Section 8.0

Assessment of Potential Social Effects

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8.0 ASSESSMENT OF POTENTIAL SOCIAL EFFECTS

8.1 Social Background

This section describes the baseline social conditions in the area that would potentially be affected by the proposed Kitsault Mine Project (proposed Project). The baseline characterisation focuses on key social indicators or Valued Components (VC) related to regional demographics, housing, community infrastructure and services, family and community well-being, education and training opportunities, transportation, Aboriginal culture, and land use that would be used to assess the effects of the proposed Project on the social environment. This section also discusses the way in which these social effects might occur when considering the effects of the proposed Project, as discussed in greater detail in Section 8.2.

The Local Study Area (LSA) and Regional Study Area (RSA) are both located in the north-western region of British Columbia (BC). The area is generally remote and removed from the major population and governance centres in the south. Its communities tend to be dispersed and isolated from one another and the population density of the region is among the lowest in the province. The LSA includes the four Aboriginal communities located on Nisga'a Lands (Gitwinksihlkw, Gingolx, Laxgalts'ap, and New Aiyansh), and a small non-Aboriginal rural population living on the Nisga'a Lands and the Kitsault Resort. The RSA includes the communities of Terrace, Smithers, Stewart, and the various smaller communities and Aboriginal reserves in the Kitimat-Stikine Regional District Electoral Areas (RDEA) A, B, C (Part 1), and E.

Aboriginal peoples comprise a much higher percentage of the local and regional population than elsewhere in the province, and their strong historical presence throughout northwestern BC continues to shape the fabric of the social landscape. Overall, the demographic trend among the Aboriginal population within the LSA tended to be distinct from the RSA, which has experienced a general decline in population during the past decade. Generally, the population in the LSA increased over the five-year period between 2001 and 2006, tended to be younger, and had larger family sizes. The non-Aboriginal population in the RSA, on the other hand, experienced negative population growth, was more ethnically diverse, and had an older population than its Aboriginal counterpart. Also, the RSA consisted of a higher proportion of married couple families, whereas the LSA had more lone-parent families.

Family and community wellbeing are sustained by a healthy environment, functioning social and familial relationships, and a strong sense of cultural identity. Key indicators of identified wellbeing issues and concerns that have been identified as Valued Components (VCs) have been presented in the proposed project baseline, and include children and youth at risk, crime, economic dependency, health problems, and educational shortfalls. Generally, Aboriginal groups in the region experience reduced health and wellbeing conditions and services in comparison to BC provincial averages. Many of the Local Health Areas (LHAs) in the study area consistently ranked high provincially in terms of the worst to best ranking system for the indicators provided. The Upper Skeena LHA ranked the worst for both children at risk and human economic hardship. Where ranking information was available for

the Nisga'a LHA, this health region ranked high for the social problem indicators of crime (2nd), health problems (7th), and education concerns (4th). Generally speaking, all five LHAs, with the exception of Smithers LHA, had very low well-being conditions across the social and economic index.

Most community infrastructure and services within the LSA are operated and delivered by Nisga'a Lisims Government (NLG) and Nisga'a Villages, rather than by the larger regional district. School programs with the highest number of student enrolment across all school districts in the study areas included Aboriginal programs, a variety of French programs, and ESL. In terms of healthcare services, each community and its associated health authority offer its residents any number of healthcare services, including acute care, dental care, mental health, etc. Similarly, each community and / or regional district (RD) has a series of protection services, whether locally or regionally based, that covers essential services such as 911, police, fire, and ambulance. Some services within the RSA are administered locally, such as fire protection, while others, such as ambulance service and law enforcement, are administered and delivered regionally through BC Ambulance Services and the Royal Canadian Mounted Police (RCMP).

In the LSA and RSA, housing prices tend to vary substantially between rural and urban areas. Commercial accommodation tends to be more abundant in the urban centers. Most communities are well serviced in terms of utilities and communications infrastructure, and urban areas in particular are able to meet the growing demands of current and future population growth. Recreational activities and amenities cater to the outdoor adventure market, and include a variety of activities for residents and non-residents alike, including sport fishing, camping, hiking, and water-based activities.

All communities in the LSA and RSA are accessible by or connected to primary highways, and air transportation services are available in Terrace, Smithers, and Stewart. Railway services are provided by Canadian Nation Rail (CN Rail), which operates a mainline between Prince Rupert and Valemount, and has station stops in Smithers, Hazelton, and Terrace. In terms of capacity, ground transportation routes are operating well below designed capacity, and airports in the surrounding area are capable of accommodating both large and small commercial and charter air carriers. Marine transportation facilities are available only at Kitsault and Prince Rupert, which is outside the RSA.

Social and economic effects by their nature derive from several sources, usually acting in combination. Very rarely is there a one-to-one correlation between a project component or activity and the effect. More often, the change in a given social and economic condition is a response to multiple influences acting together. In describing the social background of the region, it is important to provide context related to the subsequent descriptions of the relevant social conditions, identification of key issues, and selection of Valued Components (VCs). The information summarised above was used in the assessment of the potential effects of the proposed project on the VCs discussed below in Section 8.2. Included in this section is a description of the framework for analysis of potential effects of the proposed Project and development of relevant mitigation and management measures for social VCs.

Where appropriate, logical connections are made with the economic analysis in Section 7, which explains the causal linkages between economic and social effects, and the rationale for the analytic approach taken in the social assessment of the proposed Project.

8.2 Social Conditions

8.2.1 Valued Component Selection Rationale

The rationale for VC selection was based on an evolving understanding of proposed Project components (facilities and activities), and how they might interact during each project phase with the proposed setting components relevant to social conditions. The following sources were used to evaluate these interactions in the context of social conditions:

- "Application Information Requirements Template", which provides a consistent framework for all Environmental Assessments (EAs), specifying the format required for the Application Information Requirements (AIR) and the information it should include, ensuring that for all proposed projects the AIR documents will be clear, consistent and thorough (AIR Template) (BC Environmental Assessment Office (BC EAO) 2010). The AIR includes comments from all interested parties including the BC EAO Working Group, the Nisga'a Nation, Aboriginal Groups and the public;
- The proposed Project's AIR. Prepared by AMEC;
- BC EAO User Guide (BC EAO 2009);
- "Economic Social and Cultural Impact Assessment Guidelines" (NLG 2010);
- The three land use zones identified in the Central Coast and North Coast Land Use Decision, which include: protected areas; Biodiversity, Mining and Tourism Areas; and Ecosystem-Based Management (EBM) operating areas (BC Integrated Land Management Bureau (BC ILMB) 2009);
- "Avanti Kitsault Mine Socio-Economic Baseline Report" by Rescan (May 2010); and
- Assessment team experience with and review of similar EAs and relevant learned studies and professional judgment.

The Nisga'a ESCIA (Rescan 2012) also specifically addresses potential effects of the proposed Project on Nisga'a Nation rights, interests, and concerns as they relate to the NFA. Section 14.0 of the Application (Nisga'a Effects Assessment), which also provides detail and context to the conservative estimates of the economic effects of the LSA and RSA based on data from the BC Input-Output Model (BCIOM) (with input from the proponent).

8.2.1.1 Valued Component / Issue Identification and Scoping

Following discussions with Working Groups from provincial and federal scientific and regulatory agencies, the Nisga'a Nation, Aboriginal groups, and the public, the proponent has reviewed the feedback it received and has identified a number of social VCs, including: regional demographics; housing; regional services; regional infrastructure; family and community wellbeing; education; transportation; and land and resource use.

The proposed mine will create economic effects in the regional and local communities during construction, operations, and decommissioning and closure, which would in turn stimulate some demographic changes in these communities. Most social effects related to the proposed Project would result from these population changes. Furthermore, as described in Section 8.1 above, the nature and extent of social effects will be determined by proposed Project influences acting in combination with other conditions and trends not related to the proposed Project. Some social effects (for example, transportation) will be related to demographic changes and proposed Project components / activities, but these are in the minority.

Feedback regarding the proposed Project and mining projects in general in BC was provided by working groups comprised of First Nations, government, potentially affected communities, Non-Government Organisations (NGOs) and the general public. The Working Groups identified a number of issues about the effects of mining projects on social conditions in the region. In most cases, effects of concern were viewed as being both positive and adverse. For example, these potential bi-directional influences could include new project economic opportunities that could generate income increases for local and regional residents, which could be used to enhance individual, family, and community wellbeing. However, changes to lifestyle and poor use of increased income could adversely affect individual, family, and community wellbeing.

Based on the issues raised in the various working groups and on the proponent's previous experience in assessing resource development project effects on rural communities, the proponent has developed a list of key social issues as the basis for selecting the social VCs used to assess proposed project effects. These VCs are identified for each proposed Project component listed in Table 8.2.1-1, by proposed Project phase, and have been used to determine the scope of the assessment of social effects. Potential effect issues and the rationale for each are summarised by proposed Project phase in Tables 8.2.1-2, 8.2.1-3, 8.2.1-4 and 8.2.1-5.

Potential effects on land and resource use are linked primarily to physical Project disturbances, and therefore the interactions described for other social effects are not appropriate to characterising these potential effects. Proposed Project components that may have a direct or indirect effect on land and resources use can be summarised under the following three main categories for identifying potential interactions:

- Mine site infrastructure;
- Mining operations; and
- Transportation and access.

A detailed list of proposed Project components and activities, and potential interactions with land and resource use, are described in detail in Section 8.2.9.

Table 8.2.1-1: Valued Component / Issue Interaction Matrix for Social Valued Components

Project Phase	Social Valued Components							
	Regional Demographics	**Housing**	**Regional Services**	**Regional Infrastructure**	**Individual, Family and Community Wellbeing**	**Education**	**Transportation**	**Land and Resource Use**
Construction								
Direct employment	-/+				o/+	-	o	
Indirect and induced employment	-/+				o/+			
Purchasing of goods and services							o	
Spending of increased income					-/+	+		
Population change		-	o	o	o	o	o	
Personnel and material transportation							-/+	
Effects on renewable resources					-			
Mine site infrastructure							o	o
Mining operations							o	o
Transportation and access							o	o
Operations								
Direct employment	-/+				o/+	+	o	
Indirect and induced employment	-/+				o/+			
Spending of increased income					-/+	+		
Population change		-	o	o	o	-/+	o	
Personnel and material transportation							-	
Mine site infrastructure							o	
Mining operations							o	
Transportation and access							o	
Effects on renewable resources					-			
Decommissioning and closure							o	

Project Phase	Social Valued Components							
	Regional Demographics	Housing	Regional Services	Regional Infrastructure	Individual, Family and Community Wellbeing	Education	Transportation	Land and Resource Use
Direct employment	-				o			
Indirect and induced employment	-				o			
Spending of increased income					o		o	
Population change		o	o	o	o	-	-	
Personnel and material transportation								
Mine site infrastructure							o	
Mining operations							o	
Transportation and access							o	
Post-closure								
Effects on renewable resources					+			
Mine site infrastructure							o	
Mining operations							o	
Transportation and access							o	

Legend: o - interaction; - - key interaction; □□□ + - benefit.

Table 8.2.1-2: Potential Issues by Project Component and Valued Component – Construction Phase

Project Component	Relevant Key Issues	Valued Component(s)	Rationale
Direct employment	Population change, personal income	Regional demographics, family and community wellbeing, education, transportation	In-migration to fill job opportunities; positive and adverse wellbeing impacts; possible drop-outs, commuting effects
Indirect and induced employment	Population change, personal income	Regional demographics, family and community wellbeing	In-migration to fill job opportunities; positive and adverse wellbeing impacts
Spending of increased income	Quality of life	Family and community wellbeing, education	Positive and adverse impacts on individual, family and community quality of life, including traditional resource use; possible spending on education
Population change	Demand for services	Housing, regional services, regional infrastructure, family and community wellbeing, education, transportation	Increased population leads to demands for services and infrastructure; increased commuter and personal travel; possible changes in wellbeing; and change in demand for education – positive if excess capacity
Personnel and material transportation	Traffic, including safety	Transportation	Logistics requirements lead to increased road traffic
Mine site infrastructure	Trapping, guide outfitting, tourism, local communities, parks and protected areas	Land and resource use	Direct effects associated with the project footprint ; indirect effects associated with changes in the landscape and receiving environment (i.e., noise)
Mining operations	Trapping, guide outfitting, tourism, local communities, parks and protected areas	Land and resource use	Direct effects associated with the project footprint; indirect effects associated with changes in the landscape and receiving environment (i.e., noise)
Transportation and access	Trapping, guide outfitting, tourism, local communities, parks and protected areas, and mining exploration	Land and resource use	Direct effects associated with the project footprint ; indirect effects associated with changes in the landscape and receiving environment (e.g., noise)
Effects on renewable resources	Resource availability for traditional use	Family and community wellbeing	Potential impacts on traditional resource use

Table 8.2.1-3: Potential Issues by Project Component and Valued Component – Operations Phase

Project Component	Relevant Key Issues	Valued Component(s)	Rationale
Direct employment	Population change, personal income	Regional demographics, family and community wellbeing, education, transportation	In-migration to fill job opportunities; positive and adverse wellbeing impacts; incentive to complete schooling; commuting effects
Indirect and induced employment	Population change, personal income	Regional demographics, family and community wellbeing	In-migration to fill job opportunities; positive and adverse wellbeing impacts
Spending of increased income	Quality of life	Family and community wellbeing	Positive and adverse impacts on individual, family and community quality of life, including traditional resource use; possible spending on education
Population change	Demand for services	Housing, regional services, regional infrastructure, family and community wellbeing, education, transportation	Increased population leads to demands for services and infrastructure; increased commuter and personal travel; possible changes in wellbeing; and change in demand for education – positive if excess capacity
Personnel and material transportation	Traffic, including safety	Transportation	Logistics requirements lead to increased road traffic
Effects on renewable resources	Resource availability for traditional use	Family and community wellbeing	Potential impacts on traditional resource use
Mine site infrastructure	Trapping, guide outfitting, tourism, local communities, parks, and protected areas	Land and resource use	Direct effects associated with the project footprint; indirect effects associated with changes in the landscape and receiving environment (i.e., noise)
Mining operations	Trapping, guide outfitting, tourism, local communities, parks and protected areas	Land and resource use	Direct effects associated with the project footprint ; indirect effects associated with changes in the landscape and receiving environment (i.e., noise)
Transportation and access	Trapping, guide outfitting, tourism, local communities, parks and protected areas, and mining exploration	Land and resource use	Direct effects associated with the project footprint ; indirect effects associated with changes in the landscape and receiving environment (e.g., noise)

Table 8.2.1-4: Potential Issues by Project Component and Valued Component – Closure and Decommissioning Phase

Project Component	Relevant Key Issues	Valued Component(s)	Rationale
Direct employment	Population change, personal income	Regional demographics, family and community wellbeing, transportation	In-migration to fill job opportunities; positive and adverse wellbeing impacts; commuting effects
Indirect and induced employment	Population change, personal income	Regional demographics, family and community wellbeing	In-migration to fill job opportunities; positive and adverse wellbeing impacts
Spending of increased income	Quality of life	Family and community wellbeing	Positive and adverse impacts on individual, family and community quality of life, including traditional resource use
Population change	Demand for services	Housing, regional services, regional infrastructure, family and community wellbeing, education, transportation	Possible decline in population leads to lower demands for services and infrastructure; lower commuter and personal travel; possible changes in wellbeing; and possible decline in viability of schools
Personnel and material transportation	Traffic, including safety	Transportation	Logistics requirements lead to increased road traffic
Mine site infrastructure		Land and resource use	Direct effects associated with the project footprint; indirect effects associated with changes in the landscape and receiving environment (i.e., noise)
Mining operations		Land and resource use	Direct effects associated with the project footprint; indirect effects associated with changes in the landscape and receiving environment (i.e., noise)
Transportation and access		Land and resource use	Direct effects associated with the project footprint; indirect effects associated with changes in the landscape and receiving environment (i.e., noise)

Table 8.2.1-5: Potential Issues by Project Component and Valued Component – Post-Closure

Project Component	Relevant Key Issues	Valued Component(s)	Rationale
Effects on renewable resources	Resource availability for traditional use	Family and community wellbeing	Potential benefit to traditional resource use
Mining operations		Land and resource use	Direct effects associated with the footprint of the proposed Project;

8.2.1.2 Valued Component / Issues Confirmation

The result of the Working Group consultation process, whichVCs to describe potential Project social effects.. These eight VCs correspond to the issues identified in Table 8.2.1-1. One VC relates to potential effects on regional demographics, which in turn strongly influences the following social VCs: housing; regional services; regional infrastructure; family and community wellbeing; education; transportation; and land and resource use. Family and community wellbeing is related to a number of identified issues. These eight VCs have been used to assess the potential effects of Project construction, operations, decommissioning and closure, and post-closure, although not all VCs are relevant for all four stages of Project development.

Social effects are required to be assessed under the BC *Environmental Assessment Act* (*BCEAA*) (Government of BC 2002b) and environmentally linked social effects are required to be assessed under the *Canadian Environmental Assessment Act (CEA Act)* (Government of Canada 1992).

Table 8.2.1-6 summarises the issues associated with mine development, the source of those issues, and the rationale for selecting the issues in the EA process. These issues are used to assess appropriate VCs and describe proposed Project social effects.

Table 8.2.1-6: Social Valued Component Selection Rationale

Valued Component	Rationale							
	Interaction With Proposed Project Activities	**Scientific Literature And Professional Judgement**	**Nisga'a Lisims Government**	**Other Aboriginal Groups Included by BC EAO**	**Applicable Government Agencies**	**Land And Resource Management Plans**	**The Public And Other Stakeholders**	**Federal And Provincial Regulations And Guidelines**
Regional demographics	Impacts because of economic opportunities associated with mine development	Standard VC assessed as important causal link for social effects; VC assessed in recent EA processes	Identified as a VC through BC EAO Working Group process	No relevant feedback	BC MLCSOG, BC RESD, BC MARR, AANDC	Central and North Coast EBM (BC ILMB 2009), Kitsault-Stagoo SFMA	Identified as a VC through BC EAO Working Group process	BCEAA
Housing	Impacts because of population change associated with mine development	VC assessed in recent EA processes	Identified as a VC through BC EAO Working Group process	No relevant feedback	BC Housing		Identified as a VC through BC EAO Working Group process	BCEAA
Regional services	Impacts because of population change associated with mine development	VC assessed in recent EA processes	Identified as a VC through BC EAO Working Group process	No relevant feedback	BC MLCSOG, BC MOH, BC MPSSG,	Central and North Coast EBM (BC ILMB 2009), Kitsault-Stagoo SFMA	Identified as a VC through BC EAO Working Group process	BCEAA
Regional infrastructure	Impacts because of population change associated with mine development	VC assessed in recent EA processes	Identified as a VC through BC EAO Working Group process	No relevant feedback	BC MLCSOG, BC MOTI		Identified as a VC through BC EAO Working Group process	BCEAA
Family and community wellbeing	Impacts because of economic opportunities, including personal income, population change, and effects on renewable resources associated with mine development	VC assessed in recent EA processes	Identified as a VC through BC EAO Working Group process	No relevant feedback	BC MARR, BC MCSCD, BC MCFD, BC MOH, BC MPSSG, BC MFLNRO	Central and North Coast EBM (BC ILMB 2009), Kitsault-Stagoo SFMA	Identified as a VC through BC EAO Working Group process	BCEAA, CEA Act
Education	Impacts because of changes in population and motivation to stay in or leave school	VC assessed in recent EA processes	Identified as a VC through BC EAO Working Group process	No relevant feedback	BC MOEd, BC MLCSOG		Identified as a VC through BC EAO Working Group process	BCEAA

Valued Component	Rationale							
	Interaction With Proposed Project Activities	**Scientific Literature And Professional Judgement**	**Nisga'a Lisims Government**	**Other Aboriginal Groups Included by BC EAO**	**Applicable Government Agencies**	**Land And Resource Management Plans**	**The Public And Other Stakeholders**	**Federal And Provincial Regulations And Guidelines**
Transportation	Impacts because of population change and logistics associated with mine development	VC assessed in recent EA processes	Identified as a VC through BC EAO Working Group process	Identified as VC through discussions and correspondence with various representatives	BC MOTI, BC MPSSG	Central and North Coast EBM (BC ILMB 2009), Kitsault-Stagoo SFMA	Identified as a VC through BC EAO Working Group process	BCEAA
Land and resource use	Direct effects associated with the project footprint ; indirect effects associated with changes in the landscape and receiving environment (e.g., noise)	VC assessed in recent EA processes	Identified as a VC through BC EAO Working Group process	Identified as VC through discussions and correspondence with various representatives	BC MOTI, BC EAO, BC MOE, Agency, NRCan, EC	Central and North Coast EBM; Nass South SRMP; PNCIMA; NWA	Identified as a VC through BC EAO Working Group process	BCEAA, CEA Act

Note: Agency - Canadian Environmental Assessment Agency; BC - British Columbia; *BCEAA* - BC *Environmental Assessment Act; BC* EAO - BC Environmental Assessment Office; BC ILMB - BC Integrated Land Management Bureau; BC MARR - Ministry of Aboriginal Relations and Reconciliation; BC MCFD - BC Ministry of Children and Family Development; BC MCSCD - BC Ministry of Community Sport and Cultural Development; BC MFLNRO - BC Ministry of Forestry, Lands and Natural Resource Operations; BC MLCSOG - Ministry of Labour, Community Services and Open Government; BC MOH - BC Ministry of Health; BC MPSSG - BC Ministry of Public Safety and Solicitor General; BC MOE - BC Ministry of Environment; BC MOEd - BC Ministry of Education; BC MOTI - BC Ministry of Transportation and Infrastructure; BC RESD - BC Ministry of Regional Economic and Skills Development; *CEA Act - Canadian Environmental Assessment Act;* EA - Environmental Assessment; EC - Environment Canada; EBM - Ecosystem-Based Management; NRCan - Natural Resources Canada; NWA - Nass Wildlife Area; PNCIMA - Pacific North Coast Integrated Management Area; SRMP - Sustainable Resource Management Plan; VC - Valued Component.

8.2.2 Social VC #1: Regional Demographics

8.2.2.1 Introduction

One effect of the proposed Project on regional demographics is the potential changes in resident populations resulting from changing workforce demands. Following approval, the proposed Project would attract workers, who would migrate to the area in pursuit of jobs directly or indirectly associated with construction, operations, de-commissioning and closure, and post-closure activities. The labour market assessment identified in Section 7.2.6) quantifies the number of positions required by the proposed Project at the various Project phases. The linkage to the regional demographics VC is the extent to which the employment opportunities are filled by existing residents or by in-migrants. Changes in resident and in-migrant demographic characteristics represent a direct Project effect and thus require a more thorough review and examination.

Changes in size and characteristics of the local population affect a range of community and social services that are driven by use levels. Various groups of social services are defined as separate VCs in this Application, and are subject to individual effects assessment, linked to this assessment of regional demographics.

Given the mine site's remote location, it would be mandatory for many of the direct employees and contractors to reside in the Project camp while working. Work shifts would extend for three weeks on with one week off during the proposed Project's construction phase, and would change to three weeks on and three weeks off during the operations phase. For the purposes of this effects assessment, those employees who return to their permanent residence outside the LSA or RSA are not considered residents of the study area. The rationale is that these individuals and their dependents would place limited demand on local infrastructure, housing, or services.

8.2.2.1.1 Relevant Legislation and Legal Framework

This VC is included in the AIR for the proposed Project. Although there is no specific legislative requirement for consideration of proposed Project effects on regional demographics it is common practice to evaluate this as a potential effect because it directly affects the quality of life in a region, and assists public and private agencies in planning for future capacity requirements for various services.

8.2.2.1.2 Spatial Boundaries

The proposed Project is located on Alice Arm in the north coast area of BC. It is located in the central section (Area A) of the Regional District (RD) of Kitimat-Stikine, which is shown in Figure 8.2.2-1. The communities closest to the mine site include the four Nisga'a Villages, located on Nisga'a Lands - Gitwinksihlkw, Gingolx, Laxgalts'ap and New Aiyansh - as well as the communities located at Kitsault Resort and Alice Arm. These villages, communities and the small rural population on Nisga'a Lands are considered to comprise the LSA, in terms of describing social conditions and assessing social effects.

The broader RSA for describing and assessing social baseline conditions is defined to include four distinct regions and major communities:

- District Municipality (DM) of Stewart (located in Area A of the Kitimat-Stikine RDEA);
- Kitimat-Stikine RDEA Area B, including the Village of Hazelton, DM of New Hazelton and numerous reserves: Gitanmaax 1, Gitsegukla 1, Sik-e-dakh 2, Kispiox 1, Hagwilget 1, Gitwangak 1, Gitanyow 1, Moricetown 1, Bulkley River 19 and Coryatsaqua (Moricetown) 2;
- Town of Smithers; and
- Terrace Census Agglomeration (CA), which includes the City of Terrace, the rural populations of Kitimat-Stikine RDEA Area C (Part 1) and RDEA E, and four reserves: Kitsumkaylum 1, Kitselas 1, Kshish 4, and Kulspai 6.

These groupings were selected to reflect Statistics Canada (SC) census subdivisions and areas that might be called upon to provide the labour, goods, and services required for mine construction and operations.

The reserves listed above belong to a number of First Nations. The Kitimat-Stikine RDEA Area B includes reserves for the following First Nations:

- Gitanmaax (Gitanmaax 1 reserve);
- Gitanyow (Gitanyow 1 reserve);
- Glen Vowell (Sik-e-dakh 2 reserve);
- Kispiox (Kispiox 1 reserve);
- Gitsegukla (Gitsegukla 1 reserve);
- Gitwangak (Gitwangak 1 reserve);
- Hagwilget Village (Hagwilget 1 and Bulkley River 19 reserves); and
- Moricetown (Moricetown 1 and Coryatsaqua (Moricetown) 2 reserves).

The Gitanmaax, Gitanyow, Glen Vowell, and Kispiox First Nations are part of the Gitxsan Local Services Society. The Terrace CA includes the reserves of two First Nations: Kitsumkaylem (Kitsumkaylum 1) and Kitselas (Kitselas 1, Kshish 4 and Kulspai 6). Potential effects on these First Nations are subsumed in the assessment of proposed Project effects on Kitimat-Stikine RDEA B and the Terrace CA.

ID	Project Name
1	Galore Creek Gold/Silver/Copper Mine
2	Mount Klappan Coal Project
3	Schaft Creek Porphyry Copper-Gold Mine
4	Kerr -Sulphurets - Mitchell (KSM) Gold Copper Mine
5	Bear River Aggregate Project
6	Red Chris Porphyry Copper/Gold Project
7	Mount Klappen Coal Slurry Pipeline
8	Sustut Gold and Copper Project
9	Davidson Molydbdenum Mine
10	Swamp point Aggregate
11	Bronson Slope Hydropower
12	Forest Kerr Hydroelectric
13	Jade Lake Power Project
14	Kinskuch Hydro Project
15	Long Lake Power Project
16	GJ Kinaskan Lake Copper-Gold Project
17	Mclymont Creek Hydroelectric Project
18	More Creek Hydroelectric Project
19	Kitsault River and Homestake Creek Hydro Project
20	Dasque-Middle Hydro Project
21	Snowfield Gold Project
22	Hudson Bay Mountain Development
23	Upper Kitsault Valley Hydropower Projects
24	Alice Arm Hydropower Projects
25	Northwest Transmission Line
26	Stewart Omineca Resource Road
27	Northwest Community College
28	Bronson Slope Gold and Copper Mine
29	Biocoal Pellet Production Plant
30	Suskwa Biomass Power Project

KEY MAP

Scale:1:1,800,000

50 25 0 50

Kilometres

Reference

Base Data
Geobase 1:20,000 (TRIM)
Land and Resource Data Warehouse 1:20,000 (TRIM)
Atlas of Canada scale 1:1,000,000.

CLIENT: Avanti Kitsault Mine Ltd.

PROJECT: Kitsault Mine Project

Social Local and Regional Study Area

DATE:	ANALYST:	
November 2011	MY	**Figure** 8.2.2-1
JOB No: VE51988	QA/QC: TT	PDF FILE: 14-50-028_social_study_area.pdf
GIS FILE: 14-50-028.mxd		
PROJECTION: UTM Zone 9	DATUM: NAD83	

Y:\GIS\Projects\VE\VE51988_KitsaultMapping\14_socio-economics\Baseline\14-50-028.mxd

8.2.2.1.3 Temporal Boundaries

The temporal boundaries for assessment of social effects reflect the duration of various activities related to the proposed Project. For assessing construction effects, the analysis focuses on Project activities over the 25-month window beginning in Q1 2012. For assessing operations effects, the analysis focuses on the 15-year window of 2014 to 2029, and estimates average effects during a typical year of operations. The effects of decommissioning and closure focus on activities that occur in the 15 to 17 years following 2029. The post-closure phase is not assessed as it resembles base case conditions and thus is not anticipated to produce housing effects.

8.2.2.2 Information Source and Methods

The primary data source used for the demographic analysis was the 2006 Canada census, which provided information on recent population levels and their component composition, as well as migration data. These data are available for all potentially affected communities except for some portions of the LSA, which are identified where relevant below. Information on population projections were obtained from the BC Stats 2010 social and economic indices data, which are presented by Local Health Authority (LHA) (BC Stats 2010).

Generally accepted EA methods were used to determine potential proposed Project effects on the baseline population. This entailed using direct, indirect, and induced employment effects combined with migration and unemployment trends, and existing household size data to produce estimates of population effects.

8.2.2.3 Detailed Baseline for Regional Demographics

8.2.2.3.1 Population

According to the 2006 census, 1,919 people were living on Nisga'a Lands in 2006. New Aiyansh is the largest of the Nisga'a Villages, accounting for 42 percent (%) of the Nisga'a Nation population. The LSA population increased between 2001 and 2006, from 1,819 in 2001 to 1,919 in 2006, representing a 5.5% increase between the two census years (Table 8.2.2-1).

Table 8.2.2-1: Population Estimates for the Local Study Area, 2001-2006

Community	2001	2006	% Change 2001-2006
Gingolx Village	339	341	0.6
New Aiyansh Village	716	806	12.6
Gitwinksihlkw Village	212	201	-5.2
Laxgalts'ap Village	467	474	1.5
Nisga'a Land [1]	85	97	14.1
Total population	**1,819**	**1,919**	**5.5**

Note: 1. Nisga'a Land is considered a separate census subdivision (CSD) by Statistics Canada and is enumerated separately from the four Nisga'a Villages; % - percent

Source: Stats Canada 2007.

People living in the Nisga'a Villages represent only a portion of the total Nisga'a population. Information from Indian and Northern Affairs Canada (INAC) (2010) suggests that in 2010, there were 5,792 Nisga'a Nation people associated with the four communities (see Table 8.2.2-2), with only 1,969 of these (34.0%) living in their home communities (or on their home reserve). Most of the Nisga'a Nation population (62.7%) was residing outside their home communities, in larger regional communities such as Terrace and outside the region (e.g., Vancouver).

Table 8.2.2-2: Population of the Nisga'a Villages, 2010

	Own Reserve	Other Reserves	Off Reserve	Total
Nisga'a Villages	34.0%	3.3%	62.7%	5,792
Gingolx Village	20.1%	3.2%	76.7%	1,932
Gitwinksihlkw Village	47.2%	7.4%	45.4%	390
Laxgalt'sap Village	32.5%	3.0%	64.5%	1,690
New Aiyansh Village	47.5%	2.8%	49.8%	1,780

Note: % - percent

Source: INAC 2010.

The RSA population in 2006 was estimated to be 30,632, with the Terrace CA comprising 60.7% of the total. Kitimat-Stikine RDEA B and Smithers were the next largest communities, with populations of 6,483 and 5,217, respectively. There are also a number of First Nations reserves in the RSA, the largest being Gitaanmaax 1 (723 people), Gitsegukla 1 (721 people) and Kispiox (617 people).

According to SC, the RSA population declined between 2001 and 2006, from 32,538 to 30,632 (5.9%). The largest percentage decline (25.0%) occurred in the DM of Stewart, followed by the Terrace CA (7.0%). Many First Nations reserves experienced population

increases, with the largest increase occurring in Gitsegukla 1 (66.9%), followed by Sik-e-dakh 2 (31.6%). On the other hand, some First Nation reserves experienced population decreases.

According to the 2006 Aboriginal census, about 830 Métis people lived in the study area: 10 in the DM of Stewart; 70 in Kitimat-Stikine RDEA B; 65 in Smithers and 685 in the Terrace CA.

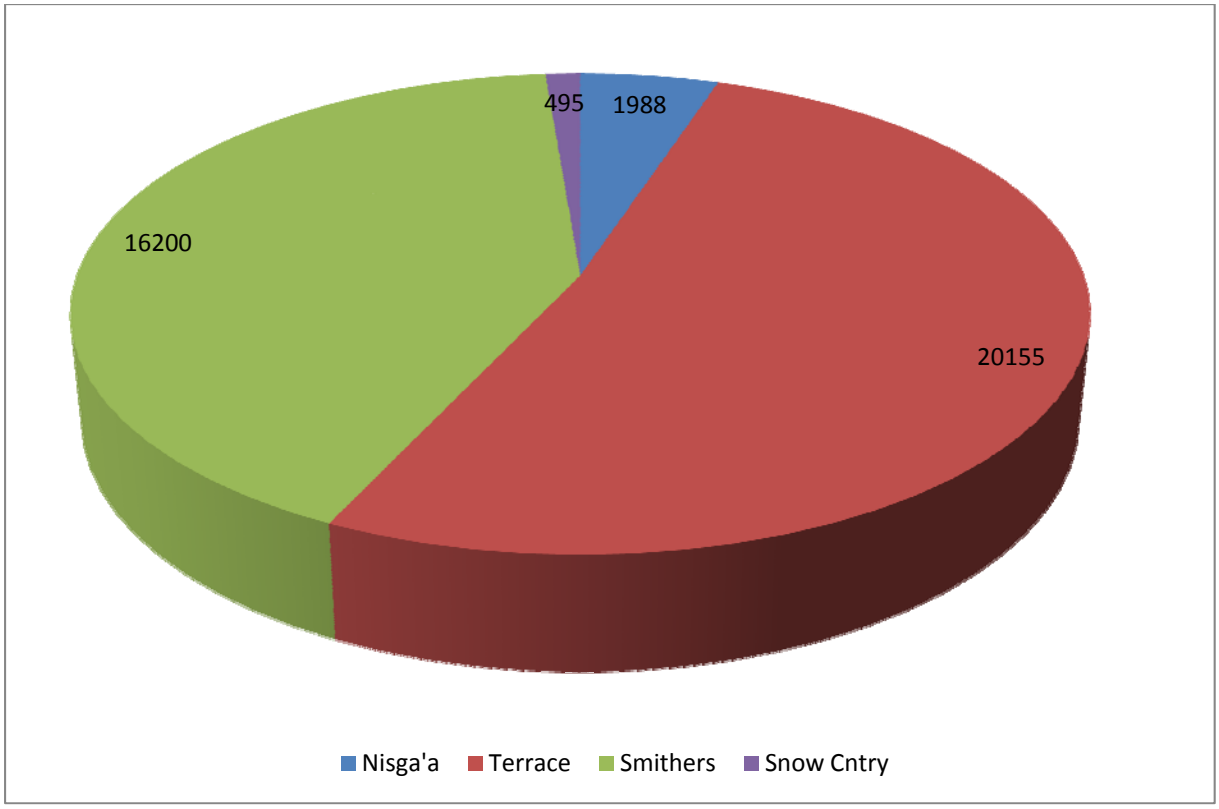
Table 8.2.2-3: Population Estimates for the Regional Study Area, 2001-2006

Community	2006	2001	% Change 2001-2006
British Columbia	3,907,738	4,113,487	10.4
RSA	30,632	32,538	-5.9
DM of Stewart	661	496	-25.0
Kitimat-Stikine RDEA B	6,483	6,338	-2.2
Town of Smithers	5,217	5,414	-3.6
Terrace CA	18,581	19,980	-7.0

Note: CA - Census Agglomeration; % - percent; RDEA - Regional District Electoral Area

Source: SC 2007

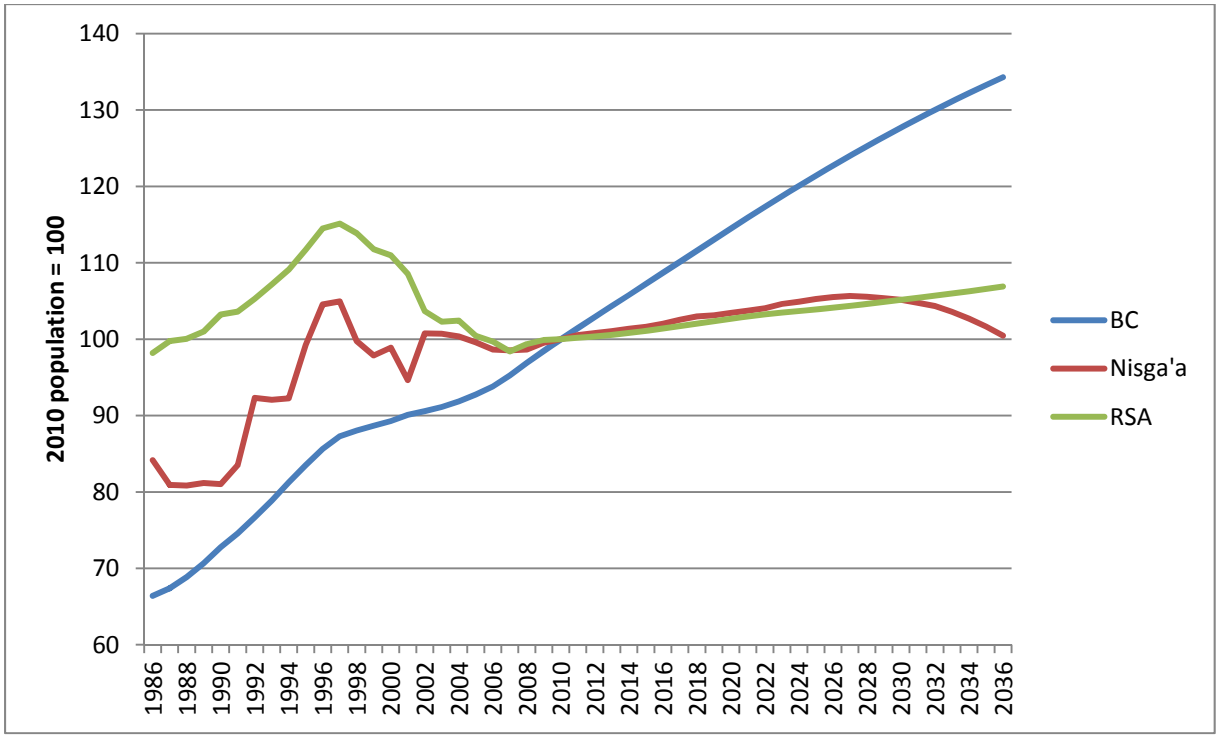
Populations of the four LHAs (includes communities and surrounding rural areas) for the most recent year are summarised in Figure 8.2.2-2. The Terrace and Smithers LHAs account for a very large share of the total population.



Source: BC Stats 2010

Figure 8.2.2-2: Local Health Area Populations (2010)

BC Stats prepares a population forecast for LHAs based on the characteristics of the population (e.g., age and sex) and assumptions about economic and population dynamics. Indices (based on setting the respective study areas' 2010 populations at 100) of the recorded and forecasted populations for the LHA and RSA are shown in Figure 8.2.2-3. An index of total provincial population change is provided for comparison purposes. The figure shows that both the LSA and RSA supported higher population levels in the mid-1990s. There is large variation in the population levels, suggesting that net migration is the dominant influence relative to the natural increase of the resident population (i.e., births less deaths). Net migration is generally positively correlated to positive economic conditions. Over the forecast period (to 2035), neither the LSA nor RSA is expected to exceed these early levels, while the provincial population is expected to expand steadily.



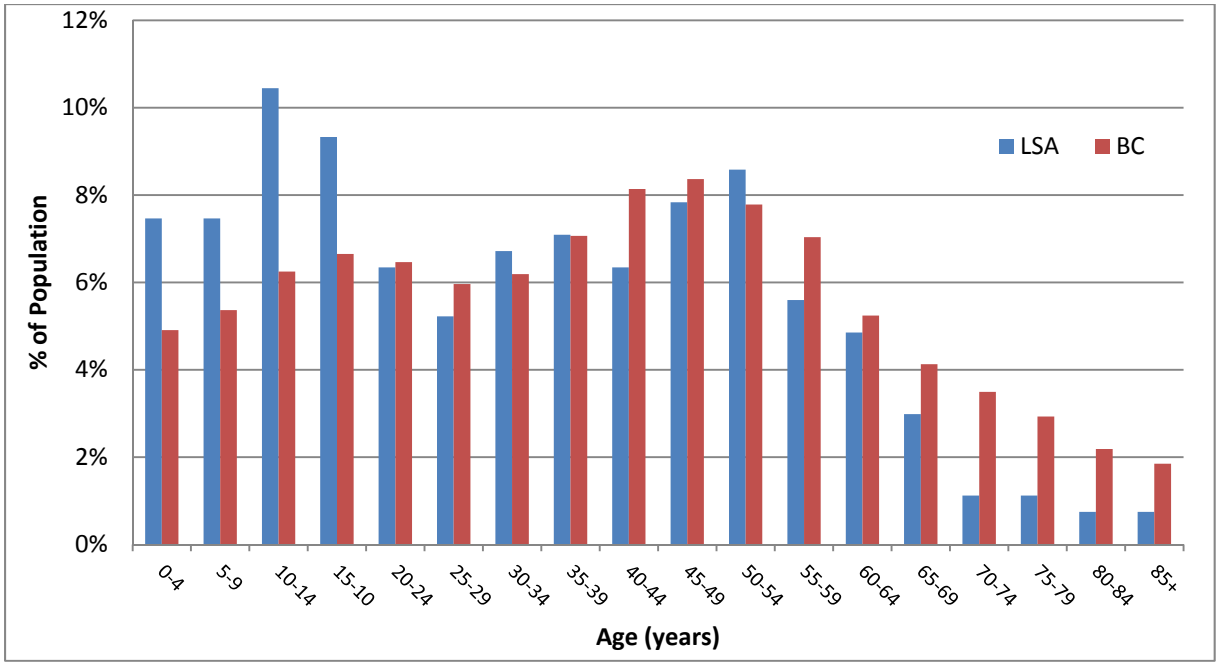
Source: BC Stats 2010

Figure 8.2.2-3: Index of Population Growth

8.2.2.3.2 Age and Gender

When compared to BC as a whole, people living on Nisga'a Lands were much younger, with much higher percentages of people under the age of 20 years. There were proportionately fewer people aged 55 years and older on Nisga'a Lands. The percentages of people between the ages of 20 and 54 years were relatively similar, although there were smaller percentages of people aged 40 to 44 years and people aged 25 to 29 years on Nisga'a Lands.

For gender, there were 70 more males than females in the Nisga'a Villages in 2006, and males accounted for 52.6% of the population. This imbalance was also apparent in 2001, when males accounted for 53.9% of the population.



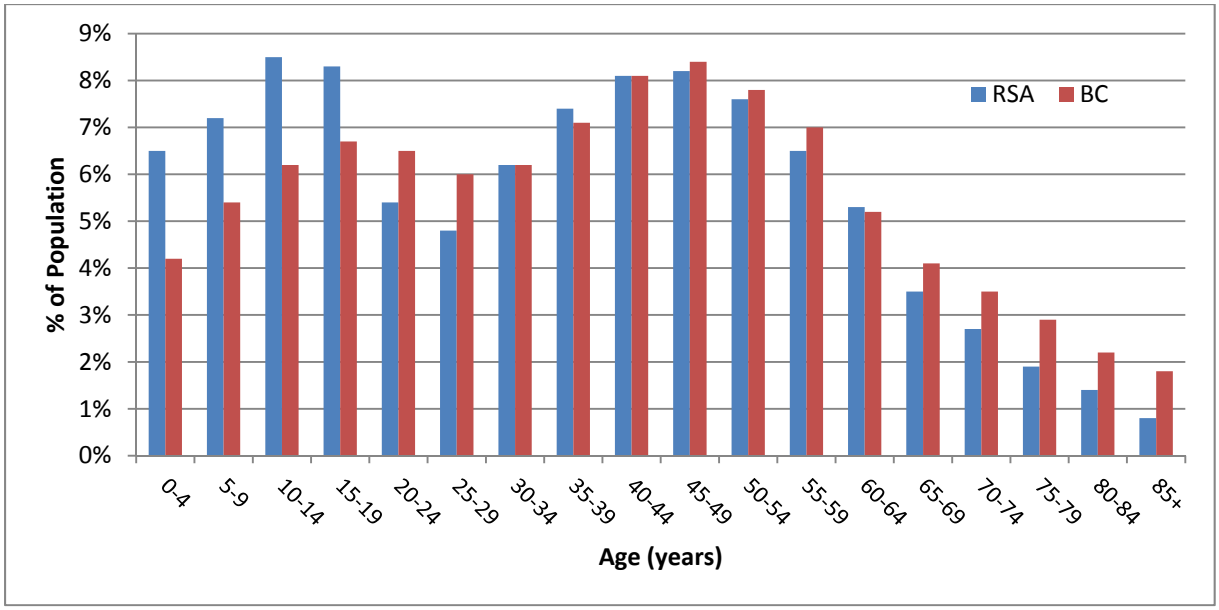
Source: SC 2007

Figure 8.2.2-4: Age Characteristics of People Living in the Local Study Area, 2006

Overall, 42.2% of the population in the RSA consisted of people in the 25-54-year-old category. The percentage of people in this age category ranged from 41.2% in Kitimat-Stikine RDEA B to 44.4% in the DM of Stewart. The RSA had a higher proportion of individuals under the age of 15 (22.1%) compared to the province (16.5%).

Communities in the RSA, with the exception of Kitimat-Stikine RDEA B, also reported higher percentages for the age category 55 years and over, varying between 21.4 and 31.3% (Figure 8.2.2-5).

For gender distribution, there were slightly more males than females in the RSA; males accounted for 50.3% of the population and females 49.7%.



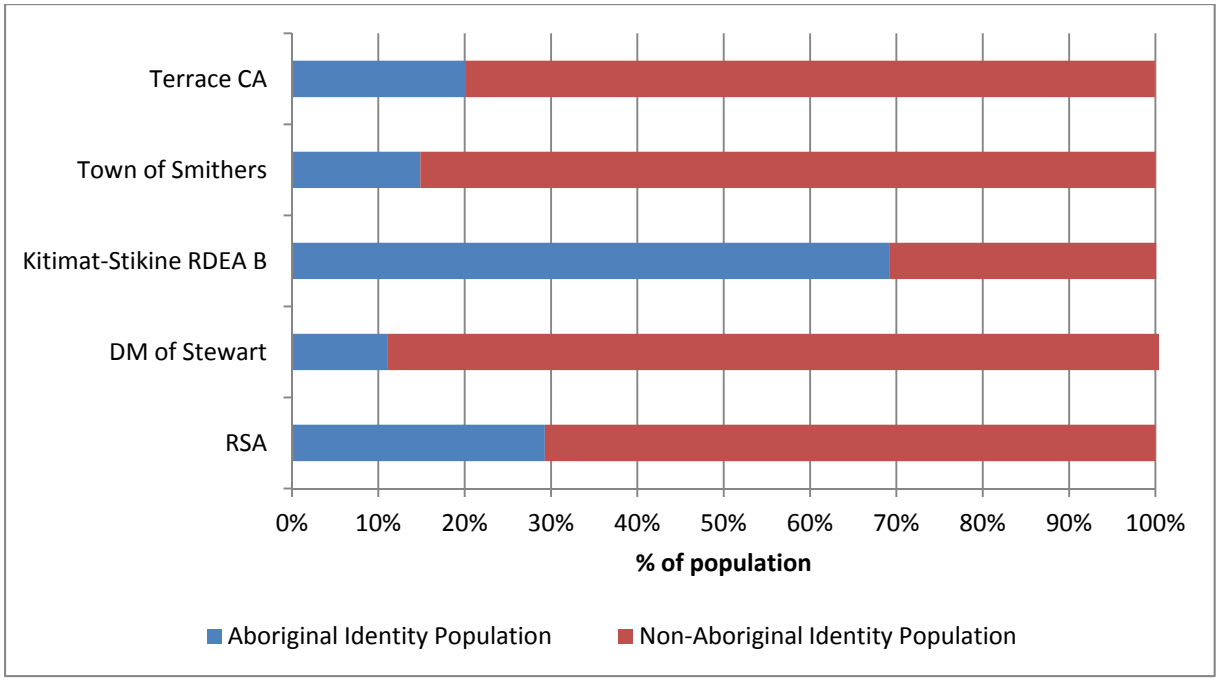
Source: SC 2007

Figure 8.2.2-5: Age Characteristics in the Regional Study Area, 2006

8.2.2.3.3 Ethnicity

According to the 2006 census, only 3.7% of the population of the Nisga'a Villages was not Aboriginal. This represents about 50 people in the three communities for which detailed census information is available (Gitwinksihlkw, Gingolx, and New Aiyansh).

