the state of the economy when the mine closes.

In sum, the potential adverse effects of the Project on the labour market are:

- changes to employment and labour participation of vulnerable groups;
- increased competition for labour and wage inflation; and
- decrease in employment at Closure.

The following preliminary indicators will be used to assess the Project’s effects on the labour market:

- personal and commercial income;
- skills and wage demands on the local labour force, and
- employment levels.

#### 19.4.3.2 Effects Not Included in the Assessment of Potential Project Effects

Many economic effects of the Project are positive and include increased employment, personal incomes, and government tax revenues. These Project benefits are fully detailed in Section 1.9, Project Benefits, and are summarized here for easy reference (Table 19.4-3).

**Table 19.4-3. Economic Benefits of the Project within British Columbia**

	Employment (person-years)		Income (\$M)		Government Revenues (\$M)	
	Construction	Operation	Construction	Operation	Construction	Operation
Project	870	12,353	134	1,475	27	320
<b>Supplier</b>						
Direct	1,510	7,669	92	393	19	96
Indirect	722	3,332	41	179	9	45
Induced	809	5,602	41	284	9	65
<b>Total</b>	<b>3,912</b>	<b>28,956</b>	<b>308</b>	<b>2,331</b>	<b>64</b>	<b>320</b>

Source: [Appendix 19-B](#) (BC Input-Output Model Report)

### Construction

Construction expenditures are estimated to occur over a three-year period, starting approximately in 2015 and ending in 2016. For the Construction phase, total direct capital investment by the Project will be approximately \$663.5 million with the majority of direct capital expenditures expected to be sourced within BC. During Construction, a total of 870 person-years of direct on-site employment will be created by the Project with an additional 3,042 person-years of employment in supplier industries (Table 19.4-3.). The provision of direct, indirect, and induced employment will in turn contribute an estimated \$308 million in household income. Further, approximately \$64 million in personal, corporate, and sales taxes will benefit regional, provincial, and federal governments.

### Operation

The Project is expected to be in Operation for approximately 22 years, beginning in 2017 and ending in 2038. The most recent feasibility study report from June 2014 ([Appendix 5-A](#)) describes an 18 year Operation phase, while an earlier feasibility study (Tetra Tech 2013) had identified a 22 year Operation phase. For the purposes of this environmental assessment, an Operation phase of 22 years has been used as this is expected to provide, overall, a more conservative effects assessment associated with greater waste rock and tailings production and longer period of active disturbance prior to reclamation activities. Total direct spending by the Project is estimated to be approximately \$4.9 billion over the life of the mine with the majority of direct Project spending expected to occur within BC and some spending in the rest of Canada, depending on the requirements of the purchases.

Over the life of the mine, direct Project direct employment is predicted to be approximately 12,353 person-years of employment or an estimated 431 to 619 full time positions per year. An additional 16,603 person-years of employment is expected to be created in suppliers industries (Table 19.4-3.). The provision of employment will contribute an estimated \$2.3 billion to household income with most of it a result of direct on-site employment. Additionally, as a result of Project Operation, regional, provincial, and federal government revenue will increase by approximately \$320 million.

### Closure and Reclamation

The Project will be closed at the end of the mining period. The Closure of the mine will involve the removal of structures and equipment, closure of the portals, and reclamation of site disturbances. Mine Closure is expected to begin in the last year of Project Operation. The estimated cost of Closure for labour and equipment is \$9.1 million (Section 30.10, Closure Costing). The site preparation, reclamation and material costs for the areas that are associated with the Project are estimated at \$1.6 million. The costs include the cost of site preparation, soil placement, and re-vegetation. The material costs for the concrete seals for the portals and ventilation shafts are also included. The total cost for closing the Project facilities and the reclamation for the components of the Project—including the Brucejack Mine Site, Brucejack Transmission Line, Brucejack Access Road, Bowser Aerodrome, and the Knipple Transfer Area—is estimated at \$10.7 million (Section 30.10, Closure Costing). Specific estimates of direct employment during this phase of the Project are not yet available, but some employment and business benefits will occur in the RSA.

### Post-closure

During Post-closure, the majority of Project activities will focus on reclamation of mine site facilities. As with Closure, specific estimates of direct employment during this Project phase are unknown. Associated procurement and expenditures and direct employment by the Project will provide employment and business opportunities, but as with Closure these opportunities will be limited as compared to the Operation phase of the Project.



Canadian Environmental Assessment Act, 2012, Section 5(1)(c) Requirements

Changes to the environment as a result of the Project have the potential to affect the socio-economic conditions of Aboriginal people in the Economic LSA. Section 5(1)(c) of the *Canadian Environmental Assessment Act, 2012* (2012) requires consideration of these effects during the effects assessment. Effects on changes to the environment as a result of the Project on social conditions of Aboriginal people are considered in Section 20.4.3.4. Changes to the environment as a result of the Project on economic conditions of Aboriginal people are considered here. Environmental effects of the Project could affect the economic well-being of Aboriginal people through effects on country foods harvested for subsistence purposes. The inability to harvest country foods due to effects on the abundance, distribution and quality of country foods could result in Aboriginal people having to purchase more store bought food.

The assessment of effects in the Application/EIS with respect to fish (Chapter 15, Fish and Fish Habitat), economically and culturally important plants (Chapter 16, Terrestrial Ecosystems), and wildlife (Chapter 18), conclude there are no significant effects on the abundance and distribution of animals or plants harvested by Aboriginal people. Aboriginal trappers who utilize traplines in the vicinity of the Project are not expected to see impacts on furbearers they harvest, and any economic gains from trapping activities should remain the same as without the Project. Aboriginal people who harvest pine mushrooms for sale to foreign markets should see no impact to their harvest levels, and hence not suffer economic loss.

No residual effects on country foods are predicted (Chapter 21, Assessment of Potential Health Effects). A Screening Level Risk Assessment (SLRA) for the LSA (Chapter 21, Section 21.6.4.2) predicted no unacceptable risks related to consumption of moose, snowshoe hare, grouse, or berries (the species selected for testing and representative of all country foods in the LSA and RSA) during Operation and Closure. Based on the measured baseline conditions and the modelled Operation and Closure conditions, the quality of country foods is not expected to change substantially. The Exposure Ratio (ER) and Recommended Maximum Weekly Intake (RMWI) of the assessed country foods did not change substantially from baseline to Operation and Closure scenarios. This means that Aboriginal people will be able to continue to consume country foods at baseline rates and frequencies, and the magnitude of health effects due to consumption of foods in the LSA is considered negligible.

Changes to the environment as a result of changes to the Project are not expected to impact the economic conditions of Aboriginal people due to the lack of predicted effects on animals and plants harvested by Aboriginal people. Consequently, effects on the economic conditions of Aboriginal people due to changes to the environment are scoped out of the effects assessment.

## 19.5 IDENTIFYING KEY EFFECTS ON THE LABOUR MARKET

Professional judgement based on baseline data collection and research, as well as consultation and feedback from stakeholders, was used to identify potential interaction between the labour market and the Project's activities. These interactions are assessed in Table 19.5-1. For those interactions marked yellow or red in Table 19.5-1 (i.e., are being carried forward in the assessment), the effects assessment applies best practice methods to predict the nature and extent of effects that may result from the Project.

As indicated, the key effects that will be analyzed and assessed below for the Construction and Operation phases of the Project are: change to employment and labour participation of vulnerable groups; and increased competition for labour and wage inflation. For the Closure phase of the Project, decreased employment and loss of associated income, as well as potential out-migration of population leading to a decrease in the labour market, will be discussed.

**Table 19.5-1. Ranking Potential Effects on the Labour Market**

Project Components / Physical Activities	Labour Market		
	Changes to Employment and Labour Participation of Vulnerable Groups	Increased Competition for Labour and Wage Inflation	Decrease in Employment at Closure
<b>Construction</b>			
Employment and labour	●	●	○
Procurement of goods and services	●	●	○
<b>Operation</b>			
Employment and labour	●	●	○
Procurement of goods and services	●	●	○
<b>Closure</b>			
Employment and labour	○	○	●
Procurement of goods and services	○	○	●
<b>Post-closure</b>			
Employment and labour	○	○	●
Procurement of goods and services	○	○	●

**Notes:**

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

**19.5.1.1 Changes to Employment and Labour Participation of Vulnerable Groups**

Construction associated with mine projects typically requires a relatively large number of trained and skilled workers over a short period of time, who are predominantly brought in from outside the region (e.g., use of a mobile construction workforce, where workers move from one heavy engineering construction project to another). Because of the employment requirements, the share of those employed locally directly by the Project is expected to be relatively modest. Most construction work packages would likely be undertaken by contactors and businesses located outside the RSA due to the specialized construction experience and expertise needed. However, it is expected that those contractors hired from outside the region would, in turn, hire local people in a number of different positions (e.g., labourers, equipment operators, truck drivers) to undertake non-skilled construction. Operation brings longer-term employment opportunities and affords a greater opportunity for training and skills development to increase the share of employment that is within the RSA and LSA communities.

Overall, during Construction it is estimated that direct, indirect, and induced employment within the RSA will total approximately 867<sup>2</sup> person-years or an average of about 434 jobs because of the Project (Section 1.9.5, Employment). This represents about 1.9% of the size of the current labour force in the RSA.<sup>3</sup>

<sup>2</sup> Expected 87 person-year of direct Project employment (projection, 10% of direct Construction workforce) and 780 person-years of employment in suppliers industries.

