

20. Assessment of Potential Social Effects

20.1 INTRODUCTION

This chapter considers the potential social effects of the proposed Brucejack Gold Mine Project (the Project).

The Project is located on provincial Crown land and falls within the Regional District of Kitimat-Stikine (RDKS) and Electoral Area A of the Regional District of Bulkley-Nechako (RDBN), approximately 950 km northwest of Vancouver, 65 km north-northwest of Stewart, and approximately 40 km northeast from the BC/Alaska border. The main drivers associated with potential social effects are associated with direct Project employment and spin-off employment associated with Project procurement of goods and services, and workers spending their incomes. The potential adverse social effects considered in this assessment include effects on education, skills development, and training; community infrastructure, services, and housing; and worker and family well-being.

This chapter:

- includes a description of the regulatory and policy framework and social baseline setting, which is informed by the Socio-economic Baseline Report ([Appendix 19-A](#));
- defines spatial and temporal boundaries for the effects assessment;
- identifies potential social effects;
- provides social 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 historic, present and reasonably foreseeable future projects and activities that impact social Valued Components (VCs) and that could contribute to potential cumulative effects; and
- assesses cumulative effects of the Project and other projects.

20.2 REGULATORY AND POLICY FRAMEWORK

This chapter is written pursuant to the *Canadian Environmental Assessment Act, 2012* (2012b) 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 plans of Regional District and municipalities within the Regional Study Area (RSA) and Local Study Area (LSA). The *Local Government Act* (1996) as well as the *Indian Act* (1985) provide a governance framework for planning and management.

Section 5(1)(c) of CEAA 2012 requires that: for the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, physical activity, a designated project or a project are... (c) with respect to Aboriginal peoples, an effect occurring in Canada of any change that may be caused by the environment on... (i) health and socio-economic conditions.” This federal requirement is considered in this chapter.

The BC government released “Canada Starts Here: The BC Jobs Plan” in 2011, which focuses on the province’s strengths and competitive advantages. The Plan is intended to help create long-term jobs and investment. The Industry Training Authority is the BC agency responsible for apprenticeships and industry training programs. The federal and BC governments have both released economic development strategies, which are described in Chapter 19 (Assessment of Potential Economic Effects). These strategies include aspects related to social policy (e.g., skills training; Government of BC 2012a).

The *Local Government Act* (1996) recognizes the important role played by local governments, including both municipalities and regional districts. The Act establishes the legal framework for local government, including the powers, duties and functions necessary for fulfilling their purposes. The Act also provides local governments with the flexibility to respond to the different needs and changing circumstances of their communities (BC Laws 2014).

The *Indian Act* (1985; last amended in 2013) governs matters pertaining to Indian status, bands, and Indian reserves. The Act defines who is an “Indian” and contains certain legal rights and legal disabilities for registered Indians. Further, the Act sets out rules for governing Indian reserves (IR), defines how bands can be created, and spells out the powers of “band councils”. Bands do not have to have reserve lands to operate under the Act. The Act is intended to support Aboriginal peoples’ cultural and social relationships to their traditional territories (Government of Canada 2013).

The RDKS is responsible for services related to culture and heritage (libraries, heritage planning), development services (by-law enforcements and zoning by-laws, building permits, economic development, advisory planning commissions, Greater Terrace Agricultural Development Plan, and Thornhill Active Transportation Plan), emergency services (social, flood and fire emergency services), environmental services (air quality, climate action, solid waste management, water conservation), financial services (Regional District financial planning, utility payments, taxes and revenue sharing), public works utilities (water systems, sewer and lighting), recreational facilities (parks, community centres and other) and transit (RDKS 2014).

Among the LSA communities, Official Community Plans (OCPs) have been developed for the Town of Smithers and the City of Terrace. Each community OCP contains goals and policies for improving quality of life and economic vitality based on current demographic and economic trends, which also speak to social aspects of development (Town of Smithers 2010; City of Terrace n.d.). Terrace has adopted a set of objectives, under its recently revised OCP, focusing on economic development and diversification, social well-being, local culture, and reducing its environmental footprint (City of Terrace n.d.).

20.3 BASELINE CHARACTERIZATION

20.3.1 Regional Overview

The RSA’s population in 2011 was 42,752 (Statistics Canada 2012b). The population has generally declined over the past decade or more, largely due to the loss of jobs, particularly among non-Aboriginal communities. The proportion of males and females has remained relatively unchanged in the last 10 years, with males (51%) slightly outnumbering females (49%) in 2011. Almost 65% of the population is between the ages of 18 to 64 years, with 23% of the population aged 17 years and under (BC Stats 2011a). The RSA’s median age is around 40 to 42 which is on par with the provincial median (Statistics Canada 2002, 2007a, 2012b). Almost 5.2% of the population were visible minorities in 2006 (BC Stats 2011a). Further, a total of 12,745 people, approximately 32% of the RDKS’s population and 9% of RDBN’s Electoral Area A, identified as Aboriginal compared with 4.8% provincially (Statistics Canada 2007a; BC Stats 2010, 2011a).

Educational attainment levels across the RSA are close to, but on the whole lagging slightly behind, provincial averages. A notable difference in educational attainment is between residents of Aboriginal reserve communities and non-Aboriginal communities. The portion of the population without a high school certificate, diploma, or degree is almost double in Aboriginal communities in the RSA than in the five non-Aboriginal communities, where on average just under 28% of the workforce population is without high school certification or above (Statistics Canada 2007b).

With respect to community well-being, as measured by the Community Well-being Index (CWB), of the bottom 100 communities of the CWB Index for BC in 2006, all were Aboriginal communities (AANDC 2011). Research specific to the resource sector has highlighted women and indigenous peoples, in particular, as potentially marginalized groups who may experience the costs and benefits of resource development differently to the general population (Oxfam 2002; CCSG Associates 2004; World Bank 2004; PDAC 2009; ICMM 2010; IFC 2012). Evidence from northwest BC indicates that women, Treaty Nations, and First Nations may face additional challenges or barriers in terms of employment, income, and social development (TCC 2006).

Regional infrastructure is adequate and in several cases recently upgraded. The larger communities are for the most part well serviced and have relatively minor housing concerns. Aboriginal communities, both reserve communities and Nisga'a village communities have concerns about the adequacy of housing both with respect to supply and overall condition. It is not uncommon for Aboriginal communities to have serviced lots that remain vacant for many years due to lack of funds to build (Brucejack Gold Mine Project Research Program 2012c).

Further, the delivery of emergency, health, and social services varies across the region. Many services are provincial responsibilities that are delivered through ministry-specific, agency, or affiliate organization offices depending on the size and location of the community. Federal agencies, especially AANDC, tend to have a larger role, at least in funding if not delivery, of such services in First Nations reserve communities. Volunteers and non-government organizations play an increasingly important role in the delivery of many social and health services, especially in smaller communities. Such organizations will often receive some, but rarely all, of their operating and/or programming funding from provincial or federal ministries and it is not unusual for the demands on community volunteer capacity to be especially high in smaller communities.

20.3.2 Historical Activities

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

The Granduc Mine was a copper mine located approximately 25 km south of the Project 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 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 end 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 Project 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 Gold 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 included 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.

Since World War I, no fewer than eight mines operated within the RSA. As Table 20.3-1 illustrates, the 1990s precipitated a significant increase in the role of mining in northwestern BC, which lasted well into the first decade of the 21st century. Although there is currently only one operating mine, exploration activity has increased sharply in recent years. It is expected that the sector will continue to be an important contributor to the regional and local economies in at least the short- and medium-term (BC MEMNG 2012). 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 MEMNG 2012).

Table 20.3-1. Timeline of Past and Current Mines in the Regional Study Area and Vicinity

Mine	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Cassiar (1946-1992)										
Golden Bear (1990-1993; 1997-2001)										
Snip (1991-1999)										
Silbak Premier (1919-1953)										
Granduc (1971-1984)										
Eskay Creek (1994-2008)										
Kemess South (1998-2010)										
Huckleberry (1997-2021)										

Historically, forestry has been the most prominent contributor to the economy of the region, especially in communities along the Highway 16 corridor between Terrace and Stewart. Within the immediate Project area forestry has occurred between Highway 37 and Bowser Lake, south of the Wildfire Creek and Bell-Irving River confluence.

The Hazelton’s and neighbouring Gitxsan communities were especially dependent upon forest industry related jobs throughout much of the latter half of the twentieth century. Aggregated data for the North Coast and Nechako Development Region shows that 1,500 people were directly employed in forestry related jobs in 2011 (BC Stats 2012a). Forestry employment in this region has decreased 60% since a recent peak of approximately 3,800 in 2000.

The contraction of the forest industry in northwest BC lies behind much of the depopulation and high unemployment that has challenged both large and small communities in this part of the province in recent decades. The more recent downturn in mining that followed closure of the Cassiar mine and later the Eskay Creek Mine and simultaneous downsizing and restructuring of many government ministries and services in the late 1990s and 2000s have also been major contributing factors to this decline.

20.3.3 Baseline Studies

Social and economic baseline research was carried out concurrently 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 EA process and analysis, including the description of the social setting, the definition of spatial and temporal boundaries of the study areas, the selection of valued social components, the assessment of potentially beneficial and/or adverse social 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 RSA, the LSA, data sources, methodology and the characterization of the social environment.

The Project is not expected to produce any substantive social effects at the provincial scale. For the purposes of social effects assessment, study areas are defined at the regional and local community levels only.

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 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 traditional territories of Aboriginal groups. Aboriginal interests are considered in Chapter 26 (Assessment of Asserted or Established Aboriginal Rights and Interests) and Chapter 27 (Assessment of Nisga'a Nation Treaty Rights, Interests, and Information Requirements).

Regional Study Area

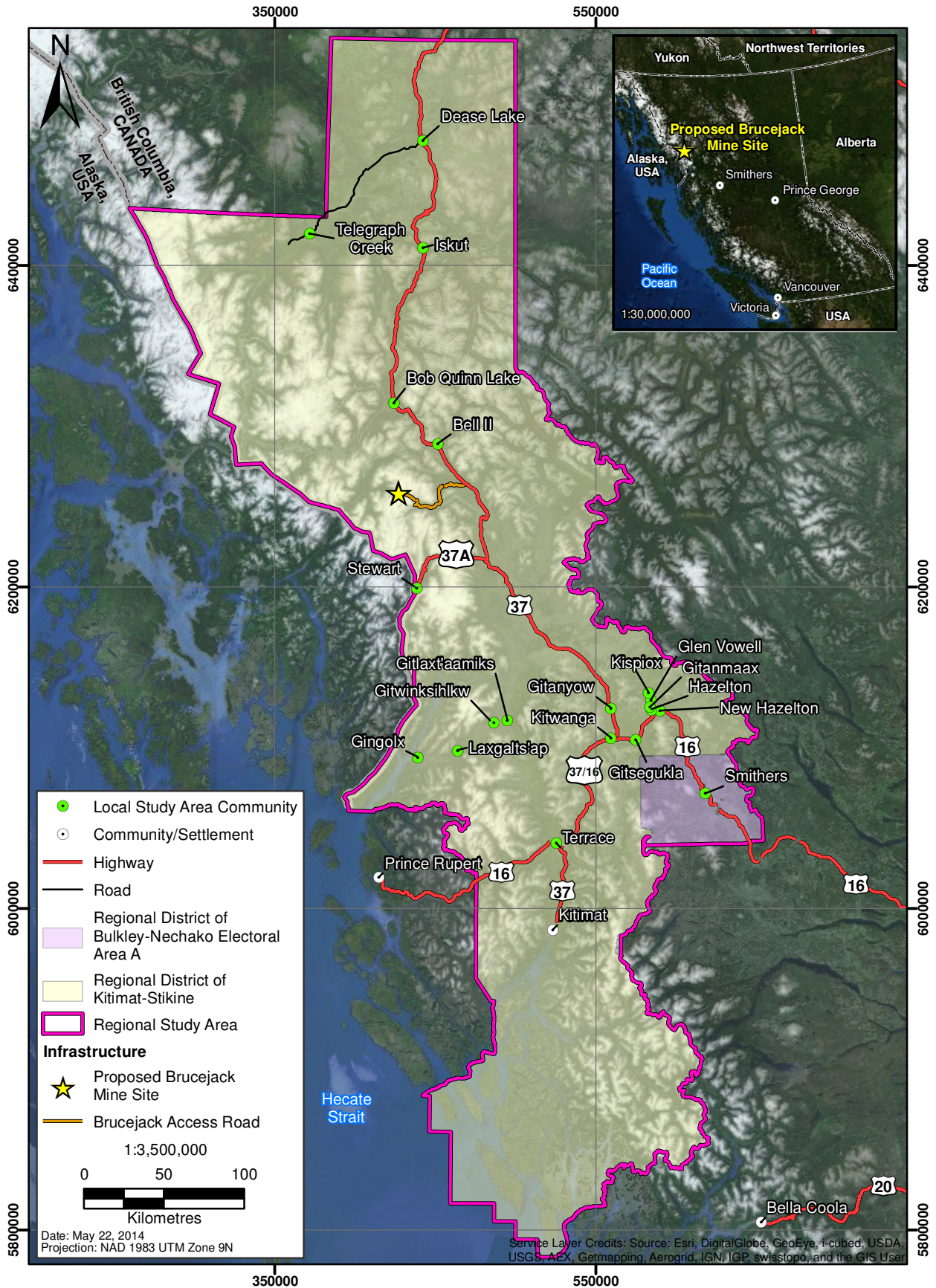
The social impact RSA coincides with the boundaries of two administrative regions, the RDKS and Electoral Area A of the RDBN (Figure 20.3-1). The RDKS provides regional planning and local government services to rural and unincorporated settlements within an area of approximately 100,000 km² in northwestern BC. Electoral Area A of the RDBN comprises 3,688 km², including Smithers and the rural areas surrounding the municipality (NDIT 2010a).

Local Study Area

The social impact LSA is not a contiguous area per se, rather it includes those communities, located within the social impact RSA, that are expected to interact most directly with the Project through its various stages (Figure 20.3-1). The communities in the social impact LSA include incorporated and unincorporated municipalities, Treaty Nation villages, and IRs. Specific rationale for the inclusion of each community in the social impact LSA is provided in the Socio-economic Baseline Report ([Appendix 19-A](#)). The social impact LSA communities are:

- Dease Lake (unincorporated);
- the Tahltan Nation reserve communities of Telegraph Creek, Dease Lake 9 and Iskut;

Figure 20.3-1
Brucejack Gold Mine Project
Regional and Local Study Areas



- the District of Stewart;
- the Nisga’a Nation communities of Gitlaxt’aamiks (New Aiyansh), Gitwinksihlkw (Canyon City), Laxgalts’ap (Greenville), and Gingolx (Kincolith);
- the Town of Hazelton and District of New Hazelton, referred to locally as “The Hazeltons”;
- the Gitxsan Nation reserve communities of Gitanmaax, Kispiox, Glen Vowell, Gitsegukla, and Gitwangak;
- the Town of Smithers; and
- the City of Terrace.

20.3.3.1 Data Sources

The Socio-economic Baseline Report ([Appendix 19-A](#)) is based on review and analysis of multiple secondary sources of data and information collected between April 2012 and May 2013, including official government statistics and other data from provincial, regional, and local organizations and government agencies (Table 20.3-2). Published social 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 nearby proposed KSM Project which allows for this report to build upon the data gathered during the KSM Project baseline efforts carried out between 2008 and 2012.

Table 20.3-2. Secondary Information and Data Sources

Topic	Indicators*	Sources
Population and Demographics	<ul style="list-style-type: none"> • Aboriginal identity population • Age • Gender • Language • Cultural identity • Migration 	<ul style="list-style-type: none"> • Statistics Canada Census Profile (2001, 2006, 2011) • Statistics Canada Aboriginal Population Profile (2001, 2006) • Statistics Canada NHS Aboriginal Population Profiles (2011) • Tahltan Central Council: Tahltan Census (2011) • Aboriginal Affairs and Northern Development Canada (AANDC): First Nation Profiles (2012) • BC Stats website: Population Estimates (2012), Socio-economic Profiles (2013) • Gitanyow Wilp-based Socio-cultural Needs Assessment (2010) • Regional District of Kitimat-Stikine website • Local government websites (Terrace, Smithers, etc.)
Education, Skills Development, and Training	<ul style="list-style-type: none"> • Educational attainment, skill level and training • Access to education facilities and programs 	<ul style="list-style-type: none"> • Statistics Canada Census Profile (2001, 2006, 2011) • Statistics Canada Aboriginal Population Profile (2001, 2006) • National Household Survey Aboriginal Population Profiles (2011) • Northwest Community College website • School District 92 and 82 websites • BC Stats website (College Region)
Community Infrastructure, Services, and Housing	<ul style="list-style-type: none"> • Housing availability and conditions • Accessibility to and quality of local and regional infrastructure 	<ul style="list-style-type: none"> • Statistics Canada Census Profile (2001, 2006, 2011) • Statistics Canada Aboriginal Population Profile (2001, 2006) • National Household Survey Aboriginal Population Profiles (2011) • Skeena Native Development Society Labour Market Census (2006) • Local government websites (Terrace, Smithers, etc.) • BC Ministry of Transportation and Infrastructure website

(continued)

Table 20.3-2. Secondary Information and Data Sources (completed)

Topic	Indicators*	Sources
Emergency, Health and Social Services	<ul style="list-style-type: none"> • Provision of emergency services • Provision of health care facilities and services • Provision of social services 	<ul style="list-style-type: none"> • BC Stats website (Indicators of Crime, Socio-Economic Profiles) • HealthLinkBC website • Canada Health website • Northern Health website: Public Health Protection on HealthSpace (2012)
Family and Worker Well-being	<ul style="list-style-type: none"> • Community well-being index • Indicators of population's general health • Crime rates and types • Prevalence of substance misuse 	<ul style="list-style-type: none"> • Aboriginal Affairs and Northern Development Canada (AANDC): Community Well-Being Index (2010) • Aboriginal Healing Foundation (2007) • BC Stats website: Socio-economic Profiles (2013) • BC Stats website: Indicators of Crime (2009)

* The availability of information varies and may not be available for all communities in the LSA.

Field work was carried out in Smithers, the Hazelton area, including several Gitxsan 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 is the key source of quantitative data used both directly and indirectly for the baseline report. BC Stats, Aboriginal Affairs and Northern Development Canada (AANDC), 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 social and economic indicators. The economic effects assessment makes use of census data that was publically available up to and including June 30, 2013.

Data Limitations

Caution must be used when drawing conclusions about current social conditions from census data as the information may be dated, especially with respect to smaller communities. The availability of information varies by community. Information from interviews helps augment the information provided by secondary data sources. Further, it is difficult to compare different data sources and time periods due to variations in geographical and statistical definitions. For example, data collected for regions defined under administrative boundaries will not align with the data collected for other boundaries such as Regional Districts, municipalities, Local Health Areas (LHAs) and Health Service Deliver Areas (HSDAs; BC Stats 2011b), or BC Development Regions (BC Stats 2006).

20.3.3.2 Indicators

Research for the social baseline is structured around a number of distinct social components or themes. These broad categories include potentially measureable indicators that will inform the characterization of VCs in the assessment of potential effects. The main social components include specific and measurable indicators that form the basis for the discussion herein and are identified in Table 20.3-2.

Social indicators are important as they provide direct and valid qualitative and quantitative measures to monitor the levels and changes over time for a broad range of social concerns. Further, social

indicators provide essential information on the general level of community well-being. For example, changes in population may indicate how desirable a community is, that is, a community where population decreases may indicate unfavorable social conditions such as high crime rates, lack of access to educational facilities, or inadequate housing. Therefore, for the purpose of the assessment in this chapter, a wide range of social indicators have been selected as presented in Table 20.3-2 and described in the Section 20.3.4 to assess baseline setting and evaluate the potential effects of the Project on the social conditions in the RSA and LSA.

20.3.4 Characterization of Social Environment Baseline Condition

Contained in this section is an overview of communities in the LSA and their location relative to the Project. This section summarizes community population and demographics; community infrastructure, services, and housing; education, skills development, and training; and community well-being. Detailed information is provided in the Socio-economic Baseline Report ([Appendix 19-A](#)).

20.3.4.1 Overview of Communities in the Local Study Area

Dease Lake, Telegraph Creek and Iskut

Dease Lake is an unincorporated municipality in the RDSK. It is located on Highway 37 about 488 km north of the junction with Hwy 16 and about 234 km south of the Yukon border. Tahltan Indian Reserve Dease Lake 9 is located approximately 4 km north of Dease Lake. Iskut Indian Reserve 6 is also a Tahltan community; it is located approximately 83 km from Dease Lake on Highway 37. Telegraph Creek is 108 km south-west of Dease Lake. It is a Tahltan community and includes three populated Tahltan Indian reserves, Telegraph 6 and 6A and Guthe Tah 12.

Stewart

The District of Stewart is located on the west coast of BC, at the head of Portland Canal and the western terminus of Highway 37A (see Figure 20.3-1). There are two ports in Stewart. Stewart Bulk Terminals is a privately-owned port that handles concentrate. The Stewart World Port is a Canadian company with a customer base that includes projects, mining, forestry, and oil and gas (Stewart World Port 2013; District of Stewart 2014).

Nisga'a Villages

The four Nisga'a villages (Gitlaxt'aamiks, Gitwinksihlkw, Laxgalts'ap, and Gingolx) are located on Nisga'a Lands, which encompass about 2,000 km². The villages are connected by road to Highway 113, the Nisga'a Highway which connects to Highway 16, near Terrace about 100 km to the south. Gitlaxt'aamiks and Gitwinksihlkw are located approximately 200 km south of the Project and approximately 100 km north of Terrace. Laxgalts'ap is located 235 km south of the Project and 140 km north-east of Terrace. Gingolx is located 265 km south of the Project and 170 km north-east of Terrace. The Brucejack Access Road is located in the Naas Area as defined by the *Nisga'a Final Agreement*.

The Hazeltons

The Hazeltons, which include the town of Hazelton and district of New Hazelton, are located approximately 140 km northeast of Terrace and 70 km northwest of Smithers on Highway 16 where the Bulkley River flows into the Skeena. Hazelton is located 7 km west of New Hazelton. The Hazeltons are approximately 205 km south of the Project.

The Hazelton area has been home to Gitxsan, Gitanyow, Skii km Lax Ha, and Wet'suwet'en First Nations for more than 7,000 years (Village of Hazelton 2008). Skii km Lax ha reside in the Village of Hazelton and on the Gitanmaax Indian reserve. The Gitxsan Nation resides on five populated Indian reserves

including Gitwangak, Gitsegukla, Gitanmaax, Glen Vowell, and Kispiox. The Gitxsan members also live in Hazelton and New Hazelton or elsewhere in BC (Gitxsan Chiefs' Office 2010). The Village of Hazelton and the Gitanmaax Indian reserve are adjacent to each other. New Hazelton, the Kispiox Indian Reserve 1 and Glen Vowell Indian Reserve 2 are located within a 10 km radius (see Figure 20.3-1). The remaining Gitxsan communities are located to the west, with Gitsegukla about 28 km from New Hazelton along Highway 16 and Gitwangak another 22 km from Gitsegukla and about 4 km north of the Skeena River along Highway 37. The Gitxsan Hereditary Chiefs Office and the Gitxsan Treaty Society are both based in Hazelton.

Smithers

Smithers is located within Electoral Area A of the RDBN along Hwy 16, approximately halfway between Prince Rupert and Prince George (Figure 20.3-1). Smithers is located approximately 315 km south-east from the Project. Smithers is the regional service centre for the Bulkley Valley, and it provides a range of commercial, business, administrative, recreational, and cultural services (Town of Smithers 2010).

Terrace

Terrace is situated on Highway 1, approximately 290 km south from the Project. It is located within the RDKS and is a regional centre for business, retail, medical, and government services, as well as a hub for highway, rail, and air transportation (NDIT 2010a).

20.3.4.2 Population and Demographics

Regional and Local Population Trends

The population of the RDKS has declined since 1996; it was 37,361 in 2011 compared to 43,618 in 1996 (Statistics Canada 2012b). The population of the RSA dropped by 15% between 1996 and 2011 (Table 20.3-3) and experienced a slower rate of decline between 2006 and 2011 (Statistics Canada 2002; BC Stats 2012b; Statistics Canada 2012b). The lower rate of decline and potential reversal of population loss in the region may be due to the increasing level of economic activity in the RSA over the last five years as well as the anticipated near and mid-term growth due to recent private and government investments in natural resources and utilities (ICABC 2013).

Table 20.3-3. Regional Study Area Population (1996 to 2011)

Region	1996	2001 (% change from previous census)	2006 (% change from previous census)	2011 (% change from previous census)	Aboriginal Identity, 2006 (% of pop.)
RDKS	43,618	40,876 (-6.3%)	38,476 (-7.0%)	37,361 (-2.9%)	12,275 (+32.9%)
Electoral Area A (RDBN)	5,573	5,696 (+2.2%)	5,290 (-7.1%)	5,391 (+1.9%)	470 (+8.7%)
Total Regional	49,191	46,572 (-5.4%)	43,766 (-6.1%)	42,752 (-2.4%)	12,745 (+29.1%)
British Columbia	3,724,500	3,907,738 (+4.9%)	4,113,487 (+5.3%)	4,400,055 (+6.7%)	196,070 (+4.8%)

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

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.

The region is populated by a number of small First Nation and Nisga'a communities and several larger centres (Table 20.3-4), which rely on resource industries such as mining and forestry. Some of the key communities that might experience population changes as a result of the Project are listed in Table 20.3-4; the table also provides population estimates for 2011 and 2006. As evident, population in most of the smaller communities mostly decreased from 2006 to 2011.

Table 20.3-4. Population in the Project's Regional and Local Economic Study Area

	Population 2011	Population 2006
Dease Lake (UNP)	303	384
Tahltan Nations (Indian Reserve)		
Dease Lake 9	58	68
Telegraph Creek ¹	209	251
Iskut 6	207	335
Nisga'a Villages		
Gitlaxt'aamiks (New Aiyansh)	758	806
Gitwinksihlkw (Canyon City)	184	201
Laxgalts'ap (Greenville)	378	474
Gingolx (Kincolith)	408	341
The Hazeltons		
Hazelton	270	293
New Hazelton (DM)	666	627
Skii km Lax Ha	N/A	N/A
The Gitxsan Nation Communities (Indian Reserves)		
Gitanmaax	627	723
Kispiox	536	617
Glen Vowell	222	225
Gitsegukla	448	721
Gitwangak	500	465
Town of Smithers	5,404	5,217
City of Terrace	11,486	11,320
District of Stewart	494	496
RDKS	37,361	38,476
RDBN	39,208	38,243

Note:

N/A = not available.

¹ Telegraph Creek is comprised of three IRs: Telegraph Creek 6, Telegraph Creek 6A, and Guhthe Tah 12.

Source: Statistics Canada (2007b, 2012a).

Dease Lake, Telegraph Creek, and Iskut

In 2011, the population on Dease Lake Indian Reserve 9, Telegraph Creek and Iskut Indian Reserve 6 was 474, a decrease from 2006 (Table 20.3-4; Statistics Canada 2007b, 2012a).