Within the RSA, there was estimated to be 8,870 Aboriginal people in 2006, and they accounted for 29.3% of the total population. Kitimat-Stikine RDEA B had the highest number of Aboriginal residents at 4,350, which accounted for 69.2% of the total population of that RDEA, followed by Terrace CA at 3,780 (20.1%). The DM of Stewart had the lowest proportion of Aboriginal residents, with 11.1% of the population reporting an Aboriginal identity (Figure 8.2.2-6).

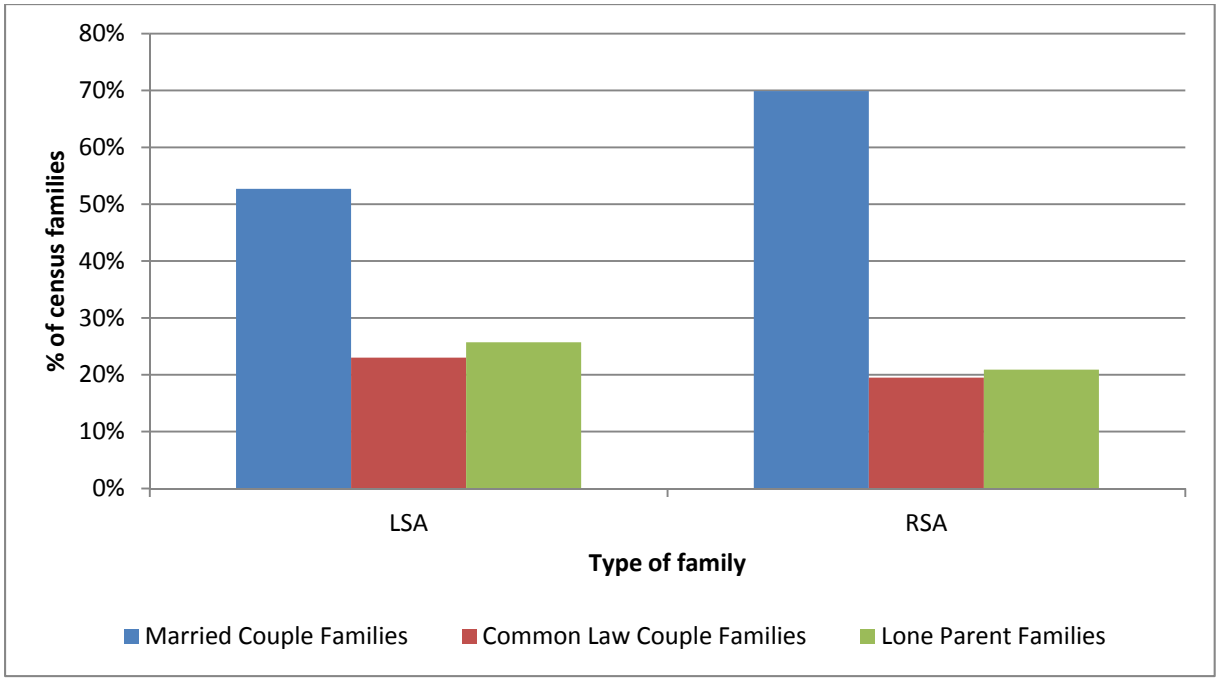


Source: SC 2007

Figure 8.2.2-6: Aboriginal Population in the Regional Study Area, 2006

8.2.2.3.4 Family Structure

Among the Nisga'a Nation, married couple families (52.7%) were the most common type of family in 2006, followed by lone-parent families (25.7%) and common-law couple families (23.0%). Similarly, in the RSA, married couple families were the most common type of family in 2006 (69.9%), followed by lone-parent families (20.9%), and common-law couple families (19.5%) (Figure 8.2.2-7). In 2006, the average family size in the Nisga'a Nation was 3.3 persons per family, compared to 3.0 in the RSA.



Source: SC 2007

Figure 8.2.2-7: Family Structure in the Local Study Area and Regional Study Area, 2006

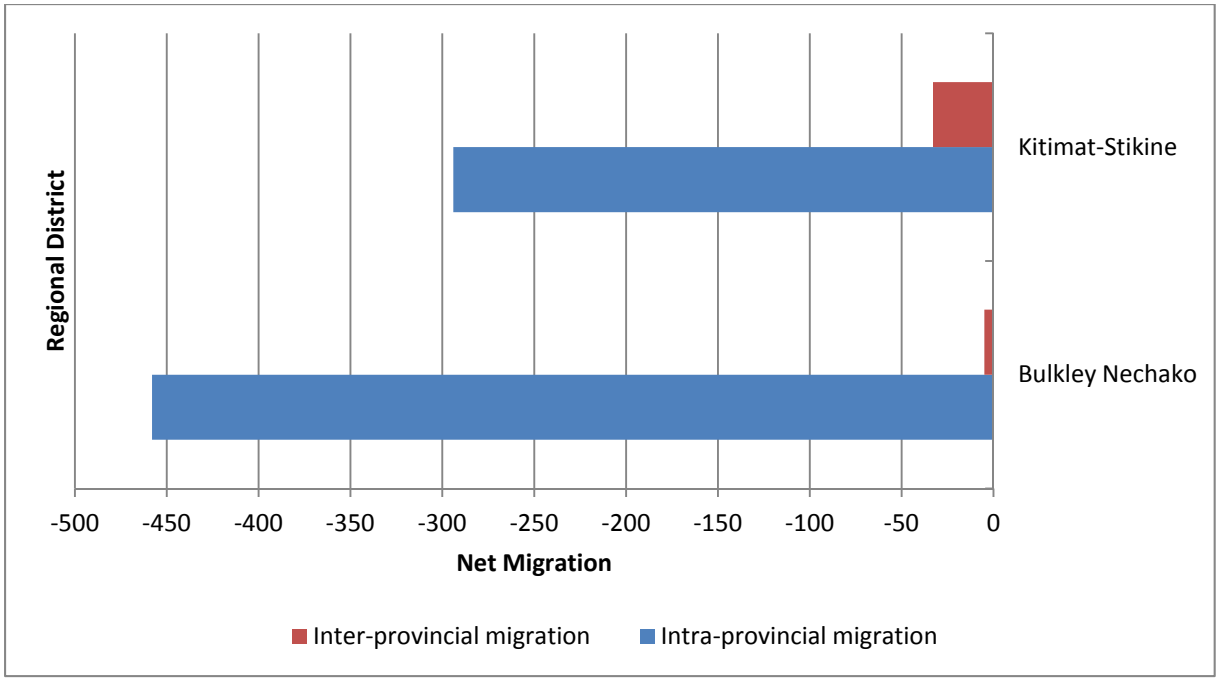
8.2.2.3.5 Population Mobility

An important factor influencing population change in the LSA and RSA is both in- and out-migration.

Part of the population change observed during 2001 to 2006 is from more births than deaths; census data provide insights to in-migration, which is another factor in population change. Census data indicate that in 2006, 17.7% of the Nisga'a Nation changed addresses within the same municipality, with the majority (67.8%) having lived at the same address for a five-year period.

In the RSA, 62.4% of people lived at the same address in 2006 as they did in 2001, and another 21.2% changed addresses within the same municipality. About 13.1% of the population moved into the region from other parts of BC.

Between 2007 and 2008, the RDs of Bulkley-Nechako and Kitimat-Stikine both experienced negative net migration, both inter-provincially and intra-provincially. Out-migration from the two regional districts to other regions (intra-provincial) was quite high in both (-458 and 294 persons, respectively for the 2007-2008 year). This shows that more people are leaving the two regions than are coming in (BC Stats 2009). Out-migration to other provinces within Canada (inter-provincial) was not as significant as out migration to other regions within BC (Figure 8.2.2-8).



Source: BC Stats 2009

Figure 8.2.2-8: Inter-Provincial and Intra-Provincial Net Migration, Regional Districts of Bulkley-Nechako and Kitimat-Stikine, 2007-2008

8.2.2.4 Cultural Ecological or Community Knowledge

8.2.2.4.1 Nisga'a Nation

The Nisga'a Nation may have an interest in regional demographics in the Nass Valley and beyond for reasons related to the fiscal financing agreements negotiated with BC and Canada. The NFA stipulates that the agreement must consider several variables to determine the level of funding transferred to the Nisga'a Nation for provision and delivery of services and programs on Nisga'a Lands, including demographics (Government of Canada 2010). Part C (Section 13.2) of the proponent's Application for an EA Certificate for the proposed Project, made under section 16 of the *BCEAA* (Application) provides demographic information for the Nisga'a Nation on Nisga'a Lands.

The Nisga'a ESCIA (Rescan 2012) also specifically addresses potential effects of the proposed Project on Nisga'a Nation rights, interests, and concerns as they relate to the NFA. Results of the Nisga'a ESCIA are discussed, summarised, and incorporated into Section 14.0 of the Application (Nisga'a Effects Assessment), which provides additional detail and context to the conservative estimates of the economic effects of the LSA and RSA based on data from the BC Input-Output Model (BCIOM) (with input from the proponent).

8.2.2.4.2 Aboriginal Groups

It is not apparent from desk-based research whether potentially affected Aboriginal groups have an interest in regional demographics. Part D (Section 16.4) of the Application (for Metlakatla only) and the Road Use Effects Assessment (Appendix 8.0-C) provides additional information on Aboriginal demographics in the northwest region of BC. Future engagement efforts with each group may reveal more on this matter.

8.2.2.5 Past, Present or Future Projects / Activities

The baseline information presented in Sections 7.2.3.3 and 8.2.2.3 reflects changes from 2006 to 2009 in regional economic activity and the related demographic indicators. For future employment, income, and population in the region, conditions would be influenced by other major projects that would be competing for labour, goods, and services. A list of these major projects is published by the BC Ministry of Finance and a summary of major projects in the study area that have been proposed, are on hold, and have started is provided in Table 7.2.3-6. The table shows major projects located near Alice Arm, Iskut, Smithers, Stewart, and Terrace.

As of December 2010, there were two major projects underway in the study area, but one is on hold (Kitsault River and Homestake Creek Hydro Project) and the other (Northwest Community College Smithers Campus) would be completed before the proposed Project would begin construction (there would be no over-lapping effects). Another project currently on hold is the Galore Creek Gold / Silver / Copper Mine near Iskut.

In all, there are 26 proposed projects in the study area. Capital cost estimates are available for 22 of these projects and suggest that $9.499 billion in new construction could occur in the foreseeable future. No cost information is available for the other three projects. Two of these projects are located in Alice Arm, seven are for areas around Iskut, one around Kispiox, one near New Hazelton, nine around Stewart, three around Smithers, and three around Terrace.

Two proposed projects in Alice Arm are the most likely to compete with the proposed Project for local labour if they proceed: the Alice Arm Hydropower Projects and Upper Kitsault Valley Hydropower Projects. Both sets of projects were proposed in response to the BC Hydro 2010 Clean Power Call (BC Ministry of Finance 2010), but neither project has received a contract from BC Hydro.

It should be noted that there is no certainty that any of the proposed projects would actually be constructed. Two of the projects were originally proposed in the late 1990s and nine of them were proposed before 2006. In addition, timelines have only been identified for seven of the proposed projects. Available information suggests that there would be a high regional demand for construction workers and people with experience in the mining and other resource sectors. This conclusion is consistent with current labour forecasts for the North Coast and Nechako Development Region.

These forecasts and their implications for the regional population (e.g., the LHA population forecasts presented above) have been considered in the analysis of the demographic VC. As a result, this effects assessment for the proposed Project is also inherently cumulative in nature.

8.2.2.6 Potential Effects of the Proposed Project and Proposed Mitigation

8.2.2.6.1 Identification and Analysis of Potential Project Effects

This effects assessment examines the potential changes in the resident population resulting from the proposed Project, including anticipated population increases and decreases. As addressed in the employment opportunities VC (Section 7.2.4), the proposed Project will require labour to construct, operate, decommission, and close the mine. Additional employment would be created off-site, in support of supplier industries and consumer-oriented industries.

The conditions under which the incremental employment would add to the existing population in the LSA and RSA is the issue for analysis of regional demographics. The relationship of the labour market outcomes to the population effects is summarised in Table 8.2.2-4.

Table 8.2.2-4: Labour Market Implications to Population Effects

Source of Labour	Baseline Status	Population Implications
Baseline resident	Unemployed	No population impact
	Employed	Potential impact
Baseline non-resident	In-migrant (with project)	Population impact
	Commute (with project)	No population impact

As indicated in Table 8.2.2-4, residents are either employed or unemployed in the baseline (i.e., without the proposed Project). If an unemployed person takes an incremental job, then the demand is fully satisfied without the need to attract additional labour supply and there is no population impact. However, if the individual quits an existing job to take employment that is related to the proposed Project, then the vacated position would be filled. It may be filled by a sequence of persons changing jobs, but ultimately either a person is drawn from the locally unemployed (i.e., no population impact) or by an in-migrant (population impact). It is probably the case that with those existing jobs that are difficult to recruit qualified workers (i.e., there are few qualified residents), it is more likely that the position would be filled by an in-migrant.

Non-residents who elect to relocate their household to the LSA / RSA contribute to population implications. In contrast, a non-resident that commutes for proposed Project-related employment creates no population impact. Those existing non-residents who would work directly for the proposed Project may be influenced through company policies and incentives to relocate to the RSA.

Given that construction lasts 25 months, and the mine would eventually close, there are two proposed Project effects related to population: an increase and a decrease in the resident population. The scale of other demographic changes (i.e., ethnicity, age / gender, etc.) is directly dependent on the magnitude of the population change, so the proposed Project effects assessment would focus on that indicator. As noted in Table 8.2.2-5, decommissioning and closure involves only potential out-migration.

It is recognised that in-migrants may elect to remain in the study area after employment related to the proposed Project ceases. However, if that occurs, it likely would be for reasons unrelated to the proposed Project (i.e., not a project effect). Potential direct effects are summarised in Table 8.2.2-5.

Table 8.2.2-5: Potential Direct Project Effects on Regional Demographics

Project Component	Project Phase	Potential Direct Project Effect	Likelihood Of Occurrence
All	C	In-migration of job seekers and their dependents	High
		Out-migration of workers and their dependents	High
	O	In-migration of job seekers and their dependents	High
		Out-migration of job seekers and their dependents	High
	D/C	Out-migration of workers and their dependents	High
	PC	Negligible effect	High

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

The direct proposed Project effect on regional demographics, through the population effect, would indirectly affect a number of other VCs, as indicated in Table 8.2.2-6. However, the indirect effects are fully addressed in the relevant social VC effects assessments so are not carried forward in this assessment.

Table 8.2.2-6: Potential Indirect Project Effects on Other Valued Components

Direct Project Effect (Adverse or Positive)	Project Phase	Potential Indirect Project Effect	Carry Forward (Yes / No)	Rationale
In-migration of job seekers and their dependents	C	Housing, regional services, regional infrastructure, education	no	Addressed in relevant social VC effects assessment
Out-migration of job seekers and their dependents	C	Housing, regional services, regional infrastructure, education	no	Addressed in relevant social VC effects assessment
In-migration of job seekers and their dependents	O	Housing, regional services, regional infrastructure, education	no	Addressed in relevant social VC effects assessment
Out-migration of job seekers and their dependents	D/C	Housing, regional services, regional infrastructure, education	no	Addressed in relevant social VC effects assessment

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure
Note: VC - Valued Component

Table 8.2.2-7 summarises the potential for direct Project effects on demographics to change the status of other VCs, and whether that change is beneficial or detrimental. For the biophysical VCs there is no linkage, or causal pathway, to the changes in population or demographic characteristics. The economics VC, specifically regional employment, is the main driver for change in population and demographics, but changes in demographics are not expected to have an indirect effect on economics – hence, the 'no interaction' designation. Proposed Project effects on regional demographics do interact with the other social VCs, but in this specific case it acts in only one direction (e.g., population change affects services) and the magnitude of the interaction, both in terms of population change and family/household characteristics, is expected to be small.

Table 8.2.2-7: Summary of Potential Interaction Between Project Direct Effects on Other Valued Components and Regional Demographics

Direct Project Effect	Air Quality and Climate Change	Noise and Vibration	Hydrogeology	Groundwater Quality	Freshwater and Sediment Quality	Surface Hydrology	Freshwater Fisheries	Marine Water Quality	Marine Biota	Terrestrial Environment	Wildlife and Their Habitat	Environmental Health	Economic	Social	Heritage	Health	Nisga'a Nation Land Use	Aboriginal Groups Land Use
In-migration of job seekers and their dependents	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	O	NI	NI	NI	NI
Out-migration of job seekers and their dependents	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	O	NI	NI	NI	NI

Legend: Interaction definitions: o - interaction; - - key interaction;□□□ + - benefit; NI - no interaction

In summary, the regional demographic effect is not expected to amplify the change caused by any other VC with which it interacts, except as noted for the relevant affected social and health VCs. For these interactions, it is the identified VC that will experience the effect, and these effects are described in those VC sections where appropriate.

As noted in Table 8.2.2-8, the main driver of the proposed Project's effect on regional demographics is migration into or out of the study area at different project phases. The Project's labour demand affects migration patterns which in turn determine population change and demand for social services. The assessment of regional demographics is carried forward here because even small changes in labour demand and hiring practices can produce measurable effects. Similarly, mitigation for regional employment and income will effectively serve as mitigation for effects anticipated for regional demographics.

Table 8.2.2-8: Summary of Potential Project Effects to be Carried Forward Into the Assessment for Regional Demographics

Adverse Effects / Positive Effects	Project Phase	Direction
In-migration of job seekers and their dependents	C, O	+
Out-migration of job seekers and their dependents	C, D/C	-

Project phase: C - construction; D/C - decommissioning and closure; O - operations

8.2.2.6.2 Mitigation Measures

Mitigation measures are aimed at lessening detrimental Project effects or enhancing beneficial ones. The causal pathway for proposed Project effects on regional demographics is the source of the labour force directly or indirectly employed by the proposed Project. It is recognised in the regional employment and income analysis (Section 7.2.3) that adequate numbers of qualified persons with the requisite skills to satisfy proposed Project needs are not available in the study area.

The pool of qualified persons can be increased by offering appropriate training, which would be particularly beneficial for individuals who would otherwise be unemployed. Nevertheless, it is recognised that the proponent must offer a competitive package of employment conditions to attract resident as well as non-resident workers. This offering includes supporting the employee's preference to maintain a stable household outside the study area. The employment package essentially functions as mitigation in that it serves to reduce the need for persons to relocate to the study area unless it is their preference to do so. If the level of in-migration, particularly during construction, is giving rise to adverse effects (e.g., housing shortages), the employment package could be adjusted to encourage commuting from locations outside the study area.

Ultimately, the proposed Project would produce no effect on the regional population if all direct and indirect employment positions are filled by some combination of non-residents and existing residents who would otherwise be unemployed. The proponent's workforce strategy for managing in-migrants, in conjunction with a local resident training program,

should ensure that an adequate workforce is available to meet proposed Project requirements without inducing potentially substantial effects on the regional population. Potential effects and relevant mitigation are shown in Table 8.2.2-9 below.

Table 8.2.2-9: Potential Project Effect by Project Phase on Regional Demographics and Mitigation Measures

Project Effect	Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
In-migration of job seekers and their dependents	C, O	Training programs for unemployed and under-employed, changes to employment package to meet individual and family needs	High
Out-migration of job seekers and their dependents	C, D/C	None	n/a

Project phase: C - construction; D/C - decommissioning and closure; n/a - not applicable; O – operations

8.2.2.7 Potential Residual Effects and Their Significance

8.2.2.7.1 Potential Residual Effects After Mitigation

The potential residual effects are summarised in Table 8.2.2-10.

Table 8.2.2-10: Summary of Residual Effects for Regional Demographics

Project Phase	Residual Effect	Direction
C, O	In-migration of job seekers and their dependents	+
C, D/C	Out-migration of job seekers and their dependents	-
PC	None	

Legend: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

8.2.2.7.1.1 Construction Phase

Direct proposed Project effects on regional demographics or, specifically population, during construction are addressed in this section.

The construction phase of the proposed Project is expected to be 25 months in duration. An estimate of the average number of persons that might be involved during each year of construction is summarised in Table 8.2.2-11. As stated earlier, those employees who reside outside of the study area (i.e., leave the study area when off-shift) do not give rise to population effects, thus producing no direct or indirect project effect.

Table 8.2.2-11: Construction Phase Person Estimate

	Average Persons	Expected Location Of Permanent Residence
Direct labour force	600	
Non-resident	540	Outside RSA / LSA
Existing resident	60	RSA / LSA
Existing resident (supplier industries)	78	RSA / LSA
Other employment		
Indirect and induced	27	RSA / LSA

Source: see Table 7.2.3-9 for regional employment and Table 7.2.2-3 for provincial employment

The proponent expects that 90% of the direct construction labour force would consist of non-residents (people living outside the LSA and the RSA). This expectation is supported by the regional employment and income assessment (see Section 7.2.3), which indicates that the size of the local labour market and mix of skills required are not locally available in the quantity needed. The decision by the non-resident work force to relocate to the RSA / LSA is tempered by the relatively short period of employment and proponent policies and procedures regarding the transportation and accommodation of contractors and their workforce, including the following:

- Work packages awarded to contractors from outside the region would need to accommodate contractors and their workers in a camp at the mine site;
- Private vehicles would not be permitted to drive to / from the mine site from communities in the RSA, LSA, other parts of BC, and beyond;
- Contractors and workers from outside the region would drive or fly to Terrace and from there be bussed to and from the mine site in accordance with their work rotation schedule; and
- Current practice in the construction and mining sectors for relatively short construction periods, such as the proposed Project's 25-month schedule, is to provide a prescribed work rotation schedule and on-site camps for the labour force working at projects in remote locations. This approach helps maintain family stability and reduces the risk of adverse social effects related to relocating contractors' and their personnel's families to the community in the proposed Project region for a relatively short period of time,

Population effects on the LSA, including a range of in- and out-migration scenarios, are discussed in more detail in Part C (Section 14.0), and are based on the survey results contained in the Nisga'a ESCIA (Rescan 2012).

During each year of construction, LSA and RSA residents are expected to fill about 138 positions at the construction site and in businesses that directly support the project plus

another 27 indirect and induced jobs in support industries and the retail sector. These incremental positions could potentially have population implications if the positions are directly filled, or through displacement jobs filled by in-migrants.

With respect to the 138 direct jobs for residents of the LSA and RSA, these may involve individuals who currently reside in the study are but may be employed at locations outside the study area (e.g., northeast BC or Alberta). In this circumstance, the 'vacated' position outside the study area does not give rise to in-migration to the study area.

An unemployed resident does not trigger a population response for the reasons discussed above. The number of positions created off-site in the LSA / RSA is small, and many positions require a reduced skill set (i.e., positions in wholesale and retail trade). A large proportion of these jobs may be drawn from the ranks of the unemployed or from new entrants to the labour market. In either case, the magnitude of the potential population effect is expected to be negligible.

Even if it is conservatively assumed that all LSA and RSA residents left existing jobs to fill the construction and indirect employment associated with the Project and the jobs they vacated were backfilled by in-migrants, which is highly unlikely, the population the population effect is still likely to be small.

The relatively short duration of the work would suggest that positions would be taken up by single persons from outside the RSA. We have assumed that an average household size would be 1.5 persons (the average household size for the RSA is 2.6 persons), which generates a population effect for the LSA / RSA in the order of 250 persons. This number of people would in-migrate and out-migrate over the 25-month construction period. The magnitude of this population change is a fraction of the variation historically recorded at the RSA level, as discussed later.

8.2.2.7.1.2 Operations Phase

Operations is expected to start at the end of January 2014 and continue for 15 to 16 years. Mine operations would be 24 hours per day, 365 days per year. The work shifts would be 12-hour days, three weeks on and three weeks off.

The long-term employment opportunity during operations is generally an inducement for households to relocate closer to the project site to reduce travel times. Given the remote location of the Process Plant, residents in the larger communities in the LSA / RSA would still require considerable travel time to reach the mine site, thus reducing the influence of this factor. While the proponent will endeavour to employ local persons and offer suitable training programs, it is nevertheless recognised that the availability of local tradesmen to fill the skilled positions is limited and there will be the need to recruit from outside the LSA / RSA as well. To enhance its ability to attract these persons and recognising competition with other mining and petroleum operations for skilled labour, the proponent is offering a range of inducements, including the following.

- The proponent would offer subsidised or free charter flights from hub locations in BC to the operations labour force recruited from outside the RSA (e.g., Vancouver, Prince George, Kamloops, Kelowna), thus reducing the cost and time to travel to and from the work site at the time of rotation. This would further reduce the likelihood of families relocating to a community in the RSA;
- Strategies to enhance Nisga'a Nation business opportunities and entice Nisga'a Nation workers to work at the mine;
- A shorter rotation schedule could be implemented for Nisga'a Nation workers and those from other local First Nations in order to attract and retain local staff; and
- Those Nisga'a citizens qualified and interested in operations employment that live outside the LSA and RSA could access free or subsidised air transportation from designated hubs in other parts of BC and bus service from Terrace, and possibly other communities in the RSA.

Table 8.2.2-12 provides an estimate of the number of persons and permanent residents who might be involved in this phase. The expectation is that a large proportion of the labour force would continue to reside outside the LSA / RSA, hence not creating population effects in the study area.

Table 8.2.2-12: Operations Phase Person Estimate

	Average Persons	Expected Location Of Permanent Residence
Direct labour force	300	
Non-resident	240	Outside RSA / LSA
LSA and RSA residents	60	RSA / LSA
Other employment		
Indirect and induced	30	RSA / LSA

Note: LSA - Local Study Area; RSA - Regional Study Area

Source: See Section 7.2.9.6.1.

The total number of existing residents who would directly or indirectly be employed is estimated to be approximately 90. Given the long-term nature of the employment opportunity, one would not expect that the positions would be filled by individuals who would otherwise be unemployed for the duration of the proposed Project's 15- to 16-year-operations phase. That is, an existing resident taking an operating position would create a vacancy that would in some instance be filled by other LSA or RSA resident and in other instances would attract an in-migrant to fill the vacancy, potentially including Nisga'a citizens returning to the LSA from outside the region. Assuming the most conservative scenario whereby all jobs vacated by local and regional residents to fill Project operations direct, indirect and induced employment are filled by in-migrant's whose demographic characteristics are similar to those of the study area's existing residents, the average

household size would be about 2.6 persons, which indicates a population impact of some 235 persons.

8.2.2.7.1.3 Decommissioning and Closure Phase

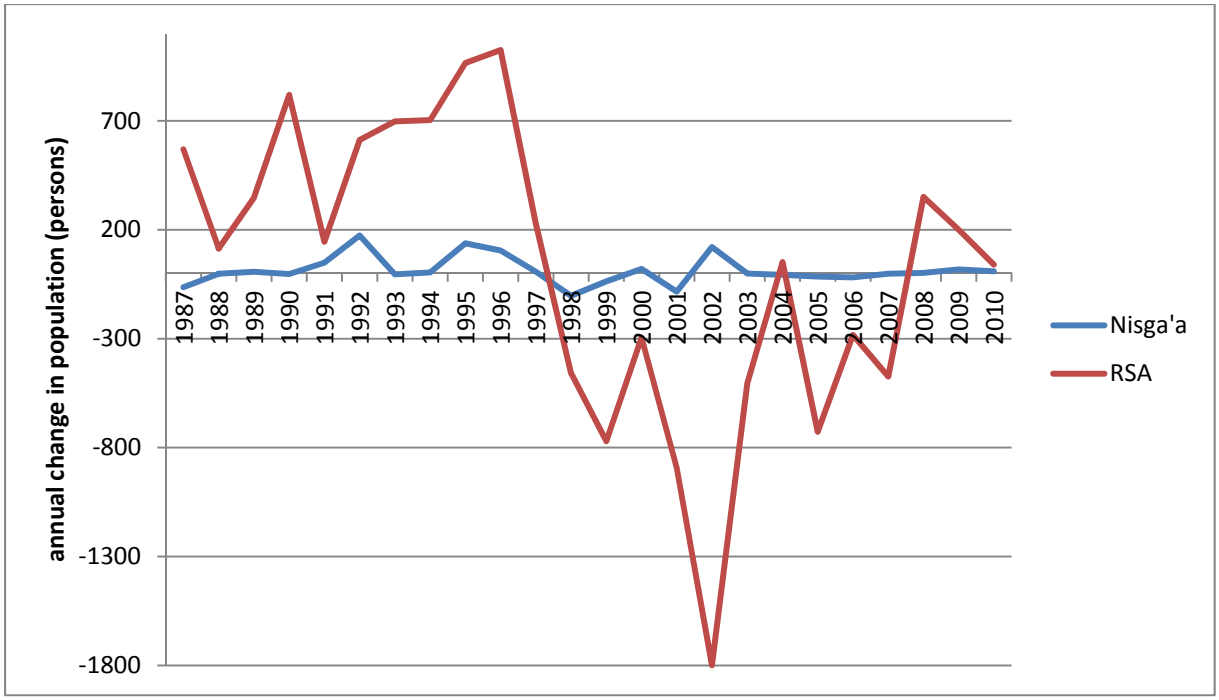
When operations wind down, the labour force would be reduced accordingly. This reduction in employment would be shared among both residents of the LSA / RSA and non-resident workers. The population implication of this closure would depend on the economic conditions at that time – whether those leaving the proposed Project would be able to find employment and maintain their existing residence. If not, they would at some point be required to relocate to find employment. This migration in response to regional employment opportunities is evident in the population record. Relative to that record, even if (in a worst case) all those employed during operations were to out-migrate, this loss would be much lower than the record of net migration from the area in recent times.

The decommissioning and closure phase would directly employ 8 to 10 regional residents for the first three years and then drop to 0.3 PYs of work per year for the remainder of the closure activities. These positions would probably be filled by persons already working during operations. The population effect at the LSA / RSA would be minimal in any case.

8.2.2.7.2 Significance of Potential Residual Effects

The potential residual effect of in-migration during construction and operations are summarised in Table 8.2.2-13 and Table 8.2.2-14. Proposed Project phases are sequential, and there would be little temporal overlap in Project effects. The population effect near the end of construction would tend toward out-migration of people, which would be quickly followed by an in-migration of persons as operations start.

In considering the potential Project effect on regional demographics, it is important to recognise the magnitude of the change relative to the receiving environment. For instance, Figure 8.2.2-9 shows the net annual variation in population for the LSA and RSA over the past 20 years. At the RSA level, most years have seen annual population fluctuations (plus and minus) exceeding 200 persons. Some years net inflows were recorded of over 700 persons, or net outflows of more than 1,000 were recorded. At the LSA level, the variation is smaller in absolute terms, but still averages an annual change in population of 40 persons. Hence the population effect is well within the variation experienced in the study area over the past 15 years or so.



Source: BC Stats 2010

Figure 8.2.2-9: Net Annual Population Variation (1986-2010)

From another perspective, the 250 or so persons expected during operations would not be a large increase in population relative to the existing population level of some 36,000 persons in the LSA / RSA. However, because the expectation is for very low population growth in the region (i.e., about 1,500 persons over the operating period) it accounts for about 15% of the growth increment. Furthermore, given the recent trend of declining populations in regional communities, the effects related to the proposed Project would somewhat off-set this trend. The population effect would ramp up with the operating labour force, remain roughly constant over the full production phase and wind down as mining and processing operations are curtailed.

Given the short duration of construction and the likely negligible number of households that may choose to relocate to either the LSA or the RSA, the population effect during construction is considered to be not significant. It therefore follows that the proposed Project effect on the other demographic indicators (age, gender, ethnicity) is also not significant.

Residual effects from in-migration of job seekers and their dependents are expected to be low in magnitude, regional, short term for construction and long-term for operations, continuous, reversible, positive, high in certainty, and not significant (minor). No effects are expected during decommissioning and closure, or post-closure. There is a high level of confidence for these predictions because of understanding of local labour market conditions,

Project labour demand probabilities and the experience of past development projects in the RSA. Table 8.2.2-13 summarises these residual effects by proposed Project development phase for in-migration of job seekers and their dependents.

Table 8.2.2-13: Residual Effects Assessment by Project Development Phase for In-Migration of Job Seekers and Their Dependents

Parameter	Stage Of Development / Rating			
Stage of Project development	Construction	Operations	Decommissioning and Closure	Post-closure
Residual effect	Increase in population	Increase in population	n/a	n/a
Effect attribute				
Magnitude (persons)	Low	Low	n/a	n/a
Spatial extent	Regional	Regional	n/a	n/a
Duration	Short-term	Long-term	n/a	n/a
Frequency	Continuous	Continuous	n/a	n/a
Reversibility	Reversible	Reversible	n/a	n/a
Direction	Positive	Positive	n/a	n/a
Certainty	High	High	n/a	n/a
Residual effect significance	Not significant (minor)	Not significant (minor)	n/a	n/a
Level of confidence	High	High	n/a	n/a

Note: n/a - not applicable

Residual effects from out-migration of job seekers and their dependents may occur during construction, and decommissioning and closure. For construction, these effects are characterised as low in magnitude, regional, short term, continuous, reversible, positive, high in certainty, and not significant (minor). Effects for decommissioning and closure are expected to be low in magnitude, regional, long term, continuous, not reversible, negative, high in certainty, and not significant (minor). The level of confidence for all predictions is high. Table 8.2.2-14 summarises these effects by project development phase for out-migration of job seekers and their dependents.

Table 8.2.2-14: Residual Effects Assessment by Project Development Phase for Out-Migration of Job Seekers and Their Dependents

Parameter	Stage Of Development / Rating			
Stage of Project development	Construction	Operations	Decommissioning and closure	Post-closure
Residual effect	Decrease in population	n/a	Decrease in population	n/a
Effect attribute				
Magnitude	Low	n/a	Low	n/a
Spatial extent	Regional	n/a	Regional	n/a

Parameter	Stage Of Development / Rating			
Duration	Short-term	n/a	Long-term	n/a
Frequency	Continuous	n/a	Continuous	n/a
Reversibility	yes	n/a	no	n/a
Direction	Negative	n/a	Negative	n/a
Certainty	high	n/a	high	n/a
Residual effect significance	Not significant (minor)	n/a	Not significant (minor)	n/a
Level of Confidence	High	n/a	High	n/a

Note: n/a - not applicable

Given the relatively small magnitude of the population effect, which would not exceed historic levels, population effects during all project phases are considered to be not significant (minor).

8.2.2.8 Cumulative Effects Assessment

8.2.2.8.1 Rationalisation for Carrying Forward Project Related Residual Effects Into the Cumulative Effects Assessment

The assessment of potential Project effects on regional demographics was conducted in the context of local, regional, and provincial level supply and demand for labour. It is expected that other projects would move forward and compete with the proposed Project for employees and contractors. To the degree LSA / RSA labour is not available, the proponent will draw from the very large supply of skilled trades provincially and nationally, as well as implement local training for those who are unemployed, if appropriate. The mobility of the labour market (as well as adjusting employment packages) are mechanisms for the labour market to address imbalances and negate the role that migration may contribute to the adjustment process. Thus the population effect may not be amplified at all by considering the effect of other similar projects proceeding. In addition, the population effect from the proposed Project is expected to be very slight. For these reasons, substantial cumulative effects are not expected.

Because proposed Project effects for all phases were already assessed in the context of current and forecast economic activity in the study region, which includes the LSA and the RSA, no further assessment of cumulative effects is required. In addition, the residual effects are very small, there is good existing capacity in the RSA, and the Project contribution to cumulative effects is unlikely to be detectable. This, and the lack of VC-specific effects data from potentially overlapping projects, means it is impractical to conduct a cumulative effects assessment for this VC (see Table 8.2.2-15).

Table 8.2.2-15: Project-Related Residual Effects - Rationale for Carrying Forward Into the Cumulative Effects Assessment

Project Component	Project Phase	Residual Effect	Rationale	Carried Forward In CEA
All	C, O, D/C	Changes in and out-migration create small changes in population	The low magnitude of expected changes in population in the RSA and the nature of the assessment method combine to indicate that Project contribution to cumulative effects is unlikely to be detectable	No

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

8.2.2.8.2 Interaction Between Regional Demographics and Other Past, Present or Future Projects / Activities

As discussed above, there are no other projects anticipated to interact with the proposed mine site area, therefore there is no discussion of this potential interaction.

8.2.2.8.3 Mitigation Measures

As the assessment of effects specific to the proposed Project has already been conducted in the context of other proposed projects and their effects on regional demographics, no additional mitigation measures are required.

8.2.2.8.4 Potential Residual Cumulative Effects and Their Significance

The potential residual effects on regional demographics are the same as the effects related to the proposed Project, as stated above.

8.2.2.9 Limitations

Proposed Project effects on regional demographics depend on the number of in-migrants and their characteristics, which in turn depend on prevailing economic conditions and the degree of hiring of locally and regionally available unemployed persons. If existing residents who would otherwise be unemployed take employment positions that are directly or indirectly supported by the proposed Project, the need to draw persons from outside the RSA is minimised. Hence, the economic conditions in the RSA during each proposed Project phase would directly influence the availability of locally unemployed persons. Nevertheless, even if there is a relatively high level of unemployment, the proponent may need to implement effective training programs so that the unemployed can obtain the required skills.

It is also noted that hiring local persons who would otherwise be employed may attract new in-migrants to fill vacated positions. This is largely outside the proponent's direct control as

it is the function of an efficient labour market. The proponent estimates that local hires would comprise approximately 20% of their direct labour needs, so this effect is not large in magnitude.

Given the proponent's expectations, most of its labour force would consist of non-RSA residents that will "commute" to the mine site on a three-weeks-on three-weeks-off shift schedule. The proponent believes it would be competing with other projects for labour and those other projects are offering subsidised travel to allow individuals to maintain existing household arrangements. The proponent is proposing to at least match those inducements. Nevertheless, the presumption is that the proponent's future employees (particularly during operations) would prefer to continue their pre-Project place of residence. It is anticipated that there would be exceptions to this planning assumption as some employees may prefer to relocate to the RSA.

It may be the case that Nisga'a persons may return to the LSA to take advantage of employment opportunities related to the proposed Project. While this may have a population effect, and result in an increasing demand on services and infrastructure, their demographic characteristics are expected to be very similar to the resident population of the LSA.

8.2.2.10 Conclusion

Overall, proposed Project effects on regional demographics would be not significant (minor) throughout the proposed Project life because the proposed Project would not draw large numbers of new residents to the area. This is because of the remote location of the proposed Project and the proponent's preference to operate a camp to accommodate workers during construction and operations.

8.2.3 Social VC #2: Housing

8.2.3.1 Introduction

The AIR require an examination of the housing requirements and an evaluation of the Project settlement options with specific reference to the potential housing needs of employees and migrants. The primary issue is how to meet the accommodation requirements of Project employees without adversely affecting the housing market in the LSA and RSA. Proposed Project activities would create housing demand starting with construction, continuing through operations, and then gradually declining toward baseline conditions post-closure.

The proposed Project definition includes on-site construction and work camps able to accommodate all workers at all times. However, the proposed Project would likely induce some in-migration to the RSA, creating demand that cannot be met by on-site camps. This demand would be considered relative to the existing stock or developable potential as appropriate.

8.2.3.1.1 Relevant Legislation and Legal Framework

There is no specific legislative requirement for consideration of proposed Project effects on housing. However, it is common practice to estimate the potential effects as it assists public and private agencies planning for future capacity requirements. This VC has therefore been included in the AIR for the proposed Project.

Most people obtain their housing needs by participating in the real estate market, where buyers and sellers willingly engage in exchange. Regulations of different types can be set by all three levels of government, but within these parameters the public is generally free to obtain the housing they so choose.

The *National Housing Act* (*NHA*) (Government of Canada 1985) promotes construction of new houses, repair and modernisation of existing houses, and improvement of housing and living conditions. The *NHA* provides Canada Mortgage and Housing Corporation (CMHC) with a range of authorities and tools to address housing and related needs of Canadians. The potential point of interaction between federal jurisdiction and Project housing issues is in the area of financing for permanent housing.

The BC Housing Management Commission (BC Housing) fulfills the government's commitment to the development, management and administration of subsidised and non-market housing. BC Housing provides programs and resources to assist residents in greatest need of emergency and affordable housing, and plays an important role in home ownership by licensing residential builders, administering owner builder authorisations, overseeing the third-party home warranty insurance system, and carrying out research and education to improve the quality of construction of new homes.

The form and character of the regional and local housing stock is determined mainly through local and regional government and their land use policies. The *Local Government Act* (Government of BC 1996e) and the *Land Titles Act* (Government of BC 1996d) empower local and regional governments with the planning tools, permitting measures, and subdivision powers to control the use and development of lands and buildings for any and all purposes (outside of federal lands and reservations). This includes enforcement of national and provincial building codes in the permitting and inspection processes. Such policies and regulations may be reflected in municipal and regional district by-laws, including Official Community Plans.

The Government of Canada annually invests in on-reserve housing needs of First Nations, through Aboriginal Affairs and Northern Development Canada (AANDC) and CMHC. ANDC provides either subsidies or assistance through the On-Reserve Housing Policy, introduced in 1996. It allows First Nations to play a key role in decisions about how, where and when housing funds are invested. These funds can be used to build and renovate houses, as well as contribute towards costs such as maintenance, insurance, debt servicing, and the planning and management of a housing portfolio. AANDC does not cover the full cost of housing, and First Nations and their residents must secure other sources of funds to fully

construct a housing unit and / or establish a housing authority. Further context for Nisga'a housing issues is presented in Section 8.2.3.4.1.

8.2.3.1.2 Spatial Boundaries

The proposed Project would be located on Alice Arm in the north coast area of BC. It is located in the central section (Area A) of the RD of Kitimat-Stikine (Figure 8.2.2-1). The communities closest to the mine site include the four villages on Nisga'a Lands (Gitwinksihlkw; Gingolx; Laxgalts'ap; and New Aiyansh), as well as the Kitsault Resort and Alice Arm. These communities and the villages on Nisga'a Lands are considered to comprise the LSA for the purpose of describing social conditions and assessing social effects.

The broader RSA for describing social baseline conditions is defined to include four distinct regions and major communities:

- The DM of Stewart (located in the Kitimat-Stikine RDEA A);
- Kitimat-Stikine RDEA B, including the Village of Hazelton, the DM of New Hazelton and numerous Indian reserves (Gitanmaax 1, Gitsegukla 1, Sik-e-dakh 2, Kispiox 1, Hagwilget 1, Gitwangak 1, Gitanyow 1, Moricetown 1, Bulkley River 19, and Coryatsaqua (Moricetown) 2);
- The Town of Smithers; and
- The Terrace CA, which includes the City of Terrace, the rural populations of Kitimat-Stikine RDEA C (Part 1) and RDEA E, and four reserves (Kitsumkaylum 1, Kitselas 1, Kshish 4, and Kulspai 6).

These groupings were selected to reflect SC census subdivisions and areas that might be called upon to provide labour, goods, and services required for mine construction and operation.

The reserves listed above belong to a number of First Nations. The Kitimat-Stikine RDEA B includes reserves for the following First Nations:

- Gitanmaax (Gitanmaax 1 reserve);
- Gitanyow (Gitanyow 1 reserve);
- Glen Vowell (Sik-e-dakh 2 reserve);
- Kispiox (Kispiox 1 reserve);
- Gitsegukla (Gitsegukla 1 reserve);
- Gitwangak (Gitwangak 1 reserve);
- Hagwilget Village (Hagwilget 1 and Bulkley River 19 reserves); and
- Moricetown (Moricetown 1 and Coryatsaqua (Moricetown) 2 reserves).

The Gitanmaax, Gitanyow, Glen Vowell, and Kispiox First Nations are part of the Gitxsan Local Services Society. The Terrace CA includes the reserves of two First Nations: Kitsumkaylem (Kitsumkaylum 1) and Kitselas (Kitselas 1, Kshish 4, and Kulspai 6). Potential effects on these First Nations are subsumed in the assessment of proposed Project effects on Kitimat-Stikine RDEA B and the Terrace CA.

8.2.3.1.3 Temporal Boundaries

The temporal boundaries for assessment of social effects reflect the duration of various activities related to the proposed Project. For assessing the effects of construction, the analysis focuses on proposed Project activities over the 25-month window beginning in the first quarter (Q1) of 2012. For assessing operations effects, the analysis focuses on the 15-year window of 2014 to 2029, and estimates average effects during a typical year of operations. The effects of decommissioning and closure focus on activities that occur in the 15 to 17 years following 2029. The post-closure phase is not assessed as it resembles base case conditions and thus is not anticipated to produce housing effects.

8.2.3.2 Information Source and Methods

Generally accepted EA methods were used to determine potential Project effects on housing. The baseline conditions consist of data on the existing housing stock, including: permanent, temporary, and rental components; residential development trends; real estate prices; occupancy costs; and a discussion of the developable land base. Information and statistics were obtained from BC Stats, the BC Real Estate Association, CMHC, the Northern BC Real Estate Board, and the local government. Key informant interviews were conducted with housing representatives to fill data gaps and confirm the nature, scope, and likelihood of proposed Project residual effects.

The accommodation requirements for the proposed Project workforce and contractors are to be met by a combination of camp facilities provided by the proposed Project, and existing and forecast available accommodation and housing units in the LSA and RSA. Impacts on housing come from the labour market and population assessments, which estimate the scale and timing of new housing demand based on its direct, indirect, and induced components.

