Section 14.0

Nisga'a Effects Assessment

TABLE OF CONTENTS

14.0 NISGA'A EFFECTS ASSESSMENT 14-1
14.1 Overview 14-1
14.2 Incorporation of Nisga'a Input into Project Design and Assessment 14-2
14.2.1 Process 14-3
14.2.2 Project Design 14-3
14.2.3 Baselines and Work Plans 14-3
14.2.4 Valued Component Selection 14-3
14.2.5 Effects Prediction 14-4
14.2.6 Development of Mitigation 14-4
14.2.7 Consideration of Alternatives 14-4
14.3 Economic Effects 14-5
14.3.1 Overview 14-5
14.3.2 Mitigation Measures and Commitments 14-5
14.3.3 Employment Opportunities 14-8
14.3.4 Contract and Business Opportunities 14-14
14.3.5 Income 14-16
14.3.6 Unemployment Rates 14-18
14.3.7 Labour Force Qualifications 14-21
14.3.8 Links to Nisga'a Rights and Interests 14-24
14.4 Social Effects 14-25
14.4.1 Overview 14-25
14.4.2 Demographics 14-25
14.4.2.1 Out-migration Scenario 14-26
14.4.2.2 In-Migration Scenario 14-29
14.4.2.3 Mitigation Measures 14-29
14.4.3 Housing 14-30
14.4.3.1 LSA 14-30
14.4.3.1.1 Out-Migration Scenario 14-30
14.4.3.1.2 In-Migration Scenario 14-30
14.4.3.2 RSA 14-31
14.4.3.3 Mitigation Measures 14-32
14.4.4 Regional Services 14-33
14.4.4.1 Out-Migration Scenario 14-33
14.4.4.2 In-Migration Scenario 14-33
14.4.4.3 Mitigation Measures 14-34
14.4.5 Regional Infrastructure 14-34
14.4.5.2 Mitigation Measures 14-35
14.4.6 Educational Services 14-36
14.4.6.1 Net Out-Migration Scenario 14-36
14.4.6.2 Net In-Migration Scenario 14-36
14.4.6.3 Mitigation Measures 14-37
14.4.7 Links to Nisga'a Rights and Interests 14-37
14.5 Cultural Effects 14-38
14.5.1 Overview 14-38
14.5.2 Schedule-related Effects 14-41
14.5.3 Diet-related Effects 14-43
14.5.4 Language-based Effects 14-43
14.5.5 Camp Environment 14-44
14.5.6 Income-Related Effects 14-44
14.5.7 Access-related Effects 14-45
14.5.8 Land-based Effects 14-45
14.5.9 Migration-related Effects 14-46

14.5.10 Summary 14-46
14.5.11 Mitigation Measures 14-50
14.5.12 Potential Residual Effects and Their Significance 14-53
14.5.13 Cumulative Effects Assessment 14-55
14.5.13.1 Rationalisation for Carrying Forward Project Related Residual Effects Into the Cumulative Effects Assessment 14-55
14.5.13.2 Interaction Between Nisga'a Culture and Other Past, Present or Future Projects / Activities 14-56
14.5.13.3 Identification of Potential Cumulative Effects 14-58
14.5.13.4 Mitigation Measures 14-62
14.5.13.5 Potential Residual Cumulative Effects and Their Significance 14-63
14.5.13.6 Limitations 14-64
14.5.13.7 Conclusion 14-64
14.6 Archaeological Effects 14-64
14.7 Human Health 14-65
14.7.1 Public Health 14-65
14.7.2 Healthy Living 14-67
14.7.3 Worker Safety 14-67
14.8 Land Use Effects 14-69
14.8.1 Overview 14-69
14.8.2 Land Use Area 14-70
14.8.3 Increased Accessibility 14-71
14.8.4 Resource Availability 14-71
14.8.4.1 Overview 14-71
14.8.4.2 Wildlife Resources 14-71
14.8.4.2.1 Moose 14-71
14.8.4.2.2 Grizzly Bear 14-73
14.8.4.2.3 Mountain Goat 14-75
14.8.4.2.4 American Marten 14-76
14.8.4.3 Fish Resources 14-77
14.8.4.3.1 Overview 14-77
14.8.4.3.2 Exclusions 14-77
14.8.4.3.3 Dolly Varden 14-77
14.8.4.3.4 Coho Salmon 14-81
14.8.4.3.5 Rainbow Trout 14-82
14.8.4.4 Marine Resources 14-84
14.8.4.5 Vegetation Resources 14-84
14.8.4.5.1 Overview 14-84
14.8.4.5.2 Large Cedar Model 14-85
14.8.4.5.3 Pine Mushroom 14-85
14.8.4.5.4 Medicinal Plants 14-85
14.8.4.5.5 Edible Berry-Producing Plants 14-85
14.8.4.5.6 Mitigation Measures and Residual Effects 14-85
14.8.4.5.7 Links to Nisga'a Rights and Interests 14-86
14.8.4.6 Water Resources 14-86
14.8.5 Aesthetics 14-88
14.8.5.1 Overview 14-88
14.8.5.2 Air Quality 14-88
14.8.5.3 Noise 14-88
14.8.5.4 Visual Quality 14-89
14.8.6 Transportation 14-90
14.8.6.1 Wildlife 14-90
14.8.6.2 Fisheries 14-91

14.8.6.3 Access 14-91
14.8.6.4 Grease Trail 14-92
14.8.6.5 Human Safety 14-92

List of Tables

Table 14.2.1-1: Summary of Disciplines and Valued Components relevant to Nisga'a Nation ... 14-1
Table 14.3.2-1: Proponent Action to Reduce Nisga'a Barriers to Employment ... 14-7
Table 14.3.3-1: Direct Employment of Local and Regional Residents During Construction, Operations, and Closure, by Community ... 14-9
Table 14.3.3-2: Nisga'a Respondent Interest in Mine Employment During Construction ... 14-9
Table 14.3.3-3: Nisga'a Respondent Interest in Mine Employment During Operations ... 14-10
Table 14.3.3-4: Nisga'a Respondent Reasons for Low-level Interest in Mine Employment during Construction ... 14-11
Table 14.3.3-5: Nisga'a Respondent Reasons for Low-level Interest in Mine Employment during Operations ... 14-11
Table 14.3.3-6: Perceived Barriers to Employment among Nisga'a Respondents ... 14-12
Table 14.3.3-7: Perceived Limitations to Employment Among Nisga'a Respondents ... 14-12
Table 14.3.3-8: Perceived Effects of Employment Among Nisga'a Respondents ... 14-13
Table 14.3.5-1: Average Wages and Salaries Per Person-Year of Direct, Indirect and Induced Employment ... 14-17
Table 14.3.6-1: Reasons for Lack of Interest in Construction Employment among Unemployed Nisga'a Respondents ... 14-20
Table 14.3.6-2: Reasons for Lack of Interest in Operation Employment among Unemployed Nisga'a Respondents ... 14-20
Table 14.3.7-1: Level of Education Received Among Unemployed Nisga'a Respondents ... 14-23
Table 14.3.7-2: Type of Skills Among Unemployed Nisga'a Respondents ... 14-23
Table 14.4.2-1: Main Reasons for Staying or Moving for Nisga'a Respondents Living on and off Nisga'a Lands in Scenarios With or Without the Mine ... 14-28
Table 14.5.1-1: Summary of Types of Effects on Nisga'a Culture ... 14-39
Table 14.5.2-1: Summary of Effects of Remote Job on Nisga'a Harvesting ... 14-42
Table 14.5.2-2: Summary of Effects of Remote Job on Nisga'a Cultural Activities ... 14-42
Table 14.5.4-1: Summary of Nisga'a Place Names (as defined in the NFA) ... 14-44
Table 14.5.10-1: Potential Direct Project Effects On Nisga'a Culture ... 14-48
Table 14.5.10-2: Summary of Potential Interaction Between Project Direct Effects on Other Valued Components and Nisga'a and Aboriginal Culture ... 14-49
Table 14.5.11-1: Mitigation Options Related to Potential Project on Nisga'a Culture ... 14-50
Table 14.5.11-2: Nisga'a Preferences for Camp and Schedule Provisions in Employment Consideration ... 14-52
Table 14.5.12-1: Summary of Residual Effects for Nisga'a and Aboriginal Culture ... 14-54
Table 14.5.12-2: Residual Effects Assessment by Project Development Phase for Nisga'a and Aboriginal Culture ... 14-55
Table 14.5.13-1: Project Related Residual Effects - Rationale for Carrying Forward Into the Cumulative Effects Assessment ... 14-56
Table 14.5.13-2: Assessment of Interaction Between Other Projects, Human Activities and Reasonable Foreseeable Projects with Nisga'a and Aboriginal Culture ... 14-57
Table 14.5.13-3: Overlapping Kerr-Sulphurets-Mitchell Copper / Gold Mine Project, Northwest Transmission Line, and Kitsault Project Components ... 14-59
Table 14.5.13-4: Potential Cumulative Effect by Project Phase on Nisga'a and Aboriginal Culture and Mitigation Measures ... 14-62
Table 14.5.13-5: Residual Cumulative Effects Assessment on Nisga'a and Aboriginal Culture by Project Development Phase ... 14-63
Table 14.8.1-1: Potential Project Effects on Nisga'a Final Agreement Rights ... 14-70

Table 14.8.2-1: Nisga'a Final Agreement Areas Lost Compared to Total Nisga'a Final Agreement Area 14-70
Table 14.8.4-1: Summary of Residual Effects for Hydrology 14-87

List of Figures

Figure 14.3.4-1: Distribution of Regional Purchases of Goods and Services Among Communities in the Regional Study Area and Local Study Area (2012 to 2051) 14-15
Figure 14.3.5-1: Distribution of Total Project-Related Labour Income Among Communities in the Regional Study Area and Local Study Area (2012 to 2040) 14-18
Figure 14.3.6-1: Level of Interest Among Unemployed Nisga'a Respondents During Construction and Operations 14-19
Figure 14.3.7-1: Level of Qualification among Nisga'a Survey Respondents for Construction Employment 14-22
Figure 14.3.7-2: Level of Qualification Among Nisga'a Survey Respondents for Operation Employment 14-22
Figure 14.4.2-1: Likelihood of In- or Out-Migration Among Nisga'a Respondents Living off Nisga'a Lands With or Without the Mine 14-26
Figure 14.4.2-2: Likelihood of In- or Out-Migration Among Nisga'a Respondents Living on Nisga'a Lands With or Without the Mine 14-27
Figure 14.4.3-1: Housing Availability in the Regional Study Area During Construction and Operations 14-32
Figure 14.5.1-1: Flowchart of Effects on Nisga'a Culture 14-41
Figure 14.7.3-1: WorkSafeBC Insurance Base Rates for Construction and Operations Employment-Related Risk 14-68

14.0 NISGA'A EFFECTS ASSESSMENT

14.1 Overview

The Application Information Requirements (AIR) for the proposed Kitsault Mine Project (proposed Project) includes plans for the assessment of proposed Project-related effects on Nisga'a citizens and Nisga'a Lands related to social, economic, and cultural aspects of Nisga'a society during construction, operations, and closure and post-closure phases as set out in Chapter 10 (paragraph 8) of the Nisga'a Final Agreement (NFA) (British Columbia Ministry of Aboriginal Relations and Reconciliation (BC MARR) 2000). This section summarises key discussions, results, and outcomes of the assessment of biophysical, social, and economic effects in Sections 6 to 10 relevant to Nisga'a interests, rights, values, concerns, and issues as raised during consultation activities. Section 13.0 provides background and baseline information for the Nisga'a Nation setting, which informs the nature, scope, and scale of effects related to the proposed Project on the Nisga'a Nation, its citizens, and lands. Table 14.2.1-1 provides a summary of the applicable disciplines and Valued Components (VCs) that are summarised and discussed in this section vis-à-vis the Nisga'a Nation. This section also provides a summary of the incorporation of Nisga'a input into the design and assessment of the proposed Project, including VC selection, effects prediction, development of mitigation, and consideration of alternatives.

Table 14.2.1-1: Summary of Disciplines and Valued Components relevant to Nisga'a Nation

Discipline (Section of the Application)	Valued Component(s)
Economic (Section 7.0)	1) Employment Opportunities 2) Contract and Business Opportunities 3) Income Generated 4) Unemployment Rates 5) Training and Education
Social (Section 8.0)	1) Regional Demographics 2) Housing 3) Regional Services 4) Regional Infrastructure 5) Family and Community Wellbeing 6) Educational Services
Cultural	Related to 1) Schedule 2) Work environment 3) Income 4) Food 5) Language 6) Traffic 7) Land 8) Migration
Heritage (Section 9.0)	1) Archaeological 2) Heritage Sites

Discipline (Section of the Application)	Valued Component(s)
Human Health (Section 10.0)	1) Public Health 2) Healthy Living 3) Worker Safety
Land Use (Sections 6.2, 6.3, 6.5, 6.7, 6.8, 6.10, 6.11, and 6.12)	1) Land use area 2) Accessibility 3) Resource availability (wildlife, fish, vegetation, marine biota, and water) 4) Aesthetics (air, noise, and visual) 5) Transportation

Avanti Kitsault Mine Ltd.'s (proponent) and its consultants worked with NLG to collect and compile social, and cultural information to supplement the statics from Census Canada and desk-based research and sources. This section includes results from the household and business surveys contained in the Nisga'a Social, Economic, Resource Use, and Cultural Survey (ESCIA - Rescan 2012) to support determination of effects and development of locally-relevant mitigation measures. The methods of the survey are described in more detail in Section 13.1.2. The results of the effects assessments are also informed by desk-based research of the Nisga'a Nation (including a detailed review of the NFA and Nisga'a Lisims Government (NLG) publications), and, as such, provide limited site-specific information about the location, seasons, level and type of Nisga'a Nation social, cultural, economic, health, and land use, and access rights, interests, and issues related to the proposed Project.

There are key differences between the sets of data supporting Nisga'a-specific effects. In particular, the results of Section 7.0 and 8.0 are based on the results of the BC Input-Output Model (BCIOM) and input from the proponent based on typical experiences in the mining sector, an economic model with input from 2006 Canada Census data on a regional and provincial scale. On the other hand, the Nisga'a surveys contains more recent data on local and regional levels, specific to the existing conditions of Nisga'a citizens residing on and off Nisga'a Lands. Both sets of data are important to understanding the overall and specific social and economic effects of the proposed Project on Nisga'a citizens, economy, and communities. The Nisga'a survey results allow for more refined understanding and perspective on social and economic effects determined by the BCIOM.

14.2 Incorporation of Nisga'a Input into Project Design and Assessment

The AIR requires that the proponent's Application for an Environmental Assessment Certificate for the proposed Project, made under section 16 of the British Columbia *Environmental Assessment Act* (Application) will describe where and how Nisga'a Nation input is incorporated into the design and management of the proposed Project, including its contribution to selecting VCs, predicting effects, determining mitigation measures and considering alternatives. This section describes the proponent's efforts to engage the

Nisga'a Nation at various stages of the pre-Application process and the resulting changes to proposed Project design or assessment.

14.2.1 Process

The Nisga'a Nation provided feedback on the proponent's approach of going through the *Mines Act* (Government of British Columbia (BC) 1996b) permitting process for proposed Project. The Nisga'a Nation indicated that it did not support the *Mines Act* permitting process because of legacy issues related to the previous permit that created potential for negative reaction from Nisga'a constituents, as well as Nisga'a concerns about BC Ministry of Energy and Mines' (BC MEM) lack of environmental expertise and objectivity in the Environmental Assessment (EA) process. Based on the response from the Nisga'a Nation, the proponent (after some deliberation) decided to voluntarily opt into the BC EA process because it is more familiar to the Nisga'a Nation and could harmonise with the requirements of Canadian Environmental Assessment Agency (Agency).

14.2.2 Project Design

The proponent provided NLG with a copy of the preliminary feasibility study in 2008 and feasibility study in January 2011. These reports were provided in order to increase Nisga'a Nation understanding of the proposed Project design and associated processes.

14.2.3 Baselines and Work Plans

The proponent provided the Nisga'a Nation with copies of interim biophysical, social, and economic baseline reports in June 2010 for its information and review. The Nisga'a Nation and its environmental consultants (LGL Limited (LGL)) were also provided with copies of the 2011 environmental work plans, for which LGL developed responses. In general, LGL raised issues about length of reclamation related to vegetation communities, inclusion of the Illiance River in the hydrology study area, groundwater and surface water stations on the lower Illiance River, water quality sampling frequency and intensity, turbidity levels in Alice Arm, details of the vegetation inventory, map scale for vegetation inventory, rare plant identification, inclusion of coastal tailed frogs and moose as VCs, wildlife survey and tissue sampling, inclusion of Nisga'a fishing and hunting interests, large red cedar inventory, compensation measures for habitat loss, and acid rock drainage and metal leaching site-specific criterion. These were considered and incorporated by the proponent with responses to NLG / LGL comments.

14.2.4 Valued Component Selection

The draft AIR contained the proponent's proposed VCs for each discipline for consideration and input by NLG during the public comment period. NLG recommended the addition of several VCs to the proposed Project assessment, including moose and Yellow / Red cedar for consideration in the Application. These were incorporated and discussed in the Application (Section 6.11.9 - Moose and Section 6.10.7 - Cultural Plants) and summarised in this section (Part C - Section 14.0). NLG also suggested inclusion of coastal tailed frog as a

VC; however, no coastal tailed frogs were found during field survey, and, as such, were not included in the assessment of effects related to the proposed Project.

14.2.5 Effects Prediction

Nisga'a Nation input into and direction on effects prediction has been mainly focused on the social, economic, and cultural disciplines. In November 2010, NLG provided the proponent with the Economic, Social and Cultural Impact Assessment (ESCIA) Guidelines to fulfill Chapter 10 (paragraph 8(f)) of the NFA, from which a Work Plan was developed between and agreed upon by NLG, the proponent, its consultants, the province, and federal agencies. Household and business surveys were conducted in the summer and fall of 2011 in the four Nisga'a Villages and Nisga'a Urban Locals (NULs), including Prince Rupert, Terrace, and Vancouver. The results of the surveys are included in the subsequent sections to support determining social and economic effects and developing locally-relevant mitigation measures.

Furthermore, in a meeting with the proponent and the Fisheries and Oceans Canada (DFO) on 29 June 2011, the Nisga'a Nation provided input on the effects of the proposed Project related to fish in Lime Creek, which was considered and incorporated into assessment of fisheries effects.

14.2.6 Development of Mitigation

In the meeting with the proponent and the DFO on 29 June 2011, the Nisga'a Nation also provided feedback on the preliminary fisheries compensation plan by suggesting and stating its preferences for compensation locations and target species. The Nisga'a Nation indicated the importance of preserving and enhancing chum population in the Kitsault River. This suggestion has been incorporated into the Fisheries Habitat Compensation Plan (FHCP) (Appendix 11.2-A).