Stewart

The district of Stewart had 494 residents in 2011, two residents less as compared to 2006 (Table 20.3-4; Statistics Canada 2007b, 2012a).

Nisga'a Villages

Nisga'a Villages 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 20.3-4; Statistics Canada 2007b, 2012a).

The Hazeltons

The population in the Hazeltons 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 20.3-4; Statistics Canada 2007b, 2012a).

Smithers

In 2011, the population in Smithers was 5,404, 4% higher as compared to 2006 (Table 20.3-4; Statistics Canada 2007b, 2012a). Figure 20.3-2 illustrates the fluctuations in local populations over a fifteen year period. Generally, local populations have declined between 1996 and 2011.

Aboriginal Population in the RSA

In 2006, 12,745 people, or approximately 32% of the RDKS's population and 9% of RDBN's Electoral Area A, identified as Aboriginal compared with 4.8% provincially (Statistics Canada 2007b; BC Stats 2010, 2011a). In 2006, the combined population of Indian reserves included in the LSA was 5,711, or almost 45% of the RSA's overall Aboriginal population (Statistics Canada 2007b; Statistics Canada 2012b). Since 2006, Nisga'a Nation population has remained relatively stable while Tahltan and Gitksan populations have declined (Statistics Canada 2012b). As of June 30, 2011 there were 2,577 people of Tahltan ancestry enumerated (Tahltan Central Council 2011), with 427 living on Tahltan Nation reserves (AANDC 2012; Statistics Canada 2012a). In July of 2012, Gitksan Nation had the total registered population of 6,453; in 2011, approximately 2,299 lived in Gitksan communities (AANDC 2012; Statistics Canada 2012a).

Approximately 20% of individuals residing in non-Aboriginal communities in the LSA identified as Aboriginal (Statistics Canada 2007a) Members of the Tahltan, Nisga'a, and Gitksan Nations, as well as Aboriginal people from elsewhere, reside in service centres, such as Dease Lake, the Hazeltons, Smithers, and Terrace. In 2006, the Aboriginal identity population in non-Aboriginal communities in the LSA ranged from 11% in Stewart to 41% in the Hazeltons, 39% in Dease Lake, 21% in Terrace, and 15% in Smithers. Due to high non-response rates in the LSA communities, 2011 National Household Survey (NHS) data is not comparable.

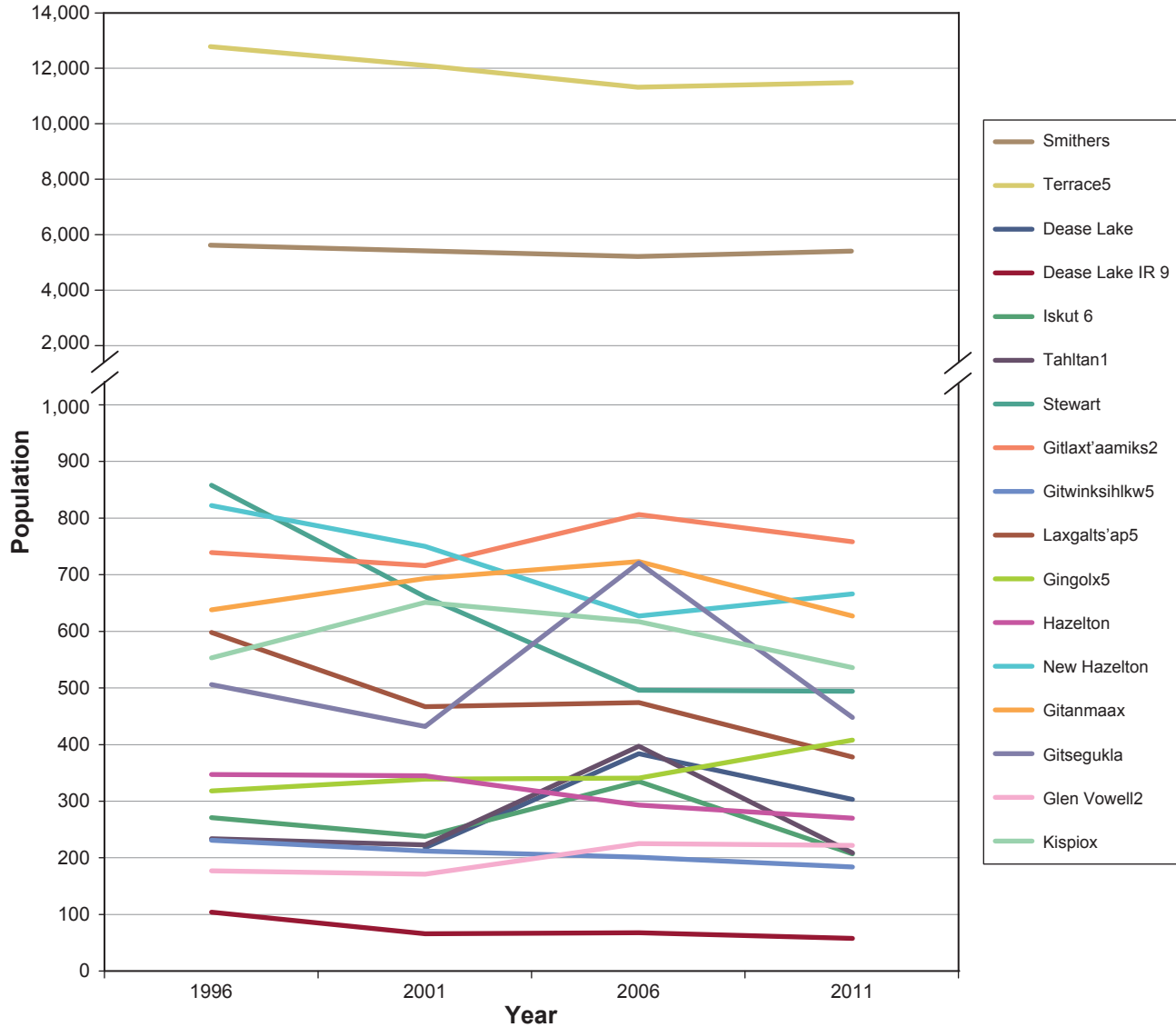
Age and Gender Characteristics

Over the past decade, the median age and percentage of the population 15 years and over has steadily increased in the non-Aboriginal LSA communities. Dease Lake is the exception where the percent of the population 15 and over decreased over the same time period (Statistics Canada 2002, 2007b, 2012b). In general, in 2011, the median age of Aboriginal population in the RDKS was 30.2 years of age; this was lower than the median age of the total population of RDKS of 40.3 years of age, lower than the provincial median age of 41.9 or the national median age of 40.6 (Statistics Canada 2011, 2012a). Age and gender characteristics in the non-Aboriginal LSA communities are similar to that of the Province. There are generally more males to females in most of the non-Aboriginal LSA communities, with the exception of Dease Lake, New Hazelton, and Stewart where there were more females compared to males in 2011. Notably, Dease Lake was the only LSA community with more females in 2006 (Statistics Canada 2002, 2007b, 2012b).

20.3.4.3 Education, Skills Development, and Training

Educational attainment levels across the RSA lag behind the provincial averages. The percentage of the regional population without high school certification is slightly higher (32%) than the province (20%) while the percentage of those with high school or above (27%) is slightly lower compared to BC (28%) as a whole. Education levels trend to differ in Dease Lake where higher percentages of the population over the age of 15 have obtained trades certificates and other non-university degrees at comparatively higher rates (Figure 20.3-3).

Figure 20.3-2
Population Trends in Local Study
Area Communities, 1996 to 2011

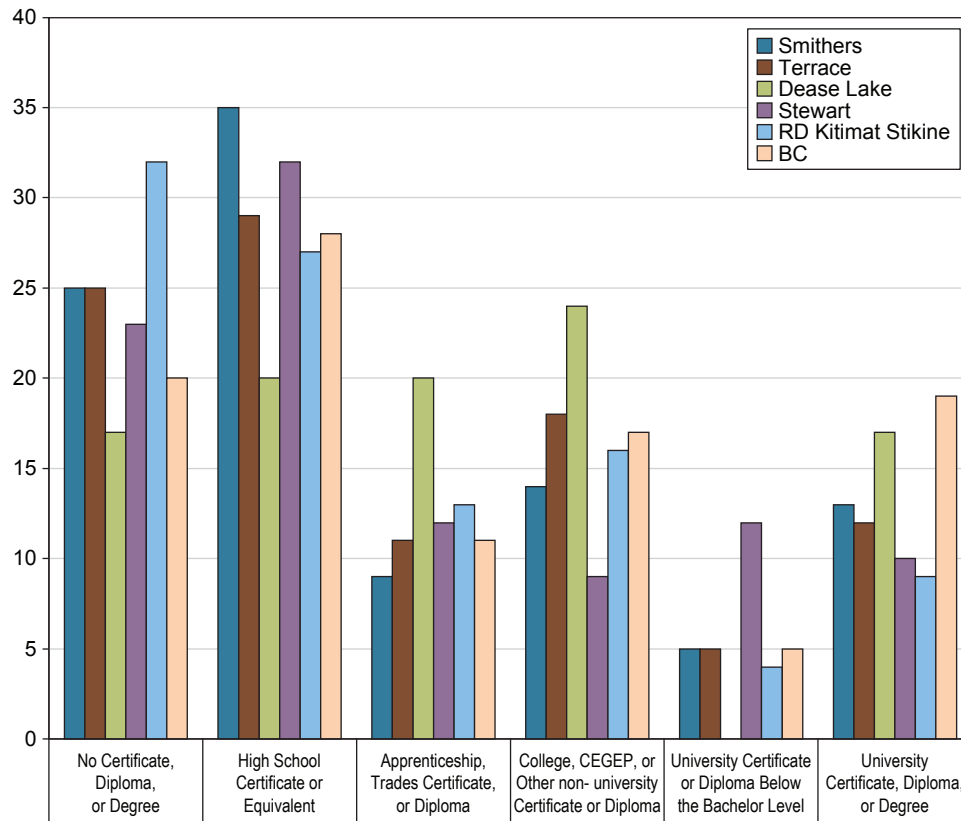


- Notes: 1 To ensure confidentiality and protect the privacy of individuals, Statistics Canada employs a method called random rounding in which values, including totals, are randomly rounded either up or down to a multiple of five.
- 2 To enable comparison between census years, Statistics Canada has adjusted 2006 census data as needed to take into account boundary changes that occurred between 2006 and 2011.
- 3 Statistics Canada notes an adjusted population count for 1996.
- 4 A percentage change from zero to any number represents an increase of 100% or infinity.
- 5 Statistics Canada notes adjusted 1996 census data, to account for a census boundary change between 1996 and 2001.
- 6 Statistics Canada has adjusted 2006 census data to account for a census boundary change between 2006 and 2011.

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

Figure 20.3-3

Educational Attainment as a Percentage of the Population in Municipal LSA Communities, the Regional District of Kitimat-Stikine, and British Columbia, 2006



Notes: Statistics Canada employs the "random rounding" method to ensure confidentiality in which values, including totals, are randomly rounded either up or down to a multiple of 5 or 10. As a result, when these data are summed or grouped, the total value may not match the individual values since total and sub-totals are independently rounded. Similarly, percentages, which are calculated on rounded data, may not necessarily add up to 100%.

Source: Statistics Canada (2007b).

There is a notable difference in educational attainment between residents of Aboriginal and non-Aboriginal communities. The portion of the population without a high school certificate, diploma, or degree is almost double in Aboriginal communities in the RSA as compared to non-Aboriginal RSA communities, where on average just under 28% of the workforce population is without high school certification or above (Statistics Canada 2007b). As shown in Figure 20.3-4, Glen Vowel stands out as having a higher percentage of individuals with apprenticeship, trades certificates, or diplomas. For further detailed related to educational attainment levels in the RSA see the Socio-economic Baseline Report ([Appendix 19-A](#)).

Over the past four years, the percentage of Aboriginal youth enrolled in post-secondary programs in BC has increased by approximately 25%. The number of post-secondary credentials awarded to Aboriginal students increased from about 2,100 in 2005/2006 to 2,634 in 2009/2010 (Government of BC 2012b). At the British Columbia Institute of Technology, program completion rates among students who identify as Aboriginal have increased by 22% since 2006 (The Vancouver Sun 2012).

Facilities and Programs

With the exception of Telegraph Creek, most students in the RSA communities can obtain their high school certificate (or equivalent) within their home or neighbouring community. The closest high school for residents of Telegraph Creek is in Dease Lake. Post-secondary institutions are mainly represented by the various campuses of Northwest Community College (NWCC). The closest university is the University of Northern British Columbia in Prince George. In addition, several independent and/or First Nations run training or post-secondary institutions offer high school completion and other speciality programmes.

Terrace, Smithers, Dease Lake, and Hazelton provide K-12 education and have fairly steady enrollment. The Tahltan School provides K-7 and students attend high school in Dease Lake. The Hazelton and Gitksan communities have K-7 and students attend the Hazelton Secondary School. In 2012, Nisga'a students had access to K-7 schools in each of the villages and K-12 in New Aiyansh.

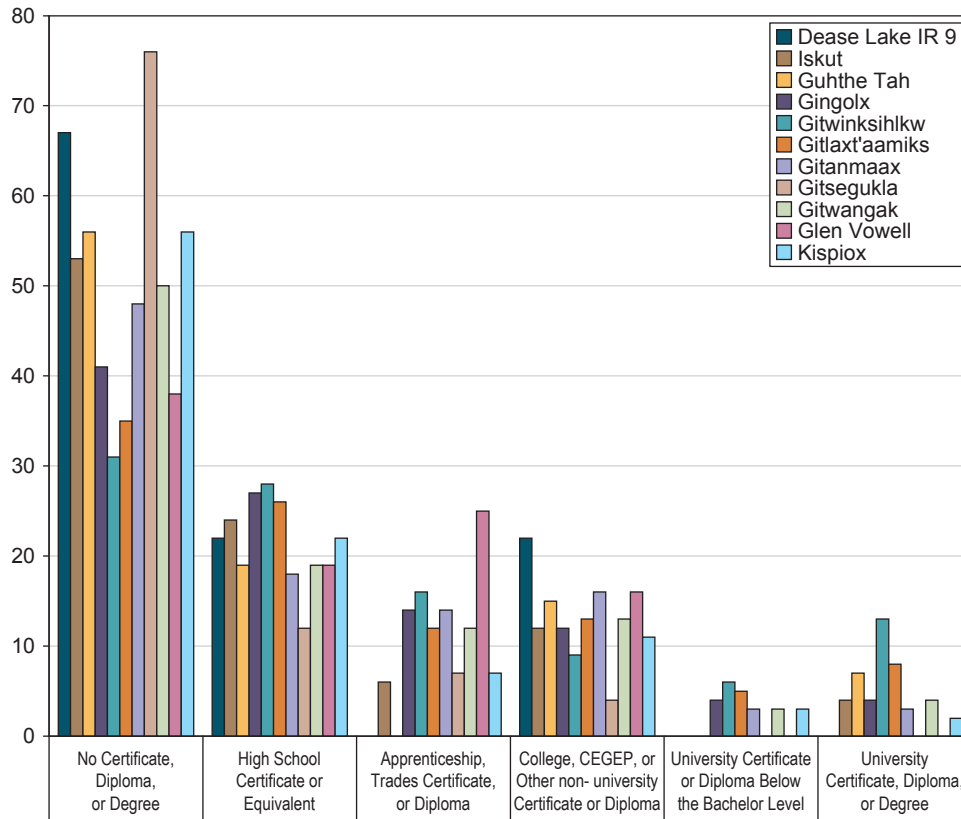
There is a wide range of adult education, post-secondary programmes, and trades and technical training opportunities throughout much of the RSA. The main post-secondary institution is NWCC, which was established in Terrace in 1975 and operates nine regional campuses servicing 34 communities in northwest BC including Gitwinksihlkw, Hazelton, Smithers, Stewart, Dease Lake and Terrace (main campus; NDIT 2010c). The northwest campus of the University of Northern British Columbia is located in Terrace.

A number of post-secondary and skills training programs are available to residents of Aboriginal communities. In addition to the NWCC campuses, post-secondary/skills training institutions that emphasize access for Aboriginal students include: the Northern Lights College in Dease Lake, the Wilp Wixo'xskwhl Nisga'a Institute in Gitwinksihlkw, and the Gitksan-Wet'suwet'en Education Society in the Hazeltons.

The School of Exploration and Mining (SEM) operated through NWCC in Smithers was developed in direct response to demand created by the recent expansion of mine exploration in the region. At the time of writing, the school had graduated 850 students, and 83% of graduates had either found jobs or gone on to pursue additional schooling (NWCC 2012). The SEM offers a wide range of courses, programs and internships in areas where exploration and mining companies have identified both short- and long-term skill needs (NWCC 2010).

Figure 20.3-4

Educational Attainment as a Percentage of the Population in Aboriginal Study Area Communities, 2006



Notes: Statistics Canada employs the "random rounding" method to ensure confidentiality in which values, including totals, are randomly rounded either up or down to a multiple of 5 or 10. As a result, when these data are summed or grouped, the total value may not match the individual values since total and sub-totals are independently rounded. Similarly, percentages, which are calculated on rounded data, may not necessarily add up to 100%. Data was suppressed for Laxgalts'ap, Telegraph Creek 6, and Telegraph 6A.

Source: Statistics Canada (2007b).

In June of 2013, the Mining Industry Human Resources Council (MIHR) published *British Columbia Underground Miner Occupational Analysis and Skills Development* in light of increases in underground mining activities in the province. Six recommendations were formed for the provincial underground mine training and skills development, these are: endorsing the National Occupational Standard and certification for Underground Miner (UGM); forming a centre of Training Excellence in Mining (CTEM; MIHR 2013); forming a model of successful employer-led education partnerships that takes into account the stated skills requirements and job creation related to specific mining projects in the province; providing a virtual training technology for the mining industry that should be coordinated through a coalition of industry and education stakeholders; creating an international partnerships for industry-related training; and contributing to the provincial job creation and skills development strategy by matching people with jobs in mining.

As a result of the *British Columbia Underground Miner Occupational Analysis and Skills Development* report, British Columbia's Centre of Training Excellence in Mining (CTEM) was created in April 2013 by the provincial government to provide and support British Columbians access to education and training programs that deliver career skills for the natural resource industries. The Centre is not to deliver the training itself, but to support organizations and programs that deliver the training. The BC Centre of Training Excellence in Mining will be the "virtual" hub for linking the mineral industry, post-secondary providers, students, First Nations and communities. The CTEM already delivered some workshops to allow representatives from the mineral industry, post-secondary institutions, First Nations, government and others to get together to talk about ways to improve all aspects related to mineral industry training; workshops will come to various parts of BC. The centre is also working to produce an easily searchable online listing of all mineral industry related courses and programs in the province, as well as producing BC's first mineral industry career pathways guidebook (CTEM 2014).

20.3.4.4 Community Infrastructure, Services, and Housing

The larger LSA communities, for the most part, are well serviced and have relatively minor housing concerns, although reserve communities and Nisga'a villages face challenges with both housing supply and overall condition of housing. It is not uncommon for Aboriginal communities to have serviced lots that remain vacant for many years due to lack of funds to build (Brucejack Gold Mine Project Research Program 2012c).

Housing

There is a pronounced difference in the quantity and quality of housing in Aboriginal versus non-Aboriginal communities in the LSA. The average number of persons per household across BC is around 2.5. Non-Aboriginal communities in the LSA are at or below the provincial average while Aboriginal communities, with two exceptions, have a mean of about 3.5 persons per household. According to the 2011, 2006 and 2001 census, Iskut and Telegraph Creek have dropped to below three persons per household from previous levels of 3.3 and 4.1 respectively (Statistics Canada 2002, 2007b, 2012a). Based on the results of interviews conducted as part of the baseline research, over-crowding in Aboriginal communities is reportedly worse than indicated by the census information ([Appendix 19-A](#); Statistics Canada 2002, 2007b, 2012a).

Statistics Canada data on dwellings in need of major repairs indicates that housing condition is also an issue in Aboriginal communities in the RSA. Across the province about 7% of dwellings are in need of major repairs or maintenance, whereas in most of the Aboriginal communities in the social impact RSA it is closer to a third and, in some cases, more.

The average price of single-family home within the RSA falls mostly within the range of \$100,000 to \$200,000. The price in 2010/2011 for houses was highest in Terrace and Smithers and lowest in Stewart

(Statistics Canada 2007b; NDIT 2010b, 2010e). Recent numbers released by Northern B.C Real Estate Board (NBCBEB) show that in 2012, the average price of a detached family house in Terrace was \$200,926; by March 2013 it was \$226,303; for the beginning of 2014 it was recorded at \$294,067, that is a 32% increase since 2012 (Killen 2014). Much of this increase is believed to be due to overflow pressures from development in Kitimat, but the recent resurgence of forestry is also contributing. In 2010 and 2011, the average price ranged from \$130,000 to \$150,000 on Nisga'a Lands (NDIT 2010d, 2010a; NLG et al. 2010). It is important to note that on most Indian reserves, there is no housing market as houses are owned by the Band, consequently prices cannot be compared.

Local and Regional Infrastructure

Local and regional infrastructure refers to domestic and commercial water supply, energy supply, waste disposal and management, ground and air transportation, and telecommunications.

For the most part, all communities in the LSA have adequate physical infrastructure and utilities for current population levels and have the capacity to absorb some increase in demand as well ([Appendix 19-A](#); Brucejack Gold Mine Project Research Program 2012c, 2012a, 2012b; Rescan 2013). Electrical power supply is generally stable and secure, although some of the LSA communities (Dease Lake, Telegraph Creek) are still 'off the grid' and rely on diesel-powered community generators. Some communities lack a centralized sewage treatment system (Gitsegukla, Kispiox, Glen Vowell); however, for the most part they do have at least a minimum level of community infrastructure including municipal water and basic telecommunication. High-speed internet is increasingly available in all but the most remote communities (Glen Vowell, Gitanmaax; Socio-economic Baseline Report, (Glen Vowell, Gitanmaax; Socio-economic Baseline Report, [Appendix 19-A](#); Brucejack Gold Mine Project Research Program 2012c, 2012a, 2012b; Rescan 2013).

Some communities have infrastructure nearing the end of its useful life. While funding is often available from higher levels of government, it is usually targeted for capital expenditure and not available to cover operating and maintenance costs where there is frequently a greater need (A. Danuser and S. McFee, pers. comm. 2009). A further challenge for local leaders is the demand placed on local services from unincorporated settlements beyond district boundaries and, in some cases, from neighbouring Indian band governments (A. Maitland and B. Smith, pers. comm. 2009).

All communities are connected by paved roadways except for Telegraph Creek which has an unpaved road connecting it to Dease Lake. Railways connect regional centres Prince Rupert, Terrace, and Smithers with Prince George and the south of British Columbia. All highways experience potentially dangerous winter driving conditions.

The main airports in the RSA are in Terrace and Smithers. There are also paved or gravel airstrips in Dease Lake, Telegraph Creek, Iskut and Stewart; the smaller communities have gravel airstrips for charter, contract, and emergency use. Winter weather is a challenge for air transport across the region.

20.3.4.5 Emergency, Health, and Social Services

The delivery of emergency, health, and social services varies across the region. The level of service, availability, and reliability is influenced to a large degree by geography and location. Many services are provincial responsibilities that are delivered through ministry-specific, agency, or affiliate organization offices depending on the size and location of the community. Federal agencies, especially AANDC, tend to have a larger role, at least in funding if not delivery of such services on Indian reserves. Volunteers and non-government organizations play an increasingly important role in the delivery of many emergency, health, and social services, especially in smaller communities. Such organizations will often receive some, but rarely all, of their operating and/or programming funding from provincial or

federal agencies and it is not unusual for the demands on community volunteer capacity to be especially high in smaller communities. The challenge of service delivery, in this case ambulance service, in remote places is exemplified by the recent resignation of paramedics in Stewart due to concerns about their capacity to adequately fulfil their mandate as first responders (Massey 2013). Dependence on community volunteers means that the capacity to respond to increased demand is limited. Current economic activity in northwest BC is increasing demand for such services and potentially increasing the pressure on already limited local resources (Massey 2013).

Emergency Response

The Dease Lake RCMP detachment provides services to the Tahltan communities. The Lisims/Nass Valley RCMP detachment provides services to Nisga'a Villages, and the RCMP detachment in New Hazelton provides services to the Hazeltons and Gitxsan communities. Volunteer fire departments in Stewart, Smithers, and Terrace serve local areas that include surrounding communities. For example, volunteer fire departments in New Hazelton and Gitwangak serve the Hazeltons and all Gitxsan communities (A. Maitland and B. Smith, pers. comm.). In the Nisga'a Villages, fire and rescue is provided by two volunteer emergency fire departments located in Laxgalts'ap and Gitlaxt'aamiks. Ambulance services in the LSA communities are provided by BC Ambulance and are extended from larger centers to surrounding communities, as is the case in Smithers, Terrace, Stewart, and Dease Lake (A. Maitland and B. Smith, pers. comm.).

Health Services and Facilities

For the most part, the larger more established centers within the RSA (Smithers, Terrace, Stewart, and the Hazeltons) are equipped with full-service health centres or hospitals and related emergency and specialist services. The primary health care facility in northwest BC is Mills Memorial Hospital in Terrace, which has the largest concentration of physicians and services north of Prince George (TEDA 2010). Other major facilities include Bulkley Valley District Hospital in Smithers, and Wrinch Memorial Hospital in Hazelton. The health centre in Stewart is small and no longer provides overnight services and patients source prescriptions from Terrace (NDIT 2010d). The Stikine Health Centre in Dease Lake is the primary health centre for the region, serving an area from Bell II on Hwy 37 to the Yukon Border. Although Iskut and Telegraph Creek have local health services providing basic first aid they rely on the Stikine Health Centre for more serious cases. The Nisga'a Valley Health Authority (NVHA) manages healthcare services in Nisga'a villages via the main centre in Gitlaxt'aamiks and two satellite clinics. For more complex emergencies and/or long-term care the main full-service health facility in the region, Mill Memorial Hospital in Terrace is relied upon. Patients from Stewart, Dease Lake, Iskut, and Telegraph Creek with moderate to serious health issues are often transported to Mills Memorial Hospital in Terrace for further care (City of Terrace 2010). Depending on the nature of the emergency or illness patients may be airlifted to centres in Prince George or Vancouver.

Social Services

The availability and type of social services in the RSA varies by community. Centres that serve a larger population typically offer a wider range of services; for example, residents of the Hazeltons and Gitxsan communities have access to life skills training, recreational therapy, perinatal depression support, and supportive recovery through Northern Health's Mental Health and Addictions Services. The Hazelton Health Unit also provides community health services to residents, including HIV/AIDS education and support, immunizations, mother and infant care, nursing support services, pregnancy evaluation, and nutrition counselling (HealthLinkBC 2012). The accessibility of health and social services has often decreased following population decline. For example, in Stewart the amount of health services have decreased in the last several years; however, the current service capacity is reportedly adequate and meets the community's current needs (S. Clark, pers. comm.).