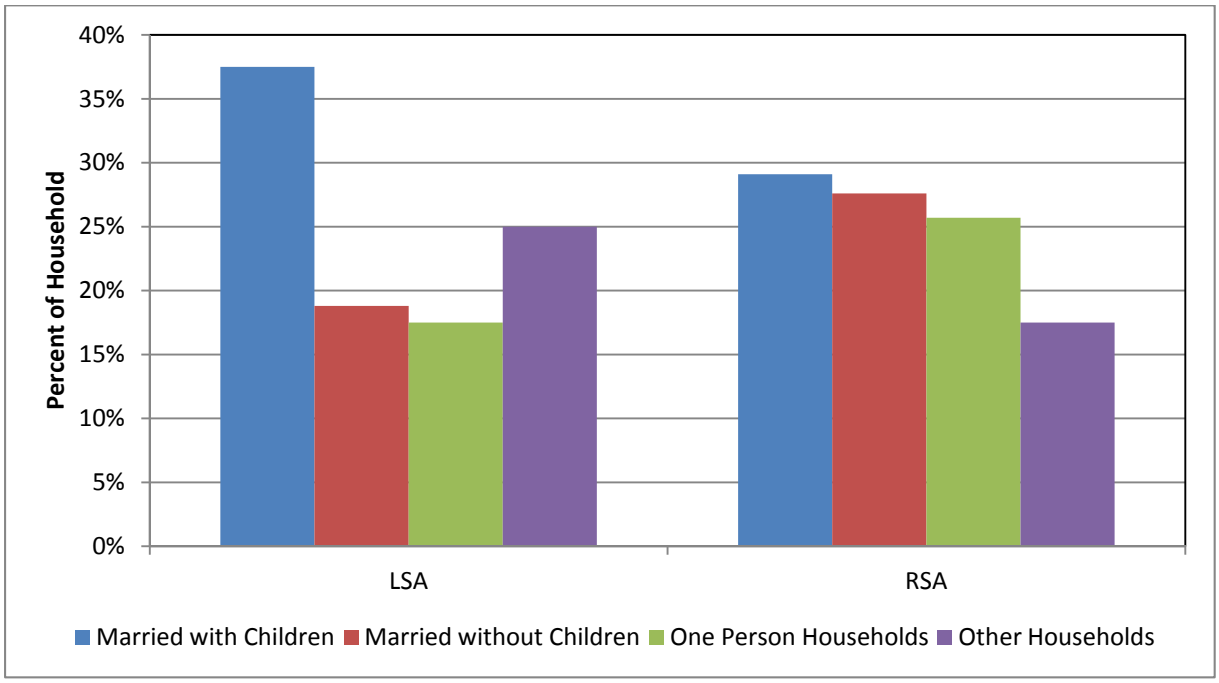
8.2.3.3 Detailed Baseline for Housing

8.2.3.3.1 Household Structure

Household structure is different from family structure in that households may consist of more than one family or may consist of groups of unrelated adults. Most households in the Nisga'a Villages (37.5%) consisted of couples (married or common-law) with children. Couples without children accounted for 18.8% of total households in the three communities.

For households in the RSA, couples with children were fewer than among the Nisga'a Villages, accounting for 29.1%. Couples without children accounted for 27.6% of total

households in the RSA (Figure 8.2.3-1). There was an average of 3.4 persons per household among the three Nisga'a Villages in 2006, compared to 2.4 in the RSA.

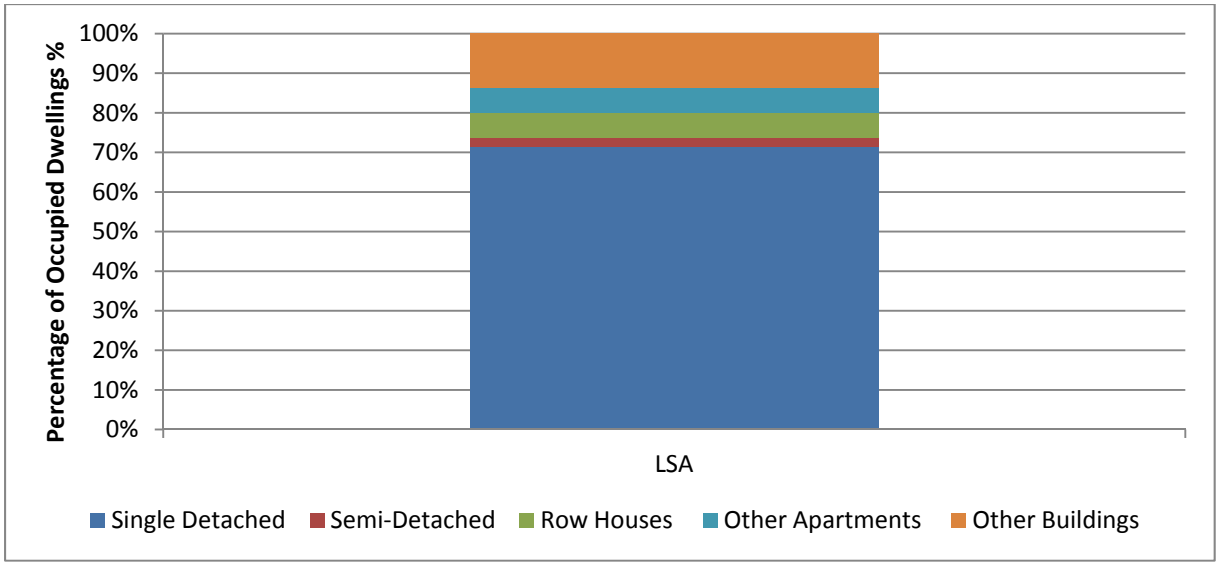


Source: SC 2007

Figure 8.2.3-1: Household Structure in the Local Study Area, Regional Study Area, 2006

8.2.3.3.2 Dwelling Type

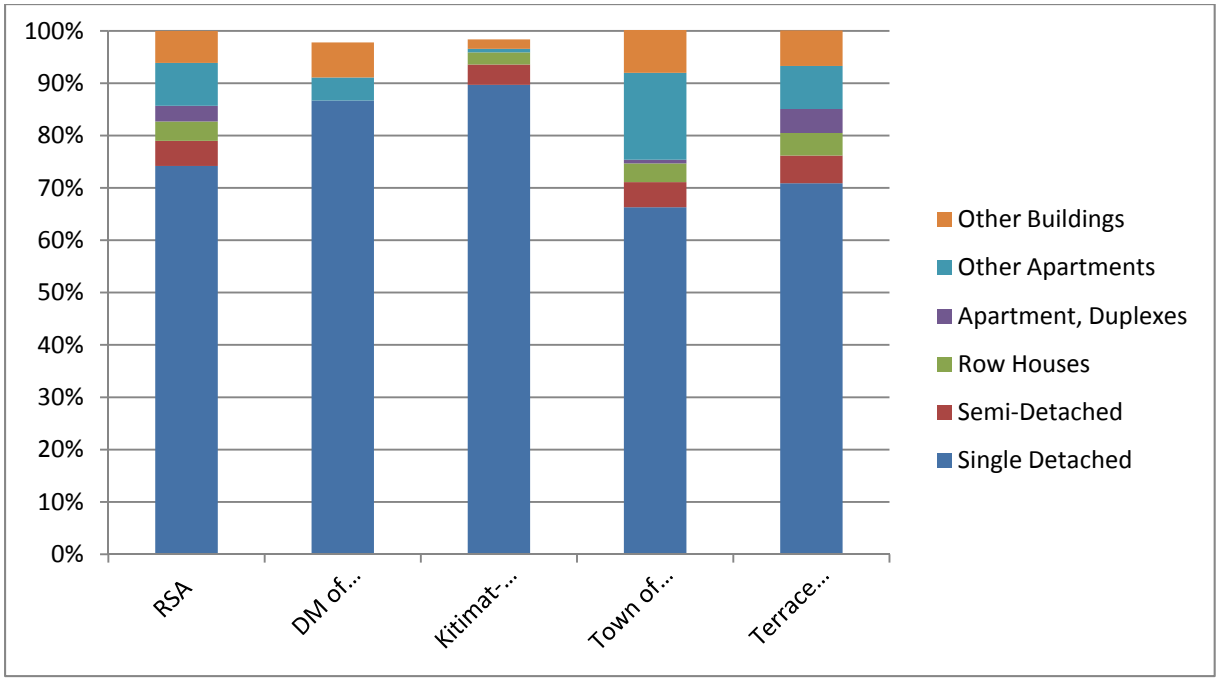
In 2006, there were about 400 private dwelling units in the LSA, 71.3% of which were single family dwellings. The remainder consisted of various types of multi-family dwellings, including semi-detached houses (2.5%), row houses (6.2%), apartments (6.3%) and other dwellings (15.0%) (Figure 8.2.3-2). Of the private dwellings, 74.7% were occupied by the owners while the other 25.3% were rented. Just over half of the housing (57.8%) was constructed between 1986 and 2006, with the balance (25.3%) being constructed prior to 1986. Overall, 40.0% of housing in the three communities was considered to be in need of major repair.



Source: SC 2007

Figure 8.2.3-2: Characteristics of Occupied Dwellings in the Local Study Area, 2006

Single-detached homes accounted for 74.2% of all occupied dwellings within the RSA in 2006; most of these were owned (72.7%) rather than rented (25.3%). This high home ownership demonstrates a strong commitment by people to their respective communities. The remainder of the housing supply consisted of various other types of multi-family dwellings, including semi-detached houses (4.8%), row houses (3.7%), apartment duplexes (3.0%), other apartments (8.2%), and other dwellings (6.1%). Kitimat-Stikine RDEA B had the highest rate of home ownership (89.4%), followed by the DM of Stewart (86.7%), Terrace and area (70.9%), and Smithers (66.3%) (Figure 8.2.3-3).



Source: SC 2007

Figure 8.2.3-3: Characteristics of Occupied Dwellings in the Regional Study Area, 2006

The average housing prices in the RSA show that rural-based communities or RDs had lower housing costs than their urban counterparts. The average cost of a home in the DM of Stewart, as an example, was $57,488, compared to urban areas such as the Terrace CA and Smithers, at $165,989 and $178,244, respectively (SC 2007).

Much of the housing stock in the RSA is more than 20 years old. About 72.8% of housing was constructed before 1986, compared to 27.1% between 1986 and 2006. Additionally, 16.1% of all housing in the RSA was in need of major repair.

8.2.3.4 Cultural Ecological or Community Knowledge

8.2.3.4.1 Nisga'a Nation

According to desk-based research, housing in Nisga'a Villages is limited and, in some villages, limited land base hinders expansion of housing to meet growing needs. The Nisga'a Villages and village-based housing committees are responsible for daily operations and delivery of management, financing, renovations, and new construction of housing in the Nisga'a Villages. The NFA is, for the most part, silent on housing, with the exception of identifying the Nisga'a investment trust as a tool for Nisga'a citizens to obtain a low- or zero-interest loan to "acquire, construct or renovate a residential property for their own habitation in British Columbia" (Government of Canada 2010). According to paragraph 47 of Chapter 11 of the NFA, the Nisga'a Nation can make laws with regard to "the use,

management, planning, zoning, or development of Nisga'a Lands" (Government of Canada 2010). Part C (Section 13.2.3) also provides information on the Nisga'a housing context.

The Nisga'a ESCIA (Rescan 2012) also specifically addresses potential effects of the proposed Project on Nisga'a Nation rights, interests, and concerns as they relate to the NFA. Section 14.0 of the Application (Nisga'a Effects Assessment), also provides additional detail and context to the conservative estimates of the social and economic effects of the LSA and RSA based on data from the BC Input-Output Model (BCIOM) (with input from the proponent).

8.2.3.4.2 Aboriginal Groups

It is not apparent from desk-based research what interest in housing related to the proposed Project that potentially affected Aboriginal groups may have. Part D (Section 16.4) of the Application (for Metlakatla only) and the Road Use Effects Assessment (Appendix 8.0-C) provide additional information on the Aboriginal social context in the northwest region of BC. Future engagement efforts with each group may reveal more on this matter.

8.2.3.5 Past, Present, or Future Projects / Activities

The baseline information presented in Sections 7.2.3.3 and 8.2.2.3 reflects changes in regional economic activity and the related demographic indicators that have occurred between 2006 and 2009. In terms of future employment, income, and population in the region, conditions would be influenced by other major projects that would be competing for labour, goods, and services. A list of these major projects is published by the BC Ministry of Finance, and a summary of major projects in the study area that have been proposed, are on hold, and have started is provided in Table 7.3.2-6. The table shows major projects located near Alice Arm, Iskut, Smithers, Stewart, and Terrace.

The implications of these projects for the regional population have been considered in the analysis of the demographic VC (e.g., the LHA population forecasts), which is a key pathway to housing effects. As a result, this housing effects assessment specific to the proposed Project is also inherently cumulative in nature.

8.2.3.6 Potential Effects of the Proposed Project and Proposed Mitigation

8.2.3.6.1 Identification and Analysis of Potential Project Effects

The population assessment examined how the proposed Project would add to the existing and future expected populations in the LSA and RSA. Residents working on the proposed Project are assumed to already have housing as reflected in the baseline. Non-residents who commute to the proposed Project footprint do not create a population impact or otherwise affect housing demand. Non-residents who relocate to the LSA / RSA would create a population impact and, by extension, increase the demand for housing.

The timing of housing effects reflects population change - demand would rise once construction starts and would continue in a relatively steady state through to closure, when it

would decline rapidly. The completion of construction and onset of operations occur within a relatively short period of time, effectively offsetting demand changes. Decommissioning and closure would involve a small population decline and a return of demand to base case conditions. As noted in the population assessment, some in-migrants may choose to remain in the study area after closure and contribute to a more balanced market; however, this would not be considered a Project effect. Table 8.2.3-1 presents likelihood of occurrence of the potential direct project effect during each project phase.

Table 8.2.3-1: Potential Direct Project Effects on Housing

Project Component	Project Phase	Potential Direct Project Effect	Likelihood Of Occurrence
All	C	Changes in in- and out-migration affect housing demand and change the housing market	Medium
	O	In-migration creates housing demand and changes the housing market	Medium
	D/C	Out-migration decreases housing demand and changes the housing market	Medium
	PC	None	High

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

Housing demand is linked to the expected change in population attributable to the proposed Project. Other social and economic components would be affected by population and housing effects, but these interactions are identified and addressed separately as specified in the AIR and for subsequent social VCs later in this section. Table 8.2.3-2 summarises indirect proposed Project effects on other VCs during construction, operations, closure and de-commissioning.

Table 8.2.3-2: Potential Indirect Project Effects on Other Valued Components

Direct Project Effect (Adverse or Positive)	Project Phase	Potential Indirect Project Effect	Carry Forward (Yes / No)	Rationale
Changes in in- and out-migration affect housing demand and change the housing market	C, O, D/C	New population would change demand for all other public services and infrastructure	No	These indirect effects are assessed in other social VCs

Project phase: C - construction; D/C - decommissioning and closure; O – operations

The potential interaction of proposed Project housing effects on other VCs is outlined in Table 8.2.3-3. There is no cause-effect linkage to environmental, land use, economic, heritage or health VCs. A potential interaction between residual housing effects and other social VCs should be viewed as attributable directly to demographic change, rather than via housing changes, which are themselves induced by demographic change. The act of

participating in the housing market, whether through purchase, sale or renting, does not directly affect other social VCs.

Table 8.2.3-3: Summary of Potential Interaction Between Project Direct Effects on Other Valued Components and Housing

Direct Project Effect	Air Quality and Climate Change	Noise and Vibration	Hydrogeology	Groundwater Quality	Freshwater and Sediment Quality	Surface Hydrology	Freshwater Fisheries	Marine Water Quality	Marine Biota	Terrestrial Environment	Wildlife and Their Habitat	Environmental Health	Economic	Social	Heritage	Health	Nisga'a Nation Land Use	Aboriginal Groups Land Use
Changes in in- and out-migration affect housing demand and change the housing market.	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

Legend: Interaction definitions: o - interaction; - - key interaction; □□□ + - benefit; NI - no interaction

Changes in housing demand, as outlined in Table 8.2.3-4, are carried forward in this assessment to a consideration of mitigation measures. Even though the magnitude of change is minor, the direction is characterised as alternatively adding then subtracting from total demand. Effects can be both negative and positive, reflecting the fact that housing purchases are effectively a transfer of wealth between two willing parties, and that an increase in demand can be negative if supply is constrained and positive when it is not. Periods of rising demand and constrained supply conditions would favour sellers, whereas a reverse scenario would favour buyers. In all housing transactions there would be beneficiaries.

Table 8.2.3-4: Summary of Potential Project Effects to be Carried Forward Into the Assessment for Housing

Adverse Effects / Positive Effects	Project Phase	Direction
Changes in in- and out-migration affect housing demand and change the housing market	C	+/-
In-migration creates housing demand and changes the housing market.	O	+/-
Out-migration decreases housing demand and changes the housing market.	D/C	-

Project phase: C - construction; D/C - decommissioning and closure; O – operations

8.2.3.6.2 Mitigation Measures

It is important to note that the proponent acting alone cannot unilaterally decide upon and implement most of the mitigation measures required to manage social effects. Governments are responsible for planning and implementing social programs and delivering public services that address social effects concerns. Furthermore, individuals and families must make lifestyle decisions that are consistent with enhanced social circumstances. As a result, all parties must share responsibility for social effects management in order to realise the greatest benefits derived from improved social conditions.

In the LSA, the proponent will work with NLG to minimise the in-migration of members where it is deemed to be beyond the capacity of local government to respond to new housing demands. In recognition of the concerns that mine closure may have on employment, population, and housing in the LSA, the proponent will commit to working with communities around mine closure issues. It will be important to identify and evaluate various options to help offset closure issues, for example, over-supply of housing. Table 8.2.3-5 summarises proposed Project effects and proposed mitigation by phase.

Table 8.2.3-5: Potential Project Effect by Project Phase on Housing and Mitigation Measures

Project Effect	Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
Changes in in- and out-migration affect housing demand and change the housing market	C	Work with NLG to minimise in-migration	Unknown
In-migration creates housing demand and changes the housing market	O	Work with NLG to minimise in-migration	Unknown
Out-migration decreases housing demand and changes the housing market.	D/C	Work with NLG to minimise in-migration	n/a

Project phase: C - construction; D/C - decommissioning and closure; O – operations

Note: n/a - not applicable; NLG - Nisga'a Lisims Government

8.2.3.7 Potential Residual Effects and Their Significance

8.2.3.7.1 Potential Residual Effects After Mitigation

Residual effects of the proposed Project on housing are summarised in Table 8.2.3-6.

Table 8.2.3-6: Summary of Residual Effects for Housing

Project Phase	Residual Effect	Direction
C	Changes in in- and out-migration affect housing demand and change the housing market	+/-
O	In-migration creates housing demand and changes the housing market	+/-
D/C	Out-migration decreases housing demand and changes the housing market	-
PC	None	n/a

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

Note: n/a - not applicable

8.2.3.7.1.1 Construction Phase

Current plans call for the construction workforce to be housed in a work camp at the mine site, and to be bussed to and from the camp at the beginning and end of each work rotation. On-site accommodation would be available for all employees at all times during the construction period. Most of the construction workforce would not be residents of either the LSA or the RSA, but instead would come from other regions of BC and Canada. Because of the short duration of construction, these workers are not expected to consider LSA or RSA residency but instead would fly in and out on the three weeks on / one week off work schedule. Terrace would be the staging area, with all workers being bussed to and from the

mine site at the proposed Project. Any demands for additional housing would be associated with construction workers who migrate into the region.

According to the assessment of demographic effects, in the LSA / RSA incremental demand would be at most approximately 167 housing units during the 25-month construction period. According to census data, the population declined more than 5.9% in the RSA between 2001 and 2006, while the number of occupied dwellings also declined. BC Stats estimates of inter-census populations up to 2010 suggests this declining trend has subsided and the population is growing again, albeit slowly. The average annual number of residential building permits in the RSA over the last five years has been between 50 and 60 units. According to real estate representatives, the number of current Multiple Listing Service (MLS) listings in the Terrace area is 170, while it is 50 for the Smithers area (Materi 2011 pers. comm.; Lund 2011 pers. comm.). The RSA listing total is over 220. The latest BC Real Estate Association information shows the northern BC region to be experiencing a "buyer's market", with a residential supply of approximately eight months. Prices have remained relatively stable since 2008, while unit sales continue to fluctuate.

Construction workers are more likely to seek temporary accommodation options rather than purchase housing, especially if they are on a short- or medium-term contract. With an available rental stock, along with a sizeable inventory of hotel / motel units (approximately 700 rooms) and at least 500 RV and campground units, the proponent anticipates that there should be few problems accommodating those workers who would be transiting between the RSA and the camp at the mine site.

8.2.3.7.1.2 Operations Phase

When compared to construction, Project operations would result in slightly lower incremental demand for housing in the LSA and RSA, but this demand would extend for a longer period – 15 years. The construction camp would be converted to an operating camp capable of accommodating all employees for the duration of operations. Skill and experience requirements mean that 80% of the operating workforce would be from outside the LSA or the RSA, and are unlikely to consider relocating to the RSA (because of shift scheduling and subsidised flights) and thus would not be contributing to new housing demand. The other 20% of workers would be residents of the LSA and RSA who already have homes. Only some of the local and regional workers would be unemployed, but for those workers who leave other jobs that must be taken by new in-migrants (after accounting for unemployment in indirect and induced positions), some incremental housing demand is anticipated.

The demographic assessment shows that up to 235 persons could be new residents of the LSA / RSA, most likely in Terrace or Smithers. This would result in a total increase in demand of about 90 housing units over the proposed Project's 15-year operating period. The MLS has close to 220 listings in the Terrace and Smithers areas, ranging from low-price condominium units at $150,000 to $200,000 up to estate properties of more than $600,000. Terrace has a new fully serviced, 25-lot subdivision (Golden Place) with approximately 17 available lots ready for new home construction. Discussions with real estate representatives indicated that the market was currently balanced but favouring the buyer

(Materi 2011 pers. comm.; Lund 2011 pers. comm.). Prices remain stable and well below those in other regions of the province, while local builders are available for contract construction. Terrace and Smithers have apartment vacancy rates among the highest in the province, with rents among the lowest in the province. Unless there is a considerable turnaround in the regional economy, mine workers coming to the region, or other in-migrants taking up job vacancies created by those taking up mine work, are unlikely to encounter difficulties meeting their housing needs. Therefore, housing effects in the LSA / RSA are expected to be minimal.

8.2.3.7.1.3 Decommissioning and Closure Phase

Once the mine closes, the 90 existing positions would decline to 10 to 20 positions, and most of these workers are expected to continue residing in the LSA / RSA. Given the small magnitude of housing demand during construction and operations, closure is not expected to result in new supply above and beyond what would normally be expected in the regional economy, which has historically fluctuated in response to resource development trends.

8.2.3.7.2 Significance of Potential Residual Effects

The proposed Project construction effects on housing are characterised as low in magnitude, regional, short-term, continuous, reversible, and high in certainty. Given the relative balance in the market (i.e., available supply and reasonable, stable prices) the effect of increased demand for housing is considered neither positive nor negative. The effects are considered to be not significant (negligible).

Proposed Project operations effects are characterised as low in magnitude, regional, long-term, continuous, and reversible. Given the relative balance in the market (i.e., available selection and supply, as well as reasonable, stable prices) the effect of increased demand for housing is considered to be both positive and negative and not significant (negligible). Confidence in this assessment for the RSA is high, but because of the uncertainty of migration behaviour of potential Nisga'a and Aboriginal employees, there is less confidence regarding effects in the LSA.

The effects of mine decommissioning and closure on housing are described as negative, low in magnitude, regional, short-term, continuous, and reversible. Confidence in this assessment is less than for the construction and operations assessments because of the time factor; closure would occur far into the future, by which time the prevailing baseline would have changed considerably. Nevertheless, given the magnitude and direction of the effects, they are considered to be not significant (negligible).

A summary of residual effects on housing is presented in Table 8.2.3-7. Residual effects for all but post-closure are expected to be low in magnitude, contained within the RSA, continuous, reversible, and high in certainty throughout the 19 years leading up to post-closure. Effects are considered to be short term during construction, and long term during operations, and decommissioning and closure. For both construction and operations, effects are expected to be both positive and negative; they are expected to be negative

during decommissioning and closure. Effects are expected to be not significant (negligible) during construction and operations, and not significant (minor) during decommissioning and closure. In light of the quantifiable conditions of the local and regional housing markets, understanding of similar projects in the past, and the fact that incremental demand would appear in the market in the early years of construction and operations when current conditions are less likely to change, there is a high level of confidence in this assessment.

Table 8.2.3-7: Residual Effects Assessment by Project Development Phase for Housing

Parameter	Stage Of Development / Rating			
Stage of Project development	Construction	Operations	Decommissioning and Closure	Post-closure
Residual effect	Changes in in- and out-migration affect housing demand and change the housing market	In-migration creates housing demand and changes the housing market	Out-migration deceases housing demand and changes the housing market	n/a
Effect attribute				
Magnitude	Low	Low	Low	n/a
Geographic extent	Regional	Regional	Regional	n/a
Duration	Short-term	Long-term	Long term	n/a
Frequency	Continuous	Continuous	Continuous	n/a
Reversibility	Reversible	Reversible	Reversible	n/a
Direction	+/-	+/-	-	n/a
Certainty	High	High	High	n/a
Residual effect significance	Not significant (negligible)	Not significant (negligible)	Not significant (minor)	n/a
Level of confidence	High	High	High	n/a

Note: n/a - not applicable

8.2.3.8 Cumulative Effects Assessment

8.2.3.8.1 Rationalisation for Carrying Forward Project Related Residual Effects Into the Cumulative Effects Assessment

As noted in Table 8.2.3-8, overlap with other future projects in the RSA might occur but is unlikely to be discernible during the construction and operations phases. In addition, the demographic analysis and, by extension, the housing assessment is inherently cumulative in nature. Considering the lack of VC-specific effects data from potentially overlapping projects, it is impractical to conduct a cumulative effects assessment for this VC. For these reasons, further cumulative effects are not considered necessary in this assessment.

Table 8.2.3-8: Project Related Residual Effects - Rationale for Carrying Forward into the Cumulative Effects Assessment

Project Component	Project Phase	Residual Effect	Rationale	Carried Forward In CEA
All	C, O, D/C	Changes in in- and out-migration affect housing demand and change the housing market	The low magnitude of expected demand and good existing capacity for a higher population in the RSA, and the nature of the assessment method combine to indicate that the project contribution to cumulative effects is unlikely to be detectable	No

Project phase: C - construction; D/C - decommissioning and closure; O – operations

Note: CEA - cumulative effects assessment; RSA - Regional Study Area

8.2.3.8.2 Interaction Between Housing and Other Past, Present or Future Projects / Activities

As discussed above, there are no other projects anticipated to interact with the proposed mine site area, therefore there is no discussion of this potential interaction.

8.2.3.8.3 Mitigation Measures

As the assessment of effects specific to the proposed Project has already been conducted in the context of other proposed projects and their effects on housing, no additional mitigation measures are required to address cumulative effects.

8.2.3.8.4 Potential Residual Cumulative Effects and Their Significance

The potential residual effects on housing, and associated mitigation measures, are the same as the effects specific to the proposed Project stated above.

8.2.3.9 Limitations

The housing effects assessment relies in large part on the population effects assessment, which concludes that population change attributable to the proposed Project would be well within historic variations and thus not significant. The primary underlying assumption is that most of the workforce would originate from outside the RSA and would not be seeking accommodation either regionally or locally. During operations, it may be that some employees would choose to relocate to the RSA, a factor taken into account in this assessment.

The greatest area of uncertainty is LSA effects. Even though accommodation options are limited in the Nass Valley, it may be that word of mouth among First Nations members would cause them to migrate back to the LSA in the hopes of employment with the proposed Project. Census data suggests that household size is higher than the provincial average while household structure is more flexible, so the community may be able to absorb

returning members without adding to the housing stock. If new housing is required, then the current options are limited. There are only three traveller accommodation facilities in the Nass Valley. Resources such as the Nisga'a Urban Housing program, which provides grants to members who wish to build a house in an urban area like Terrace, could help balance LSA housing demand. Beyond that, housing developments on Nisga'a Lands do exist, and while construction activity in the recent past has been low, it is likely that employment income and other economic benefits from the mine would be sufficient to address any new permanent housing demand.

8.2.3.10 Conclusion

The remote location and the proponent's preference to operate a camp for construction and operations would lead to negligible population impacts in the LSA / RSA. A balanced housing market with ample supply of temporary accommodation, permanent housing, and available developable residential properties is expected to absorb any new demand coming onto the market as a result of construction and operation of the proposed Project. As a result, the residual effects on housing are likely to be not significant (negligible).

8.2.4 Social VC #3: Regional Services

8.2.4.1 Introduction

The AIR requires an examination of the regional services and an evaluation of the implications associated with operation and effects of the proposed Project on the LSA and RSA population. The activities at the mine site and camp would create new demand on regional services that would not have existed without the mine. These new demands are primarily associated with providing regional services associated with the movement of workers and supplies to and from the mine and camp over a long length of road in the LSA and RSA, and providing services to the mine camp workforce during construction and operations. There would also be additional demand on regional services as new workers and their families relocate to the LSA and RSA during the proposed Project. Effects on regional education services, and transportation infrastructure and services are discussed in Sections 8.2.7 and 8.2.8, respectively.

8.2.4.1.1 Relevant Legislation and Legal Framework

The proposed Project site will be regulated under the Health, Safety and Reclamation Code for Mines in BC (BC Ministry of Energy, Mines and Petroleum Resources (BC MEMPR) 2008) and Work Safe BC. All off-site services would be provided by various service delivery agencies subject to relevant issue-specific legislation and / or regulation. The service providers would be responsible for addressing any Project effects within the context of their existing regulatory requirements as a matter of normal business practice.

8.2.4.1.2 Spatial Boundaries

The proposed Project is located on Alice Arm in the north coast area of BC, in the central section (Area A) of the RD of Kitimat-Stikine (Figure 8.2.2-1). The communities closest to

the mine site include the four villages on Nisga'a Lands (Gitwinksihlkw; Gingolx; Laxgalts'ap; and New Aiyansh) as well as the Kitsault Resort and Alice Arm. These communities and the villages on Nisga'a Lands are considered to be the LSA for the purpose of describing social conditions and assessing social effects.

The broader RSA for describing social baseline conditions is defined to include four distinct regions and major communities.

- The DM of Stewart (located in the Kitimat-Stikine RDEA A);
- Kitimat-Stikine RDEA B, including the Village of Hazelton, the DM of New Hazelton and numerous Indian reserves (Gitanmaax 1, Gitsegukla 1, Sik-e-dakh 2, Kispiox 1, Hagwilget 1, Gitwangak 1, Gitanyow 1, Moricetown 1, Bulkley River 19, and Coryatsaqua (Moricetown) 2);
- The Town of Smithers; and
- The Terrace CA, which includes the City of Terrace, the rural populations of Kitimat-Stikine RDEA C (Part 1) and RDEA E, and four reserves (Kitsumkaylum 1, Kitselas 1, Kshish 4, and Kulspai 6).

These groupings were selected to reflect SC census subdivisions and areas that might be called upon to provide labour, goods, and services required for mine construction and operation.

The reserves listed above belong to a number of First Nations. The Kitimat-Stikine RDEA B includes reserves for the following First Nations:

- Gitanmaax (Gitanmaax 1 reserve);
- Gitanyow (Gitanyow 1 reserve);
- Glen Vowell (Sik-e-dakh 2 reserve);
- Kispiox (Kispiox 1 reserve);
- Gitsegukla (Gitsegukla 1 reserve);
- Gitwangak (Gitwangak 1 reserve);
- Hagwilget Village (Hagwilget 1 and Bulkley River 19 reserves); and
- Moricetown (Moricetown 1 and Coryatsaqua (Moricetown) 2 reserves).

The Gitanmaax, Gitanyow, Glen Vowell and Kispiox First Nations are part of the Gitxsan Local Services Society. The Terrace CA includes the reserves of two First Nations: Kitsumkaylem (Kitsumkaylum 1) and Kitselas (Kitselas 1, Kshish 4, and Kulspai 6). Potential effects on these First Nations are subsumed in the assessment of proposed Project effects on Kitimat-Stikine RDEA B and the Terrace CA.

8.2.4.1.3 Temporal Boundaries

The temporal boundaries for assessment of social effects on regional services reflect the duration of various activities related to the proposed Project. For assessing construction effects, the analysis focuses on proposed Project activities over the 25-month window beginning in the first quarter of 2012. For assessing operations effects, the analysis focuses on the 15-year window starting in 2014 and ending in 2029, and estimates average effects during a typical year of operations. The effects of decommissioning and closure focus on activities that occur in the 15 to 17 years following 2029. The post-closure phase is not assessed because the employment and associated social effects are small and would resemble base case conditions and there are anticipated to be no effects on regional services.

8.2.4.2 Information Source and Methods

The primary data source utilised for the regional services analysis was the 2006 Canada census, supplemented by administrative data supplied by relevant local, regional, and provincial government agencies. Generally accepted EA methods were used to determine potential Project effects on the baseline public services conditions. This entailed producing estimates of population effects that were compared to existing service levels to determine potential effects of population change.

8.2.4.3 Detailed Baseline for Regional Services

8.2.4.3.1 Health Facilities and Services

Statistics on community wellbeing are not available for individual communities, but are reported for five LHAs that correspond to the various communities in the LSA and RSA, which include the following:

- The Nisga'a Nation;
- Snow Country;
- Upper Skeena;
- Smithers; and
- Terrace.

The information used for this analysis is drawn from the BC Stats (2010) social and economic indices data and outlines key social and economic indicators by LHA, providing in-depth data on a number of wellness conditions in each LHA.

8.2.4.3.2 Local Study Area

In 1984, NLG established the Nass Valley Health Authority (NVHA), which operates a health centre in each Nisga'a Village. The main centre is the James Samuel Gosnell Health Centre, located in New Aiyansh (NVHA 2010; Rescan Environmental Services Ltd. (Rescan 2010).

The NVHA Board of Directors is made up of elected representatives from each Nisga'a Village, representatives from Nass Camp (the non-Nisga'a community in the Nass Valley), and a representative of NLG (NVHA 2010).

The NVHA's approach to health care is rooted in Nisga'a culture and traditional healing practices. Services include primary health care services, community health, and preventative services. Primary health and preventative services include public health, home support and resident care, cultural and community health, mental health and wellness, and youth enrichment (NVHA 2010; Rescan 2010).

8.2.4.3.3 Regional Study Area

Terrace's one hospital, Mills Memorial Hospital, is operated by the Northern Health Authority (NHA) and is a regional centre for medical services, including renal, paediatric, cardiology, obstetrics, ophthalmology, and psychiatric specialists. Its programs have included education, prevention, diabetic education, prenatal and post-partum education, Meals-on-Wheels, community-based health, and public outreach (e.g., concerning road safety). The hospital's capacity has been reduced over the years (Rescan 2010).

Mental health services in Terrace are provided by Terrace Community Mental Health Services, and a psychiatric unit and residential services are provided at the Seven Sisters Residence. The Terraceview Lodge is a long-term care facility for seniors with 75 beds. Residential treatment services are provided by Birchwood Place (Affiliation of Multicultural Societies and Service Agencies of BC (AMSSA) 2008; Rescan 2010).

Smithers and the surrounding area are serviced by the Bulkley Valley District Hospital, which has a range of available health care facilities, services, and specialists. Operated by the NHA, it is the main hospital serving the Bulkley Valley. The hospital provides around-the-clock emergency services, surgical services, cancer care, palliative care, and outpatient services, including laboratory and medical imaging (Town of Smithers 2008; Rescan 2010).

Currently, there are two long-term care facilities for seniors in Smithers. The Meadows is a long-term care facility providing affordable housing for independent seniors with disabilities. It is jointly run by NHA and the Smithers Community Services Association. Additionally, the Bulkley Lodge provides residential care and an extensive activity program for seniors (Town of Smithers 2008).

The Wrinch Memorial Hospital in Hazelton is owned and operated by the United Church of Canada, which has an affiliation agreement with NHA to deliver health care within the Hazelton region of BC. Health services include acute care, dental care, and public and population health programs, in addition to mental health services, and regionally provided home and community care programs (Wrinch Memorial Hospital 2009; Rescan 2010). The hospital is currently facing financial pressures, in addition to challenges recruiting doctors and other staff (CJFW Radio 2010; Rescan 2010).

The Stewart Health Centre offers acute care, home support, public health, physicians, counselling services, a community pharmacy, visiting specialist services, mammography, and ambulance services (Stewart and Hyder 2010).

8.2.4.3.4 Social Services

8.2.4.3.4.1 Local Study Area

Each Nisga'a Village government has its own respective social development department that provides any number of programs, including:

- Basic needs;
- Special needs;
- Guardian financial assistance;
- Adult in-home care;
- National child benefit re-investment;
- Training and employment support services;
- Family violence prevention; and
- Community support services (NLG 2011; Rescan 2010).

Programs offered by the Nisga'a Child and Family Services include Voluntary Care Agreements (to enable parents to find a safe home to place their children during medical treatment or training), Special Needs Agreements, support for adults who provide foster care for Nisga'a children in Nisga'a Family Care Homes, family support services, a youth worker program, community workshops, speech therapy, drug awareness resistance education, psychologist services, family support services, and a recreation program (NLG 2011; Rescan 2010).

8.2.4.3.4.2 Regional Study Area

Social services and support groups in Terrace offer programs in the following areas: anti-poverty; mental health; Big Brothers and Big Sisters; services designed for parents and children, literacy, First Nations women, seniors, victims, workers in transition and disabled people; housing; emergency shelter; and legal services; (City of Terrace 2010).

Smithers Community Services offers programs in the following areas: affordable housing; emergency shelter; community learning; residential support services for young offenders; English as a second language; family support for foster parents; foetal alcohol spectrum disorder services; food security; risk reduction services for children and families; shared support housing; transit; seniors services; volunteer services; youth empowerment; and youth support (Smithers Community Services 2007).

Currently, there is no information available on social services in the Hazelton and Stewart areas.

8.2.4.3.5 Protection Services

This section on protection services includes an overview of policing services, fire and ambulance services. These three protection services are highlighted given their close linkage to per capita demand with policing, fire and ambulance case loads influenced by population and increased traffic activities. A summary of these protection services offered in the LSA and the RSA is provided in Table 8.2.4-1. Services such as the court system and legal aid are not anticipated to be impacted, given a camp-based workforce and small incremental demand on these services over the LSA and RSA.

Table 8.2.4-1: Emergency Protection Services in the Local Study Area and Regional Study Area

	911	Police	Fire	Ambulance
LSA	Emergency phone number operated by the NVHA.	RCMP Lisims / Nass Valley - New Aiyansh 1 corporal, 5 constables, 1.5 public servants, and 1 victim assistance program manager.	The Gitlakdamix Volunteer Fire Department - New Aiyansh	BC Ambulance Service's Northern Region
Terrace	A 911 service is available	Terrace RCMP detachment 5 regular members, 10 municipal employees, 5 public service employees, and 2 victim assistance contractors	City of Terrace Fire Department	1 full-time daytime and 2 part-time call-out ambulances available
Smithers	n/a	Smithers RCMP detachment 1 staff sergeant with a 22-person staff	Smithers Volunteer Fire Department	British Columbia Ambulance Service (BCAS)
Kitimat-Stikine RDEA B	Available	New Hazelton RCMP Detachment	n/a	n/a
DM of Stewart	n/a	RCMP 3 officers	Fire protection office serviced by RCMP	n/a

Note: BC - British Columbia; DM - District Municipality; LSA - Local Study Area; n/a - not available; NVHA - Nass Valley Health Authority; RCMP - Royal Canadian Mounted Police; RDEA - Regional District Electoral Area

Source: BC Ambulance Service 2008; BC MOFR 2007; City of Terrace 2011; City of Terrace Fire Department 2010; Community Living BC 2010; NVHA 2010; Town of Smithers 2010a; Save Our Paramedics 2010

8.2.4.4 Cultural, Ecological or Community Knowledge

8.2.4.4.1 Nisga'a Nation

The Nisga'a Nation has law-making authority over social and health and programs for Nisga'a citizens within Nisga'a Lands. Administration and delivery of provincial and / or federal social and health services on Nisga'a Lands is negotiated with BC, with a key

provision requiring the Nisga'a Nation to provide equal treatment, level, and quality of care for non-Nisga'a citizens living n Nisga'a Lands. Part C (Sections 13.2 and 13.5) provides additional information on the Nisga'a Nation social and health services. The Nisga'a ESCIA (Rescan 2012) also specifically addresses potential project-specific effects on Nisga'a Nation rights, interests, and concerns as they relate to the NFA.

8.2.4.4.2 Aboriginal Groups

Health and social services for each potentially affected Aboriginal group is administered with funding from INAC and / or Health Canada (HC). Generally, there is limited funding and services, which creates a reliance on regional service centres (e.g., Smithers, Terrace, and Prince George) for more complex, long-term care and services for social and health conditions. Depending on the location of the group, this reliance may require travel from various Aboriginal communities to these centres, which adds expense and time. As such, Aboriginal groups have an interest in improved health and social services available in their community of residence. The Road Use Effects Assessment (Appendix 8.0-C) and Part D (Section 18.4 - Metlakatla only) contain additional information on Aboriginal social and health interests. Future engagement efforts with these groups may increase understanding of Aboriginal interests related to regional services.

8.2.4.5 Past, Present or Future Projects / Activities

The baseline information presented in Sections 7.2.3.3 and 8.2.2.3 reflects changes in regional economic activity and the related demographic indicators that have occurred between 2006 and 2009. In terms of future employment, income, and population in the region, conditions would be influenced by other major projects that would be competing for labour, goods, and services. A list of these major projects is published by the BC Ministry of Finance and a summary of major projects in the study area that have been proposed, are on hold, and have started is provided in Table 7.3.2-6. The table shows major projects located near Alice Arm, Iskut, Smithers, Stewart, and Terrace.

The implications of these projects for regional population have been considered in the analysis of the demographic VC (e.g., the LHA population forecasts), which represents a key pathway to regional services effects. As a result, this effects assessment specific to the proposed Project is also inherently cumulative in nature.

8.2.4.6 Potential Effects of the Proposed Project and Proposed Mitigation

8.2.4.6.1 Identification and Analysis of Potential Project Effects

As described in the introduction to this VC discussion, proposed Project effects on regional services will be largely attributable to changes in population, and thus in demands for local and regional public services, as well as changes in traffic on area roads that could result in higher demands for public safety services if there is an increase in accidents. Table 8.2.4-2 describes the potential effects and their likelihood.

Table 8.2.4-2: Potential Direct Project Effects on Regional Services

Project Component	Project Phase	Potential Direct Project Effect	Likelihood Of Occurrence
All	C	Change in traffic volumes to mine site and workforce at mine camp creates new demand on regional services	Low
		Population changes associated with in- and out-migration as workers relocate families to area creates new demand on regional services	Low
	O	Change in traffic volumes to mine site and workforce at mine camp creates new demand on regional services	Low
		Changes from population in- and out-migration as workers relocate families in area creates new demand on regional services	Low
	D/C	Reduction in traffic volumes to mine site and termination of mine camp decreases demand on regional services	Low
		Out-migration of population as workers and their families leave the area	Low

Project phase: C - construction; D/C - decommissioning and closure; O – operations

Demand for regional services are linked to the expected change in population attributable to the proposed Project and increases in traffic. Other social and economic components are related to regional services effects, but these interactions are identified and addressed separately as specified in the AIR and for subsequent social VCs in this section. Thus these indirect effects are not carried forward for consideration as part of mitigation planning. Table 8.2.4-3 summarises indirect proposed Project effects on other VCs.

Table 8.2.4-3: Potential Indirect Project Effects on Other Valued Components

Direct Project Effect (Adverse or Positive)	Project Phase	Potential Indirect Project Effect	Carry Forward (Yes / No)	Rationale
Change in traffic volumes and operation of mine camp creates demand on regional services	All	Traffic and camp operations place demand on other public services	No	Indirect effects are assessed in other social and health VCs
Population change from in- and out-migration creates new demand on regional services	All	New population would change demand for other public services and infrastructure	No	Indirect effects are assessed in other social and health VCs

Note: VC - Valued Component

The potential interaction of Project regional services effects on other VCs is outlined in Table 8.2.4-4. There is no cause-effect linkage to environmental, land use, economic or

heritage VCs. There is a potential interaction between regional services effects and other social VCs. The link with demographics is a one-way interaction; as is noted here, increases in population cause effects on services. Education services are one regional service likely to be affected and these are addressed as a separate social VC in Section 8.2.7.

Table 8.2.4-4: Summary of Potential Interaction Between Project Direct Effects on Other Valued Components and Regional Services

Direct Project Effect	Air Quality And Climate Change	Noise And Vibration	Hydrogeology	Groundwater Quality	Freshwater And Sediment Quality	Surface Hydrology	Freshwater Fisheries	Marine Water Quality	Marine Biota	Terrestrial Environment	Wildlife And Their Habitat	Environmental Health	Economic	Social	Heritage	Health	Nisga'a Nation Land Use	Aboriginal Groups Land Use
Population change in in- and out-migration creates school enrolment demand.	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	O,-	NI	NI	NI	NI

Legend: Interaction definitions: o - interaction; - - key interaction; + - benefit; NI - no interaction

While the interactions described in Table 8.4.2-4 could lead to combined effects, in all cases it is the identified VC that would experience the effect; these effects are described in the appropriate VC sections.

Changes in demand for regional services, as outlined in Table 8.2.4-5 are carried forward in this assessment for mitigation planning and supporting the retention of regional services in the LSA and RSA at levels prior to the Project being initiated. Effects are negative when reflecting increases in demand for a range of services and positive when this demand declines.

Table 8.2.4-5: Summary of Potential Project Effects to be Carried Forward into the Assessment for Regional Services

Adverse Effects / Positive Effects	Project Phase	Direction
Change in traffic volumes to mine site and workforce at mine camp creates new demand on regional services.	C	-
Changes associated with in and out-migration creates additional demand for regional services.		
Change in traffic volumes to mine site and workforce at mine camp creates demand on regional services.	O	-
In-migration creates demand for regional services.		
Change in traffic volumes to mine site and workforce at mine camp reduces demand on regional services.	D/C	+
Out-migration reduces demand for regional services.		

Project phase: C - construction; D/C - decommissioning and closure; O - operations

8.2.4.6.2 Mitigation Measures

It is important to note that the proponent acting alone cannot unilaterally decide upon and implement most of the mitigation measures required to manage social effects. Governments are responsible for planning and implementing social programs, and delivering public services that address social effects concerns. Furthermore, individuals and families must make lifestyle decisions that are consistent with maximising the benefits derived from enhanced social circumstances. As a result, these parties must all share responsibility for social effects management in order to realise the greatest effect.

The proponent will clearly communicate its mine planning schedules and activities for construction, operations, and decommissioning and closure with key regional service delivery agencies, including Northern Health; School District Nos. 54, 82 and 92; BC Ministry of Transportation; local fire departments; RCMP; local governments; and BC Ambulance. The proponent will also work closely on an ongoing basis with these agencies to ensure that the appropriate information on the changes in area transportation volumes, camp operations, and the change to the local population are considered when planning for future social services support and emergency response capabilities. In the case of the LSA and

RSA populations, the proponent will provide information on which communities new residents associated with the mine are locating and what sort of additional social services and support may be required as the proposed Project moves forward.

In addition, at the mine site and camp, the proponent would be providing contracted security services that would focus on ensuring a secure and safe worksite and camp environment. The camp would also have a policy of no alcohol or drugs on-site. There would be camp policies and guidelines for ensuring a respectful workplace, no harassment, safety and security, multi-cultural workforce considerations, and Aboriginal awareness training. These measures would assist in mitigating the requirement of local policing resources to enforce criminal code offences that may occur. The camp and mine site would provide full firefighting equipment and trained personnel to meet all onsite fire and rescue needs Response to wildfires in the vicinity of the mine site is the primary responsibility of the provincial forest services.

The site would also have health and medical equipment and personnel to meet the Health, Safety and Reclamation Code for Mines in BC (BC MEMPR 2008) and Work Safe BC. This provision would include a minimum of two staff with Level 3 medical aid training on-site at all times and an on-site ambulance that would be used to transfer workers with injury or illness. Access to a helicopter med-evac service would be arranged to transport workers with life-threatening illnesses or injuries to the closest appropriate medical facility. Table 8.2.4-6 summarises effects by phase.