14.2.7 Consideration of Alternatives

In several meetings with the proponent (18 November 2008, 4 February 2010, 13 April 2010, 20 May 2010, and 19 November 2010), the proponent provided alternative assessment reports completed by Knight Piésold Consulting (Knight Piésold), and sought Nisga'a Nation feedback on the tailings options. The Nisga'a Nation commented on its preferred Tailings Management Facility (TMF) options and concerns / issues each option. The Nisga'a Nation indicated their preference to avoid the destruction of fish habitat if possible.

The proponent has also offered for Nisga'a consideration the road option from Gitwinsihlkw as an enhancement measure. This would reduce Nisga'a employee travel by 50 kilometres (km) per day. It is on Nisga'a Lands, and, as such, the proponent has suggested that Nisga'a would lead this project with funding from the proponent.

14.3 Economic Effects

14.3.1 Overview

This section provides a summary of the economic effects relevant to the Nisga'a Nation discussed in detail in Section 7.0. The assessment evaluated effects related to the proposed Project on local, regional, and provincial economies, including nine VCs, including:

1. Provincial economy and government revenue.
2. Regional employment and income.
3. Employment opportunities.
4. Contract and business opportunities.
5. Labour income generated.
6. Local unemployment rates and trends.
7. Employment and economic diversification.
8. Labour force qualifications.
9. Regional government finances.

Based on Nisga'a interests and issues raised during consultation activities with the Nisga'a Nation and NFA rights, VCs 3 to 6 and 8 will be summarised in the following sections. VCs 1, 2, 7, and 9 contain discussions on a regional and provincial level and, as such, do not contain Nisga'a-specific information.

There are two spatial boundaries used in Sections 7.0 and 8.0 of the Application. The Local Study Area (LSA) is comprised of the four Nisga'a Villages (i.e., Gingolx, Laxgalts'ap, Gitwinksihlkw, and Gitlaxt'aamiks). The Regional Study Area (RSA) is defined to include four distinct regions and major communities:

- The District Municipality (DM) of Stewart (located in the Kitimat-Stikine Regional District Electoral Area (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 Census Agglomeration (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.

14.3.2 Mitigation Measures and Commitments

There are several broad commitments made by the proponent in Section 7.0 that are common to all Nisga'a-relevant VCs, including discussions with NLG about strategies and

approaches,, development of a Recruitment, Training, and Employment Plan (Section 11.2.15),, and a mine closure plan. To avoid redundancy in the subsequent sections, the measures and plans are described here.

The proponent is committed to local hiring, training, and procurement. The proponent has offered to work with NLG to enhance employment, business, and contract benefits, especially given the low numbers typical for similar mining projects and used to run the BCIOM. No details have been discussed between the proponent and NLG to date, but it is anticipated that the these discussions would inform the proponent's commitments to providing Nisga'a citizens in the LSA with employment and training, and providing Nisga'a Nation businesses and contractors with opportunities to participate in all Project phases. The commitments may include development of training and hiring strategy that would provide Nisga'a citizens and contractors with increased opportunities to participate in the proposed Project. Implementation of these measures would assist in improving the capacity and qualifications of the Nisga'a labour force in the LSA and RSA. Consequently, the potential proposed Project effects identified in the subsequent sections should be considered conservative with respect to the extent of proposed Project effects on employment, business and contracts, income, and unemployment in the LSA. That is, the proponent is confident that discussions with NLG will increase the level of Nisga'a economic participation, including more direct Nisga'a hires at the mine site, increased business and contracts, greater total labour income generated, and lower Nisga'a unemployment rates than predicted in the assessment in Section 7.0.

The estimates of local and regional employment during construction and operations are based on development and implementation of a Recruitment, Training, and Employment Plan (Section 11.2.15) that will provide opportunities for Nisga'a residents of the LSA and the RSA to take the training required to gain employment on the proposed Project. The proponent has committed to developing a Recruitment, Training and Employment Plan (Section 11.2.15) that will address:

- Preferential hiring policy favouring qualified Nisga'a Nation, Aboriginal, and local workers;
- Local training and education programs;
- Support for future economic opportunities in the region;
- A safe work environment for employees and contractors;
- Respect for cultural and regional diversity;
- Demonstrated fairness in all employment and business practices; and
- Upholding ethical conduct as a core value and belief.

Key elements of the Recruitment, Training and Employment Plan (Section 11.2.15) include developing a comprehensive human resources strategy that establishes policies and processes for maximising Nisga'a and Aboriginal employment through all aspects of the proposed Project. The strategy will also address training and education, including

scholarships, apprenticeships and on-the-job training. Particular attention will be paid to creating an inclusive and positive work place including consideration of hiring an Aboriginal Employment Coordinator (or similar), creating a Kitsault mine recruitment network, providing scholarships and on-the-job-training for recruits, having flexible housing and work schedules, establishing an Aboriginal Advisory Committee, and making a full commitment to ongoing monitoring and evaluation.

This approach and strategy is confirmed by the results of the Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012), which measures how the proponent could minimise barriers to employment. Based on survey results, almost a third of Nisga'a respondents indicated providing training and education, followed by 10.4 percent (%) of Nisga'a respondents suggesting offering different or flexible scheduling.

Table 14.3.2-1: Proponent Action to Reduce Nisga'a Barriers to Employment

		Count	% of Responses	% of Cases
1	Provide transportation	18	6.0	7.0
2	Provide training / education	89	29.9	34.6
3	Environmental hazards / pollution	13	4.4	5.1
4	Offer a good salary/benefits	13	4.4	5.1
5	Help with family	16	5.4	6.2
6	My age / too old / retired	13	4.4	5.1
7	Not interested	14	4.7	5.4
8	Oppose / dislike mines	10	3.4	3.9
9	Provide jobs / hire me	23	7.7	8.9
10	Offer different schedules / flexible time off	31	10.4	12.1
11	Provide accommodations / daycare	28	9.4	10.9
12		2	.7	.8
95	Other	30	10.1	11.7
Total		**298**	**100.0**	**116.0**

Note: Percent of cases is based on 257 valid cases (107 missing cases)
Total Pct of Cases exceeds 100% due to multiple responses
% - percent

Source: Rescan 2012

Nearly all of the employment opportunities for Nisga'a citizens of the LSA and RSA would cease during decommissioning and closure. It is not possible to establish a list of specific mitigation actions at this time that will ultimately prove to be effective, given that closure would occur nearly 20 years into the future. However, the proponent will commit to working with the affected communities and government agencies to develop a mine closure plan that includes a strategy for buffering the effects of eventually losing mine-related jobs. Elements of the Recruitment, Training and Employment Plan (Section 11.2.15) could include

continuing to offer skills upgrading to workers to provide them with the capacity to find other non-mining jobs after mine closure, assistance in developing other sustainable business opportunities, and work with other regional employers to find new jobs for mine employees.

14.3.3 Employment Opportunities

The proposed Project is expected to have a potential beneficial effect on the LSA by providing direct employment opportunities to Nisga'a citizens in the LSA. Overall, the proposed Project is anticipated to generate a total of 1,200 Person Years (PYs) of direct employment during the 25-month construction phase, 300 PYs during operations, and 51 PYs during decommissioning and closure, after which there would be no direct employment with the proposed Project during post-closure. A portion of the total direct employment opportunities is expected to occur in the LSA and RSA. The regional construction employment would conservatively represent 10% of the total direct employment (120 PYs), 20% during operations (60 PYs), and 67% during decommissioning and closure (34 PYs).

Based on the results of the BCIOM, the proposed Project is expected to generate (at a minimum) 10 direct Nisga'a hires in 2012 and 14 Nisga'a hires in 2013 in the LSA during the construction phase. During operations, direct employment of Nisga'a citizens in the LSA is anticipated to be 24 over the 16-year mine life. At closure, the number of jobs generated by the proposed Project for Nisga'a citizens in the LSA is expected to decline to five in 2030, five in 2031, four in 2032, and two from 2033 to 2046.

The LSA includes only the four Nisga'a Villages; however, there are NULs residing in Terrace, who are expected to be a part of the proponent's hiring targets for the Terrace CA. The proponent anticipates that 50% of the Terrace CA hires will be Nisga'a citizens (i.e., 36 PYs during construction, 12 PYs during operations, 8 PYs during closure, and none during post-closure). As such, the total Nisga'a expected employment from both the LSA and Terrace at the proposed Project is 60 PYs during construction, 36 PYs during operations, and 24 PYs during closure. Over life of the proposed Project, there is an anticipated 120 PYs for Nisga'a citizens living on and off Nisga'a Lands. Table 14.3.3-1 provides a summary of the predicted local and regional Nisga'a employment during the phases of the proposed Project.

These employment numbers exclude indirect and induced employment from business and contract opportunities (discussed in Section 14.3.4). NULs also reside in Prince Rupert, which was excluded from the RSA; however, NULs are amalgamated with the provincial hire figures. The rationale for this exclusion is that in the absence of the marine transportation related to the proposed Project:

- The distance from Prince Rupert to Kitsault is greater compared to the Nisga'a Villages and Terrace where most of the services will be sources;
- The mix of businesses and services in Prince Rupert does not align well with what is required during construction and operations.

Table 14.3.3-1: Direct Employment of Local and Regional Residents During Construction, Operations, and Closure, by Community

Population Segment	Construction		Operations	Closure	Post-Closure
	2012	2013			
LSA	10	14	24	16	0
RSA	38	58	36	17	0
DM of Stewart	0	0	0	0	0
Kitimat-Stikine RDEA B	7	11	12	0	0
Town of Smithers	2	4	0	0	0
Terrace CA – Nisga'a	14.5	21.5	12	8.5	0
Terrace CA – Non-Nisga'a	14.5	21.5	12	8.5	0
Nisga'a Total	**25**	**35**	**36**	**24.5**	**0**
Regional Total	**48**	**72**	**60**	**33**	**0**

Note: CA - Census Agglomeration; DM - District Municipality; LSA - Local Study Area; RDEA - Regional District Electoral Area; RSA - Regional Study Area; % - percent

The Nisga'a Social, Economic, Resource Use and Cultural Survey (Rescan 2012), conducted among Nisga'a citizens on and off Nisga'a Lands provides insight into the level of interest among Nisga'a citizens in working at the mine during construction and operations phases of the proposed Project. Among the 405 total Nisga'a respondents, 41 indicated that they are retired, so the results are based on 364 respondents who are currently employed or unemployed. Table 14.3.3-2 summarises the responses of employable Nisga'a respondents in terms of their interest in participating in construction-related employment, and Table 14.3.3-3 summarises the interest in operations-related employment. There are minor changes in interest levels from construction to operations, and many of Nisga'a respondents have a low-level of interest in employment at the proposed Project (46.9% for construction and 44.2% for operations). However, there are a total of 149 Nisga'a respondents (41.8%) who have a moderate to very high interest in construction employment, and 160 respondents (44.8%) who expressed an interest in operations employment. Based on the survey results, the Nisga'a interest level is comparable to the predicted Nisga'a construction, operations, and closure employment levels (i.e., 120 PYs). The number of Nisga'a survey respondents represents approximately 10% of the total Nisga'a population (on and off Nisga'a Lands), so it is recognised that there may be additional Nisga'a interest in mine-related employment.

Table 14.3.3-2: Nisga'a Respondent Interest in Mine Employment During Construction

		Count	Percent
1	Not At All	123	34.6
2		20	5.6
3		24	6.7
4		40	11.2

		Count	Percent
5		42	11.8
6		25	7.0
7	Very Interested	82	23.0
Total		**356**	**100.0**

Note: 8 missing cases: 6 no response, 2 don't know
Source: Rescan 2012

Table 14.3.3-3: Nisga'a Respondent Interest in Mine Employment During Operations

		Count	Percent
1	Not At All	119	33.3
2		16	4.5
3		23	6.4
4		39	10.9
5		51	14.3
6		24	6.7
7	Very Interested	85	23.8
Total		**357**	**100.0**

Source: Rescan 2012-03-27

The top three reasons for Nisga'a respondents' low-level interest in construction employment at the proposed Project are satisfaction with current employment (21.7%), family situation and responsibilities (17.9%), and work away from home in camp (12.8%). The responses for lack of interest in operations employment are similar to the responses for construction. Tables 14.3.3-4 and 14.3.3-5 provide summaries of the rationale given by Nisga'a respondents related to their lack of interest in mine-related employment during construction and operations.

Table 14.3.3-4: Nisga'a Respondent Reasons for Low-level Interest in Mine Employment during Construction

		Count	% of Responses	% of Cases
1	Happy with current employment	81	21.7	40.5
2	Family situation / responsibilities	67	17.9	33.5
3	Not looking for employment	38	10.2	19.0
4	Type of work involved	46	12.3	23.0
5	Work away from home in camp	48	12.8	24.0
6	Hours	9	2.4	4.5
7	Physical or mental disability	21	5.6	10.5
8	I am retired	6	1.6	3.0
9	Attending school	27	7.2	13.5
10	Oppose mining	25	6.7	12.5
95	Other	6	1.6	3.0
Total		**374**	**100.0**	**187.0**

Note: Percent of Cases is based on 200 valid cases (7 missing cases)
Total Percent of Cases exceeds 100% due to multiple responses
% - percent

Source: Rescan 2012

Table 14.3.3-5: Nisga'a Respondent Reasons for Low-level Interest in Mine Employment during Operations

		Count	% of Responses	% of Cases
1	Happy with current employment	77	21.3	40.5
2	Family situation / responsibilities	62	17.2	32.6
3	Not looking for employment	38	10.5	20.0
4	Type of work involved	36	10.0	18.9
5	Work away from home in camp	52	14.4	27.4
6	Hours	10	2.8	5.3
7	Physical or mental disability	22	6.1	11.6
8	I am retired	7	1.9	3.7
9	Attending school	25	6.9	13.2
10	Oppose mining	24	6.6	12.6
95	Other	8	2.2	4.2
Total		**361**	**100.0**	**190.0**

Note: Percent of Cases is based on 190 valid cases (7 missing cases)
Total Percent of Cases exceeds 100% due to multiple responses
% - percent

Source: Rescan 2012

Aside from levels of interest among Nisga'a survey respondents, the Nisga'a Social, Economic, Resource Use and Cultural Survey (Rescan 2012) also measures the perceived barriers to accessing employment opportunities related to the proposed Project. Table 14.3.3-6 summarises the responses of Nisga'a citizens on different types of barriers. The three main barriers to employment are considered to be family and household situations (33.2%), current employment status (29.9%), resource harvesting activities (29.2%), and cultural activities / events (29.2%). Fewer respondents consider health / disability, location of the mine, work experience, skill level, and education level as barriers to employment at the mine.

Table 14.3.3-6: Perceived Barriers to Employment among Nisga'a Respondents

Barrier to Employment	Small Barrier		Neutral		Large Barrier		Total
	Freq	%	Freq	%	Freq	%	
Location of mine	169	44.6	108	28.5	102	26.9	379
My family / household situation	146	38.2	109	28.5	127	33.2	382
My community / social commitments	140	36.8	135	35.5	105	27.6	380
My health / disability	235	61.0	71	18.4	79	20.5	385
My work experience	177	46.1	136	35.4	71	18.5	384
My skill level	183	47.5	141	36.6	61	15.8	385
My education level	181	47.0	138	35.8	66	17.1	385
My current employment status	189	49.2	80	20.8	115	29.9	384
My cultural activities / events	150	39.2	121	31.6	112	29.2	383
My resource harvesting activities	156	40.7	115	30.0	112	29.2	383

Note: Freq - frequency; % - percent
Source: Rescan 2012

Nisga'a survey respondents were also asked what their perceived main limitations with regard to employment at the mine, which included lack of training / education (26.4%), family (14.4%), and health / disability (11.7%). Table 14.3.3-7 summarises the types of limitations that Nisga'a employees may face in accessing mine-related employment.

Table 14.3.3-7: Perceived Limitations to Employment Among Nisga'a Respondents

		Count	% of Responses	% of Cases
1	Transportation	25	6.8	7.4
2	Lack of training / education	97	26.4	28.6
3	My health / disability	43	11.7	12.7
4	Current employment	24	6.5	7.1
5	My family	53	14.4	15.6
6	My age / too old / retired	43	11.7	12.7

		Count	% of Responses	% of Cases
7	Not interested	33	9.0	9.7
8	Oppose / dislike mines	14	3.8	4.1
9	No jobs available	13	3.5	3.8
10	Long hours	5	1.4	1.5
11	Need to complete my education	4	1.1	1.2
95	Other	13	3.5	3.8
Total		**367**	**100.0**	**108.3**

Note: Percent of Cases is based on 339 valid cases (25 missing cases)
Total Percent of Cases exceeds 100% due to multiple responses
% - percent

Source: Rescan 2012

The survey also measures the perceived effects of employment on Nisga'a respondents. Table 14.3.3-8 summarises the perceptions of negative and positive effects related to employment at the proposed Project. The main perceived positive effects of Project employment is related to income, skill development, and job satisfaction. The main perceived negative effects of Project employment are related to the Nisga'a language, cultural activities and events, and resource harvesting activities. Nisga'a survey respondents were divided in their perception related to the employment effects of the proposed Project on health and community.

Table 14.3.3-8: Perceived Effects of Employment Among Nisga'a Respondents

Positive / Negative Impact	Negative		Neutral		Positive		Total
	Freq	%	Freq	%	Freq	%	
Income	16	4.1	94	23.9	283	72.0	393
Job satisfaction	31	8.0	159	41.2	196	50.8	386
Skill development	27	7.0	148	38.1	213	54.9	388
Experience level	36	9.3	146	37.7	205	53.0	387
Household or family	79	20.4	170	43.8	139	35.8	388
Resource harvesting activities	145	36.8	184	46.7	65	16.5	394
Language	95	25.1	189	49.9	95	25.1	379
Health	96	24.7	178	45.9	114	29.4	388
Non-mining related training / education	66	17.4	172	45.3	142	37.4	380
Cultural activities and events	120	30.5	188	47.8	85	21.6	393
Community	87	22.3	181	46.3	123	31.5	391

Note: Freq - frequency; % - percent

Source: Rescan 2012

The proponent recognises that employment numbers used for the effects assessment in Section 7.0 (Economics) are below the desired direct hires for the Nisga'a Nation, especially to meet the level of Nisga'a interest in employment and to capitalise on the positive effects of employment. The proponent hopes to achieve higher levels of Nisga'a employment at the mine site during construction, operations, and closure phases of the proposed Project. The proponent is confident that the proposed Project can achieve closer to 30% of total employment at the proposed Project (i.e., 360 PYs and 90 PYs) for Nisga'a and regional direct hires in the LSA and RSA during construction and operations, and will work with NLG to achieve these or similar levels of Nisga'a employment. The likelihood of achieving these targets for Nisga'a and regional employment during construction and operations are based on development and implementation of a Recruitment, Training and Employment Plan (Section 11.2.15) that would provide opportunities for residents of the LSA and RSA to undertake the training required to access employment at the proposed Project.