Assisted living facilities for seniors, people with disabilities, and/or others are available in Smithers (CMHC 2007a), Terrace (Northern Health 2011), and Hazelton (CMHC 2007b). These facilities provide services for local residents as well as those in surrounding communities. Smaller communities, for example Stewart and Nisga'a villages, do not have local long-term care for seniors.

Programs that assist individuals that struggle with subsistence abuse are available in Smithers, Terrace, Dease Lake, and in most Aboriginal communities. In comparison to other LSA communities, Smithers provides a number of social programs including programs for the treatment of drug and alcohol addictions, emergency housing and shelter, programs for learning (youth, literacy, seniors, and disabled individuals), family support programs, fetal alcohol spectrum disorder services, programs for seniors, risk reduction services, pregnancy outreach, and victims services (Smithers Social Planning Council 2011b).

Indian reserves typically provide access to community health and social service programs through the Band office. A typical suite of programs provided on reserve might include National Native Alcohol and Drug Abuse Program (NNADAP), Brighter Futures, Community Health Prevention and Promotion, Youth Solvent Abuse Reduction, Mental Health Services, Prenatal Nutrition, and HIV and AIDS Strategy, as is the case in the Gitksan communities. Programs vary slightly by community and other programs provided might include victim's services and home care, which are available to residents of the Tahltan communities (Province of BC 2011).

Nisga'a Village governments each have a social services or development department that manage a range of programs including basic and special needs, home care for seniors and/or disabled, training and education support, domestic violence prevention, and support services (Rescan 2010; NLG 2011). Tahltan Health and Social Services Authority provides health and social services programs within the communities and to members of the Tahltan Band in Dease Lake and Telegraph Creek (HealthLinkBC 2011), while the Iskut Band provides access to these services for their members.

Daycares services are available in Smithers, Terrace, the Hazeltons, Dease Lake, and three of the Nisga'a Villages. Neighbouring communities utilize services in larger centers, for example, residents of Gitwinksihlkw use the daycare services available in New Aiyansh which is only a short drive away (BC Ministry of Child and Family Development 2010; HealthSpace 2012b, 2012a).

There is a wide variety of outdoor and indoor recreation options in Smithers, Terrace, and the Hazeltons from golf courses, campgrounds, water sports, and skiing to aquatic centres, ice rinks, tennis courts, and ball fields (P. Weeber and B. Faasnidge, pers. comm.; City of Terrace 2010; NDIT 2010d, 2010e, 2010b; Smithers Social Planning Council 2011a). Access to the back country for outdoor recreation is important to these communities as it defines the lifestyle for residents.

There are limited recreation facilities on Indian reserves. The Tahltan recreation hall at Telegraph Creek is used to host community meetings; however, at present, the community lacks the infrastructure and funding to offer sufficient recreational opportunities and programs. Iskut has a school gymnasium and new arena (opened in 2014). There is a new indoor arena on the Tahltan reserve near Dease Lake. (Northern Development Initiative Trust 2013). Each Nisga'a village has a recreation centre with a gymnasium and various activity rooms that house community based recreation programs organized and funded by NCFs (NLG 2009).

20.3.4.6 Family and Worker Well-being

Community Well-being Measures

AANDC and BC Stats have their own approaches to measuring CWB for Aboriginal communities based on social and economic indicators of income, education, housing conditions, employment, crime, and health. AANDC takes the additional step of aggregating its indicators into a single CWB index. While these indices are useful for comparative purposes or as a relative measure and means for following trends over time of a large group or groups of communities, care is needed when attempting to interpret the meaning of a CWB as it applies to any one community.

Regional Overview of Community Well-being in the RSA

Overall, comparisons of the AANDC CWB index from 1981 to 2006 suggest that well-being in First Nations communities is consistently below that of other communities across the country. The areas of greatest disparity between First Nations and other Canadian communities are in housing and income (AANDC 2010). Nevertheless, well-being appears to vary considerably between First Nations communities, which show a greater range than that observed in other communities. However, on average Aboriginal communities in BC rank higher (i.e., are better off) than their counterparts in other parts of the country.

Within the RSA, the highest CWB scores were found in Stewart (83), Smithers (81), and Terrace (80). The Hazeltons scored in mid-70s and the Tahltan communities in the mid-60s, while the Gitksan communities ranged from a low of 49 in Gitsegukla, which represents the lowest score among LSA communities, to 61 in Gitanmaax and Glen Vowell. Nisga'a CWB scores ranged from the high 60s (New Aiyansh and Gitwinski) to high 50s for Gingolx. Data was unavailable for the unincorporated town of Dease Lake, Telegraph Creek 6 and 6A, and Laxgalts'ap.

Supplemental Indicators of Well-being

The discussion below is framed around the broad themes of community health, children at risk, youth at risk, human economic hardship, and crime, each of which is considered as an important aspect of community and family well-being. The data references Local Health Authorities (LHAs), which coincide reasonably well with different segments of the RSA. The Terrace, Smithers, and Nisga'a are covered by respective LHA of the same name. Snow Country LHA covers Stewart and the Upper Skeena LHA includes the Hazelton and Gitksan communities. In some cases, data for Snow Country LHA was unavailable.

Community Health

Life expectancy at birth and potential years of life lost (PYLL) from natural and accidental causes, suicides, and homicide are indicators of overall community health (BC Stats 2010). Life expectancy is an indicator of the population's general health and the quality of healthcare (DHSS 2004). PYLL refers to the number of years of life lost before an individual reaches a specified age (75 years) and is used as an explicit measure of premature death (Kashaninia 2011). PYLL are higher than the provincial average for all RSA communities. Notably PYLL as linked to suicide was particularly high in the Nisga'a communities (40.4/1,000) and Upper Skeena (13.9/1,000) between 2006 and 2010, as compared to the Provincial rate (3.9/1,000).

Aboriginal communities in Canada experience higher rates of suicide as compared to the general population. Youth suicide and attempted suicide is of particular concern in First Nations communities. In a 2007 report, the Aboriginal Healing Foundation states that for Aboriginal communities, more often than not, suicide is an affliction of the young, accounting for over one-third for deaths among Aboriginal youth. The report also notes that suicide rates contribute to indices of community health and well-being and are an indicator of community distress (Aboriginal Healing Foundation 2007).

Children and Youth at Risk

The well-being of children and youth is thought to be indicative of family and community well-being. The children at risk indicator is based on the infant mortality rate, the rate of children in care, the percentage of children below standard reading levels, and percentage of children receiving income assistance (BC Stats 2013).

Infant mortality is recognized as an indicator of population health and is considered to reflect the effectiveness of health care and public health initiatives in a given area. Further, infant mortality rates in Canada often demonstrate the differential distribution of, and unequal access to, health and social services. Data indicates the infant mortality rate for the Nisga'a LHA as zero, likely because there are no hospitals in the Nisga'a LHA and women likely travel to Terrace to give birth. The infant mortality rate for the Upper Skeena LHA (which includes the Hazelton and Gitxsan communities) is notably high at 6.3/1,000, while the rate for Smithers is notably low (0.9/1,000), even as compared to the provincial rate (3.7/1,000).¹

The rate of children in care and reading levels also speak to family and community well-being. Rates of children in care in the RSA communities are well above the provincial rate, and are more than double when comparing the rate of an LHA mainly comprised of First Nations to the provincial rate. For all measures of children at risk, the rates and figures of those residing in the Nisga'a LHA were relatively high as compared to other LHAs. Rates and figures for the Upper Skeena LHA more closely resembled Terrace, both of which generally lagged behind the province. Rates for the Smithers LHA were similar to, and in some cases lower than that of the province.

The youth at risk indicator is measured by the percentage of young adults (age 15 to 24 years) receiving social assistance, the percentage of young adults who did not graduate from high school, and the serious crime rate by juveniles (age 12 to 17 years; BC Stats 2013). The percentage of teenage pregnancy, non-graduates, and serious crime by juveniles was highest in the Nisga'a and Upper Skeena LHA, at times representing rates more than five times the provincial average. High incidence of teenage pregnancy is linked to lower rates of high school completion, as young mothers, of necessity or choice, elect to stay home for a period of time after giving birth while young fathers may feel compelled to seek employment to provide for their family. Notably high rates of young adults receiving income assistance were found in Terrace (5.3) as compared to the provincial rate (1.6).

Economic Hardship

Economic hardship is also thought of as an indicator of overall family and community well-being. The ability to provide necessities can be challenging in rural areas affected by economic downturn, especially in communities that rely heavily on resource development industries. BC Stats uses the percentage of the population receiving income assistance and the percentage of seniors receiving maximum income support as indicators of economic hardship (BC Stats 2013). The portion of the population receiving income assistance was highest in the Upper Skeena LHA (5.2%) and Terrace (5.1%), notably higher as compared to the province as a whole (1.9%). Higher rates of income assistance in LSA communities are partially linked to the downturn of the forestry and public sectors that occurred during the 2000s.

¹ Caution is necessary when comparing percentages or rates per thousand between very small and very large populations because the incremental effect of a single incident is larger for the smaller population and may exaggerate the difference between the two populations. For example, one additional serious crime in a Nisga'a village would increase the rate per 1,000 from 25 to 25.53, whereas at the provincial scale the serious crime rate of 10/1000 would increase to 10.0002/1000 with the addition of one more serious crime.

Livelihoods and self-worth are often associated with gainful employment. In 1991, in the Hazelton area, forestry accounted for 39% of basic income and the public sector accounted for approximately 20%. In 1996, the forestry sector dropped slightly to account for 36% of basic income; however, the amount of basic rates for the public sector increased at that time (Statistics Canada 1997) to account for 35% of basic income. In 2001, the forestry sector supported 28% of all jobs in the Upper Skeena LHA and the public sector supported approximately 34% of jobs in the Upper Skeena LHA. Since 2001, job losses have occurred in both the forestry and public sectors, from mill closures and the closure of public offices. Notably, the distribution of basic income from government transfers was 13% in 1991, 10% in 1996, and increased to 28% in 2001 (Robinson Consulting and Associates Ltd; Timberline Forestry Inventory Consultants Ltd. 2006). For many LSA communities issues of economic hardship, as exemplified by rates of dependence on government support payments, are tightly coupled to the fortunes of resource industries in northwest BC, especially forestry.

Crime Rates

Crime rates often inform community perceptions of public safety. Crime rates also inform measure of community well-being as they speak to public safety and security of the family. The measurement of crime reported by BC Stats includes total serious crime, serious crimes per police officer, property crime, and violent crime (BC Stats 2010).

Crime rates are substantially higher in the Nisga'a LHA as compared to provincial rates, particularly for serious crimes, while the crime rate for the Smithers LHA is below the provincial rate (BC Stats 2013). The Upper Skeena and Terrace LHAs are similar to each other and moderate in all categories as compared to Nisga'a LHA. Smithers' crime rate statistics are the lowest, and at or below provincial averages. This pattern is similar for children at risk, with Smithers close to the provincial average and Terrace and Upper Skeena LHAs having rates that are slightly worse.

The overall occurrence of serious crimes (including violent and property offences) in Terrace (41.8) is notably higher than the provincial average (13.5). Rates for serious juvenile crime (18.3) are also over four times those of the province as a whole (4.2). The crime rate in the City of Terrace has risen and fallen in the years between 2001 and 2010, resulting in a 3.7% overall decrease (BC Stats 2013).

The RCMP collects crime rate statistics by RCMP Detachment Units, which are then compiled into regional profiles. Crime rates indicate that the Dease Lake police, who also administer services to the Tahltan communities, experienced a decrease in the crime rate by almost half (-43.4%) between 2001 and 2010, while the crime rate in Stewart remained notably below that of the other LSA communities (BC Stats 2013). The overall occurrence of serious crimes for the Smithers LHA is slightly lower than the provincial average and considerably below the other LHA's in the RSA (BC Stats 2013).

Overall, the incidence of serious violent crime increased 43% while the occurrence of serious property crime simultaneously decreased by 27% across the RSA. Notably, rates of spousal assault crimes in Smithers were 63% higher than that of the province and child abuse was also slightly more common as compared to the provincial average (BC Stats 2009). The only RSA communities, as recorded by RCMP detachment units, to experience a persistent upward trend in crime (almost a 55% increase over 9 years 2001 to 2010) were the Hazeltons and Gitxsan communities.

Summary of Community Well-being Supplemental Indicators

Through the review of community health, children and youth at risk, economic hardship, and crime rates, it is evident that a higher percentage of the population in the Nisga'a and Upper Skeena LHAs experience challenges in these areas, with residents of the Terrace LHA often exhibiting only slightly improved rates. Conversely, residents of the Smithers LHA more closely resemble provincial rates.

20.4 ESTABLISHING THE SCOPE OF THE ASSESSMENT FOR SOCIAL ENVIRONMENT

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

20.4.1 Selecting Receptor Valued Components

Receptor VCs are specific attributes of the biophysical and social environments that have environmental, social, economic, heritage, or health significance. Receptor VCs also have the potential to be indirectly affected by changes in the baseline condition of other environmental components, thereby acting as receptors of that change. Indirect effects may, in turn, also affect the baseline condition of the receptor VC. To be considered for assessment, a component must be of recognized importance to society, the local community, or the environmental system, and there must be a perceived likelihood that the receptor VC will be affected by the proposed Project. Receptor VCs are scoped during consultation with key stakeholders, including Aboriginal communities, municipal communities, regional government, and the Environmental Assessment (EA) Working Group. Consideration of certain receptor VCs may also be a legislated requirement, or known to be a concern because of previous project experience.

As described in Chapter 6, Assessment Methodology, Section 6.4.1.1, a scoping exercise was conducted during the development of the draft Application Information Requirements (AIR) to explore potential Project interactions with candidate receptor 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 was integrated into the Application.

Determination of VCs for the social environment involved several steps, including:

- review of the AIR;
- review of issues identified from pre-application stage consultation and feedback;
- social baseline research interviews;
- consultation with Aboriginal peoples;
- desk-based research and literature review; and
- application of professional judgement.

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 VCs identified relative to potential social effects are:

- Education, Skills Development, and Training;
- Community Infrastructure, Services, and Housing; and
- Family and Worker Well-being.

Each VC is broken down into a number of elements. These elements were selected as they characterize the VCs and because information is available to support meaningful assessment. The elements are as follows.

Education, Skills Development, and Training

This VC comprises:

- educational profile of communities; and
- existing educational facilities and programs within the study areas.

Community Infrastructure, Services, and Housing

This VC comprises:

- water and sewer delivery;
- roads;
- communications;
- utilities;
- housing and accommodation;
- local emergency response services (fire, medical, and police); and
- health care and social services.

Family and Worker Well-being

This VC comprises:

- financial independence;
- substance misuse; and
- family stress.

These elements are discussed further in Section 20.5.

20.4.1.1 Potential Interactions between the Project and Social Environment

Table 20.4-1 provides an impact scoping matrix of VCs that have a possible or likely interaction with Project components and projects and activities for the social environment. 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 social environment were assigned a colour code as follows:

- Not expected (white);
- Possible (grey); and
- Likely (black).

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

Table 20.4-1. Interaction of Project Components and Physical Activities with Social Environment

Project Components and Physical Activities by Phase	Education, Skills Development, and Training	Community Infrastructure, Services, and Housing	Family and Worker Well-being
Construction Phase			
Employment and labour	Black	Black	Black
Procurement of goods and services	Black	Black	Black
Operation Phase			
Employment and labour	Black	Black	Black
Procurement of goods and services	Black	Black	Black
Closure Phase			
Employment and labour	Black	Grey	Black
Procurement of goods and services	Black	Grey	Black
Post-closure Phase			
Employment and labour	Grey	Grey	Grey
Procurement of goods and services	Grey	Grey	Grey

Note:
Interactions: not expected (white); possible (grey); likely (black)

As Table 20.4-1 indicates, the points of interaction between the VCs and the Project are human-based activities that cut across different Project components as opposed to being directly linked to Project-specific infrastructure development.

20.4.1.2 Consultation Feedback on Receptor Valued Components

Consultation feedback from Aboriginal groups, the EA Working Group, and the public during the draft AIR and EIS Guidelines review phase were considered in identification and further refinement of the selected receptor VCs. Specifically, as it applies to the social effects assessment, comments were received from the Skii km Lax Ha. The Skii km Lax Ha asked for clarification on the sub-components of the VC Family and Worker Well-being and requested that cultural well-being be examined as part of this VC. It was clarified that family and worker well-being will primarily look at the effects associated with shift work.

During consultation, several groups expressed interest in mine-related training opportunities. The Skii km Lax Ha expressed interest in having access to training opportunities to create a skilled labour force and take advantage of employment opportunities. Gitxsan Chiefs’ indicated that may be able to provide mine-related training opportunities locally as there is preference for local training.

20.4.1.3 Summary of Receptor Valued Components Included in the Application/EIS

All of the VCs that have been included in the Application/EIS have been included as a VC because the AIR requires consideration of the indicators associated with these VCs.

In addition to AIR requirements, Education, Skills Development, and Training has been included as a VC because RSA and LSA communities may be affected as the Project will require approximately 870 person-years² of direct employment during Construction (estimated 435 full-time positions) and

² Person-years represents one year of work in the given industry by one person. One year of work usually comprises 2,080 hours, and in most mining industries this implies 12 hour days with 2 weeks on the job and 2 weeks off the job.

12,353 person-years of direct employment during Operation (estimated average of 542 personnel) with a diversity of skills from different trades and professions. Communities and residents have expressed an interest in opportunities for education, skills enhancement, and training (Section 20.4.1.2). Educational institutions in the RSA have also expressed an interest in understanding the Project’s workforce needs in order to plan their program development accordingly. A summary of the rationale for inclusion of Education, Skills Development, and Training as a VC is provided below in Table 20.4-2.

Table 20.4-2. Identification and Rationale for Social Valued Component Selection

Valued Component	Identified by*				Rationale for Inclusion
	AG	G	P/S	O	
Education, Skills Development, and Training	✓	✓	✓		<p>The AIR requires consideration of education and training characteristics and services.</p> <p>The Project will require a workforce and result in indirect and induced employment during Construction and Operation. It is predicted that there will be an average total of 1,956 jobs (FTE) per year for the 2 year Construction phase. During Operation it is predicted that there will be an average total of 1,316 jobs (FTE) for the 22-year life of the mine. These jobs will require diverse education and training needs.</p> <p>Aboriginal peoples and local communities have expressed interest in new education, skills, and training.</p>
Community Infrastructure, Services, and Housing	✓	✓	✓	✓	<p>The AIR requires consideration of demographic characteristics and infrastructure.</p> <p>New residents within the RSA and LSA seeking Project employment may change community populations and demographics, which may increase the demand on infrastructure and services.</p> <p>Local and regional governments have expressed an interest in planning needs to address any population change.</p>
Family and Worker Well-being	✓	✓	✓	✓	<p>The AIR require considering family and worker well-being characteristics.</p> <p>Federal policy requires consideration of impacts to individual and community health (Health Canada 2004).</p> <p>Aboriginal peoples have identified issues relating to the Project’s potential effects on their CWB.</p> <p>Aboriginal peoples have interests in community stability, cohesion, and sense of identity.</p> <p>Existing literature and professional practice suggest evaluating CWB.</p>

*AG = Aboriginal Group; G = Government; P/S = Public/Stakeholder; O = Other.

None of the VCs that were included in the AIR have been excluded from consideration in this Application/EIA.

Community infrastructure and services may be affected by the Project if new individuals and families move to the RSA and communities in the LSA. Local governments have indicated that a population influx would increase demand on community infrastructure and services, particularly with respect to Highway 37 tourist destinations and facilities.

Family and worker well-being within communities in the LSA may be affected by the Project due to potentially higher crime rates, substance abuse and family violence associated with higher income. Family and worker well-being is a multi-dimensional concept that refers to individual and collective

levels of health, satisfaction, quality of life, and standard of living (Kusel 1996; Costa and Scoble 2006; Sirgy et al. 2009; Murphy 2010). The Tahltan Nation have identified family and worker well-being as a culturally and socially important consideration. In addition, the Tahltan have expressed concern that Project involvement may potentially result in socially damaging outcomes, and both local governments and Tahltan Nation communities have stated that a change in community demographics may affect community stability, the social fabric, and its sense of identity.

20.4.2 Assessment Boundaries for Social Environment

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

20.4.2.1 Spatial Boundaries

The social effects assessment uses the same study areas as the study areas used for the socio-economic baseline study; this area is described in Section 20.3.

Regional Study Area

The RSA coincides with the boundaries of the RDKS and Electoral Area A of the RDBN (see Figure 20.3-1).

Local Study Area

The LSA includes Aboriginal and non-Aboriginal communities likely to experience direct Project-related social effects. LSA communities were selected based on their proximity to the Project, which can bring about population changes influencing infrastructure and services, changes in the demand for education and skill training, as well as changes to community well-being. The LSA includes: the four Nisga'a Nation communities, the Tahltan Nation Indian Reserve communities, the District of Stewart, the Gitksan Nation Indian Reserve communities, the Hazeltons, the Town of Smithers and the City of Terrace (Figure 20.3-1).

The selection of LSA communities and the RSA was completed in conjunction with Chapter 19 (Assessment of Potential Economic Effects) due to the interrelated nature of the social and economic effects of the Project.

20.4.2.2 Temporal Boundaries

The temporal boundaries of the social effects assessment include the following phases:

- **Construction:** two years;
- **Operation:** 22 years run-of-mine life;
- **Closure and Reclamation:** two years (includes project decommissioning, abandonment and reclamation activities); and
- **Post-closure:** minimum of three years (includes ongoing reclamation activities and Post-closure monitoring).

20.4.2.3 Administrative Boundaries

Regional district, LHAs, Indian reserve and *Nisga'a Final Agreement* boundaries are the most relevant administrative boundaries in relation to the social effects assessment. These can place constraints on the assessment in two primary ways:

1. The organization of socio-economic information and data available for use in the social effects assessment is according to these boundaries and the populations that reside within.
2. The agencies or governance organizations that operate according to these administrative units provide the social services that are the backdrop for the assessment of potential social effects and the mitigation and management of any effects of the Project.

Regional Districts

The RSA includes two regional districts: RDKS, and Electoral Area A of the RDBN. The RDKS provides local government services to rural and unincorporated settlements within an 100,000 km² area of northwest BC, including the municipalities of Kitimat, Terrace, Stewart, Hazelton, and New Hazelton (RDKS 2012a). Electoral Area A of RDBN comprises approximately 3,688 km² and includes Smithers, several unincorporated settlements, and surrounding rural areas.

Stewart, Terrace, Hazelton, New Hazelton, and Smithers are incorporated municipalities, governed by the BC *Local Government Act* (1996) with an elected mayor and council. The remaining communities, including Dease Lake and South Hazelton, are not incorporated and fall under the regional district.

Local Health Authorities

The RSA includes five LHAs:

- Snow County LSA (Stewart);
- Nisga'a LHA;
- Upper Skeena LHA;
- Smithers LHA; and
- Terrace LHA.

Indian Reserves

Aboriginal governance takes several forms in BC, most of which are represented in the RSA (see Section 20.3.3) and range from hereditary systems to bands established under the *Indian Act* (1985).

Nisga'a Final Agreement

The Nisga'a Nation is governed by Nisga'a Lisims Government (NLG) established under the *Nisga'a Final Agreement* (NFA) between Nisga'a Nation and the governments of Canada and British Columbia (NLG, Province of BC, and Government of Canada 1998). The overarching framework of Nisga'a governance is derived from the traditional laws and practices of the Nisga'a people (see Socio-economic Baseline Report, [Appendix 19-A](#)) with guidance and interpretation the *Constitution Act* (1982) and the Canadian Charter of Rights and Freedoms. The NFA provided by the Council of Elders (NLG 2002). NLG governance is also guided by, and operates within, three categories of lands: Nisga'a Lands, Nass Wildlife Area, and Nass Area. The Project falls within the Nass Area.

20.4.3 Identifying Potential Effects on the Social Environment

Project components are expected to broadly interact with the social VCs by creating a number of potential social effects, including effects in the following areas:

- change in educational profile and attainment levels;
- change in demand on infrastructure and services (including health, social and emergency services); and
- change in worker and family well-being.

These effects are anticipated to occur both within the RSA and the LSA. However, the effects, in particular with respect to education and the demand upon infrastructure, services, and housing, are expected to be felt within the LSA. It is anticipated that Aboriginal communities in the LSA are also susceptible to these effects due to existing baseline conditions (see Section 20.3.4 and [Appendix 19-A](#)) and their pre-existing vulnerability (see Section 20.3.4).

The identification of vulnerable and disadvantaged groups within a Project's area of influence is important, as these groups may experience adverse effects from the Project more significantly than others, as they are less able to adapt to changes due to their vulnerability (IFC 2012). Vulnerability may be due to ethnicity, gender, language, dependence on natural resources or other factors. Identification can also ensure that individuals and groups within potentially affected communities have equal opportunity to benefit from the Project opportunities. Research on the resource sector has highlighted women and Aboriginal peoples, in particular, as marginalized groups who experience the benefits of resource development differently than other groups (Oxfam 2002; CCSG Associates 2004; World Bank 2004; ICMM and Render 2005; IFC 2006). For the purposes of this social impact assessment, Aboriginal peoples are seen as being more vulnerable than other groups within the RSA. This is due to pre-existing social conditions and challenges that they currently face, such as levels of educational attainment, drug and alcohol misuse and addiction, housing conditions, as well as indicators associated with CWB (see Section 20.3).

Social benefits in the form of jobs and business opportunities are expected to flow from Project related investment; however, insufficient education and/or lack of specific skills training may limit the employment prospects for residents of communities in the RSA, especially in Aboriginal communities. Education levels and skills attainment and the associated facilities and program capacity may be affected in positive and negative ways by projects.

As described in Chapter 1, Project Overview (Section 1.9, Project Benefits) the Project will require a number of workers, as well as supplies and services, during Operation. Experience with similar projects indicates that the Project workforce and procurement needs will likely result in direct and spin-off (indirect and induced) economic benefits, including employment gains, increases in personal income, and increases in overall economic value-added gross domestic product (GDP), as well as increases in the local, regional, and provincial tax base. In addition, workforce and procurement needs are expected to alter local labour markets with respect to employee qualifications and educational attainment levels. Finally, the Project is anticipated to attract some new residents to the LSA communities who are seeking to access and/or secure new employment opportunities, in particular those associated with spin-off economic activity in the region. However, economic changes bring about social changes. Population increase, even relatively modest, may increase the demand on existing social and health services, and community infrastructure and services, and this may also place strain on traditional values and culture. However, these must be weighed against the prospects of an improved standard of living, new training and valuable work experience, and the opportunities for new businesses and economic growth.