Table 8.2.4-6: Potential Project Effect by Project Phase on Regional Services and Mitigation Measures

Project Effect	Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
Change in traffic volumes and mine camp	C, O	Work with protective service providers (ambulance, fire responders, police) to incorporate increased traffic, camp operations and population demands into their planning	High
Change in in- and out-migration creates demand on regional services	C, O	Work with Northern Health to ensure the project population demands are incorporated into health planning and resourcing processes	High
Decline in traffic volumes and termination of mine camp	D/C	Work with protective and health service providers to incorporate decline in population in planning	High
Out-migration decreases demand on regional services	D/C	Work with protective and health service providers to incorporate decline in population in planning	

Project phase: C - construction; D/C - decommissioning and closure; O – operations

8.2.4.7 Potential Residual Effects and Their Significance

8.2.4.7.1 Potential Residual Effects After Mitigation

8.2.4.7.1.1 Construction Phase

Current plans call for the construction workforce to be housed in a work camp at the mine site, and to be bussed to and from the camp at the beginning and end of each work rotation. During the 25-month construction period, 90% of the workforce would come from outside the LSA or RSA (i.e. from other regions of BC and Canada). Approximately 120 PYs of employment would be created for workers in the LSA and RSA during construction over this period; however, because of the nature of construction employment and the short construction period, it is anticipated that the existing local construction workforce would be utilised by the Project and only a small number of new residents would be drawn to relocate to either the LSA or RSA during this phase, resulting in a minimal impact related to population.

However, there would also be additional traffic on Highway (Hwy) 113 and Hwy 37 as workers and goods move to and from the mine construction camp and mine site (based on average weekly traffic anticipated, approximately 17,000 trips would made during construction). This may result in transportation accidents that would create new demand for police, ambulance, and fire department first responder services. If an accident occurs on one of the FSRs or near a Nisga'a Village, the Nisga'a RCMP and BC Ambulance Services from Terrace would likely respond. Accidents occurring on Hwy 113 some distance south of New Aiyansh would be responded to by RCMP from Terrace, as well as the Terrace Fire Department First Responders.

At the mine site and camp there could be demand placed on local policing resources if there are criminal code offences that occur at the site. In addition, any injury or illness at the camp would see workers transferred to health care services in Terrace. There would also be arrangements made to med-evac workers with life-threatening illnesses or injuries to the nearest appropriate facility.

8.2.4.7.1.2 Operations Phase

During operations, regional services (i.e., health, ambulance, and policing services) would be subject to impacts similar to during construction, with the key variation being that the camp size would be 230 workers - less than half the size as the construction camp - and the number of new residents in the RSA would be approximately 235 people.

There would be upwards of 12,840 trips annually associated with moving workers and goods to and from the mine site along Hwys 113 and 37 during operations. This additional traffic would result in transportation accidents and would create demand for police, ambulance, and fire department first responder services. If the accidents occur on one of the FSRs or near a Nisga'a Village, it would likely be the Nisga'a RCMP and BC Ambulance Services from Terrace that would respond. If an accident occurs on Hwy 113 some distance

south of New Aiyansh, it would be responded to by RCMP from Terrace, as well as the Terrace Fire Department First Responders.

At the mine site and mine camp the proponent would deploy contracted security services and camp policies to ensure a secure and respectful work place. However, RCMP would still be responsible for providing law enforcement at the mine site and work camp should the need arise, and any policing not mitigated by on-site security services would impose increase demands on local policing services.

Firefighting at the mine site and camp would be provided by resources at the mine, and maintained and operated by the proponent. Firefighting involving forest lands in the area would be responded to and coordinated through the provincial government fire response services. It is not envisioned that firefighting resources from the LSA or RSA would respond to structural or site fires at the mine site or camp.

Medical personnel at the mine site and camp would be responsible for initial assessment, treatment, and stabilisation of workers with illness or injuries onsite, and an on-site ambulance would be used to transfer workers with more serious injuries or illnesses to the hospital located in Terrace. There would also be arrangements made to have access to a helicopter med-evac service to transport workers with life-threatening illnesses or injuries to the closest appropriate medical facility.

8.2.4.7.1.3 Closure and Decommissioning Phase

With mine closure, most of the local employment associated with the mine would be lost; however, it is unlikely there would be a noticeable decline in population with only 235 local residents forecast to arrive in the LSA or the RSA as a result of mine operations. In addition, it is likely that some of the workers at closure would have retired in the region or would choose to remain, which would further reduce any out-migration (see Table 8.2.4-7).

Table 8.2.4-7: Summary of Residual Effects for Regional Services

Project Phase	Residual Effect	Direction
C	Increased traffic volumes and changes from in and out-migration creates demand and changes regional services	-
O	Increased traffic volumes and changes in in-migration creates demand for regional services	-
D/C	Termination of mine camp and traffic volumes, out-migration creates reduction for regional services	+

Project phase: C - construction; D/C - decommissioning and closure; O - operations

8.2.4.7.2 Significance of Potential Residual Effects

Proposed Project construction effects on regional services are characterised as low in magnitude, regional, continuous, reversible, negative, and low in certainty. With minimal

population impacts, the key impact on regional services (ambulance services, first responders, and police) is anticipated to be increased demand associated with the movement of workers and goods from the staging area in Terrace to the mine and camp site. There would be additional demand on local health services associated with the operation of the construction camp serving upwards of 600 workers. However, these effects are considered not significant (minor) because of the relatively low magnitude and short-term duration of the proposed Project effects during construction.

Proposed Project operation effects on regional services are characterised as low in magnitude, regional, long term, continuous, reversible, negative, and low in certainty. Given the small population increase anticipated and with most new residents likely concentrated in the RSA, the population effect of increased demand is considered not significant (minor). In addition, camp operations and transportation associated with mine operations and the camp site are anticipated to have only a minimal impact on regional services over the period of mine operations. Confidence in this assessment for the RSA is high, but because of uncertainty regarding the share of workers associated with Nisga'a employment, there is less confidence regarding effects of proposed Project operations on services in the LSA.

Closure of the mine camp and significant reduction of truck transportation along Hwys 113 and 37 would reduce demand on regional policing, ambulance, fire rescue services, and health care services. However, the effect would be small (low in magnitude) and reversible, and the demand reduction on these services would be positive, low in certainty and long term. Overall, given the magnitude and direction of the effects on regional services, they are considered to be not significant (minor).

The proponent's level of confidence for all predictions, as noted in Table 8.2.4-8, is high.

Table 8.2.4-8: Residual Effects Assessment by Project Development Phase for Regional Services

Parameter	Stage Of Development / Rating			
Stage of Project development	Construction	Operations	Decommissioning and Closure	Post-closure
Residual effect	Traffic volume, camp operations, and change from in- and out-migration create demand for regional services	Traffic volume, camp operations, and change from in- and out-migration create demand for regional services	Termination of traffic volume and camp operations, and out-migration of population decrease demand for regional services	n/a
Effect attribute				
Magnitude	Low	Low	Low	n/a
Geographic extent	Regional	Regional	Regional	n/a
Duration	Short-term	Long-term	Long-term	n/a
Frequency	Continuous	Continuous	Continuous	n/a

Parameter	Stage Of Development / Rating			
Reversibility	Reversible	Reversible	Reversible	n/a
Direction	Negative	Negative	Positive	n/a
Certainty	Low	Low	Low	n/a
Residual effect significance	Not significant (minor)	Not significant (minor)	Not significant (minor)	n/a
Level of confidence	High	High	High	n/a

Note: n/a - not applicable

8.2.4.8 Cumulative Effects Assessment

8.2.4.8.1 Rationalisation for Carrying Forward Project Related Residual Effects Into the Cumulative Effects Assessment

The residual effects resulting from the proposed Project are considered to be very small. There is good existing capacity for delivery of regional services in the RSA. This, combined with the nature of the assessment method, indicates that the Project contribution to cumulative effects is unlikely to be detectable. Additionally, the lack of VC-specific effects data from potentially overlapping projects makes it impractical to conduct a cumulative effects assessment for this VC (see Table 8.2.4-9). For these reasons, the identification of very minor residual effects does not warrant carrying forward into a cumulative effects assessment.

Table 8.2.4-9: Project Related Residual Effects - Rationale for Carrying Forward Into the Cumulative Effects Assessment

Project Component	Project Phase	Residual Effect	Rationale	Carried Forward In CEA
All	All	Changes in demand for services.	The low magnitude of expected demand and good existing capacity in the RSA and the nature of the assessment method combine to indicate that the proposed Project's contribution to cumulative effects is unlikely to be detectable.	No

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure
Note: CEA - cumulative effects assessment; RSA - Regional Study Area

8.2.4.8.2 Interaction Between Regional Services and Other Past, Present, or Future Projects / Activities

As discussed above, there are no other projects anticipated to interact with the proposed mine site area, therefore there is no discussion of this potential interaction.

8.2.4.8.3 Mitigation Measures

Since the assessment of effects specific to the proposed Project has already been conducted in the context of other proposed projects and their effects on regional services, the proponent concludes that no additional mitigation measures are required.

8.2.4.8.4 Potential Residual Cumulative Effects and Their Significance

The potential residual effects on regional services are the same as the effects specific to the proposed Project, as stated above.

8.2.4.9 Limitations

The regional services effects assessment relies, in large part, on the population effects assessment, which concluded that population change attributable to the proposed Project would be well within historic variations and thus not significant. The primary underlying assumption is that most of the workforce would originate from outside the RSA and would not be seeking to reside regionally or locally, and therefore would not draw on regional services. During operations, it may be that some employees would choose to relocate to the RSA, a factor that has been taken into account in this assessment.

The greatest area of uncertainty is LSA effects given the uncertainty of the direction and scale of Nisga'a migration patterns related to the proposed Project.

Direct mine construction and operations would also generate road traffic volume over a secondary road system in a variety of weather and road conditions. Workers would be bussed to and from the mine site, goods and materials would be trucked in, and ore concentrate would be trucked out. There is uncertainty about the potential number of accidents that may occur due to the additional traffic generated by the mine, but it is assumed to be minimal given that most traffic would be conducted by professional drivers, and road improvements would be made where required to accommodate Project traffic and improve road safety, which would be within the capacity of the regional road system.

8.2.4.10 Conclusion

The remote proposed Project location and the proponent's preference to operate a camp for Project construction and operation would lead to very small population impacts in the LSA / RSA. Implications for regional services would primarily be associated with road accidents relating to moving workers and goods to and from the mine site during construction and operations.

8.2.5 Social VC #4: Regional Infrastructure

8.2.5.1 Introduction

The AIR requires an investigation of proposed Project effects on regional infrastructure. Effects could arise from two different pathways: direct project use of infrastructure; and use attributable to changes in the local population driven by proposed Project labour

requirements. Specific infrastructure investigated in this section includes utilities, communication services, and recreation. In general, demand for this infrastructure is driven by the regional residential, commercial, and industrial base. Where increases to these user groups are anticipated, an associated rise in demand can be expected.

8.2.5.1.1 Relevant Legislation and Legal Framework

Utilities and communication services are highly regulated provincial and federal industries, while recreation infrastructure is regulated either by the province for outdoor recreation and land use, or by local government (including the NLG in the Nass Valley) through municipal and regional parklands and recreation facilities. The relevance of the regulatory framework is in the context of the provision, consumption, and cost of services, but provision of regional infrastructure lies entirely outside of the proponent's responsibility.

8.2.5.1.2 Spatial Boundaries

The proposed Project is located on Alice Arm in the north coast area of BC, in the central section (Area A) of the RD of Kitimat-Stikine (Figure 8.2.2-1). The communities closest to the mine site include the four villages on Nisga'a Lands (Gitwinksihlkw; Gingolx; Laxgalts'ap, and New Aiyansh) as well as the Kitsault Resort and Alice Arm. These villages, communities, and the small rural population on Nisga'a Lands are considered to comprise the LSA for the purpose of describing social conditions and assessing social effects.

The broader RSA for describing social baseline conditions is defined to include four distinct regions and major communities:

- The DM of Stewart (located in the Kitimat-Stikine RDEA A);
- Kitimat-Stikine RDEA B, including the Village of Hazelton, the DM of New Hazelton and numerous Indian reserves (Gitanmaax 1, Gitsegukla 1, Sik-e-dakh 2, Kispiox 1, Hagwilget 1, Gitwangak 1, Gitanyow 1, Moricetown 1, Bulkley River 19, and Coryatsaqua (Moricetown) 2);
- The Town of Smithers; and
- The Terrace CA, which includes the City of Terrace, the rural populations of Kitimat-Stikine RDEA C (Part 1) and RDEA E, and four reserves (Kitsumkaylum 1, Kitselas 1, Kshish 4, and Kulspai 6).

These groupings were selected to reflect SC census subdivisions and areas that might be called upon to provide labour, goods, and services required for mine construction and operation.

The reserves listed above belong to a number of First Nations. The Kitimat-Stikine RDEA B includes reserves for the following First Nations:

- Gitanmaax (Gitanmaax 1 reserve);
- Gitanyow (Gitanyow 1 reserve);

- Glen Vowell (Sik-e-dakh 2 reserve);
- Kispiox (Kispiox 1 reserve);
- Gitsegukla (Gitsegukla 1 reserve);
- Gitwangak (Gitwangak 1 reserve);
- Hagwilget Village (Hagwilget 1 and Bulkley River 19 reserves); and
- Moricetown (Moricetown 1 and Coryatsaqua (Moricetown) 2 reserves).

The Gitanmaax, Gitanyow, Glen Vowell and Kispiox First Nations are part of the Gitxsan Local Services Society. The Terrace CA includes the reserves of two First Nations: Kitsumkaylem (Kitsumkaylum 1); and Kitselas (Kitselas 1, Kshish 4, and Kulspai 6). Potential effects on these First Nations are included in the assessment of proposed Project effects on Kitimat-Stikine RDEA B and the Terrace CA.

8.2.5.1.3 Temporal Boundaries

The temporal boundaries for assessment of social effects reflect the duration of various activities related to the proposed Project. For assessing construction effects, this analysis focuses on proposed Project activities over the 25-month window beginning in Q1 2012. For assessing operations effects, the analysis focuses on the 15-year window, beginning in 2014 and concluding in 2029, and estimates average effects during a typical year of operations. The effects of decommissioning and closure focus on activities that occur in the 15 to 17 years following 2029. The post-closure phase is not assessed as the employment effects are so small that effects on regional infrastructure would resemble base case conditions and there are anticipated to be no regional infrastructure effects.

8.2.5.2 Information Source and Methods

For regional infrastructure, the increased population would place new demand on access to services, which could have availability, quality, and cost implications for current residents and businesses. The nature of demand could also vary according to the demographic makeup of the population change.

Generally accepted EA methods were used to determine potential proposed Project effects on regional infrastructure. Baseline data were obtained from NLG, municipal and regional governments, and utility companies. A review of other EAs and online resources provided supplemental baseline information, capacity utilisation, likely base case conditions, and potential issues.

8.2.5.3 Detailed Baseline for Regional Infrastructure

8.2.5.3.1 Utilities - LSA

Within Nisga'a Lands, community utilities are operated by NLG and the individual Nisga'a Villages. All forms of water, including domestic, industrial, and agricultural, are sourced from a water reservation (NLG 2011; Rescan 2010). A community landfill is located near New

Aiyansh and operated by a Nisga'a Village. All the Nisga'a Villages are currently connected to the provincial electricity grid. No information is currently available from public secondary sources regarding sewer services for the villages. The RD of Kitimat-Stikine is not involved in operating these services (Rescan 2010).

8.2.5.3.2 Utilities - RSA

8.2.5.3.2.1 Water / Sewer

The City of Terrace's major water source is the municipal well, which has water treated with chlorine and fluoride. The capacity of water treatment is 5.3 million gallons per day (mgd) (Invest British Columbia n.d.). Primary sewage treatment is also provided by the City of Terrace, and its capacity is estimated at 3.17 mgd (Invest British Columbia n.d.). The water and sewer services systems are currently sufficient for Terrace's population (Rescan 2010).

In Smithers, the existing water supply system of three wells, two storage reservoirs, and a distribution system provide water for Smithers residents. The water supply is adequate to serve the town's population until it reaches approximately 7,500, and beyond that additional water sources and system upgrades would be needed. Rural residences outside town boundaries obtain water from private wells. The town has no plan in the near future to extend the municipal water supply to these areas (Rescan 2010; Town of Smithers 2010b).

Within the Smithers municipal boundaries, the town provides many residences and businesses with a sewer service. The town sewage treatment plant uses an aerated lagoon system. The sewage collection and treatment system is designed to adequately accommodate the needs of a population of 9,000 residents. If necessary, there is adequate land available to at least double the capacity in the future. The sewage treatment facility operates within the town regulatory standards and guidelines, and the sewer collection lines are in good condition (Rescan 2010; Town of Smithers 2010b).

The community water system for the Kitimat-Stikine RDEA B and the DM of Stewart is provided and administered by the RD of Kitimat-Stikine. No further information is available on additional infrastructure for this region.

8.2.5.3.2.2 Landfill and Waste Management

There are two landfills for Terrace: the City of Terrace landfill, with a remaining capacity of 50 years; and the Thornhill landfill, with a remaining capacity of 47 years (Invest British Columbia n.d.).

For Smithers, waste disposal is accommodated by a major regional landfill site near Houston, owned and operated by the RD of Bulkley-Nechako. Solid waste is collected and deposited at the Smithers / Telkwa Transfer Station, then trucked to Houston for disposal (Rescan 2010; Town of Smithers 2010b).

No information is available on landfill and waste management service in the remainder of the RSA.

8.2.5.3.2.3 Natural Gas

Pacific Northern Gas supplies natural gas to Terrace and Smithers (Invest British Columbia n.d.; Rescan 2010; Town of Smithers 2008). No information is available on natural gas service in the remainder of the RSA.

8.2.5.3.2.4 Electricity

BC Hydro provides electricity to the communities of Terrace and Smithers (Invest British Columbia n.d.; Rescan 2010; Town of Smithers 2008). No information is available on electricity service in the remainder of the RSA.

8.2.5.3.3 Communication Services

In the LSA, high-speed Internet is currently supplied through enTel, a collaboration of NLG and the Nisga'a Commercial Group (NCG). Fibre optic Internet services are supplied to all Nisga'a Villages, including government, businesses, and residences (NLG 2011; Rescan 2010).

A complete range of telecommunications services, including telephone, Internet, and cellular service, is provided by Telus and Telus Mobility to the communities of Terrace and Smithers (Invest British Columbia n.d.; Rescan 2010; Town of Smithers 2008).

Newspapers available in Terrace include the weekly Terrace Standard (and "Northern Connector" insert) and Terrace Times, as well as the daily Vancouver Sun, The Province, Globe and Mail, and National Post. In Smithers, The Interior News is the local weekly, and The Houston Daily provides regional coverage (Rescan 2010; Town of Smithers 2008).

No information is available on communication services for Kitimat-Stikine RDEA B or the DM of Stewart.

8.2.5.3.4 Recreation

There are a number of natural- and cultural-based recreation opportunities on Nisga'a Lands. Through NCG Tourism, three cultural tours are being developed that will demonstrate the Nisga'a culture and sustainable use of Nisga'a Land (NFA Implementation Report 2010). Also available are touring, sport fishing and backcountry excursions in the Anhluut'ukwsim Laxmihl Angwinga'asanskwhl Nisga'a (Nisga'a Memorial Lava Bed Park) (NLG 2011; Rescan 2010).

There are a variety of recreational opportunities and activities within the wider RSA. The general area offers a combination of attractions, scenery, and wilderness recreation opportunities. There are many activities, sport groups, and events that provide numerous opportunities for engaging in sporting activities, culture, and outdoor adventure. Generally speaking, opportunities are geared towards outdoor adventure type recreation, including sport fishing, backcountry excursions, water-based activities, camping, and hiking (Rescan 2010).

Community-based amenities include local hockey and curling arenas, in addition to community pathways and trails. Urban areas that cater to a larger concentrated population, such as Terrace and Smithers, tend to have a greater variety of recreational amenities and opportunities.

8.2.5.4 Cultural Ecological or Community Knowledge

Desk-based research was conducted to identify the Nisga'a Nation and Aboriginal groups' rights, interests, and values related to the regional infrastructure VC; however, none was available from public secondary sources. The Nisga'a ESCIA (Rescan 2012) identifies and discusses the effects of the proposed Project on Nisga'a infrastructure, including utilities.

8.2.5.5 Past, Present or Future Projects / Activities

The baseline information presented in Sections 7.2.3.3 and 8.2.2.3 reflects changes in regional economic activity and the related demographic indicators between 2006 and 2010. In terms of future employment, income, and population in the region, conditions would be influenced by other major projects that would be competing for labour, goods, and services. A list of these major projects is published by the BC Ministry of Finance and a summary of major projects in the study area that have been proposed, are on hold and have started is provided in Table 7.2.3-6. The table shows major projects located near Alice Arm, Iskut, Smithers, Stewart and Terrace.

The implications of these projects for regional population have been considered in the analysis of the demographic VC (e.g., the LHA population forecasts), which is a key pathway to regional infrastructure effects. As a result, this assessment of effects on regional infrastructure specific to the proposed Project is also inherently cumulative in nature.

8.2.5.6 Potential Effects of the Proposed Project and Proposed Mitigation

8.2.5.6.1 Identification and Analysis of Potential Project Effects

The population assessment examined how the proposed Project would add to the existing and future expected population in the LSA and RSA. Non-residents who relocate to the LSA / RSA would create a population impact and, by extension, increase the demand for regional infrastructure. Whether it is new home construction, rental activity, or securing temporary accommodations in hotels, motels or RV / camp sites, these new residents would require utilities, housing, communication services, and recreation facilities. Demand would increase beginning with the onset of construction and, while there would be an adjustment period between the end of construction and beginning of operations, demand would essentially remain continuous throughout this transition period. At decommissioning and closure, there would be a rapid drop-off in population and demand as conditions return toward the base case (see Table 8.2.5-1).

Table 8.2.5-1: Potential Direct Project Effects on Regional Infrastructure

Project Component	Project Phase	Potential Direct Project Effect	Likelihood Of Occurrence
All	C	Population change would alter demand for regional infrastructure	Medium
	O	Population growth would increase demand for regional infrastructure	Medium
	D/C	Population loss would decrease demand for regional infrastructure.	Medium
	PC	None	Medium

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

Changes in the demand for regional infrastructure are unlikely to induce any indirect effects on other VCs. These are final services that operate in competitive or quasi-competitive markets, where business providers cater to consumers and businesses on a fee-for-service or contract basis. Table 8.2.5-2 shows indirect proposed Project effects on other VCs.

Table 8.2.5-2: Potential Indirect Project Effects on Other Valued Components

Direct Project Effect (Adverse or Positive)	Project Phase	Potential Indirect Project Effect	Carry Forward (Yes / No)	Rationale
Changes in population would alter demand for regional infrastructure	C, O, D/C	None	No	Use of regional infrastructure is a final demand and unlikely to interact with other VCs

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure; VC - Valued Component

The potential interaction of regional infrastructure effects relating to the proposed Project on other VCs is outlined in Table 8.2.5-3. There is no cause-effect linkage to environmental, land use, economic, heritage or health VCs. Regional infrastructure is theoretically linked to population growth but it is a one-way interaction; i.e., population could cause an infrastructure effect - not vice-versa.

Table 8.2.5-3: Summary of Potential Interaction Between Project Direct Effects on Other Valued Components and Regional Infrastructure

Direct Project Effect	Air Quality and Climate Change	Noise and Vibration	Hydrogeology	Groundwater Quality	Freshwater and Sediment Quality	Surface Hydrology	Freshwater Fisheries	Marine Water Quality	Marine Biota	Terrestrial Environment	Wildlife and Their Habitat	Environmental Health	Economic	Social	Heritage	Health	Nisga'a Nation Land Use	Aboriginal Groups Land Use
Changes in population would alter demand for regional infrastructure.	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

Legend: Interaction definitions: o - interaction; - - key interaction; + - benefit; NI - no interaction

Indirect effects and combined effects are not anticipated for regional infrastructure.

Although its ratings magnitudes are minor, potential effects on regional infrastructure are carried forward - that is, examined further for their implications on regional infrastructure for mitigation planning purposes (see Table 8.2.5-4). The change in population would generate more demand for regional infrastructure; however, given the previous population levels in the RSA and the postage-stamp pricing of utilities and communications services, it is unlikely the proposed Project would create changes in the availability, quality, or costing of these services. In fact, increased demand may have the opposite effect as it could attract more service providers and competition to the region.

Table 8.2.5-4: Summary of Potential Project Effects to be Carried Forward Into the Assessment for Regional Infrastructure

Adverse Effects / Positive Effects	Project Phase	Direction
Population change would alter demand for regional infrastructure	C	-
Population growth would increase demand for regional infrastructure	O	-
Population loss would decrease demand for regional infrastructure	D/C	+

Project phase: C - construction; D/C - decommissioning and closure; O - operations

8.2.5.6.2 Mitigation Measures

It is important to note that the proponent, acting alone, cannot unilaterally decide upon and implement most of the mitigation measures required to manage social effects. Governments are responsible for planning and implementing social programs and delivering public services that address social effects concerns. Furthermore, individuals and families must make lifestyle decisions that are consistent with enhanced social circumstances. As a result, these parties must all share responsibility for managing social effects.

Mitigation measures for regional infrastructure are similar to those for other social VCs (i.e., consultation with affected service providers to provide the current and relevant information on direct and indirect labour force adjustments and related demographic implications that they require to adjust their programs and services). See Table 8.2.5-5 for proposed Project effects by phase.

Table 8.2.5-5: Potential Project Effect by Project Phase on Regional Infrastructure and Mitigation Measures

Project effect	Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
Population change would alter demand for regional infrastructure	C	Work with service providers to incorporate population increases in planning processes	Medium
Population growth would increase demand for regional infrastructure	O	Work with service providers to incorporate population increases in planning processes	Medium
Population loss would decrease demand for regional infrastructure	D/C	Work with service providers to incorporate population declines in population planning	Medium

Project phase: C - construction; D/C - decommissioning and closure; O - operations

8.2.5.7 Potential Residual Effects and Their Significance

8.2.5.7.1 Potential Residual Effects After Mitigation

Residual Project effects on regional infrastructure are summarised in Table 8.2.5-6.

Table 8.2.5-6: Summary of Residual Effects for Regional Infrastructure

Project Phase	Residual Effect	Direction
C	Population change would alter demand for regional infrastructure	-
O	Population growth would increase demand for regional infrastructure	-
D/C	Population loss would decrease demand for regional infrastructure	+

Project phase: C - construction; D/C - decommissioning and closure; O - operations

8.2.5.7.1.1 Construction Phase

Proposed Project construction would have a minimal effect on regional infrastructure. The construction workforce would be housed on-site at the mine and the camp would have its own recreation complex, sewage treatment system, and potable water system, so would not be placing any demands on regional infrastructure. When not in camp, mine workers would return to their home communities, so would not place any additional demands on infrastructure in the region. While small amounts of in-migration and new housing demand are expected, the LSA / RSA has sufficient utility, communication and recreation capacity to accommodate these needs.

8.2.5.7.1.2 Operations Phase

The demographic assessment indicated that the proposed Project would induce a population impact of approximately 235 people and 90 households in the LSA / RSA. These numbers represent about a 1% increase in the RSA population, which is well within

historical norms and services capacity. For the RSA, even the most optimistic estimate of the increment triggered by the Project would result in a population well below the peaks in the mid 1990s, when most service levels were supporting 10 to 15% more residents.

8.2.5.7.1.3 Closure and Decommissioning Phase

The loss of approximately 90 households in the LSA / RSA as a result of mine closure would not adversely affect the availability of regional infrastructure. It may mean that the remaining population would be faced with the costs of continuing to operate infrastructure locally and regionally, but this change falls within historic norms, and infrastructure providers are used to fluctuations in their client bases. Even following closure and decommissioning, it is uncertain whether the affected workers and their families would leave the region, especially if the economy is growing and unemployment is low.

8.2.5.7.2 Significance of Potential Residual Effects

Proposed Project construction effects on regional infrastructure are characterised as low in magnitude, regional, short term, continuous, reversible, and high in certainty. Effects are considered positive because services are being supported by a slightly larger population base, but overall would not be significant (minor).

Proposed Project operations effects on regional infrastructure are characterised as low in magnitude, regional, long term, continuous, reversible, and high in certainty. These effects are also considered positive because the costs of operating facilities and services are shared among a larger population, and there are no expected regional infrastructure capacity constraints. These effects are expected to be not significant (minor).

Proposed Project decommissioning and closure effects on regional infrastructure are characterised as low in magnitude, regional, long term, continuous, reversible, negative, high in certainty, but not significant (minor).

A summary of residual effects on regional infrastructure is presented in Table 8.2.5-7. The region is well equipped to provide infrastructure services now and in the future. It is a region that is used to alternating periods of population gain and loss due to shifting resource commodity cycles. Despite the presence of boom / bust conditions of the past, service providers and communities have nevertheless continued to improve infrastructure. There is a high level of confidence that proposed Project effects would be not significant.

Table 8.2.5-7: Residual Effects Assessment by Project Development Phase for Regional Infrastructure

Parameter	Stage Of Development/Rating			
Stage of Project development	Construction	Operations	Decommissioning and closure	Post-closure
Residual effect	Population change would alter demand for regional infrastructure.	Population growth would increase demand for regional infrastructure.	Population loss would decrease demand for regional infrastructure.	n/a
Effect attribute				
Magnitude	Low	Low	Low	n/a
Spatial extent	Regional	Regional	Regional	n/a
Duration	Short-term	Long-term	Long-term	n/a
Frequency	continuous	continuous	continuous	n/a
Reversibility	Reversible	Reversible	Reversible	n/a
Direction	Positive	Positive	Negative	n/a
Certainty	High	High	High	n/a
Residual effect significance	Not significant (minor)	Not significant (minor)	Not significant (minor)	n/a
Level of confidence	High	High	High	n/a

Note: n/a - not applicable

8.2.5.8 Cumulative Effects Assessment

8.2.5.8.1 Rationalisation for Carrying Forward Project Related Residual Effects Into the Cumulative Effects Assessment

As the residual effects for construction and operations are positive, they are not carried forward to the cumulative effects assessment. The decommissioning and closure effect is very small and unlikely to be discernable. This, and the nature of the assessment method, combines to indicate that the proposed Project contribution to cumulative effects is unlikely to be detectable, and does not warrant carrying forward into a cumulative effects assessment. Additionally, due to the lack of VC-specific effects data from potentially overlapping projects, it is impractical to conduct a cumulative effects assessment for this VC (see Table 8.2.5-8).

Table 8.2.5-8: Project Related Residual Effects - Rationale for Carrying Forward Into the Cumulative Effects Assessment

Project Component	Project Phase	Residual Effect	Rationale	Carried Forward In CEA
All	D/C	Population change would alter demand for regional infrastructure	The decommissioning and closure effect is very small and unlikely to be discernable. This and the nature of the assessment method combine to indicate that the Project contribution to cumulative effects is unlikely to be detectable	No

Note: Under "Carried Forward in CEA" the response "No" refers to the fact that it would not require evaluation in the CEA process

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

8.2.5.8.2 Interaction Between Regional Infrastructure and Other Past, Present, or Future Projects / Activities

As discussed above, there are no other projects anticipated to interact with the proposed mine site area, therefore there is no discussion of this potential interaction.

8.2.5.8.3 Mitigation Measures

As the assessment of effects specific to the proposed Project has already been conducted in the context of other proposed projects and their effects on regional infrastructure, no additional mitigation measures are required.

8.2.5.8.4 Potential Residual Cumulative Effects and Their Significance

The potential residual effects on regional infrastructure are the same as the effects specific to the proposed Project, as stated above.

8.2.5.9 Limitations

Effects on regional infrastructure are closely linked to population and housing effects. These latter effects (population and housing) are expected to be negligible because most of the workforce would originate from outside the RSA and would not be seeking accommodation regionally or locally. As long as construction and operating camps remain part of the proposed Project and the regional labour force conforms to its current profile, this assessment of regional infrastructure would remain valid.

8.2.5.10 Conclusion

The remote Project location and the proponent's preference to operate a camp for construction and operations would lead to negligible infrastructure impacts in the LSA / RSA. Some population effects are anticipated, but they would be easily absorbed into RSA

communities, which have ample housing and infrastructure capacity. As a result, the residual effects on regional infrastructure would be not significant.

8.2.6 Social VC #5: Family and Community Wellbeing

8.2.6.1 Introduction

Family and community wellbeing could be affected in a variety of ways and by a wide range of factors as a result of the proposed Project. Some effects are obvious and are linked to changes in a family's income; others are less obvious and are linked to behavioural or social condition changes associated with the influx of workers.

Effects related to income on social conditions come from individual and family spending decisions. Positive spending decisions – such as on improved housing or education, or increased investment or savings, for example – could enhance overall wellbeing of the individual and family members. These effects related to income apply to the persons benefiting from direct, indirect and induced employment related to the proposed Project, but also to unemployed or underemployed persons in the LSA and RSA who fill the jobs vacated by people who secure employment as a result of the proposed Project.

However, negative spending decisions – such as on increased alcohol consumption or gambling, for example – could reduce overall wellbeing for those directly or indirectly affected by this behaviour. In addition, the distribution of income effects may result in adverse equity effects on vulnerable sub-populations such as Aboriginal people, women, children, seniors and the disabled, who are less likely to benefit from job / income opportunities.

An influx of population to the LSA and RSA, either as a result of speculative in-migration or to fill direct, indirect, or induced employment opportunities related to the proposed Project, has the potential to cause adverse social effects that can affect existing family and community wellbeing. If the incoming population is transient and / or engages in socially disruptive or illegal activities while in the LSA and RSA, this could create negative behavioural changes such as increases in crime, alcohol abuse and family dysfunction. However, as indicated in Section 8.2.2, a substantive increase in the LSA and RSA populations is not anticipated.

Another family wellbeing issue is separation of the workers from their families and dependants for extended periods of time because of the mine location, as well as a fixed work rotation schedule and the requirement to stay in on-site camp accommodation while workers are on the job. This isolation of workers from their families for extended periods could result in stress to the workers and their dependants, altered roles and responsibilities in the home, and behavioural issues when a worker returns home because of incompatible needs of the worker and his / her dependants. The worker may want time to unwind and rest, participate in traditional on-land pursuits or other less constructive behaviour such as partying with friends, while the family would want to spend meaningful time with the worker

and expect him / her to resume some parental duties while at home. These differing demands on workers' time could lead to stress and dysfunction.

The proposed Project life cycle activities and related on-site camp and work rotation scenario could also affect family and community wellbeing as it relates to Aboriginal traditional land and resource use. This could result from biophysical changes related to the proposed Project (e.g., reduced resource levels), or affect resource harvesting activity (e.g., reduced available time and motivation of harvesters). Traditional resource harvesting is an important part of Aboriginal culture in the LSA and RSA. It is undertaken for commercial, personal (food consumption), cultural, and ceremonial purposes (community and family feasts). The various resources are harvested on a seasonal basis, and harvesting may also be directly linked to community celebrations and events.

8.2.6.1.1 Relevant Legislation and Legal Framework

Addressing social effects is required under the requirements of the *BCEAA,* and family and community wellbeing was identified as a VC through the AIR process. Other relevant legislation, regulations and permits include the BC health acts: *Drinking Water Protection Act* (Government of BC 2001), *Food Safety Act* (Government of BC 2002c) and *Community Care Facility Act* (Government of BC 2002a).

8.2.6.1.2 Spatial Boundaries

The proposed Project would be located on Alice Arm in the north coast area of BC. It is located in the central section (Area A) of the RD of Kitimat-Stikine (Figure 8.2.2-1). The communities closest to the mine site include the four villages on Nisga'a Lands (Gitwinksihlkw; Gingolx; Laxgalts'ap; and New Aiyansh) as well as the Kitsault Resort and Alice Arm. These communities and the villages on Nisga'a Lands are considered to comprise the LSA for the purpose of describing social conditions and assessing social effects.

The broader RSA for describing social baseline conditions is defined to include four distinct regions and major communities:

- The DM of Stewart (located in the Kitimat-Stikine RDEA A);
- Kitimat-Stikine RDEA B, including the Village of Hazelton, the DM of New Hazelton and numerous Indian reserves (Gitanmaax 1, Gitsegukla 1, Sik-e-dakh 2, Kispiox 1, Hagwilget 1, Gitwangak 1, Gitanyow 1, Moricetown 1, Bulkley River 19, and Coryatsaqua (Moricetown) 2);
- The Town of Smithers; and
- The Terrace CA, which includes the City of Terrace, the rural populations of Kitimat-Stikine RDEA C (Part 1) and RDEA E, and four reserves (Kitsumkaylum 1, Kitselas 1, Kshish 4, and Kulspai 6).

These groupings were selected to reflect SC census subdivisions and areas that might be called upon to provide labour, goods, and services required for mine construction and operation.

The reserves listed above belong to a number of First Nations. The Kitimat-Stikine RDEA B includes reserves for the following First Nations:

- Gitanmaax (Gitanmaax 1 reserve);
- Gitanyow (Gitanyow 1 reserve);
- Glen Vowell (Sik-e-dakh 2 reserve);
- Kispiox (Kispiox 1 reserve);
- Gitsegukla (Gitsegukla 1 reserve);
- Gitwangak (Gitwangak 1 reserve);
- Hagwilget Village (Hagwilget 1 and Bulkley River 19 reserves); and
- Moricetown (Moricetown 1 and Coryatsaqua (Moricetown) 2 reserves).

The Gitanmaax, Gitanyow, Glen Vowell and Kispiox First Nations are part of the Gitxsan Local Services Society. The Terrace CA includes the reserves of two First Nations: Kitsumkaylem (Kitsumkaylum 1) and Kitselas (Kitselas 1, Kshish 4, and Kulspai 6). Potential effects on these First Nations are subsumed in the assessment of proposed Project effects on Kitimat-Stikine RDEA B and the Terrace CA.

8.2.6.1.3 Temporal Boundaries

The temporal boundaries for assessment of social effects reflect the duration of various activities related to the propose Project. For assessing construction effects, the analysis focuses on proposed Project activities over the 25-month window beginning in Q1 2012. For assessing operations effects, the analysis focuses on the 15-year window of 2014 to 2029, and estimates average effects during a typical year of operations. The effects of decommissioning and closure focus on activities that occur in the 15 to 17 years following 2029 and post-closure activities continue beyond that point but are expected to have no noticeable social effects.

8.2.6.2 Information Source and Methods

Generally accepted EA methods were used to determine potential Project effects on family and community wellbeing. Secondary data sources used to compile the baseline and assessment of proposed Project effects on family and community wellbeing include:

- The proponent's policies, plans, and procedures during construction and operations (2011);

- Social and economic indices data that outline key social and economic indicators by LHA (BC Stats 2010);
- City of Terrace website;
- The Nisga'a Nation website; and
- The "Avanti Kitsault Mine Socio-Economic Baseline Report" (Rescan 2010).

Additional primary data were collected by Rescan (2012) from key Nisga'a informants and Nisga'a citizens through surveys of the Nisga'a Nation labour force, businesses, and social, economic, and cultural conditions and perceptions of anticipated employment-related effects. Results of these surveys have been compiled and incorporated into Section 14.0 of Part C of the Application.

8.2.6.3 Detailed Baseline for Family and Community Wellbeing

Statistics on community wellbeing are not available for individual communities, but are reported for five LHAs that correspond to the various communities in the LSA and RSA, as noted in Table 8.2.6-1.

Table 8.2.6-1: Local Health Areas in the Local Study Area and Regional Study Area

Communities	Local Health Areas	
LSA	LHA 92	Nisga'a Local Health Area
DM of Stewart	LHA 51	Snow Country Health Area
Kitimat-Stikine RDEA B	LHA 53	Upper Skeena Health Area
Town of Smithers	LHA 54	Smithers Local Health Area
Terrace CA	LHA 88	Terrace Local Health Area

Note: DM - District Municipality; RDEA - Regional District Electoral Area

The information in the following sections is from the BC Stats social and economic indices data, which outlines key social and economic indicators by LHA. This source provides in-depth data on children at risk, youth at risk, human economic hardship, crime, health and education, and is used to describe wellness conditions in the region. Using the social and economic indices data for the indicators noted above, BC Stats has created a composite index to rank each of the 78 provincial LHAs for each indicator (BC Stats 2010).

8.2.6.3.1 Children at Risk

Data is provided in for five indicators of children at risk (see Table 8.2.6-2):

- Infant mortality (number of deaths of children under one year old per 1,000 births);
- Children in care (number of children taken into custody by Child Care per 1,000 population aged 0-18 years);

- Below standard reading for children in Grades 4 and 7 (percentage of students taking exams who scored below standard); and
- Children aged 0-18 years receiving income assistance (percentage of the population aged 0-18 years receiving income assistance for less than a year, and percentage of the population aged 0-18 years receiving income assistance for more than a year).

Table 8.2.6-2: Children at Risk Indicators, by Local Health Area

Location	Infant Mortality Rate[1]	Children In Care[2]	Below Standard Reading (Grades 4 And 7)[3]	Children Aged 0-18 Years Receiving Income Assistance[4]	
				>1 Year	<1 Year
	(rate/1,000)	(rate/1,000)	(%)	(%)	(%)
Nisga'a	–	34.6	65.3	–	–
Terrace	4.0	16.4	24.8	3.2	4.5
Upper Skeena	6.0	23.3	45.7	7.3	3.6
Smithers	4.6	10.3	21.7	1.6	1.8
British Columbia	3.9	9.4	20.5	1.1	1.7

Note: 1. Average for 2005-2009 (per 1,000 live births)
2. As of December 2009 (per 1,000 population)
3. Average for 2007/2008 and 2008/2009
4. Percent of children aged <19 years receiving income assistance as at September 2009
– data suppressed; % - percent

Source: BC Stats 2010

The rate of children in care for the Nisga'a LHA (34.6/1,000 children) was more than three times the provincial rate (9.4/1,000 children). The percentage of students falling below in the reading standards for the Nisga'a LHA (65.3%) was also just over three times the provincial average of 20.5%. Data on infant mortality and children on income assistance are not available for the Nisga'a LHA. Using the BC Stats composite index, the Nisga'a LHA was ranked 78th out of 78 LHAs for reading standards and 77th for the rate of children in care (BC Stats 2010).

In the RSA, the Upper Skeena LHA had the highest infant mortality rate (6.0 deaths/1,000 births), followed by the Smithers LHA (4.6 deaths/1,000 births). The rates of students below reading standards were higher than the provincial average for all LHAs in the RSA. The indicators suggest that children aged 0-18 years in the Upper Skeena LHA were dependent upon income assistance for longer (more than one year) than both the provincial average and the other LHAs in the RSA. Using the BC Stats composite index for children at risk for 2009, the Upper Skeena LHA was ranked 78th, followed by the Terrace LHA, which ranked 67th.

8.2.6.3.2 Youth at Risk

The status of youth at risk in the region is summarised using three indicators (see Table 8.2.6-3):

- Young adults aged 19-24 years receiving income assistance (total and for more than one year);
- Young adults aged 18 years who did not graduate from high school; and
- Serious crime by juveniles aged 12-17 years.

Table 8.2.6-3: Indicators of Youth at Risk, by Local Health Area

LHA	Young Adults Aged 19-24 Years Receiving Income Assistance[1]		Young Adults Aged 18 Years Who Did Not Graduate[2]	Serious Crime Rates By Juveniles Aged 12-17 Years[3]
	Total	>1 Year		
	(%)	(%)	(%)	(Rate/1,000)
Nisga'a	–	–	49.8	25.0
Terrace	4.2	2.3	44.6	14.4
Upper Skeena	9.2	2.1	69.6	9.7
Smithers	2.3	0.8	19.0	10.2
British Columbia	1.6	0.5	29.8	13.5

Note: 1. As of September 2009
2. Average for 2007/2008 and 2008/2009
3. Average for 2006-2008
– data suppressed; % - percent

Source: BC Stats 2010

The number of youth who did not graduate from high school in the Nisga'a LHA (49.8%) was much higher than the provincial average (29.8%). Similarly, the Nisga'a LHA also reported a higher juvenile serious crime rate (25.0/1,000 population) than the provincial average (13.5/1,000 population). There is no information available on young adults receiving income assistance for the Nisga'a LHA. Using the 2009 composite index, the Nisga'a LHA was ranked 75th for serious crime rates and 72nd for percentage who did not graduate (BC Stats 2010).

At the RSA level, the Smithers LHA had a slightly higher percentage (2.3%) of youth receiving income assistance compared to the provincial average (1.6%), while the Upper Skeena LHA percentage was significantly higher (9.2%). The number of young adults aged 18 years who did not graduate from high school was much higher for all LHAs than the provincial average (29.8%), with the exception of the Smithers LHA. Only Terrace reported a higher serious crime rate (14.4/1,000 population) than the provincial average (13.5). The Terrace and Upper Skeena LHAs were ranked 74th and 73rd of the 78 LHAs in BC. Smithers, however, was ranked 37th (BC Stats 2010).

8.2.6.3.3 Human Economic Hardship

The indicators of economic hardship include (see Table 8.2.6-4):

- Percentage of the population receiving income assistance; and
- Percentage of seniors receiving maximum Income Support (IS).

Table 8.2.6-4: Indicators of Economic Hardship, by Local Health Area

LHA	Population Aged 0-64 Years On Income Assistance[1]			Seniors Receiving Maximum IS[2]
	Total	>1 Year	<1 Year	
	(%)	(%)	(%)	(rate/1,000)
Nisga'a	6.2	–	–	11.8
Terrace	5.1	2.1	3.0	2.3
Upper Skeena	7.4	4.5	2.9	4.5
Smithers	2.4	1.0	1.4	2.2
British Columbia	1.9	0.7	1.3	3.1

Note: 1. As of September 2009
2. As of December 2009 (per 1,000 population)
– data suppressed; IS - Income Support; LHA - Local Health Area; % - percent

Source: BC Stats 2010

For the population receiving income assistance, the Nisga'a LHA (6.2%) was significantly higher than the provincial average (1.9%). Using the 2009 composite index, the Nisga'a LHA was ranked 78th for the percentage of seniors receiving the maximum IS (BC Stats 2010). The percentage of seniors receiving government income support in the Nisga'a LHA (11.8%) was also considerably higher than the provincial rate (3.1%). Compared to other LHAs in BC, the Nisga'a LHA was ranked 78th for seniors receiving the maximum IS (BC Stats 2010). For seniors receiving IS, the Terrace and Smithers LHAs were lower than the provincial average (3.1%). The Upper Skeena LHA was ranked 78th of the 78 LHAs in BC. This was followed by Terrace, which was ranked 76th.

In the RSA, the Upper Skeena LHA ranked the highest (or almost) for both indicators among all four LHAs. All four reported income assistance rates higher than the provincial average. For seniors receiving IS, the Terrace and Smithers LHAs were lower than the provincial average (3.1%). The Upper Skeena LHA was ranked 78th of the 78 LHAs in BC. This was followed by Terrace, which was ranked 76th.

8.2.6.3.4 Crime

Indicators used to describe crime include:

- Total serious crime;

- Serious crimes per police officer;
- Property crime; and
- Violent crime.

Table 8.2.6-5 provides information for total serious crime, property crime, and violent crime.

Table 8.2.6-5: Indicators of Crime, by Local Health Area

LHA	Violent Crime (rate/1,000)	Property Crime (rate/1,000)	Total Serious Crime (rate/1,000)	Serious Crime (rate/ Police Officer)
Nisga'a	9.3	15.7	25	11.9
Terrace	4.5	9.8	14.4	8.0
Upper Skeena	3.2	6.5	9.7	6.1
Smithers	2.6	7.6	10.2	8.0
British Columbia	3.5	10	13.5	9.4

Note: LHA - Local Health Authority
Source: BC Stats 2010

The crime rates in the Nisga'a LHA were substantially higher than the provincial rates, particularly for total serious crimes. The total serious crime rate in the Nisga'a LHA was 25.0/1,000 population; this is nearly double the provincial rate (13.5/1,000 population). The 2009 composite index for crime in each LHA includes rates of total serious, violent, and property crimes, as well as the number of serious crimes per police officer. The highest number of serious crimes per police officer was found in the Nisga'a LHA (11.9 serious crimes per officer). Using the 2009 composite index, the Nisga'a LHA was ranked 78th for violent crime rates and 75th for property crime rates and 70th for serious crimes per police officer. The Nisga'a LHA was ranked 77th of the 78 provincial LHAs for number of serious crimes per police officer (BC Stats 2010).