As part of its commitment to Nisga'a hiring, the proponent intends to work with NLG to address these commitments. This may include measures to address the lack of interest in, barriers and limitations to, and negative effects of employment identified by Nisga'a survey respondents (summarised above), including lack of training and skills, family situations, working away from home at camp, and conflicts with resource harvesting / cultural activities. Measures may include flexible and/or shorter work schedules to accommodate Nisga'a family connection and cultural or harvesting activities, and training programs as developed in the Recruitment, Training, and Employment Plan (Section 11.2.15).

Overall, the construction employment residual effects predicted by the BCIOM are considered medium in magnitude, local, short-term, continuous, reversible, positive, and not significant (moderate) during construction. Operations residual effects are characterised as medium in magnitude, local, long term, continuous, reversible, positive, and not significant (moderate). The loss of employment during decommissioning and closure is considered to be medium in magnitude, local, long term, continuous, reversible, negative, and not significant (moderate). There would be no additional loss of employment in post-closure, so the effect would be nil in magnitude, local, short term, continuous, reversible, neutral, and not significant (negligible).

14.3.4 Contract and Business Opportunities

This section assesses the Nisga'a-specific effects related to Project expenditures and jobs generated from provision of goods and services to the proposed Project. Based on the results of the *Nisga'a Business Survey Statistical Report* (Rescan 2012), it is evident that there is both interest and capacity among the 22 Nisga'a businesses surveyed to participate in the proposed Project through contract opportunities. Based on previous understanding and estimations with few businesses in the LSA experienced with the construction and mining industries, it was assumed that, in the absence of discussions with NLG, Nisga'a businesses would supply 5% of regional goods and services during construction, operations, and decommissioning and closure. In this scenario, the total value of purchases between 2012 and 2051 would be $4,400,000.

Figure 14.3.4-1 depicts the distribution of purchases of goods and services based on the BCIOM over the life of the mine among communities in the LSA, where Nisga'a citizens reside, and Terrace CA, where NULs reside.

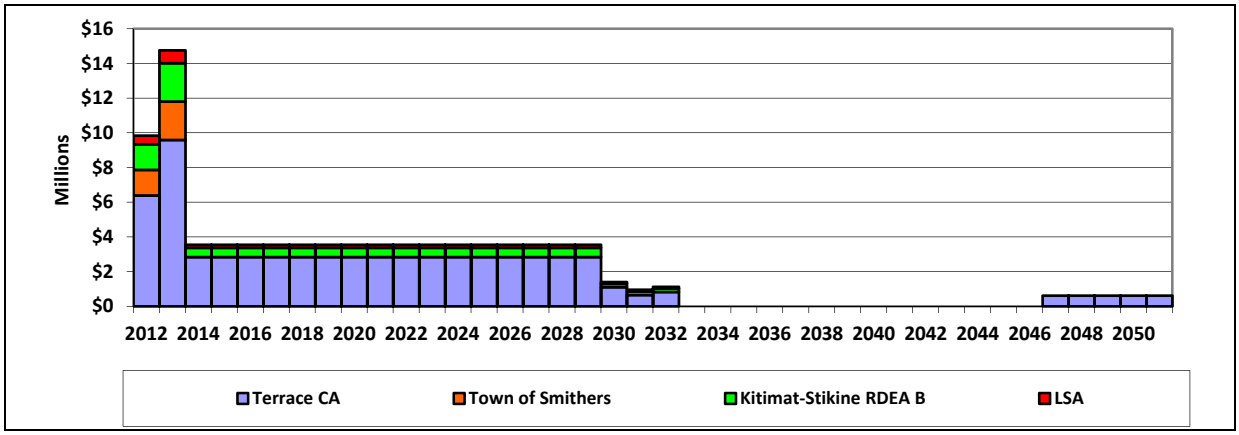

Figure 14.3.4-1: Distribution of Regional Purchases of Goods and Services Among Communities in the Regional Study Area and Local Study Area (2012 to 2051)

However, it is understood from the results of the *Nisga'a Business Survey Statistical Report* (Rescan 2012) that the collective Nisga'a business interest exceeds this previously predicted estimates (i.e., approximately $41,000,000 in Nisga'a business contract interests) with half of respondents interested in contracts of $25,000 or less. The interests among Nisga'a businesses identified in the survey are in construction contracts related to supplying services, catering, earthworks and general site services, and camp services, and during operations Nisga'a business focus is concentrated on contracts related to general site services, road maintenance, snow removal, personnel transport, and camp catering. There are several capacity issues and challenges related to financing, lack of experience with proposals, competitive bidding, joint ventures, and trade unions that may hinder Nisga'a businesses from accessing these contracts. These will be addressed in the mitigation measures as options for consideration in discussion with NLG.

Direct employment in the LSA as a result of regional purchases of goods and services would range from three jobs in 2012, to five jobs in 2013, and then drop to one job per year during operations. By comparison, in the RSA relevant to Nisga'a NULs, about 94 direct jobs would be created in 2013 as a result of purchases of goods and services from regional suppliers, with most of these (61 jobs) occurring in Terrace. During operations, 14 direct jobs would be created in the region as a result of purchases of goods and services, with 11 of these occurring in Terrace. During decommissioning and closure, this would drop to seven jobs per year in 2030 and six jobs per year in each of 2031 and 2032. There would be no direct employment from purchases of goods and services from 2033 through 2046, but post-closure would result in 0.9 jobs per year. NULs residing in Terrace may take

advantage of these direct, indirect, and induced jobs related to supply of goods and services to the proposed Project.

The proponent recognises that the expenditures and employment numbers associated with provision of goods and services are below the desired level based on expressed Nisga'a business interest identified in the survey results (Rescan 2012). The proponent hopes and is committed to achieving higher levels of Nisga'a employment and expenditures in the LSA through business and contract opportunities. As part of its commitment to Nisga'a hiring and procurement, the proponent intends to work with NLG on a business capacity building plan that will address these commitments.

While detailed mitigation measures have yet to be discussed and decided upon, the following are options based on feedback from Nisga'a businesses for consideration in discussion with Nisga'a Nation. The commitments may include measures to provide Nisga'a Nation businesses with advance notice of potential Project business opportunities, and work packages that Nisga'a Nation businesses and contractors are qualified to undertake based on existing capacity and / or potential future capacity developed in cooperation with other businesses where reasonable and commercially feasible.

Information from the *Nisga'a Business Survey Statistical Report* (Rescan 2012) indicates "[t]he most recommended measures that could be taken by the Projects to assist business in securing work at the mines were 'direct negotiations as opposed to competitive bids' and 'early payment arrangements', which were regarded as very likely to assist businesses by 57.1% and 52.4% of respondents, respectively. "Financial assistance" was another highly rated mitigation measure (47.6% indicating highly likely to assist Nisga'a businesses). Overall, "joint venture with other firms" and "shorter duration of contracts" were perceived as less likely to assist businesses" (Rescan 2012). Furthermore, where trade unions arise at the Kitsault Project, the proponent and NLG will develop measures to increase Nisga'a business capacity of working with trade unions. Where requested and required, the proponent will also assist in developing capacity among Nisga'a businesses for proposal writing and participating in competitive bid processes. This may be achieved through courses and seminars offered at the Northwest Community College or Small Business BC. Based on survey results from Nisga'a businesses, the proponent is committed to considering and discussing these and other options in coordination with NLG.

Overall, the residual effects of the proposed Project on Nisga'a contract and business opportunities in the LSA and RSA would be positive but not significant (moderate) during Project construction, positive and not significant (moderate) during operations, negative but not significant (moderate) during decommissioning and closure, and negative but not significant (negligible) during post-closure.

14.3.5 Income

Income generated by the proposed Project from direct, indirect, and induced employment is based on the predicted average wages and salaries calculated by the BCIOM.
Table 14.3.5-1 summarises the average wages and salaries per PY for direct, indirect, and

induced employment based on results from BCIOM. There will be considerable variation in income depending on the type of job with construction managers paid substantially more than labourers.

Table 14.3.5-1: Average Wages and Salaries Per Person-Year of Direct, Indirect and Induced Employment

Project Phase	On-Site	Supplier Industries			Total
	Direct	Direct	Indirect	Induced	
Construction	$138,667	$56,466	$49,404	$48,387	$83,958
Operations	$78,333	$62,500	$46,296	$52,182	$71,696
Closure and decommissioning	$78,333	$63,872	$50,175	$47,904	$60,442
Post-closure	n/a	$63,872	$50,175	$47,904	$56,370

Source: Calculated using employment and labour income estimates for direct, indirect, and induced employment as per the BCIOM customised simulation conducted by BC Stats, June 2011

Note: n/a - not applicable

The importance of labour income related to the proposed Project can be assessed by comparing Project effects to the total incomes reported by taxpayers in each of the communities, using the most recent tax information (2008). Also, based on the results from the Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012), the majority of the Nisga'a survey respondents (61%) indicated an annual income lower than $25,000, and 26% of respondents earn between $25,000 and $55,000 annually. Furthermore, of the 405 Nisga'a survey respondents, 43% do not receive any government assistance, while 25% derive half of their income from government assistance and 16% derive all their income from government assistance.

The wages and salaries associated with the proposed Project, both directly and indirectly, would represent a substantial increase from current levels for Nisga'a workers in the LSA when compared to recent tax information and the Nisga'a survey results. The employment income related to the proposed Project in the peak year of construction (2013) would be equivalent to 29.0% of estimated total income in 2008, and this would increase to 32.0% during operations.

During the 25-month construction phase, 13% of the total labour income related to the proposed Project in the RSA will be earned by residents of the LSA ($3,635,000), whereas NULs residing in the Terrace CA may benefit from part of the $17,703,000 (63% of RSA total) in labour income anticipated for the Terrace CA. During operations, 32% of the total labour income in the RSA would be earned by residents of the LSA ($1,952,000 per year). NULs in Terrace may benefit from $44,835,000 in labour income (49% of the RSA) predicted for the Terrace CA. During the three-year decommissioning and closure phase, 31% of the total labour income related to the proposed Project would be earned by residents of the LSA ($1,364,000), while NULs in Terrace may benefit from $2,772,000 in labour income (63% of the RSA). During post-closure, NULs in Terrace may also benefit from

labour income in Terrace amounting to $9,000,000. Overall, the LSA would benefit from $36,249,000 in income generated through employment related to the proposed Project for all the phases of the proposed Project. NULs residing in the Terrace CA would benefit from part of the total of $74,310,000 of the labour-related expenditures for the proposed Project. Figure 14.3.5-1 represents the distribution of total Project-related labour income in the LSA and RSA from 2012 to 2050.

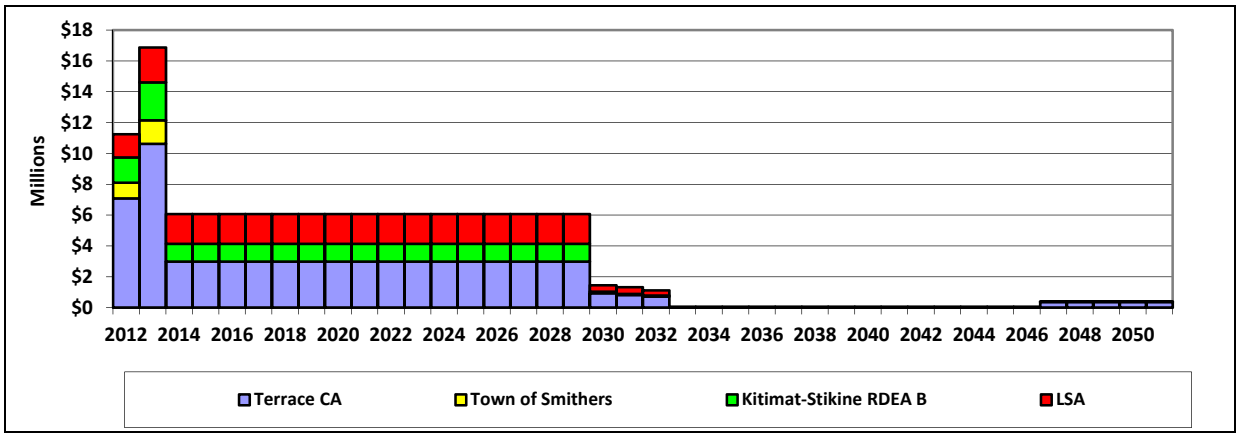

Figure 14.3.5-1: Distribution of Total Project-Related Labour Income Among Communities in the Regional Study Area and Local Study Area (2012 to 2040)

Construction and operations employment income effects are considered medium in magnitude, local, short term for construction and long term for operations, continuous, reversible, positive, and not significant (moderate). The loss of employment during decommissioning and closure is considered to be medium in magnitude, local, long term, continuous, reversible, negative, and not significant (moderate), while the additional loss of employment in post-closure is considered nil in magnitude, local, long term continuous, reversible, negative, and not significant (negligible).

14.3.6 Unemployment Rates

This section discusses the effects of the proposed Project on reducing the unemployment rate in the LSA. Based on the BCIOM results, hiring five to seven unemployed workers during construction would reduce the unemployment rate in the LSA from 26.2% to 25.2%, a reduction of 1.0 percentage point. During operations, the unemployment rate would decline from 26.8% to 25.2%, which represents a 1.6 percentage point reduction. While the loss of 20 operations jobs for LSA residents during decommissioning and closure would likely increase unemployment rates at that time, the significance of these effects would be affected by regional economic growth at that time and the effectiveness of mitigation measures in finding alternative employment for these workers. Post-closure would result in the loss of another four jobs, which could further increase the number of unemployed workers in the LSA, depending on the effectiveness of mitigation.

The positive effect of reducing Nisga'a unemployment is further amplified by the recent results of the Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012). The survey measures interest among unemployed Nisga'a survey respondents (N= 77) in mine employment during construction and operations. Interest levels are almost equally divided between those interested and those who are not interested with a few undecided. Figure 14.3.6-1 provides a summary of interest levels of unemployed Nisga'a respondents during construction and operations. There are a total of 34 unemployed Nisga'a survey respondents interested in construction employment, and 33 respondents in operation employment. These numbers represent a potential further reduction in Nisga'a unemployed rates in the LSA during construction and operation phases of the proposed Project.

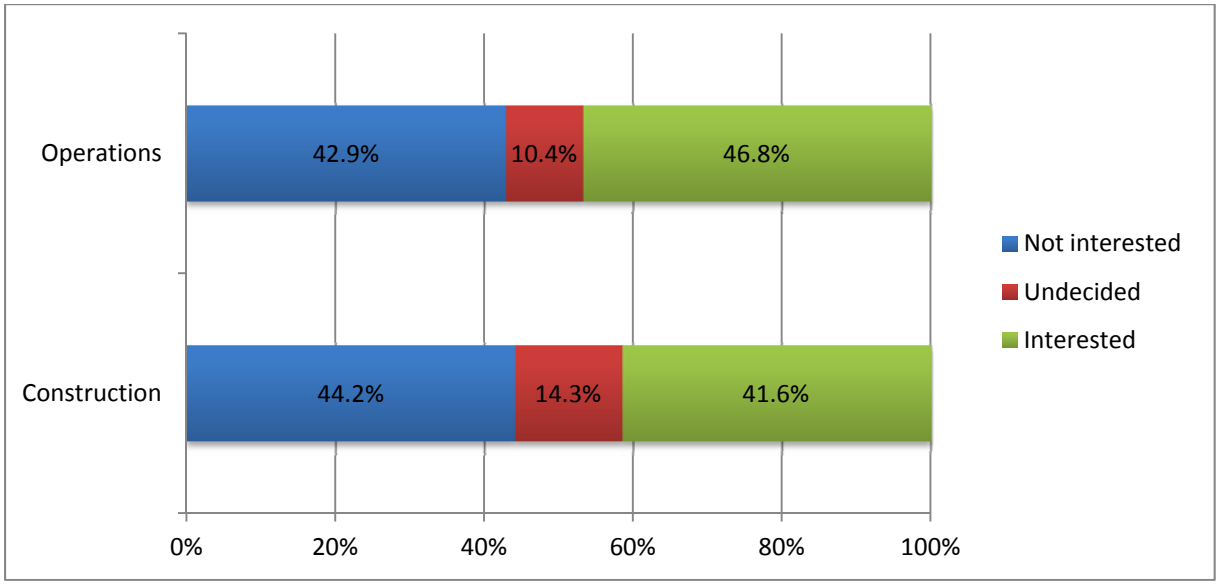

Figure 14.3.6-1: Level of Interest Among Unemployed Nisga'a Respondents During Construction and Operations

Source: Rescan 2012

The main reasons provided for a lack of interest among unemployed Nisga'a survey respondents in construction employment are family situation and responsibilities, type of work involved, and physical and mental disability. For operations employment, unemployed Nisga'a respondents were not interested due to work away from home in camp, family situation and responsibilities, and physical and mental disability. Tables 14.3.6-1 and 14.3.6-2 summarise the responses of unemployed Nisga'a respondents related to their lack interest in construction and operations employment at the proposed Project.

Table 14.3.6-1: Reasons for Lack of Interest in Construction Employment among Unemployed Nisga'a Respondents

		Count	% of Responses	% of Cases
1	Happy with current employment	1	1.5	2.3
2	Family situation / responsibilities	16	23.5	37.2
3	Not looking for employment	2	2.9	4.7
4	Type of work involved	13	19.1	30.2
5	Work away from home in camp	11	16.2	25.6
6	Hours	2	2.9	4.7
7	Physical or mental disability	12	17.6	27.9
8	I am retired	1	1.5	2.3
9	Attending school	7	10.3	16.3
10	Opposed mining	3	4.4	7.0
Total		**68**	**100.0**	**158.1**

Note: Percent of Cases is based on 43 valid cases (38 missing cases)
Total Percent of Cases exceeds 100% due to multiple responses
% - percent

Source: Rescan 2012

Table 14.3.6-2: Reasons for Lack of Interest in Operation Employment among Unemployed Nisga'a Respondents

		Count	% of Responses	% of Cases
1	Happy with current employment	1	1.5	2.6
2	Family situation / responsibilities	13	20.0	34.2
3	Not looking for employment	2	3.1	5.3
4	Type of work involved	10	15.4	26.3
5	Work away from home in camp	16	24.6	42.1
6	Hours	2	3.1	5.3
7	Physical or mental disability	13	20.0	34.2
9	Attending school	6	9.2	15.8
10	Opposed mining	2	3.1	5.3
Total		**65**	**100.0**	**171.1**

Note: Percent of Cases is based on 38 valid cases (43 missing cases)
Total Percent of Cases exceeds 100% due to multiple responses
% - percent

Source: Rescan 2012

Effects of the proposed Project on employment rates, trends, and interests in the LSA for construction and operations are characterised as low in magnitude, local, short term for construction and long term for operations, continuous, reversible, positive, and not significant (minor). The effects are considered low because, although a 1.5 percentage point reduction in unemployment would be a major benefit in a community with a relatively low rate of unemployment, the unemployment rate in the LSA would still be much higher than for the overall region. For decommissioning and closure, proposed Project effects are considered to be low in magnitude, local, long term, continuous, reversible, negative, and not significant (minor). Proposed Project effects during post-closure are considered to be nil in magnitude, local, short term, continuous, reversible, negative, and not significant (negligible).