The Proponent will strive to hire as many local residents as possible; however, if there is a shortage of skilled workers in the LSA, some workers will need to be brought in from other communities or regions. The Project will provide well-appointed camp facilities to accommodate workers, eliminating the need for workers to reside close to the Project in the LSA communities. Nevertheless, there is expected to be some in-migration and, consequently, community demographic composition could change within the LSA communities. Demand on existing infrastructure and services can also increase with an influx of new workers and their families and the changing demographic composition of the RSA, which in recent years has experienced a population decline, often meaning a reduction of access to services in particular in more remote communities.

In the long-run, the educational attainment of residents within the LSA communities is expected to change as the Project both attracts people with existing education and skill sets and offers new training and skills development for existing residents. Educational facilities may also need to adapt to new and potentially increasing demand for mining-related programs and resources.

Family and worker well-being is also expected to be affected as individual community employment and income profiles potentially improve through access to Project-related employment opportunities. Employment will provide a source of financial independence and access to goods and services. New employment and income opportunities will likely also contribute to either a stabilization or reversal of the declining population trend that many LSA communities have experienced in recent years. Family and worker well-being is also expected to benefit from the change in tax base through additional residents and income spending. However, employment demands, such as rotating shift-schedules and remote camp-based work, and increased income may create potential adverse effects in family stress and substance misuse, and may lead to other negative social behaviours.

Provided below is an outline of the Project-related activities and potential effects during the Construction, Operation, Closure, and Post-closure phases.

20.4.3.1 Construction

The Construction phase is two years. During this time a number of activities will occur. Of relevance to the social environment are:

- employment and labour; and
- procurement of goods and services.

Both of these Project activities lead to changes in regional employment and income (either directly through Project employment or through the procurement of goods and services) that, in turn, have the potential to result in social effects. During the Construction phase a number of interactions are expected to occur with the social VCs, including the following potential effects:

- Construction will result in an estimated 870 person-years³ of direct Project employment and 3,042 person-years of indirect and induced employment across the province, with an average of about 1,956 jobs (full-time equivalent; FTE) per year (direct, indirect and induced) for residents across the province (Chapter 19, Assessment of Potential Economic Effects, and Section 1.9, Project Benefits). Within the RSA, it is estimated that the average total employment (direct,

³ A unit of measurement based on an ideal amount of work done by one person in a year consisting of a standard number of person-hours (2,080 h/year).

indirect and induced) generated by the Project during Construction will be approximately 410 jobs. This represents about 25% of the total number unemployed in the RSA and approximately 3% of the current labour force.

- It is possible that, because of the number of jobs that will be available in the RSA and LSA, demand on educational institutions and programs may increase with any population increase, and as demand for mining-related programs and resources increases in anticipation of securing longer-term employment once operation commences.
- Although some employees might move into LSA communities during Construction, it is unlikely that community demographics, infrastructure, and services will be affected in a major way, due to the short timeframe, the temporary and specialized nature of Construction employment and the ability of these communities to absorb some increase in demand, the exception being Aboriginal communities.
- Although workers will reside within dedicated Construction camps while on shift, it is anticipated that a number of them will come from a variety of communities within the LSA, as well as from communities outside of the area. The Project will establish pick-up points in key centres such as Smithers and Terrace, which is anticipated to lead to population increases in these pick-up points, including the potential for an increase in transient population.
- Increased income levels and rotational work schedules (fly-in/fly-out; FIFO) may affect worker and family well-being, both positively and negatively by increasing stress or anxiety levels and potentially leading to poor lifestyle choices or socially damaging behaviours.

The above are the key effects anticipated during the Construction phase of the Project and are further discussed in Section 20.5.

20.4.3.2 Operation

The Operation phase is expected to last approximately 22 years; activities relevant to the social environment are:

- employment and labour; and
- procurement of goods and services.

As with Construction, both of these Project activities will lead to changes in regional employment and income (either directly through Project employment or through the procurement of goods and services) that, in turn, have the potential to result in social effects. During Operation a number of interactions are expected to occur with the social VCs, including the following potential effects:

- Operation, over the life of the mine, will result in an estimated 12,353 person-years of direct Project employment and 16,603 person-years of indirect and induced employment, with an average of about 1,316 jobs (FTE) per year (direct, indirect, and induced) for residents across the province (Chapter 19, Assessment of Potential Economic Effects, and Section 1.9, Project Benefits). Within the RSA, it is estimated that the average total employment (direct, indirect, and induced) generated by the Project within the RSA during Operation will be approximately 440 jobs. This represents about 26% of the total number unemployed in the RSA and approximately 4% of the current labour force.
- Community demographics are expected to be affected by Project Operation. Workforce needs associated with Project Operation are likely to result in new individuals and families moving to the surrounding communities in order to minimize commute times and benefit from

employment and business opportunities. Due to the small size of certain LSA communities, this influx has the potential to change community demographics in terms of median age, gender distribution, and ethnicity. This will be more likely in the Operation, as opposed to Construction, phase due to the longer term nature of employment opportunities.

- The educational profile of the LSA communities and educational facilities have the potential to be affected by the Operation of the Project, which will require a diverse range of technical and professional skills from different trades and professions. A change in demand on local and regional educational facilities, programs, and resources is anticipated.
- Community infrastructure also has the potential to be indirectly affected by Project Operation. Increasing and changing populations could lead to a change in demand on housing, water, sewage, waste management, and road infrastructure, as well as health, social and emergency services.
- Project Operation has the potential to affect family and worker well-being. The rotation schedules for staff residing in camps has the potential to adversely affect family and community dynamics which, in turn, would contribute to stress and potentially increase mental health issues. Access to additional income may also contribute to substance misuse or other negative social behaviours (Gibson G. 2005; Shandro 2011; Storey 2010; Carrington 2011).

The above are the key effects anticipated during the Operation of the Project and are discussed further in Section 20.5.

20.4.3.3 *Closure and Post-closure*

The Closure and Post-closure phases are expected to last a minimum of three years and include reclamation activities and Post-closure monitoring; activities relevant to the social environment are:

- employment and labour; and
- procurement of goods and services.

During the Closure and Post-closure phases a number of interactions are expected to occur with the social VCs, including the following potential effects:

- Decommissioning activities during Closure will provide employment and business opportunities, but these activities will be more limited than during Operation. Therefore, there will be a decrease in direct, indirect and induced employment associated with the Project. Exact figures are not known at the time of this report; however, total employment will be substantially less than during Operation and Construction. LSA and RSA communities that have become economically and, to some degree, socially dependent on the Project during Operation may experience adverse effects during Closure.
- Decreases in employment levels (direct, indirect and induced) have the potential to contribute to a decline in population if residents leave their communities in search of new employment opportunities ([Appendix 19-A](#)). If there is a change in the population of LSA communities (i.e., some workers leaving to take advantage of employment opportunities elsewhere), community demographics and education profiles may be altered. Any decrease in demand on infrastructure and services may also reduce the service level for remaining residents within communities. However, due to the presence of other resource development projects and the overall development of the economy that is expected for the region, it is anticipated that this will be limited.

- Family and worker well-being may be adversely affected as individual and community incomes are lost, potentially leading to a reduction in financial independence and access to goods and services, as well as stress associated with career change and job uncertainty. However, this potential effect is expected to be tempered by Project employment during Operation, equipping workers with the skills and experience to enhance their competitive position in the labour market.

The above are the effects anticipated during Closure and Post-closure phases of the Project and are discussed further in Section 20.5.

20.4.3.4 *Effects Not Included in the Assessment*

Changes to the environment as a result of the Brucejack Gold Mine Project have the potential to affect the socio-economic conditions of Aboriginal people in the LSA; section 5(1)(c) of CEAA 2012 requires consideration of these effects during the assessment process. Potential effects on fish, wildlife, water, air soils could affect socio-economic conditions due to changes in the quality of country foods consumed by Aboriginal people. The Application/EIS makes the following conclusions related to the potential adverse effects on country foods, air, water, and soils (Chapter 21, Assessment of the Potential Health Effects):

- During Construction and Operation, residual effects on human health from changes in air quality are predicted in the air quality RSA (Chapter 21) due to increases in PM_{2.5} and PM₁₀⁴. These effects are predicted to be of moderate magnitude, regular frequency, and landscape in extent, with a low likelihood. Air quality will be mitigated by regular monitoring to meet BC MOE Air Quality Standards as proposed in the Air Quality Management Plan (Chapter 21, Section 29.2). If CAC⁵ levels are elevated, installation of HEPA⁶ filters at building air intakes will reduce CAC levels to background levels. With the implementation of mitigation measures, residual changes to air quality are not expected to impact human health.
- During Construction and Operation, residual effects on human health from changes in noise levels are predicted at the work camps and at Skii km Lax Ha Lodge. These effects are predicted to be of major magnitude, long-term in duration, regular frequency, and landscape in extent, but reversible in the short-term, with a low likelihood. To mitigate camp noise, buildings will be built with material to reduce noise travel, and BMPs will be followed (Chapter 21, Section 8.7, Mitigation Measures for Noise). With the implementation of mitigation measures, residual changes to noise levels are not expected on human health.
- During Construction and Operation, residual effects on human health from changes in drinking water quality are predicted in the drinking water LSA. These effects are predicted to be of minor magnitude, short-term in duration, sporadic frequency, and local in extent, and reversible in the short-term, with a low likelihood. Drinking water quality will be mitigated by the Spill Prevention and Response Plan (Chapter 21, Section 29.14), erosion and sediment control BMPs⁷, and adaptive management practices. Filtered treated water will be available to camp workers and residents of Skii km Lax Ha Lodge. With the implementation of mitigation measures, no significant effects to drinking water quality are predicted.

⁴ PM refers to Particulate Matter.

⁵ CAC refers to Criteria air contaminants.

⁶ High-efficiency particulate air or HEPA is a type of air filter.

⁷ Best management practices (BMP).

- No residual effects to country foods quality are predicted. 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.

The closest Aboriginal community to the Project is more than 100 km away from the Project and the Application/EIS predicts no effects on these communities. Changes to the environment as a result of changes to the Project are not predicted to affect the socio-economic conditions of Aboriginal people due to the lack of predicted effects on human health and the distance of the Project from Aboriginal communities. Consequently, effects on the socio-economic conditions of Aboriginal people due to changes to the environment are scoped out of the effects assessment.

20.5 EFFECTS ASSESSMENT AND MITIGATION FOR THE SOCIAL ENVIRONMENT

This section presents each VC for the social environment and then looks at how each phase of the Project interacts with each VC in order to determine the key effects for each.

20.5.1 Effects on Education, Skills Development, and Training

This section identifies the key potential effects associated with the Project and its interaction with Education, Skills Development, and Training.

20.5.1.1 Identifying Effects

These effects have been identified through the analysis of baseline data, the Project Description and application of the effects assessment methodology (Chapter 6). Key effects identified for Education, Skills Development, and Training within the study areas as described in Section 20.5.1 are:

- increased demand for educational programs in the LSA; and
- changes in the educational profile of the LSA.

These key effects are described in greater detail, by phase, below.

Construction

Increased Demand for Educational Programs in the Local Study Area

The Construction phase is not anticipated to have a notable effect on educational institutions and programs in the LSA due to the short Construction timeline. Demand for programs providing training for mining jobs may increase once Construction of the Project commences.

Post-secondary institutions within the LSA are currently facing issues around funding, access, and capacity (Appendix 19-A, Section 11.3). Tuition costs are often a barrier for individuals from participating in short-term courses, including safety certifications (Simpson and Simpson 2006). AANDC funding is provided to pursue post-secondary education; however, programs must last at least a year. For example, Northern Lights College removed programming services from Dease Lake in 2010 due to provincial budget cuts, but reopened the program in 2012. NWCC's School of Exploration and Mining

offers several courses related to mining, with new courses often added throughout the year (Northwest Community College 2014). The college previously offered a mining course in Dease Lake; however, this course is no longer offered (Appendix 19-A, Socio-economic Baseline Report). As indicated in Section 20.4.1.2, community consultation revealed that Aboriginal groups and communities in the LSA such as Skii km Lax Ha and Nisga'a are interested in mine-related training opportunities.

As with most small communities in the province and in Canada, vocational training, trades and technical programs are mostly offered in larger urban centres such as Terrace or Smithers. In the LSA there are six technical colleges, some with several campuses (for example NWCC) and a UNBC campus located in Terrace. Of these, five provide some mining-related programs such as the School of Exploration and Mining at the NWCC, as discussed in the Socio-economic Baseline Report (Appendix 19-A, Socio-economic Baseline Report).

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. Consequently, the share of those employed locally directly by the Project is expected to be relatively modest and, therefore, it is not expected that during the short Construction timeframe of the Project there would be an increased demand for educational services. The technical colleges may experience an increase in demand for mining-related training programs after the Construction of the Project starts, with workers recognizing the rising demand for skilled labour as the Project enters the Operation phase.

Change in Educational Profile of Communities in the Local Study Area

During the Construction phase of the Project, the Project is not expected to affect the educational profile of communities in the LSA due to the short Construction timeline. For this reason, change in the educational profile of the LSA communities is not assessed further for the Construction phase.

Operation

Increased Demand for Educational Programs in the Local Study Area

Educational facilities within the LSA may be adversely affected by the Operation phase of the Project, which will require a diversity of technical and professional skills from different trades and professions. This may lead to a change in demand on local and regional educational facilities, programs, and resources.

As outlined above, although there are five technical institutions within the LSA that offer mining-related programs, many currently face issues such as funding, access and/or capacity. Therefore, increases in demand for services have the potential for an adverse effect as educational institutions attempt to meet an increase in demand throughout the LSA. This can potentially lead to issues around capacity and access, which may cause deviation from baseline conditions (Section 20.3.3). In the long run it is anticipated that the educational institutions within the RSA and LSA will gain access to increased funding, build capacity and increase access adjusting to the changes in the socio-economic environment.

Changes in Educational Profile of the Local Study Area

During the Operation phase, the Project has the potential to direct and indirectly affect the educational profile of the LSA in a beneficial way. The Project will provide an estimated 12,353 person-years⁸ of

⁸ The BC Input-Output Model Report for the Brucejack Mine generated by BC Stats looks at person-years, which is considered to be one year of work by one person in a given industry or 2080 h/year. Person-years assumes that all jobs are full-time jobs; however, it is possible that while having 3,042 person-years of employment, there will be more jobs with people working fewer hours. This would be the case for retail/service industry jobs which are generally not full-time jobs.

direct employment as well as indirect and induced opportunities associated with procurement and worker spending (Section 20.4.3). A relatively small number of these jobs are expected for residents of communities in the LSA. Total regional employment (direct, indirect, and induced) of approximately 440 jobs (full-time equivalent) is expected for the Operation phase averaged over the 22 years.

Although the Project is expected to generate a relatively modest number of jobs in the RSA, potential in-migration associated with Operation opportunities is expected to indirectly affect the LSA's educational profile, with people moving into the LSA communities in order to access employment opportunities (direct, indirect, and induced). Current educational attainment levels within the RSA and LSA are either equivalent or just slightly behind provincial averages (Section 20.3.3). An influx of residents with higher levels of education will help increase the educational profile of the LSA. Furthermore, current residents may be motivated to obtain more education and training in order to access the high paying jobs that will be offered by the Project. Over time, this may alter the educational profile of the RSA and LSA as the overall level of educational attainment changes. It is not possible to predict the extent of the change. However, the effect is expected to be beneficial.

The Project will also beneficially affect education attainment levels in the LSA through the provision of on-the-job training, work experience and skill development for Project workers. Along with in-migration and gaining higher levels of education, this will contribute towards the change of the overall educational profile of the LSA in the long-term as employees increase their skill levels and qualifications.

The above positive effect is predicted to occur most visibly in the five non-Aboriginal communities within the LSA. Although some positive changes to the educational profile of Aboriginal communities are expected to occur, it is unlikely that in-migration will happen to the same extent in these communities; therefore, the changes to the educational profile of Aboriginal communities will not happen to the same degree as in non-Aboriginal communities. In addition, the change in the educational profile will be more limited in Aboriginal communities due to barriers such as limited access to post-secondary facilities and programs, depressed social status and, following from that, tuition costs often acting as a barrier for individuals (Simpson and Simpson, pers. comm., 2013). Another factor is that current levels of educational attainment in Aboriginal communities are lower than in non-Aboriginal communities, which are lower than provincial averages ([Appendix 19-A](#)). In non-Aboriginal communities, the labour force that does not have a high school diploma or higher level of education ranges between 34% and 17%. For Aboriginal communities, the range is between 76% and 31%, which is above the provincial average of 20% ([Appendix 19-A](#), Socio-Economic Baseline Report).

A change to the educational profile during Operation is considered to be a positive or beneficial effect. Consequently, it will not be discussed further as the focus of the social effects assessment is on adverse effects.

Closure and Post-closure

Effects to education, skills development, and training are anticipated to be minor during both the Closure and Post-closure phases of the project. This is primarily due to the fact that people will not lose the educational levels that they have acquired due to Closure. Therefore, although there may be some out-migration of skilled labour, this out-migration is unlikely to be enough to notably change the educational profile of the RSA or the LSA due to the expected presence of other infrastructure and resource-related projects in the region, which will stem out-migration, both in mining, oil and gas and hydro-electric development (Section 20.4.3.3). For a full-list of projects please refer to Figure 6.8-2 of Chapter 6, Assessment Methodology.

It is likely that educational institutions will continue to offer these types of programs after Closure of the Project, as there are other mining operations and resource development projects in the RSA that are

anticipated, which would continue to look to employ people locally with skills and training; therefore, the programs at these institutions would continue to be used by residents of the LSA and RSA.

There may be a decrease in the number and variety of programs offered which would be considered an indirect adverse effect, as there may be a slight decrease in demand for education associated with any population out-migration associated with Closure, particularly in the unlikely event that other projects do not develop and the economy does not grow over time. However, population out-migration is expected to be negligible due to the large amount of economic diversification and growth occurring within the region. An example of this is the economic development opportunities associated with the NTL project, as well as other existing and proposed projects (e.g., pipeline and LNG projects and other mining projects). It is expected that residents of the LSA communities will continue to rely upon these institutions to access training in order to gain access to employment opportunities associated with the development of the resource sector in the RSA. For this reason, change in the educational profile of the LSA communities is not assessed further for the Closure and Post-closure phases.

20.5.1.2 Mitigation Measures for Education, Skills Development, and Training

Measures to mitigate potential effects on Education, Skills Development, and Training as they apply to the adverse effect of a change in the demand for educational programs in the LSA are identified below.

Increased Demand for Educational Programs in the Local Study Area

For the adverse effect of increased demand for educational programs in the LSA during the Construction and Operation phases, the following mitigation measures have been identified:

- Communicate with communities in the LSA to provide information on the Project development schedule, including workforce requirements and the recruitment process.
- Communicate with educational institutions prior to the commencement of Construction and during Construction and Operation to provide information on workforce job categories, the Project development schedule, and training needs. Communicate with post-secondary educational institutions involved in education and training of Aboriginal workers in the LSA to provide information on workforce job categories, the Project development schedule, and training needs.
- IBAs or other forms of negotiated agreements may be pursued with First Nations and Nisga'a Nation to address some of the barriers their community members face with respect to gaining higher levels of educational attainment levels, and ensure that the necessary facilities and programs are available for individuals to take advantage of Project opportunities.

Decreased Demand for Educational Programs in the Local Study Area

The key effect associated with Closure would be the potential for a negative effect associated with the decrease in demand for educational programs related to the mining industry offered by institutions. This effect is anticipated to be negligible due to the presence of other projects in the RSA and LSA. Communications with educational institutions within the RSA and LSA will occur in advance of Closure so that affected organizations are able to adjust their programs accordingly.

20.5.2 Key Effects on Community Infrastructure, Services, and Housing

This section identifies the key potential effects associated with the Project and its interaction with Community Infrastructure, Services, and Housing.

20.5.2.1 Identifying Key Effects

These key effects have been identified through the analysis of baseline data, the Project Description and the application of the environmental assessment methodology (Chapter 6). Key effects identified

for community infrastructure (water, housing sewage, communications, waste management and roads) and services (health and social services) as described in Section 20.5.2 are:

- increased demand for infrastructure and housing (including in Aboriginal communities) as a result of population in-migration; and
- increased demand on health and social services.

These key effects depend on the level of in-migration and population increase in the RSA and LSA communities directly and indirectly as a result of the Project. They are described in greater detail, by phase below.

Construction

Increased Demand for Infrastructure and Housing as a Result of Population In-migration

During the Construction phase of the Project there is expected to be some people coming into the LSA due to Project-related employment opportunities (direct, indirect, and induced). It is estimated that the Construction phase will create 870 person-years of direct Project employment and 3,042 person-years of employment in supplier industries over 24 months, for a total of 3,912 person-years of employment (Hallin 2013). However, employment of RSA residents is predicted to be a fraction of this total (an average of approximately 410 direct, indirect, and induced jobs over the duration of Construction), with most direct Project workers coming from outside of the region and not expected to substantially interact with the LSA communities. As mentioned in Section 20.5.1, the population influx associated with the Construction phase of the Project is not anticipated to be as large or as long-term as during Operation. This is attributed to four main factors:

- short period of time of the Construction phase (24 months);
- temporary nature of Construction phase employment;
- a well-appointed camp on the Project site to house workers; and
- highly specialized nature of mine construction work typically requiring a high percentage of experienced mobile workers from outside the region and the LSA communities, with sourcing of much of this expertise from outside of the province.

During Construction, workers will reside at the Project site worker camp while on rotation. Brucejack personnel will be accommodated at two camps, the Brucejack exploration camp with a capacity of 120 people, that will be later reduced to construct new mill pads, and a new permanent camp that will accommodate 330 people; the new camp will include a kitchen, recreation and exercise facilities, camp offices, and sewage treatment. Total capacity of the two camps will be 440 people for the Construction phase. Once the Construction phase is complete, the permanent camp will be refurbished for use during Operation. Also, a camp at the Knipple Transfer Area will be constructed to accommodate staff for road maintenance and for short visitor stays in the event of adverse weather conditions that prevent the transportation of personnel to the mine site (Chapter 5, Project Description).

Workers will FIFO and/or bus-in-bus-out (BIBO) from key hubs in the LSA (Terrace and Smithers). While workers and their families may choose to re-locate to the LSA to reduce commute times, it is anticipated that most that do relocate will choose Terrace or Smithers due to the availability of services and infrastructure. It is expected that the majority of workers will not relocate for the Construction phase, choosing from their current home residence – be it outside of the RSA in the province or elsewhere. In addition, it may be that the Construction phase workforce chooses to rent rather than relocate permanently due to the shorter length of the phase (24 months), the temporary nature of

Construction phase employment, and the rotational schedule. These factors are predicted to lead to a very modest increase in the number of transient workers coming into the RSA (see Section 20.5.3).

For the five non-Aboriginal communities (Terrace, Smithers, Stewart, Dease Lake, and the Hazeltons) the effect of in-migration during Construction on housing is also expected to be beneficial as there is the capacity to absorb additional population partly due to population out-migration in recent years ([Appendix 19-A](#)). It is unlikely that there will be in-migration to the Aboriginal communities.

For those looking to temporarily locate to the non-Aboriginal communities, rental housing is available in key pick up centres in the LSA. For example, in Terrace the share of housing that is rentals is 3.9% for private apartments and 3.2% for townhouses, as of April 2012. In addition, in Terrace the number of private dwellings has increased by 5.4% in 2011, even though population has decreased indicating a higher availability of housing (Socio-economic Baseline Report, [Appendix 19-A](#), Section 13.1.7). Further, as mentioned in Section 20.3.4 (Community Infrastructure and Services: Housing), between 2012 and 2014 the price of single family house in Terrace went up by 32% (Killen 2014). Smithers has experienced an increase in the number of private dwellings of 3.2% between 2001 and 2011, and in general the housing that exists is considered to be in good condition (Socio-economic Baseline Report, [Appendix 19-A](#), Section 13.1.6). Dease Lake has experienced a 23% increase in the number of private dwellings in the community since 2001 and the homes are generally considered to be a good condition ([Appendix 19-A](#), Section 13.1.2). The Hazeltons are also anticipated to be able to absorb an increase in population, due to recent depopulation; however, many homes are in need of repair (Socio-economic Baseline Report, [Appendix 19-A](#), Section 13.1.5). In Stewart many houses remain vacant and most of the houses are considered to be in good condition (Socio-economic Baseline Report, [Appendix 19-A](#), Section 13.1.3). Due to the temporary nature of Construction employment and the availability of accommodations in the pick-up points and key centres, it is not anticipated that there will be an adverse effect associated with the Project and housing in the five non-Aboriginal communities during the Construction phase.

The five non-Aboriginal communities are also, overall, well positioned with respect to community services and infrastructure is considered adequate and in several cases recently upgraded. Therefore, despite the potential for an increase in demand on infrastructure, it is not predicted to result in an adverse effect in the five non-Aboriginal communities where capacity and ability to provide services is not an issue ([Appendix 19-A](#)).

There is a key distinction to be made between non-Aboriginal communities and municipalities who have the capacity to absorb a reasonable influx in population versus Aboriginal communities who generally do not have additional capacity. Aboriginal communities within the LSA continue to face housing challenges. Overcrowding is currently common and is associated with limited availability of housing and housing that is in poor condition, as compared to the LSA non-Aboriginal communities.

All Aboriginal communities have an average of at least 3.5 people per household (exception being Iskut and Telegraph Creek), while non-Aboriginal communities have an average that is at or below the provincial average of 2.5 people per household (Section 20.3.3). Many Aboriginal communities do have serviced vacant lots where new homes could be built; however, many remain vacant due to lack of funds to build.

In general, the Aboriginal communities are considered to have some capacity and/or ability to support additional residents. However, a population influx into Aboriginal communities is not expected during Construction.

Increased Demand on Health and Social Services

The potential for an adverse effect related to health and social services in the LSA exists during the Construction phase of the Project, again related to any in-migration to LSA communities that occurs as

a result of the Project. Health and social service provision within the LSA varies based on a community's geographic location. Geographic location and distance from municipal centres tends to affect access, capacity and quality of services. Volunteers and professionals deliver a wide range of health, social and emergency services across the region. Those communities who rely heavily upon volunteers struggle to meet the current level of demand.

The Brucejack Gold Mine Project will have first aid and emergency response facility incorporated in the truck shop and will include parking for a fire truck and an ambulance. A helicopter pad will be located close to the facility for any medical evacuation requirements. Further, there will be two paramedics in the operational workforce at the Project (Chapter 5, Project Description). Consequently, workers directly employed by the Project will be serviced by Project's staff and are not expected to substantially increase the demand for health and social services in the LSA.

Further, population in-migration is expected to be modest during Construction, as a limited number of workers are expected to migrate because of job opportunities. As previously described, the Construction phase of the Project is expected to equal 870 person-years of direct employment (approximately 410 FTE throughout the region) over 24 months. The change in population may result in an increase in the demand on health care and social services, including emergency services. However, it is expected that majority of workers will be accommodated at the camp, creating negligible demand on local health and social services.

For example, Terrace has no 24 hour ambulance service currently. Stewart would also struggle to deal with increases in demand associated with the Construction phase of the Project on its emergency service provision, as it currently has limited capacity to provide emergency services due to a lack of ambulance drivers (APBC 2014). In addition, the health centre in Stewart can no longer provide overnight services and for medium and emergency services patients need to be transported to Terrace. This gives rise to a potential for an adverse indirect effect on the provision of emergency services during the Construction phase.