The total serious crime and violent crime rates were higher than the provincial average in the Terrace LHA, but lower in the Smithers and Upper Skeena LHAs. Property crime rates were lower than the provincial average in all three LHAs. The highest number of serious crimes per police officer was found in Terrace (8.5/1,000 population). The Smithers (8.0) and Upper Skeena (6.1) LHAs reported lower serious crimes per police officer than the provincial average (9.4). The regional LHAs ranked 56th, 29th and 25th, respectively for number of serious crimes per police officer.

8.2.6.3.5 Health Concerns

The two indicators of health concerns include (see Table 8.2.6-5):

- Average life expectancy at birth; and

- Potential years of life lost (PYLL) from natural and accidental causes, suicides and homicides.

Table 8.2.6-6: Indicators of Health Problems, by Local Health Area

LHA	Life Expectancy At Birth[1]	Potential Years Of Life Lost[2]		
		Natural Causes	Accidental Causes	Suicides/ Homicides
	(years)	(rate/1,000)	(rate/1,000)	(rate/1,000)
Nisga'a	73.8	53.5	8.7	32.6
Terrace	78.0	47.0	13.1	6.2
Upper Skeena	80.2	47.6	3.9	13.3
Smithers	79.3	36.0	11.2	5.4
British Columbia	81.4	33.4	7.5	3.8

Note: 1. Average for 2005-2009
2. Average for 2004-2008 (rate per 1,000 population)

Source: BC Stats 2010

The Nisga'a LHA reported life expectancy at 73.8 years, compared to 81.4 years provincially. In the Nisga'a LHA, the PYLL from natural causes averaged 53.5 years/1,000 population; this rate is 20 years higher than the provincial rate of 33.4 years. PYLL from suicide / homicide in the Nisga'a LHA (32.6 years/1,000 population) was also considerably higher than the provincial average (3.8 years). Using the 2009 composite index, the Nisga'a LHA was ranked 78th for life expectancy and PYLL from suicide / homicide, 70th for death from natural causes and 28th in terms of death from accidental causes. Overall, the Nisga'a LHA was rated 72nd of all 78 LHAs for health problems (BC Stats 2010).

For average life expectancy at birth, the regional LHAs were all below the provincial average of 81.4 years. The Terrace LHA ranked 62nd, the Upper Skeena LHA 58th, and the Smithers LHA 37th.

8.2.6.4 Cultural Ecological or Community Knowledge

8.2.6.4.1 Nisga'a Nation

The Nisga'a Nation can make laws regarding child and family services with the requirements that they are comparable to provincial standards "intended to ensure the safety and well-being of children and families" (Government of Canada 2010). The NFA defines BC's right to protect children under emergency circumstances. Agreements between the province and the Nisga'a Nation govern child and family services of Nisga'a citizens living outside of Nisga'a Lands. Nisga'a Child and Family Services (NCFS) has offices supported by 20 staff both on and off Nisga'a Lands, including New Aiyansh, Terrace, and Prince Rupert. NLG reports a rate of 2% children-in-care compared to the provincial average of 10%, which NLG attributes to the involvement of *wilp* members (NLG 2011).

The Nisga'a ESCIA (Rescan 2012) also provides Nisga'a-specific information and addresses potential effects of the proposed Project on Nisga'a Nation rights, interests, and concerns as they relate to the NFA.

8.2.6.4.2 Aboriginal Groups

It is not apparent from desk-based research what the interests in family and community wellbeing are of potentially affected Aboriginal groups related to the proposed Project. Future engagement efforts with each group may reveal more on this matter.

8.2.6.5 Past, Present or Future Projects / Activities

The baseline information presented in Sections 7.2.3.3 and 8.2.2.3 reflects changes in regional economic activity and the related demographic indicators between 2006 and 2010. In terms of future employment, income, and population in the region, conditions would be influenced by other major projects that would be competing for labour, goods, and services. A list of these major projects is published by the BC Ministry of Finance and a summary of major projects in the study area that have been proposed are on hold and have started is provided in Table 7.2.3-6. The table shows major projects located near Alice Arm, Iskut, Smithers, Stewart, and Terrace.

The implications of these projects for regional population have been considered in the analysis of the demographic VC (e.g., the LHA population forecasts), which is a key pathway to wellbeing effects. As a result, this effects assessment specific to the proposed Project is also inherently cumulative in nature.

8.2.6.6 Potential Effects of the Proposed Project and Proposed Mitigation

8.2.6.6.1 Identification and Analysis of Potential Project Effects

Baseline statistics on family and community wellbeing have been presented at the level of five LHAs that correspond to the various communities in the LSA and RSA where data were available. Note that most information on wellbeing for the Snow Country Health Authority is not available because of data suppression due to the small population size. In the following assessment, references would be made to the LHAs instead of the LSA and RSA (see Table 8.2.6-1). Information used to support the effects assessment is drawn from the BC Stats social and economic indices data (BC Stats 2010) that outlines key social and economic indicators by LHA.

8.2.6.6.1.1 Construction Phase

As noted in Section 7, proposed Project construction would provide an average of 60 direct on-site jobs, 79 jobs in direct employment associated with purchases from regional businesses, and 26indirect and induced jobs per year of construction. Anticipated Project effects on family and community wellbeing are linked to income-related effects and the work schedule at the mine, and are also, to a lesser extent, linked to behavioural changes associated with the influx of population related to the proposed Project. These effects are discussed below.

8.2.6.6.1.1.1 Income-Related Effects

In general, employment opportunities available to local residents during construction would benefit family and community wellbeing by reducing unemployment for existing residents, increasing economic diversification, creating new types of jobs, and providing higher incomes. Further, improvements to worker skills and experience related to the proposed Project would provide residents of the LSA and RSA with opportunities to pursue higher-paying jobs at the mine and potentially elsewhere.

Effects related to income on social conditions come from individual and family spending decisions. If increased income is saved or invested in social goods such as better housing, education, or lifestyle amenities, overall wellbeing could be enhanced. If, on the other hand, it is spent on socially disruptive behaviour such as drugs, alcohol and / or gambling, overall wellbeing could decline for those directly or indirectly affected by this behaviour. A relevant study (Gibson and Klinck 2005) noted that increased incomes associated with mining can lead to a greater potential for alcohol and drug use, increased sexually transmitted diseases, and other social and health problems. The distribution of income also may result in adverse equity effects on vulnerable sub-populations – Aboriginal people, women, children, seniors, and the disabled – who are less likely to benefit from job / income opportunities.

However, increased wages can also lead to improved health and wellbeing. For example, a recent study (Phipps and Lethbridge 2006) found that the wellbeing of children was almost always associated with the household income of their family. Using the 2009 composite index for children at risk, the Upper Skeena LHA was ranked 78th of the 78 provincial LHAs, followed by the Terrace LHA (ranked 67th) (BC Stats 2010). Accordingly, communities in the LSA and RSA, particularly in Upper Skeena and Terrace, could experience some improvements in the health and wellbeing of their children as a result of increased incomes.

While other factors also influence wellbeing, increased income provides people with more choices and creates the potential for them to improve their wellbeing based on the choices they make. Additional income may be particularly beneficial for First Nations communities. According to the Community Well Being Index (CWBI) used by INAC, the income scores for First Nations in the region were much lower than for the other communities. Further, the 2009 composite index for health indicated that the Nisga'a LHA was ranked 72nd of the 78 provincial LHAs for health problems, the Terrace LHA ranked 62nd, and the Upper Skeena LHA ranked 58th (BC Stats 2010). Thus, by providing additional income and employment, the proposed Project could substantially increase the CWBI for local First Nation communities in the LSA and RSA. In particular, the Nisga'a Nation, Terrace, and Upper Skeena LHAs could experience some health and wellbeing improvements as a result of increased wages.

In evaluating the potential overall Project effects on family and community wellbeing, the outcome would largely depend on how workers choose to spend their higher wages.

8.2.6.6.1.1.2 Behavioural Changes

An influx of population to the LSA and RSA, either as a result of speculative in-migration or to fill direct, indirect, or induced employment opportunities related to the proposed Project, could affect existing family and community wellness. These effects are associated with the transient population being engaged in socially disruptive or illegal activities; they are also associated with competition for housing and other community services. However, as indicated in Section 8.2.2, a substantive increase in population in the LSA and RSA is not anticipated.

8.2.6.6.1.1.3 Work Schedule

The work schedule at the mine (three weeks on and one week off) could also affect family wellbeing. Workers coming off shift could be exhausted and irritable, and may require a period of adjustment to home life. Limited family time can lead to family fragmentation, behavioural issues in children who grow up with a part-time parent, and family violence (Gibson and Klinck 2005). Adverse effects could be seen in families with teenagers and youth. The 2009 composite index for youth at risk shows that the Terrace and Upper Skeena LHAs were ranked 74th and 73rd of the 78 provincial LHAs, and Smithers was ranked 37th of the 78 LHAs (BC Stats 2010). In these LHAs, there is some potential for mine development to make social conditions worse for some individuals and their families.

8.2.6.6.1.1.4 Traditional Land and Resource Use

Traditional harvesting is done for commercial, personal consumption, and cultural purposes, and harvesting is largely linked to specific seasons in which the resources are harvested. The potential adverse effect of living away from the community in camp on a rotational basis is that the worker could have less time available for harvesting or could miss the windows of opportunity for resource harvesting for family consumption or cultural events such as community feasts or feasts of particular significance. There is also the potential that the proposed Project footprint and related activities at the site as well as transportation of equipment, supplies, and labour to and from the site could adversely affect the quantity or quality of the resources harvested by the local and regional Aboriginal population.

However, a potential positive effect related to the proposed Project on traditional land and resource use is that increased incomes could be used to enhance traditional land and resource use activities; this increased income could be used to purchase needed equipment and supplies (e.g., boats, motors, firearms, fuel, ammunition, traps, fishing gear, all terrain vehicles, etc.) that could make traditional harvesting activities easier and more efficient.

8.2.6.6.1.2 Operations Phase

Proposed Project operation would lead to an improvement in family and community wellbeing. It would create 90 direct, indirect, and induced jobs in the LSA / RSA that would be filled by local or regional residents, which would increase personal incomes (see Section 7). Some of the workers filling direct jobs at the mine would leave existing jobs; these would be filled by other residents in the region, generating indirect employment income. The generated income contributes to family and community wellness. Similar to

construction, proposed Project effects on family and community wellbeing include effects related to income, effects related to behavioural changes, work schedule effects and effects on traditional land and resource use.

8.2.6.6.1.2.1 Income-Related Effects

Similar to the effects accruing during the construction phase of the proposed Project, the employment opportunities available to local residents during the operations phase would benefit family and community wellbeing by reducing unemployment for existing residents, increasing economic diversification and creating new types of jobs, and providing higher incomes. Skills improvement and experience related to the proposed Project would provide LSA residents with opportunities to pursue higher-paying jobs at the mine and potentially elsewhere. With the additional income, it is expected that local households would be less reliant on government transfer payments, and there would be lower demand for income assistance for children, youth, and young adults. Given the length of operation, effects related to income could extend over the 15-year operating life of the mine.

Poor choices for spending disposable income could have consequences similar to those previously discussed in Section 8.2.6.6.1.1 Construction Phase. However, based on experience with work rotations occurring in other projects of a similar size and scope, it is likely that serious consequences would diminish during operations, after a period of adjustment by the workers and their families.

At the same time, increased incomes may create the potential for additional social problems and could increase crime rates. The crime rates in the Nisga'a LHA were significantly higher than the provincial rates, particularly for total serious crimes. With the exception of Smithers, the crime rates in the regional LHAs were higher than the average rates for the province (BC Stats 2010).

Another issue of concern is that a large proportion of young adults in the RSA have not graduated from high school, presumably leaving school early to work in the forest sector. Without a high school diploma, these young adults may be particularly vulnerable because forest sector employment is declining and their ability to find alternate employment is limited. The number of youth who did not graduate from high school in the Nisga'a LHA (49.8%) was much higher than the provincial average (29.8%). The number of young adults aged 18 years who did not graduate from high school was much higher in all regional LHAs than the provincial average, with the exception of the Smithers LHA (BC Stats 2010).

The proponent would help address these problems in two ways:

- Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault, thereby encouraging youth to stay in school. These educational requirements would be made known before Project start-up so potential workers would be made aware of the requirements well in advance; and

- Encourage skills improvement and experience related to the proposed Project to help residents of the RSA improve their overall education and employability.

8.2.6.6.1.2.2 Behavioural Changes

Similar to the issues previously raised in Section 8.2.6.6.1.1 Construction Phase, an influx of population to the LSA and RSA, either as a result of speculative in-migration or to fill direct, indirect, or induced employment opportunities related to the proposed Project, could affect existing family and community wellness. These effects are associated with the transient population being engaged in socially disruptive or illegal activities; they are also associated with competition for housing and other community services. However, as indicated in Section 8.1, substantive increases in the LSA and RSA populations are not anticipated. Further, problems related to behavioural changes are anticipated to happen early on in the operations phase, and are expected to lessen over time.

8.2.6.6.1.2.3 Work Schedule

As discussed in Section 8.2.6.6.1.1, Construction Phase, the effects of isolation, separation of worker from family and dependants, and readjustment problems also apply during the operations phase. However, for two reasons the effects should be reduced. Firstly, the work schedule is different – working three weeks on followed by three weeks off would give workers more time to spend in home community and family obligations. Secondly, after a period of adjustment to the new living and working situation and somewhat altered roles, the adverse social and wellbeing effects are expected to diminish. In addition, the proponent has indicated that a shorter rotation schedule could be implemented for the Nisga'a Nation and local First Nations to attract and retain staff. Employment income can also help to improve this situation if good spending choices are made.

8.2.6.6.1.2.4 Traditional Land and Resource Use

As discussed in Section 8.2.6.6.1.1, Construction Phase, traditional harvesting could be affected as a result of living away from the community in camp on a rotational basis. Potential effects include:

- Missing the windows of opportunity for resource harvesting for family consumption or cultural events such as community feasts or events of particular significance; and
- The proposed Project footprint and related activities at the site, including transportation of equipment, supplies, and labour to and from the site, could adversely affect the resources harvested by local and regional Aboriginal population.

These effects should lessen over time for workers who also harvest.

A potential positive effect on traditional land and resource use related to the proposed Project is using the additional income to enhance the traditional land and resource use activities. Examples include the purchase of needed equipment and supplies (e.g., boats, motors, firearms, ammunition, traps, fishing gear and all-terrain vehicles) that could make

traditional harvesting activities easier and more efficient. This positive effect is expected to increase over time as workers adjust to their work schedule.

8.2.6.6.1.3 Decommissioning and Closure Phase

Mine decommissioning and closure is expected to take three years. The workforce would average 13 and peak at 30; most would be operation workers. Given the small number and percentage of direct operation workers recruited from the LSA / RSA, it is likely that less than five workers from the LSA / RSA would be involved in decommissioning, closure, and monitoring activities.

While most of the mine operation effects would improve family and community wellbeing, mine decommissioning and closure could have the opposite effect. The loss of jobs and income, and any resulting population out-migration would result in a less diverse community that could become more reliant on government support, depending on how economic conditions in the LSA evolve over the next 15 years. If forest sector employment continues to decline, mine closure could lead to potential loss of the local population, which is very disruptive from a community wellbeing perspective. However, from a family wellbeing perspective, the training offered by the proponent during construction and operations would provide residents with opportunities to pursue higher-paying jobs elsewhere.

8.2.6.6.1.4 Post-Closure Phase

Post-closure activities would include environmental monitoring and reporting, including periodic field sampling of surface and ground water, soils, and air quality. This work would involve only a handful of people working on a part-time basis. Post-closure activities would have no effects on family and community wellbeing.

A summary of the potential direct Project effects on family and community wellbeing is provided in Table 8.2.6-6.

Table 8.2.6-7: Potential Direct Project Effects on Family and Community Wellbeing

Project Component	Project Phase	Potential Direct Project Effect	Likelihood Of Occurrence
Jobs and employment	C	Employment opportunities during construction and additional income related effects (spending decisions)	High
		Influx of workers and associated behavioural changes	Low
Construction camp	C	Work schedule at the mine 3 weeks on/off) and separation from family and dependants	High
		Construction camp (living away from the community) and related effects on Aboriginal traditional land and resource use	High
Jobs and employment	O	Employment opportunities during construction and additional income related effects (spending decisions)	High

Project Component	Project Phase	Potential Direct Project Effect	Likelihood Of Occurrence
		Influx of workers and associated behavioural changes	Low
Operations camp	O	Work schedule at the mine (3 weeks on/off) and separation from families and dependents	Low
		Operations camp (living away from the community) and related effects on Aboriginal traditional land and resource use	Low
Mine closure	D/C	Mine closure and loss of jobs	High

Project phase: C - construction; D/C - decommissioning and closure; O - operations

All wellbeing effects identified are essentially indirect effects resulting from direct effects on some other VCs, such as employment or in-migration, for example. Therefore, the effects linkages discussed here are all one way. A summary of potential indirect project effects on the wellbeing VC is provided in Table 8.2.6-8.

Table 8.2.6-8: Potential Indirect Project Effects from Other Valued Components

Direct Project Effect (Adverse or Positive)	Project Phase	Potential Indirect Project Effect	Carry Forward (Yes / No)	Rationale
Employment opportunities during construction and additional income-related effects (spending decisions)	C	Positive spending decisions could enhance family and community wellbeing. Negative spending decisions could reduce family and community wellbeing, and could have equity effects on vulnerable sub-populations.	Yes	Regulatory (social concern under BCEAA)
Influx of workers and associated behavioural changes	C	Family and community wellbeing could decline if the transient population engages in socially disruptive or illegal activities, or compete with other residents for housing and other community services.	Yes	Regulatory (social concern under BCEAA)
Work schedule at the mine (3 weeks on and 1 week off) and separation from family and dependents	C	Limited family time can lead to family fragmentation, behavioural issues in children with a part-time parent, and family violence.	Yes	Regulatory (social concern under BCEAA)

Direct Project Effect (Adverse or Positive)	Project Phase	Potential Indirect Project Effect	Carry Forward (Yes / No)	Rationale
Construction camp (living away from the community) and related effects on Aboriginal traditional land and resource use	C	Missing the windows of opportunity for resource harvesting for family consumption or cultural events.	Yes	Regulatory (social concern under BCEAA)
Employment opportunities during operation and additional income-related effects (spending decisions)	O	Positive spending decisions could enhance family and community wellbeing. Negative spending decisions could reduce family and community wellbeing, and could have equity effects on vulnerable sub-populations.	Yes	Regulatory (social concern under BCEAA)
Influx of workers and associated behavioural changes	O	Family and community wellbeing could decline if the transient population engages in socially disruptive or illegal activities, or compete with other residents for housing and other community services.	Yes	Regulatory (social concern under BCEAA)
Work schedule at the mine (3 weeks on and 1 week off), and separation from family and dependents	O	Limited family time can lead to family fragmentation, behavioural issues in children with a part-time parent, and family violence.	Yes	Regulatory (social concern under BCEAA)
Operations camp (living away from the community) and related effects on Aboriginal traditional land and resource use	O	Missing the windows of opportunity for resource harvesting for family consumption or cultural events.	Yes	Regulatory (social concern under BCEAA)
n/a	D/C	No effect	No	Regulatory (social concern under BCEAA)

Project phase: C - construction; D/C - decommissioning and closure; O - operations

Note: n/a - not applicable

A summary of potential interactions between direct proposed Project effects on other VCs, and family and community wellbeing is provided in Table 8.2.6-9.

Several of the interactions described below could lead to combined effects, for example economic and Nisga'a and Aboriginal land use VCs. The economic VCs could act to influence wellness through increased employment and income and is discussed. In the traditional land use cases, it is the identified linked VC that would experience the bulk of the effect; the wellbeing implications could occur but are expected to be minor. The other identified potential linkages (health and social VCs) are components of the wellbeing VC being assessed herein.

Table 8.2.6-9: Summary of Potential Interaction Between Direct Project Effects on Other Valued Components, and Family and Community Wellbeing

Direct Project Effect	Air Quality And Climate Change	Noise And Vibration	Hydrogeology	Groundwater Quality	Freshwater And Sediment Quality	Surface Hydrology	Freshwater Fisheries VCs	Marine Water Quality	Marine Biota	Terrestrial Environment VCs	Wildlife And Their Habitat VCs	Environmental Health VCs	Economic VCs	Social VCs	Heritage VCs	Health VCs	Nisga'a Nation Land Use	Aboriginal Groups Land Use
Employment opportunities during construction and additional income-related effects (spending decisions).	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	+	+/-	NI	-	o	o
Influx of workers and associated behavioural changes	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	-	NI	-	NI	NI
Construction work schedule at the mine (3 weeks on/off), and separation from family and dependents	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	-	NI	-	o	o

Direct Project Effect	Air Quality And Climate Change	Noise And Vibration	Hydrogeology	Groundwater Quality	Freshwater And Sediment Quality	Surface Hydrology	Freshwater Fisheries VCs	Marine Water Quality	Marine Biota	Terrestrial Environment VCs	Wildlife And Their Habitat VCs	Environmental Health VCs	Economic VCs	Social VCs	Heritage VCs	Health VCs	Nisga'a Nation Land Use	Aboriginal Groups Land Use
Construction camp (living away from the community) and related effects on Aboriginal traditional land and resource use	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	o	-	-
Employment opportunities during operation and additional income -related effects (spending decisions)	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	+	+/-	NI	o	o	o
Influx of workers and associated behavioural changes	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	o	NI	-	NI	NI
Operation work schedule at the mine (3 weeks on/off), and separation from family and dependents.	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	-	NI	o	o	o

Direct Project Effect	Air Quality And Climate Change	Noise And Vibration	Hydrogeology	Groundwater Quality	Freshwater And Sediment Quality	Surface Hydrology	Freshwater Fisheries VCs	Marine Water Quality	Marine Biota	Terrestrial Environment VCs	Wildlife And Their Habitat VCs	Environmental Health VCs	Economic VCs	Social VCs	Heritage VCs	Health VCs	Nisga'a Nation Land Use	Aboriginal Groups Land Use
Operations camp (living away from the community) and related effects on Aboriginal traditional land and resource use	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	o	-/+	-/+
Decommissioning and closure loss of jobs	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	-	o	NI	o	NI	NI

Legend: Interaction definitions: o - interaction; - key interaction; + - benefit; NI - no interaction

A summary of potential Project effects on family and community wellbeing, to be carried forward into the assessment for mitigation planning, is provided in Table 8.2.6-10.

Table 8.2.6-10: Summary of Potential Project Effects to be Carried Forward into the Assessment for Family and Community Wellbeing

Adverse Effects / Positive Effects	Project Phase	Direction
Income-related effects: decisions on spending disposable income	C	+/-
Influx of workers-related effects: behavioural changes	C	-
Work schedule effects: isolation and separation of workers from families and dependents	C	-
Effects on Aboriginal traditional land and resource use: missing the windows of opportunity for resource harvesting for family consumption or cultural events	C	-
Income-related effects: decisions on spending disposable income	O	+/-
Influx of workers-related effects: behavioural changes	O	-
Work schedule effects: isolation and separation of workers from families and dependents	O	-
Effects on Aboriginal traditional land and resource use: missing the windows of opportunity for resource harvesting for family consumption or cultural events	O	+/-
Loss of jobs and income and potential out-migration	D/C	-

Project phase: C - construction; D/C - decommissioning and closure; O - operations

8.2.6.6.2 Mitigation Measures

It is important to note that the proponent, acting alone, cannot unilaterally decide upon and implement most of the mitigation measures required to manage social effects, particularly those affecting individual, family, and community wellbeing. Governments are responsible for planning and implementing social programs and delivering public services that address social effects concerns. Furthermore, individuals and families must make lifestyle decisions that are consistent with enhanced wellbeing. As a result these parties must all share responsibility to successfully manage social effects.

8.2.6.6.2.1 Construction Phase

By working with its contactors and community representatives, the proponent can help monitor social and economic conditions in the LSA during construction, and take corrective actions within their sphere of responsibility to minimise adverse effects on family or community wellbeing. The proponent's mitigation measures during construction would consider the following:

- Promote wise spending decisions;

- Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault;
- Provide a flexible rotation schedule, where practical, that could vary based on the needs of the local hires;
- Facilitate and maintain communication between construction workers and their families by providing internet and phone services on-site;
- Offer counselling services to employees; and
- Work with local agencies to assist in monitoring community wellbeing and to take corrective actions where appropriate (see biophysical mitigation measures).

8.2.6.6.2.2 Operations Phase

By working with its contactors and community representatives, the proponent can help monitor social and economic conditions in the LSA during operation and take actions within its sphere of responsibility to minimise adverse effects on family or community wellbeing. The proponent's mitigation measures during the operation would consider the following:

- Promote wise spending decisions;
- Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault;
- Provide a flexible rotating schedule that could vary based on the needs of local hires;
- Maintain communication between the operation workers and their families by providing cell phones, Internet and satellite phone services on-site;
- Offer counselling services to employees; and
- Work with local agencies to assist in monitoring community wellbeing and to take corrective actions where appropriate (see biophysical mitigation measures).

8.2.6.6.2.3 Decommissioning and Closure Phase

While there is no easy solution to adverse effects related to job losses, the proponent will commit to working with the Nisga'a Nation to develop a mine closure plan that identifies strategies and actions to help minimise potential adverse effects from closing the mine. Although mine closure would increase unemployment in the LSA and RSA, Project skills development and work experience would help residents improve their overall education, and increase their competitiveness and opportunities to secure employment elsewhere. The proponent recognises that good practice in the area of human resources includes planning for eventual mine closure and reclamation. All employees would be informed of the expected life of the mine as part of their offer of employment and workplace orientation. At a minimum, the proponent would inform its workforce two years prior to the anticipated mine closure and decommissioning, sharing appropriate details such as severance packages.

8.2.6.6.2.4 Post-Closure

Post-closure activities would have no effect on family and community wellness. No mitigation would be required.

8.2.6.6.2.5 Summary

A summary of potential proposed Project effects and mitigation measures on family and community wellbeing by Project phase is provided in Table 8.2.6-11.

Table 8.2.6-11: Potential Project Effect by Project Phase on Family and Community Wellbeing and Mitigation Measures

Project Effect	Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
Income-related effects: decisions on spending disposable income	C	The proponent would: Promote wise spending decisions; Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault; Provide a flexible rotation schedule that could vary based on the needs of the local hires; Facilitate and maintain communication between the construction workers and their families by providing Internet and/or satellite phone services on-site; Work with local agencies to assist in monitoring community wellbeing and to take corrective actions where appropriate.	High
Influx of workers-effects: behavioural changes	C		Moderate
Work schedule effects: isolation and separation of workers from families and dependants	C		Moderate
Effects on Aboriginal traditional land and resource use: missing the windows of opportunity for resource harvesting for family consumption or cultural events	C		High
Income-related effects: decisions on spending disposable income	O	The proponent would: Promote wise spending decisions. Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault; Provide a flexible rotating schedule that could vary based on the needs of the local hires; Maintain communication between the operations workers and their families by providing internet and satellite phone services on-site;	High
Influx of workers effects: behavioural changes	C		Moderate
Work schedule effects: isolation and separation of workers from family and dependants	O		High

Project Effect	Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
Effects on Aboriginal traditional land and resource use: missing the windows of opportunity for resource harvesting for family consumption or cultural events	O	Work with local agencies to assist in monitoring community wellbeing and to take corrective actions where appropriate (see biophysical mitigation).	High
Loss of jobs and income, and potential out-migration	D/C	The proponent would: Work with the community to develop a mine closure plan that identifies strategies and actions to help minimise the potential adverse effects of closing the mine; and Ensure ongoing training opportunities to help residents of the LSA and RSA improve their overall education, and increase their competitiveness and chances to get employment elsewhere.	Moderate

Project phase: C - construction; D/C - decommissioning and closure; O – operations

8.2.6.7 Potential Residual Effects and Their Significance

8.2.6.7.1 Potential Residual Effects After Mitigation

8.2.6.7.1.1 Construction Phase

By managing potential adverse effects and applying the mitigation measures above, proposed Project construction is expected to have a positive effect and is characterised as local, low, short-term, continuous, and not significant. From the RSA perspective, these effects are considered regional, low, short-term, continuous, and not significant (minor).

8.2.6.7.1.2 Operations Phase

By providing local residents with employment and income that would enable them to improve their overall economic and social wellbeing, and by applying the above discussed mitigation measures, proposed Project operations are expected to have an overall positive effect on family and community wellbeing. These effects are characterised as medium, long-term, and continuous, but not significant.

8.2.6.7.1.3 Decommissioning and Closure Phase

Given the large uncertainty about economic and demographic conditions in the region at the time of mine closure and the length of time available to design and implement an effective closure plan, the effects of mine closure on family and household wellbeing in the LSA are characterised as negative but local, medium, long-term, and continuous, but not significant. There is a low degree of confidence about the magnitude of proposed Project effects at time

of closure. For the RSA, the effects are considered negative, regional, low, long-term, continuous, adverse, and not significant.

A summary of residual effects after mitigation is provided in Table 8.2.6-12.

Table 8.2.6-12: Summary of Residual Effects for Family and Community Wellbeing

Project Phase	Residual Effect	Direction
C	Effects related to spending, in-migrant behaviour, separation from families and Aboriginal land use	Positive
O	Effects related to spending, in-migrant behaviour, separation from families and Aboriginal land use	Positive
D/C	Wellbeing effects from job losses	Negative

Project phase: C - construction; D/C - decommissioning and closure; O - operations

8.2.6.7.2 Significance of Potential Residual Effects

Although some potential family and community wellbeing effects from construction have the potential for adverse consequences, the net effects are expected to be on balance slightly positive because incomes can be used to enhance quality of life. The proposed mitigation is anticipated to be effective as long as the proponent, communities, and governments cooperate in management initiatives. The residual effects are considered to be low in magnitude, local and regional, short term, continuous, reversible, low in certainty and not significant (minor).

Although some potential family and community wellbeing effects from operations have the potential for adverse consequences, the net effects are expected to be on balance positive because incomes can be used to enhance quality of life. The proposed mitigation is anticipated to be effective as long as the proponent, communities, and governments cooperate in management initiatives. The residual effects are considered to be low in magnitude, local and regional, long term, continuous, reversible, low in certainty, and not significant (minor).

The potential family and community wellbeing effects from decommissioning and closure are expected to be negative because of job losses. The proposed mitigation is anticipated to be effective as long as the proponent, communities and governments cooperate in management initiatives. The residual effects are considered to be low to medium in magnitude, local and regional, long term, continuous, reversible and not significant (minor).

A summary of residual effects on family and community wellbeing by project phase is provided in Table 8.2.6-13. The level of confidence of these predictions ranges from low during decommissioning and closure to medium for construction and operations.

Table 8.2.6-13: Residual Effects Assessment by Project Development Phase for Family and Community Wellbeing

Parameter	Stage Of Development/Rating			
Stage of Project Development	Construction	Operations	Decommissioning and Closure	Post-closure
Residual effect	Effects related to spending, in-migrant behaviour, separation from families, and Aboriginal land use	Effects related to spending, in-migrant behaviour, separation from families, and Aboriginal land use	Wellbeing effects from job losses	n/a
Effect attribute				
Magnitude	Low	Low	Low to medium	n/a
Spatial extent	Local and regional	Local and regional	Local and regional	n/a
Duration	Short term	Long term	Long term	n/a
Frequency	Continuous	Continuous	Continuous	n/a
Reversibility	Reversible	Reversible	Reversible	n/a
Direction	Positive	Positive	Negative	n/a
Certainty	Low	Low	Low	n/a
Residual effect significance	Not significant (minor)	Not significant (minor	Not significant (minor)	n/a
Level of confidence	Medium	Medium	Low	n/a

Legend: n/a - not applicable

8.2.6.8 Cumulative Effects Assessment

For this VC, the significance of potential Project effects was assessed by comparing the effects to baseline conditions and future trends that reflect the effects of approved and reasonably foreseeable projects expected to be developed within the near future. Because this assessment examines proposed Project effects in combination with the effects of other activity in the study region, this assessment is effectively a cumulative effects assessment (CEA); therefore, a separate assessment of these effects is not required. In addition, the residual effects are very small, there is good existing capacity in the RSA, and Project contributions to cumulative effects are unlikely to be detectable. This, and the lack of VC-specific effects data from potentially overlapping projects, means it is impractical to conduct a cumulative effects assessment for this VC.

8.2.6.8.1 Rationalisation for Carrying Forward Project-Related Residual Effects Into the Cumulative Effects Assessment

For this VC, the significance of potential effects related to the proposed Project was assessed by comparing the effects to baseline conditions and future trends that reflect the effects of approved and reasonably foreseeable projects. Because wellbeing is a multi-dimensional VC influenced by many other activities in the study region, the effects assessment specific to the proposed Project is effectively a cumulative effects assessment, and therefore a separate assessment of these effects is not required. In addition, the residual effects are very small and the proposed Project contribution to cumulative effects is unlikely to be detectable. Additionally, the lack of VC-specific effects data from potentially overlapping projects, means it is impractical to conduct a cumulative effects assessment for this VC.

8.2.6.8.2 Interaction Between Family and Community Wellbeing and Other Past, Present, or Future Projects / Activities

As discussed above, there are no other projects anticipated to interact with the proposed mine site area, therefore there is no discussion of this potential interaction.

8.2.6.8.3 Mitigation Measures

As the assessment of effects specific to the proposed Project has already been conducted in the context of other proposed projects and their effects on family and community wellbeing, no additional mitigation measures are required.

8.2.6.8.4 Potential Residual Cumulative Effects and Their Significance

The potential residual effects on family and community wellbeing are the same as the effects specific to the proposed Project, as stated above.

8.2.6.9 Limitations

The main limitation to any wellbeing effects assessment is related to the complex interactions among many often unrelated actions, which combine to influence family and community wellbeing. Proposed Project effects are only one of these causal influences and they often cannot effectively be isolated from the others in an assessment – a well-being assessment is and must be inherently a combined and cumulative assessment. Furthermore, individual, family, and community decisions, as well as government policy and programming, can dramatically change the nature and extent of wellbeing conditions.

8.2.6.10 Conclusion

Overall, proposed Project effects on family and community wellbeing in the study region would be both positive (during construction and operations because of income effects) and negative (during decommissioning and closure because of job losses). All of these effects are not significant; they are negligible during construction, and minor during operations and decommissioning and closure.

8.2.7 Social VC #6: Educational Services

8.2.7.1 Introduction

The AIR requires an examination of the education services and evaluation of the implications associated with the change in population that is tied to the proposed Project. The primary issue is how to meet the change in school enrolment that would result from employees relocating to the LSA and RSA with their families. Student enrolment is directly linked to new families arriving in the study area and increased demand for educational credentials to qualify for employment. Close communication with the appropriate school districts is required so that adequate teaching staff can be in place for specific increases or decreases in demand that the Project may generate. Proposed Project activities would create demand on education services starting with construction, continuing through operations, and then gradually declining to baseline conditions during the proposed Project's post-closure period.

8.2.7.1.1 Relevant Legislation and Legal Framework

There is no specific legislative requirement for consideration of proposed Project effects on the education services. However, it is common practice and the proponent's intent to estimate the potential effects as this evaluation assists public and private agencies in their planning for future capacity requirements. This VC was included in the AIR for the proposed Project.

8.2.7.1.2 Spatial Boundaries

The proposed Project is located on Alice Arm in the north coast area of BC, in the central section (Area A) of the RD of Kitimat-Stikine (Figure 8.2.2-1). The communities closest to the mine site include the four communities on Nisga'a Lands (Gitwinksihlkw; Gingolx; Laxgalts'ap; and New Aiyansh) as well as the Kitsault Resort and Alice Arm. These communities and the small rural population on Nisga'a Lands are considered to be the LSA for the purpose of describing social conditions and assessing social effects.

The broader RSA for describing social baseline conditions is defined to include four distinct regions and major communities:

- The DM of Stewart (located in the Kitimat-Stikine RDEA A);
- Kitimat-Stikine RDEA B, including the Village of Hazelton, the DM of New Hazelton and numerous Indian reserves (Gitanmaax 1, Gitsegukla 1, Sik-e-dakh 2, Kispiox 1, Hagwilget 1, Gitwangak 1, Gitanyow 1, Moricetown 1, Bulkley River 19, and Coryatsaqua (Moricetown) 2);
- The Town of Smithers; and
- The Terrace CA, which includes the City of Terrace, the rural populations of Kitimat-Stikine RDEA C (Part 1) and RDEA E, and four reserves (Kitsumkaylum 1, Kitselas 1, Kshish 4, and Kulspai 6).

These groupings were selected to reflect SC census subdivisions and areas that might be called upon to provide labour, goods and services required for mine construction and operation.

The reserves listed above belong to a number of First Nations. The Kitimat-Stikine RDEA B includes reserves for the following First Nations:

- Gitanmaax (Gitanmaax 1 reserve);
- Gitanyow (Gitanyow 1 reserve);
- Glen Vowell (Sik-e-dakh 2 reserve);
- Kispiox (Kispiox 1 reserve);
- Gitsegukla (Gitsegukla 1 reserve);
- Gitwangak (Gitwangak 1 reserve);
- Hagwilget Village (Hagwilget 1 and Bulkley River 19 reserves); and
- Moricetown (Moricetown 1 and Coryatsaqua (Moricetown) 2 reserves).

The Gitanmaax, Gitanyow, Glen Vowell and Kispiox First Nations are part of the Gitxsan Local Services Society. The Terrace CA includes the reserves of two First Nations: Kitsumkaylem (Kitsumkaylum 1); and Kitselas (Kitselas 1, Kshish 4, and Kulspai 6). Potential effects on these First Nations are subsumed in the assessment of proposed Project effects on Kitimat-Stikine RDEA B, and the Terrace CA.

8.2.7.1.3 Temporal Boundaries

The temporal boundaries for assessment of social effects reflect the duration of various activities related to the proposed Project. For assessing construction effects, the analysis focuses on proposed Project activities over the 25-month window beginning in Q1 2012. For assessing operations effects, the analysis focuses on the 15-year window of 2014 to 2029, and estimates average effects during a typical year of operations. The effects of decommissioning and closure focus on activities that occur in the 15 to 17 years following 2029. The post-closure phase is not assessed as it resembles base case conditions and thus is not anticipated to produce education services effects.

8.2.7.2 Information Source and Methods

The primary data source utilised for the demographic analysis was the 2006 Canada census. Information on education conditions and concerns were obtained from the BC Stats 2010 social and economic indices data, which is presented by LHA. Important administrative data on existing capacity and utilisation was obtained from LSA and RSA school districts.

Generally accepted EA methods were used to determine potential Project effects on the baseline education conditions. This process entailed producing estimates of population

effects and considering these in light of existing conditions to produce an assessment of potential effects.

8.2.7.3 Detailed Baseline for Education Services

The Nisga'a School District No. 92 exclusively oversees educational services for the Nisga'a Villages. In 2010 / 2011, District 92 employed 47 full-time teachers and a small number of part-time teachers at four public schools (three elementary and one secondary). Collectively, the district operates 108 classes, with current student enrolment of 422 students. All students are of Aboriginal heritage. Among the 108 classes, there are two classes with more than 30 students. In recent years, the student enrolment has been declining, falling from an enrolment of 536 in 2006 / 2007 to the current level (BC Ministry of Education (BC MOEd) 2010).

In the 2010 / 2011 school year, 8,172 students were enrolled in School District No. 54, 82, and 92 in 927 classes at 35 schools. However, enrolment has been steadily declining in recent years in these three school districts. For example, in 2006 / 2007 8,847 students were enrolled in the RSA, 675 students more than in 2010 / 2011. In 2006 / 2007 529 full-time administrators and educators were employed in the three school districts, which declined to 443 in 2010 / 2011 (BC MOEd 2010).

8.2.7.3.1 Educational Concerns

Educational concerns are summarised using the following five indicators (see Table 8.2.7-1):

- Percentage of the population aged 25-54 years who did not complete high school;
- Percentage of the population aged 25-54 years old without post-secondary credentials;
- Percentage of young adults aged 18 years who did not graduate from high school;
- Percentage of students enrolled in Grade 12 who did not take or did not pass Grade 12 provincial exams (math, chemistry and English); and
- Percentage of students in Grade 4 with below-standard Grade 4 reading, writing, and math skills.

Table 8.2.7-1: Indicators of Education Concerns, by Local Health Area

LHA	Population Aged 25-54 Years[1]		Young Adults Aged 18 Years Who Did Not Graduate[2]	Grade 12 Provincial Exam Non-Completion Rate[3]			Below Standard Grade 4 Reading, Writing, And Math[4]
	Did Not Complete High School	Without Post-Secondary Credentials		Math	Chemistry	English	
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Nisga'a	25.5	54.0	49.8	96.8	99.7	80	62.5

LHA	Population Aged 25-54 Years[1]		Young Adults Aged 18 Years Who Did Not Graduate[2]	Grade 12 Provincial Exam Non-Completion Rate[3]			Below Standard Grade 4 Reading, Writing, And Math[4]
	Did Not Complete High School	Without Post-Secondary Credentials		Math	Chemistry	English	
Terrace	17.2	47.0	44.6	79.3	83.7	51	30.3
Upper Skeena	34.9	57.8	69.6	88.2	88.8	67.2	43.0
Smithers	13.9	48.2	19	76.5	83.2	26.5	19.3
British Columbia	11.1	37.2	29.8	60.6	76.5	25.2	20.0

Note: 1. For 2006
2. Average for 2007/2008 and 2008/2009
3. Average for 2006/2007 and 2007/2008
4. Average for 2007/2008 and 2008/2009
% - percent

Source: BC Stats (2010, Internet site)

Table 8.2.7-1 shows that the Nisga'a LHA reported high provincial exam non-completion rates (80% or greater) for all three subjects. The percent of the Nisga'a population aged 25-54 years who did not complete high school (25.5%) was more than double that of the provincial rate (11.1%). Similarly, the percentage of people without post-secondary credentials in the Nisga'a LHA (54.0%) was noticeably higher than the provincial rate (37.2%). Nearly half of young adults aged 18 years (49.8%) did not graduate high school, nearly double the provincial average (29.8%). The percentage of students in the Nisga'a LHA with below a Grade 4 standard of reading, writing and math skills (62.5%) was more than three times the provincial average (20.0%). The Nisga'a LHA was ranked 75th in the province.

The Upper Skeena LHA reported the highest percentage in the province of individuals without high school and post-secondary credentials (34.9 and 57.8% respectively). The Upper Skeena LHA also reported more than double the number of young adults aged 18 years who did not graduate from high school (69.6%) than the province (29.8%). The Upper Skeena LHA was ranked 78th of the 78 provincial LHAs. Terrace was ranked 58th. Smithers ranked the best out of all LHAs in the RSA (30th).

Within the LSA and RSA, there are three school districts that oversee and offer education services to their communities:

- School District No. 92 (Nisga'a) – all Nisga'a Villages;
- Coast Mountain School District No. 82 – covers the DM of Stewart, community of Hazelton within the Kitimat-Stikine RDEA B, and the City of Terrace (Board of Education Office is located in Terrace); and

- Bulkley Valley School District No. 54 – Smithers.

The Nisga'a School District No. 92 exclusively oversees educational services for the Nisga'a Villages. In 2010 / 2011, the latest year for which data were available, a majority of elementary students enrolled in this school district were Aboriginal students in Aboriginal programs (62.9% of all student enrolment). English as a Second Language (ESL) had the second highest enrolment (33.5%), followed by a small number of students enrolled in continuing education (3.3%) and distributed learning programs (0.3%) (BC MOEd 2010).

The Coast Mountain School District No. 82 includes Terrace, Stewart and Hazelton (Kitimat-Stikine RDEA B). In 2010 / 2011, 43.7% of students were Aboriginal and many of these students were enrolled in Aboriginal programs. For the overall district, 30.9% of students were enrolled in Aboriginal programming. Other programs with high student enrolment included French programs (25.1%) and core French (19.9%). Additional programs with student enrolment include the distributed learning program (12.4%), ESL (6.3%), French immersion[1] (5.3%), and career technical programs (0.1%) (BC MOEd 2010).

In the Bulkley Valley School District No. 54, French programs had the highest enrolment (35.5%), followed by core French (29.7%), Aboriginal students in Aboriginal programs (22.9%) and French immersion (5.8%). Other program enrolments included distributed learning (5.3%) and ESL (0.7%) (BC MOEd 2010).

Table 8.2.7-2: Educational Facilities in the Local Study Area and Regional Study Area

Community / District	Educational Facilities
Nisga'a Villages	Alvin McKay Elementary
	Gitwinksihlkwel Elementary
	Nisga'a Elementary
	Nathan Barton Elementary
	Nisga'a Adult and Continuing Education (ACE)
DM of Stewart	Stewart Elementary
	Stewart Secondary
	North Coast Christian School
Kitimat-Stikine RDEA B	Hazelton Secondary
	John Field Elementary
	New Hazelton Elementary School
	South Hazelton Elementary
Town of Smithers	Smithers Secondary
	Bulkley Valley Learning Centre
	Lake Kathlyn Elementary School

[1] French Immersion is a more ambitious second-language program than Core French. It is designed to produce functionally bilingual students by using French as the language of instruction. The program generally begins in Kindergarten (Early Immersion) or Grade 6 (Late Immersion), starting with 100% French instruction during the beginning years, gradually diminishing to 2 courses in Grade 12 (BC Ministry of Education 2010).

Community / District	Educational Facilities
	Muhiem Elementary School
	Walnut Park Elementary School
Terrace CA	Cassie Hall Elementary
	Upland Elementary
	Skeena Junior
	Parkside Secondary
	Caledonia Secondary
	PACES
	Ecole Kit K'shan
	Suwilaawks Community
Prince Rupert / RSA	Conrad Street Elementary School
	Lax Kxeen Elementary School
	Pineridge Elementary School
	Ecole Westview Elementary School
	Roosevelt Primary School
	Prince Rupert Secondary School
	Charles Hays Secondary School
	Pacific Coast School (Grade 8 to adult)
	Port Edward Elementary School
	Hartley Bay Jr. Sr. School

Note: DM - District Municipality; LSA - Local Study Area; RSA - Regional Study Area

Source: Coast Mountain School District (2010); Prince Rupert School District (2010); Rescan (2010); School District No. 92 (Nisga'a) (2010)

8.2.7.3.2 Advanced Education

The Northwest Community College (NWCC) is based in Terrace and operates nine campuses throughout northwestern BC. Available programs include academic and career, technical, trades and apprenticeship, and college preparation. NWCC also has programs in mining, art, and culinary arts, and provides continuing education and industry training. Online, teleconference, and videoconference courses are also available (NWCC 2010; Rescan 2010).

The NWCC Smithers campus offers a number of programs, including business technology, social service work, and carpentry. Many college classes are transferable for university credits, or may be used for high school-equivalent credit. Also available through this campus is the School of Exploration and Mining, a joint effort by NWCC and the Smithers Exploration Group. Programs offered include Driller's Helper, Camp Management, Exploration Field Assistant, and Equipment Operations (Town of Smithers n.d.; Rescan 2010).

During the 2008 / 2009 school year, 1,935 Full-time Equivalent (FTE) students were enrolled in credit and non-credit programs at NWCC. Of these, 39% of all students were in Terrace and 43% of those in credit programs were Aboriginal (NWCC 2009; Rescan 2010).

The University of Northern BC (UNBC)'s northwestern regional campus is in Terrace. Programs include:

- Bachelor of Social Work;
- Master of Education;
- Master of Arts in First Nations Studies;
- Certificate in First Nations Studies;
- General Arts; and
- Summer courses.