14.3.7 Labour Force Qualifications

The labour force qualifications breakdown of the proposed Project workforce is 20.6% requiring no experience, and 80% requiring some form of post-secondary education, trade certification, or professionally accredited training. During construction, 120 of the 1,200 workers working at the mine site would be filled from within the LSA and RSA. Approximately 60 of the 300 operations positions are expected to be filled by residents in the LSA and RSA. The Nisga'a labour force qualifications and level of interest among qualified Nisga'a citizens are important elements of local and regional benefits where there is an anticipated mismatch between skills availability and the skill requirements of the proposed Project.

According to recent results from the Nisga'a Social, Economic, Resource Use and Cultural Survey (Rescan 2012), more than half (56%) of Nisga'a respondents who expressed interest in working in General Labour during construction and operations and perceive they have the necessary skills to be hired in this position. Three-in-ten of those interested in working in management or vocational positions also feel they currently have the skill set required to get hired. The largest disparities in interest in a job type and skills needed to secure a position are in Technical and Professional jobs, where three quarters (or more) of those who would like to work in this area do not consider themselves qualified. These data are summarised in Figures 14.3.7-1 and 14.3.7-2. Overall, perception among those interested in working for the mine in construction and operations do not feel they have the qualifications or training needed to get hired in jobs they consider of interest.

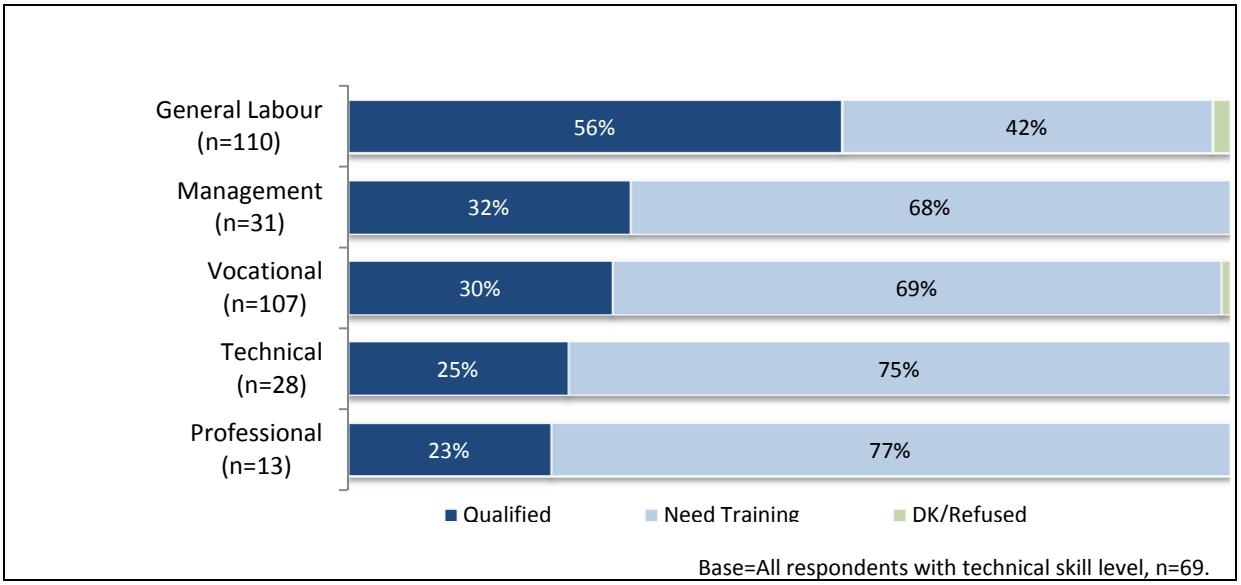

Figure 14.3.7-1: Level of Qualification among Nisga'a Survey Respondents for Construction Employment

Source: Rescan 2012

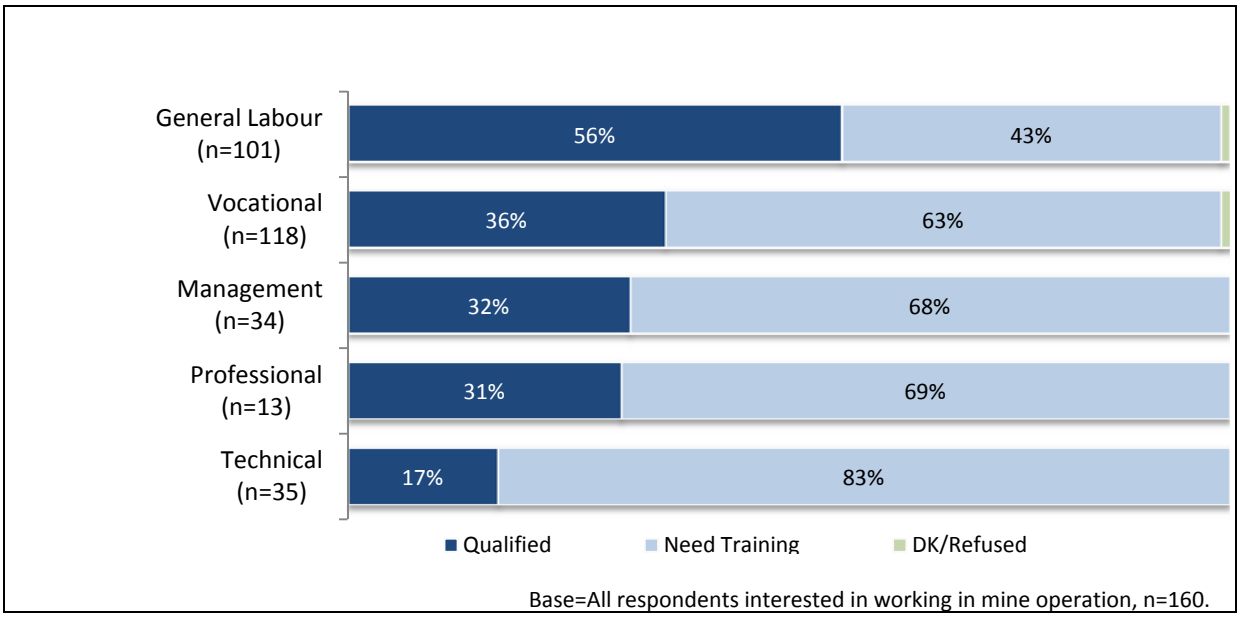

Figure 14.3.7-2: Level of Qualification Among Nisga'a Survey Respondents for Operation Employment

Source: Rescan 2012

The Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012) also measures the educational and skill level of unemployed Nisga'a respondents. Almost half of

the unemployed Nisga'a respondents have an educational level below a high school diploma. Table 14.3.7-1 summaries the educational attainment of unemployed Nisga'a from high school diploma to undergraduate degree.

Table 14.3.7-1: Level of Education Received Among Unemployed Nisga'a Respondents

		Frequency	Valid %
1	Under high school diploma	36	46.8
2	High school diploma / equivalent certificate	18	23.4
3	Registered apprentice / trades certificate or diploma	9	11.7
4	College, College of General or Vocational Education, non-university diploma	9	11.7
5	Undergraduate degree	5	6.5
Total		**77**	**100.0**

Note: % - percent

Source: Rescan 2012

Unemployed Nisga'a respondents also provided information on their level of skills, including 48.5% indicating skills as general labour with 6.1% having professional and management skills, respectively. Table 14.3.7-2 provides a summary of the types of skills obtained by unemployed Nisga'a respondents.

Table 14.3.7-2: Type of Skills Among Unemployed Nisga'a Respondents

		Count	% of Responses	% of Cases
1	General labour	64	48.5	82.1
2	Vocational	37	28.0	47.4
3	Technical	11	8.3	14.1
4	Professional	4	3.0	5.1
5	Management	8	6.1	10.3
95	Other	8	6.1	10.3
Total		**132**	**100.0**	**169.2**

Note: Percent of Cases is based on 78 valid cases (3 missing cases).
Total Percent of Cases exceeds 100% due to multiple responses.
% - percent

Source: Rescan 2012

There is an ample supply of labour in all the skill categories in the RSA (especially Terrace where NULs reside), with more than 2,000 residents having university degrees and over 7,000 having some form of vocational or technical certification. However, many participants in the labour market are already employed and would not be available to work on the proposed Project. Even if some people leave existing employment, the job vacancies left

behind would leave shortages in other sectors and industries, and potentially contribute to a regional skills deficit. Trade skills, in particular, are difficult to recruit in northwest BC.

Because of the lack of tradesmen, apprentices, and other skilled workers in the LSA and RSA, training programs and opportunities for building an experienced local and regional workforce would benefit recruitment targets for the proposed Project, and contribute to an enhanced skills profile for the general labour force.

This would have the effect of supplementing the regional skills profile that would benefit the study area economy, especially if workers leave employment with the proposed Project for other opportunities within the region. Overall, it is expected that training programs related to the proposed Project would upgrade the skills profile for less than 1% of the current regional labour force. However, the educational prerequisites for Project employment will likely encourage more existing regional residents to achieve higher attainment than otherwise would be the case.

The residual effects during construction and operations are characterised as low in magnitude, local and regional, short term during construction and long term during operations, continuous, reversible, positive, and not significant (minor).

14.3.8 Links to Nisga'a Rights and Interests

In general, the proposed Project effects on economic VCs related to employment, businesses, income, unemployment, and labour force qualifications are positive during construction and operations, but are negative during decommissioning and closure, and positive or neutral during post closure. In addition, proposed Project effects are low and not significant (minor) at both the provincial and regional levels, but are relatively larger in magnitude for the LSA (although not significant). The proponent has made commitments to developing and implementing plans and measures in collaboration with NLG to enhance Nisga'a economic benefits, including hiring, training, and business contracts.

Because Project effects for all phases of the proposed Project were already assessed in the context of current and forecasted 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 economic effects are very small and the proposed Project's contribution to cumulative effects is unlikely to be detectable within the overall forecasts of increased economic activity in the study area. Incremental cumulative effects on the Nisga'a Nation are identified, modeled, and discussed in the Nisga'a ESCIA (Rescan 2012).

Furthermore, the economic benefits of the proposed Project compliment and contribute to Nisga'a interests in economic participation, business development, and skills and capacity training. There are opportunities for the proponent and the Nisga'a Nation to work together to support and build upon existing programs, plans, and policies related to develop the Nisga'a economy. Based on results from the Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012), Nisga'a survey responses indicate a need for addressing

employment barriers and effects related to Nisga'a family, cultural events and harvesting activities, and lack of training and skills.

Based on desk-based research results, the Nisga'a Nation has an interest in participating in and developing the economy in northwest BC (NLG 2009), and sees the NFA as an important means of achieving this interest. The Nisga'a Nation has and hopes to maximise its participation and opportunity within the regional economy as a means of deriving regional employment income. The Nisga'a Nation has also specified an interest in contract and business opportunities, and has developed and established the Nisga'a Business Development Fund, which "provides services and funding streams to both young, growing companies, as well as, established organisations with promising products and / or services" with a total of $873,143 for 21 projects since 2007 (NLG 2010). The Nisga'a Nation is interested in business contract opportunities as a means of further developing the growing Nisga'a Nation economy and promoting economic wellbeing among Nisga'a citizens. Skills training are key focuses of the Nisga'a Nation to increase participation in the local and regional economies. The *Wilp* Wilxo'oskwl Nisga'a Institute (WWNI) offers training programs in several industries. According to NLG, "the Nisga'a Nation is committed to improving its educational system, helping adult learners gain more training, and encouraging all Nisga'a to engage in lifelong learning to help build the economy and strengthen Nisga'a society" (NLG 2009).

14.4 Social Effects

14.4.1 Overview

In Section 8.0, social effects of the proposed Project were assessed for eight VCs, including:

- Regional demographics;
- Housing;
- Regional services;
- Regional infrastructure;
- Family and community wellbeing;
- Educational services;
- Transportation; and
- Non-Aboriginal land and resource use.

VCs with information relevant to the Nisga'a Nation include demographics, housing, services, infrastructure, family and community wellbeing, and educational services, which are summarised in subsequent sections.

14.4.2 Demographics

Possible changes in demographics on Nisga'a Lands may arise related to employment at the proposed Kitsault Project; however, these are difficult to assess and predict. Several sources were considered in determining the potential effects of the Project on Nisga'a

demographics, including conservative population estimates based on the outcomes of the BC Input / Output Model (BCIOM), and the results of the Nisga'a Social, Economic, Resource Use and Cultural Survey (Rescan 2012). Although the Nisga'a household survey offers unique insight into the complex decision-making for Nisga'a citizens living both on and off Nisga'a Lands, it cannot be considered conclusive given possible respondent confusion arising from migration-related questions in the survey. As such, this section provides two scenarios, including net in- and out-migration, to cover a range of possibilities. Both scenarios will be explored in subsequent sections related to indirect effects of population changes on demand for housing, public services, infrastructure, and educational services.

14.4.2.1 Out-migration Scenario

The Nisga'a Social, Economic, Resource Use and Cultural Survey (Rescan 2012) assessed several in- and out-migration scenarios with and without the proposed Project. The survey inquired about plans of those living on and off Nisga'a Lands to move to or away from Nisga'a Lands in the next five years without the mine, including their reasons for staying or leaving and how many household members would accompany them. The same set of questions was asked for the scenario of the mine proceeding. The survey results indicate that regardless of current residence in or out of the Nass Valley, two thirds of residents (63% and 65%, respectively) do not think it likely that they would move. Figure 14.4.2-1 shows that if the mine project were to proceed, it would not increase the likelihood of those living outside the Nass Valley to move to the valley. However, survey results indicate that the mine may increase the likelihood of those living on Nisga'a Lands to move from the Nass Valley at 24% without the mine to 30% with the mine (Figure 14.4.2-2).

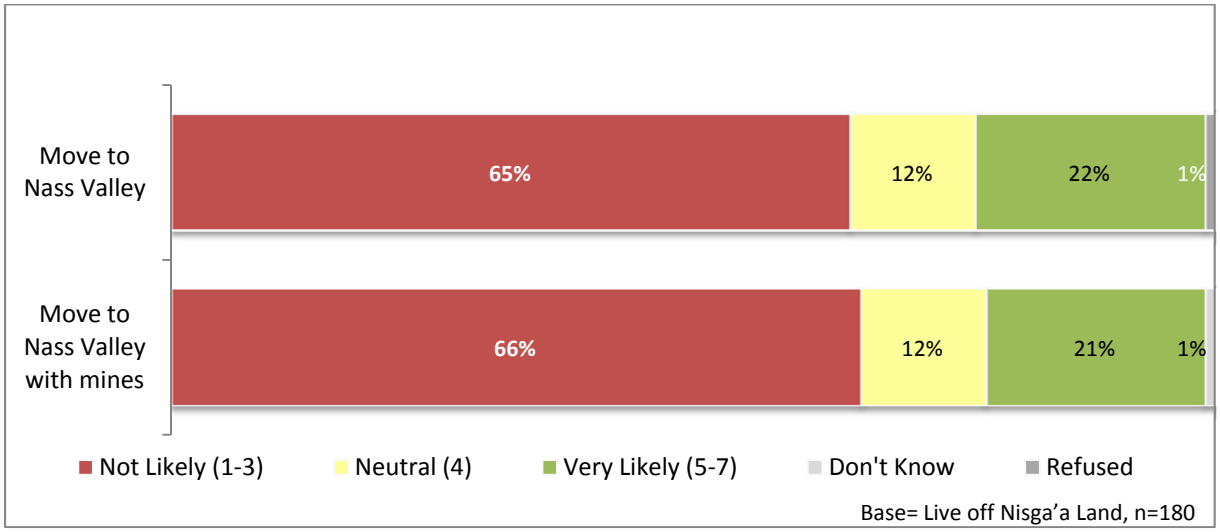

Figure 14.4.2-1: Likelihood of In- or Out-Migration Among Nisga'a Respondents Living off Nisga'a Lands With or Without the Mine

Source: Rescan 2012

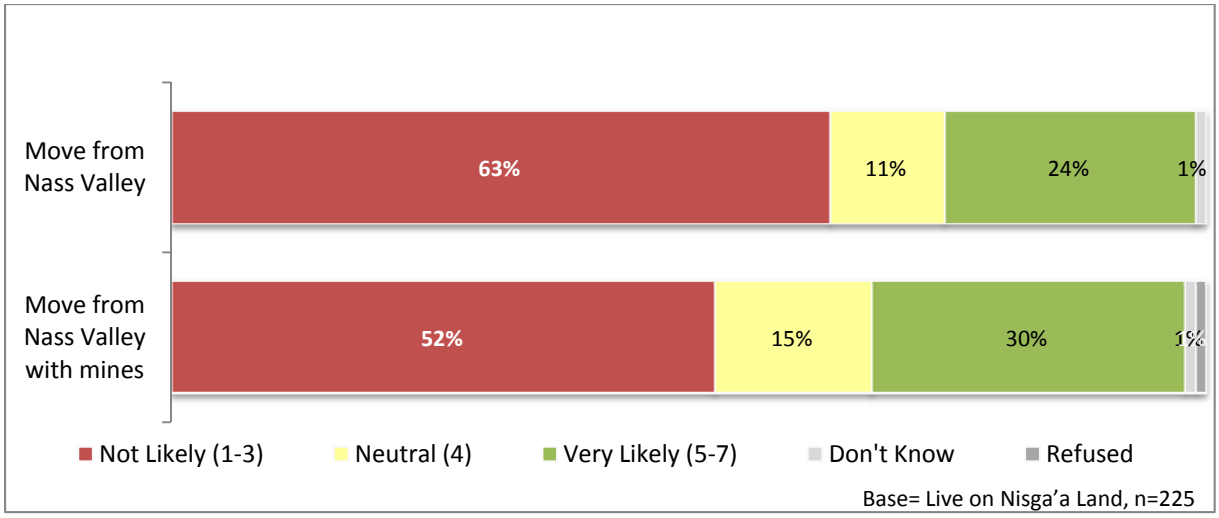

Figure 14.4.2-2: Likelihood of In- or Out-Migration Among Nisga'a Respondents Living on Nisga'a Lands With or Without the Mine

Source: Rescan 2012

There are complex reasons for staying or moving to and from the Nass Valley in scenarios with or without the mine. Table 14.4.2-1 summarises the main reasons provided by survey respondents considering different scenarios of in- and out-migration. Table 14.4.2-1 also provides the total number of household members for scenarios where Nisga'a respondents indicate that they would likely move to or from the Nass Valley. In the scenario with the mine, the survey results indicate a possible net departure of 93 Nisga'a respondents. While this number should not be considered definitive or in absolute terms, it provides valuable insight into the possible scale of migration. In the scenario without the mine, the in- and out-migration patterns among Nisga'a respondents are nearly balanced with a slight tendency towards out-migration.