A broad range of social services currently exist throughout the RSA. Smithers acts as a large centre for the provision of social services, as does Terrace, and addiction services exists in Smithers, Terrace, Dease Lake and most Aboriginal communities ([Appendix 19-A](#)). Most Aboriginal communities offer a broad range of social services. As noted, the population in-migration during Construction is expected to be modest – split between those who are coming into the RSA because they were specifically recruited for positions, and transient workers who are coming into the RSA looking for jobs. The level of transient workers coming to the RSA is expected to be limited due to the fact that the Project is not of the size to be a large attractant for people to the region. However, it should be noted that transient workers (see Section 20.6) tend to place large demands on social services due to negative social behavioural practices (Carrington 2011).

Population growth in short periods of time, associated with mining projects, have been shown to place pressure upon health, social and emergency services because they do not have the time to adapt (Carrington 2011). It is anticipated that the population in-migration during the Construction phase will include transient workers, which will place additional pressures on existing local services, including social and health services; however, as noted in-migration is predicted to be limited in nature due to the size of the Project. Research on the rotational work schedule indicates that it trends towards increasing negative social behaviours (see Section 20.5.3), which can further stress existing social and health services.

It is expected that the increase in demand may have more of an adverse effect in the short-term as some workers come into the area in search of work during the 24-month Construction phase; however in the longer term, health, social and emergency service provision is predicted to be able to adapt.

Operation

Increased Demand for Infrastructure and Housing as a Result of Population In-migration

As with the Construction phase, during the Operation phase of the Project there is predicted to be some in-migration of people into the RSA and LSA communities due to Project-related employment opportunities. However, the potential length of time for this in-migration will be notably longer than during Construction. Over the life of the mine, direct Project employment will total to approximately 12,353 person-years; 16,603 person-years of indirect and induced employment will be created in supplier industries, for an estimated total of 28,956 person-years of direct, indirect and induced employment over the 22-year period (Hallin 2013). This equates to an average of about 1,316 jobs in total across BC during Operation. But on average within the RSA, the total employment generated by the Project (direct, indirect, and induced) during Operation is estimated to be approximately 440 jobs (FTE). In general, all non-Aboriginal communities within the RSA and LSA have adequate infrastructure for their current populations and they are considered to have the capacity to absorb an increase in demand.

Increasing incomes (Chapter 19, Assessment of Potential Economic Effects) associated with Project employment will result in an increase in overall government tax base, including corporate and personal income tax, sales tax, property tax, and mining tax payments (Section 1.9, Project Benefits). The increase in taxes would assist governments and local municipalities in the provision of infrastructure necessary to support the change in demand in the long-term. Therefore, there is not expected to be an adverse effect on infrastructure, but rather a benefit in the longer-term.

The exception may be different for Aboriginal communities, as infrastructure can generally be characterized as lacking in some Aboriginal communities, as noted above for effects during Construction, particularly with respect to housing (Socio-economic Baseline Report, [Appendix 19-A](#), Table 13.1-2). It should be noted that in-migration to Aboriginal communities during Operation is expected to be limited. Given current high unemployment rates in Aboriginal communities, it is anticipated that many of those that become employed because of the Project's economic impacts will be current residents rather than those returning to their home communities, although a certain amount of in-migration is expected. Aboriginal communities do not stand to benefit through taxation in the same manner as the non-Aboriginal communities as funding mechanisms are different and operate mainly through the federal government, the exception being the Nisga'a Nation that has other revenue collection and funding alternatives available.

Housing represents a potential area for an adverse effect, as the ability to absorb an influx of workers and their families in response to the labour demands of the Project is currently limited. The longer time period associated with the Operation phase of the Project and the more stable nature of the jobs means that workers and their families are more likely to be looking for houses to purchase and live in for the duration of their employment versus use of shorter-term accommodations that may be associated with the Construction phase.

During Operation, all Project workers will reside at the Project site worker camp on a rotational shift. Workers will FIFO or BIBO from key hubs within the RSA (Terrace, Smithers, Stewart). While workers and their families may choose to re-locate to within LSA communities to reduce commute times, it is expected that most will choose Terrace and Smithers due to the availability of services and infrastructure. Therefore, it is these communities which are anticipated to experience the effect more acutely.

In both Smithers and Terrace, the number of private dwellings has increased by 3.2% and 5.4% respectively, between 2001 and 2011 (Socio-economic Baseline Report, [Appendix 19-A](#)). This increase is likely a response to the currently economic and infrastructure development taking place in the region.

It can be surmised that the potential for adverse effects as it relates to the availability of housing in non-Aboriginal communities exists, as the capacity to absorb a large population influx in the communities in the LSA is not guaranteed. However, in the long-term it is expected that increased tax revenue associated with the Project and higher incomes will work to mitigate the potential adverse effect. In addition, with respect to housing development, the private sector is expected to respond to the increase in housing demand over time.

The potential for adverse effects related to housing for Aboriginal communities during Operation are expected to be similar to those outlined for the Construction phase of the Project. It is anticipated these effects may be further exacerbated due to the longer term job opportunities available during Operation, in particular during the initial time period, which may compound any in-migration that occurred during Construction. In addition to challenges related to over-crowding in these communities, Aboriginal communities also have concerns about the overall condition of housing in their respective communities and a large number of homes are in need of repair (Socio-economic Baseline Report, [Appendix 19-A](#)). Twenty-five percent of the houses in these communities are in need of repair, as compared to the provincial average of 7%. This makes them less suitable for residence and further contributes to the limited ability to support additional influx. In these communities, there are few options for people who wish to move back to their home communities.

Increased Demand on Health and Social Services

The potential for adverse effects related to the provision of health, social and emergency services in the RSA also exists during the Operation phase of the Project, for the similar reasons as discussed in the predicted effects during Construction. The key difference is that the Operation phase is longer and, therefore, health and social services will have more time to build capacity to meet the increases in demand over time.

Closure/Post-closure

It is anticipated that Closure and Post-closure phases will lead to some out-migration associated with loss of employment. This out-migration may have an adverse effect on health and social services, as the departure of a high income-earning population will lead to a reduced tax base for government services. Therefore, residents may have reduced levels of care for a period of time until the income base is replaced. However, as previously argued, it is anticipated that with the development of other projects and overall economic growth in the region, this adverse effect would be moderated or even negligible.

Another potential effect associated with population out-migration and income—which would lead to a decrease in tax base and revenues—may be the deterioration of community infrastructure and housing. However, this effect would be longer term in nature and difficult to predict at this point in time. LSA communities that have become economically and, to some degree, socially dependent on the Project during Operation may experience adverse effects during Closure. Any decrease in demand on infrastructure and services may also reduce the service level for remaining residents within communities. It is important to keep in mind the number of current and reasonably future foreseeable projects in the region will assist to offset the potential adverse effects during Closure and Post-closure.

Population out-migration is not considered to be extensive enough during Closure and Post-closure to adversely affect health, social or emergency services. Consequently, this effect is not assessed further.

20.5.2.2 Mitigation Measures for Community Infrastructure, Services, and Housing

Mitigation and enhancement measures are identified below to address both adverse and beneficial effects on Community Infrastructure, Services, and Housing during the Construction and Operation phases.

Construction and Operation

Increased Demand for Infrastructure and Housing as a Result of Population In-migration

As discussed, in the short term there may be some adverse effects felt in some communities with respect to housing; however, it is expected that in the long term communities will adapt and there will be beneficial effects for the communities. This effect will be mitigated by communicating the Project development schedule to Aboriginal and non-Aboriginal communities in the LSA. This communication is expected to help reduce the in-migration of speculative, opportunistic workers, so that the number of people coming to LSA communities is minimized and largely comprised of those who have secured work.

Increased Demand on Health and Social Services

There is the potential for adverse effects associated with health and social services during the Construction and Operation phases. This effect will be mitigated by communicating the Project development and workforce schedule to Aboriginal and non-Aboriginal communities in the LSA.

Closure/Post-closure

Decreased Demand for Infrastructure and Housing as a Result of Population Out-migration

As discussed, it is unlikely that Closure and Post-closure will have significant adverse effects on community infrastructure, services, and housing. However, a potential effect in the long term may be the deterioration of community infrastructure and housing partly attributable to the loss of Project associated population and income, which would lead to decreases in the tax base and revenues. This decrease in tax base and revenues will mean that fewer funds are available for maintenance and repairs to community infrastructure and housing. This effect will be mitigated by communicating the Closure Plan with Aboriginal and non-Aboriginal communities in the LSA.

20.5.3 Key Effects on Family and Worker Well-being

This section identifies the key potential effects associated with the Project and its interaction with Worker and Family Well-being. Discussion centers on the LSA, as the LSA speaks specifically to communities (non-Aboriginal and Aboriginal) that are likely to experience effects because of changes in populations and incomes (see Section 20.3.4). In addition, the discussion is specifically focused on the Nisga'a LHA 92, Upper Skeena LHA, Smithers LHA and Terrace LHA, which are the LHAs that overlap with the RSA and LSA, as outlined in Section 20.3.4.

20.5.3.1 Identifying Key Effects

This section will look at some of the key effects upon Family and Worker Well-being with the discussion centering on the indicators discussed in Section 20.3.3⁹. These include community health, children at risk, and youth at risk, economic hardship and crime rates. Many mining communities in British Columbia have demonstrated historic economic vulnerability, demographic instability and negative health impacts stemming from declining and/or boom-bust economic and employment conditions (Shandro 2011). This is also the case for the communities found in the LSA. A higher percentage of the population in the Nisga'a LHA, Upper Skeena LHA and Terrace LHA currently experience challenges in the areas of well-being. Smithers, in general, can be said to more closely resemble provincial averages. It is also important to note that often both adverse and beneficial effects can occur simultaneously in

⁹Baseline data reflects indicators related to Community Well-being (CWB). However, CWB information is also an accurate portrayal of the existing baseline for the subset of the population that will become workers and their families.

relation to the Project's interaction with Worker and Family Well-being. However, the focus of this effects assessment will be on the adverse effects.

These key effects have been identified through the analysis of baseline data, Project description and the application of the environmental assessment methodology (Chapter 6). Key effects identified for Worker and Family Well-being as described in Section 20.5.3 are:

- increase in transient workers coming into the LSA communities;
- increase in levels of stress and anxiety on workers and their families due to rotational work;
- increase in poor lifestyle choices; and
- increased levels of stress and anxiety associated with Closure.

These key effects are described in greater detail, by phase, below.

Construction

Increase in Transient Workers Coming into the Local Study Area Communities

A potential indirect adverse effect exists around an increase in transient workers being present in LSA communities due to Project-related employment (direct, indirect, and induced). The three main contributing factors that would attract transient workers into the LSA and lead to adverse effects are: the temporary nature of Construction phase employment, the high wages associated with direct and indirect Project employment, and the preference for FIFO work schedule by the Project.

It is anticipated that during off rotation times (i.e., times when workers are not at site) workers will travel to hub¹⁰ communities in the LSA in order to fly home, or to otherwise occupy themselves in the communities during their break periods prior to returning to work. The choice will depend on the location of their home community and the duration of the on/off rotation. The Project has yet to finalize the length of the rotations. However, in general, it is expected that direct Project employees will have short periods of time off after working for extended periods of time, and may choose to engage in social pursuits that could have adverse effects to communities in the LSA.

Direct Project employees will also have increased disposable income, as the average annual income for the Construction phase per direct employee is estimated at \$154,028¹¹ (Hallin 2013). This is three times the median employment income in the RSA in 2011 and at least three times the median employment income in the LSA communities where the median employment income varied from \$25,000 to \$52,000 in 2011 (Chapter 19, Assessment of Potential Economic Effects).

Studies on transient workers in the mining industry in rural areas indicate that they make little contribution to the community, and often impose high social costs that result in increases in crime, drug use, prostitution, gambling and similar activities (Storey 2010). Transient workers on rotation are shown to have disruptive effects on families, communities and the lives of residents of communities (Carrington 2011). This type of behaviour will lead to adverse effects on Worker and Family Well-being, as well as to community well-being during the Construction phase of the Project. However, at the

¹⁰ A "hub" is a key transfer point used by the Project to collect workers travelling to and from site. The Project will either collect workers from these points and fly them or bus them to the Project site for their shift rotation and then bus them back to these hub locations for their off rotation. These hubs are expected to be Terrace and Smithers.

¹¹ This number includes wages and benefits; this is not the total value of each employee's direct pay.

Project, the remote camp living arrangement will not allow for evenings in a community, and therefore, the negative effects related to transient workers will be reduced.

Increased Levels of Stress and Anxiety on Families due to Rotational Work

Increased stress on workers and families in the LSA is a potential indirect adverse effect of the Project during Construction. This effect is caused by the nature of direct employment with the Project, as the Project will rely upon a FIFO (rotational) schedule. It is also likely most contractors will rely on a FIFO schedule due to the location of the Project, the need to rely on the worker camp on site, and the general trend within the sector where remote resource-based developments often lack communities in proximity. This type of rotational schedule has been studied and has been shown to have an adverse effect on family and worker well-being, leading to increased levels of stress and anxiety. FIFO can be disruptive to family life as one member of the family is away for extended periods of time. This can lead to a disconnect when the partner and parent who works the FIFO returns home (Shandro 2011).

The FIFO schedule can also lead to pressure on family relationships and contribute to family break-ups and increases in family violence (Storey 2010). The rate of spousal assault in Smithers, a hub community for the Project, is more than 63% higher than that of the province, and child abuse is also more common than the provincial average (Appendix 19-A). In Terrace, another hub for the Project, the rate of child abuse (10.5 per 1,000) and children in care (16.4 per 1,000) were higher than the provincial rates of 7.0/1,000 and 9.4/1,000 respectively (Appendix 19-A). Also, one of the most common reasons for emergency room visits at the Wrinch Memorial Hospital between 2009 and 2010 were mental health issues (S.Robertson, pers.comm.). This indicates that the communities within the LSA are already at risk around key indicators for family and worker well-being and, therefore, are more susceptible to the adverse effects related to the FIFO rotation, such as family and worker anxiety levels.

However, it should be noted that, in some cases, FIFO can also mean extended periods of time at home with family and friends during the off time, which can be beneficial. In addition, employment provides a steady income, as well as health benefits associated with increased income and better lifestyle choices. However, as noted previously, the focus of this social effects assessment is on adverse effects. Consequently, these will not be discussed in further detail.

One beneficial effect of FIFO rotation has been that it attracts Aboriginal workers, as it permits them to earn high incomes, but return to their home communities on a regular basis for extended periods. Similarly, to non-Aboriginal communities there is also the adverse effect of the increased pressure on family relationships, which can contribute to family break-ups and increases in family violence (Storey 2010). Of particular importance is that Aboriginal communities in Canada experience high rates of suicide as compared to the general population. Youth suicide and attempted suicide is of particular concern in First Nation communities. The Nisga'a LHA has the highest rate of suicide/homicide PYLL¹² equivalent to 40.4 years/1,000 population and the Upper Skeena LHA has the second highest in the province 13.9 years/1,000 population (Appendix 19-A). This indicates that these two LHA that incorporate many of the Aboriginal communities within the RSA/LSA are already prone to mental illness caused by stress and anxiety and, therefore, they are more sensitive to factors that may increase levels of anxiety.

Increase in Poor Lifestyle Choices

Higher incomes associated with Project employment and the FIFO rotational work schedule can lead to potential adverse indirect effects to lifestyle choices. Disposable income (see Chapter 19, Assessment

¹² PYLL= Potential Years of life lost from natural and accidental causes, suicides and homicides. PYLL is an indicator for community health.

of Potential Economic Effects, and Section 1.9, Project Benefits) and long periods of down time can lead workers to participate in increased usage of drugs and alcohol, gambling and increased incidences of sexually transmitted diseases (Storey 2010). Also, higher income levels without the experience or knowledge on money management can lead to poor choices on how to spend additional income. Increased work-related stress can also result in a potential increase in substance misuse and other negative social behaviours by workers, including Aboriginal workers (Gibson G. 2005).

All of the communities within the LSA suffer from serious crime¹³ rates that are higher than the provincial rate of 11.1/1,000. Smithers is the exception with a total serious crime rate of 10.4/1,000 (BC Stats 2010). The occurrence of serious crimes in Terrace LHA is 14.4/1,000 and the Upper Skeena LHA has a total serious crime rate of 14.0/1,000. In Terrace LHA drug-related offences were more common than the BC average. It is possible that the increase in poor lifestyle choices will also lead to increased demand upon police, medical and social services, as previously discussed.

In addition, obesity, diabetes, heart disease and respiratory disease are common in all communities within the LSA. Poor lifestyle choices associated with increased alcohol and drug misuse can often exasperate these pre-existing health issues leading to decreased levels of overall health and well-being.

These key indicators of well-being show the LSA non-aboriginal communities to be susceptible to further adverse effects of poor lifestyle choices associated with the Construction phase of the Project as many of these social issues are already prevalent in the LSA. Increases in income levels and stress levels may exacerbate these pre-existing conditions.

For Aboriginal communities that already suffer from low indicators around well-being, increases in wages and FIFO rotation may serve to exacerbate existing social problems, such as drinking and drug misuse which is highest in Aboriginal communities within the LSA. Tahltan communities have a high proportion of social issues around alcohol and drug misuse (Appendix 19-A). In a key informant interview it was noted: “If it’s someone who drinks or uses drugs – giving them more money just makes it easier for them to continue” (Appendix 19-A). This speaks to how money, associated within increased wages, can serve to exacerbate pre-existing social issues. The Nisga’a LHA has a total serious crime rate of 18.6/1,000 almost double the provincial rate. These communities are more sensitive to the adverse effects of the Project with respect to the increase in poor lifestyle choices due to their current social challenges.

Operation

Increase in Transient Workers Coming into the Local Study Area Communities

Similarly to the Construction phase of the Project, the potential for indirect adverse effects exist around an increase in the number of transient workers being present in LSA communities due to Project related employment (direct, indirect, and induced).

This is attributed to the FIFO model, as well as the higher levels of income and overall economic activity serving as an attractant to workers from outside the LSA. During the Operation phase of the Project, the average annual income for direct employees has been estimated at \$119,436¹⁴ (Hallin

¹³ Serious crimes for the purposes of this study are violent crimes and property crimes combined. Violent crimes include: homicide, attempted murder, sexual and non-sexual assault, sexual offences against children, abduction, forcible confinement or kidnapping, robbery, criminal harassment, extortion, uttering threats and threatening or harassing phone calls. Property crimes include: breaking and entering, theft, and motor vehicle theft, possession of stolen property, fraud, mischief and arson.

¹⁴ This number includes wages and benefits; this is not the total value of each employee’s direct pay.

2013). This income level is more than double the 2011 median employment income in the RSA and the LSA (Chapter 19, Assessment of Potential Economic Effects). These income levels combined with long periods of down time while off rotation are likely to lead to similar adverse effects for Worker and Family Well-being as during the Construction phase.

Increased Levels of Stress and Anxiety on Families due to Rotational Work

Increased stress on workers and families in the LSA is a potential indirect adverse effect of the Project that is expected to continue through Operation for both non-Aboriginal and Aboriginal communities within the LSA. These are expected to be similar to those previously described for Construction.

Increase in Poor Lifestyle Choices

Increase in poor lifestyle choices is an adverse project effect that is expected to continue into the Operation phase of the project for both non-Aboriginal and Aboriginal communities within the LSA. These are expected to be similar to those previously described for Construction.

Closure/Post-closure

Increased Levels of Stress and Anxiety on Workers and Families

Increased anxiety on workers and family during Closure is considered to be an indirect adverse effect of the Project. Workers and families will experience anxiety around uncertainty related to their future employment due to mine closure. Loss of higher income levels can also contribute to increased stress levels as families have become accustomed to certain lifestyles, facilitated by the higher wages paid by the Project.

The potential of having to move the family to a new community in order to pursue employment opportunities can be stressful, as well as the primary income earner taking a position elsewhere, perhaps even further away from the family, leading to additional stress for the family. In addition, the potential for out-migration does exist, which might lead to lower levels of community pride and social cohesion as workers and their families leave the RSA and LSA in search of other work.

It is difficult to judge the specific extent of the effect as Closure is occurring in the distant future and the adverse effects to worker and family well-being will be linked to the overall economic situation of the RSA at the time of Closure. Specifically, if there is the availability of other employment opportunities in the region the adverse effect will be lessened. As previously argued, it is anticipated that other resource development projects will occur in the region and that, over time, the economy will continue to grow. This will serve to mitigate any adverse effect of increased levels of stress and anxiety on workers and families because of job and income loss.

20.5.3.2 Mitigation Measures for Family and Worker Well-being

Construction and Operation

Measures to mitigate adverse effects on Worker and Family Well-being during the Construction and Operation phases are identified below.

Increase in Transient Workers Coming into the Local Study Area Communities

As discussed, it is possible that during the Construction and Operation phases of the Project, the LSA will see an increase in transient workers. This effect will be mitigated by ensuring communication and information sharing (commission date, daily operations, mode of transportation, workforce rotation schedule) associated with permitting and the use of the camp. Strategies, such as human resource policies to identify expected behaviours when traveling to and from work, will be developed to manage the work camp and to effectively anticipate and mitigate its impacts on the region. Further, the

remote location of the camp will prevent workers from traveling to communities reducing the magnitude of the potential adverse effect.

Increased Levels of Stress and Anxiety on Families due to Rotational Work

The potential for adverse indirect effects associated with work rotation exists during the Operation phase of the Project for Worker and Family Well-being. The Proponent will have programs in place to assist employees who are experiencing work or family stress, such as an Employee Assistance Program or will connect workers to external service organizations that have such programs.

Increase in Poor Lifestyle Choices

The Proponent will have programs or will connect workers to external service organizations that have programs to assist employees who are experiencing difficulty with poor lifestyle choices.

Closure/Post-closure

Increased Levels of Stress and Anxiety on Workers and Families

It is anticipated that uncertainty around mine closure will lead to adverse indirect effects of increased stress for workers and their families. The Proponent will communicate the Closure Plan to employees and assist them to find and transition to new employment.

20.6 RESIDUAL EFFECTS ON SOCIAL ENVIRONMENT

This section discusses in greater detail the residual effects after mitigation for each VC: Education, Skills Development, and Training; Community Infrastructure, Services, and Housing; and Family and Worker Well-being. It should be noted that no additional discussion will be provided for effects that were identified as being beneficial, nor discussion of any associated enhancement measures that are to be applied. Table 20.6-1 provides a summary of the predicted residual adverse effects on the social environment.

20.6.1 Residual Effects on Education, Skills Development, and Training

This section will discuss the residual effects on Education, Skills Development, and Training after mitigation has been applied for the both Construction and Operation.

20.6.1.1 Increased Demand for Educational Programs in the Local Study Area

It is anticipated that after the application of mitigation there will be an adverse residual effects to educational programs at least in the short term during Operation as communities in the LSA work to adjust to the increase in demand for their services in response to the long-term opportunities for employment. However, in the longer term no adverse residual effect is anticipated as facilities and programs adjust to the change in demand. The significance of this adverse residual effect is assessed in Section 20.7.1.1 and only for the Operation phase, as no residual effect is associated with the short-term and more limited opportunities during Construction.

20.6.2 Residual Effects on Community Infrastructure, Services, and Housing

This section will discuss the residual effects on Community Infrastructure, Services, and Housing after mitigation has been applied for both Construction and Operation.

20.6.2.1 Increased Demand for Infrastructure and Housing as a Result of Population In-migration

As there are pre-existing issues around housing in Aboriginal communities in the LSA, which revolve around overcrowding, availability of housing and condition, it is anticipated that there will be an adverse residual effect despite the application of mitigation by the Project. The significance of this adverse residual effect is assessed in Section 20.7.1.2.

Table 20.6-1. Summary of Residual Effects on the Social Environment

Ref.No.	Valued Component	Project Phase (timing of effect)	Project Component/ Physical Activity	Description of Cause-Effect ¹	Description of Mitigation Measure(s)	Description of Residual Effect
<i>Education, Skills Development, and Training</i>						
1.0	Education, Skills Development, and Training	Construction and Operation	Employment and Labour	Increased demand for educational programs in the LSA	Communicate Project development and workforce schedule with communities in the LSA and with educational institutions	Employment opportunities directly and indirectly associated with the Project leading to an increase in demand for education (see Section 20.6.1.1)
2.0	Education, Skills Development, and Training	Operation	Employment and Labour	Change the educational profile of the LSA	Communicate Project development and workforce schedule with educational institutions	None
3.0	Education, Skills Development, and Training	Closure/ Post-closure	Employment and Labour	Decreased demand for educational programs in the LSA	Communicate Project development and workforce schedule with educational institutions	None
<i>Community Infrastructure, Services, and Housing</i>						
4.0	Community Infrastructure, Services, and Housing	Construction and Operation	Employment and Labour; Procurement of Goods and Services	Increased demand for infrastructure and housing as a result of population in-migration	Communicate Project development and workforce schedule with communities in the LSA	Employment opportunities directly and indirectly associated with the Projects leading to in-migration of Aboriginal peoples back to their home communities (see Section 20.6.2.1)
5.0	Community Infrastructure, Services, and Housing	Construction and Operation	Employment and Labour	Increased demand on health and social services	Communicate Project development and workforce schedule with communities in the LSA	Employment opportunities directly and indirectly associated with the Project leading to in-migration and increase in demand on community health and social services (see Section 20.6.2.2)
6.0	Community Infrastructure, Services, and Housing	Closure/ Post-closure	Employment and Labour; Procurement of Goods and Services	Decreased demand for infrastructure and housing as a result of population out-migration	Communicate Project development and workforce schedule with communities in the LSA	None

(continued)

Table 20.6-1. Summary of Residual Effects on the Social Environment (completed)

Ref.No.	Valued Component	Project Phase (timing of effect)	Project Component/ Physical Activity	Description of Cause-Effect ¹	Description of Mitigation Measure(s)	Description of Residual Effect
Worker and Family Well-being						
7.0	Worker and Family Well-being	Construction and Operation	Employment and Labour; Procurement of Goods and Services	Increase in transient workers coming into LSA communities	Communication and information sharing on use of the camp, manage the work camp and behaviour of workers	Employment opportunities directly and indirectly associated with the Project leading to in-migration of transient communities (see Section 20.6.3.1)
8.0	Worker and Family Well-being	Construction and Operation	Employment and Labour	Increased levels of stress and anxiety on families due to rotational work	Establish employee assistance program	Use of FIFO by the Project leading to extended periods with workers away from home, resulting in family stress and anxiety (see Section 20.6.3.2)
9.0	Worker and Family Well-being	Construction and Operation	Employment and Labour	Increase in poor lifestyle choices	Human resource policies and employee assistance program	Use of FIFO by the Project and increases in personal incomes leading to poor lifestyle/ spending choices by some individuals (see Section 20.6.3.3)
10.0	Worker and Family Well-being	Closure/ Post-closure	Employment and Labour; Procurement of Goods and Services	Increased levels of stress and anxiety on workers and families	Communicate Closure Plan, transition assistance for employees	None

¹ "Cause-effect" refers to the relationship between the Project component/physical activity that is causing the change or effect in the condition of the intermediate component, and the actual change or effect that results.