<sup>3</sup> In 2011, the labour force in the RSA (RDKS and the RDBN’s Electoral Area A) was 22,830 (Table 19.3-2).

The specific origins of the workforce for Operation are not yet known, although it is likely that a greater proportion of workers will come from LSA communities and within the RSA than during Construction. On average, it is expected that the majority of the Operation workforce will be BC residents, with the remainder being from other provinces in Canada. A minor component of the Operation labour force may come from outside of Canada, those being individuals with specialized skillsets and qualifications.

Overall, during Operation it is estimated that direct, indirect, and induced employment within the RSA will total approximately 9,697<sup>4</sup> person-years or an average of about 441 jobs because of the Project (Section 1.9.5, Employment; Table 1.9-29). This represents about 1.9% of the size of the current labour force in the RSA.

It is not expected that a large proportion of the local labour force will be able to obtain employment at the mine due to a lack of skills and experience, although the Project has the potential to provide substantial employment across a number of positions. Workforce composition may change over the life of the mine as more workers in the RSA obtain mine-related skills and seek related employment.

Investigation of mining developments pointed to regional benefits of the project potentially masking highly localized inequalities and advantages (Hajkowicz 2011). Mining developments have been found to contribute to economic inequalities within a community as mining can enhance the income opportunity of some (those able to secure a job or contract at the mine) while undermining the sources of income of others (Sosa 2001). Evidence from literature indicates that mining, among other effects, contributes to economic inequality in the region as there is a large wage discrepancy between skilled and unskilled workers (Juhn 1993). Wage discrepancy is also found to increase over time where average wages for the least skilled workers decline and wages for the most skilled workers increase (Juhn 1993). This trend of wage inequality that contributes to economic inequality is also most apparent within narrowly defined education and labour market experience groups. Further, lowest income groups are often found in economically weak sectors, with women and Aboriginal workers being disproportionately represented (Bibb 1977).

Women continue to be underrepresented in BC mining, compared to the rest of the labour force and despite recent positive gains. Women only account for 16% of Canada's mining industry and 18% of BC's mining industry, which, as noted by the Council of Mining Industry and Human Resources (MIHR), accounts for only about one-third of female participation in the labour force generally (MIHR 2012a). Currently, unemployment levels also vary widely across LSA communities, though in the regional centres of Stewart, Terrace, and Smithers they are relatively close to the provincial average of 6% (see Section 19.3.3.3). Estimates of unemployment in Aboriginal communities vary significantly but are typically high, ranging between approximately 18% and 56% depending on the community (Section 19.3.3.3; Statistics Canada 2013a). Within the LSA communities, the labour force totals approximately 12,600; labour force of Aboriginal identity is approximately 2,000 (Section 19.3.3.3; Statistics Canada 2013a).

Through the provision of direct, indirect, and induced employment, the Project has the potential to affect the employment levels and labour participation of vulnerable groups within the economic RSA. This effect is relevant to those individuals and groups who are at a disadvantage, including women, Aboriginal peoples, and people without the necessary education and experience. Further, residents of the economic RSA are expected to fill only approximately one-tenth of the employment opportunities during the Construction phase and approximately half of direct jobs during the Operation phase, as

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<sup>4</sup> Estimated 6,177 person-years of direct Project employment (projection, 50% of direct Operation workforce) and 3,520 person-years of employment in suppliers industries.

compared to the employment opportunities expected to be obtained by individuals who reside elsewhere in the province. There is expected to be a modest level of in-migration of individuals to LSA communities, many likely with higher levels of education and skills, attracted to the direct and spin-off employment opportunities due to the Project. This in-migration of workers is also expected to contribute to the adverse effect on vulnerable groups.

Overall, changes to employment and labour participation of vulnerable groups in the LSA are expected to be less notable during Construction as a result of the short duration and high level of skills specialization required (most construction workers will be brought in from outside of the LSA communities). During the Operation phase of the Project, more changes to the employment and labour participation of vulnerable groups are expected as a result of the longer duration (22 years) and expected heavier reliance on local workers more broadly by the Project. Although this is expected to have the potential for an adverse effect on vulnerable groups as they may be “left behind” exacerbating current inequalities, there is a greater potential for local employment following the implementation and training programs and other policies aimed to promote the inclusion of the economically disadvantaged in Project employment. Thus, this potential effect may be both beneficial and adverse, depending on the success of workforce development efforts and the choices of individuals to participate in training and take advantage of employment opportunities.

#### Mitigation Measures for Changes to Employment and Labour Participation of Vulnerable Groups

A number of mitigation and enhancement measures are identified to address both adverse and beneficial effects on the Labour Market, specifically employment and labour participation of vulnerable groups. These mitigation measures are set out below and apply to both the Construction and Operation phases:

- Communications with Aboriginal and non-Aboriginal communities in the LSA on:
  - The Project development schedule, including timing of major activities and key milestones;
  - Workforce requirements and the hiring schedule, including types of experience and qualifications required to work at the Project, in particular once it enters the Operation phase; and
  - The workforce recruitment process and where information on recruitment can be obtained.
- Communications with educational institutions:
  - The Proponent will inform Aboriginal, regional, and local educational institutions, as appropriate, on the Project development schedule and workforce requirements to encourage educational institutions to ensure that relevant programs are available within the RSA and LSA communities for residents to take advantage of training and education opportunities relevant to Project employment. Communications are to provide educational institutions throughout the RSA with early notice with respect to workforce job categories, the workforce schedule, and training needs to assist administrators in taking pro-active steps to prepare resources to meet the demand.
- Human resources policies and programs:
  - Hiring practices will follow BC and federal legislation and regulations with a focus on hiring LSA and RSA residents, where possible, in consultation with local Aboriginal groups and LSA communities.

For the beneficial effect of changes to employment and labour participation of vulnerable groups the following enhancement measures are proposed and are applicable for Operation:

- Training:

- Offer training and skill development to Project employees across departments, including on-the-job training, in order to support ongoing enhancement of worker skillsets and internal job advancement.
- Local educational institutions:
  - Promote and support mining-related training and education for vulnerable groups as led and implemented by educational institutions within the RSA. These efforts are expected to assist individuals in overcoming pre-existing barriers to reaching higher levels of education and skill attainment.
- Aboriginal communities:
  - Through the pursuit of IBAs or other forms of agreements, work with First Nations and Nisga’a Nation to address some of the barriers their community members face with respect to gaining higher levels of education and skill attainment.
  - Work to support pre-existing government training initiatives in order to maximize their effectiveness.

With mitigation, residual adverse effects are not predicted for changes to employment and labour participation of vulnerable groups. In addition, controlling and correcting for such effects, beyond the mitigation identified here, is outside the scope and responsibility of the Project.

#### *19.5.1.2 Increased Competition for Labour and Wage Inflation*

Direct Project employment and procurement may increase competition for local labour and inflate wage expectations within the economic RSA. The provision of Project employment may serve to attract those skilled workers who are currently employed within the economic RSA, indirectly creating the need to replace those skilled workers. That is, the provision of Project employment may result in an increased need for skilled labour in non-mining sectors if workers choose to leave their current positions. This increase in demand for skilled employees also has the potential to produce inflated wage expectations as one of the attractions to mine employment is the provision of higher-than-average salaries and compensation.

Construction activities are estimated to generate approximately 870 person-years of direct employment over three years. Although many positions will be filled by individuals from outside the region, there is potential for the provision of Project employment to affect local businesses not only during the Construction phase but longer-term, as some individuals who become employed with the Project during Construction may continue their employment with the Project during the Operation phase.

One attractant of mine sector employment is the higher-than-average earnings; estimates of the average annual wage associated with Project-related employment are provided in Table 19.5-2 ([Appendix 19-A](#)). In BC, to compare, mine employment compensation inclusive of salary and benefits, increased from an average of \$115,700 in 2011 to \$121,100 in 2012 but dropped to \$114,600 in 2013 (MABC 2014). Salaries in this range are notably higher as compared to the salaries of workers employed in other goods- and service-producing occupations (Table 19.5-3). In 2011, the average employment income in the LSA communities ranged from \$29,294 to \$53,028, being below the provincial average (Section 19.3.3.3; Statistics Canada 2013a).

**Table 19.5-2. Average Project-related Wage Estimates**

	Average Annual Earnings		
	Direct	Indirect	Induced
<b>Construction</b>			
Project	\$154,028		
Supplier	\$60,920	\$56,275	\$50,675
<b>Operation</b>			
Project	\$119,436		
Supplier	\$51,275	\$53,710	\$50,675

Sources: [Appendix 19-B](#) (BC Input-Output Model Report)

**Table 19.5-3. British Columbia Industrial Comparison of Average Annual Earnings, 2012**

Goods-Producing Industries	Average Annual Earnings
Agriculture	\$37,305
Forestry, Fishing, Mining, Quarrying, Oil and Gas	\$69,949
Utilities	\$66,049
Manufacturing	\$52,367
Construction	\$55,905
<b>All Goods-Producing Industries</b>	<b>\$55,890</b>
Transportation and Warehousing	\$52,509
Retail and Wholesale Trade	\$32,751
Finance and Related	\$50,350
Professional, Scientific and Technical Services	\$65,983
Educational Services	\$50,234
Health Care and Social Services	\$45,646
Accommodation and Food	\$22,838
Public Administration	\$66,204
<b>All Service-Producing Industries</b>	<b>\$44,247</b>

Source: BC Stats (2013b)

Note: Average annual earnings are based on average weekly earnings in the specific industry as of October 2013.