Additionally, the campus offers undergraduate courses that can be used towards a general Bachelor of Arts, part-time graduate programs, or the requirements for obtaining a Minor in Resource Recreation and Tourism (UNBC 2010; Rescan 2010).

8.2.7.4 Cultural Ecological or Community Knowledge

8.2.7.4.1 Nisga'a Nation

NLG may also make laws with regard to educational programs for Nisga'a citizens from pre-school to Grade 12, "including the teaching of Nisga'a language and culture" (Government of Canada 2010). Educational curriculum, testing, and standards for Nisga'a citizens must be comparable to the provincial standards to allow for ease of transfer to another school and access to post-secondary education. Teachers must also have certification recognisable and comparable to the provincial standard, with the exception of Nisga'a language and culture teachers, who are measured against Nisga'a standards set by Nisga'a Nation law. Agreements between the province and NLG would govern administration of education to Nisga'a citizens outside of Nisga'a Lands and non-Nisga'a living on Nisga'a Lands.

The Nisga'a ESCIA (Rescan 2012) also provides Nisga'a-specific information and addresses potential effects of the proposed Project on Nisga'a Nation rights, interests, and concerns as they relate to the NFA.

8.2.7.4.2 Aboriginal Groups

It is not apparent from desk-based research what potentially affected Aboriginal groups' interest in education is related to the proposed Project. Future engagement efforts with each group may reveal more on this matter.

8.2.7.5 Past, Present, or Future Projects / Activities

The baseline information presented in Sections 7.2.3.3 and 8.2.2.3 reflects changes in regional economic activity and the related demographic indicators that have occurred between 2006 and 2010. In terms of future employment, income, and population in the region, conditions would be influenced by other major projects that would be competing for labour, goods and services. A list of these major projects is published by the BC Ministry of Finance, and a summary of major projects in the study area that have been proposed, are on hold, and have started is provided in Table 7.2.3-6. The table shows major projects located near Alice Arm, Iskut, Smithers, Stewart and Terrace.

The implications of these projects for regional population have been considered in the analysis of the demographic VC (e.g., the LHA population forecasts), which is a key pathway to education effects. As a result, this effects assessment specific to the proposed Project is also inherently cumulative in nature.

8.2.7.6 Potential Effects of the Proposed Project and Proposed Mitigation

8.2.7.6.1 Identification and Analysis of Potential Project Effects

Project effects on education would be largely attributable to changes in population, and thus in demands for local and regional education services. Table 8.2.7-3 describes the potential direct effects on education and their likelihood of occurrence.

Table 8.2.7-3: Potential Direct Project Effects on Education

Project Component	Project Phase	Potential Direct Project Effect	Likelihood Of Occurrence
All	Construction	Changes in in- and out-migration of school-age population	Low
	Operations	In-migration of school age population	Low
	Closure and Decommissioning	Out-migration of school age population	Low

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

Demand for education services is linked to the expected change in population attributable to the proposed Project. Table 8.2.4-4 summarises potential indirect proposed Project effects on other VCs.

Table 8.2.7-4: Potential Indirect Project Effects on Other Valued Components

Direct Project Effect (Adverse or positive)	Project Phase	Potential Indirect Project Effect	Carry Forward (Yes / No)	Rationale
Population change from in- and out-migration creates new school enrolment demand	All	New population would change demand for other social services and infrastructure	No	Indirect effects are assessed in other social VCs

The potential interaction of project education services effects with other VCs is outlined in Table 8.2.7-5. There is no cause-effect linkage to environmental, land use, economic, health, or heritage VCs; however, there is a potential interaction between education services effects and other social VCs. The interaction linkage is one way from population and not vice versa. There could be other indirect interactions, but these are more directly the consequence of general population effects and therefore are discussed under the regional services and wellbeing VCs and not carried forward here.

Table 8.2.7-5: Summary of Potential Interaction Between Project Direct Effects on Other Valued Components AND Education

Direct Project Effect	Air Quality and Climate Change	Noise And Vibration	Hydrogeology	Groundwater Quality	Freshwater and Sediment Quality	Surface Hydrology	Freshwater Fisheries	Marine Water Quality	Marine Biota	Terrestrial Environment	Wildlife and Their Habitat	Environmental Health	Economic	Social	Heritage	Health	Nisga'a Nation Land Use	Aboriginal Groups Land Use
Population change in in- and out migration creates school enrolment demand.	NI	NI	NI	NI	Nil	NI	NI	NI	NI	NI	NI	NI	NI	o	NI	NI	NI	NI

Legend: Interaction definitions: o - interaction; - - key interaction; + - benefit; NI - no interaction; n/a - not applicable

The interaction described in Table 8.2.7-5 could lead to combined effects; however, it is the identified subject area that would experience the effect, and those effects are described in the relevant VC section where appropriate.

Changes in demand for education services as outlined in Table 8.2.7-6 are carried forward in this assessment for purposes of mitigation planning. Effects are negative when reflecting increases in demand for services and positive when this demand declines.

Table 8.2.7-6: Summary of Potential Project Effects to be Carried Forward Into the Assessment for Education

Adverse Effects/Positive Effects	Project Phase	Direction
Changes in in- and out-migration creates demand and changes school enrolment	C	-
In-migration creates demand and changes school enrolment	O	-
Out-migration reduces demand for educational services	D/C	+

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

8.2.7.6.2 Mitigation Measures

It is important to note that the proponent, acting alone, cannot unilaterally decide upon and implement most of the mitigation measures required to manage social effects. Governments are responsible for planning and implementing social program and delivering public services that address social effects concerns. Furthermore, individuals and families must make lifestyle decisions that are consistent with enhanced social circumstances. As a result, these parties must all share responsibility for social effects management for success to be realised.

The proponent would work with the three school districts (Nos. 54, 82, and 92) to ensure that the appropriate information on construction and operations is made available concerning the timing and the communities in which new residents may locate, so that the school district(s) can make the appropriate arrangements to incorporate the new student enrolment into their resource planning process. Likewise, with mine decommissioning and closure, the proponent would communicate directly with the school districts so that they can be prepared for the number of students leaving the local school system. In addition, to discourage dropouts, the proponent will cooperate with educational authorities, particularly in clearly communicating employment prerequisites and encouraging ‘stay in school’ programs. Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault. Table 8.2.7-7 summarises the proposed Project effects by phase.

Table 8.2.7-7: Potential Project Effect by Project Phase on Education and Mitigation Measures

Project Effect	Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
Change in- and out-migration creates demand on school enrolment	C	Work with school districts to inform school district planning and resourcing processes. The proponent would require all of its employees to have appropriate educational attainment or the equivalent competencies. Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault.	High
In-migration creates educational demand by increasing student enrolment	O	Work with school district to inform school district planning and resourcing processes. The proponent would require all of its employees to have appropriate educational attainment or the equivalent competencies. Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault.	High
Out-migration reduces educational demand by increasing student enrolment	D/C	Work with school district to inform school district planning and resourcing processes.	High

Project Phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

8.2.7.7 Potential Residual Effects and Their Significance

8.2.7.7.1 Potential Residual Effects After Mitigation

8.2.7.7.1.1 Construction Phase

From the perspective of education services, proposed Project construction would create new demand for labour and could potentially result in new workers with school-age children relocating to the LSA and RSA with their families. Current plans call for the construction workforce to be housed in a work camp at the mine site, and to be bussed to and from the camp at the beginning and end of each work rotation. During the 25-month construction period, most of the construction workforce would come from outside of either the LSA or the RSA and not relocate their families.

Overall, an average of 165 jobs (direct, indirect and induced) would be created for workers in the LSA and RSA during each year of construction; however, because of the nature of construction, employment, and the short construction period, it is anticipated that only a small number of new residents would be drawn to either the LSA or RSA during this phase, resulting in a minimal impact on school enrolment. However, because of recent declining enrolments, these effects, however minimal, could have positive effects on school and

program viability, providing that the educational system has underutilised capacity. In addition, the small population change would not have implications for post-secondary demand.

8.2.7.7.1.2 Operations Phase

During proposed Project operations, education services would be subjected to an influx of a small number of new residents residing in the LSA and RSA. Overall, approximately 235 new residents are anticipated, and potentially could result in approximately 45 additional school-age children throughout the LSA and RSA. In addition, in the first few years of operations, the small increase in school enrolment would serve to offset the small reduction in school enrolment caused by out-migration, and school-age children are anticipated to move away with their families, upon completion of construction.

This impact on school enrolment during operations is equivalent to approximately two additional classrooms and two additional teachers across three different school districts. As discussed in the baseline, enrolments and programming, including teacher / administrator employment, have generally been declining. Therefore, the additional student enrolment that would result from mine operations would likely serve to support the existing educational workforce and infrastructure in the LSA and RSA without overtaxing capacity, and assist in buffering against future enrolment declines.

8.2.7.7.1.3 Closure and Decommissioning Phase

With mine closure, most of the local employment associated with the mine would be lost and would result in a small decline in the school-age students as the local labour force associated with the mine operations and their families relocate to new communities for employment. See Table 8.2.7-8 for a summary of residual effects for education.

Table 8.2.7-8: Summary of Residual Effects for Education

Project Phase	Residual Effect	Direction
C	Changes in in- and out-migration creates demand and changes school enrolment	-
O	In-migration creates change in school enrolment	-
D/C	Out-migration creates reduction in school enrolment	+

Project Phase: C - construction; D/C - decommissioning and closure; O - operations

8.2.7.7.2 Significance of Potential Residual Effects

Overall, proposed Project construction effects on education services in the LSA and RSA are characterised as low in magnitude, regional, short term, continuous, reversible, positive, and high in certainty. These effects are considered to be not significant (minor).

Proposed Project operations effects on educational services would be characterised as low in magnitude, regional, long term, continuous, reversible, negative and high in certainty.

Given that most of the increase in school-age population would likely be concentrated in the RSA, demand for school enrolment in the public school K-12 system would be not significant (minor). In addition, it is anticipated that operations demand for post secondary education would also be not significant (minor). Confidence in this assessment for the RSA is high, but because of uncertainty with the share of workers associated with Nisga'a employment, there is less confidence for effects in the LSA.

For decommissioning and closure, the effect would be small and the demand reduction on educational services would be low in magnitude, regional, long term, continuous, reversible, positive and high in certainty. Overall, given the magnitude and direction of the effects on educational services, effects are considered to be not significant (minor).

Table 8.2.7-9 summarises the residual effects on education by project development phase.

Table 8.2.7-9: Residual Effects Assessment by Project Development Phase for Education

Parameter	Stage Of Development / Rating			
Stage of Project development	Construction	Operations	Decommissioning and closure	Post-closure
Residual effect	Change in in- and out-migration creates increase in student enrolment	In-migration creates demand on educational services	Out-migration reduces school enrolment	n/a
Effect attribute				
Magnitude	Low	Low	Low	n/a
Geographic extent	Regional	Regional	Regional	n/a
Duration	Short-term	Long-term	Long-term	n/a
Frequency	Continuous	Continuous	Continuous	n/a
Reversibility	Reversible	Reversible	Reversible	n/a
Direction	Negative	Negative	Positive	n/a
Certainty	High	High	High	n/a
Residual effect significance	Not significant (minor)	Not significant (minor)	Not significant (minor)	n/a
Level of confidence	High	High	High	n/a

Note: n/a - not applicable

8.2.7.8 Cumulative Effects Assessment

8.2.7.8.1 Rationalisation for Carrying Forward Project-Related Residual Effects Into the Cumulative Effects Assessment

As the residual effects for construction and operations are positive, they are not carried forward to the CEA. The decommissioning and closure effect is very small; there is existing capacity in the RSA, and the nature of the assessment method combine to indicate that Project contribution to cumulative effects is unlikely to be detectable. This, and the lack of

VC-specific effects data from potentially overlapping projects, means it is impractical to conduct a cumulative effects assessment for this VC (see Table 8.2.7-10).

Table 8.2.7-10: Project-Related Residual Effects - Rationale for Carrying Forward Into the Cumulative Effects Assessment

Project Component	Project Phase	Residual Effect	Rationale	Carried Forward In CEA
All	All	Changes in demand for school enrolment.	The low magnitude of expected demand, good existing capacity in the RSA, and the nature of the assessment method combine to indicate that the project contribution to cumulative effects is unlikely to be detectable	No

Project Phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure
Note: CEA - cumulative effects assessment; RSA - Regional Study Area

8.2.7.8.2 Interaction Between Education and Other Past, Present, or Future Projects / Activities

As discussed above, there are no other projects anticipated to interact with the proposed mine site area, therefore there is no discussion of this potential interaction.

8.2.7.8.3 Mitigation Measures

As the assessment of effects specific to the proposed Project has already been conducted in the context of other proposed projects and their effects on education services, no additional mitigation measures are required.

8.2.7.8.4 Potential Residual Cumulative Effects and Their Significance

The potential residual effects on education services are the same as the effects specific to the proposed Project stated above.

8.2.7.9 Limitations

The regional services effects assessment relies in large part on the population effects assessment, which concluded that population change attributable to the proposed Project would be well within historic variations and thus not significant. The primary underlying assumption is that most of the work force would originate from outside the RSA and would not be seeking to reside regionally or locally and so would not draw on regional services. During operations, it may be that some employees would choose to relocate to the RSA, a factor that has been taken into account in this assessment.

The greatest area of uncertainty is LSA effects, especially given the uncertainty of the direction and scale of Nisga'a migration patterns related to the proposed Project.

8.2.7.10 Conclusion

The remote Project location and the proponent's preference to operate a camp for proposed Project construction and operations would lead to very small population effects and proportionally even smaller education effects in the LSA / RSA. Implications for education services are small, would be associated with those workers that relocate their families to the LSA and RSA, and would be positive in direction during construction and operations because of the current trend to declining enrolments.

8.2.8 Social VC # 7: Transportation

8.2.8.1 Introduction

The transportation of equipment, supplies, materials, and labour would be an essential Project component throughout construction, operations, and decommissioning and closure of the proposed Project, and this Project activity could have effects on transportation infrastructure, its users, the adjacent environment, and the Nisga'a Nation culture and resource use. These pathways will be discussed in this section. Transportation of equipment, supplies, material and labour is also discussed in the Road Use Effects Assessment (RUEA) included in Appendix 8.0-C. The assessment in this section may not be entirely consistent with the RUEA, because the latter is informed by additional information.

Trucking would be the primary mode of transportation for delivery of equipment, supplies, materials, and consumables to the proposed Project site during construction and operations. During operations, molybdenum concentrate would be trucked to Vancouver for marine shipment to its final destination. As such, ground transportation is the focus of the transportation assessment.

Air transportation services and infrastructure would transport the construction contractors, and their workers living outside the region, to Terrace. From there the contractors and workers would be bussed to the site via a project charter bus service. The contractors and their crews would also have the option of driving personal vehicles to Terrace and then taking the bus to the site. No personal vehicles would be allowed access into the mine site.

The proponent will mitigate congestion at the Terrace airport for existing commercial passengers and the construction workforce by staggering the work rotation over a two-week period during proposed Project construction.

It is likely that intermodal transportation involving rail to ground transportation could be utilised during construction. There may be instances when the location of the procured equipment, supplies, and materials makes it more economical or efficient to transport the freight to either Smithers or Terrace by rail and then offload to trucks for the remainder of the trip to the mine.

CN Railway provides daily freight service to both Terrace and Smithers. If rail service is integrated into the proponent's logistics and transportation plans during proposed Project

construction, the rail service to and within the RSA by CN Railways is adequate to meet proposed Project needs without adversely affecting existing clientele or schedules in the RSA.

Marine shipping and barging has been removed from the Project Description so it is not considered in the transportation assessment.

8.2.8.1.1 Relevant Legislation and Legal Framework

Transportation was identified as a VC that should be addressed under the requirements of the *BCEAA for assessing social effects*, and it was identified in the approved AIR document. Other relevant legislation, regulations, and permits include the BC *Transportation Act* (Government of BC 2004b), federal *Transportation of Dangerous Goods Act (TDG Act), Motor Vehicle Act* (Government of BC 1996f), *Passenger Transport Act* (Government of BC 2004a), and *Commercial Transport Act* (Government of BC 1996a) (commercial vehicle permits for oversized loads). Permits for road use are also required under the *Forest Act* (Government of BC 1996b).

8.2.8.1.2 Spatial Boundaries

The proposed Project is located on Alice Arm in the north coast area of BC, in the central section (Area A) of the RD of Kitimat-Stikine (Figure 8.2.2-1). The communities closest to the mine site include the four villages on Nisga'a Lands (Gitwinksihlkw; Gingolx; Laxgalts'ap; and New Aiyansh) as well as the Kitsault Resort and Alice Arm. These communities and the villages on Nisga'a Lands are considered to be the LSA for the purpose of describing social conditions and assessing social effects.

The broader RSA for describing social baseline conditions is defined to include four distinct regions and major communities:

- The DM of Stewart (located in the Kitimat-Stikine RDEA A);
- Kitimat-Stikine RDEA B, including the Village of Hazelton, the DM of New Hazelton and numerous Indian reserves (Gitanmaax 1, Gitsegukla 1, Sik-e-dakh 2, Kispiox 1, Hagwilget 1, Gitwangak 1, Gitanyow 1, Moricetown 1, Bulkley River 19, and Coryatsaqua (Moricetown) 2);
- The Town of Smithers; and
- The Terrace CA, which includes the City of Terrace, the rural populations of Kitimat-Stikine RDEA C (Part 1) and RDEA E, and four reserves (Kitsumkaylum 1, Kitselas 1, Kshish 4, and Kulspai 6).

These groupings were selected to reflect SC census subdivisions and areas that might be called upon to provide labour, goods, and services required for mine construction and operation.

The reserves listed above belong to a number of First Nations. The Kitimat-Stikine RDEA B includes reserves for the following First Nations:

- Gitanmaax (Gitanmaax 1 reserve);
- Gitanyow (Gitanyow 1 reserve);
- Glen Vowell (Sik-e-dakh 2 reserve);
- Kispiox (Kispiox 1 reserve);
- Gitsegukla (Gitsegukla 1 reserve);
- Gitwangak (Gitwangak 1 reserve);
- Hagwilget Village (Hagwilget 1 and Bulkley River 19 reserves); and
- Moricetown (Moricetown 1 and Coryatsaqua (Moricetown) 2 reserves).

The Gitanmaax, Gitanyow, Glen Vowell and Kispiox First Nations are part of the Gitxsan Local Services Society. The Terrace CA includes the reserves of two First Nations: Kitsumkaylem (Kitsumkaylum 1) and Kitselas (Kitselas 1, Kshish 4, and Kulspai 6). Potential effects on these First Nations are included in the assessment of proposed Project effects on Kitimat-Stikine RDEA B and the Terrace CA.

8.2.8.1.3 Temporal Boundaries

The temporal boundaries for assessment of social effects reflect the duration of various activities related to the proposed Project. For assessing construction effects, the analysis focuses on proposed Project activities over the 25-month window beginning in Q1 2012. For assessing operations effects, the analysis focuses on the 15-year window of 2014 to 2029, and estimates average effects during a typical year of operations. The effects of decommissioning and closure focus on activities that occur in the 15 to 17 years following 2029. Post closure is estimated at five years or more.

8.2.8.2 Information Source and Methods

Generally accepted EA methods were used to determine potential proposed Project effects on transportation. Secondary data sources used to compile the baseline and assessment of proposed Project effects on transportation include:

- Kitsault Mine Feasibility Study Report - by AMEC Mines and Minerals, 2011;
- Kitsault Construction Shipping Estimate (details, area summary and schedule), by AMEC Mines and Minerals, May 2011;
- “Kitsault Mine Project: Traffic Impact Analysis” - by McElhanney Consulting Services Ltd, January and June 2011;
- Avanti Kitsault Mining policies, plans, and procedures during construction and operations (2011);

- City of Terrace website;
- CN Rail website;
- The Nisga'a Nation website;
- "Avanti Kitsault Mine Socio-Economic Baseline Report" by Rescan (May 2010);
- BC Ministry of Transportation and Infrastructure (BC MOTI) website, Hwy Use and Traffic Volume Data; and
- Cranberry Road Business Case Assessment, Robinson Consulting and Associates Ltd. September (2009).

In addition to the secondary information collected, primary information was collected from AMEC engineers contracted by the proponent, as well as the proponent's management personnel regarding ground and air transportation of labour and trucking volume estimates and route information for the shipment of equipment, supplies, and materials to the site.

Additional primary data are currently being collected from NLG, Nisga'a key informants, and Nisga'a citizens. When available this information will be integrated with baseline data collected from secondary sources and taken into consideration in the impact assessment.

8.2.8.3 Detailed Baseline for Transportation

8.2.8.3.1 Roads

All communities in the LSA and RSA are accessible by primary highways. Terrace, Old and New Hazelton, and Smithers are all located on Hwy 16 (the Yellowhead Hwy), which provides west-to-east access from Prince Rupert to Prince George and Valemont, and into Alberta and beyond. This highway has #3 classification as a major arterial roadway, based on traffic volume and size of vehicles using the roadway. At Prince George, Hwy 16 is intersected by Hwy 97, which provides access south to Hwy 1 (the TransCanada Hwy) that connects Vancouver on the west coast to Eastern Canada, with highway connectors at numerous locations south to the United States.

Hwy 37 (the Stewart-Cassiar Hwy) connects the District of Kitimat to Terrace and continues east, then north to Kitwanga, Stewart, Dease Lake, Cassiar, and into the Yukon Territory. The section of Hwy 37 from District of Kitimat to Kitwanga is also a section of Hwy 16 (this section of highway has dual status). The section of Hwy 37 north of Kitwanga has a #4 classification based on traffic volumes and the mix of vehicles that use the roadway (Baker, pers. comm., 2011).

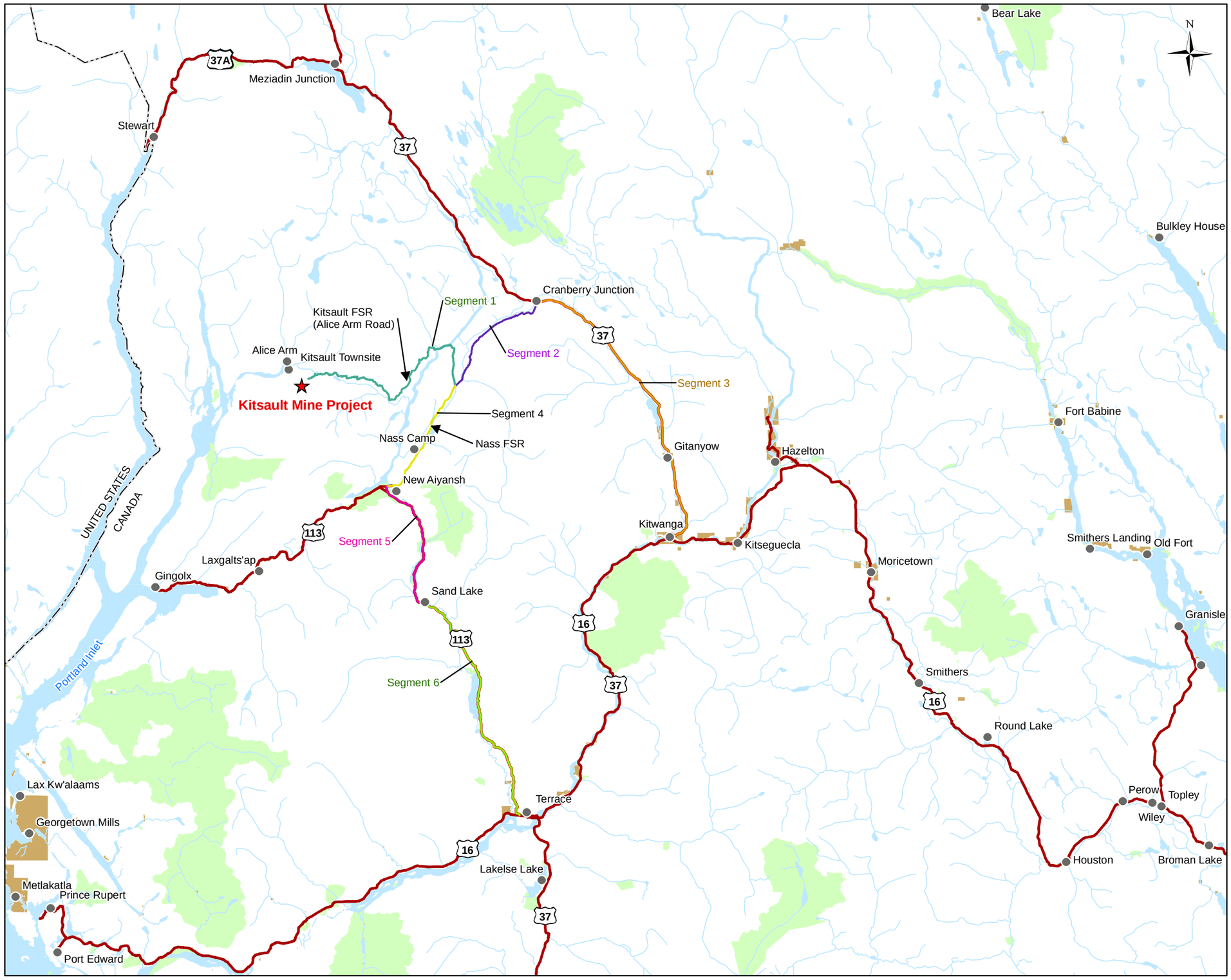
Hwy 113 (the Nisga'a Hwy) links the Nisga'a Nation lands and the four villages therein (Gingolx, Gitwinksihlkw, Laxgalts'ap and New Aiyansh) to Terrace, where it intersects Hwy 16. This highway has a #4 classification. An alternate ground transportation route from Nisga'a lands in the Nass Valley and the four villages therein to Terrace and Smithers, excluding winter months, is via the Nass FSR, also known as the Cranberry Connector, a

gravel surfaced road that runs northeast from the Nass Camp to Hwy 37 at Cranberry Junction and south on Hwy 37 to Kitwanga at Hwy 16.

Road access from Hwy 16 to the Kitsault mine site is possible via two routes. One of the routes runs north on Hwy 37 from Kitwanga to Cranberry Junction, then west on the Nass FSR to the Nass-Kinskuch FSR, which runs north from the Nass River Bridge to the Kwinatahl FSR and after approximately 10 km, this FSR merges with the Alice Arm Road which continues on to the former town of Kitsault (now known as the Kitsault Resort) and beyond to the Kitsault mine site. The other route begins at Terrace and runs north via Hwy 113 (Nisga'a Hwy) to New Aiyansh and the Nass Camp, then northeast on the Nass FSR to the Nass River Bridge and then follows the Nass-Kinskuch FSR, Kwinatahl FSR and the Alice Arm Road to the former Town of Kitsault, and on to the mine site. Coastal Tsimshian Resources (CTR) is the designated primary user of the Nass FSR and the Nass-Kinskuch, but Avanti has a Road Use Permit (RUP) to use the three FSRs and a Special Use Permit (SUP) for the Alice Arm Road. The Nass-Kinskuch and Kwinatahl FSRs and the Alice Arm Road are gravel surfaced, and the terrain that they traverse is undulating with numerous curves.

The segment of Hwy 113 from Sand Lake to Nass Camp was upgraded in 2005 from a gravel surfaced resource road to a 70-80 km / hour, two-lane paved highway capable of handling 100% legal loading year round. The majority of the Nass FSR and Nass-Kinskuch FSR are seasonally maintained by the primary user. However, a 30-km section of the Nass-Kinskuch and Kwinatahl FSRs has received no maintenance, is in poor shape and requires upgrading and widening. In 2009, BC Ministry of Forest, Lands and Natural Resource Operations (BC MFLNRO) announced that the Nass FSR would receive upgrades, including redecking the Nass River Bridge to single-lane legal highway standard (64,000 kg Gross Vehicle Weight (GVW) 9 (Ness pers.comm.,2011).

Terrace, the District of Hazelton and Smithers on Hwy 16, the DM of Stewart on Hwy 37 and the four Nisga'a Villages on Hwy 113 are all served by short-, medium- and long-haul trucking and transportation companies. With the exception of the Nisga'a Villages, these communities all have trucking and transportation companies based in them. Transportation routes are shown in Figure 8.2.8-1.



Legend

- Kitsault Mine Project
- Populated Place
- Highway
- International / Provincial Border
- Stream
- Waterbody
- Indian Reserve
- Parks & Protected Area
- Segment 1: Kitsault mine site to Cranberry Connector/Nass Forest Service Road (FSR)
- Segment 2: Cranberry Connector to Cranberry Junction
- Segment 3: Cranberry Junction to Kitwanga along Highway 37
- Segment 4: Cranberry Connector to New Aiyansh
- Segment 5: New Aiyansh to Sand Lake
- Segment 6: Sand Lake to Terrace

KEY MAP

Scale:1:900,000

0 5 10 20 30 40 50

Kilometres

Reference

Base Data

Atlas of Canada scale 1:1,000,000.

Territory Boundary: Metlakatla First Nation Website

CLIENT: Avanti Kitsault Mine Ltd.

PROJECT: Kitsault Mine Project

Segments Along the Kitsault Transportation Route Options

DATE: November 2011	ANALYST: MY	**Figure** 8.2.8-1
JOB No: VE51988	QA/QC: TT	PDF FILE: 14-50-017_segment.pdf
GIS FILE: 14-50-017.mxd		
PROJECTION: UTM Zone 9	DATUM: NAD83	

Y:\GIS\Projects\VE\VE51988_Kitsault\Mapping\14_socio-economics\Baseline\14-50-017.mxd

BC MOTI operates permanent and / or seasonal traffic counters on Hwys 16, 113, and 37, and near the merging point of Hwy 113 and the Nass FSR. The counters record Average Annual Daily Traffic (AADT) and / or Average Summer Daily Traffic (ASDT). The most current available traffic data for highways in the LSA and RSA are presented in Table 8.2.8-1. Hwy 16 is the heaviest travelled road in the RSA, with the greatest traffic volumes occurring near Terrace where they ranged from 11,217 (AADT) to 11,978 (ASDT) in 2009. The next highest traffic volumes were recorded at Smithers, where volumes ranged from 10,791 (AADT) to 11,642 (ASDT) in 2005. The 2009 AADT traffic volumes recorded at Kitwanga ranged from 1,283 to 1,332 and the ASDT at this location ranged from 1,886 to 1,962.

In 2008, traffic volumes recorded on Hwy 113 near New Aiyansh ranged from 399 (AADT) to 424 (ASDT). In 2005, traffic volumes on the Nass FSR near New Aiyansh ranged from 941 (AADT) to 1,018 (ASDT). However, in 2008 at a temporary counter location east of Tillicum Lodge Road, the ASDT was 59.

In 2001, traffic volume counts on Hwy 37 at a location immediately south of Cranberry Junction ranged from 548 (AADT) to 645 (ASDT). AADT traffic counts on Hwy 37 near Kitwanga ranged from 740 to 760 in 2008 and 2009.

During a 15-year period from 1996 to 2010, BC MOTI tracked motor vehicle accidents, including collisions with animals on the section of Hwy 37 from Hwy 16 at Kitwanga to Cranberry Junction (access route one to the mine site). There were 78 motor vehicle accidents recorded over the 15 years, with two thirds of the accidents resulting in personal injuries to motor vehicle occupants; the majority of accidents (58%) occurred from April to through September (ICBC, 2011). The accidents occurred at all hours of the day and night with no specific peak periods. They were attributed to a variety of factors, with the most common being speed, alcohol, animals, fatigue, weather conditions, and lack of attention. There were 76 animal strikes on this section of Hwy 37 during the 15-year period. Moose and bear accounted for the majority of animal strikes (BC MOTI, 2011).

On Hwy 113 from Hwy 16 at Terrace to New Aiyansh (the second access route to the Kitsault mine site), 53 motor vehicle accidents were recorded from 1996 to 2010, with about half of the accidents occurring prior to Hwy 113 being paved in 2005 (ibid). Only about 35% of the accidents resulted in personal injuries and two-thirds of the accidents occurred during the winter months (October to March). There were 19 animal strikes recorded on this road by BC MOTI between 2002 and 2010, with moose accounting for more than half of the animals killed (BC MOTI, 2011).

Table 8.2.8-1: Traffic Volumes on Major Highways in the Regional Study Area (2001-2009)

Hwy	Station	Description	2009		2008		2005		2001	
			AADT	ASDT	AADT	ASDT	AADT	ASDT	AADT	ASDT
16	48-005	EW 0.2 km east of Hwy 37 at Terrace	11,217	11,978	11,751	12,490	10,841	11,665		
16	P-47-2	EW Just west of Hwy 37 at Kitwanga	1,332	1962						
16	P-47-1	EW Just east of Hwy 37 Kitwanga Junction	1,283	1,886			1,950	2,648		
16	47-028	EW 0.1 km east of Queen St. in Smithers					10,791	11,642		
113	48-910	NS 135 km north of Vetter Bridge, south of New Aiyansh			399	424	659	713		
113	48-911	NS Nass Road 1.0 km West of Aiyansh road					941	1,018		
Nass FSR		East of Tillicum Lodge Road				59				
37	47-015	0.1 km south of Nass Forest Service Road							548	645
37	47-09NS	Just north of Hwy 16 at Kitwanga	760		740	816				

Note: AADT - Average Annual Daily Traffic; ASDT - Average Summer Daily Traffic; FSR - Forest Service Road; km - kilometre

Source: BC MOTI 2010

During the 14-year period from 1997 to 2010, 15 motor vehicle accidents were recorded on the Nass FSR, also known as the Cranberry connector (part of access routes one and two to the Kitsault mine site). Only two of the accidents resulted in personal injuries to vehicle occupants. FSRs fall under the jurisdiction of BC MFLNRO, which does not monitor these roads for animal strikes (BC MOTI, 2011).

8.2.8.3.2 Air

Public municipal airports are located in Terrace, Smithers and Stewart, which provide fixed-wing, helicopter, commercial, charter, passenger, and air cargo services. Additionally, seaplane service is available at the Nisga'a Village of Ginglox. The proposed Project mine can also be accessed by charter float plane from Prince Rupert to Alice Arm.

All airports in the RSA have paved runways that range in length from 1,188 metres (m) in the DM of Stewart to 2,286 m in Terrace and Smithers. They can accommodate propeller-driven aircraft up to and including a Dash 8s. The Terrace-Kitimat Airport and the Smithers Regional Airport offer daily air travel by three commercial carriers (Air Canada, Hawk Air and Central Mountain Air), with flights to Vancouver and Prince George. From these two cities there are air connections to other locations in BC, including Victoria, Kamloops, and Kelowna, as well as to other provinces. International carriers are available from Vancouver.

8.2.8.3.3 Rail

CN Rail operates a mainline rail service between Prince Rupert and Valemount with station stops in Terrace, Hazelton, Smithers, and Prince George. This line continues east into Alberta and beyond via Jasper. At Valemount this mainline intersects another CN mainline that runs southwest to Vancouver. The CN mainline between Valemount and Prince Rupert transports a variety of freight, including grain, coal, wood products, chemicals, and containers. It is anticipated that with ongoing improvements at the Port of Prince Rupert, rail traffic on this CN mainline would continue to increase in the future. Grain, coal, timber, and containers are loaded onto ocean-going ships at the Port of Prince Rupert en route to the United States and Asia.

VIA Rail offers passenger rail service, known as "The Skeena," three times per week between Prince Rupert and Jasper, with an overnight station stop in Prince George. At Jasper, passengers can connect with VIA's "The Canadian," which runs between Toronto and Vancouver via Jasper.

8.2.8.4 Cultural, Ecological, or Community Knowledge

8.2.8.4.1 Nisga'a Nation

The proposed Project would use a variety of secondary roads and highways to transport materials, concentrate, and personnel to and from the mine site, including Hwys 37 and 113, and the Nass FSR. Hwy 113 is a two-lane paved highway that intersects Nisga'a Lands. This highway connects Terrace to the northerly Nisga'a Villages of New Aiyansh,

Laxgalts'ap, Gingolx, and Gitwinksihlkw. The traffic along the highway is a mix of private and tourist vehicles (including motorhomes), and industrial traffic for mining and forestry.

The Nass FSR is a 51-km gravel Wilderness Road connecting Hwys 113 and 37. The road has a range of conditions, including poor drainage, surface conditions, alignment, and sight lines.

In addition to the above road and highway, Hwys 37 and 37A intersect the Nass Wildlife Area (NWA) and Nass Area. Hwy 37 is a north-south two-lane highway starting in Kitwanga and terminating at the Yukon-BC border. It is a remote highway covering 725 km with few amenities along rugged mountainous terrain, and featuring many abrupt turns and elevation gains.

According to Chapter 6 of the NFA, the responsibility for maintenance, upgrades, and traffic management of Hwy 113 and Nass FSR lie with the Province. The NFA guarantees Nisga'a access to and within Nisga'a Lands, NWA, and the Nass Area to fulfill treaty rights.

Part C (Section 13.9) of this Application provides additional information on the Nisga'a access rights, and provincial responsibilities and obligations to the Nisga'a Nation.

8.2.8.4.2 Other Aboriginal Groups

Potentially affected Aboriginal groups have reserves and communities adjacent to the provincial highway system. In particular, the communities and territories intersected by the Kitsault transportation route alternatives include:

- **Kitselas**: Hwy 16 between Terrace and Kitwanga;
- **Kitsumkalum**: Hwy 113 from Terrace to Sand Lake as well as part of Hwy 16 between Terrace and Kitwanga;
- **Metlakatla**: Mine site and Kitsault Road as well as part of Hwy 16 between Terrace and Kitwanga;
- **Gitanyow**: Hwy 37 from Kitwanga to Cranberry Junction, as well as Nass FSR from Cranberry Junction to Jack Pine Mountain; and
- **Gitxsan**: Hwy 37 (Kitwanga) and Hwy 113 (near Cedar River), and Hwy 16 between Terrace and Moricetown.

As part of the Kispiox-Cranberry Landscape Unit Plan, the Gitanyow *wilp* expressed concern about increased disturbance of wildlife from human and vehicular traffic along roads and highways. In particular, prospects of upgrading the Cranberry Connector (i.e., Nass FSR) to meet highway standards causes Gitanyow *wilp* concerns related to important moose winter range. If the upgrade occurs, Gitanyow *wilp* predict increased vehicular traffic and noise may cause increased rates of moose displacement, disturbance, and mortality from hunting and collisions.

Kitsumkalum First Nation has expressed an interest in upgrading the Cranberry Connector as a way to promote tourism through circle tours.

It is not known from desk-based research what other Aboriginal interests and concerns are related to transportation that may be identified and clarified during engagement activities with each group.

8.2.8.5 Past, Present, or Future Projects / Activities

The baseline information regarding transportation infrastructure and services in the LSA and RSA are presented above in Section 8.2.8.3. Information in Section 7.2.3.3 reflects changes that have occurred in regional economic activity between 2006 and 2010 in the RSA. Future projects and activities inside and outside the RSA in northwest BC are listed in Table 7.2.3-6. The table shows major projects that are proposed in the vicinity of Alice Arm, Iskut, Smithers, Stewart, and Terrace, all of which feature a transportation component.

As of December 2010 two major projects were shown to be underway in the RSA, with a combined capital cost of $38,000, 000 and creating a total of 245 construction jobs. One of these projects, the Kitsault River and Homestake Creek Hydro Project, was scheduled to be completed in 2011; however, project completion is in question because the original power purchase agreement for this project has been cancelled. The second project is construction of the Northwest Community College Smithers Campus, which should be completed in 2011. There are no traffic data for these projects but it is assumed that the Northwest Community College in Smithers is captured in the AADT and ASDT statistics for Smithers.

BC Hydro Corporation's $400,000,000 Northwest Transmission Line (NTL) development is another project in the RSA that is scheduled to begin construction in 2011, with a completiondate in 2013. The project has received BC regulatory approval, and BC Transmission is in the process of negotiating Impact Benefit Agreements with several First Nations in the RSA. The transmission line would parallel Hwy 37 from a point north of Meziadin Junction to Cranberry Junction, and then proceed west along the Nass FSR to Nass Camp, and southwest along Hwy 113 to a grid connection point near Terrace. As a result, the NTL is expected to share portions of the two road access routes to the Kitsault mine site. Construction for NTL and this proposed Project is expected to overlap for up to two years.

Two additional projects listed in Table 7.2.3 are currently on hold, including the Galore Creek Gold / Silver / Copper Mine near Iskut, with a capital cost of $4.0 billion that was scheduled to begin construction in 2013. This project was originally approved in 2008 but construction was suspended due to the global economic downturn, a review of capital costs, and changes to the original mine plan.

The Kerr-Sulphurets-Mitchell (KSM) mine project by Seabridge Gold Inc. located north of Stewart, and with a capital cost of $3 billion, is currently in the BC EAO EIA review process. If the project proceeds, it is assumed that ground access to the mine site would be via Hwys 16, 37 and 37A and a local access road. However, at present no information about

project construction and operations schedules or transportation plans and traffic volume is publicly available.

There is no information available on other potential future projects in the RSA beyond the information provided in Table 7.2.3-6.

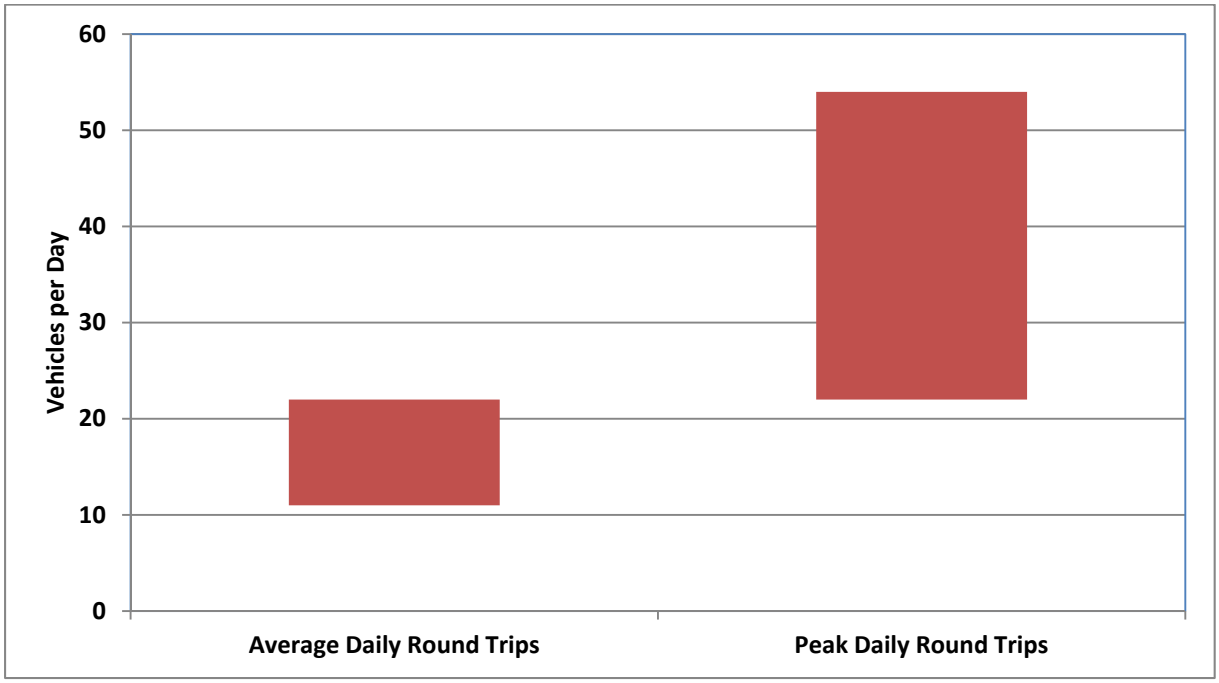
8.2.8.6 Potential Effects of the Proposed Project and Proposed Mitigation

8.2.8.6.1 Identification and Analysis of Potential Project Effects

8.2.8.6.1.1 Construction Phase

Proposed Project construction would require delivery to the site of a wide range of freight, including construction equipment, permanent equipment, camp modules, and other temporary buildings, fuel, and a range of materials including structural steel, pipe, concrete, and mechanical products. Over the 25-month construction period, there would be about 6,206 truckloads (including a 13% contingency) of freight transported to the site.

Throughout construction, it is estimated that an average of 11 to 22 heavy vehicles per day would travel to site over a 12-hour period, five to seven days per week. During peak construction, truck traffic would increase to 22 to 54 heavy vehicles per day. An additional three to 10 light passenger vehicles (mainly half-ton trucks of suppliers, vendors and expediters) per day would also travel to and from the site. Figure 8.2.8-2 shows the average and peak truck traffic periods during construction.



Note: Average Daily Round Trips includes half ton truck and vans

Source: AMEC Metals and Mines

Figure 8.2.8-2: Project Average And Peak Daily Construction Traffic (One-Way Trips)

At the height of construction activities (months seven to 19), the daily average round trips are anticipated to be 24 (i.e., 48 vehicles movements in and out of the mine sites), including smaller vehicle traffic. Peak daily round trips may occur for a day or two at a time and reach a level of 54 round trips per day (i.e., 108 vehicle movements in and out of the mine site). Maximum daily volume is anticipated to increase by 11.1% during construction along Hwy 37, and increase 25.5% along Hwy 113 during construction. The combined traffic volumes are far below the design capacity of Hwys 113 and 37, which could accommodate up to three times the existing baseline AADT traffic volumes prior to any substantive changes to these highways (Baker pers. comm., 2011).

Because most of the construction equipment, materials, and freight would be procured from outside the RSA, it is assumed that most traffic would travel to the site along Hwy 37 / Nass and Kinskuch FSRs / Alice Arm Road. Hwy 113 / Nass and Kinskuch FSRs / Alice Arm Road would be used mainly by buses transporting workers between Terrace and Nisga'a Villages to the mine site and by trucks transporting freight and consumables purchased at Terrace or offloaded at Terrace from rail, or a national trucking service to a regional trucking service for the remainder of the trip to the mine site.

The physical dimensions and condition of the FSRs and the Alice Arm Road, the size and weight of heavy trucks and buses using these roads, the terrain through which these roads pass, and changing weather conditions throughout the year all contribute to the potential for collisions with other motor vehicles and animals, and to the potential for vehicles leaving the roads unintentionally. Mitigation and management measures would be required to address these issues, enhance motor vehicle safety, and reduce risk to the environment and wildlife resources; see Transportation and Access Management Plan (Section 11.2.18).

8.2.8.6.1.2 Operations Phase

During operations, trucking services would be required to deliver and remove mining and camp consumables, Process Plant operating and maintenance supplies, concentrate, and operations and maintenance personnel and supplies.

Total annual vehicle trips to the mine (each trip is one inbound and one outbound) is estimated at about 6,424 (see Table 8.2.8-2). The maximum number of daily trips is 27 (i.e., 54 additional vehicles on the selected route). Maximum daily volume is anticipated to increase by 5.5% along Hwy 37, and 12.7% along Hwy 113 during operations. If vehicle travel occurs over one or two peak hours in morning and evening periods, it could mean as many as 22 vehicles travelling to the mine during these periods. However, because both Hwys 37 and 113 would be used to access the mine, the number of vehicles travelling on each route would be less than 22 vehicles during these peak hours.

A traffic impact assessment undertaken for the proponent concluded that the KMP operations and related traffic will not result in a need for road or intersection upgrades to Hwy 113 (McElhanney Consulting Services 2011). It should be noted that Hwy 37 was not considered in the traffic impact assessment, and traffic volumes predicted for Hwy 113 would in fact be less because two access routes to the mine will be used.