20.6.2.2 *Increased Demand on Health and Social Services*

It is expected that after applying mitigation there will be an adverse residual effect to health, social and emergency services in the LSA, as the services work to adjust to an increase in demand in particular in the short-term. However, in the longer term in Operation it is expected that health and social services will be able to adapt and adjust to the service needs. The significance of this adverse residual effect is assessed in Section 20.7.1.2.

20.6.3 **Residual Effects on Worker and Family Well-being**

This section will discuss the residual effects on Worker and Family Well-being after mitigation has been applied. Adverse residual effects are predicted during both Construction and Operation for the first three effects described below. In addition, an adverse residual effect of increased levels of stress and anxiety on workers and families is predicted during Closure/Post-closure.

20.6.3.1 *Increase in Transient Workers Coming into Local Study Area Communities*

Despite the application of mitigation it is anticipated that there will be adverse residual effects related to the increase in transient workers coming into the LSA during both Construction and Operation phases. Ultimately workers and individuals coming into the Project area (associated with direct, indirect and inducted employment opportunities) will have personal choice to behave as they like despite the presence of Project mitigation, as it is difficult to predict and control peoples' actions. The significance of this adverse residual effect is assessed in Section 20.7.1.3.

20.6.3.2 *Increased Levels of Stress and Anxiety on Workers and Families due to Rotational Work*

Despite the application of mitigation to reduce worker and family stress and anxiety during Construction and Operation, it is anticipated that there will be an adverse residual effect at least for a portion of the worker population and their families. This is because much of the success of the mitigation is dependent upon workers willingness to participate in the programs offered and to accept the support being offered. The significance of this adverse residual effect is assessed in Section 20.7.1.3.

20.6.3.3 *Increase in Poor Lifestyle Choices*

Due to the anticipated increase in poor lifestyle choice and the fact that there is already a tendency towards this behaviour for a certain segment of the population in the LSA, it is expected that even with the application of mitigation there will be an adverse residual effect. For example, research indicates that participation in drug use outside of work hours, despite strict anti-drug and alcohol policies by most Canadian-based companies, can be quite common (LaPalme 2003). The significance of this adverse residual effect is assessed in Section 20.7.1.3.

20.7 **CHARACTERIZING RESIDUAL EFFECTS, SIGNIFICANCE, LIKELIHOOD, AND CONFIDENCE ON SOCIAL ENVIRONMENT**

Residual effects are characterized using standard criteria: magnitude, geographic extent, duration, frequency, reversibility, and resiliency. Each of these terms are outlined and defined for the Social Environment in Table 20.7-1 and in [Appendix 20-A](#) of this chapter. Thresholds for likelihood and confidence criteria are defined in [Appendix 20-B](#).

20.7.1 **Residual Effects Characterization for Social Environment**

Each identified residual effects (Section 20.6) is characterized and a significance conclusion of “not significant” or “significant” is assigned. The following definitions are applied:

- **Not significant:** Residual effects have low or moderate magnitude; individual/household or community geographic extent; short- or medium-term duration; and occur once or sporadically if at all. There is a high level of confidence in the analyses. The effects on the receptor VC are indistinguishable from background conditions (i.e., occur within the range of natural variation).
- **Significant:** Residual effects have high magnitude; have regional or beyond regional geographic extent; are chronic (i.e., persist into the long term or far future), and occur on a regular or continuous basis. Residual effects on the receptor VC are consequential (i.e., structural and functional changes in populations and communities). The probability of the effect occurring is medium or high. Confidence in the conclusions can be high, medium, or low.

Table 20.7-1. Definition of Characterization Criteria for Residual Effects on Social Environment

Magnitude <i>(Expected magnitude or severity of the residual effect)</i>	Duration <i>(The length of time the effects lasts)</i>	Frequency <i>(How often the effects occurs)</i>	Geographic Extent <i>(The spatial scale over which the residual effect is expected to occur)</i>	Reversibility <i>(This refers to the degree to which the effect is reversible)</i>	Resiliency <i>(Capacity of the receptor VC to resist or recover from major changes in structure and function following disturbances)</i>
Low: differing from the average value for baseline conditions to a small degree, but within the range of natural variation and well below guideline or threshold	Short-term: an effect that lasts approximately 1 to 5 years	Once: an effect occurs once during any phase of the Project	Individual/Households: an effect is limited to individuals, families and/or households Community: an effect extends to the LSA community level	Reversible Short-term: an effect that can be reversed relatively quickly	Low: the receptor is considered to be of low resiliency following disturbances
Moderate: Differing from the average value for baseline conditions and approaching the limits of natural variation, but below or equal to a guideline or threshold value	Medium-term: an effect that lasts between 6 to 25 years	Sporadic: an effect occurs at sporadic or intermittent intervals during any phase of the Project	Regional/Aboriginal Peoples: an effect extending across the broader regional community or economy, or an effect extending to one or more Aboriginal groups	Reversible Long-term: an effect that can be reversed after many years	Neutral: the receptor is considered to be moderately resilient following disturbances
High: differing from baseline conditions and exceeding guideline or threshold values so that there will be a detectable change beyond the range of natural variation (i.e., change of state from baseline conditions)	Long-term: an effect that lasts between 26 and 50 years Far Future: an effect that lasts more than 50 years	Regular: an effect occurs regularly during any phase of the Project Continuous: an effect occurs constantly during any phase of the Project	Beyond Regional: an effect extends possibly across or beyond the province	Irreversible: an effect that cannot be reversed (i.e., is permanent)	High: the receptor is considered to be highly resilient following disturbances

The likelihood of a residual effect occurring is calculated as a measure of probability, to determine the potential for the Project to cause residual effects (Appendix 20-B). The likelihood of a residual effect does not influence the determination of significance, rather it influences the risk of an effect occurring. Likelihood has been considered here in keeping with the most recent guidance issued in September 2013 by the BC EAO (2013): *Guidelines for the Selection of Valued Components and Assessment of Potential Effects*.

20.7.1.1 Likelihood for Residual Effects on Education, Skills Development, and Training

Increased Demand for Educational Programs in the Local Study Area

Based on qualitative research, field research and engagement with stakeholders, as well as an understanding of the social environment of the LSA, it is considered that there is a medium likelihood that demand for educational services and programs in the LSA will outpace capacity at least in the short-term during the Operation phase of the Project leading to an adverse residual effect.

20.7.1.2 Likelihood for Residual Effects on Community Infrastructure, Services, and Housing

Increased Demand for Housing and Infrastructure as a Result of Population In-migration

Based on qualitative research, field research and engagement with stakeholders, as well as an understanding of the social environment of the LSA, it is considered that there is a high likelihood that an increased demand for housing and infrastructure in Aboriginal communities during the Construction and Operation phases will lead to an adverse residual effect. This is due in large part to the current situation with housing and infrastructure in these communities.

Increased Demand on Health and Social Services

Based on qualitative research, field research and engagement with relevant stakeholders, as well as an understanding of the social environment of the RSA, it is considered that there is a medium likelihood that an increased demand in health and social services will arise during the Construction and Operation phases and that this demand would outreach capacity in the short-term, leading to an adverse residual effect.

20.7.1.3 Likelihood for Residual Effects on Family and Worker Well-being

Increase in Transient Workers Coming into Local Study Area Communities

Based on qualitative research, field research, review of secondary literature and engagement with relevant stakeholders, an understanding of the social environment of RSA and LSA, and trends within the mining industry, it is considered that there is a high likelihood that there will be an adverse residual effect associated with the presence of transient workers in the LSA during both Construction and Operation.

Increased Levels of Stress and Anxiety on Workers and Families due to Rotational Employment

Based on qualitative research, field research, and engagement with relevant stakeholders, an understanding of the social environment of RSA and LSA, and research related to social risks associated with rotational employment and FIFO, it is considered that there is a medium likelihood that there will be an adverse residual effect associated with increased levels of stress and anxiety on workers and families due to rotational employment during Construction and Operation. There is considered to be an increased likelihood of an adverse residual effect in Aboriginal communities due to the presence of high baseline levels of health and social issues, and lower levels of CWB in these communities (Socio-economic Baseline Report, [Appendix 19-A](#)).

Increase in Poor Lifestyle Choices

Based on qualitative research, field research, and engagement with relevant stakeholders, an understanding of the social environment of RSA and LSA, and research related to social risks associated with rotational employment and FIFO, it is considered that there is a high likelihood that the RSA and LSA will experience an adverse residual effect associated with the increase in poor lifestyle choices

during Construction and Operation. Despite mitigation it is difficult to control peoples' actions and this is supported by other case studies within the mining industry. It is considered that there is a high likelihood that Aboriginal communities will experience an adverse residual effect associated with increase in poor lifestyle choices, as these communities are considered to be particularly sensitive to these types of behaviours (Socio-economic Baseline Report, [Appendix 19-A](#)).

20.7.1.4 Significance of Residual Effects on Education, Skills Development, and Training

There is one residual effect for Education, Skills Development, and Training. The details of the significance ratings are provided in Table 20.7-2. For the summarized characterization of residual effects on all VCs, see Table 20.7-8.

Table 20.7-2. Significance of Increased Demand for Educational Programs in the Local Study Area

Criteria	Rating	Comment
Nature	Adverse	
Type	Indirect	The effect is caused by people wanting to increase their skills levels in order to access employment opportunities (direct, indirect and induced) associated with the Project.
Magnitude	Moderate	It is expected that there will be an increase in demand from baseline conditions upon educational institutions especially in the short-term.
Duration	Short-term	This increase in demand is anticipated to primarily occur early during the Operation phase of the Project as people seek to upgrade their skills.
Frequency	Sporadic	It is anticipated that this effect will occur at a few points in time early in the Operation phase of the Project as people gain information about what types of skills are needed in order to get employed.
Geographic Extent	Regional	It is expected that this effect will be felt by educational programs throughout the LSA.
Reversibility	Reversible short-term	Removal of the Project will reverse the demand. Also, it is expected that through mitigation and capacity building over time that this effect will be reversible, that educational institutions will be able to build their capacity.
Resiliency	High	The receptor is considered to be high in resiliency following disturbances and it is considered that educational institutions will be able to adapt to the change in demand rather easily.
Significance	Not significant	Given resiliency, reversibility and duration, residual effect is not significant.

20.7.1.5 Significance of Residual Effects on Community Infrastructure, Services, and Housing

There are two residual effects after the application of mitigation measures for Community Infrastructure, Services, and Housing. The details of the significance ratings are provided in the tables below (Tables 20.7-3 and 20.7-4). The characterization of residual effects on all VCs is summarized in Table 20.7-8.

20.7.1.6 Significance of Residual Effects on Worker and Family Well-being

There are three adverse residual effects after the application of mitigation measures for Worker and Family Well-being. The details of the significance ratings are provided in the tables below (Tables 20.7-5 to 20.7-7). The characterization of residual effects on all VCs is summarized in Table 20.7-8.

Confidence, which can also be thought of as scientific uncertainty, is a measure of how well residual effects are understood ([Appendix 20-B](#)). The predicted residual effects were assessed for their reliability to portray the certainty in the predicted outcome, based on the acceptability of the data inputs and analytical methods used in the characterization.

Table 20.7-3. Significance of Increased Demand for Infrastructure and Housing as a Result of Population In-migration

Criteria	Rating	Comment
Nature	Adverse	
Type	Indirect	This effect is caused not directly by the presence of the Project, but rather by the influx of population moving into the LSA due to employment opportunities (direct, indirect and induced) associated with the Project.
Magnitude	Low	As Aboriginal communities (First Nations and Nisga'a Nation) are already experiencing housing overcrowding, waitlists and higher rates of maintenance required, the effect is expected to be tempered because of a current lack of housing availability (limited options for people to move into the communities) but will have some impact to those communities and villages.
Duration	Long-term	The effects are considered to be long-term as those individuals who do move back to their home communities and find employment are expected to, for the most part, stay for the life of the Project and perhaps longer.
Frequency	Sporadic	The effect is predicted to occur sporadically corresponding to different periods of hiring by the Project and will carry into Operation.
Geographic Extent	Regional/Aboriginal peoples	This effect is predicted to mainly impact Aboriginal communities.
Reversibility	Reversible long-term	Removal of Project demand for workers will reverse this effect. It would also be possible to reverse this effect in the long-term with the construction of new houses in Aboriginal communities.
Resiliency	Low	Aboriginal peoples due to their social standing and numerous barriers are considered to be less resilient to disturbances as they have fewer resources to be able to adapt to changes in their environment and, therefore, are more sensitive.
Significance	Not significant	Due primarily to magnitude rating, residual effect is considered to be not significant.

Table 20.7-4. Significance of Increased Demand on Health and Social Services

Criteria	Rating	Comment
Nature	Adverse	The increase in demand may result in an inability to provide the quality of service that communities in the LSA are used to receiving.
Type	Indirect	The increase in demand is caused not by the Project itself, but by people coming into the LSA in search of Project related employment.
Magnitude	Moderate	The change from baseline conditions is predicted to be within the limit of historical variation, with a modest number of people anticipated to be moving into the LSA due to the Project.
Duration	Short-term	With mitigation, this effect is predicted to last between one and five years, as health and social services adjust to the increase in demand.
Frequency	Sporadic	The effect is predicted to occur sporadically corresponding to different periods of hiring by the Project and will carry into Operation.
Geographic Extent	Regional	Due to the importance that the regional hospital in Terrace plays in the provision of health and emergency services throughout the LSA it is anticipated that this effect will be felt throughout the region.

(continued)

Table 20.7-4. Significance of Increased Demand on Health and Social Services (completed)

Criteria	Rating	Comment
Reversibility	Reversible short-term	Removal of Project demand for workers will reverse this effect. Also, in the long term it is anticipated that the effect is reversible, as health services adapt to the increase in demand.
Resiliency	High	The health services that currently exist are in good standing and it is anticipated that with mitigation health and social services will be able to adapt to the disturbances.
Significance	Not significant	Based on magnitude, duration, frequency, reversibility and resiliency, residual effect is not significant.

Table 20.7-5. Significance of Increase in Transient Workers Coming into the Local Study Area Communities

Criteria	Rating	Comment
Nature	Adverse	
Type	Indirect	During the Construction and early Operation phases it is expected that there will be individuals coming into the RSA in search of employment opportunities associated with the Project, whether direct, indirect or induced. It is the presence of these workers that may lead to the adverse effects.
Magnitude	Low	It is anticipated that the in-migration of workers will be relatively modest and focused in the hubs of Terrace and Smithers, as these will be the key transfer points for the Project and are the main service centres for the region.
Duration	Short-term	It is expected that these effects will last the length of the Construction phase, and into the start of Operation.
Frequency	Sporadic	It is expected that these effects will occur on a regular basis throughout the Construction phase of the Project and into Operation, in particular during shift/rotation changes and also at the beginning of the phase corresponding to main periods of recruitment.
Geographic Extent	Regional	This effect is expected to take place in the RSA, but mainly in the hub communities of Terrace and Smithers.
Reversibility	Reversible long-term	Removal of Project demand for workers will reverse this effect; however, some of the effects associated with transient worker behaviour may not be reversible (for example increase alcohol consumption, rise in Sexually Transmitted Infections, STIs).
Resiliency	Neutral	The communities are considered to have some unique attributes, although in general these central communities would not be considered particularly sensitive due in part to the history of mining activity in the area.
Significance	Not significant	Due to mitigation measures, magnitude, duration and frequency, residual effect is considered to be not significant.

20.7.1.7 *Characterization of Confidence for Residual Effects on Education, Skills Development, and Training*

Increased Demand for Educational Programs in the Local Study Area

Based on the acceptability of the qualitative research and analytical methods, the cause-effect relationship between the Project and its interaction with Education, Skill Development, and Training within the RSA is well understood. Therefore, there is high confidence that there will be an adverse residual effect, at least in the short-term.

Table 20.7-6. Significance of Increased Levels of Stress and Anxiety on Families due to Rotational Work

Criteria	Rating	Comment
Nature	Adverse	
Type	Indirect	The type of employment associated with direct Project employment may result in increased stress and anxiety for families. The effect is indirect as it is not the work itself that leads to the effect.
Magnitude	Moderate	It is expected that even with mitigation there will be some variations that differ from baseline, but that remain within the limits of historical variation based on past experiences of the LSA communities with mine projects and other work that relies on worker rotation and FIFO.
Duration	Short-term	Even though the FIFO rotation will last for the duration of the Construction and Operation phases it is anticipated that workers and families will adjust, which leads to a short-term ranking. It is anticipated that some people will not use the resources available to them.
Frequency	Continuous	It is expected that this effect will occur constantly throughout the phases as the FIFO rotational work will remain in place.
Geographic Extent	Regional/Aboriginal peoples	Workers and their families are anticipated to live in communities throughout the RSA. Aboriginal communities are anticipated to feel effects differently due to pre-existing sensitivities.
Reversibility	Reversible long-term	Removal of Project demand for workers will reverse this effect. Also, with assistance the effects of increased stress and anxiety for workers and their families may be reversible; however, it is recognized that this is not the case for everyone.
Resiliency	High	Resiliency will vary based upon the worker and the family; however, most will be able to adjust and are not seen to be particularly sensitive.
	Low	Aboriginal communities are anticipated to feel this effect differently and due to pre-existing sensitivities they are considered to have low resiliency.
Significance	Not significant	Due to magnitude, duration, reversibility and resiliency, residual effect is considered to be not significant.

Table 20.7-7. Significance of Increase in Poor Lifestyle Choices

Criteria	Rating	Comment
Nature	Adverse	
Type	Indirect	Increased income levels associated with Project employment and the rotational schedule are anticipated to contribute to higher rates of poor lifestyle choices. It is not the Project itself that is causing the poor lifestyle choices.
Magnitude	Moderate	The magnitude is considered moderate as the effects are considered to be within the boundaries of natural variance, given previous experience of the LSA communities with projects of similar or larger magnitude.
Duration	Short-term	Due to the presence of mitigation measures it is expected that for most this effect will be short-term in duration. However, not everyone will access mitigation in place.
Frequency	Continuous	This effect will occur continuously throughout the Construction and Operation phases.
Geographic Extent	Regional/Aboriginal peoples	The effect will primarily be felt in the communities within the LSA where people are employed directly or indirectly by the Project. The effect will be felt differently by Aboriginal communities due to pre-existing sensitivities.

(continued)

Table 20.7-7. Significance of Increase in Poor Lifestyle Choices (completed)

Criteria	Rating	Comment
Reversibility	Irreversible	Removal of Project demand for workers will remove the income source that can support this behaviour. Some of the activity associated with high income and work schedule might change once the Project closes but the effects associated with those lifestyle choices could be permanent for those who participate in them.
Resiliency	Neutral	Resiliency will vary based upon the individual worker and the family; however, most will be able to recover and are not seen to be particularly sensitive.
	Low	Aboriginal communities are anticipated to feel this effect differently and due to pre-existing sensitivities they are considered to have low resiliency.
Significance	Not Significant	The duration, magnitude and resiliency indicate residual effect is not significant.

20.7.1.8 *Characterization of Confidence for Residual Effects on Community Infrastructure, Services, and Housing*

Increased Demand for Infrastructure and Housing as a Result of Population In-migration

Based on the acceptability of the qualitative research and analytical methods, the cause-effect relationship between the Project and its interaction with housing and infrastructure in Aboriginal communities, including First Nations and Nisga'a Nation defined as part of the LSA, is well understood. Therefore, there is high confidence that there will be an adverse residual effect.

Increased Demand on Health and Social Services

Based on the acceptability of the qualitative research and analytical methods, the cause-effect relationship between the Project and its interaction with health and social services in the RSA and LSA is well understood. Therefore, there is high confidence that there will be an adverse residual effect, in particular in the short-term.

20.7.1.9 *Characterization of Confidence for Residual Effects on Family and Worker Well-being*

Increase in Transient Workers Coming into Local Study Area Communities

Based on the acceptability of the qualitative research and analytical methods, the cause-effect relationship between the Project, and its interaction with an increase in transient workers coming into the LSA communities, is not fully understood. Moreover, the outcome is affected by a number of factors, most notably the choices of individuals. The certainty for this adverse residual effect is rated as medium, as it is difficult to draw conclusions with a high level of certainty given the degree of complexity of the socio-economic factors and individual behaviours involved.

Increased Levels of Stress and Anxiety on Workers and Families due to Rotational Work

Based on the acceptability of the qualitative research and analytical methods, the cause-effect relationship between the Project, and its interaction with increased stress and anxiety levels on workers and families associated with FIFO rotational work is not fully understood. The certainty for this adverse residual effect is rated as medium, as it is difficult to say with a high level of certainty what the residual effect will be as the mitigation for this effect will only be successful if people choose to use the services and programs available to them. Despite the sensitivity and existing trends in Aboriginal communities, the certainty for this adverse residual effect is also rated medium, as it is

difficult to say with a high level of certainty that the residual effect will be realized due to the individual choices and actions of the people involved.

Increase in Poor Lifestyle Choices

Based on the acceptability of the qualitative research and analytical methods, the cause-effect relationship between the Project, and its interaction with increased poor lifestyle choices is not fully understood. Moreover, the outcome is affected by a number of factors, most notably the choices of individuals. The certainty for this residual effect is rated as medium, as it is difficult to say with a high level of certainty what the residual effect will be as the mitigation for this effect will only be successful if people choose to use the services and programs available to them. Despite the sensitivity and existing trends in Aboriginal communities, the certainty for this residual effect is also rated as medium, as it is difficult to say with a high level of certainty what the residual effect will be due to the individual choices and actions of the people involved.

20.8 SUMMARY OF RESIDUAL EFFECTS AND SIGNIFICANCE FOR SOCIAL ENVIRONMENT

The majority of the potential effects associated with the Project and its interactions with the VCs are expected to be mitigated. However, there are some residual effects that remain after mitigation for all VCs across both Construction and Operation phases. For Education, Skills Development, and Training there is one adverse residual effect; for Community Infrastructure, Services, and Housing there are two adverse residual effects; and for Worker and Family Well-being there are three adverse residual effects post-mitigation (Table 20.8-1).

20.9 CUMULATIVE EFFECTS ASSESSMENT FOR SOCIAL ENVIRONMENT

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 CEAA (2012b) and is consistent with the IFC Good Practice Note on Cumulative Impact Assessment which refers to consideration of other existing, planned and/or reasonably foreseeable future projects and developments. Cumulative effects assessment (CEA) is a requirement of the AIR and the EIS Guidelines and is necessary for the proponent to comply with CEAA (2012b) and the BC EAA (2002).

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

The 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.

Table 20.7-8. Characterization of Residual Effects, Significance, Confidence and Likelihood on Social Environment

Reference Number	Valued Component	Residual Effects	Evaluation Criteria						Significance of Adverse Residual Effects (not significant, significant)	Likelihood and Confidence	
			Magnitude (low, moderate, high)	Duration (short-term, medium-term, long-term, far future)	Frequency (once, sporadic, regular, continuous)	Geographic Extent (local, landscape, regional, beyond regional)	Reversibility (reversible short-term, reversible long-term, irreversible)	Resiliency (low, neutral, high)		Likelihood (low, medium, high)	Confidence (low, medium, high)
1	Education, Skills Development, and Training	Increase demand for educational programs in the RSA and LSA	Moderate	Short-term	Sporadic	Regional	Reversible short-term	High	Not significant	Medium	High
2	Community Infrastructure, Services, and Housing	Increased demand for infrastructure and housing, including Aboriginal communities as a result of population in-migration	Low	Long-term	Sporadic	Regional/Aboriginal Peoples	Reversible long-term	Low	Not significant	High	High
3	Community Infrastructure, Services, and Housing	Increased demand on health and social services	Moderate	Short-term	Sporadic	Regional	Reversible short-term	High	Not significant	Medium	High
4	Worker and Family Well-being	Increase in transient workers coming into the LSA	Low	Short-term	Sporadic	Regional	Reversible long-term	Neutral	Not Significant	High	Medium
5	Worker and Family Well-being	Increased levels of stress and anxiety on families due to rotational work	Moderate	Short-term	Continuous	Regional/Aboriginal Peoples	Reversible long-term	Neutral/Low	Not Significant	Medium	Medium
6	Worker and Family Well-being	Increase in poor lifestyle choices	Moderate	Short-term	Continuous	Regional/Aboriginal peoples	Irreversible	Neutral/Low	Not Significant	High	Medium

Table 20.8-1. Summary of Residual Effects, Mitigation, and Significance on Social Environment

Residual Effects	Project Phase(s)	Mitigation Measures	Significance
<i>Education, Skills Development, and Training</i>			
Increased demand for educational programs in the LSA	Operation	Communicate Project development and workforce schedule with communities and educational institutions	Not significant
<i>Community Infrastructure, Services, and Housing</i>			
Increased demand for infrastructure and housing	Construction and Operation	Communicate Project development and workforce schedule with communities	Not significant
Increase demand on health and social services	Construction and Operation	Communicate Project development and workforce schedule with communities	Not significant
<i>Family and Worker Well-being</i>			
Increase in transient workers coming into LSA communities	Construction and Operation	Communicate Project development and workforce schedule with communities where workers are picked up/dropped off	Not significant
Increased levels of stress and anxiety on families due to rotational work	Construction and Operation	Employee assistance program	Not significant
Increase in poor lifestyle choices	Construction and Operation	Human resource policies and employee assistance program	Not significant

The approach to cumulative effects assessment is presented in Figure 20.9-1.

20.9.1 Establishing the Scope of the Cumulative Effects Assessment

The scoping process involves identification of the receptor VCs for which residual effects are predicted, definition of the spatial and temporal boundaries of the assessment, and an examination of the relationship between the residual effects of the Project and those of other projects and activities.