The Operation phase of the Project is predicted to generate a total of approximately 12,353 person-years of employment over 22 years. This implies the development of the Project has the potential to result in a long-term demand for skilled labour from businesses operating within the economic RSA. This effect is relevant for businesses that employ individuals with trades or other industry certifications, such as heavy truck operators, welders, mechanics, and electricians. One can predict that some portion of skilled and currently employed individuals whose earnings are notably lower as compared to mine sector salaries may choose to explore their options.

During the Closure and Post-closure phases of the Project the competition for local labour, as induced by the Project, and associated wage inflation pressures will come to an end.

Overall, the Mining Industry and Human Resource Council (MIHR) reports that the Canadian mining industry will need more than 145,000 workers by 2023 to fill new positions and to replace individuals

leaving the sector. However, MIHR also reports that mining speciality programs have been developed in recent years to increase the number of skilled graduates to fill these jobs (MIHR 2013a). Within BC, the BC mining industry forecasted a need for over 15,000 new workers over the next decade (PWC 2013). Evidence of the increase in mine employment can be seen in the 12% increase in the number of individuals employed in BC's mining industry between 2011 and 2012 (from 9,310 to 10,419, respectively; PWC 2013). Increased training efforts for the economic RSA may result in further draws of the capable, skilled labour force from other types of employment these individuals would likely have obtained in the absence of the Project.

#### Mitigation Measures for Increased Competition for Labour and Wage Inflation

A number of mitigation measures are suggested to address adverse effects on increased competition for labour and wage inflation. These mitigation measures are set out below and apply for both the Construction and Operation phases. Key Project mitigation for increased competition for labour and wage inflation includes many of those identified previously (Section 19.5.1.1). Specific mitigation is as follows:

- Communications with Aboriginal and non-Aboriginal communities in the LSA on:
  - The Project development schedule, including timing of major activities and key milestones;
  - Workforce requirements and the hiring schedule, including types of experience and qualifications required to work at the Project, in particular once it enters the Operation phase; and
  - The workforce recruitment process and where information on recruitment can be obtained.
- Communications with educational institutions:
  - The Proponent will inform Aboriginal, regional, and local educational institutions, as appropriate, on the Project development schedule and workforce requirements to encourage educational institutions to ensure that relevant programs are available within the RSA and LSA communities for residents to take advantage of training and education opportunities relevant to Project employment. Communications are to provide educational institutions throughout the RSA with early notice with respect to workforce job categories, the workforce schedule, and training needs to assist administrators in taking pro-active steps to prepare resources to meet the demand.
- Human resources policies and programs:
  - Hiring practices will follow BC and federal legislation and regulations with a focus on hiring LSA and RSA residents, where possible, in consultation with local Aboriginal groups and LSA communities.
- Aboriginal Communities:
  - Through the pursuit of IBAs or other forms of agreements work with First Nations and Nisga'a Nation to address some of the barriers their community members face with respect to gaining higher levels of education and skill attainment.
  - Working to support pre-existing government training initiatives in order to maximize their effectiveness.

The development of the Project is likely to result in moderate competition for labour and wage inflation despite the implementation of mitigation. As a result, a residual effect is expected and is further assessed in Section 19.6.

### 19.5.1.3 *Decrease in Employment at Closure*

At the end of Operation, as the Project moves into Closure there will be a loss of employment. Decommissioning, reclamation, and ongoing operation/maintenance activities during Closure and Post-closure will provide some employment; workforce requirements have yet to be determined. A small number of jobs associated with long-term environmental engineering, monitoring, and management are also anticipated and Project expenditures of approximately \$26 million on goods and services are also predicted ([Appendix 19-B](#)).

Along with the loss of direct Project employment following the Operation phase will be the accompanying loss of employment in suppliers industries. At that time, the RSA is predicted to lose approximately 431 to 619 full-time mine-related positions and an estimated 755 positions in supplier industries ([Appendix 19-B](#)). While employment in supplier industries would likely begin to taper off following the loss of Project expenditures, direct on-site employment is expected to end more abruptly. This loss of employment is expected to comprise a notable change within the region. As noted in Section 19.5.1.1., the labour force of the economic RSA was approximately 21,730 in 2011 and, while it is acknowledged that many workers will likely come from other areas within BC, Canada, and elsewhere, the loss of jobs in the region might comprise a change for RSA residents.

Overall, direct project employment and expenditures will be much less during the Closure phase as compared to the Operation phase of the mine and, therefore, loss of employment, income, GDP, and government tax revenues is expected. This loss of employment and reduction in expenditures to suppliers has the potential to further result in indirect and induced employment and income loss. LSA communities that have become economically dependent on the Project during Operation may experience adverse effects during Closure, although there will be continued employment and procurement by the Project that otherwise would not occur.

#### Mitigation Measures for Decrease in Employment at Project Closure

A number of mitigation measures will be adopted to facilitate the transition of the workforce to other employment following the completion of the Operation phase. The mitigation measures will seek to minimize the adverse effects associated with increased levels of unemployment and will focus on enhancing the ability of Project employees to find employment elsewhere and aims to achieve the following:

- Communications with Aboriginal and non-Aboriginal communities in the LSA:
  - Provide formal, clear, and transparent communications with LSA communities, including First Nations and Nisga'a Nation, in advance of when Closure is going to occur so that affected Project contractors and local business employees are able to adjust accordingly.
  - Engage with Aboriginal leadership responsible for economic development for the LSA communities. The primary purpose of the ongoing engagement will be to ensure the Aboriginal leadership is aware of the current Project activities and when Closure is going to occur.
- Workforce transition programs:
  - Support training and career development opportunities prior to Closure, including worker training programs as part of worker recruitment and on-the-job training to enhance worker job expertise.
  - Implement measures prior to Closure to assist employees to identify opportunities for Post-closure employment, including providing job search assistance to workers seeking the service to maximize the number of workers that find alternative suitable employment.
  - Identify skills acquired during employment with the Project and match the identified skills to similar positions available at Closure, as well as alternative industries.



These measures are thought to contribute to Project employees' ability to transition to other employment once Project Operations are discontinued.

While mitigation measures are expected to reduce the effect of the decrease in employment at Project Closure, a residual effect is predicted and will be further assessed in Section 19.6.

## 19.6 RESIDUAL EFFECTS ON THE ECONOMY

The Project is expected to result in residual adverse effects on the labour market. These effects are expected to occur primarily within the RSA and LSA communities. Potential residual effects, remaining after mitigation measures, are described below. A summary of potential residual effects is included in Table 19.6-1.

**Table 19.6-1. Summary of Residual Effects on Labour Market**

Sub-component	Project Phase (timing of effect)	Project Component/ Physical Activity	Description of Cause-Effect	Description of Mitigation Measure(s)	Description of Residual Effect
Increased Competition for Labour and Wage Inflation	Construction, Operation	Employment and Income, Procurement of Goods and Services	Project employment and expenditures will contribute to competition for skilled labour and induce wage inflation pressures.	Communications with Aboriginal and non-Aboriginal communities; communications with educational institutions, human resources policies and programs.	Increased Competition for Labour and Wage Inflation
Decrease in Employment at Closure	Closure	Employment and Income, Procurement of Good and Services	Closure of the Project will result in loss of employment; this may increase unemployment in LSA communities.	Communications with Aboriginal and non-Aboriginal communities; workforce transition programs.	Decrease in Employment at Closure

### 19.6.1 Residual Effects on the Labour Market Remaining after Mitigation Measures

#### 19.6.1.1 Increased Competition for Labour and Wage Inflation

Direct, indirect, and induced employment and expenditures generated by the Project are expected to contribute to the competition for skilled labour and induce wage inflation pressures. Despite mitigation measures that aim to reduce the adverse effects of increased labour competition and wage inflation, it is likely that the development of the Project will result in a residual effect to some extent. The higher wages associated with mine-related employment both attract or draw workers' interest from their current employment and also serve to set higher expectations for income. Local business and industry will be required to respond to the increase in the demand for labour, likely through higher wage and salary offerings, as well as benefits. This is predicted to incur additional costs for businesses and reduce profitability or viability, as least in the short-term until the market adjusts to the changes.

#### 19.6.1.2 Decrease in Employment at Project Closure

The Closure of the Project will result in a loss of employment once the Operation phase is complete, affecting residents of the economic LSA and RSA. The availability of alternative employment at the time of Closure may serve to increase or decrease the severity of this effect. Should alternative employment be readily available at that time in the region, the decrease in Project employment may be largely offset. However, should economic conditions at the time be characterized by a lack of

alternative employment, Closure has the potential to result in the development of adverse economic conditions such as higher-than-average rates of unemployment within the economic RSA.