The report on Nisga'a Social, Economic, Resource Use and Cultural Survey (Rescan 2012) indicates a possible confusion among survey respondents related to this series of questions: "Some of the answers appear unusual, which suggests a possible misunderstanding of the question" (Rescan 2012). In particular, respondents living in the Nass Valley may have misunderstood "moving" to include transportation to the mine to work, even though remain interested in being residents of the Nass Valley. As such, survey data related to the migration issue should be considered with caution, and does not provide a conclusive prediction of outcomes related to demographic changes on and off Nisga'a Lands. However, the data still provide useful insight into possible trends and rationale for migration decisions among Nisga'a survey respondents.

Table 14.4.2-1: Main Reasons for Staying or Moving for Nisga'a Respondents Living on and off Nisga'a Lands in Scenarios With or Without the Mine

Nisga'a Respondents Living Off Nisga'a Lands (N=180)				
Scenarios	**Without Mine**		**With Mine**	
	Moving to Nass Valley (Total Moving = 40 respondents + 82 family members = 122 Nisga'a)	**Staying in Current Residence**	**Moving to Nass Valley (Total Moving = 37 respondents + 28 family members = 65 Nisga'a)**	**Staying in Current Residence**
Main reasons	Considering / will eventually move, my house is here, want to get land / house there, and more work opportunities here.	Don't want to move, happy here, never lived there before, and limited health care services.	For employment / mining, for family, and other reasons.	Don't want to move / happy here, depends on family / spouse, not interested in mining / working in Nass.
Nisga'a Respondents Living On Nisga'a Lands (N=225)				
Scenarios	**Without Mine**		**With Mine**	
	Moving away from Nass Valley (Total Moving = 55 respondents + 74 family members = 129 Nisga'a)	**Staying in Nass Valley**	**Moving away from Nass Valley (Total Moving = 68 respondents + 90 family members = 158 Nisga'a)**	**Staying in Nass Valley**
Main reasons	Lack of jobs and education.	My home / house is here, employed here, don't want to leave / prefer to stay.	Employment, would move / work for mine, other reasons.	Not interest / no plans to move, this is my home, current employment.

Source: Rescan 2012

The survey also measured how likely Nisga'a respondents, living off Nisga'a Lands who may return to the Nass Valley if the mine proceeds, would chose to commute to the proposed Project. The majority of these Nisga'a respondents (57.9%) are likely to consider commuting to the proposed Project. The main reasons for staying in current residence and commuting to the proposed Project are more convenient transportation, do not want to move / happy here, and other reasons. The main reasons for moving to the Nass Valley and commuting to work elsewhere are "not interested or would not work in mines", "my family is here", and "other" reasons.

14.4.2.2 In-Migration Scenario

On the other hand, Section 7.0 (Economic Effects) of the Application, based on the outcomes of the BCIOM, anticipated that the proposed Project could attract a sizeable number of Nisga'a citizens back to Nisga'a Villages in the Nass Valley who are currently living elsewhere in the region and other parts of BC. Rescan 2012For the RSA, Section 7.0 predicts a conservative influx of 250 new residents during the construction phase, and 235 new residents during operations, based on results of the BCIOM. This represents a small proportion of the total existing population in the LSA with approximately 1,696 people and an estimated 30,632 residents in the RSA.

At the LSA level, the variation is smaller in absolute terms, but still averages an annual change in population of 40 persons. The population effect is considered well within the variation experienced in the study area over the past 15 years or so. 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 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. 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 proposed Project and the jobs they vacated were backfilled by in-migrants, which is highly unlikely, the population effect is still likely to be small. 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.

14.4.2.3 Mitigation Measures

The proponent commits to tracking the community of residence of mine employees in the LSA and RSA as a means of monitoring population trends. The proponent will share aggregated data of employee community of residence with NLG and other relevant government agencies, and will work collaboratively with appropriate levels of government, if and when population-inducted effects of the Project arise. Also, the proponent commits to using competitive and relevant employment packages as a means of encouraging and

influencing local and regional employment to reduce the effects of population changes on the LSA.

14.4.3 Housing

The Project may affect the demand for housing in the LSA and RSA based on changes in population. Depending on the direction of the population shift, this may present a challenge, because accommodation options are limited in the Nass Valley.

14.4.3.1 LSA

14.4.3.1.1 Out-Migration Scenario

Based on the results of the Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012), there may be a net out-migration of Nisga'a citizens from the LSA, despite a minimal increase of Nisga'a citizens (i.e., according to survey results possibly 37 respondents) moving to the Nass Valley from outside Nisga'a Lands (Section 14.4.2). However, based on the hypothetical departure of 68 Nisga'a survey respondents (from Table 14.4.2-1), housing availability would increase sufficiently to fulfill the demand of the possible influx of Nisga'a citizens from outside Nisga'a Lands. In the net expatriation scenario, there might be a possible surplus of housing on Nisga'a Lands, which presents a challenge and cost of maintenance and upkeep during the period of vacancy. Long-term vacancy and financial challenges (such as foreclosures) may pose challenges for the community in terms of housing and property values. It is assumed that NLG and private Nisga'a citizens carry these potential costs and risks, depending on ownership arrangements.

14.4.3.1.2 In-Migration Scenario

At the other extreme, the net in-migration scenario entails the possibility that Nisga'a citizens living outside of Nisga'a Lands may choose to migrate back to the LSA with the prospect of long-term employment at the proposed mine site. Census data suggests that the LSA 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. However, 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. The proponent will work with the NLG to address the in- and out-migration of Nisga'a citizens if or when issues of capacity and new housing demands arise. This mitigation effort would be focused on hiring and procurement policies and practices, and would be discussed, finalised, and embodied in collaboration with NLG.

14.4.3.2 RSA

By comparison in the RSA where NULs reside, the incremental demand for housing would be at most approximately 167 housing units during the 25-month construction period, and 90 housing units over the proposed Project's 15-year operating period. 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, ranging from low-price condominium units at $150,000 to $200,000 up to estate properties of more than $600,000. 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.

Figure 14.4.3-1 depicts the current temporary and permanent availability of housing in the RSA compared to the mine-related demand for housing during construction and operations phases. 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 RSA are expected to be minimal.

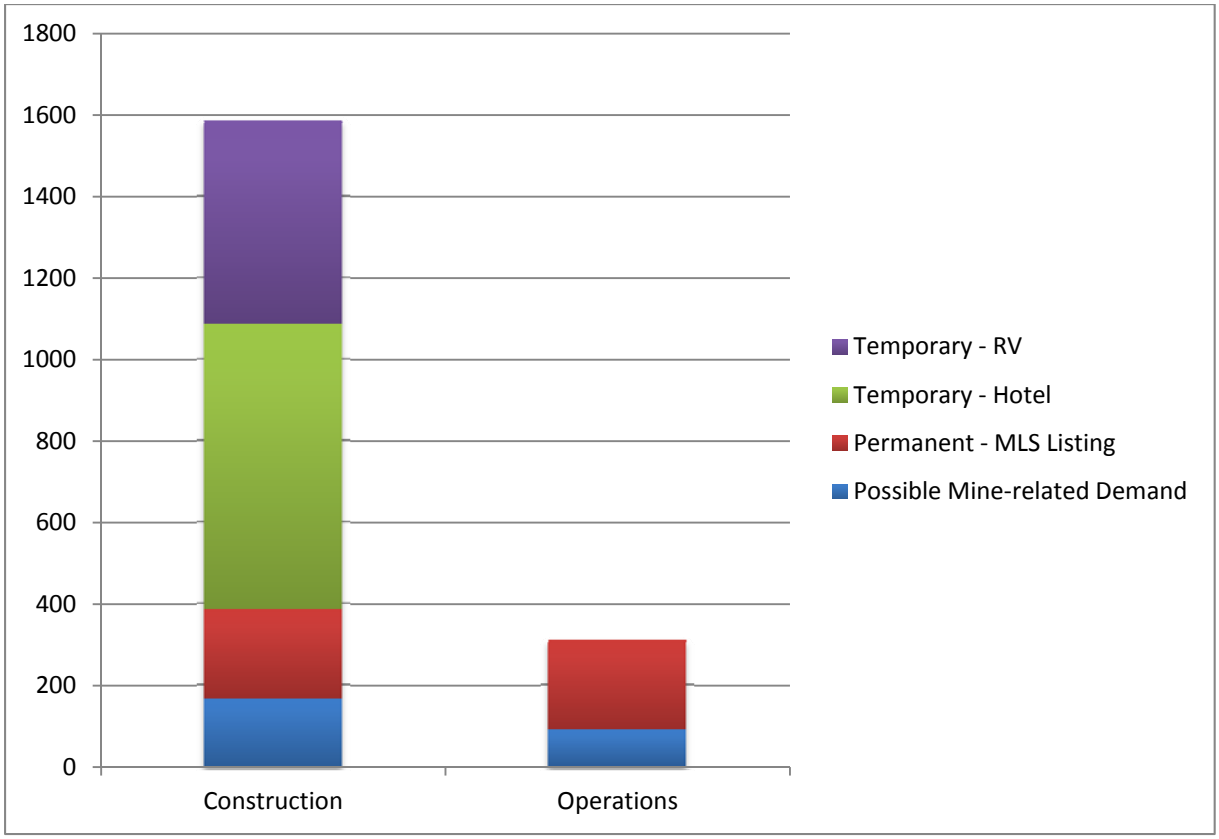

Figure 14.4.3-1: Housing Availability in the Regional Study Area During Construction and Operations

14.4.3.3 Mitigation Measures

The proponent cannot unilaterally implement mitigation measures required to manage social effects. It is recognized that there is a role and responsibility for governments to plan and implement social programs and deliver public services that address social effects. Also, individuals and families are responsible the lifestyle decisions to enhance their social circumstances and conditions. As a result, all parties have a shared responsibility for management of social effects to realise the greatest benefits of the proposed Project.

In the LSA, the proponent will work with NLG developing and employing different strategies and solutions regardless of whether the net in- or out-migration scenario arises. This will be based on monitoring local population trends by collecting and aggregating Nisga'a employees' community of residence. This information will be shared on an annual basis with NLG and other relevant government agencies. In the case of in-migration of Nisga'a citizens, the proponent will collaborate with NLG where increases in local populations are deemed to be beyond the capacity of local government to respond to new housing demands. If net Nisga'a expatriation occurs, it will be important for the proponent and NLG to identify and evaluate various options to help offset over-supply of housing.

14.4.4 Regional Services

The proposed Project effects on regional services will be largely attributable to: 1) changes in population, and thus in demands for local and regional public services; and 2) changes in traffic on highways in the LSA / RSA resulting in possible higher demands for public safety services (including ambulance and police) in the case of accidents. There could also 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.

With minimal population impacts, the key effect on regional services 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. There is also good existing capacity for delivery of regional services in the RSA.

14.4.4.1 Out-Migration Scenario

Based on the results of the Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012), there is a possibility of a net out-migration of Nisga'a citizens from the Nass Valley (Section 14.4.2). If this scenario arises, it would result in a decline in the demand for public services in the Nass Valley. Depending on the scale of a possible Nisga'a expatriation, this may erode the funding base and annual budgets for local services, which receive funding on a per capita basis. Lower numbers of customers and users may also drive up the cost of services, or threaten the loss of the service, requiring Nisga'a citizens in the Nass Valley travel to regional centres, such as Terrace, for these services.

14.4.4.2 In-Migration Scenario

At the other extreme, Nisga'a citizens living outside of Nisga'a Lands may choose to migrate back to the LSA with the prospect of long-term employment with the proposed Project, resulting in increased demand on local services. An average of 165 jobs would be created for workers in the LSA and RSA during each year of construction, and approximately 235 new residents are anticipated. The impact on services would be minimal even in the conservative migration scenario. 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 services. However, because of recent declining population trends, these effects, however minimal, could have positive effects on service viability, given that the services are currently underutilised capacity.

14.4.4.3 Mitigation Measures

The proponent proposes the following mitigation measures to address effects on services related to the proposed Project:

- Monitoring population trends by collecting and tracking aggregated data on Nisga'a employees' community of residence and sharing the information with NLG. Collaborating with NLG to develop strategies depending on the migration pattern that emerges (i.e., in- or out-migration of Nisga'a citizens to/from Nass Valley). If necessary, a Social Sustainable Committee, comprised of NLG, proponent, and regional and provincial government agencies representatives, may be established to meet on a biannual basis to identify, discuss, and address a range of social issues, including service provision in the LSA, arising from population trends.
- Communication of information about mine-related traffic volumes, camp operations, and changes to the local population with key regional service delivery agencies: Northern Health; School District Nos. 54, 82 and 92; BC Ministry of Transportation and Infrastructure (BC MOTI); local fire departments; Royal Canadian Mounted Police (RCMP); local governments; and BC Ambulance;
- Provision of contracted security services at the mine site and camp to ensure a secure and safe work site and environment. The camp would also have a policy of no alcohol or drugs on-site. The camp and mine site would provide full fire-fighting equipment and trained personnel; and
- Provision of health and medical equipment and personnel to meet 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 with 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 and a helicopter med-evac service for life-threatening illnesses and injuries.

14.4.5 Regional Infrastructure

Effects on regional infrastructure 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 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.

Non-residents who relocate to the LSA / RSA would create a population impact and, by extension, increase the demand for local and 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 would remain continuous throughout the transition period between

construction and operations phases. At decommissioning and closure, there would be a rapid drop-off in population and demand as conditions return toward the base case.

14.4.5.1.1.1 Out-Migration Scenario

Based on the results of the Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012), there may be of a net out-migration of Nisga'a citizens from the Nass Valley, despite a low-level increase in Nisga'a moving to the Nass Valley from outside Nisga'a Lands (Section 14.4.2). As such, there may be a decline demand on local infrastructure in the Nass Valley, including utilities, housing, communication services, and recreation facilities. In fact, depending on the scale of the Nisga'a expatriation, local infrastructure may decline or depreciate based on lower numbers of customers and users.

14.4.5.1.1.2 In-Migration Scenario

Based on the results of the BCIOM, there may be a net in-migration of Nisga'a citizens living outside of Nisga'a Lands, who choose to migrate back to the LSA with the prospect of long-term employment with the proposed Project. The change in population may generate more demand for local infrastructure; however, given the previous population levels in the LSA 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 LSA.

14.4.5.2 Mitigation Measures

The proponent proposes to work with service providers to incorporate population increases in planning processes as a means of mitigating the effects of the proposed Project on regional infrastructure. With the proposed mitigation measures, the residual effects are 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).Family and Community Wellbeing

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 linked to changes in a family's income (e.g., positive and negative spending decisions), and others are linked to behavioural or social condition changes associated with the influx of workers and the challenges of mine work schedule rotation. Positive spending decisions - such as on improved housing or education, or increased investment or savings - could enhance overall wellbeing of the individual and family members. However, negative spending decisions - such as on increased drug and alcohol consumption or gambling, for example - could reduce overall wellbeing for those directly or indirectly affected by this behaviour. Increased consumption of drugs and alcohol may also increase rates of crimes in communities. Another family wellbeing issue is separation of the workers from their families and dependants for extended periods of time due to fixed work rotation schedule and the requirement to stay in on-site camp accommodations while workers are on the job.

The following mitigation measures are proposed to address project-related effects to family and community:

- Promote wise spending decisions;
- Preference will be given to candidates with Grade 12 education (or those completing it);
- Provide a flexible rotating schedule for local hires;
- Maintain communication between the operation workers and their families;
- Offer counselling services to employees;
- Work with local agencies to assist in monitoring community wellbeing; and
- Developing workplace policies that consider cultural obligations.

By providing local residents with employment and income that would enable them to improve their overall economic and social wellbeing, and by applying mitigation measures, the proposed Project construction and 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 (minor).

14.4.6 Educational Services

Employees relocating to the LSA and RSA with their families may affect school enrolment. Also, there would be increased demand for educational credentials to qualify for employment. 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.

14.4.6.1 Net Out-Migration Scenario

Based on the results of the Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012), there is a possibility of a net expatriation of Nisga'a citizens from the Nass Valley (Section 14.4.2). As such, there may be a decrease in the demand on local educational services in the Nass Valley, including elementary, secondary, and post-secondary programs. Depending on the scale of the Nisga'a expatriation, local educational services may decline or depreciate based on lower numbers of school-aged students. In extreme circumstances, there may also be the possibility of school closure, requiring Nisga'a school-aged children to travel to and attend schools in other Nisga'a Villages or in regional centres, such as Terrace.

14.4.6.2 Net In-Migration Scenario

Nisga'a citizens living outside of Nisga'a Lands may choose to migrate back to the LSA with the prospect of long-term employment with the proposed Project. An average of 165 jobs would be created for workers in the LSA and RSA during each year of construction, and approximately 235 new residents are anticipated, and potentially could result in approximately 45 additional school-age children throughout the LSA and RSA. The impact

on school enrolment during operations is equivalent to approximately two additional classrooms and two additional teachers across three different school districts. 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.

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).

14.4.6.3 Mitigation Measures

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 related to 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 the proposed Project.

14.4.7 Links to Nisga'a Rights and Interests

In general, most of the residual social effects of the proposed Project on a regional level are anticipated to be not significant (negligible) to not significant (minor), with possible positive effects for regional infrastructure, family and community wellbeing, and educational services. The proposed Project is anticipated to have social effects on the Nisga'a Nation related to demographics, housing, services, infrastructure, family and community, and educational services. The proponent is committed to working with the NLG to address social effects on Nisga'a citizens as they may arise.

The Nisga'a Nation has rights defined in the NFA to develop laws, administer social programs, and negotiate and implement fiscal financing. The social effects experienced in the LSA may require changes to some of the programs or services delivered by the NLG, depending on the scale of the net Nisga'a expatriation.

The Nisga'a Nation may have an interest in possible demographic changes in the Nass Valley for reasons related to the fiscal financing agreements negotiated with BC and Canada. 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. Depending on in- or out-migration scenarios, there may be a respective increase or decrease in provincial and federal funding (accounting for demographic shifts) to address local social and health services and infrastructure (such as housing).

Housing in Nisga'a Villages is limited and, in some villages, the limited land base hinders expansion of housing to meet growing demands. 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. Depending on the arising migration trend (i.e., in- or out-migration), the Nisga'a Nation may or may not face increasing demands on local housing. The proponent is committed to working with NLG to ensure that housing needs can be met in the Nass Valley.

Based on the social challenges faced by Nisga'a citizens employed at the proposed Project, there may be added demand for social and health services administered by the Nisga'a Nation, especially family and child services. 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." 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.

Depending on the project-related migration pattern (i.e., in- or out-migration), the educational services in the Nass Valley may increase or decline. NLG has jurisdiction, defined by the NFA, over educational programs for Nisga'a citizens from pre-school to Grade 12, "including the teaching of Nisga'a language and culture." 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.