20.9.1.1 Identifying Receptor Valued Components for the Cumulative Effects Assessment

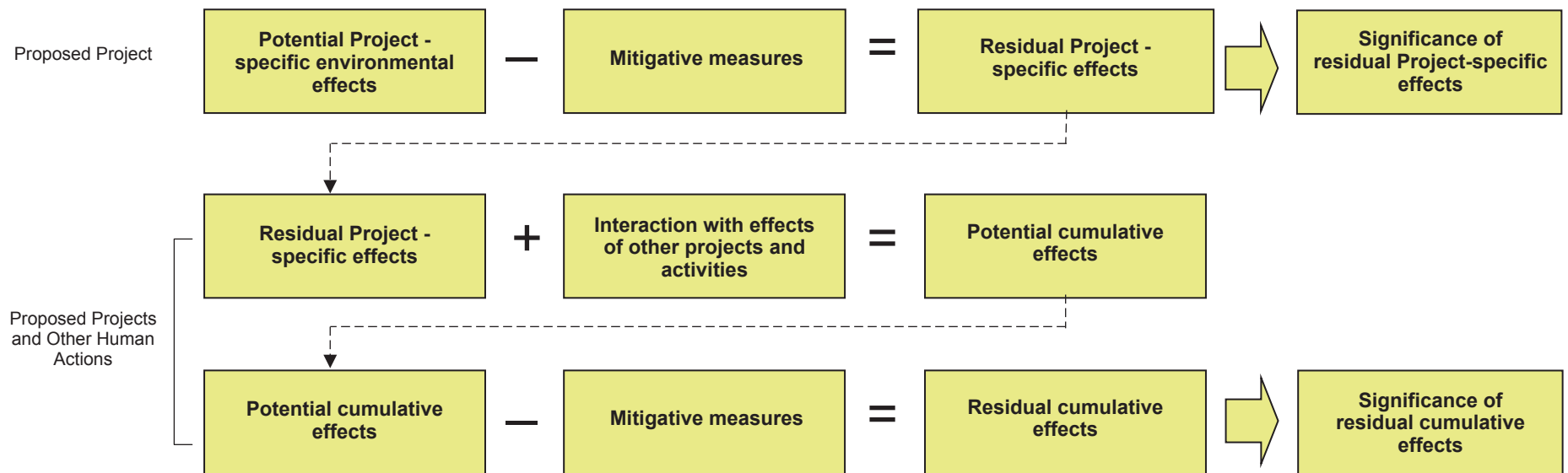
Receptor VCs included in the Social Environment CEA were selected using four criteria following BC EAO (2013):

1. There must be a residual environmental effect of the project being proposed.
2. That environmental effect must be demonstrated to interact cumulatively with the environmental effects from other projects or activities.
3. It must be known that the other projects or activities have been or will be carried out and are not hypothetical.
4. The cumulative environmental effect must be likely to occur.

The receptor VCs included in the Social Environment CEA are:

- Education, Skills Development, and Training;
- Community Infrastructure, Services, and Housing; and
- Worker and Family Well-being.

Figure 20.9-1
Steps to Cumulative Effects Assessment



The residual effect for Education, Skills Development, and Training is the increased demand for educational programs within the LSA during the early period of the Operation phase. The reason for the residual effect post-application of mitigation is that even with mitigation it will take time for education institutions within the RSA and LSA to increase their capacity to meet demands.

The two residual effects for Community Infrastructure, Services, and Housing are: increased demand for infrastructure and housing as a result of population in-migration, and increased demand for health and social services. One of the residual effects (i.e., increased demand on housing and infrastructure) in Aboriginal communities is expected to be present during both the Construction and Operation phases of the Project, even with the application of mitigation. This is because it will take time to address the housing and infrastructure issues faced by First Nations and Nisga'a Nation communities.

There are three residual effects for Worker and Family Well-being. They are: increase in transient workers coming into LSA communities; increased levels of stress and anxiety on families due to rotational work; and increase in poor lifestyle choices. It is expected that the increase in transient workers coming into the RSA and LSA will occur during both the Construction and Operation phases of the Project, even with the application of mitigation. These residual effects are related to the fact that with mitigation the effects will be decreased; however, the effect will still exist as there is no guarantee that workers or their families will access the services and supports available to them. In addition, certain individuals are expected to be more susceptible or vulnerable to the changes.

20.9.1.2 *Potential Interaction of Projects and Activities with the Brucejack Gold Mine Project for Social Environment*

A review of the interaction between potential effects of the Brucejack Gold Mine Project and effects of other projects and activities on Social Environment was undertaken. The review assessed the projects and activities identified in Section 6.8.2 of the Assessment Methodology, including:

- regional projects and activities that are likely to affect the receptor 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 the receptor VC); and
- activities not limited to other reviewable projects, if those activities are likely to affect the receptor VC cumulatively (e.g., forestry, mineral exploration, commercial recreational activities).

A matrix identifying the potential cumulative effect interactions for the Social Environment is provided in Table 20.9-1.

20.9.1.3 *Spatio-temporal Boundaries of the CEA*

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 receptor 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 Social Environment CEA, and encompasses possible direct, indirect, and induced effects of the Project on the Social Environment.

Table 20.9-1. Potential Cumulative Effect Interactions for Social Environment

Projects and Activities	Social Environment Valued Components		
	Education, Skills Development, and Training	Community Infrastructure, Services, and Housing	Family and Worker Well-being
Historical			
Eskay Creek Mine			
Goldwedge Mine			
Granduc Mine (Past Producer)			
Johnny Mountain Mine			
Kitsault Mine (Past Producer)			
Silbak Premier Mine			
Snip Mine			
Sulphurets Project			
Swamp Point Aggregate Mine			
Present			
Brucejack Exploration			
Forrest Kerr Hydroelectric Power			
Long Lake Hydroelectric			
McLymont Creek Hydroelectric Project			Grey
Northwest Transmission Line			Grey
Red Chris Mine	Black	Black	Black
Reasonably Foreseeable Future	Black	Black	Black
Arctos Anthracite Coal Mine	Black	Black	Black
Bear River Gravel	Grey	Grey	Black
Bronson Slope Mine			Black
Coastal GasLink Pipeline Project		Grey	Grey
Galore Creek Mine	Grey	Grey	Black
Granduc Copper Mine			Black
Kerr-Sulphurets-Mitchell (KSM) Mine	Black	Black	Black
Kinskuch Hydroelectric Project	Grey	Grey	Grey
Kitsault Mine	Black	Black	Black
Kutcho Mine	Black	Black	Black
LNG Canada Export Terminal Project		Grey	Grey
Northern Gateway Pipeline Project		Grey	Grey
Prince Rupert Gas Transmission Project		Grey	Grey
Prince Rupert LNG Project			
Schaft Creek Mine	Black	Black	Black
Spectra Energy Transmission Line Project		Grey	Grey
Storie Moly Mine	Grey	Grey	Grey
Treaty Creek Hydroelectric Project			
Turnagain Mine	Grey	Grey	Grey
Volcano Hydroelectric Project			

Note: Interactions not expected (white); possible (grey); or likely (black).

Spatial Boundaries

The spatial boundaries for the social CEA are based on the RSA used for the social effects assessment (Figure 20.3-1). The RSA contains a number of past, present, and reasonable foreseeable projects (mainly mines) that have created, do create, or will create changes in employment, income, population, infrastructure, services, health and education (see Figure 20.9-2). These projects and activities may interact spatially with the Projects' effects on the social conditions of the LSA communities and the region.

Temporal Boundaries

Present mine and electrical transmission projects (i.e., NTL and Red Chris Mine), and future mine and hydroelectric projects may cause social changes that are similar to the Project and that occur at a similar time. Past projects and activities are not considered to be temporally linked to the Project, as they no longer produce any notable residual social effects. Furthermore, any residual adverse effects would be captured as a contribution to baseline conditions.

The temporal boundaries for the CEA include the temporal boundaries for the social effects assessment for the Project (Section 20.5):

- **Construction:** 24 months;
- **Operation:** 22-year run-of-mine life;
- **Closure and Reclamation:** 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 type organized mining activity first started to occur in the regional area. Effects of historic 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.

Administrative Boundaries

The same boundaries apply for the CEA as for the social effects assessment (Section 20.4.2.3). It should be noted that regional subdivisions of the province, for example, include areas defined by regional districts, municipal areas, LHAs, and economic development zones. The borders of these regions and categories do not necessarily coincide with one another and often change over time; in addition they do not necessarily coincide with RSA and LSA boundaries. Furthermore, the traditional territories of relevant First Nations transcend many of these contemporary boundaries, and cultural linkages may extend across different administrative jurisdictions.

The administrative boundaries that are most relevant to the social effects assessment, as they both influenced the information available and reflect the management of key social issues by governments, include: municipalities and regional districts; LHAs; and First Nations reserves and Nisga'a Nation land.

Municipalities and Regional Districts

The RSA includes two regional districts: i) RDKS, and ii) Electoral Area “A” of the RDBN. The RDKS provides local government services to rural and unincorporated settlements within an 100,000 km² area of northwest BC, including the municipalities of Kitimat, Terrace, Stewart, Hazelton, and New Hazelton (RDKS 2012a). Electoral Area “A” of RDBN covers approximately 3,688 km² and includes Smithers, several unincorporated settlements, and surrounding rural areas.

Stewart, Terrace, Hazelton, New Hazelton, and Smithers are all incorporated municipalities, governed by the BC *Local Government Act* (1996) with an elected mayor and council. The remaining communities, including Dease Lake and South Hazelton, are not incorporated and fall under the governance auspices of the regional district.

As mentioned in Section 20.2, OCPs are provincially mandated under the (BC) *Local Government Act* (1996), provide a framework for strategic planning, including the setting of social goals at the local level. Among the LSA communities, OCPs have been developed for the Town of Smithers and the City of Terrace. Each community OCP contains goals and policies for improving quality of life and economic vitality based on current demographic and economic trends, which also speak to social aspects of development (Town of Smithers 2010; City of Terrace n.d.).

Local Health Authorities

Of relevance to the social effects assessment, particularly with respect to Worker and Family Well-being, are the LHAs that exist within the RSA and LSA. The RSA includes five LHAs: Snow County LSA (Stewart); Nisga’a LHA; Upper Skeena LHA; Smithers LHA; and Terrace LHA.

First Nations Reserves and Nisga’a Nation Lands

Aboriginal governance takes several forms in BC, most of which are represented in the RSA (see Section 20.3.3) and range from hereditary systems to those outlined in the *Indian Act* (1985). Table 20.3-1 lists the Aboriginal communities within the RSA and the type of governance system which they have. The exception is the Nisga’a Nation, which is governed by the NLG established under the NFA between Nisga’a Nation and the governments of Canada and British Columbia (NLG, Province of BC, and Government of Canada 1998). The overarching framework of Nisga’a governance is derived from the traditional laws and practices of the Nisga’a people (see Socio-economic Baseline Report, [Appendix 19-A](#)) with guidance and interpretation provided by the Council of Elders (NLG 2002). NLG governance is also guided by, and operates within, the *Constitution Act* (1982) and the *Canadian Charter of Rights and Freedoms*.

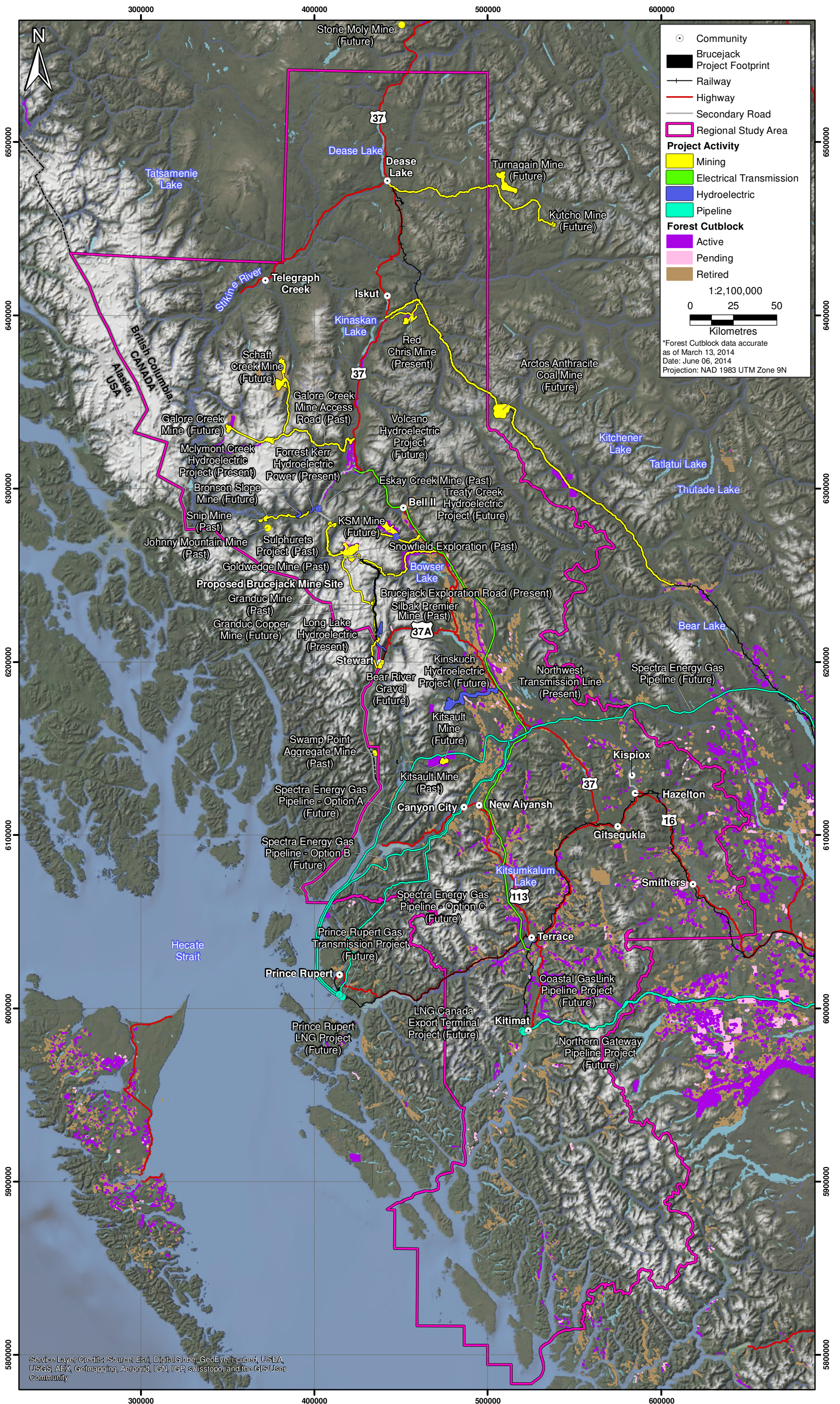
20.9.1.4 Potential for Cumulative Effects

The types of cumulative effects (Section 6.8-1) that will present themselves in the social environment are:

- **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 amount actions (e.g., indirect demand on health and social services 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.”

Figure 20.9-2

Cumulative Effects Scoping: Projects and Activities Interacting with the Brucejack Project for Socio-economics



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 the social environment are identified in Table 20.9-2. For the social CEA, the following key assumptions are made:

- Past projects and activities are not considered to be linked to the Project, as they no longer produce relevant adverse social effects. The effect of historic projects on the RSA and LSA have been captured in the description of baseline conditions ([Appendix 19-A](#)).
- Not all future projects and activities that have been identified as having the potential to act cumulatively with the Project on the social VCs (i.e., Education, Skills Development, and Training; Community Infrastructure, Services, and Housing; and Worker and Family Well-being) are certain to occur. Rather, it is likely that not all will 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. Thus, the CEA represents a high interaction scenario.
- The majority of the Projects listed in Table 20.9-1 occur within the social RSA. The social RSA is considered to have two regional hubs – Terrace and Smithers. Due to the central role these two communities play with respect to the provision of a labour force, infrastructure and services (Social Economic Baseline Study: [Appendix 19-A](#)) and the number and nature of projects being considered for this CEA for the social environment, the CEA will be looking primarily at the cumulative effects in the key centres within the RSA – Terrace and Smithers. Secondly, Stewart will also be considered as a community where it is expected that the cumulative effects will be evident.
- Due to the sensitivity of Aboriginal communities, including both First Nations and Nisga'a Nation, the CEA will also be focusing the evaluation of potential effects on these communities.
- Rather than discuss each project (historical, present and reasonably foreseeable future) individually, the CEA will discuss the cumulative effect of having all of these projects present in the RSA and how the projects, as a whole, will interact with the residual social effects. This approach is being taken as details around the future projects are not known and, therefore, a detailed discussion will not be undertaken as the supporting evidence is not available. Although it is understood that there are two main types of effects that will occur in the social environment (Section 20.9.1.4), “growth-inducing potential” is primarily associated with reasonably foreseeable projects and, therefore, it is assumed that this effect is present for all reasonably foreseeable projects, as each project and associated activities within the RSA will create a feedback social effect. Consequently, the discussion of cumulative effects will be focused around “spatial or temporal crowding” as the primary differentiator in the analysis.
- For the purposes of the CEA it is assumed that the vast majority of the reasonably foreseeable future projects will be operating on either a FIFO model and/or a rotational schedule model based on the use of remote camp accommodations.

Table 20.9-2. Potential Cumulative Effects between the Brucejack Gold Mine Project Social Environment and Other Projects and Activities

Ref.No.		Brucejack Gold Mine Project	Existing Project or Activity ¹	Reasonably Foreseeable Future Projects ²	Type of Potential Cumulative Effect ³
<i>Education, Skills Development, and Training</i>					
1.0	Increased demand for educational programs in the LSA	X	X	X	Spatial and temporal crowding, additive, and synergistic
<i>Community Infrastructure, Services, and Housing</i>					
2.0	Increased demand for infrastructure and housing	X	X	X	Spatial and temporal crowding, additive, and synergistic
3.0	Increased demand on health and social services	X	X	X	Spatial and temporal crowding, additive, and synergistic
<i>Worker and Family Well-being</i>					
4.0	Increase in transient workers coming into LSA communities	X		X	Spatial and temporal crowding, additive
5.0	Increased levels of stress and anxiety on families due to rotational work	X		X	Spatial and temporal crowding, additive, and synergistic
7.0	Increase in poor lifestyle choices	X		X	Spatial and temporal crowding, additive, and synergistic

¹ Northwest Transmission Line, Red Chris Mine

² Arctos Anthracite Coal Mine, Bear River Gravel, Bronson Slope Mine, Coastal GasLink Pipeline Project, Galore Creek Mine, Granduc Copper Mine, KSM Mine, Kinskuch Hydroelectric Project, Kitsault Mine, Kutcho Mine, LNG Canada Export Terminal Project, Northern Gateway Pipeline Project, Prince Rupert Gas Transmission Project, Schaft Creek Mine, Spectra Energy and BG Group Natural Gas Transportation System, Story Moly Mine, Treaty Creek Hydroelectric Project, Turnagain Mine and Volcano Hydroelectric Project

³ Physical-chemical transport, nibbling loss, spatial crowding, temporal crowding, synergistic, additive, growth inducing

20.9.2 Analysis of Cumulative Effects

For the CEA, the data sources and methods used are the same as those for the social effects assessment (Section 20.3.3.1 and Section 20.3.3.2). The guidelines for analysis of data and findings are taken from the AIR, Section 11 and Section 7.7.

20.9.2.1 Cumulative Effects on Education, Skills Development, and Training

Increased Demand for Educational Programs in the Local Study Area

As indicated in Table 20.8-1, there is one adverse residual effect for Education, Skills Development, and Training related to the Project's social effects assessment. The cumulative effect related to increased demand for educational programs in the RSA and LSA is characterized as both spatial and temporal crowding, additive and synergistic.

There are 12 current and reasonably foreseeable future projects within the RSA that are mining projects. The one current project is the Red Chris mine. Of these 12 projects, seven are projected to have construction begin at the same time as the Project (Chapter 6, Assessment Methodology, Sections 6.9.2.1, 6.9.2.2, and 6.9.2.3). These seven projects are estimated to generate over 2,000 jobs during their construction phases and employment figures just below that for operation phases (Chapter 6, Assessment Methodology, Sections 6.9.2.1, 6.9.2.2, and 6.9.2.3). The high number of jobs available combined with all the projects occurring within a similar timeframe suggests that educational institutions within the RSA would struggle to meet this sharp increase in demand for mining-related programs. Essentially demand would outpace capacity, thereby limiting access. Spatial crowding is applicable as all of these projects are occurring within the RSA and temporal crowding applies as seven of the 12 projects are due to begin their construction phases around the same time. In short, educational institutions within the RSA are predicted to struggle in the short-term.

The 11 reasonably foreseeable future projects will work in a linear way, as all the projects will work to increase demand for mining-related programs within the RSA beyond what current capacity is able to handle. There is a potential that there will also be a synergistic effect as the result of the lack of capacity could mean that people living within the RSA are less employable as they do not have the required skills and training to access the employment opportunities; therefore, they would lose out on the economic benefits of the projects being present in the RSA (Section 19, Economic Effects Assessment). The cumulative effects associated with increase in demand for educational programs will primarily be felt by educational institutions in Terrace and Smithers, which act as hubs for educational programs and services within the RSA.

20.9.2.2 Cumulative Effects on Community Infrastructure, Services, and Housing

As indicated in Table 20.8-1 there are two adverse residual effects for Community Infrastructure, Services, and Housing related to the Project's social effects assessment. The cumulative effects related to these residual effects are expected to be spatial and temporal crowding, additive and synergistic.

Increased Demand for Infrastructure and Housing as a Result of Population In-migration

After reviewing all of the projects considered in this CEA, 16 projects are considered to have the potential to affect housing and infrastructure within the RSA in First Nation and Nisga'a Nation communities (see Table 20.10-1). Due to the current state of housing and infrastructure in these communities (waitlists for housing, overcrowding and lack of adequate housing infrastructure), any in-migration of population is expected to have an adverse residual effect without changes to current procedures to provide housing.

Of the 16 projects (mining, pipeline and hydroelectric) that could potentially interact with housing and infrastructure, 11 are predicted to have construction periods that begin around the same time as the Project's, which means that there will be substantial regional employment opportunities during both construction (peak employment period will be construction for all projects) and operation. These opportunities will draw Aboriginal peoples back to their home communities as opportunities for economic advancement through employment with associated projects will be readily available.

The cumulative effect is characterized as both spatial and temporal crowding as all of these projects are occurring within the RSA, and some within 50 km of the Project. In addition, the receptor will have difficulty recovering due to the timing of the 11 projects which are predicted to kick-off around the same time (the year 2015). These projects will combine in a linear fashion, meaning the cumulative effect is additive in nature, as all the projects work to increase demand for housing and infrastructure in these communities in a short period of time. There is also the potential for a synergistic effect, as people moving back to their home communities may decide to look in other communities for housing if there is none available in their own communities, potentially contributing to a housing issue in key hubs, including Terrace, Smithers and Stewart.

Increased Demand on Health and Social Services

Chapter 6, Assessment Methodology, includes 26 current and reasonably foreseeable future projects. Of these, 16 are considered to be either likely to (6) or will possibly (10) interface with health and social services within the RSA (see Table 20.9-1).

Of the 16 projects that could potentially affect health and social services within the RSA, 11 are predicted to have construction period that would begin around the same time as the Brucejack Gold Mine Project's. As discussed in Sections 20.3 and 20.5, Terrace acts as a health service centre within the RSA, providing services to many residents. There are also current issues with capacity (e.g., emergency services in Stewart) within the RSA. The sheer number of projects and, in particular, those that have construction phases that are planned to begin at the same time as that of the Brucejack Gold Mine Project indicates that there is an increased potential for demand to outstrip capacity and, therefore, affecting access and quality of services within the RSA.

The cumulative effect is characterized as both spatial and temporal crowding. Essentially, a large number of projects may be occurring in a brief period of time. The cumulative effect will be spatial as there will be a sharp increase in demand for health and social services within the RSA from the projects themselves, as well as from the predicted increase in population associated with the increase in the number of employment opportunities. The cumulative effect will also be temporal; with so many projects predicted to occur in the same timeframe, it will leave little time for health and social services to recover and meet the increase in demand, at least in the short-term. The cumulative effect will also be additive in nature, as the effect will increase in a linear way with each project contributing to the overall effect to health and social services in the RSA. It is possible that there will also be a synergistic effect in the short-term – if people are unable to access services due to a lack of capacity there could be a decrease in overall health conditions within the RSA as people are not able to get the treatment they need. It is predicted that this cumulative effect will primarily occur in the key hubs within the RSA – Terrace, Smithers and Stewart – and it is expected that this effect will take place primarily during the Construction phase of the Project. As time passes, health and social services are predicted to recover with proper mitigation.

20.9.2.3 Cumulative Effects on Worker and Family Well-being

As indicated in Table 20.8-1 there are three adverse residual effects for worker and Family Well-being related to the Project's social effects Assessment. The cumulative effects related to these residual effects are expected to be spatial and temporal crowding, additive and, in some cases, synergistic effects.

Increase in Transient Workers Coming into Local Study Area Communities

Of the 26 projects that have been included for consideration in the CEA (see Table 20.9-1) there are ten that are thought to have likely interactions with this social residual effect and ten that are predicted to have possible interactions with this residual effect. These projects have been considered to have interactions due to their start dates for construction or their proximity to the Project.

These 20 projects are estimated to generate over 3,000 jobs during their construction phase and employment figures just below that for their operation phase (Chapter 6, Assessment Methodology). The high number of jobs available combined with all the projects occurring within a similar timeframe suggests that there could be high levels of in-migration to the RSA and LSA. Migrant/transient workers, as discussed in Section 20.5.3, tend not to contribute to communities and can often have adverse effects to overall CWB. This in-migration of transient workers is expected to occur both during Construction and Operation phases, as people will be drawn to the employment opportunities that will be available during each phase. It is predicted that this in-migration will be focused on the hub communities of Terrace, Smithers and Stewart.

This cumulative effect is characterized as being spatial and temporal in nature, due to the restricted area where the effect is predicted to occur and the number of projects that will stimulate the cumulative effect, as well as the short timeframe within which it will occur. These hub communities will struggle to recover in the short-term and potentially in the long-term as well. The cumulative effect is also characterized as additive, as it is predicted that each project will add in a linear fashion to the residual social effect of increased numbers of transient workers coming into the RSA and LSA.

Increased Levels of Stress and Anxiety on Workers and Families due to Rotational Work

Of the 26 projects that have been included for consideration in the CEA (see Table 20.9-1) there are ten that are predicted to have a “likely” interaction with this social residual effect and ten that are predicted to have a “possible” interaction. As stated in the assumptions, 80% of the reasonably foreseeable future projects are considered to be operating on either a FIFO work rotation or another type of rotational schedule.

As discussed in Section 20.5.3, increased levels of stress and anxiety are associated with the prevalence of FIFO work. It is reasonable to assume that with the number of projects operating in the RSA with FIFO schedules that there will be cumulative effects related to an increase in stress and anxiety for workers and their families. It is also reasonable also to predict that as the majority of the in-migration of population will occur in the hubs of the RSA (Terrace, Smithers and Stewart) that these are the areas where these cumulative effects will be most evident. This cumulative effect will occur during both the Construction and Operation phases.

This cumulative effect is characterized as being spatial and temporal crowding in nature. It is spatial as it is predicted that there will be overlapping effects of the FIFO work rotation within the RSA, due to the number of jobs that will be based on this rotation. It is temporal as the effects from the FIFO work rotation on worker and family stress and anxiety levels will likely occur in a very short period of time and it is likely that some workers and families will have challenges in effectively managing this effect in the short-term. The cumulative effect is also additive in nature as the projects combine in a linear fashion to increase the effect. The cumulative effect could also be considered to be synergistic, because if there are increases in levels of stress and anxiety for workers and their families this will in turn increase demand for health and social services in the RSA. As mentioned above, health and social services are predicted to also be experiencing an adverse cumulative effect related to a lack of capacity and it may mean that they will have additional difficulties in being able to respond to the needs of workers and

families in the RSA. Aboriginal communities are seen as being particularly sensitive and already suffer from high rates of illness and social issues ([Appendix 19-A](#), Section 20.3 and Section 20.5.3).