Table 8.2.8-2: Estimated Average Annual Trip Generation During Project Operations

Truck Type	Load	Delivery Frequency		Total Annual Trips	Maximum Daily Trips[1]
40-Tonne Tandem	Mine processing materials	7	Month	84	1
	Lime	1	Month	12	1
	Grinding Balls and Liners	38	Month	456	2
	Explosives	24	Month	288	2
	Concentrate	2	Daily	730	2
40-foot Trailer	Food (40-foot trailer)	2	Weekly	104	2
20,000-litre Trailer	Diesel	82	Month	984	3
50-Person Bus	Personnel	2	Week	104	2
Passenger Vehicles	People, Vendors, Suppliers, Expeditors, etc	10	Daily	3,650	10
20 -tonne Tractor Trailer	Maintenance and Warehouse Supplies	6	Weekly	312	2
Total Annual & Maximum Daily Trips				6,424	27

Note: 1. Each trip represents one inbound and one outbound trip (return trip)

Source: McElhanney Consulting Services Ltd. 2011

The physical dimensions and condition of the FSRs and the Alice Arm Road, the size and weight of heavy trucks and buses using these roads, the terrain through which these roads pass, and changing weather conditions throughout the year all contribute to the potential for collisions with other motor vehicles and wildlife, and to vehicles leaving the roads unintentionally. Mitigation and management measures would be needed to address these issues and enhance motor vehicle safety and reduce risk to the environment and wildlife resources; see Wildlife Management Plan (Section 11.2.21) and Transportation and Access Management Plan (Section 11.2.18).

8.2.8.6.1.3 Decommissioning and Closure

Traffic volumes during the 15-to-17-year decommissioning and closure phase have not yet been calculated. However, substantially lower traffic volumes than during construction or operations are expected because concentrate shipments would cease, there would be far fewer passenger vehicles carrying suppliers, vendors, and expediters, fuel requirements would be less, and the on-site workforce would shrink to an average of 13 people over the 15-to-17-year period. Heavy trucks and trailers would represent the largest percentage of the traffic mix-particularly during the initial year of decommissioning when materials to be disposed of or recycled would be removed, along with camp modules, small buildings, stationary and mobile equipment.

8.2.8.6.1.4 Summary

Table 8.2.8-3 lists potential direct Project effects on transportation and Table 8.2.8-4 lists potential indirect effects on other VCs.

The transportation of personnel, equipment and materials during all phases of the Project, including bussing of workers between the Terrace and Nisga'a Villages and the onsite camp via Hwy 113 and the FSRs, would result in several potential direct effects. Increased traffic on these roads may increase the risk of motor vehicle accidents for users of these roads, including vehicle wildlife collisions and spills of hazardous and nonhazardous materials, and all project-related traffic could cause additional wear and tear on the access roads. The likelihood of the bussing of workers and the additional wear and tear on the gravel surfaced roads is high, and the likelihood of motor vehicle accidents, animal strikes and spills is medium.

Potential indirect effects on other VCs that are carried forward in the project assessment and mitigation include: incremental traffic causing dust and deposition that could affect wildlife heath and surface water quality; risk to motor vehicles and occupants from increased traffic and dust that could increase demand for first responders; vehicle-animal strikes could affect Nisga'a traditional harvesting; and spills could affect terrestrial environment.

Table 8.2.8-3: Potential Direct Project Effects on Transportation

Project Component	Project Phase	Potential Direct Project Effect	Likelihood Of Occurrence
Personnel and materials transportation	C, O, D/C	Workers from outside the RSA fly to Terrace and from there are bussed to site (-)	Medium
		Project traffic on access roads to the mine site would cause additional wear and tear on access roads (-)	Medium
		Increased traffic on access routes results in increased risk to motor vehicle safety for users of these roads (-)	Medium
		Increased traffic on access roads would result in motor vehicle-animal collisions (-)	Medium
		Vehicle collisions or driving off the road could result in spills of hazardous and non hazardous materials (-)	Medium
All	PC	Negligible effect	High

Project Phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

Table 8.2.8-4: Potential Indirect Project Effects on Other Valued Components

Direct Project Effect (Adverse or Positive)	Project Phase	Potential Indirect Project Effect	Carry Forward (Yes / No)	Rationale
Workers from outside the RSA fly to Terrace and are bussed from there to site (-)	C, O	Existing air carrier schedules and customers	Yes	Staggered rotation schedule over 1 to 2 weeks and use of charter aircraft during operations would prevent congestion at Terrace airport.
Project traffic on access roads to the mine site would cause additional wear and tear on access roads (-)	C, O	Traffic would cause dust and deposition that could affect wildlife health and surface water quality	Yes	Project mitigation measures will address wear and tear on gravel roads and suppress dust to acceptable levels
Increased traffic on access routes results in increased dust and risk to motor vehicle safety for users of these roads (-)	C, O	Risk to motor vehicle safety from increased traffic and dust could increase demand for first responders and health services in the RSA	Yes	Dust effects on wildlife health and water quality would meet acceptable standards. Project design and mitigation measures would reduce this risk of motor vehicle safety to acceptable levels
Increased traffic on access roads would result in motor vehicle-animal collisions (-)	C, O	Collisions with animals could adversely affect Nisga'a traditional harvesting	Yes	Mitigation measures would reduce this direct and indirect effect to acceptable levels.
Vehicle collisions or driving off the road could result in spills of hazardous and non hazardous materials (-)	C, O	Spills could adversely affect terrestrial environment	Yes	Mitigation measures would reduce this direct and indirect effect to acceptable levels

Project phase: C - construction; O - operations

Table 8.2.8-5: Summary of Potential Interaction Between Project Direct Effects on Other Valued Components and Transportation

Direct Project Effect	Air Quality and Climate Change	Noise and Vibration	Hydrogeology	Groundwater Quality	Freshwater and Sediment Quality	Surface Hydrology	Freshwater Fisheries	Marine Water Quality	Marine Biota	Terrestrial Environment	Wildlife and Their Habitat	Environmental Health	Economic	Social	Heritage	Health	Nisga'a Nation Land Use	Aboriginal Groups Land Use
Project traffic on access roads to the mine site would cause dust and additional wear and tear on access roads	NI	NI	NI	NI	NI	NI	Ni	NI	NI	NI	NI	NI	o	o	NI	NI	NI	NI
Increased traffic on access routes results in dust and increased risk to motor vehicle safety for road users	NI	NI	NI	NI	o	NI	NI	NI	NI	NI	NI	NI	o	o	NI	o	NI	NI
Increased traffic on access roads would result in motor vehicle-animal collisions	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	o	o	NI	NI	NI	NI	o	NI
Vehicle collisions or driving off the road could result in spills of hazardous and non hazardous materials	NI	NI	NI	NI	NI	NI	NI	NI	NI	o	NI	o	o	o	NI	o	NI	NI

Legend: Interaction definitions: o - interaction; - - key interaction; + benefit; NI - no interaction

While several of the interactions described in Table 8.2.8-6 could lead to combined effects, in all cases it is the identified linked VC that would experience these effects, and these are described in the appropriate VC sections of this report. This includes wildlife, health and water quality effects from dust, wildlife kills by motor vehicles, accidental spills and associated environmental effects, and effects of motor vehicle accidents on regional health services and effects on regional trucking businesses. These are all one-way interactions. In no instances would they result in a material combined effect on the transportation VC.

Table 8.2.8-6: Summary of Potential Project Effects to be Carried Forward Into the Assessment for Transportation

Adverse Effects / Positive Effects	Project Phase	Direction
Workers from outside the RSA fly to Terrace and bussed to site	C, O	Negative
Project traffic on access roads to the mine site would cause additional wear and tear on access roads	C, O	Negative
Increased traffic on access routes results in increased dust and risk to motor vehicle safety for users of these roads	C, O	Negative
Increased traffic on access roads would result in motor vehicle-animal collisions	C, O	Negative
Vehicle collisions or driving off the road could result in spills of hazardous and non hazardous materials	C, O	Negative
Decreased traffic would result in fewer motor vehicle-animal collisions, less wear and tear on the roads, less dust, and improvements to motor vehicle safety	D/C	Positive

Project Phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

8.2.8.6.2 Mitigation Measures

8.2.8.6.2.1 Construction

A number of management and mitigation measures would be implemented to:

- Minimise potential adverse effects on road infrastructure;
- Help ensure the health and safety of mine-related vehicles, personnel and other vehicles sharing the roads;
- Protect the surrounding environment and resources; and
- Respect the Nisga'a Nation culture.

The proposed Project holds a Special Use Permit (SUP) 09228 for the Alice Arm Road, and road use permits for the Kwinatahl, Nass-Kinskuch and Nass FSRs. However, because CTR is the designated primary user of the Nass and Nass-Kinskuch FSRs, the proponent will need to contact CTR and BC MFLNRO to request that its SUP be extended to cover the three FSRs that provide access to the mine. If accepted, the proponent would assume overall responsibility for road upgrading and maintenance, dust suppression, and snow removal on the three FSRs and the Alice Arm Road.

In 2011, BC MFLNRO announced that the Nass FSR would undergo maintenance due to its age; the bridge originally had a 120,000 kg GVW capacity and has now been conservatively downgraded to 64,000 kg GVW. The proponent will perform annual maintenance to ensure that the bridge maintains capacity.

The proponent will complete long overdue maintenance along the FSRs used to access the Project. Road conditions would be monitored continuously, graded regularly and dust suppression materials applied to the road surface as required. The ongoing monitoring and implementation of these activities would minimise risk and enhance motor vehicle safety for users of these roads.

The proponent will ensure that the FSRs are properly signed for speed, curves, and the presence of wildlife.

The proponent's traffic safety and cultural sensitivity protocols would be issued to all trucks travelling to the mine site. The safety protocols include obeying all posted regulatory speed, advisory speed, and wildlife signage; and carrying flares and pylons in the event of a breakdown enroute to or from the mine site, including in extreme weather.

- Extreme weather traffic safety protocols would also be issued to all vehicles travelling to the mine site that include reduced speeds during low visibility, driving with chains during heavy snow / ice conditions, and ensuring that all vehicles carry emergency overnight kits in the event the vehicle gets stranded;
- The proponent logistics group would follow up on all major incidents (involving significant injury or vehicular damage), ensuring that accident reports are filed with the appropriate RCMP detachment(s), reviewing the accident report findings and contributing factors against the Project transportation safety protocols in place, and being willing to share this information with other interested parties (e.g., BC MOTI, BC MFLNRO, and NLG and Aboriginal groups);
- The proponent would be willing to contribute to and collaborate with any regional traffic planning and managing efforts (as they may arise) that pertain to motor vehicle transportation on the two access routes to/from the mine site.

Cultural sensitivity protocols include exercising caution and reduced speed when passing through areas with wildlife signage, and not stopping within Lava Bed Provincial Park, except at designated turn-outs. This is necessary because the road in the park near the lava beds has little or no shoulders, and the sight lines along this section of road are poor and not considered adequate for sudden stops, creating potentially unsafe conditions for road users at this location.

Pilot vehicles would be used when transporting oversized truck loads on the two access routes to the mine site.

The proponent would monitor and collect data on vehicle-wildlife collisions near the mine footprint as well as along the Alice Arm Road, the two FSRs, Hwy 113, and Hwy 37 between

Cranberry Junction and Kitwanga. All contractor and commercial vehicles travelling to and from the mine site would be asked to complete a form if their vehicle has been in a collision with an animal en route to or from the mine site via one of the two access routes. The form would mirror the wildlife collision forms currently completed by BC MOTI staff and contractors. The form can be handed into the security staff at the site gate or mailed to the proponent's logistics and transportation coordinator at the site. This information, together with the wildlife accident reporting conducted by BC MOTI and collected from BC MOTI by the proponent's on-site logistics and transportation staff, would be used to monitor vehicle-wildlife collisions during Project construction and operations. Information collected would include numbers, species of wildlife, and locations of wildlife-vehicle collisions. If the data show an upward spike in animal strikes during construction or operations, additional remedial action may be required that could include additional wildlife signage and speed reductions, as well as verbal or written warnings to contractors, commercial truckers, and bus operators about the increase in wildlife strikes and the need for more awareness when driving on the mine access roads.

Ongoing communication will also be maintained between the proponent and NLG regarding the Project transportation plans, schedules and any transportation or traffic-related issues.

Ongoing communication will be maintained with BC MOTI regarding highway traffic risks, issues, and safety along the Kitsault transportation routes.

Peak and average daily traffic estimates during all Project phases indicate that there should be no unacceptable traffic congestion on either access route or at intersections along these routes. However, if access route monitoring or feedback received by truckers or other users of these roads indicates that traffic congestion is occurring that could result in motor vehicle safety issues, the concerns would be investigated and a mitigating action plan would be developed and implemented.

An emergency response plan would be developed and in effect throughout all proposed Project phases. All trucking companies travelling to the site would be given an outline of the plan as well as a protocol that must be followed in the event of a motor vehicle accident and / or a cargo spill on route to or from the mine site. Specific procedures and protocols would be in effect in the event of a spill of fuel or other hazardous materials (see Sections 11.2.6 and 11.2.9). Call numbers would be provided to the site transportation and logistics coordinator, as well as to emergency responders at site, and first responders at communities in the LSA and RSA.

Project contractors and their workforce would not be permitted to drive to the mine site. This would substantially reduce the number of vehicles using the access roads, and would help to ensure motor vehicle and worker safety. Contractors and workers from within and beyond the RSA would be bussed to site from Terrace in accordance with their work rotation schedule. Contractors and workers from the LSA would be bussed to site from New Aiyansh in accordance with the designated work rotation schedule.

8.2.8.6.2.2 Operations Phase

The same management and mitigation measures implemented during construction would be in place during operations.

The proponent commissioned a traffic impact assessment for Route Two (Hwy 113 from Hwy 16 at Terrace to the Nass FSR) using the total annual deliveries and maximum daily and hourly traffic estimates provided above. The study considered existing baseline traffic volumes (AADT and ASDT) on access Route Two, as well as projected future traffic growth with and without the proposed Project. It also considered intersections, and regulatory and advisory speed signage along the route, as well as road characteristics, terrain, and visibility. The assessment concluded that throughout Project operations, no road or intersection improvements would be required on Hwy 113 to accommodate project traffic and existing background traffic (McElhanney 2011).

8.2.8.6.2.3 Decommissioning and Closure

Applicable management and mitigation measures from construction and operations would be implemented, recognising the volume and mix of vehicle movements during this 15-to-17-year period would be substantially less than what is anticipated during the earlier phases of the proposed Project.

8.2.8.6.2.4 Summary

Table 8.2.8-7 summarises the effects by phase on transportation and mitigation measures.

Table 8.2.8-7: Potential Project Effect by Project Phase on Transportation and Mitigation Measures

Project Effect	Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
Workers from outside the RSA fly to Terrace and bus to site	C, O	On-site camp and no personal vehicles allowed at site	High
Project traffic on access roads to the mine site would cause additional wear and tear on access roads	C, O	Using SUP, the proponent monitor, maintain, suppress dust, and remove snow on FSRs and Alice Arm Road	High
Increased traffic on access routes creates increased dust and risk to motor vehicle safety for users of these roads	C, O	Traffic safety protocols, regulatory and cautionary signage and self policing by contractors, plus road maintenance, dust suppression, and snow removal	High
Increased traffic on access roads may result in motor vehicle-animal collisions	C, O	Traffic safety protocols, regulatory and cautionary signage and self policing by contractors, plus road maintenance, dust suppression, and snow removal	Moderate

Project Effect	Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
Vehicle collisions or driving off the road may result in spills of hazardous and non-hazardous materials	C, O	Traffic safety protocols, regulatory and cautionary signage and self policing by contractors, plus road maintenance, dust suppression, and snow removal, as well as emergency response plan implementation	High
Decreased traffic would reduce the risk to motor vehicle safety for road users, collisions with animals or load spills l	D/C	n/a	n/a
All	PC	n/a	n/a

Note: n/a - not applicable

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

8.2.8.7 Potential Residual Effects and Their Significance

8.2.8.7.1 Potential Residual Effects After Mitigation

As discussed above, traffic volumes on the two access routes to the mine site would increase noticeably above baseline traffic volumes during construction and operations, and decline to nondetectable and within existing baseline traffic volumes during decommissioning and closure. The greatest average daily increases in traffic volumes would occur during construction, whereas the greatest annual increases in traffic volumes would occur during project operations. Management and mitigation for the sections of the two access routes beyond the paved Hwys 113 and 37 includes ongoing monitoring by the proponent as well as enhanced ongoing maintenance, grading, dust suppression, and snow removal. Incremental traffic on Hwys 113 and 37 would be well below the design and effective capacity of these highways and intersections on these two access routes.

The proponent will maintain ongoing contact with NLG throughout all phases of the proposed Project and take additional remedial actions, with NLG input, if the mitigation measures identified fall short of expectation or if other unforeseen issues arise.

Table 8.2.8-8 summarises residual effects for transportation.

Table 8.2.8-8: Summary of Residual Effects for Transportation

Project Phase	Residual Effect	Direction
C, O	Increased traffic on access roads resulting in increased maintenance, dust suppression, safety, accident and wildlife strike effects	Negative
D/C	Decreased traffic on would result in reduced maintenance, dust suppression and safety issues, fewer motor vehicle-animal collisions and improvements to safety	Positive

Project Phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

8.2.8.7.2 Significance of Potential Residual Effects

As illustrated in Table 8.2.8-9, the residual effects of transportation related to the proposed Project on road infrastructure, motor vehicle and passenger safety, vehicle-animal collisions, and spills of hazardous and non hazardous materials during construction and operations is expected to be low in magnitude, regional, short term for construction and long term for operations, continuous, reversible, negative, high in certainty and not significant (minor), assuming implementation of the management and mitigation measures identified. The reduction in traffic volumes and related consequences during decommissioning and closure would reverse the negative effects of construction and operations, and therefore the residual effects on transportation would be low in magnitude, regional, long term, continuous, reversible, positive, high in certainty and not significant (minor).

Table 8.2.8-9: Residual Effects Assessment by Project Development Phase for Transportation

Parameter	Stage Of Development / Rating			
Stage of Project development	Construction	Operations	Decommissioning and closure	Post-closure
Residual effect	Increased traffic effects on road conditions, dust, and risk of collisions with other vehicles, animals and load spills	Increased traffic effects on road conditions, dust, and risk of collisions with other vehicles, animals and load spills	Decreased traffic effects on road conditions, dust, and risk of collisions with other vehicles, animals and load spills	n/a
Effect attribute				
Magnitude	Low	Low	Low	n/a
Geographic extent	Regional	Regional	Regional	n/a
Duration	Short term	Long-term	Long- term	n/a
Frequency	Continuous	Continuous	Continuous	n/a
Reversibility	Reversible	Reversible	Reversible	n/a
Direction	Negative	Negative	Positive	n/a
Certainty	High	High	High	n/a

Parameter	Stage Of Development / Rating			
Stage of Project development	Construction	Operations	Decommissioning and closure	Post-closure
Residual effect significance	Not significant (minor)	Not Significant (minor)	Not significant (minor)	n/a
Level of confidence	High	High	High	n/a

Note: n/a - not applicable

8.2.8.8 Cumulative Effects Assessment

8.2.8.8.1 Rationalisation for Carrying Forward Project Related Residual Effects Into the Cumulative Effects Assessment

Past and present projects, activities, and land and resource uses are included in the baseline transportation information provided in Section 8.2.8.3; effects on transportation related to the proposed Project are discussed in Sections 8.2.8.6 and 8.2.8.7 above. Proposed future projects are identified in Section 7.2.3.5 (past, present and future projects and activities). However, there is a lack of certainty about many of these projects and activities, their timing and transportation plans. All have been announced but at least two are on hold (Kitsault River and Homestake Creek Hydro) and at least one other project has been delayed (Galore Creek Mine).

The BC Hydro NTL has received regulatory approval and construction is scheduled to begin in 2011 and last until 2013. It would overlap most of the proposed Project construction period and would put additional traffic on Hwy 113, Hwy 37 and the Nass FSR. The assessment of NTL did not provide estimates of vehicle composition or volumes using these roads but it indicated that NTL construction traffic volumes were expected to fall within existing baseline volumes on these roads and a traffic management plan was proposed during construction. NTL operations traffic volumes are predicted to be nominal and related to periodic transmission line maintenance and repair activities.

The Seabridge KSM gold mining project is expected to use Hwy 37 for transportation of most goods and services required during construction and operations of the mine, but details about the project and associated transportation requirements are not publicly available at this time.

Little is known about the other projects on the BC major projects list for northwest BC.

The assessment takes the following into account:

- Avanti's mitigation and management measures to address potential effects on road infrastructure, motor vehicle accidents, load spills and animal strikes and the anticipated low magnitude residual effects;

- The KMP traffic impact assessment by McElhanney Consulting Services Ltd. that concluded no intersection improvements or upgrades are required for Hwy 113, even without considering the use of a second access route (Hwy 37);
- Incremental KMP construction and operations traffic would be well within the design and effective capacities of Hwys 13 and 37;
- NTL construction traffic is predicted to fall within baseline traffic levels experienced on Hwy 37 over the past 20 years and on the Nass FSR during active logging periods;
- Galore Creek Mine is delayed due to a revised mine plan and other considerations, and the revised construction and operations schedule and transportation information is not available; and
- No relevant information is available about other major project identified in the RSA and listed in Section 7.2.3.5.

Therefore, the residual effects on transportation VCs will not be carried forward for further evaluation in a cumulative effects assessment.

Table 8.2.8-10 summarises the rationale for not carrying residual effects forward to the CEA.

Table 8.2.8-10: Project Related Residual Effects - Rationale for Carrying Forward Into the Cumulative Effects Assessment

Project Component	Project Phase	Residual Effect	Rationale	Carried Forward In CEA
Transportation of labour, equipment and materials	C, O	Increase wear and tear on Nass/Kinskuch FSRs and Alice Arm Road	Project traffic may spatially and temporally overlap other projects / activities in the RSA but no transportation details are available for other projects in the RSA. Further, the KMP transportation mitigation will reduce the magnitude of transportation effects to low and traffic associated with KMP in combination with projects in the RSA is expected to be well below the design capacities of Hwys 113 and 37.	No
Transportation of labour, equipment and materials	C, O	Increased traffic on Hwy 113 and Hwy 37 results in increased risk of motor vehicle accidents and vehicle-animal collisions	Project traffic may spatially and temporally overlap other projects / activities in the LSA / RSA but no transportation details are available for other projects in the LSA and RSA. Further, the KMP transportation mitigation will reduce the magnitude of transportation effects to low and traffic associated with KMP in combination with projects in the RSA is expected to be well below the design capacities of Hwys 113 and 37.	No

Project Component	Project Phase	Residual Effect	Rationale	Carried Forward In CEA
Transportation of labour, equipment and materials	C, O	Transportation of hazardous and non hazardous materials and risk of spills	Project traffic may spatially and temporally overlap other projects / activities in the LSA but no transportation details are available for other projects in the LSA and RSA. Further, the KMP transportation mitigation will reduce the magnitude of transportation effects to low and traffic associated with KMP in combination with projects in the RSA is expected to be well below the design capacities of Hwys 113 and 37.	No

Project phase: C - construction; O - operations

Note: CEA - Cumulative Effects Assessment; Hwy - Hwy; LSA - Local Study Area; RSA - Regional Study Area

8.2.8.8.2 Interaction Between Transportation and Other Past, Present, or Future Projects / Activities

For the reasons cited in Sections 8.2.8.3, 8.2.8.5 and 8.2.8.8.1, there are no other projects anticipated to interact with the proposed mine site area, therefore there is no discussion of this potential interaction.

8.2.8.8.3 Potential Residual Cumulative Effects and Their Significance

As indicated above, there are no cumulative effects for the ecosystem composition VC; therefore, there is no discussion on residual cumulative effects and their significance.

8.2.8.9 Limitations

A limitation in assessing project effects on transportation is the dated or missing baseline traffic information for the two access routes to the mine. Available information for Hwy 37 and Hwy 113 is dated, there is only one ASDT count on the Nass FSR, and no data for the Kinskuch FSRs and the Alice Arm Road in terms of traffic volume, type of traffic or current condition of these roads.

Estimates of deliveries to the mine during construction and operations have been developed by the engineers and linked to the capital and operating expenditures, but transportation and logistics planning and execution plans have not yet progressed beyond the conceptual stage. As a result, the estimate of total number of trips, types of vehicles, average and peak daily trips is reasonable, but hourly rates and numbers of vehicles using Route One and Two are very difficult to estimate with any degree of accuracy.

Information on potential future projects and activities in the RSA is, for the most part, nonexistent or very cursory, making a meaningful assessment of cumulative effects challenging.

In terms of mitigation measures, it is not possible to accurately estimate BC MFLNRO or BC MOTI's schedule for road maintenance or upgrades, if deemed necessary.

8.2.8.10 Conclusion

Overall, proposed Project effects on transportation in the study region would be not significant (minor).

8.2.9 Social VC # 8: Land and Resource Use

8.2.9.1 Introduction

This section addresses effects expected to result from Project-related disturbances and activities to the VC associated with the land and resource use component of the proposed Project. The identification and confirmation of VCs is presented within this section followed by the assessment and validation of potential effects of the proposed Project. Mitigation measures to manage the potential effects are also presented. Where residual effects are identified, a CEA is presented.

The baseline setting for land and resource use is discussed in detail in the Land and Resource Use Baseline Report (Appendix 8.0-B), which includes detailed descriptions and maps of the various land uses within the RSA and the LSA.

8.2.9.1.1 Relevant Legislation and Legal Framework

The proposed Project falls within the planning area outlined by the Coast Land Use Decision and described in the Central and North Coast order. Land use planning processes began on the Central Coast in 1997 and on the North Coast in 2001. Consensus agreements were reached in both areas in 2004 and 2005 and were finalised through consultations between the provincial government and Aboriginal groups.

On 7 February 2006, the Province of BC joined with Aboriginal groups, industry, conservationists, communities, and other stakeholders to announce new land use decisions for the Central Coast and North Coast that would protect a total of 1,800,000 hectares (ha) (BC Ministry of Agriculture and Land (BC MAL) 2006). The Coast Land Use Decision, which includes both the Central and North Coast planning area, was an Ecosystem EBM[2] decision representing collaboration between Aboriginal peoples, industry (e.g., forestry, forest products), environmentalists, government, and other stakeholders (BC MAL 2006).

The Central and North Coast order outlines a number of specific objectives, which are organised under the categories of First Nations, aquatic habitats, and biodiversity (BC MAL 2009). The Central and North Coast order utilises portions of land use objectives outlined in existing legislation such as the *Land Act* (Government of BC 1996c), *Forest and Range Practices Act* (Government of BC 2002d), and *Land Use Objective Regulation* (Government of BC 2005). The land use objectives outlined in the Central and North Coast order support

[2] Adaptive, systematic approach to managing human activities that focuses on the co-existence of healthy, fully functioning ecosystems and human communities

implementation of EBM. The implementation of EBM will be monitored to ensure ecosystem integrity is maintained. The implementation committees listed below were established to oversee the implementation of the Central and North Coast order.

The Nass South SRMP area overlaps with a small portion of the Kitsault transportation route Nass-Kwinatahl and Nass-Kinskuch FSRs. The Nass South SRMP was developed in close collaboration with the Gitanyow Hereditary Chiefs, and involvement from the Nisga'a Nation. The plan covers a wide range of topics with associate management objectives, including water, biodiversity, botanical forest products, wildlife, fisheries, cultural heritage resources, timber, and special resource management areas (none of which overlap with the proposed Project).

The land use RSA overlaps the PNCIMA, an 88,000 kilometres squared (km^2) of BC's northern marine and coastal area. This is a new initiative sponsored by the Canadian government as one of five pilot areas for stakeholder-based integrated management planning. The first PNCIMA forum was held in 2009 with participation from Fisheries and Oceans Canada (DFO), Coastal First Nations, and the North Coast-Skeena First Nations Stewardship Society. Potential PNCIMA stakeholders include coastal communities, industries (e.g., commercial and recreational fishing, aquaculture, marine transport, recreation, tourism, and energy), non-governmental organisations, and researchers.

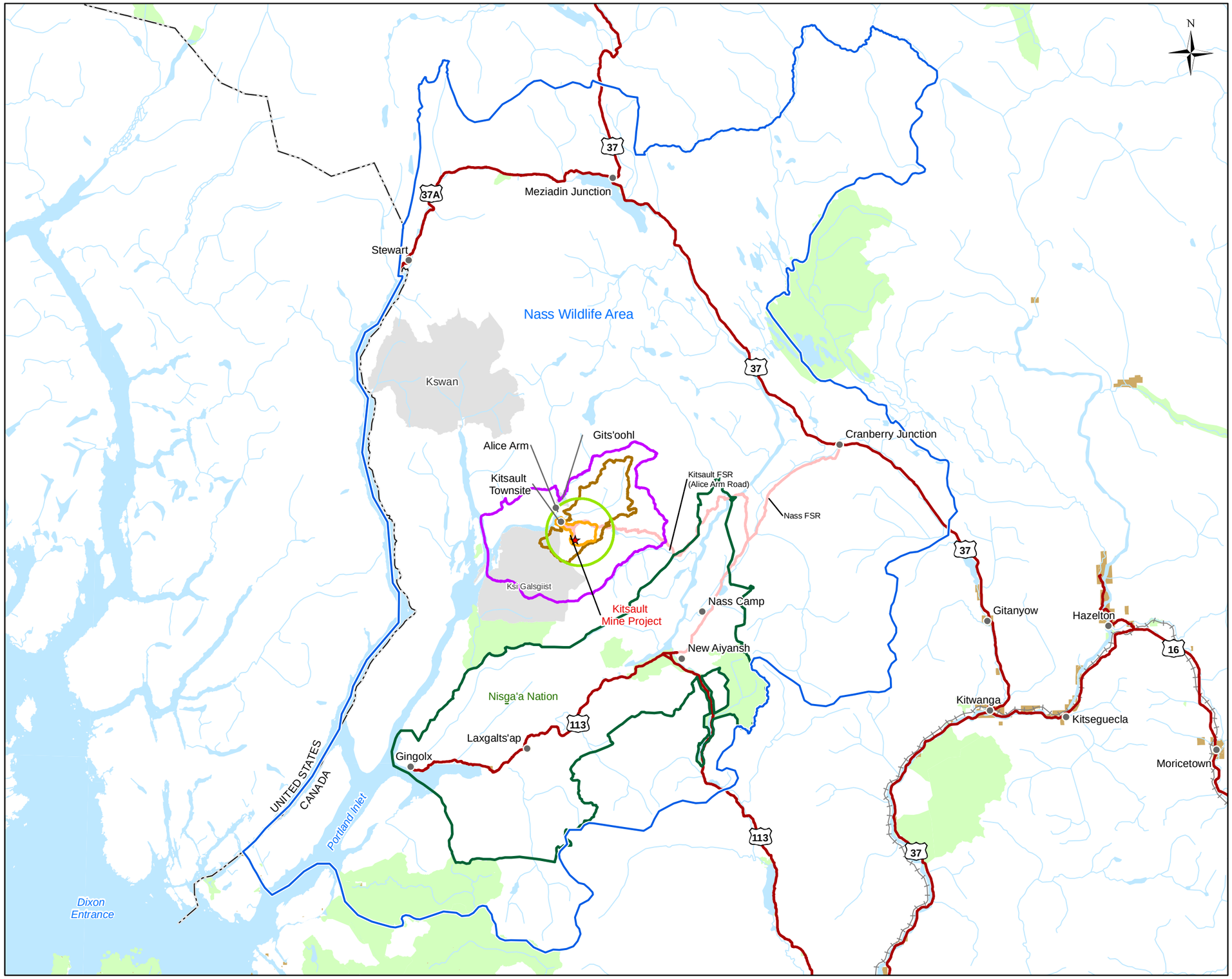
8.2.9.1.2 Spatial Boundaries

The spatial boundaries for the proposed Project were selected to accommodate those established for other study areas including aquatics, terrestrial vegetation, soils and wildlife. The established boundary incorporates unique ecosystems, natural landform barriers and features of the land area and usage in the vicinity of the proposed Project as shown on Figure 8.2.9-1.

The LSA was adopted to ensure consistency and the ability to compare results between the various baseline studies (i.e., vegetation and soils). The LSA is based on potential direct effect (i.e., disturbance) from the proposed Project which may affect land use. The LSA is therefore defined to include the proposed Project infrastructure including the haul road along Lime Creek with a 500 m buffer (to include any contiguous effects from activities causing land use disturbance). This provides a reasonable assessment area based on the planned activities in the mine.

The land use RSA, which is based on the wildlife RSA, includes the south side of Chaloner Ridge, Mount Theophilus, Ksi Gwinhatal, and Dawson Ridge (Rescan 2010b). It also overlaps with Alice Arm, Bessie Lake, Patsy Lake, Shishilabet Lakes, the Kitsault and Illiance Rivers, and a number of creeks including Roundy, Lime, Clary, Falls, Wilauks, Morley, Foxy, Hoan, Kelskiist, and Theophilus. Natural barriers such as waterbodies and mountain ranges are influenced by human activity. The RSAs for air quality, noise and water resources are also captured within the land use RSA.

The CEA study area (shown in Figure 5.10-1 in Section 5.0) was defined as the NWA. The NWA was selected because a planning process has been implemented and the area was determined to be large enough to capture other past and present human activities and projects as well as potentially future foreseeable projects that may overlap with potential residual effects associated with the proposed Project.



Legend

- Kitsault Mine Project
- Road
- Rail
- Highway
- Stream
- Waterbody
- Indian Reserve
- Parks, Protected Areas and Conservancies
- Biodiversity, Mining And Tourism Area
- Land and Resource Use Regional Study Area
- Land and Resource Use Local Study Area
- Air Regional Study Area
- Aquatics Regional Study Area
- Nisga'a Nation
- Nass Wildlife Area / Cumulative Effects Study Area

KEY MAP

Scale:1:800,000

10 5 0 10 20

Kilometres

Reference

Base Data
Geobase 1:20,000 (TRIM)
Land and Resource Data Warehouse 1:20,000 (TRIM)
Atlas of Canada scale 1:1,000,000.

CLIENT: Avanti Kitsault Mine Ltd.

PROJECT: Kitsault Mine Project

Land and Resource Use Study Area Rationale

DATE:	ANALYST:	
November 2011	MY	**Figure** 8.2.9-1
JOB No: VE51988	QA/QC: SB	PDF FILE: 17-50-002_study_area_v3.pdf
GIS FILE: 17-50-002_v3.mxd		
PROJECTION: UTM Zone 9	DATUM: NAD83	

Y:\GIS\Projects\VE\VE51988_KitsaultMapping\17_non-traditional-res\Base\ne\17-50-002_v3.mxd

8.2.9.1.3 Temporal Boundaries

Potential effects on the landscape are assessed for phases which may affect land and resource use. These are the construction, operations, and closure and decommissioning phases. The construction phase is expected to occur over 25 months. Operation of the mine site is proposed for 15 years. Decommissioning and closure is anticipated to last for three years with a post-closure phase of 15 years. As the proposed project is located on a brownfield site, post-closure effects of the Project on land and resource use are considered to be neutral or potentially positive as reclamation efforts will continue to improve the landscape into the foreseeable future.

Temporal boundary selection is based on a reasonable expectation of the time over which the proposed Project would have effects on biophysical and human environment receptors. Mine operation is projected to be 15 to 16 years following construction; decommissioning and closure, and post-closure phases would follow.

Preliminary temporal boundaries of the proposed Project, which are contingent on permitting, include four primary phases:

1. Construction Phase - estimated 25-month period. Includes:
    - Site clearing and preparation, earthworks such as excavating and grading site;
    - Facilities, such as the mine processing facilities, TMF South Embankment, and water management facilities;
    - Camp complex;
    - May include the Patsy Creek diversion.(this may be scheduled during the operations phase depending on environmental and project feasibility considerations);
2. Operations Phase - estimated at approximately two months of commissioning, and 15 to 16 years of mining (last two years are milling low-grade ore).
3. Decommissioning and Closure Phase - estimated at 15 to 17 years. Includes a closure period during which the buildings and decommissioned infrastructure would be removed and the area reclaimed.
4. Post-Closure Phase - estimated at five years or more. This includes post-closure monitoring until on-site water quality has stabilised and indicates no material future adverse effects on local receiving waters; stabilisation of the Waste Rock Management Facility (WRMF) and TMF would also be considered in post-closure monitoring.

8.2.9.2 Information Source and Methods

Three methods were used to compile the baseline land use information used to complete the effects assessment:

- Information from various government websites and reports was summarised and referenced;
- Information from GIS databases was sorted, summarised and mapped where available; and
- Individuals and companies familiar with the proposed Project area were contacted and requested to provide comment.

The information from the Rescan (2010b) report was summarised and updated, where necessary, in order to determine which land use components would be carried forward into the effects assessment. A description of applicable land use management objectives for the proposed Project area is presented at the beginning of the section to provide the background for the area. The land and resource baseline report provides a summary of the publicly available baseline data describing land use activities that occur near the proposed Project. Land uses considered in the land and resource use baseline report (Appendix 8.0-B):

- Kitsault Resort and Alice Arm;
- Protected areas and parks;
- Mining, prospects, exploration and mineral tenures;
- Forestry;
- Hunting;
- Trapping;
- Fishing;
- Recreation and tourism;
- Permits, licenses and land tenures;
- Transportation and access;
- Marine uses; and
- Other land uses.

8.2.9.3 Detailed Baseline for Land and Resource Use

A land and resource baseline study was prepared by Rescan in 2010, which presented a comprehensive overview of the land and resource use context within the area in which the proposed Project is located. Information from the "Kitsault Project: Land Use and Resource Baseline Report" prepared by Rescan (2010b) was summarised and updated, where necessary, in order to determine which land use components would be carried forward into the effects assessment. The land use RSA was based on the wildlife RSA.

There are no designated National Parks, National Historic Sites, National Marine Conservation Areas, National Wildlife Areas, Migratory Bird Sanctuaries or Marine Wildlife

Areas within the proposed Project study area (Canadian Wildlife Service (CWS) 2009; Parks Canada (PC) 2008). Other than two Biodiversity, Mining and Tourism Areas (BMTAs), Ksi Galsgiist / Stagoo, which overlaps the site and Gits'oohl (Nisga'a Category A Lands), located 3 km north of the site, the nearest protected area is Ksi Xts'at'kw / Stagoo, located 18 km south of the site. BMTAs are located adjacent to existing conservancies and protected areas to contribute to species, ecosystem, diversity and conservation.

The Kitsault Resort, a now privately-owned abandoned mining town, and the town of Alice Arm, are located within the land use RSA. The former Kitsault Mine was first staked for silver in 1911. Molybdenum mining commenced in 1968 where two short periods of mining occurred until 1982, at which time the mine was closed due to low metal prices. The property changed hands several times and was purchased by the proponent in 2008. There are no active mines within the land use RSA. Six past producers and six exploration projects were identified within the land use RSA. In addition to the proponent, three other companies and seven private owners hold 91 claims / tenures totalling 28,584 ha.

The proponent holds one active forest tenure (L48548) with a total area of 7792 ha that surrounds the proposed Project. The proponent holds Permit Number M-10, an "Amended Permit Approving Reclamation Program", which supports reclamation associated with historical activities at the former Kitsault Mine (Avanti Mining Inc. 2010). Since 1996, reclamation has included building demolition, rock dump re-sloping, re-vegetation and remediation of the pit area. Remediation was concluded in 2006. The proponent holds SUP 9228, issued by the BC Ministry of Forests and Range (BC MOFR). A SUP gives non-exclusive authority to a company or an individual to occupy and use an area of Crown Land, within a designated Provincial Forest, when they have demonstrated to the District Manager that the intended use is in accordance with the *Provincial Forest Use Regulation* (Government of BC 1995).

There are no active forestry operations within the land use RSA. Pine has not been found to be a major component of the local stands and mountain pine beetle is not a significant issue in the area (BC MOFR 2009). There are no active forestry camps located within the land use RSA. There are signs of a historical camp along the access road, including an old airstrip (Rescan 2010b).

The proposed Project falls within the Skeena Region (Region 6), and overlaps predominately with Wildlife Management Unit (WMU) 6-14 and to a smaller degree with WMU 6-16. The study area has moderate value for wildlife harvest compared to other areas of the Skeena Region. Coast Mountain Outfitters, which is also known as Milligan's Outfitting, is owned and operated by Robert Milligan who holds the Guiding Territory Certificate for the entire study area. Registered trap line TR0614T088 encompasses the entire proposed Project area and has been owned and trapped by Charlie and Dana Fleenor since 1994.

A basic recreational fishing licence allows a person to angle, down-rig, ice fish, set line (in certain areas), including lakes in Region 6. Available information indicates that coho fishing

is prohibited in the Illiance River between 21 September and 31 December upstream of signs near the river mouth, and in the Kitsault River and its tributaries between 1 October and 31 December upstream of signs near the river mouth. Chinook fishing is prohibited all year in the Kitsault River and tributaries.

Recreation values within the study area range from low sensitivity and significance to moderate sensitivity and high significance (Rescan 2010b). Gwunya Falls, located on the northern boundary of the land use RSA, is the only recreation site located in the land use RSA. Lisims Backcountry Adventures holds a commercial recreation license in Nisga'a Nation's commercial recreation area (Ksi Galsglist) that overlaps the land use RSA.

Several crown grants, wind power permits and water power licences are actively held in the immediate vicinity and to the northeast and southeast of Alice Arm. There are 8 active water licence applications and 2 current water licences located within the land use RSA for points of diversion. One active water licence application, Licence #Z121409 for power generation, is located on Lime Creek in the Lime / Patsy Creek Watershed. Water licensed work, under license #38870769 is also located on Lime Creek in the Lime / Patsy Creek Watershed. An active water licence application, Licence #Z121408 for power generation, is also located on Clary Creek in the Clary Creek Watershed. One groundwater well (license #69539) is located proximate to the site of the historical open pit mine. Kitsault Resorts Ltd. also has a deep groundwater well (KS-KA-WAT-06-E-01) located east of the mouth of Lime Creek.

The proposed Project is only accessible by land by FSRs. Alice Arm is accessible by floatplane or boat from Observatory Inlet. The Silver City Water Aerodrome is located in Alice Arm. There are no airports or rail within the land use RSA.

8.2.9.4 Cultural Ecological or Community Knowledge

Nisga'a Nation rights and interests were reviewed and described in detail in Part C of the Application. The main areas of importance in terms of land use in relation to the proposed project included the following:

- The Nisga'a Nation has fee simple title to Gits'oohl and rights to a commercial recreation tenure within 5 km of the proposed Project;
- The Nisga'a Nation have rights to use 10% of the volume in Kwinatahl River (approximately 2.5 km southeast of the proposed Project) for domestic, commercial, and industrial purposes;
- The Nisga'a Nation have rights to harvest wildlife in the NWA, in particular allocations for grizzly bears, moose, and goats;
- The Nisga'a Nation have trapping rights to four trap lines none of which overlap directly with the proposed Project);
- The Nisga'a Nation have the right to harvest salmon, steelhead, aquatic plants, oolichan, intertidal bivalves and migratory birds within in the Nass Area; and

- There are recreation opportunities at Kwinamuck Lake (2.5 km south of the Kitsault access road) and Dragon Lake (located approximately 6 km north of the Nass Camp on the Nass FSR.

Part D includes a description of the Metlakatla First Nation and the Road Use Effects Assessment (Appendix 8.0-C) provides information for the remaining Aboriginal groups, including: Kitselas First Nation; Kitsumkalum First Nation; Gitxsan Chiefs; and Gitanyow Hereditary Chiefs, whose traditional territories overlap with the Kitsault transportation route. A review of publically available information indicated that the main areas of importance in terms of land use in the area included the following:

- Continued practice of traditional activities, such as hunting, trapping, and fishing;
- Developing sustainable ecotourism, cultural tourism and recreation industries' and
- Economic development related to forestry and small-scale hydroelectric developments, and mineral extraction and includes areas set aside as biodiversity, tourism and mining zones located proximate to the proposed Project.

These interests were taken into account in scoping the specific areas included in the land and resource use effects assessment.

No cultural or sacred sites were identified within the proposed Project footprint during the desk top review and field investigation.

8.2.9.5 Past, Present or Future Projects / Activities

Mining activity associated with the historical operations, closure and decommissioning of the previous Kitsault Mine have changed the landscape. Mining exploration has historically occurred throughout the area and continues today. It is presumed that mining exploration activity will continue and have been included as foreseeable in the CEA. Any existing power line (part of the historical Kitsault mining operations) runs near the site that needs only to be upgraded to its original capacity to meet the project power requirements. Potential effects associated with upgrading the existing power line are considered negligible and are not included in the effects assessment.

Currently, the area is primarily occupied by vacationers staying in the Alice Arm area during the summer months. The Alice Arm Lodge, located in Alice Arm provides support to mining exploration companies operating in the area including a marine barging operation. One trapper, who owns the trap line that encompasses the Project footprint, resides in Alice Arm year round. One caretaker resides at the Kitsault Resort year round. Additional maintenance staff may also reside at the Kitsault Resort intermittently depending on site maintenance requirements. One individual holds the guide outfitting rights to the RSA.

Traffic associated with construction and operations of the proposed Project may overlap with projects constructed in the future.

8.2.9.6 Potential Effects of the Proposed Project and Proposed Mitigation

Following a review of the available information including comments provided by regulators and stakeholders a list of representative issues was identified and carried forward into the effects assessment for land and resource use.

The issues identification and confirmation process recognised four issues associated with land and resource use. The relevance of issues was validated through consideration of the proposed issues in the context of the existing baseline conditions of the proposed Project, review of the Project Description (Section 3.0), and a consideration of identified stakeholder concerns. Potential effects on land and resource use were identified through consultation with the following groups:

- Federal government agencies, including: EC and the Agency;
- Provincial government agencies, including: BC MOE, BC Ministry of Energy and Mines (BC MEM), BC MFLRNO, and BC EAO;
- The Nisga'a Nation and Aboriginal groups; and
- The general public or other stakeholders, including the community of Terrace.

The rationale for selecting the list of issues is summarised in Table 8.2.9-1.

The proponent holds one active forest tenure (L48548) with a total area of 7792 ha that surrounds the proposed Project. The proposed Project is located within a brownfield which is predominately cleared and any additional clearing activities will be limited to areas directly associated with construction and operations of the proposed Project. There is the potential for Project traffic to overlap forestry traffic within the RSA.

The entire land use RSA falls within the Guiding Territory Certificate held by Coast Mountain Outfitters (also known as Milligan's Outfitting). The proposed Project footprint falls within one trap line tenure area (TR0614T088), and the land and resource use study area overlaps 11 other trap line tenure areas. Project traffic and improved access in the RSA could have an effect on trapping and guide outfitting activities.

Gwunya Falls, located on the northern boundary of the land use RSA, is the only recreation site (BC Recreational Resources Inventory 2011). The land use RSA overlaps with the following two BMTAs officially designed 30 September 2008 (BC ILMB 2008a):

- Gits'oohl - also known as Kitsault; and
- Ksi Galsgiist / Stagoo BMTA - also known as Dawson / Stagoo.