14.5 Cultural Effects

14.5.1 Overview

Effects of the proposed Project on Nisga'a culture may fall along a spectrum of both positive and negative effects depending on a combination of individual, familial, community, and cultural resilience and / or vulnerabilities. Given the complexity, richness, and history of Nisga'a culture in northwest BC, the effects of the proposed Project on culture are difficult to predict and rate. Furthermore, given the evolving and dynamic nature of culture, it is difficult to isolate changes in culture directly linked to mine-related activities. Opinions about the positive or adverse nature of cultural effects related to the proposed Project may also range across Nisga'a citizens. Nevertheless, qualitative descriptions and assessment will be

conducted in this section to the degree possible with the understanding that the experts on this subject are the Nisga'a people and that this topic is expected to be further discussed and addressed between the proponent and NLG. This text is also a placeholder for additional information from ongoing research and results.

There are eight general categories of potential cultural effects that are addressed in this section, including schedule-related, work environment-related, income-related, food, language, traffic-related, land-based, and migration-related effects. These activities and ways of being are not the sum total of Nisga'a culture, but are representative of key components of culture that may have measurable effects. There are other aspects of culture, especially spiritual in nature, that are difficult (if not impossible) to assess. Assessments are necessarily reductionistic and do not reflect the true nature of culture, which is inherently interconnected and interdependent. These activities, practices, and ways of being work in concert to create a complex social fabric and landscape, which individuals and groups navigate and co-create. As such, it is recognised that this assessment may fall short of capturing the cultural effects in their entirety, and is intended to be used more as a dialogue starter and framework for further discussion and development between the proponent and NLG.

The Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012) measures perceived effects of employment on Nisga'a respondents (summarised in Section 14.3.3). The main perceived positive effects of Project employment are related to income, skill development, and job satisfaction. The main perceived negative effects of Project employment are related to the Nisga'a language, cultural activities and events, and resource harvesting activities. The survey results indicate the level of importance and concern among respondents related to Nisga'a culture.

Table 14.5.1-1 provides a summary of possible adverse and beneficial effects on culture for each of these categories. Figure 14.5.1-1 represents a diagram of the culturally-related effects of the proposed Project. The Nisga'a Nation may experience different levels and aspects of these effects depending on their participation in the workforce and existing levels of cultural practices and engagement. Based on the results of the BCIOM outlined in Section 7.0, it is anticipated that the proposed Project will generate 120 direct hires for Nisga'a citizens in the LSA and Terrace during construction, operations, and closure phases of the proposed Project. The level of labour participation at the mine and related services may increase based on discussions between the proponent and the Nisga'a Nation.

Table 14.5.1-1: Summary of Types of Effects on Nisga'a Culture

Effect Category	Beneficial Effect(s)	Adverse Effect(s)
Schedule-related	Three week fly-in / fly-out work rotation allows lengthy uninterrupted time to participate fully in extended trips for traditional activities, burials, and / or cultural events, especially if coordinated with paid vacation time (i.e., three week vacation = 9 weeks	If the three week fly-in / fly-out work rotation does not coincide with traditional activities, burials, and / or cultural events, Nisga'a mine employee will miss these important events with resulting impacts of feelings of isolation, depression, incomplete grieving, loss of productivity and concentration, and / or resentment. For younger people loss of opportunity

Effect Category	Beneficial Effect(s)	Adverse Effect(s)
	off).	to participate also means an interruption in their cultural training.
Work Environment-related	Increased positive intercultural communication, relations, and understanding with exchange of information, experience, cultural practices, and worldviews.	Increased work place discrimination, racism, hostility, and prejudice toward groups with different ethnicities, races, gender, or religions. This may manifest in low-level avoidance to severe effects through work place violence and threats.
Income-related	Increased ability to support participation in traditional activities and more resources to access remote land use areas.	Increased inequality among community members between those who are employed at the mine and those who are not with resulting differing levels and quality of cultural participation.
Food	During three weeks off, Nisga'a citizens have access to Nisga'a diet.	Continued influx of Western cuisine in Nisga'a diet during three weeks at camp.
Language	During three weeks off, uninterrupted participation in speaking or being exposed to Nisga'a language or classes / courses teaching these languages.	Continued dominance of English and difficulty accessing language learning opportunities. English-only use and reference to place names in and around the Kitsault mine site, including mine publications and communications hinder Nisga'a language retention.
Traffic-related	Increased year round accessibility along the FSRs to the important Nisga'a land use sites.	Increased third party interest / use and impeded / delayed access to important land use sites. Prohibited access to mine site for traditional use.
Land-based	None.	Possible direct loss or degradation of land use areas due to overlap with the mine footprint.
Migration-related	Increased intercultural communication and contact in communities in the LSA and RSA with more mutual understanding and exchange.	Intercultural conflict, segregation, and prejudice aggravated by perceived cultural differences in communities in the LSA and RSA.

Note: FSR - Forest Service Road; LSA - Local Study Area; RSA - Regional Study Area

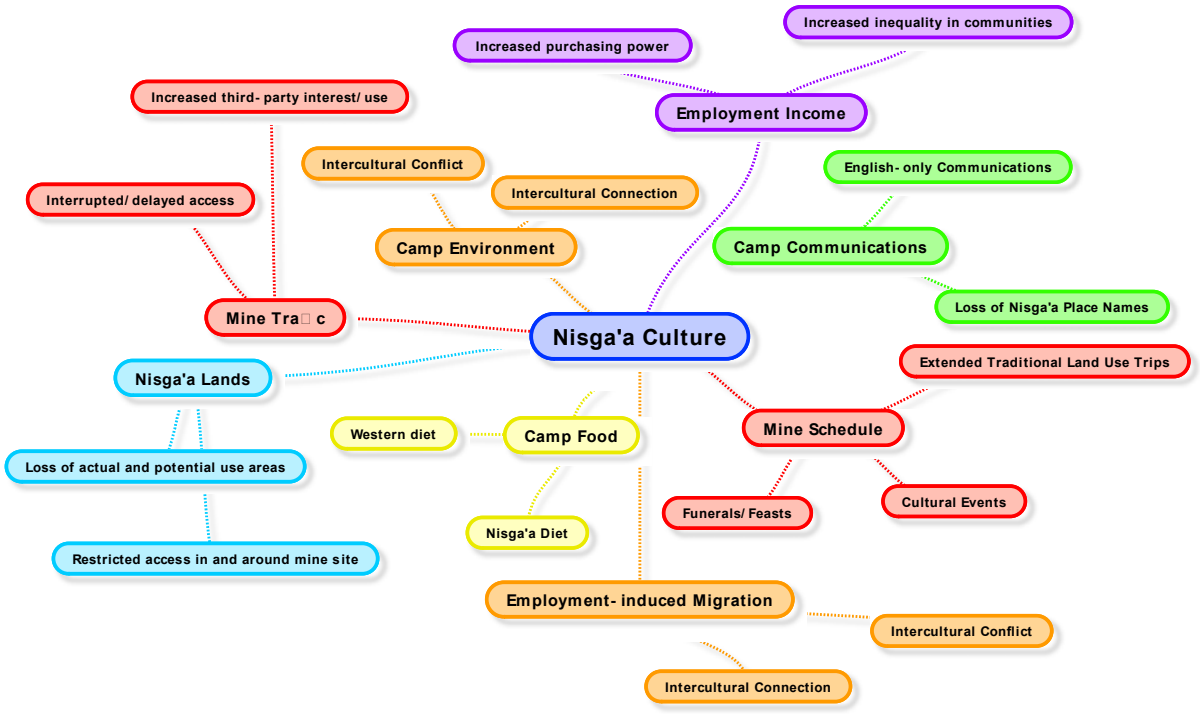

Figure 14.5.1-1: Flowchart of Effects on Nisga'a Culture

14.5.2 Schedule-related Effects

Possible negative schedule-based effects on the Nisga'a may include the inability to participate in extended traditional land use trips, funeral and bereavement events, and community cultural events. The overlap between the three-week shift rotation and these culturally important activities may occur year round, especially in summer and fall months during moose hunting and salmon fishing trips. Mine employees who cannot participate in cultural and traditional activities due to scheduling conflicts may experience a diminishment of their sense of connection to culture, ancestry, family, land, history, and community. Conversely, for harvest trips and cultural activities occurring within three weeks off, the three-week rotation may facilitate full and uninterrupted participation of the Nisga'a mine employees in these activities, which may not have been possible in previous working arrangements. This would have a resulting positive cultural effect on both individual mine employee and communities in terms of more country food availability and increased cultural wellbeing, including increased connection to Nisga'a people, places, and the history. Regardless of positive or adverse direction of the cultural effect, Nisga'a mine employees may experience greater challenges and / or complication coordinating their work and personal schedules in order to fulfill their cultural responsibilities in their community and participate in land-based traditional activities important to cultural connection and sustainability.

Based on the results of the recent Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012), the Nisga'a respondents are almost equally divided on the effect of mine-related employment on their resource harvesting activities with 48.7% (172) indicating that harvesting would be affected and 51.3% (181) responding that employment would not affect harvesting. A similar trend is observed for cultural activities with over half (56.4%) indicating it would affect their participation in cultural activities. Effects are mainly due to the distance from the area where activities take place. The remote nature of the work site primarily prevents the individuals from engaging in resource harvesting (44.7%) and participating in cultural events (58.2%). Tables 14.5.2-1 and 14.5.2-2 summarises the Nisga'a responses to how the remote job may affect their harvesting and cultural activities.

Table 14.5.2-1: Summary of Effects of Remote Job on Nisga'a Harvesting

		Count	% of Responses	% of Cases
1	No time to harvest / fish / plant	97	44.7	57.4
2	Depends on the season	79	36.4	46.7
3	No food for my family / for winter	19	8.8	11.2
4	Environmental hazards / pollution concerns	6	2.8	3.6
5	Being away from home / family	10	4.6	5.9
95	Other	6	2.8	3.6
Total		**217**	**100.0**	**128.4**

Note: Percent of Cases is based on 169 valid cases (3 missing cases)
Total Percent of Cases exceeds 100% due to multiple responses
% - percent

Table 14.5.2-2: Summary of Effects of Remote Job on Nisga'a Cultural Activities

		Count	% of Responses	% of Cases
1	Unable to attend events	135	58.2	68.2
2	Away from home / family	21	9.1	10.6
3	Culture / events are important	26	11.2	13.1
4	Obligations to participate	39	16.8	19.7
95	Other	11	4.7	5.6
Total		**232**	**100.0**	**117.2**

Note: Percent of Cases is based on 198 valid cases (0 missing cases)
Total Percent of Cases exceeds 100% due to multiple responses
% - percent

Source: Rescan 2012

14.5.3 Diet-related Effects

Nisga'a mine employees will primarily consume a diet of Western foods during their stay at the Kitsault camp. While the contemporary diet of most Nisga'a citizens includes a mixture of both Nisga'a and Western foods, the preference among some Nisga'a citizens may be for the former. The Nisga'a survey results (Rescan 2012) indicate a consistent consumption of wild meat, plants / berries, and fish. Access to and availability of Nisga'a foods is greater in the communities as compared to Kitsault camp. As such, during three-week in-camp rotation, Nisga'a employees may eat comparatively less Nisga'a foods than in their communities. Nisga'a foods represent cultural and social connection to the land and an important source of self-sufficiency and economic independence. Furthermore, land-based harvest of wild animals, fish, and vegetation also has health benefits compared to Western foods. As such, the Kitsault camp may contribute to an ongoing, overall departure from the traditional food base for Nisga'a citizens. This could be mitigated by an inclusion of Nisga'a food options in the camp diet.

14.5.4 Language-based Effects

The Project may have language-based effects on Nisga'a employees at the mine site. English will be the language spoken and used in written communications at the Kitsault camp. While most Nisga'a work and live in English-only settings, the rotation schedule presents unique challenges to language revival efforts underway in Nisga'a Villages. During the shift rotation at camp, Nisga'a mine employees may have fewer opportunities to speak the Nisga'a language. Furthermore, they will be removed for three weeks at a time from opportunities available in communities to acquire or revive their Nisga'a linguistic skills. This effect may be more pronounced in Nisga'a Villages as compared to other Aboriginal communities given the high level of linguistic knowledge in Nisga'a Village (28.8% according to the 2006 Census with greatest knowledge among residents of Gingolx at 39.7%). These statistics are confirmed by more recent results from the Nisga'a Social, Economic, Resource Use and Cultural Survey (Rescan 2012) conducted in 2011, which indicate that 32.4% of survey respondents had moderate to high understanding of the Nisga'a language.

Furthermore, mine use of English place names on maps, in figures, press releases, publications, reports, and verbal communications with Nisga'a employees and communities may contribute to continued disuse of the Nisga'a place names and / or the loss of information and importance of these place names within the Nisga'a cultural landscape. Nisga'a place names form an important part of the cultural record. The Nisga'a Nation identified important place names as part of the NFA process, which has been added to the BC Geographic Names Information System (BCGNIS) as defined in the NFA.
Table 14.5.4-1 provides a summary of formal Nisga'a place names.

Table 14.5.4-1: Summary of Nisga'a Place Names (as defined in the NFA)

Map Reference	Nisga'a Place Name	English Place Name
103P.014	*Gitwinksihlkw*	Canyon City
103P. 003	*Laxgalts'ap*	Greenville
103I. 091	*Gingolx*	Kincolith
103P. 025	*Gitlaxksiip*	Grease Harbour
103P. 035	*Ksi Gwinhat'al*	Kwinatahl River
103P. 043	*Gits'oohl*	Gitzault I.R. No. 24
103P. 056	*Ksi Gahlt'in*	Kiteen River
103P. 025	*Gitlaxt'aamiks*	New Aiyansh
103P. 042/043	*K'alii Ts'im Gits'oohl*	Alice Arm
103P. 042	*K'alii Kshwan*	Hastings Arm
103I. 092	*K'alii Aksim Lisims*	Nass River
103O.010	*K'alii Xk'alaan*	Portland Canal
103P. 056	*Ksi W'iipdalks*	Cranberry River

Note: NFA - Nisga'a Final Agreement

14.5.5 Camp Environment

Employment at the proposed Project may increase the likelihood of both positive and negative intercultural interactions. Nisga'a mine employees will make up a percentage of the total work force at the proposed Project. The remainder of the work force will be a mixture of hires from regional, provincial, and national sources. Employees from a variety of social, economic, cultural, ethnic, and religious contexts will co-habit the small, remote premises at the Kitsault camp. Mine employees will work, eat, and live together in rotations of three weeks. Close quarters, combined with work-related stress and demands create an environment for potential conflict among employees from different backgrounds. The range of expression of this conflict may be as subtle as forming separate social groups to as severe as use of violence and racial hate speech. However, there may also be the potential for positive interactions between employees from different backgrounds. Increased contact among employees may facilitate transfer of information and knowledge about distinct cultures and worldviews, including increased understanding of the Nisga'a Nation by non-Aboriginal mine employees, and development of long-term, positive relationships.

14.5.6 Income-Related Effects

Nisga'a mine employees participating in seasonal traditional activities, such as hunting, fishing, or trapping, may experience a positive cultural effect from increased purchasing power for equipment and supplies due to employment the proposed Project. This may include ATVs, boats, snowmobiles, rifles, temporary camp structures, fishing supplies, ammunition, fuel, horses, and traps. This allows Nisga'a citizens to participate in traditional activities more often, effectively, and efficiently.

The adverse effect of mine-related income on Nisga'a culture is an increased income inequality among Nisga'a Village residents. Nisga'a citizens employed at the mine may have better access to equipment and resources to support improved cultural participation compared to other citizens with fewer resources. This may create resentment and division among Nisga'a citizens in Nisga'a Villages. There may be a spirit of mutual help and sharing that could counteract the effects of income inequality to ensure broader distribution of economic benefit throughout the communities for wider improvement of cultural participation; however, this is on an individual case-by-case basis and cannot be adequately predicted or anticipated.

14.5.7 Access-related Effects

Year-round maintenance activities associated with the proposed Project along the Kitsault transportation route, especially the Nass, Nass-Kinskuch, and Nass-Kwinatahl Forest Service Roads (FSRs), may create positive and negative cultural effects related to access. Increased accessibility will arise from snowploughing in winter months and grading and vegetation management along the road Right-of-Ways (ROWs) in the spring. This may have a positive effect on local Nisga'a citizens seeking access to important land use and cultural sites for use and / or seasonal occupancy. For example, Nisga'a citizens use the FSR network for pine mushroom picking, hunting, fishing, and trapping. Furthermore, Nisga'a citizens have NFA-defined resource allocations and rights to access in the NWA and Nass Area. Increased access along the network of FSRs could facilitate land and resource use year round, especially in the winter months for steelhead fishing, snowmobiling, trapping, and hunting. Also, the mine site does not block important land-based access to Alice Arm for Nisga'a citizens.

Increased accessibility, however, may also have a perceived negative effect on Nisga'a culture due to potential increased interest and access from third parties, including local, regional, and non-resident hunters. This may create pressure on limited wildlife, vegetation, and fish resources, in particular, a declining moose population in both the Nass Valley. This may decrease the availability of resources important to Nisga'a sustenance and cultural practices, such as ceremonies and events. This also creates a conservation issue with minimal existing enforcement capacity due to limited funding and expansive jurisdictional area to respond to reports of illegal hunting and fishing. This also conflicts with Nisga'a Nation's ability to manage their NFA lands in a way that is in harmony with their laws, undermining the functionality of generations-old cultural practices and customs.

14.5.8 Land-based Effects

Construction and operations at the Kitsault mine site may cause the loss or degradation of land use sites and areas defined by the NFA. This is also discussed in Section 14.8.2. The NFA describes Nisga'a rights to Category A Land (i.e., *Gits'oohl*) 5 km northwest of the Kitsault mine site, overlap with Nisga'a guide outfitting territory, Nisga'a intertidal bivalve area along Alice Arm (15 km southwest of the proposed Project), and Nisga'a angling guiding tenures along Kitsault and Illiance Rivers (5 km north of the proposed Project). Traditional activities will be prohibited among both Nisga'a mine employees and Nisga'a

land users in and around the mine site. The area occupied by the mine footprint, including a 500 metre (m) buffer, amounts to 1,980 hectares (ha). The NWA and Nass Area cover an area of 1,610,100 ha and 2,700,000 ha, respectively. The proportion of prohibited area in and around the mine site is 0.12% of NWA and 0.07% of the Nass Area. This represents a minimal loss to these NFA lands. It is recognised that all NFA lands and areas are equally important to the Nisga'a Nation. However, it is anticipated that there are other alternative areas throughout NFA lands for Nisga'a citizens to engage in traditional and traditional activities besides the prohibited mine site area.

Disturbance, including noise and visual, are possible on NFA-defined lands, access, and resource use areas in proximity of the mine site; however, it is considered minimal. This is discussed in more detail in a subsequent section (Section 14.8.5). Negligible to moderate effects are assessed for a range of wildlife species in Section 6.11 of the Application, including the initial designated species in the NFA (i.e., and moose, grizzly bear, and mountain goat), based on mine-related activities, life histories, and responses to development. As such, NFA wildlife-related allocations are not expected to decline for mountain goat and American marten, but may be minimally affected for grizzly bear and moose due to vehicular mortality. As a result, the maintenance of wildlife resources in and around the mine site available for current and potential Nisga'a harvest is expected to have an overall neutral effect on Nisga'a culture.