Increase in Poor Lifestyle Choices

Of the 26 projects that have been included for consideration in the CEA (see Table 20.9-1) there are ten that are predicted to have a “likely” interaction with this social residual effect and ten that are predicted to have a “possible” interaction with this residual social effect. As stated in the assumptions, the vast majority of the reasonably foreseeable future projects are considered to be operating on either a FIFO work rotation or another type of rotational schedule. As discussed in Section 20.5.3 FIFO schedules associated with the mining industry can lead to increased levels of stress and anxiety for workers and their families. In addition, increase in income and a lack of money management skills and knowledge lead to poor choices on how they spend their money.

As discussed in Section 20.5.3 poor lifestyle choices are associated with the prevalence of FIFO rotation work. It is reasonable to assume that with the number of projects operating in the RSA with FIFO schedules that there will be cumulative effects related to an increase in poor lifestyle choices. It is reasonable also to assume that as the majority of the in-migration of population will occur in the hubs of the RSA (Terrace, Smithers and Stewart) that these are the areas where these cumulative effects will be most evident. This cumulative effect will occur during both the Construction and Operation phases.

This cumulative effect is characterized as being spatial and temporal crowding, for the same reasons as for the other cumulative effects for the social environment. There are a large number of projects happening in a very short period of time and all within the social impact RSA. This will lead to cumulative effects as there are overlapping effects related to the number of jobs and the short time period that these changes are expected to take place. The cumulative effect is also additive, as the cumulative effects are expected to combine in a linear way. There is also the potential for synergistic cumulative effects, as with the increase in stress and anxiety for workers and their families associated with poor lifestyle choices. The increase in poor lifestyle choices on such a large scale within the RSA may further adversely affect health and social services in the RSA with more people suffering from alcohol and drug misuse related illness and issues. Aboriginal communities are seen as being particularly sensitive and already suffer from higher rates of alcohol and drug misuse ([Appendix 19-A](#), Section 20.3 and Section 20.5.3).

20.9.3 Mitigation Measures to Address Cumulative Effects

The Proponent cannot be held solely responsible for mitigation related to the above discussed cumulative effects for each of the VCs. The sheer number of projects and proponents involved in contributing to the cumulative effects within the RSA makes singular action by the Proponent an ineffective mitigation to address the cumulative social effects. In addition, many of the identified social effects are in areas that are the lead responsibility of governments - such as the community infrastructure, health care, and social services. The scale of the cumulative social effects has the potential to alter the social environment within the RSA.

The Proponent is not responsible for this shift in the social environment. Rather, it is the responsibility of all proponents with projects within the RSA to work together in a collaborative fashion in order to mitigate the cumulative effects, working in concert with governments. In particular, ongoing engagement with the municipalities of Terrace, Smithers and Stewart will be important in order to ensure that the effects are mitigated in the most effective manner and that mitigation occurs at the earliest stage possible, working to build capacity and awareness at an early stage.

20.9.3.1 Mitigation Measures to Address Cumulative Effects on Education, Skills Development, and Training

In addition to the mitigation previously identified for Project effects, the Proponent is committed to engaging key stakeholders to participate in the development of other mitigation as required in order to maximize Project benefits and minimize adverse effects, including cumulative effects. This may include, for example, participating in and facilitating the development of action plans as led by governments, as well as ongoing adaptive management of cumulative effects within the RSA. As determined by governments, planning may include specific points related to addressing the capacity of educational institutions within the RSA to respond to the predicted increase in demand for mining-related programs, in particular in the short term.

20.9.3.2 Mitigation Measures to Address Cumulative Effects on Community Infrastructure, Services, and Housing

The development of action plans by governments may also include specific points to address the current housing and infrastructure situation in First Nation and Nisga'a Nation communities in the RSA. This does not mean that the Proponent nor the other proponents are responsible for the current housing situation within the RSA, but that the Project and the other current and reasonably foreseeable projects do not additionally contribute in a negative way to the housing and infrastructure issues in these communities. Efforts should focus on building capacity in the long-term and avoiding cumulative effects as much as possible in the short-term.

20.9.3.3 Mitigation Measures to Address Cumulative Effects on Family and Worker Well-being

Cumulative effects to family and worker well-being stand to have the greatest effect on the social environment within the RSA. Mitigation could include specific measures that look at ways to build capacity around some of the risks associated with the FIFO rotational work and increases in household incomes – specifically, increased levels of stress and anxiety, and poor lifestyle choices, as well as looking to address the potential for transient workers coming into the hub communities of Terrace, Smithers and Stewart. Mitigation as previously described for the Brucejack Gold Mine Project is expected to be effective, but additional regional initiatives involving governments may be required to effectively address cumulative effects, particularly if most or all identified potential future projects proceed.

20.9.4 Cumulative Residual Effects for Social Environment

Mitigation has been identified to effectively address the adverse residual effects of the Brucejack Gold Mine Project (see Section 20.5). For the purposes of this assessment, it is assumed that the other identified current and future projects implement mitigation measures to appropriately address those project effects. However, with respect to the identified adverse social 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. Planning and response by governments, with the participation of proponents as corporate citizens, will be important. Planning and program response should be developed with all relevant proponents, Aboriginal communities, municipalities, and other government agencies together to effectively target some of the key cumulative effects for the social environment for:

- Education, Skills Development, and Training;
- Community Infrastructure, Services, and Housing; and
- Worker and Family Well-being.

For the purposes of this assessment it is assumed that this type of response will occur, to the extent necessary and appropriate to further contribute to the mitigation of cumulative effects within the social impact RSA. This will be driven by the recognition of the scale of infrastructure and resource development in the area. If this regional level planning is adopted it can be said that there will be an adjustment period in the short-term, with the potential for residual cumulative effects; however, in the long-term it is expected that the mitigations measures put in place will address the cumulative effects and there will no residual cumulative effects.

Cumulative residual effects are those effects remaining after the implementation of all mitigation measures and are summarized in Table 20.9-3.

Table 20.9-3. Summary of Cumulative Residual Effects on Social Environment

Social Environment	Timing of Cumulative Residual Effect ¹	Description of Cause-Effect	Description of Additional Mitigation (if any)	Description of Cumulative Residual Effect
<i>Education, Skills Development, and Training</i>				
Increase demand for educational programs in the LSA	Construction and Operation	Employment and labour opportunities associated with all of the projects in the RSA leading to a sharp increase in demand for education	Project-specific mitigation, and regional collaboration and planning	Short-term there will be an adjustment period, but in the long-term no cumulative residual effect is anticipated.
<i>Community Infrastructure, Services, and Housing</i>				
Increased demand for infrastructure and housing as a result of population in-migration	Construction and Operation	Employment and labour opportunities associated with all the projects will lead to in-migration of Aboriginal peoples back to their home communities.	Project-specific mitigation, and regional collaboration and planning	Short-term there will be an adjustment period, but in the long-term no cumulative residual effect is anticipated.
Increase demand on health and social services	Construction and Operation	With the convergence of many construction and operation phases for a number of projects it is anticipated that there will be an in-migration of workers into the RSA.	Project-specific mitigation, and regional collaboration and planning	Short-term there will be an adjustment period, but in the long-term no cumulative residual effect is anticipated.
<i>Worker and Family Well-being</i>				
Increased transient workers coming into LSA communities	Construction and Operation	With the convergence of many construction and operation phases for a number of projects it is anticipated that there will be an in-migration of workers into the RSA	Project-specific mitigation, and regional collaboration and planning	Short-term there will be an adjustment period, but in the long-term no cumulative residual effect is anticipated.
Increased levels of stress and anxiety on workers and families due to rotational work	Construction and Operation	Due to the prevalence of the FIFO and other forms of work rotation associated with the projects, an increase in the levels of stress and anxiety in the RSA is predicted	Project-specific mitigation, and regional collaboration and planning	Short-term there will be an adjustment period, but in the long-term no cumulative residual effect is anticipated.
Increase in poor lifestyle choices	Construction and Operation	Due to the prevalence of the FIFO and other forms of work rotation associated with the projects, an increase in poor lifestyle choices is predicted	Project-specific mitigation, and regional collaboration and planning	Short-term there will be an adjustment period, but in the long-term no cumulative residual effect is anticipated.

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

20.9.5 Characterizing Cumulative Residual Effects, Significance, Likelihood, and Confidence for Social Environment

The cumulative residual effects for each intermediate component or receptor VC were characterised by considering the Projects incremental contribution to the cumulative residual effect under two scenarios:

- 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;
- 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.

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

Prior to commencing the discussion on the cumulative residual effects for the social environment, it should be noted that the types of cumulative residual social effects are expected to be the same both with and without the Project. The Project is not considered to be a tipping point with respect to the cumulative residual effects in the social impact RSA. The types of residual cumulative social effects that are going to be seen in the RSA are of such a scale that the presence of the Project is not considered to be a significant contributor. The number and size of current and reasonably foreseeable future infrastructure and resource projects planned for the social impact RSA is predicted to change the conditions of the social environment. For that reason, this CEA will only look at evaluation of the cumulative residual effects with the Project, as the same results and conclusions will be reached without the Project because of the relatively minor contribution of the Brucejack Gold Mine Project.

20.9.5.1 Cumulative Residual Effects Characterization for all VCs in the Social Environment

This assessment chapter determines the significance of cumulative residual social effects by characterizing the effect using the attributes defined in Section 6.6.2: direction, magnitude, duration, geographic extent, frequency, reversibility, and resiliency. For the social environment, quantitative assessments are not possible; therefore, it is a Tier 1 assessment (CEA Agency 2013). Tier 1 information requirements include: expert opinion, including traditional and local knowledge, literature review, and existing site information.

Keeping in mind the assumptions at the beginning of this CEA, the following assessment was undertaken for each VC and identified cumulative residual effect to support the determination of likelihood, significance, and confidence. The identification of cumulative residual effects for the social environment is highly speculative in nature as it is not known at this time what type of mitigations will be put in place. However, as previously stated it is assumed that the other identified current and future projects implement mitigation to appropriately address those project effects, and that appropriate planning and program development is undertaken by governments.

20.9.5.2 Likelihood of Cumulative Residual Effects on Education, Skills Development, and Training

The likelihood of a cumulative residual effect occurring is calculated as a measure of probability, to determine the potential for the Project to cause cumulative effects. The likelihood of a residual effect does not influence the determination of significance, rather it influences the risk of an effect occurring. Likelihood has been considered here in keeping with the most recent guidance issued in September 2013 by the BC EAO (2013): *Guidelines for the Selection of Valued Components and Assessment of Potential Effects*.

There is considered to be a medium likelihood that there will be a cumulative residual effect for Education, Skills Development, and Training. This is due to current baseline conditions and the number and size of reasonably foreseeable future projects.

20.9.5.3 Significance of Cumulative Residual Effects on Education, Skills Development, and Training

For guidance on how the significance rating is determined refer to Chapter 6 and Section 20.7 of the Social Effects Assessment. The details of the significance ratings for the cumulative effect on Education, Skills Development, and Training are provided in Table 20.9-4. The characterization of residual effects on all VCs is summarized in Table 20.7-10.

Table 20.9-4. Significance of Cumulative Effect of Increased Demand for Educational Programs in the Local Study Area

Criteria	Rating	Comment
Nature	Adverse	
Type	Indirect	The cumulative residual effect is caused by an increased in demand associated with population in-migration and an increased interest in mine-related employment in the social impact RSA. This change is caused by the number of employment opportunities available; therefore, this residual cumulative effect is indirect.
Magnitude	Moderate	It is expected that with mitigation the difference from baseline conditions will be moderate, approaching the limits of natural variation.
Duration	Short-term	1 to 5 years.
Frequency	Sporadic	It is anticipated that this effect will occur throughout the Construction and Operation phases of the projects as people gain information about what types of skills are needed in order to get employed.
Geographic Extent	Regional	In particular in centres such as Terrace, Smithers and Stewart.
Reversibility	Reversible long-term	Removal of the projects will reverse the demand. Also, it is expected that through mitigation and capacity building over time that this effect will be reversible, that educational institutions will be able to build their capacity.
Resiliency	High	If given the proper tools and advanced notice the receptor is considered to be highly resilient to the disturbances.
Significance	Not significant	Although there may be more substantial effects in the short-term over the long-term with proper mitigation it is expected that this effect will overall be not significant.

20.9.5.4 Confidence of Cumulative Residual Effects on Education, Skills Development, and Training

There is medium confidence in the cumulative residual effects for Education, Skills Development, and Training. 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 social environment cannot be fully understood. Therefore there is a moderate degree of uncertainty.

20.9.5.5 Likelihood of Cumulative Residual Effects on Community Infrastructure, Services, and Housing

There is considered to be a high likelihood that there will be a cumulative residual effect for Community Infrastructure, Services, and Housing, both for increased demand for housing and infrastructure in first Nation and Nisga'a Nation communities, as well as health and social services in

RSA communities. This is due to current baseline conditions and the number and size of reasonably foreseeable future projects.

20.9.5.6 *Significance of Cumulative Residual Effects on Community Infrastructure, Services, and Housing*

The details of the significance ratings for the cumulative effects on Community Infrastructure, Services, and Housing are provided in Tables 20.9-5 and 20.9-6. The characterization of residual effects on all VCs is summarized in Table 20.7-10.

Table 20.9-5. Significance of Cumulative Effect of Increased Demand for Infrastructure and Housing as a Result of Population In-migration

Criteria	Rating	Comment
Nature	Adverse	
Type	Indirect	The cumulative residual effect is a result of the in-migration of people into the RSA in search of employment opportunities and moving back to their home communities (re: Aboriginal communities), not as a direct result of the Project.
Magnitude	Moderate	Even with mitigation, due to the number of projects and the potential for large population growth associated with in-migration, as well as current baseline conditions in Aboriginal communities and the degree of the increase in demand it is expected that increase in demand will approach limits of natural variation.
Duration	Medium-term	6 to 25 years.
Frequency	Sporadic	The effect is predicted to occur sporadically corresponding to different periods of hiring by the projects and will carry into operation.
Geographic Extent	Regional/ Aboriginal peoples	This potential cumulative residual effect will be mainly limited to Aboriginal communities due to their unique housing and infrastructure situations. Non-Aboriginal communities are considered to be susceptible in the short-term.
Reversibility	Reversible long-term	Removal of projects' demand for workers will reverse this effect. It would also be possible to reverse this effect in the long-term with the construction of new houses in Aboriginal communities.
Resiliency	Low	Aboriginal peoples are seen as being particularly sensitive to changes in their social environment for several reasons and, therefore, there resiliency is low following disturbances.
	High	Non-Aboriginal communities are not perceived as being particularly vulnerable and with mitigation are seen as being able to adapt to a large increases in population.
Significance	Not significant	It is expected that over the medium-term this residual effect will be more acute, with adaption in the longer term.

20.9.5.7 *Confidence of Cumulative Residual Effects on Community Infrastructure, Services, and Housing*

There is medium confidence in both the cumulative residual effects for Community Infrastructure, Services, and Housing. 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 occur 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 social environment cannot be fully understood. Therefore there is a moderate degree of uncertainty.

Table 20.9-6. Significance of Cumulative Effect of Increased Demand on Health and Social Services

Criteria	Rating	Comment
Nature	Adverse	
Type	Indirect	The increase in demand for health and social services will occur as a result of more people coming in to the social impact RSA in search of employment opportunities.
Magnitude	Moderate	It is expected that the differing value from baseline conditions with mitigation will be approaching the limits of natural variation
Duration	Short-term	1 to 5 years
Frequency	Sporadic	The effect is predicted to sporadically correspond to different periods of hiring by the different projects and will carry into operation.
Geographic Extent	Regional	Occurring mainly in key health and social service centres - Terrace, Smithers and Stewart.
Reversibility	Reversible short-term	Removal of the projects' demand for workers will reverse this effect. Also, in the long term it is anticipated that effect is reversible, as health and social services adapt to the increase in demand.
Resiliency	High	The resiliency of the receptor is considered to be high following disturbances and sensitivity is low.
Significance	Not significant	Although there may be more substantial effects in the short-term over the long-term with proper mitigation it is expected that this effect will overall be not significant.

20.9.5.8 Likelihood of Cumulative Residual Effects on Worker and Family Well-being

There is considered to be a medium likelihood that there will be a cumulative residual effect for Family and Worker Well-being for all potential cumulative residual effects. This is due to current baseline conditions, the unpredictability of human behaviour and the number and size of reasonably foreseeable future projects.

20.9.5.9 Significance of Cumulative Residual Effects on Worker and Family Well-being

The details of the significance ratings for the cumulative effects on Worker and Family Well-being are provided in Tables 20.9-7 to 20.9-9. The characterization of residual effects on all VCs is summarized in Table 20.9-10.

Table 20.9-7. Significance of Cumulative Effect of Increase in Local Study Area Communities' Transient Workers

Criteria	Rating	Comment
Nature	Adverse	
Type	Direct/Indirect	Workers may be directly employed by a project, contractor, or supplier, or may not be employed but in the social impact RSA in the hopes of gaining employment.
Magnitude	Moderate	There will be changes to baseline conditions approaching the limits of natural variation due to the number and size of projects.
Duration	Short-term	1 to 6 years.
Frequency	Sporadic	The effect is predicted to sporadically correspond to different periods of hiring by the different projects and the different timing of construction and operation phases for each project. However, it is expected to be concentrated at the commencement of construction and operation phases for each project.

(continued)

Table 20.9-7. Significance of Cumulative Effect of Increase in Local Study Area Communities' Transient Workers (completed)

Criteria	Rating	Comment
Geographic Extent	Regional	Throughout the RSA with a focus on Terrace, Smithers and Stewart.
Reversibility	Reversible short-term	Removal of the projects' demand for workers will reverse this effect. With mitigation this is considered to be reversible in the short-term.
Resiliency	Neutral	Change of this magnitude is relatively rare and, therefore, it is expected that the VC will be somewhat sensitive to this effect.
Significance	Not significant	Although there may be more substantial effects in the short-term over the long-term with proper mitigation it is expected that this effect will overall be not significant.

Table 20.9-8. Significance of Cumulative Effect of Increased Levels of Stress and Anxiety on Workers and Families due to Rotational Work

Criteria	Rating	Comment
Nature	Adverse	
Type	Indirect	This is not as a direct result of the projects, but rather due to the type of work schedule.
Magnitude	Moderate	Approaching the limits of natural variation.
Duration	Short-term	1 to 5 years.
Frequency	Regular	It is expected that this will occur throughout the life of all the projects.
Geographic Extent	Regional	This will occur throughout the RSA, with a focus on Terrace, Smithers and Stewart.
	Aboriginal Peoples	Aboriginal people due to pre-existing baseline condition are seen to be effected differently.
Reversibility	Reversible long-term	Removal of the projects' demand for workers will reverse this effect. Also, with assistance the effects of increased stress and anxiety for workers and their families is reversible. However, it is recognized that this is not the case for everyone.
Resiliency	Neutral	This magnitude of change is relatively rare and, therefore, it is expected that the VC will be somewhat sensitive to this effect.
	Low	Aboriginal communities are seen to be particularly sensitive and unable to adapt easily to change due to pre-existing social conditions.
Significance	Not significant	Although there may be more substantial effects in the short-term over the long-term with proper mitigation it is expected that this effect will overall be not significant.

Table 20.9-9. Significance of Cumulative Effect of Increase in Poor Lifestyle Choices

Criteria	Rating	Comment
Nature	Adverse	
Type	Indirect	This is not as a direct result of the projects, but rather due to the increase in incomes with employment and type of work schedule.
Magnitude	Moderate	Approaching the limits of natural variation.
Duration	Short-term	1 to 5 years
Frequency	Regular	It is expected that this will occur throughout the life of all the projects.

(continued)

Table 20.9-9. Significance of Cumulative Effect of Increase in Poor Lifestyle Choices (completed)

Criteria	Rating	Comment
Geographic Extent	Regional	This will occur throughout the RSA with a focus on Terrace, Smithers and Stewart.
	Aboriginal peoples	Aboriginal people due to pre-existing baseline condition are seen to be effected differently.
Reversibility	Reversible long-term	Removal of the projects' demand for workers will remove the income source that can support this behaviour. Some of the activity associated with high income and work schedule might change once the projects close but the effects associated with those lifestyle choices could persist for those who participate in them.
Resiliency	Neutral	Change of this magnitude is relatively rare and, therefore, it is expected that the VC will be somewhat sensitive to this effect.
	Low	Aboriginal communities are seen to be particularly sensitive and unable to adapt easily to change due to pre-existing social conditions.
Significance	Not significant	Although there may be more substantial effects in the short-term over the long-term with proper mitigation it is expected that this effect will overall be not significant.

20.9.5.10 Confidence of Cumulative Residual Effects on Worker and Family Well-being

There is medium confidence in all three cumulative residual effects for Worker and Family Well-being. 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 occur 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 social environment cannot be fully understood. Therefore, there is a moderate degree of uncertainty.

20.10 EFFECTS ASSESSMENT CONCLUSIONS FOR SOCIAL ENVIRONMENT

The proposed Project is expected to result in a number of social effects. Specifically, activities related to employment and labour, and procurement of goods and services are expected to interact with three social VCs:

1. Education, Skills Development, and Training;
2. Community Infrastructure, Services, and Housing; and
3. Worker and Family Well-being.

The education, skills development, and training of local communities are expected to change due to Project-related employment and related population in-migration. The two key effects are expected to be an increased demand for educational programs in the LSA (adverse), and changes in the educational profile of the LSA (positive). Only the increased demand for educational programs is predicted to be adverse, as existing institutions with currently limited capacity have difficulties in meeting the expected increase in demand. This effect also has a positive aspect, however, as it leads in the longer term to greater capacity for training and education in the region and the delivery of more training to residents of the LSA communities. The effects will be mitigated through communications with LSA communities and educational institutions on the Project development schedule and workforce requirements. Effects are expected to occur mainly during the early period of Operation.

Table 20.9-10. Significance Determination of Cumulative Residual Effects for Social Environment - Future Case with and without the Project

Cumulative Residual Effects	Cumulative Residual Effects Characterization Criteria						Significance of Adverse Cumulative Residual Effects (not significant, significant)	Likelihood of Occurrence	
	Magnitude (low, moderate, high)	Duration (short-term, medium-term, long-term, far future)	Frequency (once, sporadic, regular, continuous)	Geographic Extent (individual /households, community, regional, beyond regional)	Reversibility (reversible short-term, reversible long-term, irreversible)	Resiliency (low, neutral, high)		Likelihood (low, medium, high)	Confidence (low, medium, high)
Education, Skills Development, and Training									
Increased demand for educational programs in the LSA	Low	Short-term	Sporadic	Regional	Reversible short-term	High	Not significant	Medium	Medium
Community Infrastructure, Services, and Housing									
Increased demand for infrastructure and housing as a result of population in-migration	Moderate	Medium-term	Regular	Regional/Aboriginal Peoples	Reversible long-term	High/Low	Not significant	High	Medium
Increased demand on health and social services	Moderate	Short-term	Sporadic	Regional	Reversible short-term	High	Not significant	High	Medium
Worker and Family Well-being									
Increase in transient workers coming into LSA communities	Moderate	Short-term	Sporadic	Regional	Reversible short-term	Neutral	Not significant	Medium	Medium
Increased levels of stress and anxiety on workers and families due to rotational work	High	Medium-Term	Regular	Regional/Aboriginal People	Reversible long-term	Neutral/Low	Not significant	Medium	Medium
Increase in poor lifestyle choices	High	Short-term	Regular	Regional/Aboriginal people	Reversible long-term	Neutral/Low	Not significant	Medium	Medium

Community infrastructure, Services, and Housing will also be affected by the Project due to employment and associated population in-migration. The two key effects are expected to be an increased demand for infrastructure and housing (including in Aboriginal communities) as a result of population in-migration, and an increased demand on health and social services. These effects will be mitigated through communications with LSA communities on the Project development and workforce schedule. These two effects are expected to express themselves during both Construction and Operation. During the Closure and Post-closure phases, it is expected that there could be a decreased demand for infrastructure and housing as a result of population out-migration. This will be mitigated through communications with LSA communities and development of a Closure Plan.

Worker and Family Well-being will also be affected by the Project due to employment and associated population in-migration. There are three key effects that are predicted during the Construction and Operation phases of the Project: increase in transient workers coming into the LSA communities; increased levels of stress and anxiety on families due to rotational work; and increase in poor lifestyle choices. These effects will again be mitigated through communications with LSA communities on the Project development and workforce schedule, as well as the implementation of appropriate human resource policies and an employee assistance program. One potential effect during Closure and Post-closure as it relates to Worker and Family Well-being is an increase in levels of stress and anxiety on workers and families due to uncertainty around future employment and maintaining income. This will be mitigated through communications with LSA communities and development of a Closure Plan, including transition assistance for employees.

After mitigation measures have been implemented, a number of residual adverse social effects are predicted to occur (Table 20.10-1). However, the magnitude of each residual effect is expected to be relatively low. This is largely due to the relatively modest share of residents in LSA communities that are expected to experience Project-related employment, as well as the size of the Project itself. In sum, all adverse residual effects of the Project on the social environment are rated **not significant**.

All six adverse residual Project effects were carried forward for cumulative effects assessment (Table 20.10-1). In addition to the Project-specific mitigation, there will 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. Also, the proponent commits to working with governments and other proponents where and when appropriate to participate in the development of other mitigation measures, such as government plans and programs. In sum, all adverse residual cumulative effects on the social environment are rated **not significant**.

Table 20.10-1. Summary of Project and Cumulative Residual Effects, Mitigation, and Significance for Social Environment

Residual Effects	Project Phase(s)	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Education, Skills Development, and Training</i>				
Increased demand for educational programs in the LSA	Construction and Operation	Communicate Project development and workforce schedule with LSA communities and educational institutions; Proponent to work with government and other proponents when and where appropriate at the regional and local levels	Not significant	Not significant
<i>Community Infrastructure, Services, and Housing</i>				
Increased demand for infrastructure and housing as a result of population in-migration	Construction and Operation	Communicate Project development and workforce schedule with LSA communities; Proponent to work with government and other proponents when and where appropriate at the regional and local levels	Not significant	Not significant
Increased demand on health and social services	Construction and Operation	Communicate Project development and workforce schedule with LSA communities; Proponent to work with government and other proponents when and where appropriate at the regional and local levels	Not Significant	Not significant
<i>Family and Worker Well-being</i>				
Increase in transient workers in the LSA communities	Construction and Operation	Communicate Project development and workforce schedule with LSA communities; Proponent to work with government and other proponents when and where appropriate at the regional and local levels	Not significant	Not significant
Increased levels of stress and anxiety on families due to rotational work	Construction and Operation	Employee assistance program; Proponent to work with government and other proponents when and where appropriate at the regional and local levels	Not significant	Not significant
Increased in poor lifestyle choices	Construction and Operation	Human resource policies and employee assistance program; Proponent to work with government and other proponents when and where appropriate at the regional and local levels	Not significant	Not significant

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