Table 8.2.9-1: Issues Evaluation Table for Land and Resource Use

Issue	Interaction with Kitsault Mine Project	Overlaps with Project RSA	Identified by Proponent (Professional Judgement)	Identified by Nisga'a Nation	Identified by Aboriginal Group	Identified by Government Agencies	Identified by Public or other Stakeholders	Include or not in EA process	Rationale for Selection
Alice Arm and Kitsault Resort	Noise, visual, traffic, access	Yes	Yes	No	No	No	Yes	Yes	Concern that noise and aesthetics associated with the proposed Project could Kitsault Resort and Alice Arm. Potential effects associated with project traffic and access management on local communities in the RSA are discussed in the transportation section.
Protected areas and parks	No	No	No	No	No	No	No	No	No parks or protected areas are directly or indirectly affected by the proposed project
Mining, prospects, exploration and mineral tenures	Traffic, access	Yes	No	No	No	No	No	Yes – traffic and access only	No direct overlap with proposed Project footprint and other documented mining projects or exploration in the area. Potential effects associated with project traffic and access management on exploration activities in RSA are discussed in the transportation section.
Forestry	Land clearing, traffic	Yes	No	No	No	No	No	Yes – traffic only	Direct effects on forestry will be minimal as the project area is predominately brownfield and minimal land clearing will be required. Potential effects associated with project traffic on forestry activities in the RSA are discussed in the transportation section.
Recreational hunting	Land clearing/mine operations, noise, visual, traffic, access	Unknown	No	No	No	No	No	No	Available information indicates that recreational hunting does not occur to any great extent in the Project area.
Guide outfitting	Land clearing/mine operations, noise, visual, traffic, access	Yes	No	Yes	Yes	No	No	Yes	The Project footprint overlaps a small portion of one guide outfitting certificate area. Potential effects associated with project traffic and access management on hunting/guide outfitting activities in the RSA are discussed in the transportation section.

Issue	Interaction with Kitsault Mine Project	Overlaps with Project RSA	Identified by Proponent (Professional Judgement)	Identified by Nisga'a Nation	Identified by Aboriginal Group	Identified by Government Agencies	Identified by Public or other Stakeholders	Include or not in EA process	Rationale for Selection
Trapping	Land clearing/mine operations, noise, visual, traffic, access	Yes	No	No	No	No	No	Yes	The Project footprint overlaps a portion of one trapping license area. Potential effects associated with project traffic and access management on trapping/guide outfitting activities in the RSA are discussed in the transportation section.
Fishing	No	Yes	No	No	Yes	No	No	No	No direct effects on fishing are predicted as very little fishing occurs in the RSA.
Recreation and tourism	Traffic, access	Yes	No	No	No	No	No	Yes – traffic and access only	Project effects are predicted to be negligible from the Project on the one recreation site and two BMTAs within the RSA due to their distance and use. Potential effects associated with project traffic and access management on recreation and tourism in the RSA are discussed in the transportation section.
Permits, licences and land tenures	Land clearing/mine operations, traffic, access	Yes	No	No	No	No	No	Yes	The proposed Project footprint overlaps one waterpower license which is not currently associated with any specific projects. Three active water licence applications may be affected by the Project. There is the potential for indirect effects associated with project traffic and access on existing permits, licences or land tenures.
Transportation and access	Noise, visual, traffic, access, safety	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Local community traffic, mining exploration and forestry traffic during construction, operations and decommissioning and closure may overlap with Project traffic. Access may be limited around the proposed project which may affect the local trapper and guide outfitter.
Marine uses	No	Yes	No	No	Yes, Metlakatla only	No	No	No	The marine environment (Alice Arm) is not predicted to be affected by the project.

Notes: BMTA - Biodiversity, Mining and Tourism Area; RSA - Regional Study Area

There is limited information regarding specific recreation or tourism activities within these two areas. Lisims Backcountry Adventures Inc. holds an extensive Commercial Recreation Licence within the Ksi Galsgiist / Stagoo BMTA. The proposed Project will not directly affect these areas; however increased traffic and improved access could be a concern in the RSA.

There is the potential for land clearing activities and mine operations to directly affect the water license that falls within the Project footprint; however, the assessment is limited by the availability of information for this license. There are several permits, licences, and land tenures within the land use RSA; however, available information indicates that they are not currently associated with any proposed or active projects. The assessment is limited to the available information and there was no information regarding proposed or active projects in the area.

8.2.9.6.1 Identification and Analysis of Potential Project Effects

The following discussion summarises how land and resource use could be affected by the proposed Project in each of the four development phases.

During construction, land and resource use may be affected by:

- Clearing for infrastructure development and construction of mine site facilities such as the initial construction camp (and permanent camp), Process Plant and two tailings embankments;
- Light, emissions, and dust generation from vehicles, construction equipment, mine production equipment including incinerating domestic waste on-site;
- Noise from on-site vehicles, construction equipment, mine production equipment; and
- Proposed Project traffic and improved access.

During operations land and resource use may be affected by:

- Mining activities including the advancement of the Kitsault Pit, WRMF, TMF, and associated embankments and water management;
- Light, emissions and dust generation from equipment operation, incinerating of domestic waste, and periodic blasting activity;
- Noise from on-site vehicles, and mining equipment during routine operations; and
- Proposed Project traffic and improved access.

Substantially lower traffic volumes are expected during decommissioning than during construction or operations because concentrate shipments would cease, there would be far fewer passenger vehicles carrying suppliers, vendors, and expediters, fuel requirements would be less, and the on-site workforce would shrink over the 15-to-17-year period. Heavy trucks and trailers would represent the largest percentage of the traffic mix, particularly

during the initial year of decommissioning when materials to be disposed of or recycled would be removed, along with camp modules, small buildings, stationary and mobile equipment.

Reclamation activities will be carried out concurrently with mine operations wherever possible, and final closure and reclamation measures will be implemented at the time of mine closure. The proposed mine development lies in very rugged and steep terrain, and much of the development area has already been disturbed from activities associated with the former Kitsault mine. Based on the current closure work, limited sources of good-quality soil / growth medium will be available for reclamation. Therefore the degree of new disturbance has been minimised as much as possible. During decommissioning and closure negligible effects on land and resource use would be expected from:

- Light, emissions and dust generation from periodic equipment operation and vehicle movement; and
- Short term noise from on-site vehicles, and mining equipment during decommissioning of the mine site infrastructure and associated traffic off-site.

During the post closure phase, there will be little activity at the mine site. Activities will be limited to monitoring which will involve only a few light trucks transporting monitoring equipment and monitors.

Once it has been established that a road is no longer needed, it will be decommissioned and reclaimed. Where the roads can be reclaimed, culverts will be removed, stream crossings re-graded, and surfaces scarified to encourage vegetation growth. The power line corridor will be maintained to support post closure activities.

Potential effects associated with proposed Project traffic on land and resource use are discussed in Section 8.2.8. Potential direct effects of the proposed Project on land and resource use are summarised in Table 8.2.9-2.

Table 8.2.9-2: Potential Direct Project Effects on Land and Resource Use

Project Component	Project Phase	Potential Direct Project Effect	Likelihood Of Occurrence
Mine site infrastructure	C, O, D/C	Loss of trapping and guide outfitting areas associated with the mine footprint.	Likely
Mining operations	C, O, D/C	Change in local ambience associated with mining operations on the Kitsault Resort and Alice Arm, trapping and guide outfitting activities.	Likely
Mining operations	O, D/C	Water withdrawals are predicted on three water courses that have active water licence applications	Unknown
Traffic	C, O, D/C	Direct effects associated with Project traffic and improved access on trapping, guide outfitting, Kitsault Resort and Alice Arm, mining exploration and forestry, and recreation and tourism	Likely

Project Phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

Potential direct effects on land and resource use include:

- Obstruction, loss and / or usage of trapping and guiding areas will occur through all proposed Project phases, and the TMF will be a permanent feature on the area following mine closure;
- Noise and visual disturbance from mining operations that could affect Kitsault Resort and Alice Arm, recreation and tourism and trapping and guiding activities;
- Potential effects on two water courses that have active water licence applications or water licensed work; and
- Proposed Project traffic and improved access may affect utilisation of existing road infrastructure by the local population and other land uses in the area.

A description of the potential direct effects of the proposed Project on land and resource is presented in Table 8.2.9-3.

Table 8.2.9-3: Description of Potential Direct Project Effects on Land and Resource Use

Land Use Category	Change in Land Use Area	Change in Local Ambience	Change in Water Availability	Change in Accessibility
Alice Arm and Kitsault Resort	No	Adverse	No	Positive / Adverse
Hunting/guide outfitting	Adverse	Adverse	No	Positive / Adverse
Trapping	Adverse	Adverse	No	Positive / Adverse
Recreation and tourism	No	Adverse	No	Positive / Adverse
Permits, licences and land tenures	No	Adverse	Adverse	Positive
Transportation and access	No	Adverse	No	Positive/ Adverse

Note: No - no effect; Adverse - adverse effect; Positive - positive effect

Although the proposed Project location is screened from view from the Kitsault Resort and Alice Arm located north of the proposed Project, and each has small populations limited to seasonal usage and a full time populace of only a few residents, there is the potential for the proposed Project to affect the local ambience of the area. The noise modeling results indicate that the majority of noise and vibration effects from mine site operations do not extend beyond a distance of 1.5 km from the Kitsault Pit so effects on the communities are predicted to be negligible. Direct effects associated with construction, operations, decommissioning and closure activities at the mine site on the local ambience of the local communities is not carried forward into the effects assessment for land and resource use. There is the potential that the local ambience of the area will be affected by noise and visual disturbance from traffic associated with construction, routine operations and

decommissioning/closure activities. There is also the potential for traffic related to the proposed Project along the Kitsault transportation route to overlap other land uses.

Both guide outfitting and trapping tenures will lose the use of a very small portion of their tenure area to the mine footprint. There is one guide outfitter (i.e., Coast Mountain Outfitters) and one trap line holder (i.e., TR614T008) whose tenured areas overlap directly with the mine footprint. Table 8.2.9-4 summarises the tenure area lost for each guide outfitter and trap line holder, including the percentage of lost to total area. The areas lost represent a negligible portion of the tenured total areas. Furthermore, the area overlapping the proposed mine site area is for the most part previously developed and disturbed (i.e., brown field). The potential for hunting and trapping is considerably depreciated and already compromised in this area. There are adjacent, alternative areas that are more suitable for trap line and hunting purposes. This has been confirmed through engagement with the two tenure holders who did not raise concerns regarding the development of the proposed Project from the perspective of their operations and financial viability.

Table 8.2.9-4: Tenure Area Lost Compared to Total Tenure Area

Guide Outfitter / Trap line	Total Area (ha)	Area Lost (ha)	% Lost to Total
Coast Mountain Outfitters	2,680,823	701	0.03
TR0614T088	21,327	701	3.3

Note: ha - hectare; % - percent

Depending on the proximity of recreational and tourism activities, increased industrial activity and traffic related to the proposed Project could result in a degradation of land use enjoyment based on the potential for increased noise levels. The noise modeling results indicate that the majority of noise and vibration effects from mine site operations do not extend beyond a distance of 1.5 km from the Kitsault Pit; therefore, this effect is expected to be negligible due to the distance from recognised tourism areas and known and recorded recreational activities in the area. Direct effects associated with construction, operations, decommissioning and closure activities at the mine site on the local ambience of recreational areas and tourism is not carried forward into the effects assessment for land and resource use. There is the potential that the local ambience of the area will be affected by noise and visual disturbance from traffic associated with construction, routine operations and decommissioning/closure activities. There is also the potential for Project related traffic to overlap other land uses along the Kitsault transportation route.

Based on water modeling results (see Section 6.5, Hydrology), potential reduction in flows in the Lime / Patsy Creek and Clary Creek Watersheds have been identified; the magnitude of which could range from low to high depending on phase of the mine and the water management scenario being considered. Two active water license applications could be affected by the change in flows expected from the proposed Project:

- Licence #Z121409, for power generation, located on Lime Creek in the Lime / Patsy Creek Watershed: and
- Licence #Z121408, for power generation, on Clary Creek.

License #38870769, for water licensed work, is also located on Lime Creek in the Lime / Patsy Creek Watershed.

It is unknown at this time whether the fluctuations in water flow expected in the Lime / Patsy Creek and Clary Creek Watersheds will affect water license applications and water licensed work within these watersheds. As potential effects on these licenses cannot be assessed at this time they have not been carried forward into the effects assessment. Potential effects on licenses that may be identified as the Project progresses will be assessed as required.

Improved accessibility due to winter snow removal and regular maintenance along the FSRs by the proponent will benefit existing land user groups (e.g., mining exploration); however, it may also attract additional third party interest and use in the area along the maintained road infrastructure. Land use activities that may be easier to conduct on maintained roads, with less travel time and effort to access areas in and around the proposed mine site, include hunting, recreational activities (e.g., hiking, snowmobiling, all terrain vehicle use and fishing). A detailed discussion related to traffic and transportation effects associated with the proposed Project is presented in Section 8.2.8. The transportation of equipment, supplies, material and labour is also discussed in the Road Use Effects Assessment (RUEA) (Appendix 8.0-C). There may be some differences between Section 8.2.8 and the RUEA because the latter includes consideration of additional information.

Potential indirect effects of land and resource use on other VCs are predominately associated with the improved access into the proposed Project area by other potential projects and individuals for various land uses due to year round access maintained for Project traffic during construction, operations, decommissioning and closure. Table 8.2.9-5 below summarises the potential indirect effects that land and resource use may have on other VCs.

Table 8.2.9-5: Potential Indirect Project Effects on Other Valued Components

Direct Project Effect	Project Phase	Potential Indirect Project Effect	Section Where Details are Provided
Improved access to the Project area by other potential projects and individuals for a variety of land use activities	C, O, D/C	Increased wildlife mortality due to increased hunting and wildlife-traffic incidents in proposed Project area	Discussed in the Wildlife Management Plan (section 11.2.21) and Transportation and Access Management Plan (section 11.2.18)
	C, O, D/C	Increased accidents due to increased traffic in proposed Project area	Discussed in the Accidents and Malfunctions (section 21.6) and Human Health (section 10.0)
	C, O, D/C	Both positive and adverse effects on economic and social environments due to increased tourism business	Discussed in Economic Effects Assessment (section 7.0) and Social Effects Assessment (section 8.0)

Direct Project Effect	Project Phase	Potential Indirect Project Effect	Section Where Details are Provided
		in the Project area	

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

Potential interactions between direct effects of the proposed Project and other VCs on land and resource use are summarised in Table 8.2.10-6 below and are associated with facilitated access to the proposed Project area which include increased wildlife mortality, motor vehicle accidents and both positive and adverse effects on the social and economic environments. The assessment of these potential effects is provided in the relevant sections outlined in Table 8.2.9-5 above.

Table 8.2.9-6: Summary of Potential Interaction Between Project Direct Effects on Other Valued Components and Land and Resource Use

Direct Project Effect	Air Quality and Climate Change	Noise and Vibration	Hydrogeology	Groundwater Quality	Freshwater and Sediment Quality	Surface Hydrology	Freshwater Fisheries	Marines Water Quality	Marine Biota	Terrestrial Environment	Wildlife and Their Habitat	Environmental Health	Economic	Social	Heritage	Health	Nisga'a Nation Land Use	Aboriginal Groups Land Use
Maintenance of Project roads year round	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	o	NI	o	o	NI	o	o	o

Legend: Interaction definitions: o - interaction; - - key interaction; + - benefit; NI - no interaction; n/a - not applicable

From a land use perspective, increased wildlife mortality associated with a potential increase in hunting and wildlife-traffic incidents may contribute to reduced trapping and guide outfitting opportunities. Table 8.2.9-7 summarises the potential combined Project effects by Project phase on land and resource use.

Table 8.2.9-7: Potential Combined Project Effects by Project Phase on Land and Resource Use

Potential Indirect Project Effect	Potential Combined Project Effect	Project Phase	Likelihood Of Occurrence
Increased wildlife mortality	Change in trapping and guide outfitting opportunities	C, O, D/C	Likely

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

A summary of potential Project effects to be carried forward into the assessment for land and resource use is presented in 8.2.9-8.

Table 8.2.9-8: Summary of Potential Project Effects to be Carried Forward Into the Assessment for Land And Resource Use

Adverse Effects / Positive Effects	Project Phase	Direction
Decreased trapping and guide outfitting opportunities	C, O, D/C	Adverse
Improved access along transportation route	C, O, D/C	Positive / Adverse

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

Potential adverse effects contributing to decreased trapping and guide outfitting opportunities include:

- Direct loss of trapping and guide outfitting areas to mine footprint;
- Change in local ambience in hunting area due to noise, vibration and decreased aesthetics at mine site; and
- Indirect effect on wildlife populations due to increased recreational hunting pressures and wildlife-vehicle collisions due to improved access to the area.

Potential adverse effects associated with increased traffic along the Kitsault transportation route are directly related to the change in local ambience. The noise, vibration and decreased aesthetics associated with increased volume along the transportation route (primarily during construction and operations) and improved access to the area (during all Project phases) may change the local ambience.

Positive effects associated with improved access along the transportation route are primarily associated with potential business opportunities. Mining exploration companies as well as other potential projects will be able to take advantage of the maintained transportation route

all year round. Improved access provides an opportunity for individuals and companies to visit the area more often and/or at different times of the year. Potential negative effects would be associated with year round access to areas previously inaccessible during the winter months.

8.2.9.6.2 Mitigation Measures

There are several mitigation measures proposed by the proponent to address direct affects associated with noise, vibration and visual quality. Example measures are also provided to mitigate potential access- and traffic-related effects of the proposed Project. Table 8.2.9-9 provides mitigation measures to address the adverse effects on land and resource use.

Table 8.2.9-9: Potential Project Effect by Project Phase on Land and Resource Use and Mitigation Measures

Project Effect		Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
Decreased trapping and guide outfitting opportunities	Direct loss of hunting area to mine footprint	C, O, D/C	Limit mine footprint; Reclamation and Closure Plan implementation; ensure ongoing communication with local stakeholders	Low to High
	Change in local ambience in hunting area due to noise, vibration and decreased visual quality at mine site	C, O, D/C	Reclamation and Closure Plan implementation; ensure ongoing communication with local stakeholders	Moderate to High
	Indirect effect on wildlife populations due to increased hunting pressures and wildlife collisions due to improved access to the area	C, O, D/C	Wildlife Management Plan; Transportation and Access Management Plan.	Moderate to High
Project related traffic and improved access along transportation route	Change in local ambience due to increased noise, vibration and decreased visual quality associated with traffic volume	C, O, D/C	Transportation and Access Management Plan.	High
	Improved access and reduced traveling time to existing and potential land use activities/businesses	C, O, D/C	Transportation and Access Management Plan.	Moderate to High

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure

Mitigation measures identified in Section 11.0, Proposed Environmental and Operational Management Plans and defined and clarified following consultation with regulatory agencies and stakeholders will minimise potential effects associated with traffic and increased access along the transportation route related to the proposed Project.

A variety of mitigation measures will be implemented at the mine site to reduce noise, vibration and effects on visual quality that may change the local ambience. Example mitigation measures for noise and vibration are described in detail in the Noise Management

Plan (Section 11.2.12) and include: during maintenance, check that noise abatement devices are in good order; minimise operating multiple pneumatic tools at the same time, spread operation throughout working periods where possible; operating equipment within specification and capacity; using equipment conforming to noise standards; and placing crushers behind engineered or natural barriers if possible. Potential effects on visual quality are described in detail in Section 10.0 and mitigation measures include managing and controlling emission in all stages of the proposed Project and on-going reclamation.

An access management strategy will be developed for the mine site in coordination with the affected trapper and guide outfitter, Nisga'a Nation and local Aboriginal groups and other affected stakeholders. The purpose of the strategy will be to:

- Manage and limit public access to the mine operating area and site;
- Manage the potential for increased hunting pressures on wildlife;
- Reduce possible wildlife-human conflicts; and
- Protect existing wildlife-dependent land users (e.g., Nisga'a Nation and local Aboriginal groups, trappers and guide outfitters).

A Transportation and Access Management Plan will be developed that provides the framework for the control of transportation and access to the proposed Project. An outline of the Transportation and Access Management Plan is provided in Section 11.2.18 and includes the following main components:

- Traffic Control Plan;
- Implementation Plan;
- Public Information / Communication Plan; and
- Incident Management Plan.

The Transportation and Access Management Plan provides guidelines for the development and maintenance of mine site roads and existing access roads within the proposed Project site, and lists requirements for the use and maintenance of existing access roads, which form the vital link for transport of personnel and materials between the proposed Project, local communities, and distal modes of transport. These procedures would apply throughout all phases of the proposed Project life.

An Emergency and Spill Response Plan will be developed that outlines company policy with respect to emergency response and specifically addresses Project engineering design and permitting requirements. An outline of the Emergency and Spill Response Plan is provided in Section 11.2.6 and includes road closures and material transportation.

8.2.9.7 Potential Residual Effects and Their Significance

8.2.9.7.1 Potential Residual Effects After Mitigation

The loss of trapping and guide outfitting area to the mine footprint during construction and operations will be minimised to the extent possible by limiting the area cleared and fenced. Reclamation will be on-going during operations and will continue through decommissioning and closure. Following mine closure the re-vegetated areas previously occupied by the mine site footprint will be assessed and the potential release of these areas evaluated. Mitigation success is rated from low to high as it is directly related to the release of areas successfully reclaimed.

Table 8.2.9-10 summarises the potential residual effects on land and resource use.

Table 8.2.9-10: Summary of Residual Effects for Land and Resource Use

Project Phase	Residual Effect	Direction
C,O, D/C	Decreased trapping and guide outfitting opportunities	Adverse
C,O, D/C	Project related traffic and improved access along transportation route)	Adverse / Positive

Project phase: C - construction; O - operations; D/C - decommissioning and closure; PC - post-closure

8.2.9.7.2 Significance of Potential Residual Effects

The footprint of the mine site and support facilities will be inaccessible to any hunting, trapping or guide outfitting activities during all phases of the proposed Project. The loss of trapping and guide outfitting area to the mine footprint during construction and operations can be marginally mitigated and the benefits of on-going reclamation will only be realised after mine closure which accounts for the relatively low success rating. The loss of trapping and guide outfitting area associated with the Project will be reversed following mine closure to the extent possible. The significance of the residual effect was determined to be not significant (negligible) because effects are predicted to be low in magnitude (loss of area is 0.03% for guide outfitter and 3.3% for trapper), local in geographic scale, and partially reversible following operations. Effects occur continuously during all phases of the project. The ecological context was rated as nil as adverse effects are limited to the proposed Project footprint which represents a very small portion of the wildlife habitat of interest; see section 6.8 (Wildlife and their Habitat).

Mitigation measures implemented to reduce potential Project effects on the trapping and guide outfitting experience associated with changing local ambience due to noise, vibration and decreased visual quality at the mine site are predicted to have a moderate to high success rating. On-going communications with these stakeholders will ensure concerns are identified. The significance of the residual effect was determined to be not significant (negligible) because effects are predicted to be nil to low in magnitude, local in geographic scale, and reversible. Effects occur continuously during all phases of the project. The ecological context was rated as nil as adverse effects are limited to the Project footprint.

Indirect effects on trapping and guide outfitting opportunities due to the increased hunting pressures and wildlife collisions are expected to have a high mitigation success rating with the implementation of appropriate protection measures. The significance of the residual effect was determined to be not significant (negligible) because effects are predicted to be nil to low in magnitude, regional in geographic scale, and reversible. Effects occur continuously during all phases of the proposed Project. The ecological context was rated as nil as potential Project effects associated with increased hunting pressure and wildlife collisions are not expected to affect wildlife populations or community functions.

There will be an increase in traffic associated with the Project during construction, operation, decommissioning and closure of the proposed Project. The significance of the residual effect was previously assessed in Section 8.2.8 (Transportation) above and was determined to be not significant (minor) because effects are predicted to be low in magnitude, regional in geographic scale, and reversible; see Section 8.2.8 for residual effects ratings rationale. Effects occur continuously during all phases of the proposed Project.

Potential residual effects on local ambience along the transportation route with respect to other land and resource uses (i.e., tourism) was rated as not significant (minor) primary due to the uncertainty regarding the potential receptors that may be adversely affected by the increase in traffic. Residual effects on local ambience along the transportation route are mainly associated with Project construction and operations as traffic will decrease substantially once decommissioning and closure commence.

Potential negative effects associated with year round access to areas previously inaccessible during the winter months are rated as not significant (negligible) primarily due to the fact that non Aboriginal hunters and guide outfitters are bound by BC Hunting Regulations that restricts where and when they can hunt within the NWA. Specific hunting windows are defined for various wildlife species and trapping is done in accordance with registered trapping areas. There is an anticipated positive residual effect for current land user groups, including trap line holder, guide outfitter, and exploration companies, who may benefit from improved access and reduced traveling time to important land use sites.

Table 8.2.9-11 provides a summary of the residual effects on land and resource use using the effects criteria ratings provided in Section 5.0 based on the success of the proposed mitigation measures and management plans.

Table 8.2.9-11: Residual Effects Assessment by Project Development Phase for Land and Resource Use

Parameter	Stage of development/rating		
Decreased trapping and guide outfitting opportunities			
Stage of Project Development	C, O, D/C	C, O, D/C	C, O, D/C
Residual effect:	Direct loss of hunting area to mine footprint	Change in local ambience in hunting area due to noise, vibration and decreased aesthetics at mine site	Indirect effect on wildlife populations due to increased hunting pressures and wildlife collisions due to improved access to the area
Effect attribute			
Magnitude	Low	Nil to Low	Nil to Low
Geographic extent	Local	Local	Regional
Duration	Long-term to Chronic	Long-term	Long-term
Frequency	Continuous	Continuous	Continuous
Reversibility	Yes - partially	Yes	Yes
Ecological context	Nil	Nil	Nil
Direction	Negative	Negative	Negative
Certainty	High	Medium	Medium
Mitigation success	Low to High	Moderate to High	Moderate to High
Residual effect significance	Not significant (negligible)	Not significant (negligible)	Not significant (negligible)
Level of confidence	High	Medium	Medium
Project related traffic and improved access along transportation route			
Stage of Project Development	C, O	C, O, D/C	
Residual effect:	Change in local ambience along transportation route due to increased noise, vibration and decreased visual quality associated with traffic volume	Improved access and reduced traveling time to existing and potential land use activities / businesses	
Effect attribute			
Magnitude	Low	Low	
Geographic extent	Regional	Regional	
Duration	Long-term	Long-term	
Frequency	Continuous	Continuous	
Reversibility	Yes	Yes	
Ecological context	Nil	Nil	
Direction	Negative	Positive or Negative	

Parameter	Stage of development/rating		
Certainty	Medium	Medium	
Mitigation success	Moderate to high	Low to high	
Residual effect significance	Not significant (minor)	Not significant (negligible)	
Level of confidence	Medium	Medium	

Project phase: C - construction; O - operations; D/C - decommissioning and closure; PC - post-closure

8.2.9.8 Cumulative Effects Assessment

8.2.9.8.1 Rationalisation for Carrying Forward Project Related Residual Effects Into the Cumulative Effects Assessment

To produce a cumulative effect, the residual effects of the proposed Project must act in combination with the residual effects of one or more other human actions / projects. The residual effect identified for land and resource use includes:

- Change in local ambience along transportation route due to increased noise, vibration and decreased visual quality associated with traffic volume due to Project related traffic and improved access to the area.

Table 8.2.9-12 provides rationale for inclusion of proposed Project-specific residual effects in the CEA.

Table 8.2.9-12: Project Related Residual Effects - Rationale for Carrying Forward Into the Cumulative Effects Assessment

Project Component	Project Phase	Residual Effect	Rationale	Carried Forward In CEA
Project related traffic and improved access along transportation route	C, O	Increased traffic volume changes local ambience	Project related traffic and potential increased traffic associated with improved access to area may combine with traffic from other human activities and projects (e.g. mining exploration, NTL and KSM).	Yes

Project phase: C - construction; O - operations; D/C - decommissioning and closure; PC - post-closure

Note: NTL - Northwest Transmission Line; KSM - Kerr-Sulphurets-Mitchell Copper-Gold Mine

8.2.9.8.2 Interaction Between Land and Resource Use and Other Past, Present or Future Projects / Activities

Potential interactions between land and resource use residual effects and past, present and reasonably foreseeable projects are summarised in Table 8.2.9-13.

Table 8.2.9-13: Assessment of Interaction Between Other Projects, Human Activities and Reasonable Foreseeable Projects with Land and Resource Use

Potential effect	Historical Land Use			Representative Current and Future Land Use					Reasonably Foreseeable Projects	
	Mining /exploration (includes Kitsault)	Kitsault Resort (presume inhabited by caretakers for foreseeable future)	Alice Arm (presume inhabited by vacationers in the summer for foreseeable future)	Mining exploration	Transportation and access (local /regional)	Trapping / guide outfitting	Nisga'a Nation hunting, trapping, fishing and other uses	Aboriginal hunting, trapping, fishing and other uses	Northwest Transmission Line Project	Kerr-Sulphurets-Mitchell Copper-Gold Mine
Increased traffic volume changes local ambience	NI	o	o	-	-	o	o	o	-	-

Legend: o - interaction; - - key interaction; + - benefit; NI - no interaction

There is no interaction with any historical land use activities in the area. Key interactions are predicted between mining exploration, local and regional traffic, and two foreseeable future projects: NTL; and KSM. These activities and projects are identified as having a key interaction with the proposed Project because there is the potential for them all to add to the traffic volume along the transportation route and adversely affect the local ambience. Interactions were identified between the Kitsault Resort and Alice Arm, trapping / guide outfitting and Nisga'a Nation and Aboriginal land use. This interaction is based on the possibility that proposed Project traffic may change the local ambience along the transportation route and land use within the local and regional study areas by these groups may be affected by the improved access.

The use of Hwy 37 and Hwy 113 by the proposed Project and reasonably foreseeable projects (including the NTL and KSM Projects) will vary and shift over time and between highways. Table 8.2.9-14 provides a summary of the traffic scenarios, in vehicles per day (vpd) during construction and operations phases along Hwy 37 and Hwy 113 for the proposed Project and the two potentially future foreseeable projects that overlap the Kitsault transportation route. The descriptive labels low (1-50 vehicles per day (vpd)), medium (51-150 vpd), and high (150+ vpd) traffic volumes illustrates the ebb and flow of cumulative traffic associated with these projects. These descriptors are rough representations of daily traffic levels (using the information available at the time of report preparation) for purposes of developing the cumulative effects assessment and are subject to change.

Table 8.2.9-14: Summary of Transportation-Related Traffic Level Scenarios

Project	Transportation-Related Traffic Level Scenarios			
	Construction		Operations	
	Hwy 113	Hwy 37	Hwy 113	Hwy 37
Kitsault	Low	Medium	Low	Low
NTL	High	Low	Low	Low
KSM	n/a	High	n/a	Low

Note: KSM - Kerr-Sulpherets Mitchell Project; NTL - Northwest Transmission Line; n/a - not applicable

Table 8.2.10-14 shows that the medium to high use of the NTL and the proposed Project alternates between Hwy 37 and Hwy 113. Available information indicates that when the proposed Project use of Hwy 113 is low during the construction phase, NTL use is high. The reverse is predicted for Hwy 37, by Cranberry Junction, where medium-level use is anticipated by the proposed Project with a low corresponding use by the NTL Project. The medium-level use of the proposed Project along Hwy 37 may overlap temporally and spatially with the high-level use of the highway by the KSM Project during construction; however, this is largely dependent on if and when these projects are permitted. The worst-case scenario entails the KSM and proposed Project being permitted at the same time resulting in an overlap of construction phases. During the operations phases of these projects, there is low-level of use anticipated for all the projects along both Hwy 37 and Hwy 113, resulting in minimal long-term cumulative traffic effects. The KSM is not anticipated to use Hwy 113.

Along Hwy 37, it is unlikely that the NTL and the KSM Projects will reach historic levels of traffic (observed in 1990 at the height of forestry activities in the region) to support construction activities given that KSM's proposed use of the Port of Stewart for concentrate shipment and mine employees and contracts will be flown to site, limiting the use of Hwy 37 to transportation of supplies and materials.

Table 8.2.9-15 summarises the spatial and temporal overlap between the proposed Project and other potential projects and human actions with land and resource use.

Table 8.2.9-15: Assessment of Spatial and Temporal Overlap Between the Project and Other Projects and Human Actions with Land and Resource Use

	Project / Human Activity	Residual Environmental Effect	Spatial Extent	Duration	Rationale	Cumulative Effect (contribution from Project or Overlap)
Historical land use	Mining and exploration	No historical cumulative overlap				
	Kitsault Resort	No historical overlap. Cumulative overlap based on current and future activities.				
	Alice Arm	No historical overlap. Cumulative overlap based on current and future activities.				

	Project / Human Activity	Residual Environmental Effect	Spatial Extent	Duration	Rationale	Cumulative Effect (contribution from Project or Overlap)
Representative current and future land use	Mining exploration	Traffic volume changes local ambience	Regional	Long-term	Mining exploration in area is expected to continue.	
	Transportation and access	Traffic volume changes local ambience	Regional	Medium-term	Local and tourist traffic is expected to continue.	Increased Project traffic and improved access may add to local/regional traffic (i.e. residents and tourists)
	Trapping and guide outfitting	No residual effect on traffic			Trapping and guide outfitting does not contribute to traffic in area.	May be affected by Project traffic and improved access and other traffic from other human activities/ projects.
	Nisga'a Nation hunting, trapping, fishing and other uses	Increased traffic and use of area	Regional	Long-term	Improved access may increase use of area	Increased Project traffic and improved access may add to Nisga'a Nation land use.
	Aboriginal hunting, trapping, fishing and other uses	Increased traffic and use of area	Regional	Long-term	Improved access may increase use of area	Increased Project traffic and improved access may add to Aboriginal land use.
Reasonably foreseeable projects	Northwest Transmission Line Project	Traffic volume changes local ambience	Regional	Medium-term	NTL Project-related traffic will add to traffic on Hwys 37 and 113	Increased Project traffic and improved access may add to NTL Project-related traffic
	Kerr-Sulpherets Mitchell (KSM) Project	Traffic volume changes local ambience	Regional	Medium-term	KSM Project-related traffic will add to traffic on Hwy 37	Increased Project traffic and improved access may add to KSM Project-related traffic

8.2.9.8.3 Mitigation Measures

Mitigation measures for managing potential cumulative effects associated with increased traffic volume and changes to local ambience along the Kitsault transportation route will be developed in coordination with the other proponents, and, where necessary, Nisga'a Nation, Aboriginal groups, stakeholders, and local, provincial and federal agencies. If warranted, there may be an opportunity for involved parties to develop specific transportation strategies for particular areas within the Kitsault transportation route.

8.2.9.8.4 Potential Residual Cumulative Effects and Their Significance

Tables 8.2.9-16 and 8.2.9-17 summarise the residual cumulative effects, their direction, likelihood, and significance ratings.

Table 8.2.9-16: Summary of Residual Cumulative Effects for Land And Resource Use

Project Phase	Residual Cumulative Effect After Mitigation or Enhancement	Direction	Likelihood of Occurrence
C, O, D/C	Changes to local ambience due to increased traffic along transportation route and road utilisation due to increased volume as projects may overlap.	Negative	Likely

Project phase: C - construction; O - operations; D/C - decommissioning and closure; PC - post-closure

Table 8.2.9-17: Residual Cumulative Effects Assessment on Land and Resource Use by Project Development Phase

Parameter	Current / Future Cumulative Land and Resource Use Effects Without Project	Project Contribution Cumulative Land and Resource Effect	Project Phase
Changes to local ambience due to increased traffic along transportation route			
Effect attribute			
Magnitude	Low	Low	C,O,D/C
Geographic extent	Regional	Regional	
Duration	Long-term	Long-term	
Frequency	Continuous	Continuous	
Reversibility	Yes	Yes	
Direction	Negative	Negative	
Certainty	Low	Medium	
Residual effect significance	Not significant (negligible)	Not significant (negligible)	
Level of confidence	Medium	High	

Project phase: C - construction; O - operations; D/C - decommissioning and closure; PC - post-closure

There will be no residual cumulative effects associated with the Project post closure.

8.2.9.9 Limitations

Limitations for the land and resource use effects assessment are directly associated with the availability of representative land use information. Existing land uses may not necessarily be the same as future land uses and proposed future projects may or not proceed or may change completely depending on the business environment.

8.2.9.10 Conclusion

The residual cumulative effects remaining following implementation of proposed mitigation strategies are associated with increased traffic volume and changes to local ambience along the Kitsault transportation route. The proponent will develop further mitigation strategies and measures in coordination with other potential projects, and upon further consultation with the Nisga'a Nation, Aboriginal groups, stakeholders, and local, provincial and federal agencies. The final outcome may include development of specific transportation strategies for particular areas within the Kitsault transportation route to ensure that all land use interests and potential effects will be sufficiently addressed.

8.3 Summary of Assessment of Potential Social Effects

8.3.1 Summary

As was pointed out in Sections 8.1 and 8.2.1 above, social effects resulting from the proposed Project are often simultaneously both positive and negative. Table 8.3.1-1 presents a summary of the potential residual social effects specific to the proposed Project and their significance. For most effects, an assessment of a 'net' effect is found and evaluated for its significance on that basis. In one case (housing during construction and operations), the effects are bi-directional and essentially cancel each other out, resulting in a not significant (negligible) finding. For the transportation VC during construction and operations, a rating of the effects produces a negative, not significant (moderate) result; however, this will be reversed during decommissioning and closure, which results in a finding of positive and not significant (moderate). In all other cases, the effects on VCs in all phases are rated as either positive or negative at a not significant (minor) level.

From a land use perspective potential residual effects associated with trapping and guide outfitting, which were all rated as not significant (negligible), included: direct loss of hunting area to mine footprint, rated as not significant (negligible); change in local ambience in hunting area and improved access along the transportation route; and potential indirect effect on wildlife populations due to increased hunting pressures and wildlife collisions. Project related traffic and improved access along transportation route was also predicted to have a potential not significant (minor) effect on the local ambience along transportation route and a potential not significant (negligible) effect on improved access and reduced traveling time (which can be considered both a positive and negative effect).

Table 8.3.1-1: Summary of Potential Residual Social Effects Analysis

Valued Components (Note Phase Of Proposed Project)	Potential Effect	Key Mitigation Measures	Potential Residual Effect	Significance Analysis Of Residual Effects (Summary Statement)
Regional demographics C, O	In-migration of job seekers and their dependents	Training programs for unemployed, under employed, changes to employment package	In-migration of job seekers and their dependents	Positive – Not significant (minor)
Regional demographics D/C	Out-migration of job seekers and their dependents	n/a	Out migration of job seekers and their dependents	Negative – Not significant (minor)
Housing C, O	Changes in in- and out-migration affects housing demand and changes the housing market	Work with NLG to minimise in-migration	Changes in in- and out-migration affects housing demand and changes the housing market	Positive and negative, Not significant (negligible)
Housing D/C	Out-migration decreases housing demand and changes the housing market	Work with NLG to minimise in-migration.	Out-migration decreases housing demand and changes the housing market	Negative, Not significant (minor)
Regional services, C, O	Change in traffic volumes to mine site and workforce at mine camp creates new demand on regional services	Work with protective service providers (ambulance, fire responders, police) to incorporate increased traffic, camp operation and population demands into their planning	Change in traffic volumes to mine site and workforce at mine camp creates new demand on regional services	Negative, Not significant (minor)
Regional services, C, O	Population changes associated with in- and out-migration creates new demand on regional services	Work with Northern Health to ensure the Project population demands are incorporated into Health planning and resourcing processes	Population changes associated with in- and out-migration would create new demand on regional services	Negative, Not significant (minor)
Regional services, D/C	Decline in traffic volumes, and workforce and population decreases demand on regional services	Work with protective and health service providers to incorporate decline in population in planning	Change in traffic volumes to mine site and workforce at mine camp would create new demand on regional services	Positive, Not significant (minor)
Regional infrastructure C, O	Population change would alter demand for regional infrastructure	Work with service providers to incorporate increase in population in planning	Population change would alter demand for regional infrastructure	Negetive, Not significant (minor)

Valued Components (Note Phase Of Proposed Project)	Potential Effect	Key Mitigation Measures	Potential Residual Effect	Significance Analysis Of Residual Effects (Summary Statement)
Regional infrastructure D/C	Population loss would alter demand for regional infrastructure	Work with service providers to incorporate decrease in population in planning	Population loss would alter demand for regional infrastructure	Negative, Not significant (minor)
Family and Community Wellbeing, C, O	Income-related effects: decisions on spending disposable income	Promote wise spending decisions. Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault. Provide a flexible rotation schedule. Facilitate communication between the construction workers and their families. Work with local agencies to assist in monitoring community wellbeing and to take corrective actions where appropriate.	Income-related effects: decisions on spending disposable income	Positive, Not significant (minor)
Family and Community Wellbeing, C, O	Influx of workers-related effects: behavioural changes	Promote wise spending decisions. Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault. Provide a flexible rotation schedule. Facilitate communication between the construction workers and their families. Work with local agencies to assist in monitoring community wellbeing and to take corrective actions where appropriate.	Influx of workers-related effects: behavioural changes	Positive, Not significant (minor)

Valued Components (Note Phase Of Proposed Project)	Potential Effect	Key Mitigation Measures	Potential Residual Effect	Significance Analysis Of Residual Effects (Summary Statement)
Family and Community Wellbeing, C, O	Work schedule effects: isolation and separation of workers from families and dependents	Promote wise spending decisions. Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault. Provide a flexible rotation schedule. Facilitate communication between the construction workers and their families. Work with local agencies to assist in monitoring community wellbeing and to take corrective actions where appropriate.	Work schedule effects: isolation and separation of workers from families and dependents	Negetive, Not significant (minor)
Family and Community Wellbeing, C, O	Effects on Aboriginal traditional land and resource use: missing the windows of opportunity for resource harvesting for family consumption or cultural events	Promote wise spending decisions. Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault. Provide a flexible rotation schedule. Facilitate communication between the construction workers and their families. Work with local agencies to assist in monitoring community wellbeing and to take corrective actions where appropriate.	Effects on Aboriginal traditional land and resource use: missing the windows of opportunity for resource harvesting for family consumption or cultural events	Negative, Not significant (minor)
Family and Community Wellbeing, D/C	Loss of jobs and income, and potential out-migration	Work with the community to develop a mine closure plan that identifies strategies and actions to help minimise the potential adverse effects of closing the mine.	Loss of jobs and income, and potential out-migration	Negative, Not significant (minor)

Valued Components (Note Phase Of Proposed Project)	Potential Effect	Key Mitigation Measures	Potential Residual Effect	Significance Analysis Of Residual Effects (Summary Statement)
		Ensure ongoing training opportunities to help residents of the LSA and RSA improve their overall education, and increase their competitiveness and chances to find employment elsewhere.		
Education services, C, O	Changes in in- and out-migration creates demand and changes in school enrolment	Work with school districts to inform school district planning and resourcing processes.	Changes in in- and out-migration creates demand and changes in school enrolment	Negative, Not significant (minor)
		The proponent would require all of its employees to have appropriate educational attainment or the equivalent competencies. Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault.		
Education services, C, O	In-migration creates change in school enrolment	Work with school districts to inform school district planning and resourcing processes.	In-migration creates change in school enrolment	Negative, Not significant (minor)
		The proponent would require all of its employees to have appropriate educational attainment or the equivalent competencies. Preference will be given to candidates with Grade 12 education and to those that are committed to completing their Grade 12 on a part-time basis while working at Kitsault.		

Valued Components (Note Phase Of Proposed Project)	Potential Effect	Key Mitigation Measures	Potential Residual Effect	Significance Analysis Of Residual Effects (Summary Statement)
Education services, D/C	Out-migration creates reduction in school enrolment	The proponent would work with school district to inform school district planning and resourcing processes.	Out-migration creates reduction in school enrolment	Negative, Not significant (minor)
Transportation, C, O	Workers from outside the RSA fly to Terrace and bus to site	Onsite camp and no personal vehicles allowed at site	Workers from outside the RSA fly to Terrace and bus to site	Negative, Not significant (minor)
Transportation, C, O	Project traffic on access roads to the mine site would cause additional wear and tear on access Highroads	Using SUP, the proponent would monitor, maintain, suppress dust and remove snow on FSRs and Alice Arm Road	Project traffic on access roads to the mine site would cause additional wear and tear on access Highroads	Negative, Not significant (minor)
Transportation, C, O	Increased traffic on access routes creates increased dust and risk to motor vehicle safety for users of these roads	Traffic safety protocols, regulatory and cautionary signage and self policing by contractors plus maintenance, dust suppression and snow removal	Increased traffic on access routes creates increased dust and risk to motor vehicle safety for users of these roads	Negative, Not significant (minor)
Transportation, C, O	Increased traffic on access roads would result in motor vehicle-animal collisions	Traffic safety protocols, regulatory and cautionary signage and self policing by contractors plus maintenance, dust suppression and snow removal	Increased traffic on access roads may result in motor vehicle-animal collisions	Negative, Not significant (minor)
Transportation, C, O	Vehicle collisions or driving off the road could result in spills of hazardous and nonhazardous materials	Traffic safety protocols, regulatory and cautionary signage and self policing by contractors plus maintenance, dust suppression and snow removal, and emergency response plan implementation.	Vehicle collisions or driving off the road could result in spills of hazardous and nonhazardous materials	Negative, Not significant (minor)
Transportation, D/C	Decreased traffic would result in fewer motor vehicle-animal collisions and improvements to safety	n/a	Decreased traffic on would result in fewer motor vehicle-animal collisions and improvements to safety	Positive, Not significant (minor)
Land and Resource Use C,O,D/C,PC	Direct loss of hunting area to mine footprint	Limit mine footprint; Reclamation and Closure Plan implementation; ensure ongoing communication with local stakeholders.	Direct loss of hunting area to mine footprint	Negative Not significant (negligible)

Valued Components (Note Phase Of Proposed Project)	Potential Effect	Key Mitigation Measures	Potential Residual Effect	Significance Analysis Of Residual Effects (Summary Statement)
Land and Resource Use C,O,D/C	Change in local ambience in hunting area due to noise, vibration and decreased aesthetics at mine site	Reclamation and Closure Plan implementation; ensure ongoing communication with local stakeholder.	Change in local ambience in hunting area due to noise, vibration and decreased aesthetics at mine site	Negative Not significant (negligible)
Land and Resource Use C,O,D/C	Indirect effect on wildlife populations due to increased hunting pressures and wildlife collisions due to improved access to the area	Implementation of Wildlife Management Plan; Transportation and Access Management Plan.	Indirect effect on wildlife populations due to increased hunting pressures and wildlife collisions due to improved access to the area	Negative Not significant (negligible)
Land and Resource Use C,O,D/C	Change in local ambience along transportation route due to increased noise, vibration and decreased visual quality associated with traffic volume	Implementation of Transportation and Access Management Plan.	Change in local ambience along transportation route due to increased noise, vibration and decreased visual quality associated with traffic volume	Negative Not significant (minor)
Land and Resource Use C,O,D/C	Improved access and reduced traveling time to existing and potential land use activities/businesses	Implementation of Transportation and Access Management Plan; ensure ongoing communication with local stakeholders.	Improved access and reduced traveling time to existing and potential land use activities/businesses	Negative or Positive Not significant (negligible)

Project phase: C - construction; O - operations; D/C - decommissioning and closure; PC - post-closure

Note: n/a - not applicable

Because proposed Project effects for all phases were already assessed in the context of current and forecast economic activity in the study area, which includes the LSA and the RSA, no further assessment of cumulative effects is required. In addition, the residual effects are very small, there is good existing capacity in the RSA and the Project contribution to cumulative effects is unlikely to be detectable. This, and the lack of VC specific effects data from potentially overlapping projects, means it is impractical to conduct a cumulative effects assessment for social effects. The assessments of significance of Project contributions to cumulative effects are indistinguishable from effects specific to the proposed Project.

Table 8.3.1-2: Summary of Potential Residual Cumulative Social Effects Analysis

Valued Components	Potential Cumulative Effect	Key Mitigation Measures	Potential Residual Cumulative Effect	Significance Analysis Of Cumulative Effects (Summary Statement)
Land and Resource Use C,O,D/C	Changes to local ambience due to increased traffic along transportation route	Implementation of Transportation and Access Management Plan; ensure ongoing communication with local stakeholders	Changes to local ambience due to increased traffic along transportation route	Not significant (negligible)

Project phase: C - construction; O - operations; D/C - decommissioning and closure; PC - post-closure

Note: n/a - not applicable