The Closure of the Project may result in this adverse effect. However, the magnitude and duration of this effect is dependent upon the conditions present at the time of Closure and Post-closure, including the overall economic climate, the number of the RSA residents employed at the Project during Operation and the availability of alternative employment opportunities with other businesses and projects. Proposed mitigation measures will help workers prepare for new job opportunities that are available and are expected to minimize the number of Project workers that become unemployed, particularly over the longer term. In addition, Project-related employment during Operation will provide the workforce with on-the-job training, skills, and experience that are expected to be highly marketable, thus positioning workers to be competitive in the labour market.

## 19.7 CHARACTERIZING RESIDUAL EFFECTS, LIKELIHOOD, SIGNIFICANCE, AND CONFIDENCE

The assessment of the potential effects of the development of the Project on the economy identified two residual effects linked to the economic VC Labour Market. Residual effects on the labour market include: 1) increased competition for labour and wage inflation; and 2) decrease in employment at Closure.

Residual effects are characterized using standard criteria. Each of these terms are outlined and defined below.

### 19.7.1 Characterizing Residual Effects

Residual effects to receptor VCs are described using the attributes defined below.

- **Magnitude:** This refers to the expected magnitude or severity of the residual effect. The corresponding significance levels are defined as:
  - *Low:* differing from the average value for baseline conditions to a small degree, but within the range of historical variation and well below a guideline or threshold value;
  - *Moderate:* differing from the average value for baseline conditions and approaching the limits of historical variation, but below or equal to a guideline or threshold value; or
  - *High:* differing from baseline conditions and exceeding guideline or threshold values so that there will be a detectable change beyond the range of historical variation (i.e., change of state from baseline conditions).
- **Geographic Extent:** This refers to the spatial scale over which the residual effect is expected to occur, and includes:
  - *Individual/Household:* an effect limited to individuals, families, and/or households;
  - *Community:* an effect extending to the community level;
  - *Regional/Aboriginal peoples:* an effect extending across the broader regional community or economy, or an effect extending to one or more Aboriginal groups; or
  - *Beyond Regional:* an effect extending possibly across or beyond the province.
- **Duration:** This refers to the length of time the effect lasts; the duration of an effect can be:
  - *Short-term:* an effect that lasts approximately 1 to 5 years;
  - *Medium-term:* an effect that lasts between 6 to 25 years;
  - *Long-term:* an effect that lasts between 26 and 50 years; or
  - *Far Future:* an effect that lasts more than 50 years.

- **Frequency:** This refers to how often the effect occurs; the frequency of an effect is defined as:
  - *Once:* an effect that occurs once during any phase of the Project;
  - *Sporadic:* an effect that occurs at sporadic or intermittent intervals during any phase of the Project;
  - *Regular:* an effect that occurs regularly during any phase of the Project; or
  - *Continuous:* an effect that occurs constantly during any phase of the Project.
- **Reversibility:** This refers to the degree to which the effect is reversible and is classified as:
  - *Reversible Short-Term:* an effect that can be reversed relatively quickly;
  - *Reversible Long-Term:* an effect that can be reversed after many years; or
  - *Irreversible:* an effect cannot be reversed (i.e., is permanent).
- **Resiliency:** This refers to the capacity of an intermediate component or receptor VC to resist or recover from major changes in structure and function following disturbances, without undergoing a shift to a vastly different regime that is very difficult to reverse. The classes for resiliency are:
  - *Low:* the component is considered to be of low resiliency following disturbances;
  - *Moderate:* the component is considered to be moderately resilient following disturbances; or
  - *High:* the component is considered to be highly resilient following disturbances.
- **Ecological or Social Context:** This refers to the current condition of the intermediate component or receptor VC and its sensitivity. For example, an effect may have more of an impact in an area that is ecologically sensitive or a greenfield site, rather than a disturbed or brownfield location. The corresponding levels are defined as:
  - *Low:* the component is considered to have little to no unique attributes;
  - *Neutral:* the component is considered to have some unique attributes; and
  - *High:* the component is considered to be unique.

#### 19.7.1.1 Characterization of Residual Effects for Labour Market

##### Increased Competition for Labour and Wage Inflation

Increased competition for labour market and wage inflation during the Construction and Operation phases is assessed to be moderate in magnitude, of medium duration, being continuous through the duration of the Project, and extend to the LSA community level. Furthermore, the effect is predicted to be reversible in the short-term with moderate resiliency. The effect is expected to be neutral in context. However, it is important to indicate that the receptor that would have lower resiliency would be local businesses (non-mining), as these local small and medium enterprises would be expected to have lower capability to recover from adverse effects caused by competition for skilled workers and possible wage inflation pressures (Table 19.7-1).

##### Decrease in Employment at Closure

At Closure of the Project a number of jobs will be lost. It is uncertain how the Closure will impact communities within the RSA and LSA. For Closure, this effect is assessed as being moderate in magnitude and of short duration, mainly at the LSA community level, and will occur only once. Additionally, the adverse effect is expected to be reversible in the short-term, have moderate resiliency, and be neutral in context (Table 19.7-1).

**Table 19.7-1. Characterization of Residual Economic Effects, Significance, Confidence, and Likelihood – Labour Market**

	Evaluation Criteria							Likelihood (low, medium, high)	Significance of Adverse Residual Effects (not significant; significant)	Confidence (low, medium, high)
	Magnitude (low, moderate, high)	Duration (short, medium, long, far future)	Frequency (once, sporadic, regular, continuous)	Geographic Extent (individuals/ household, community, regional/ Aboriginal peoples, beyond regional)	Reversibility (reversible short term; reversible long term; irreversible)	Resiliency (low, moderate, high)	Context (low, neutral, high)			
Residual Effects										
Increased competition for labour and wage inflation	Moderate	Medium	Continuous	Community	Reversible: short term	Moderate	Neutral	Medium	Not significant	Medium
Decrease in employment at Closure	Moderate	Short	Once	Community	Reversible: short term	Moderate	Neutral	High	Not significant	High

### 19.7.2 Likelihood of Residual Effects

Following recent guidance (September 9, 2013) from the BC EAO (2013a), the likelihood of residual effects is recommended to be assessed prior to the determination of significance. This differs to the approach recommended by the CEA Agency (CEA Agency 1994), which evaluates probability following determination of significance. While this Application/EIS follows the most recent guidance from the BC EAO, in order to maintain currency for both EAO and CEA Agency approaches, likelihood is determined before the determination of significance but it is not considered in the determination of significance.

The likelihood of a residual effect occurring is expressed as a probability, to determine the potential for the Project to cause a residual effect. Probability is determined according to the attributes identified below.

**Probability:** This refers to the likelihood that an adverse effect will occur in circumstances where it is not certain that the effect will materialize and is classified as:

- *Low:* an effect that is unlikely, but could occur;
- *Medium:* an effect that is likely, but may not occur; or
- *High:* an effect that is highly likely to occur.

#### 19.7.2.1 Characterization of Likelihood for Residual Effects on Labour Market

##### Increased Competition for Labour and Wage Inflation

Increased competition for labour and wage inflation is predicted to have a **medium** likelihood of occurrence. The potential for this outcome to materialize is dependent on the skill sets, availability, and motivations of individuals currently employed within the RSA (Table 19.7-1).

##### Decrease in Employment at Closure

Decrease in employment at Closure is expected to have a **high** likelihood of occurrence (Table 19.7-1).

### 19.7.3 Significance of Residual Effects

The CEA Agency's (1994) *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects* was used as guidance in evaluating the significance of the adverse residual effects for the Project. The significance of residual effects of the Project is founded on a comparison of the current receptor VC if the Project does not proceed, with the predicted state of the receptor VC if the Project proceeds, after mitigation measures.

The significance of effects is ranked according to the two categories described below.

- **Not significant:** Residual effects have low or moderate magnitude, individual/household to community geographic extent, short- or medium-term duration, could occur at any frequency, and are reversible in either the short- or long-term. The effects on the receptor VC are indistinguishable from background conditions (i.e., occur within the range of historical variation). There is a medium to high level of confidence in the analyses.
- **Significant:** Residual effects have high magnitude; have regional or beyond regional geographic extent; duration is long-term or far future; and occur at all frequencies. Residual effects on receptor VCs are consequential (i.e., structural and functional changes in populations and communities). Confidence in the conclusions can be high, medium, or low.

### 19.7.3.1 *Characterization of Significance of Residual Effects on Labour Market*

#### Increased Competition for Labour and Wage Inflation

The Project is expected to contribute to the competition for skilled labour in the LSA communities and, as a result, induce wage inflation pressures. For the Construction and Operation phases, based on the characterization of this residual effect in Section 19.7.1, the effect of increased competition for labour and wage inflation due to the Project is predicted to be **not significant** (Table 19.7-1).

#### Decrease in Employment at Closure

Based on the characterization of this residual effect in Section 19.7.1, the effect of a decrease in employment at Closure on the labour market is predicted to be **not significant** (Table 19.7-1).