14.5.9 Migration-related Effects

Based on the results of the Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012), there is a possibility for a net Nisga'a out-migration from the Nass Valley. Depending on the scale of the out-migration, there may be a minor adverse effect related to fewer Nisga'a to ensure the strengthening and consolidating of Nisga'a culture, along with possible decreased participation in cultural events, cultural cohesiveness, and sustainability. The in-migration scenario is also considered, whereby Nisga'a citizens returning to the Nass Valley may contribute to the (re)introduction, revitalization, and strengthening of Nisga'a culture with increased numbers of people participating in cultural events and traditional harvesting activities. Given that Nisga'a culture is dynamic and evolving, Nisga'a citizens from outside the Nass Valley may influence and shape Nisga'a culture in new directions and manners, which may garner a range of reactions from existing Nisga'a residents.

14.5.10 Summary

In summary, there is potential for increased participation in traditional activities, cultural events and funerals, increased consumption of land-based diet, increased opportunity to speak and learn the Nisga'a language during the 3 weeks of the work rotation in the community, and increased positive intercultural dialogue and relationships, which are expected to strengthen and support Nisga'a culture. However, there may also be decreased participation in traditional activities, cultural events, and funerals, decreased consumption of land-based diet, decreased opportunity to speak and learn the Nisga'a language, continued prominence of English place names, increased negative intercultural interactions during the 3 weeks at the remote mining camp, and increased third party access and use along the

transportation route to the mine site, which combined could undermine Nisga'a cultural vitality. Table 14.5.10-2 summarizes the types of cultural effects that the Nisga'a Nation may experience related to the proposed Project, and the likelihood of them occurring.

The combined effect of work schedule, camp environment, diet, in-migration, mine income, and mine site on Nisga'a culture is anticipated to range from low to moderate with a greater effect on language, cultural activities, and traditional practices, such as resource harvest. The level of effect is informed by results of the Nisga'a Social, Economic, Resource Use and Cultural Survey (Rescan 2012), which indicate a concern among Nisga'a respondents that employment at the mine will adversely affect participation in these activities and practices. That is, a majority of survey respondents reported that working at a remote job would affect their cultural activities (56.4%) with the main reason for this being the inability to attend cultural events (indicated by 58.2% of respondents). However, there is a statistically significant difference in perceived effects on cultural activities between those living on and off Nisga'a Lands. A greater percentage of Nisga'a respondents living on Nisga'a Lands have concerns about remote jobs affecting their cultural activities (i.e., 64% on Nisga'a Lands versus 46.4% off Nisga'a Lands).

Less than half of survey respondents (48.7%) reported that a remote job would affect their resource harvesting activities with the top reason for this effect being a lack of time to hunt, fish, and harvest plants (reported by 44.7% of respondents). There is a statistically significant difference of perceived cultural effects of those living on and off Nisga'a Lands. That is, there is greater percentage of respondents living on Nisga'a Lands indicated that a remote job would affect their resource harvesting (i.e., 55.7% on Nisga'a Lands compared to 39.3% off Nisga'a Lands).

While in many cases, especially among Nisga'a respondents living on Nisga'a Lands, the responses are more than 50% for the effect of remote jobs on Nisga'a cultural activities and resource harvesting, this concern translates less into a barrier to employment with 29.2% of respondents reporting effects on their cultural events and resource harvesting activities as a barrier to employment. The top two barriers reported by 33.2% and 29.9% of respondents are family / household situation and current employment situation, respectively. In general, the mean score for barriers to employment are less than 4, which indicates the extent of barriers is less than neutral (i.e. smaller barriers). Furthermore, the beneficial effects of the proposed Project, according to respondents, are rated neutral for cultural effects at the Nisga'a Nation, community, family, and individual levels. The highest adverse effect indicated by 36.8% of respondents is the cultural effect on resource harvesting activities, followed by cultural activities (30.5%) and language (25.1%).

Overall, these survey results considered in combination indicate a high level of concern and the importance to Nisga'a citizens of maintaining and supporting Nisga'a language, cultural events, and harvesting activities. These play a key role in some Nisga'a survey respondent decision-making whether, and indicate challenges that Nisga'a may face if they choose employment at the proposed Project. The survey results also indicate a potential for greater

challenge among Nisga'a citizens living on Nisga'a Lands as compared to Nisga'a citizens living off Nisga'a Lands.

Table 14.5.10-1: Potential Direct Project Effects On Nisga'a Culture

Project Component	Project Phase	Potential Direct Project Effect	Likelihood Of Occurrence
Mine work schedule	C, O	Increased complication or opportunity to participate in cultural events, funerals, and traditional activities.	High
Camp environment	C, O	Increased challenge or opportunity for intercultural relations and communications.	High
Camp food	C, O	Increased challenge or opportunity to consume land-based Nisga'a or Aboriginal diet.	High
Mine employment and income	C, O	Increased challenge or opportunity to purchase equipment and resources to participate in traditional activities.	Medium
Camp environment	C, O	Increased opportunity or challenge to speak Nisga'a or Aboriginal language. Use of English place names may diminish use or importance of Nisga'a and Aboriginal place names).	Medium
Mine traffic	C, O	Increased third party interest and use of the land around the mine site and transportation route due to increased maintenance (especially the FSRs).	Medium
Mine site	C, O	Loss or degradation of Nisga'a land and resource use areas on the mine footprint.	Medium
Mine site	C, O	Prohibited access for land and resource use within buffer of the mine (for safety).	High
Mine employment and income	C, O	Increased challenge and opportunity for intercultural dialogue and relations due to in-migration from employment at the mine.	Low
Camp environment, mine traffic, mine site, mine employment and income, mine work schedule, and camp food	D/C, PC	Many cultural effects will return to baseline conditions (especially those occurring at the mine site or along transportation route) and some may persist depending on whether in-migration population moves or remains.	High

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

Note: FSR - Forest Service Road

.

Table 14.5.10-2: Summary of Potential Interaction Between Project Direct Effects on Other Valued Components and Nisga'a and Aboriginal Culture

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
Schedule-based effect	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	+/-	NI	NI	+/-
Camp Environment-related effect	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	+/-	NI	NI	+/-
Food-related effect	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	+/-	NI	+/-	+/-
Income-based effect	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	+/-	+/-	NI	NI	+/-
Language-related effects	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	+/-	NI	NI	NI
Access-related effects	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	+/-	NI	NI	+/-
Land-based effects	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	+/-	NI	NI	+/-
Effects related to in-migration	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; n/a - not applicable

14.5.11 Mitigation Measures

Based on the cultural effects identified and discussed in the previous sections, the first step toward developing meaningful and effective mitigation measures would be to conduct a cultural needs assessment among Nisga'a employees at the beginning of operations of the proposed Project. This survey effort would allow Nisga'a employees to identify their cultural needs and interests, and rank their preferences for the mitigation options listed in Table 14.5.11-1 and others provided by NLG in subsequent discussions with the proponent. This would ensure that the mitigation measures ultimately selected in collaboration with NLG align with actual needs of Nisga'a employees hired at the mine site to guarantee the greatest implementation success. Based on the results of the Nisga'a Social, Economic, Resource Use and Cultural Survey (Rescan 2012), there may different needs expressed by Nisga'a employees living on Nisga'a Lands as compared to those living off Nisga'a Lands. Sensitivity to these differences will be considered and incorporated into the cultural program at the mine site. Overall, the proponent is committed to accommodating and supporting cultural needs among Nisga'a employees working at the proposed Project.

Furthermore, the proponent would also develop key cultural monitoring indicators in collaboration with NLG, which would be tracked on an annual basis to determine the nature, scope, and scale of cultural effects of the proposed Project on Nisga'a employees and communities. Experience from other northern mines, such as Diavik and EKATI (where social, economic, and cultural indicators are collected and compiled on an annual basis) may provide useful input and direction for the social and cultural monitoring as part of the proposed Project. An annual evaluation of cultural programs implemented at the mine will also be conducted by the proponent in collaboration with NLG to ensure program efficacy and success. The mitigation options related to cultural effects are summarised in Table 14.5.11-1.

Table 14.5.11-1: Mitigation Options Related to Potential Project on Nisga'a Culture

Project Effect	Project Phase	Mitigation / Enhancement Options	Mitigation Success Rating
Increased complication or opportunity to participate in cultural events, funerals, and traditional activities.	C,O	Schedule coordination, accommodation, or development of alternatives. Develop HR policies that recognise and strive to accommodate cultural requirements.	Moderate
Increased challenge or opportunity for intercultural relations and communications.	C,O	Intercultural awareness training for all mine employees.	Moderate
Increased challenge or opportunity to consume land-based Nisga'a or Aboriginal diet.	C,O	Regular Nisga'a food service within limits of sustainability and resource availability.	Low
Increased opportunity to purchase equipment and resources to participate in traditional activities. Increased community income inequality.	C,O	Development of adaptive management strategies via the Social Sustainability Committee or similar.	High

Project Effect	Project Phase	Mitigation / Enhancement Options	Mitigation Success Rating
Increased opportunity or challenge to speak Nisga'a or Aboriginal language.	C,O	Coordination with Nisga'a educational institutions to determine possible in-camp linkages to Nisga'a language programs and courses, where interest among Nisga'a employees arises (based on feedback from cultural needs assessment). Tracking and monitoring of Nisga'a employee linguistic abilities through the hiring and application process.	Moderate
Continued decreased use of Nisga'a or Aboriginal place names.	C,O	Use of Nisga'a place names along with English place names in signage and communications at the mine site and with Nisga'a Villages (based on place names provided in the NFA or by NLG).	
Increased third party interest and use of the land around the mine site and transportation route due to increased maintenance (especially the FSRs).	C,O	Collaboration and coordination with Nisga'a Nation on the Transportation and Access Management Plan.	Moderate
Loss or degradation of Nisga'a and Aboriginal land and resource use areas on the mine footprint.	C,O	Development of adaptive management strategies through engagement with Nisga'a Nation.	Moderate
Prohibited access for land and resource use within 1 km buffer of the mine (for safety).	C,O	Communications with Nisga'a Nation about delays and impediments.	High
Increased challenge and opportunity for intercultural dialogue and relations due to in-migration from employment at the mine.	C,O	Communication between proponent and NLG regarding levels of new or departing residents to/from Nisga'a Villages.	Moderate

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

Note: FSR - Forest Service Road; HR - human resources; km - kilometre; NFA - Nisga'a Final Agreement; NLG - Nisga'a Lisims Government

The mitigation options summarised in Table 14.5.11-1 are described in more detail to support further discussion and decision-making between the proponent and the Nisga'a Nation. In order to address schedule-related cultural effects, where possible and feasible, the proponent will work with Nisga'a mine employees to address the need for extended leave of absence to participate in traditional activities, community-based cultural events, and culturally important bereavement. Furthermore, based on results from the Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012), approximately 44% of Nisga'a respondents are more likely to consider a job in a remote location if telephone and internet access are provided. Approximately 29% of Nisga'a respondents are more likely to consider a mine-related job in one or two week work cycles. Longer shifts (three and four week work cycles) have more people indicating they would be 'Less Likely' to work with these conditions (45% and 54%, respectively). Table 14.5.11-2 provides a summary of Nisga'a survey responses to different camp and schedule considerations related to

employment at the mine site. Shorter work rotations, communication methods, and other options will be discussed and agreed upon with NLG.

Table 14.5.11-2: Nisga'a Preferences for Camp and Schedule Provisions in Employment Consideration

	Less Likely		Just as Likely		More Likely		Total
	Count	%	Count	%	Count	%	
Telephone access	43	12.3	161	43.1	156	44.6	350
Internet access	49	14.1	146	42.0	153	44.0	348
Shifts 1 week away 1 week home	108	31.1	136	39.2	103	29.7	347
Shifts 2 weeks away 2 weeks home	109	31.1	140	40.0	101	28.9	350
Shifts 3 weeks away 3 weeks home	163	46.8	121	34.8	64	18.4	348
Shifts 4 weeks away 4 weeks home	198	56.9	98	28.2	52	14.9	348

Note: 14 to 17 missing cases for each item
% - percent

Source: Rescan 2012

The cultural effects related to mine camp environment, including intercultural relations, could be addressed through appropriate training and education for managers and employees on an ongoing basis throughout construction and operations of the mine. The course curriculum could be developed in collaboration with the Nisga'a Nation to ensure culturally appropriate, relevant, and meaningful content.

In order to mitigate the cultural effects related to diet, the proponent could serve Nisga'a foods in camp on an occasional, sustainable basis to accommodate Nisga'a diet and facilitate intercultural connection and understanding.

It is difficult to enhance the cultural effects of increased purchasing power for equipment and supplies related to traditional activities among Nisga'a mine employees, given that this is an individual preference and choice. The effects of income inequality within communities and related ability to participate in cultural activities are, for the most part, beyond the control of the proponent. The proponent is committed to establishing a forum in which to discuss and develop adaptive management strategies if and when community-based effects arise.

In order to address the cultural effects related to language, the proponent would consider such strategies as providing a space and resources for in-camp Nisga'a language group meetings or links to community-based courses and programs from camp. To this end, the proponent would explore coordination with WWNI and other Nisga'a educational institutions in collaboration with NLG. This option would also depend on the collective interest of Nisga'a employees in off-shift, in-camp language courses and programs, which would be assessed through feedback from the cultural needs assessment. Subject to agreement by the Nisga'a and if appropriate, these language activities could also be available to non-

Aboriginal employees to facilitate and encourage positive intercultural interactions and understanding.

Third party access along the Kitsault transportation route is generally beyond the control of the proponent. To the degree possible, the cultural effect of increased third party interest and use of areas along the annually maintained Kitsault transportation route could be addressed through the development of a final Transportation and Access Management Plan with the Nisga'a Nation. The preliminary plan is summarised in Section 11.2.18.

There are negligible anticipated losses to Nisga'a NFA-defined lands. However, if specific Nisga'a sites of importance are identified through continued engagement and research efforts, the proponent will address and protect these to the best of its ability in an adaptive management approach in collaboration with the Nisga'a Nation. To address possible cultural effects related to access, the proponent will inform Nisga'a Nation of scheduled delays or temporary blocks to access for Nisga'a citizens along the FSR network. Where possible, for prolonged interference with access (where requested), alternatives would be discussed and considered between the proponent and the Nisga'a Nation.

Where there are cultural effects arising from a possible in-migration scenario arising due to mine employment, the proponent would be prepared to discuss mine-related migration concerns with Nisga'a Nation in the context of the Social Sustainability Committee, where requested.

14.5.12 Potential Residual Effects and Their Significance

Despite implementation of mitigation options, there are several cultural effects that may remain. In spite of the proponent's best efforts to accommodate Nisga'a mine employees to facilitate their participation in cultural events and activities scheduling conflicts may still arise. The Nisga'a Social, Economic, Resource Use, and Cultural Survey (Rescan 2012) also indicates that the majority of Nisga'a survey respondents (62.7%) do not have previous experience with extended stays at a job site. In addition, Nisga'a respondents are nearly equally divided between those who would not consider a job with work in a remote location (42.5%) and those who would (48.1%) with 9.6% who are undecided. Furthermore, the camp will necessarily be mostly English speaking and serve a primarily Western diet. Even with intercultural training, the level of success is dependent on personal awareness and adaptability of individual employees. As such, intercultural conflict and negativity may occur at the camp in some capacity. Despite the Transportation and Access Management Plan, winter clearing of the FSRs provides third party year-round improved access relative to conditions today, which is outside of the proponent's control. Given that dynamics between newly arrived residents and existing populations is largely beyond the proponent's ability to address, there may be remaining adverse cultural effects based on negative interactions with in-migrated residents. In general, the aforementioned effects could negatively affect Nisga'a a culture and wellbeing.

There will also be positive residual legacies and effects on Nisga'a culture from the proposed Project, including possible increased participation in cultural events, and

traditional activities, improved intercultural connection and relations in camp and communities, increased opportunity to speak or learn Nisga'a languages and partake of an Nisga'a diet, and increased ability to purchase supplies and equipment to participate in traditional activities. Table 14.5.12-1 summarises the residual cultural effects, including the direction (i.e., adverse, positive, or mixed).

Table 14.5.12-1: Summary of Residual Effects for Nisga'a and Aboriginal Culture

Project Phase	Residual Effect	Direction
C, O	Remaining complications or opportunities to participate in cultural events, funerals, and traditional activities.	Mixed
C, O	Remaining challenge or opportunity for intercultural relations and communications.	Mixed
C, O	Remaining challenge or opportunity to consume land-based Nisga'a diet.	Mixed
C, O	Remaining opportunity to purchase equipment and resources to participate in traditional activities and income inequality in communities.	Mixed
C, O	Remaining opportunity or challenge to speak Nisga'a language.	Mixed
C, O	Remaining third party interest and use of the land around the mine site and transportation route (especially the FSRs).	Mixed
C, O	Remaining challenge and opportunity for intercultural dialogue and relations due to in-migration from employment at the mine.	Mixed

Project phase: C - construction; D/C - decommissioning and closure; O - operations; PC - post-closure
Note: FSR - Forest Service Road

The residual cultural effects considered collectively, inclusive of mitigation measures, are adverse in direction and low in magnitude, due to the small change from baseline conditions. That is, scheduling is often an issue with other employers; in other words, scheduling challenges are more symptomatic of incongruence between wage-based and sustenance economies, rather than something specific or unique to the proposed Project. Balancing work, personal, and cultural schedules is an already existing challenge faced by Nisga'a citizens, especially those seasonally employed. The proposed mitigation measures will most likely address many of the scheduling effects on Nisga'a culture. The estimated number of Nisga'a mine employees is 120 direct Nisga'a hires in the LSA and Terrace based on the results of the BCIOM (with input from the proponent). This represents small percentage of total population in the Nisga'a Villages (i.e., 1,696) and Terrace. The geographic extent of residual cultural effects are on the level of the community and the duration is medium-term during construction and long-term during operations. The frequency of the occurrence of the residual effects is anticipated to be periodic with high degree of reversibility once the mine has been closed. These cultural effects are very likely.

Positive residual cultural effects of the schedule bolstered by mitigation measures may strengthen Nisga'a cultural revival and preservation. Furthermore, there may be benefits of increased intercultural communication, interaction, and relationship, including increased knowledge, understanding of, and appreciation for Nisga'a culture among non-Aboriginal employees. Because of the low number of estimated Nisga'a mine employees, the positive

cultural effects related to schedule, income, language, food, and intercultural relations are anticipated to be minimal. The residual cultural effects are beneficial in direction, low in magnitude with a geographic extent at the community level and a medium-term for construction and long-term duration during operations with a periodic frequency. The residual effects are reversible and very likely to occur. Both positive and negative residual effects related to cultural are considered not significant (minor). Table 14.5.12-2 summarises the residual effects and their ratings.