### 19.7.4 **Confidence in Residual Effects**

Confidence, which can also be understood as the degree of scientific certainty, is a measure of how well residual effects are understood. Confidence includes a consideration of the acceptability of the data inputs and analytical methods used to predict and assess Project effects. It depends on the certainty of the predicted outcome, and it allows the decision-maker to evaluate risk associated with the Project. Confidence levels are defined as:

- *Low* (less than 50% confidence): The cause-effect relationship(s) between the Project and its interaction with the environment is poorly understood and/or data for the Project area or scientific analyses are incomplete, leading to a high degree of uncertainty;
- *Medium* (50 to 80% confidence): The cause-effect relationship(s) between the Project and its interaction with the environment is not fully understood, and/or data for the Project area or scientific analyses are incomplete, leading to a moderate degree of uncertainty; or
- *High* (greater than 80% confidence): The cause-effect relationship(s) between the Project and its interaction with the environment is well understood, and/or data for the Project area or scientific analyses are complete, leading to a low degree of uncertainty.

### 19.7.4.1 *Characterization of Confidence for Residual Effects on Labour Market*

#### Increased Competition for Labour and Wage Inflation

There is a **medium** level of confidence that the development of the Project will result in increased competition for labour and wage inflation within the economic RSA. This outcome has been documented as one commonly related to resource development projects in BC and Canada (MIHR 2013b; Table 19.7-1).

#### Decrease in Employment at Closure

There is a **high** level of confidence that the discontinuation of Project employment at Closure will result in some level of unemployment within the economic RSA. Mitigation measures will aim to increase the number of individuals able to readily obtain alternative employment (Table 19.7-1).

## 19.8 **SUMMARY OF RESIDUAL ECONOMIC EFFECTS AND SIGNIFICANCE**

Two residuals effects were identified in the assessment of the economic effects of the Project, both occurring in the labour market (increased competition for labour and wage inflation, and decrease in employment at Closure). Residual effect characterization rated all effects as not significant. Further, the assessment identified the residual effects as having either medium or high probability of

occurrence, with a medium or high level of confidence in the assessment. The summary of residual effects characterization is provided in Table 19.8-1.

**Table 19.8-1. Summary of Residual Effects, Mitigation, and Significance on the Economy**

Residual Effects	Project Phase(s)	Mitigation Measures	Significance
<i>Labour Market</i>			
Increased competition for labour and wage inflation	Construction, Operation	Communications with Aboriginal and non-Aboriginal communities; communications with educational institutions, human resources policies and programs.	Not significant
Decrease in employment at closure	Closure	Communications with Aboriginal and non-Aboriginal communities; workforce transition programs.	Not significant

## 19.9 CUMULATIVE ECONOMIC EFFECTS ASSESSMENT

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

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

The method involves the following key steps, which are further discussed in the proceeding sub-sections:

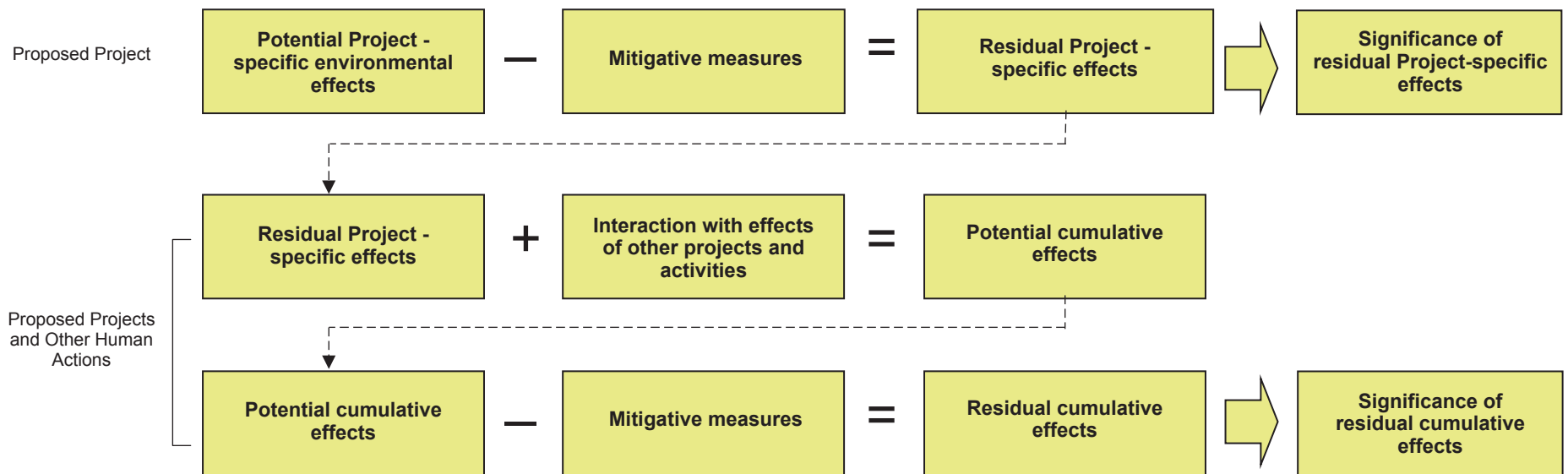
- scoping;
- analysis;
- identification of mitigation measures;
- identification of residual cumulative effects; and
- determination of significance.

The approach to CEA is presented in Figure 19.9-1.

### 19.9.1 Establishing the Scope of the Economic Cumulative Effects Assessment

The scoping process involves identification of the receptor VCs for which residual effects are predicted, and an examination of potential interaction between the projects and other relevant activities affecting economic conditions, as well as an examination of the definition of the spatial-temporal boundaries of the assessment.

**Figure 19.9-1**  
**Steps to Cumulative Effects Assessment**





### 19.9.1.1 *Identifying Intermediate Components and Receptor VCs for the Economic Cumulative Effects Assessment*

Receptor VCs included in the economic CEA were selected using four criteria following BC EAO (2013):

- there must be a residual effect of the project being proposed;
- that effect must be demonstrated to interact cumulatively with the effects of other projects or activities;
- it must be known that the other projects or activities have been or will be carried out and are not hypothetical; and
- the cumulative effect must be likely to occur.

The receptor VC included in this economic CEA is:

- labour market.

The economic effects assessment determined the Project is expected to result in two residual effects on the Labour Market including: 1) increased competition for labour and wage inflation; and 2) decrease in employment at Closure. The former refers to employment competition between businesses and industry and the Project, and includes the potential for this to result in wage inflation. The latter refers to the loss of employment that will occur following the completion of the Construction and Operation phases of the Project. The Closure of the Brucejack Gold Mine Project might coincide with the closure of other projects and, therefore, it would be expected to cumulatively contribute to the level of unemployment in the LSA communities.

Each of these residual effects has the potential to act cumulatively with the effects of other projects and activities within the RSA. However, it is important to note that the design and implementation of future projects and activities may change due to their conceptual nature, thus leading to some uncertainty in predicting the potential for cumulative effects.

### 19.9.1.2 *Potential Interaction between the Projects and Other Relevant Activities Affecting Economic Conditions*

A review of the interaction between potential effects of the Brucejack Gold Mine Project and effects of other projects and activities on economic conditions was undertaken. The review assessed the projects and activities identified in the assessment methodology, including:

- regional projects and activities that are likely to affect economic VCs, even if they are located outside the direct zone of influence of the Project;
- effects of past and present projects and activities that are expected to continue into the future (i.e., beyond the effects reflected in the existing conditions of economic VCs); and
- activities not limited to other reviewable projects, if those activities are likely to affect the economic VCs cumulatively (e.g., forestry, mineral exploration, commercial recreational activities).

A matrix identifying the potential cumulative economic effect interactions is provided in Table 19.9-1.

**Table 19.9-1. Potential Economic Cumulative Effect Interactions for Economic Environment**

Projects and Activities	Labour Market	
	Increased Competition for Labour and Wage Inflation	Decrease in Employment at Closure
<b>Historical</b>		
Eskay Creek Mine		
Galore Creek Mine (access road)		
Goldwedge Mine		
Granduc Mine (Past Producer)		
Johnny Mountain Mine		
Kitsault Molybdenum Mine (Past Producer)		
Silbak Premier Mine		
Snip Mine		
Sulphurets Advanced Exploration Project		
Swamp Point Aggregate Mine		
<b>Present</b>		
Brucejack Exploration		
Forrest Kerr Hydroelectric Power		
Long Lake Hydroelectric		
McLymont Creek Hydroelectric Project		
Northwest Transmission Line (NTL)		
Red Chris Mine		
<b>Reasonably Foreseeable Future</b>		
Arctos Anthracite Coal Mine		
Bear River Gravel		
Bronson Slope Mine		
Coastal GasLink Pipeline Project		
Galore Creek Mine		
Granduc Copper Mine		
KSM Project		
Kinskuch Hydroelectric Project		
Kitsault Mine		
Kutcho Mine		
LNG Canada Export Terminal Project		
Northern Gateway Pipeline Project		
Prince Rupert Gas Transmission Project		
Prince Rupert LNG Project		
Schaft Creek Mine		
Spectra Energy Transmission Line Project		
Storie Moly Mine		
Treaty Creek Hydroelectric Project		
Turnagain Mine		
Volcano Hydroelectric Project		

Black = likely interaction between Brucejack Gold Mine Project and other project or activity  
 Grey = possible interaction between Brucejack Gold Mine Project and other project or activity  
 White = unlikely interaction between Brucejack Gold Mine Project and other project or activity

### 19.9.1.3 Cumulative Effects Assessment Boundaries

The CEA boundaries define the maximum limit within which the effects assessment is conducted. They encompass the areas within, and times during which, the Project is expected to interact with the economic VCs and with other projects and activities, as well as the constraints that may be placed on the assessment of those interactions due to political, social, and economic realities (administrative boundaries), and limitations in predicting or measuring changes (technical boundaries). The definition of these assessment boundaries is an integral part of the economic CEA, and encompasses possible direct, indirect, and induced effects of the Project on labour market.

#### Spatial Boundaries

The spatial boundaries for the economic CEA is based on the RSA used for the economic effects assessment (Figure 19.3-1). There are a relatively large number of past and present and reasonably foreseeable projects (mainly mines) in northwestern BC that have affected or could potentially affect the labour market in the region. These projects and activities may interact spatially with the Brucejack Gold Mine Project effects on the economies of LSA communities and the region. Projects and activities considered to have a spatial linkage with the Brucejack Gold Mine Project are shown in Figure 19.9-2.

#### Temporal Boundaries

Present projects (i.e., Red Chris Mine) and future mine, hydroelectric, LNG, and pipeline projects have a temporal linkage for economics, such that these current and future projects and activities may cause similar economic changes to the Brucejack Gold Mine Project at a similar time. All past projects and activities are assessed as not having a temporal linkage with economics because there are no longer any substantial employment and expenditures associated with these past projects and activities. Furthermore, any residual adverse effects of past projects would be captured as a contribution to baseline conditions. Table 19.9-2 summarizes the linkages between the Project and other projects and activities.

The temporal boundaries for the CEA include the temporal boundaries for the economic effects assessment for the Project (Section 20.5, Effects Assessment and Mitigation for the Social Environment):

- **Construction:** 24 months;
- **Operation:** 22-year run-of-mine life;
- **Closure:** 2 years (includes project decommissioning, abandonment, and reclamation activities); and
- **Post-closure:** minimum of 3 years (includes ongoing reclamation activities and Post-closure monitoring).

As well as the following temporal phases:

- **Historical:** The year 1964 is the historic temporal boundary, representing a time when modern organized mining activity first started to occur in the regional area. Effects of historical activities are captured in the socio-economic baseline study;
- **Existing:** Includes projects and activities currently operating, undergoing construction, or will be operating concurrently with the Project; and
- **Foreseeable Future:** Includes projects that have entered or completed the BC EA process.

**Table 19.9-2. Potential Cumulative Effects between the Brucejack Gold Mine Project and Other Projects and Activities**

	Brucejack Gold Mine Project	Past Project or Activity	Existing Project or Activity <sup>1</sup>	Reasonably Foreseeable Future Project or Activity <sup>2</sup>	Type of Potential Cumulative Effect <sup>3</sup>
Increased Competition for Labour and Wage Inflation	X		x	x	Spatial and temporal crowding, additive and synergistic
Decrease in Employment at Closure	X		x	x	Spatial and temporal crowding, additive and synergistic

<sup>1</sup> McLymont Creek Hydroelectric Project, Red Chris Mine.

<sup>2</sup> Arctos Anthracite Coal Mine, Bronson Slope Mine, Coastal GasLink Pipeline, Galore Creek Mine, Granduc Copper Mine, KSM Project, Kinskuch Hydroelectric Project, Kitsault Mine, Kutcho Mine, LNG Canada Export Terminal, Northern Gateway Pipeline, Prince Rupert Gas Transmission, Prince Rupert LNG Project.

<sup>3</sup> Physical-chemical transport, nibbling loss, spatial crowding, temporal crowding, synergistic, additive, growth inducing.

#### 19.9.1.4 Potential for Cumulative Effects

Project-related residual effects are considered and analyzed for the potential to interact cumulatively with selected projects and/or activities; this analysis is supported by Table 19.9-2. For the effect on the Labour Market, the analysis narrows the scope of the CEA to focus only on those projects and activities where there is an anticipated cumulative interaction with the predicted changes and residual effects from the Brucejack Gold Mine Project. Types of cumulative effects that are present include:

- **Spatial or temporal overcrowding:** Cumulative effects can occur when there are many projects or activities within an area in a brief period of time. A threshold may be exceeded and the social environment may not be able to recover to pre-disturbance conditions. This can occur quickly or gradually over a long period of time before the effects become apparent. Spatial crowding results in an overlap of effects such as direct and indirect demand for labour from multiple projects. Temporal crowding may occur if effects from different actions overall occur before a VC has had time to recover.
- **Growth-inducing potential:** Each new action can stimulate further actions to occur. The effects of these “spin-off” actions may add to the cumulative effects already occurring in the vicinity of the proposed action, creating a feedback effect. Such actions may be considered “reasonably foreseeable actions”.

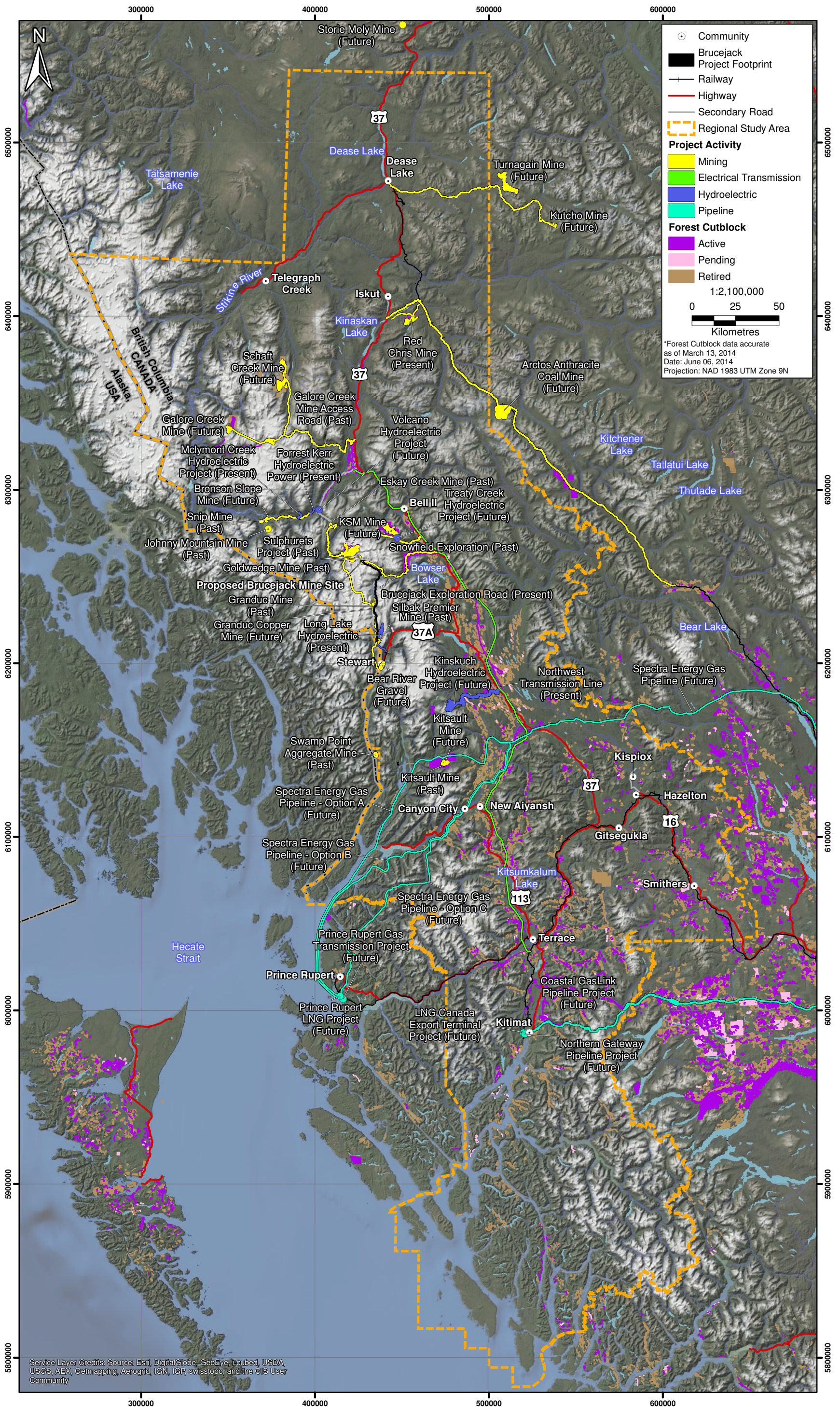
Interacting projects and activities may combine to create additive, synergistic, or induced effects. An additive effect increases the effect in a linear way. A synergistic effect may result in an effect greater than the sum of the two actions. An induced effect may result when an effect stimulates another effect.

The adverse effects of the Brucejack Gold Mine Project that have the potential to act cumulatively with other projects and activities on Labour Market are identified in Table 19.9-2. For the economic CEA, the following assumptions are made:

- Past projects and activities are not considered to be linked to the Project, as they no longer produce relevant adverse economic effects.
- Not all future projects and activities that have been identified as having the potential to act cumulatively with the Project on the labour market are certain to occur. However, for the purposes of this CEA, it is assumed that all identified future projects precede and activities occur, and that their demand for workers, supplies, and services within the RSA represents a substantial proportion of their total employment and procurement.

Figure 19.9-2

Economic Cumulative Effects Assessment Boundary Showing All Other Projects and Activities Relevant to Economic Conditions in the Vicinity of the Brucejack Mine Project



## 19.9.2 Cumulative Economic Effects and Mitigation

This section addresses the cumulative interactions identified in Tables 19.9-1 and 19.9-2.

### 19.9.2.1 Potential Cumulative Effects on the Labour Market

The predicted residual effects of the Brucejack Gold Mine Project on the labour market include: 1) increased competition for labour and wage inflation; and 2) decreased employment at Closure. With respect to other projects and activities in the region, a number of present and future projects have the potential to interact cumulatively with each of these effects and contribute to the negative effects.

#### Increased Competition for Labour and Wage Inflation

The Operation of the Brucejack Gold Mine Project will require skilled labour that will be hired from the economic RSA, from within the province and beyond. In Section 19.5.1.1 Project employment requirements indicate that the Project, over the 22-year life, will create an estimated 12,353 person-years of employment with as many as 619 full-time jobs. However, other present and future projects in the region, especially mining projects that require a large labour base, may contribute to this demand. For example, Red Chris Mine is expected to begin commissioning in June 2014 with an estimated 28 years of production and approximately 315 on-site jobs (Gillstrom, Anand, and S. Robertson 2012). The KSM Project is expected to be in operation for 52 years, creating up to 930 permanent jobs during mine Operation (Seabridge Gold 2012).

BC's mining sector is currently experiencing a labour shortage. This shortage is due to a number of factors, including recent economic growth and changes in population demographics. With high commodity prices, substantial expenditures on exploration, and the development of energy infrastructure in remote locations, the BC mining sector is poised for further growth in the longer term. In an already shrinking labour force, mining sector-related skills are becoming increasingly scarce as the experienced labour force retires, adding additional human resource challenges (MIHR 2008, 2011; Pollen 2011). However, the recently established BC Centre of Training Excellence in Mining (CTEM) is set to support the province's mine training providers in meeting industry needs and to ensure students have access to targeted training that will provide them with strong, marketable skill for the mineral industry (NWCC 2013).

Currently, around 15% of BC mining workers are 55 years of age and over, with around 28% aged 45 to 54, and around 25% aged 35 to 44. Retirements are predicted to rise over the next 10 years, the number of school graduates is expected to decline slightly, and fewer younger people are expected to choose the mining industry, further depleting the available number of mining workers. The number of mining workers in the mid-career range (33 to 44 years old) is currently relatively low, leaving fewer experienced mining workers to mentor those entering the industry (MIHR 2012b).

Further, the currently available number of mining workers<sup>5</sup> in BC is lower than that needed to fill all positions in the BC mining sector. Projections are that approximately 16,770 mining workers will be needed over the next 10 years in BC. Mining sector occupations that are predicted to be the hardest to fill include heavy equipment operators, heavy duty mechanics, construction millwrights, industrial mechanics, and industrial electricians (MIHR 2012b).

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<sup>5</sup> Here mining workers are those with education and skills training relevant to the mining sector whom have worked in the mining sector for at least one year, also termed "mining talent" by the Mining Industry Human Resources Council (MIHR 2012).

It is likely that the Brucejack Gold Mine Project will face a competitive labour market that, in turn, may lead to wage inflation pressures. In addition to competition with other mining developments in BC, there can be potential competition with large-scale developments in other provinces, such as the oil sands in Alberta or the potash and oil and gas industries in Saskatchewan (MIHR 2008, 2011). There can also be competition with labour requirements for the LNG projects in Kitimat and Prince Rupert and related pipeline projects (in particular the construction workforce). Although competition will be high, there are opportunities to increase attraction and retention of traditionally underrepresented groups, such as Aboriginal peoples. Potential labour shortages and impacts to other sectors can be mitigated with investment in training programs, and engagement of Aboriginal peoples and women (MIHR 2012b).

Overall, with a limited number of skilled workers in the region, labour requirements for present and future mine projects may temporally overlap, cumulatively contributing to the demand for skilled labour. However, although the Brucejack Gold Mine Project will require an estimated 619 full-time workers, the specialized skillsets and qualifications of workers required for the Project may not necessarily overlap with the requirements of other projects in the region. Consequently, the effect of the increased competition for skilled labour will depend on collective needs for workers with specific skillsets.

#### Decrease in Employment at Closure

Northwest BC tends to have an unemployment rate above the provincial and national average. Based on 2011 NHS data, the unemployment rate in the RDKS was approximately 12.9% (Statistics Canada 2013a), above the provincial unemployment rate of 7.8%; the unemployment rate was 14.1% in 2006, at that time the provincial unemployment rate was at 6.0% and the national unemployment rate at 6.6% (Statistics Canada 2007). In 2012, the unemployment rate in the North Coast, including Nechako, was at 10.7%; this was the highest regional unemployment rate recorded in the province of BC (BC Stats 2013c). The Brucejack Gold Mine Project, as well as other present and future projects will contribute to the employment in the region, hiring skilled workers and general labour and, therefore, decreasing the regional unemployment rate. However, following the Post-closure phase all Project-related employment will cease. With coinciding closure of future projects and resulting termination of employment, the potential for the unemployment rate to deviate from baseline conditions is substantial.

There will be approximately 431 to 619 full-time jobs lost when the Project ceases Operations. This is anticipated to occur around year 2038. However, at the same time the Closure of other present and future projects, such as the Red Chris Mine, might cumulatively contribute to this effect. Potential interactions from other projects are also possible. Therefore, it is expected that projects such as the Red Chris Mine or the Galore Creek Project and other projects (Table 19.9-1) have the potential to interact spatially with the Brucejack Gold Mine Project as the closure of one or more of the projects may result in an overlapping decrease in employment in the economic RSA; this effect will, however, depend on the number of workers from the RSA hired by the various projects.

#### *19.9.2.2 Mitigation Measures to Address Cumulative Effects on the Labour Market*

Pretivm is committed to eliminating or reducing any potential adverse effects of the Project. This section, therefore, addresses availability and implementation of mitigation measures to offset for adverse cumulative effects. While the Project is expected to result in adverse effects on the labour market, mitigation for Project-specific effects has already been addressed in Section 19.5; however, little is known of mitigation to be undertaken by other future developments as they are currently in the application process or under review. Furthermore, as cumulative effects involve other present and future proponents, the implementation of additional mitigation is often difficult due to the need for shared decision-making and funding.

### Mitigation Measures for the Increased Competition for Labour and Wage Inflation

As described in Section 19.5.1.2, the Project will implement adaptive management to mitigate the competitive pressures for skilled labour and wage inflation pressures. However, the development of the Brucejack Gold Mine Project, and its cumulative interaction with other present or future projects, may result in the competition for labour and wages despite the implemented mitigation measures.

There are no specific mitigation or management measures expected from other projects or activities to address effect on availability of skilled labour and wage inflation; however, it is expected that other large resource development projects, to meet the labour and skill requirements for existing and future projects, would adopt mitigation and management measures similar to those of the Brucejack Gold Mine Project.

### Mitigation Measures for the Decrease in Employment at Closure

As described in Section 19.5.1.3, management practices and adaptive management will be implemented to mitigate the potential Project effect on the decrease in employment at Closure. This includes facilitation of the transition of the workforce to other employment through activities such as assistance with the identification of and preparation for appropriate job opportunities. Further, training activities will be facilitated to maximize work experience, education and skill development.

There are no specific mitigation or management measures expected from other projects; however, it is expected that other large resource development projects would adopt mitigation and management measures similar to those of the Brucejack Gold Mine Project.

## **19.10 CUMULATIVE RESIDUAL EFFECTS FOR ECONOMY**

Cumulative residual effects are those effects remaining after the implementation of all mitigation measures and are, therefore, the expected consequences of the Project on the selected intermediate components and receptor VCs.

### **19.10.1 Cumulative Residual Effects Remaining after Mitigation**

For the purposes of the CEA, it is assumed that the other identified current and future projects implement mitigation to appropriately address those project effects. However, with respect to the identified adverse economic effects, it is recognized that unilateral mitigation by each proponent may not effectively address the cumulative effects because of the additive and synergistic nature and scale of the effects. Cumulative residual effects, remaining after mitigation measures, are summarized in Table 19.10-1.

## **19.11 CHARACTERIZING CUMULATIVE RESIDUAL EFFECTS, LIKELIHOOD, SIGNIFICANCE, AND CONFIDENCE**

The cumulative residual effects for the economic VCs were characterized by considering the Project's incremental contribution to the cumulative residual effect under two scenarios:

1. Future case without the Project: A consideration of residual effects from all other past, existing, and future projects and activities on a sub-component without the Brucejack Gold Mine Project.
2. Future case with the Project: A consideration of all residual effects from past, existing, and future projects and activities on a sub-component with the Brucejack Gold Mine Project.



**Table 19.10-1. Summary of Cumulative Residual Effects on the Economy**

	Timing of Cumulative Residual Effect <sup>1</sup>	Description of Cause-Effect <sup>2</sup>	Description of Additional Mitigation (if any)	Description of Cumulative Residual Effect
<b>Labour Market</b>				
Increased competition for labour and wage inflation	Construction, Operation	A number of future projects will require a substantial workforce base during Construction and Operation, mostly skilled trades and professionals that will be hired from the economic RSA and beyond. Due to the composition of the current labour force, projects will compete for skilled labour with other projects and local businesses. Further, this will likely affect the level of wage in the economic RSA as mine projects offer a substantially higher pay.	No additional mitigation measures other than those implement by the Project and mitigation measures potentially implemented by other proposed projects.	Short-term there will be an adjustment period, but in the long-term no cumulative residual effect is anticipated.
Decrease in employment at Closure	Closure	During Closure, employment will be reduced. This will cumulatively contribute to the unemployment level in the economic RSA in the case where more than one project ceases Operation at a similar time.	No additional mitigation measures other than those implement by the Project and mitigation measures potentially implemented by other proposed projects.	Short-term there will be an adjustment period, but in the long-term no cumulative residual effect is anticipated.

<sup>1</sup> Refers to the Project phase or other timeframe during which the effect will be experienced by the intermediate receptor or VC.

<sup>2</sup> “Cause-effect” refers to the relationship between the Project component/physical activity that is causing the change or effect in the condition of the receptor VC.

This approach helps predict the relative influence of the Project on the residual cumulative effect for each economic VC, while also considering the role of other projects and activities in causing that effect.

Definitions used to characterize the cumulative residual effects are the same as those described in Section 19.7.

**19.11.1 Characterization of Cumulative Residual Effects for Labour Market**

As summarized in Table 19.10-1, the Project is expected to have two cumulative residual effects on the labour market during Construction, Operation, and Closure.

**19.11.1.1 Increased Competition for Labour and Wage Inflation**

The Brucejack Gold Mine Project, as well as present and future mine projects, have the potential to result in an adverse cumulative effect on the labour market in the economic RSA. For the Construction and Operation phase, the effect of ‘increased competition for labour and wage inflation’ is assessed to be moderate in magnitude, of long duration, being continuous through the duration of the Project and regional in extent. Furthermore, the effect is predicted to be reversible in the long-term, having moderate resiliency and being neutral in context (Table 19.11-1).

**19.11.1.2 Decrease in Employment at Closure**

The Closure of the Brucejack Gold Mine Project, as well as coinciding closure of other projects, is expected to have an adverse cumulative effect on the labour market in the economic RSA. The effect of “decreased employment at Closure” is assessed to be moderate in magnitude, of short duration, being sporadic through the duration of the Project and regional in extent. Furthermore, the effect is predicted to be reversible in the short-term, have moderate resiliency and be neutral in context (Table 19.11-1).

**Table 19.11-1. Significance Determination of Cumulative Residual Effects on Labour Market - Future Case with the Project**

	Evaluation Criteria							Likelihood (low, medium, high)	Significance of Adverse Residual Effects (not significant; significant)	Confidence (low, medium, high)
	Magnitude (low, moderate, high)	Duration (short, medium, long, far future)	Frequency (once, sporadic, regular, continuous)	Geographic Extent (individual/household, community, regional/Aboriginal peoples, beyond regional)	Reversibility (reversible short term; reversible long term; irreversible)	Resiliency (low, moderate, high)	Context (low, neutral, high)			
<b>Residual Effects</b>										
Increased competition for labour and wage inflation	Moderate	Long-term	Continuous	Regional	Reversible: long term	Moderate	Neutral	Medium	<b>Not significant</b>	Medium
Decrease in employment at Closure	Moderate	Short-term	Sporadic	Regional	Reversible: short term	Moderate	Neutral	Medium	<b>Not significant</b>	Medium

### 19.11.2 Characterization of Likelihood for Cumulative Residual Effects on Labour Market

#### 19.11.2.1 Increased Competition for Labour and Wage Inflation

Increased competition for skilled labour and wage inflation is predicted to have a **medium** probability of occurrence (Table 19.11-1). The potential for this outcome to materialize is dependent on the number and type of approved projects in the region, as well as the availability of labour force in the economic RSA with project-related skills and experience.

#### 19.11.2.2 Decrease in Employment at Closure

Decrease in employment at Closure is expected to have a **medium** probability of occurrence (Table 19.11-1) as the coinciding Closure of the Brucejack Gold Mine Project and other projects in the region will take away jobs from the local market (Table 19.9-1).

### 19.11.3 Characterization of Significance for Cumulative Residual Effects on Labour Market

Key descriptors for the assessment of significance of potential effects on economic VCs are magnitude, duration, frequency, geographic extent, reversibility, and resiliency.

#### 19.11.3.1 Increased Competition for Labour and Wage Inflation

The cumulative residual effect of the Brucejack Gold Mine Project and other projects on “increased competition for labour and wage inflation” is predicted to be **not significant** (Table 19.11-1).

#### 19.11.3.2 Decrease in Employment at Closure

The cumulative residual effect for the “decrease in employment at Closure” is predicted to be **not significant** (Table 19.11-1).

### 19.11.4 Characterization of Confidence for Cumulative Residual Effects on Labour Market

#### 19.11.4.1 Increased Competition for Labour and Wage Inflation

There is a **medium** level of confidence that the cumulative effect of the Brucejack Gold Mine Project and other projects in the region will result in increased competition for labour and wage inflation within the economic RSA (Table 19.11-1).

Although it has been assumed for the purposes of the CEA that all reasonably-foreseeable future projects will occur, it is currently unknown how many of them will proceed and their timelines are not fixed. This affects the cause-effect relationship and means that the interaction between the Project, the other projects and activities, and the economic environment cannot be fully understood. Therefore there is a moderate degree of uncertainty.

#### 19.11.4.2 Decrease in Employment at Closure

Similarly, there is a **medium** level of confidence that Closure of the Brucejack Gold Mine Project and other potential projects and resulting loss of employment will affect the level of unemployment within the economic RSA (Table 19.11-1). Again, there is a moderate degree of uncertainty given that it is currently unknown how many and which future projects will ultimately proceed, the precise timing of these, and the nature of the cause-effect relationships. The Brucejack Gold Mine Project will have a number of mitigation measures and monitoring programs to increase the number of individuals able to

readily obtain alternative employment upon Closure. Other projects might have similar measures; however, this information is unavailable.

### 19.11.5 Cumulative Residual Effects Summary

Two cumulative residuals effects were identified in the assessment of the economic effects of the Project, both occurring on the labour market (increased competition for labour and wage inflation, and decrease in employment at Closure). Cumulative residual effect characterization rated all effects as not significant. Further, the assessment identified the residual effects as having a medium probability of occurrence, with a medium level of confidence in the assessment. The summary of residual effects characterization is provided in Table 19.11-2.

**Table 19.11-2. Summary of Project and Cumulative Residual Economic Effects, Mitigation, and Significance**

Residual Effects	Project Phase(s)	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Labour Market</i>				
Increased competition for labour and wage inflation	Construction and Operation	Communications with Aboriginal and non-Aboriginal communities; communications with educational institutions, human resources policies and programs. Mitigation measures developed by other projects.	Not significant	Not significant
Decrease in employment at Closure	Closure	Communications with Aboriginal and non-Aboriginal communities; workforce transition programs. Mitigation measures developed by other projects.	Not significant	Not significant

## 19.12 CONCLUSIONS

The proposed Project is expected to result in a number of economic effects. Specifically, activities related to employment and labour, and procurement of goods and services are expected to interact with one economic VC: Labour Market. Labour market in the LSA communities is expected to experience two adverse residual economic effects including: 1) increased competition for labour and wage inflation; and 2) decrease in employment at Closure. These adverse residual effects on the labour market are expected to occur during Construction, Operation, and Closure. The effects on the ‘increased competition for labour and wage inflation’ will be mitigated through engagement with Aboriginal and non-Aboriginal communities in the LSA, as well as educational institutions and other interested stakeholders, to communicate the Project development schedule and workforce requirements. The effect on the “decrease in employment at Closure” will be mitigated through the communication of the Project Closure in advance and the provision of support services assisting workers with job transition.

After mitigation measures have been implemented, the magnitude of residual effects is expected to be moderate, with moderate magnitude expected for the decrease in employment at Closure. This is due to the share of residents in LSA communities that are expected to experience Project-related employment and be affected by the Closure of the mine at the end of Operation. In sum, all adverse residual effects of the Project on the economic environment are rated **not significant**.

Two adverse residual Project effects were carried forward for cumulative effects assessment. In addition to the Project-specific mitigation, there may be additional mitigation to address cumulative effects. Specifically, it is assumed that the proponents of other projects and activities, in particular other mine developments in the RSA, will implement mitigation and benefit enhancement measures

that are similar to those identified for the Brucejack Gold Mine Project. In sum, the two adverse residual cumulative effects on the economic environment (i.e., increased competition for skilled labour and wage inflation; decreased employment at Closure) are rated **not significant** as they are expected to be moderate in magnitude. There may be competition for skilled labour with the planned construction of new developments in the region; however, the specialized skillsets and qualifications of workers required for the Brucejack Gold Mine Project may not necessarily overlap with the requirements for workers at other projects in the region. Further, it is unknown how many of the proposed projects will proceed and interact with the Project. For the second effect, the coinciding closure of future projects and resulting termination of employment may cause the unemployment rate to deviate from historical baseline variations, should most of the proposed projects be constructed. If only a few of the proposed projects proceed, or the closure of future projects do not coincide, then changes are predicted to be similar to what has been previously experienced in the region.

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