Table 14.5.12-2: Residual Effects Assessment by Project Development Phase for Nisga'a and Aboriginal Culture

Parameter	Construction / Operations	
Residual effect	Positive cultural effects related to schedule, camp environment, income, food, language, traffic, land, and migration	Negative cultural effects related to schedule, camp environment, income, food, language, traffic, land, and migration
Effect attribute		
Magnitude	Low	Low
Spatial extent	Regional	Regional
Duration	Medium-term (construction); Long-term (operations)	Medium-term (construction); Long-term (operations)
Frequency	Continuous	Continuous
Reversibility	Reversible	Reversible
Direction	Positive	Adverse
Certainty	Very likely	Very likely
Residual effect significance	Not significant (minor)	Not significant (minor)
Level of confidence	Moderate	Moderate

14.5.13 Cumulative Effects Assessment

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

Residual cultural effects from the proposed Project may combine and interact with effects from several past, present, and foreseeable projects to produce positive and negative cultural legacies for the Nisga'a Nation. It is difficult to predict cumulative cultural effects; however, a broad, qualitative overview of possible interactions will be described for which mitigation options will be proposed. Finalisation of these options is pending further discussion and agreement with the Nisga'a Nation for local-level relevance and meaning. Table 14.5.13-1 summarises the residual effects that will be carried forward in the cumulative cultural effects assessment.

Table 14.5.13-1: Project Related Residual Effects - Rationale for Carrying Forward Into the Cumulative Effects Assessment

Project Component	Project Phase	Residual Effect	Rationale	Carried Forward in CEA
Mine work schedule	C, O	Remaining schedule-related complications.	Rotational schedules on other resource development projects may compound the scheduling challenges faced by Nisga'a employees.	Yes
Mine camp	O	Remaining camp environment-based conflict.	Experiences of cultural conflict at remote camps on other resource development projects may compound with that at the proposed Project to produce a cumulative cultural effect.	Yes
Mine food	O	Continued transition away from traditional food base.	Western food served at other camps may act in combination with the proposed Project to diminish the role of Nisga'a foods.	
Mine employment	O	Continued increased purchasing power and continued income inequality in communities.	Increased inequality may continue with other projects to a certain threshold beyond which inequality will decline as more and more Nisga'a citizens are employed at high paying resource development jobs with associated cultural benefits.	Yes
Mine communications	O	Continued transition away from Nisga'a and Aboriginal language.	English-only communications on other resource development projects may combine with the proposed Project resulting in a cumulative cultural effect.	Yes
Road maintenance activities	O	Continued third party interest and use of the land around the mine site and along transportation route.	New access roads developed by the NTL Project may combine with the proposed Project year-round maintenance of the FSR network to produce a cumulative access effect on Nisga'a culture.	
Mine employment	O	Continued migration-related intercultural challenge.	In-migration from the KSM Project to regional centres (especially Terrace) may combine with that of the proposed Project to produce a cumulative shift in cultural demographics.	

Project phase: C - construction; O - operations

Note: CEA - cumulative effects assessment; FSR - Forest Service Road; KSM - Kerr-Sulphurets-Mitchell Copper / Gold Mine; NTL - Northwest Transmission Line

14.5.13.2 Interaction Between Nisga'a Culture and Other Past, Present or Future Projects / Activities

There are several past, current, and future activities and projects in the region whose components have or may combine and / or interact with the proposed Project to create cumulative cultural effects on the Nisga'a Nation. In particular, traffic, employment, income, work schedules and environments, and in-migration from the Northwest Transmission Line

(NTL) and Kerr-Sulpherets Mitchell (KSM) Projects may interact spatially and temporally with the proposed Project. To a lesser degree and smaller scale, past and current mining exploration may combine with the Kitsault traffic along the network of FSRs to create a cumulative effect. However, the most expedient access to exploration sites north of the proposed Project is by air (e.g., fixed wing airplanes and helicopters), which reduces the amount of traffic along the network of FSRs, thus minimising the cumulative effect. The historic and existing townsites of Kitsault and Alice Arm have very low number of year-round residents, and, as such, are not considered to interact with the proposed Project to produce a cumulative cultural effect. Finally, local and regional transportation and access is currently low along Highway (Hwy) 37, Hwy 113 and the network of FSRs. However, in the future this may increase with the remote possibility that the province decides to upgrade the Nass FSR to a highway (which is referenced in the NFA). This may interact with the proposed Project to produce cumulative cultural effects. Table 14.5.13-2 provides a summary of the possible spatial and temporal interactions between the past, current, and future projects and activities in the region.

Table 14.5.13-2: Assessment of Interaction Between Other Projects, Human Activities and Reasonable Foreseeable Projects with Nisga'a and Aboriginal Culture

Potential Effect	Historical Land Use			Representative Current And Future Land Use					Reasonably Foreseeable Projects	
	Mining /exploration (includes Kitsault)	Kitsault Townsite (presume inhabited by caretakers for foreseeable future)	Alice Arm (presume inhabited by vacationers in the summer for	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	Kerr-Sulpherets Mitchell (KSM) Project	Northwest Transmission Line (NTL) Project
Remaining schedule-related complications	NI	NI	NI	o	NI	NI	NI	NI	o	o
Remaining camp environment-based conflict	NI	NI	NI	o	NI	NI	NI	NI	o	o
Continued transition away from traditional food base	NI	NI	NI	o	NI	NI	NI	NI	o	o
Continued increased purchasing power and continued income inequality in communities	NI	NI	NI	o	NI	NI	NI	NI	o	o
Continued transition away from Nisga'a and Aboriginal language	NI	NI	NI	o	NI	NI	NI	NI	o	o
Continued third party interest and use of the land around the	NI	NI	NI	o	o	NI	NI	NI	o	NI

Potential Effect	Historical Land Use			Representative Current And Future Land Use					Reasonably Foreseeable Projects	
	Mining /exploration (includes Kitsault)	Kitsault Townsite (presume inhabited by caretakers for foreseeable future)	Alice Arm (presume inhabited by vacationers in the summer for	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	Kerr-Sulpherets Mitchell (KSM) Project	Northwest Transmission Line (NTL) Project
mine site and along transportation route										
Continued migration-related intercultural challenge	NI	NI	NI	o	NI	NI	NI	Ni	o	o

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

14.5.13.3 Identification of Potential Cumulative Effects

The NTL and KSM Projects have project components that may interact spatially and temporally with the proposed Project during construction, operations, closure, and post-closure phases to create cumulative cultural effects. Table 14.5.13-3 summarises the employment numbers, work rotation schedule, income, camp environment, traffic levels, and access or maintenance components of the three projects. For the most part, these components do not overlap spatially (with the exception of mine-related traffic), but rather temporally (and may be experienced at the community level).

Table 14.5.13-3: Overlapping Kerr-Sulphurets-Mitchell Copper / Gold Mine Project, Northwest Transmission Line, and Kitsault Project Components

Project	Nisga'a Employment #s		Work Schedule		Camp Environment		Traffic Numbers		Access/ Maintenance	
	C	O	C	O	C	O	C	O	C	O
NTL	165 FTEs	0.1 FTE	2-week rotation		Construction Camps at Rosswood and Nass Camp. English-only, Western Food	No camps	High**	Low**	New road access at regular intervals along the transmission corridor	
KSM	Assume 612 FTEs	Assume 82 FTEs	Assume 2-week rotation		Remote camp, English-only, Western food		High**	Low**	12 km access road north of Bell II	
Kitsault	24 FTEs	24 FTEs	3-week rotation		Remote camp, English-only, Western food		108 vpd	24 vpd	Year round maintenance along network of FSRs	

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

Note: Low - 1-50 vpd; Medium - 51-150 vpd; and High - 151+ vpd
**These descriptors are rough representations of daily traffic levels for purposes of developing the cumulative effects assessment. These are subject to change.

FSR - Forest Service Road; FTE - Full-Time Equivalent; km - kilometres; KSM - Kerr-Sulphurets-Mitchell Copper / Gold Mine; NTL - Northwest Transmission Line; vpd - vehicles per day

On a project-by-project basis, the cultural effects are for the most part incremental; however, in combination on a regional scale, they may represent larger changes to the Nisga'a cultural landscape, especially over the long term. The Nisga'a have a long history of involvement in the commercial fishing, seafood harvesting and forestry sectors, particularly the logging sector. In addition, the Nisga'a have knowledge and experience of cultural retention and promotion. It is therefore not anticipated that these projects will produce rapid or sweeping cultural effects. The exact pathway and scale of the cumulative effect is difficult to anticipate. The following are descriptions of possible scenarios based on assumptions or information provided by proponents on the NTL and KSM Projects (summarised in Table 14.5.13-3).

The predicted residual effect specific to the proposed Project of schedule conflicts may combine with similar scheduling challenges experienced by Nisga'a employees on the KSM and NTL Projects with possible adverse cumulative effects on Nisga'a culture. The possible work schedule overlaps depend on the level of employment at each respective project (with a conservative estimate of 801 predicted and assumed FTEs during construction and 106.1 FTEs during operations). Most of the cumulative schedule-related effects on Nisga'a culture are expected to be short-term arising during the construction phases of the projects.

Furthermore, the camp environment at the KSM and NTL Projects, and the propose Project may have a cumulative adverse effect on Nisga'a culture. The combined negative experiences of Nisga'a employees working at these three projects (especially during the

construction phase with the potential a high proportion of Nisga'a citizens employed), there may be greater, compounded sense of frustration, anger, disappointment, and alienation. Of particular concern is intercultural conflict that may occur and go unaddressed in similar fashion across all three projects, creating entrenched patterns potentially complicating repair and reconciliation of intercultural issues or challenges at each project.

The remote camp at the KSM and NTL Project, and the proposed Project will be English-only and serving a primarily Western diet. This may have an adverse combined cultural effect with a possible overall, continued shift away from the Nisga'a languages and traditional diets. This cumulative effect will most likely be short-term, primarily concentrated during the construction phases of these projects where there is the greatest level of employment (i.e., 801 predicted and assumed Full-Time Equivalents (FTEs) compared to 106.1 FTEs during operations). However, it is acknowledged that some of the existing Nisga'a diet consists of Western foods. This linguistic and culinary cumulative cultural effect is not unique to these projects, representing a broader, ongoing trend since Euro-Canadian contact.

While the exact income levels are not identified by the proponents of the three projects, they are assumed to be above current average incomes in Nisga'a Villages. As such, the cumulative employment of Nisga'a citizens by the proposed Project and the NTL and KSM Projects may result in a positive cumulative cultural effects related to increased purchasing power for supplies, equipment, and materials to participate in traditional use activities, such as hunting, trapping, and fishing. The possible added Nisga'a employment at the three projects may also reduce the amount of income inequality experienced in Nisga'a Villages. That is, the greater the number of Nisga'a employees hired with above average incomes, the less possible conflict and resentment there may be among village residents as more and more Nisga'a citizens have the opportunity to purchase equipment and supplies of their choosing to support their traditional activity. This cumulative effect will most likely occur primarily during construction and wane during operations.

There may also be increased third-party interest and access as a result of project-related construction and maintenance activities. Only the proposed Project and the NTL Project overlap spatially in their access and maintenance activities. As such, access-related cumulative effects on Nisga'a culture only consider these two projects. The combination of the proposed Project's year-round maintenance along the Nass FSR and the NTL Project's possible construction of additional access in the Cranberry and Kiteen areas may result in increased third party interest and use in the areas adjacent to the Nass FSR. This may include activities such as hunting, fishing, and pine mushroom picking. Without specific locations of access road construction planned for the NTL Project, it is not possible to assess the extent of this adverse cumulative effect.

Finally, there may be an adverse cumulative cultural effect related to increased in-migration to Nisga'a Villages due to the NTL and KSM Projects, and the proposed Project. In-migration is considered to be unlikely for the NTL Project due to the short-term, temporary nature of the construction of the transmission line. Nevertheless, BC Hydro conservatively

estimates 165 new residents during the three-year construction phase with substantially fewer, if any, during operations. Detailed estimates of the level of in-migration has not been provided to date by the proponent of the KSM Project; however, given the proposed KSM work rotation with fly-in, fly-out which allows out-of-region mine employees and families to stay in their residence of origin, it is anticipated that the level of in-migration to Nisga'a Villages related to the KSM Project will be minimal. In-migration related to the proposed Project is conservatively estimated at 250 persons during construction and 235 during operations phases. As such, the conservative combined in-migration levels are anticipated to be below 1,000 persons between the three projects in the RSA. Those who decide to migrate to the northwest region of BC will most likely congregate in the regional hubs, including Terrace, Smithers, and Prince Rupert, which have greater number of amenities and services. Although some of the in-migrated persons may relocate to the Nisga'a Villages, this will most likely be at substantially lower levels and disbursed between four Nisga'a Villages. Long-term employment at the KSM Project may also attract more Nisga'a citizens outside the LSA and RSA to repatriate to the Nass Valley. This would result in a net positive cumulative cultural effect combined with the proposed Project. As a result, the cumulative cultural effect related to in-migration is expected to be positive for Nisga'a culture as Nisga'a citizens are anticipated to remain the primary residents and main cultural influence in the LSA.

While there may be cumulative adverse effects of several projects and activities, the strength and resiliency of Nisga'a culture is one of its greatest assets and may counteract some of the adverse cumulative effects described above. Nisga'a societies and culture have already experienced tremendous changes, setbacks, challenges, and injustices (e.g., disease, missionisation, residential school, and government policies banning feasts). The continuation of Nisga'a culture in the face of overwhelming obstacles is a testament to its ability to overcome great odds. Nisga'a cultural strength is also exemplified in and embodied by the development and stipulations of the NFA. The resurgence and efforts to revitalise Nisga'a culture also indicate a strong commitment to the lasting legacy of Nisga'a culture. Ultimately, Nisga'a citizens' strong sense of cultural connection, pride, and transmission will ensure its longevity. The Nisga'a Nation has a positive vision for cultural continuity, which is expressed in variety of processes, programs, and legislation. There is potential for synergistic combination of efforts between the Nisga'a Nation and proponents of proposed projects to support these cultural programs, visions, and policies.

Furthermore, culture is ever evolving and, at times, highly adaptive. No culture is static; there is a continual two-way influence between surrounding and overlapping cultures. This occurred among Aboriginal groups before Euro-Canadian contact with the influence and interaction from travel, trade, and barter. Synthesis of concepts, behaviours, and customs is continual and ongoing throughout the life of a culture. However, it is recognised that there have been and are thresholds beyond which culture is unrecognisable to its former self, especially during periods of rapid change and / or declines in population and government policies relating to assimilation, which, despite strength and resilience, a culture may not be able to withstand or adapt. These have all acted in combination in the past to threaten the viability of Nisga'a cultures.

14.5.13.4 Mitigation Measures

While the responsibility of the cumulative cultural effects is not solely that of the proponents of the proposed projects (individually or collectively), there are suggested mitigation options that the proponent of the proposed Project can implement to contribute to reduction of the adverse cumulative cultural effects. Many of the proposed mitigation focus on the coordination and collaboration between the proponents of the KSM and NTL Projects, and the proposed Project with NLG on Nisga'a cultural issues, interests, and values, including exchange of social and cultural data / indicators and regularly scheduled meetings on cumulative cultural effects. Table 14.5.13-4 provides a summary of proposed mitigation options as they relate to each cumulative cultural effect identified and discussed in the previous section, including rating of the mitigation measures success. These mitigation measures will be further developed and clarified with the Nisga'a Nation, proponents of the KSM and NTL Projects, and relevant federal and provincial agencies.

Table 14.5.13-4: Potential Cumulative Effect by Project Phase on Nisga'a and Aboriginal Culture and Mitigation Measures

Project Cumulative Effect	Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
Remaining schedule-related complications	C, O	Exchange of information between the proposed Project and the NTL and KSM Projects related to work schedule rotation, especially during important cultural events, funerals, and intense traditional use activity periods.	Moderate
Remaining camp environment-based conflict	C, O	Exchange of information about intercultural training curriculum and success or challenges related to implementation training among employees. Exchange of information about intercultural conflict and lessons learned and policies implemented to resolve the dispute or issue.	Moderate
Continued transition away from traditional food base and Nisga'a and Aboriginal languages	C, O	If the NTL and KSM Projects establish a Social Sustainability Committee (or something akin to this), the proponent will propose regular meetings between the project committees to discuss cumulative cultural effects. Exchange of anecdotal or recorded social and cultural monitoring data and information on key indicators (e.g., Nisga'a language use and traditional use activity levels among employees).	Moderate
Continued increased purchasing power and continued income inequality in communities	C, O	If the NTL and KSM Projects establish a Social Sustainability Committee (or something akin to this), the proponent will propose regular meetings between the project committees to discuss cumulative cultural effects. Exchange of anecdotal or recorded social and cultural monitoring data and information on key indicators (e.g., Nisga'a language use and traditional use activity levels among employees).	Moderate
Continued third party interest and use of the land around the mine site and along transportation route	C, O	Coordination and collaboration between proponents, Nisga'a Nation and relevant government agencies (BC MFLNRO) to discuss and address levels of access and site-specific effects.	Low
Continued migration-related intercultural	C, O	If the NTL and KSM Projects establish a Social Sustainability Committee (or something akin to this), the proponent will propose regular meetings between the project committees to	Moderate

Project Cumulative Effect	Project Phase	Mitigation / Enhancement Measure	Mitigation Success Rating
challenge		discuss cumulative cultural effects. Exchange of anecdotal or recorded social and cultural monitoring data and information on key indicators (e.g., Nisga'a language use and traditional use activity levels among employees).	

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

Note: BC MFLNRO - British Columbia Ministry of Forests, Lands and Natural Resource Operations; KSM - Kerr-Sulphurets-Mitchell Copper / Gold Mine; NTL - Northwest Transmission Line

14.5.13.5 Potential Residual Cumulative Effects and Their Significance

Despite the proposed mitigation measures and their anticipated rate of success, it is predicted that there will residual cumulative cultural effects. Despite best of intentions and coordination efforts, it may be difficult to collaborate effectively and consistently between the Nisga'a Nation and project proponents.

The cumulative effects are expected to be both positive and negative in direction, regional in scale, medium magnitude, medium-term (during construction) and long-term (during operations), intermittent (for schedule conflicts) and continuous (for camp environment and in-migration), and reversible. The cumulative cultural effects are considered to be not significant (moderate) during construction phases of the three projects, and not significant (minor) during operations. The level of confidence in the cumulative cultural effects assessment is low with medium certainty, and unknown probability.

Table 14.5.13-5: Residual Cumulative Effects Assessment on Nisga'a and Aboriginal Culture by Project Development Phase

	Construction	Operations
Effect attribute		
Magnitude	Medium	Medium
Geographic extent	Regional	Regional
Duration	Medium-term	Long-term
Frequency	Intermittent (schedule); Continuous (camp environment / in-migration)	Intermittent (schedule); Continuous (camp environment / in-migration)
Reversibility	Reversible	Reversible
Direction	Adverse / beneficial	Adverse / beneficial
Certainty	Medium	Medium
Residual effect significance	Not significant (moderate)	Not significant (minor)
Level of confidence	Low	Low

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

14.5.13.6 Limitations

There is a lack of cultural and information specific to the proposed Project that prevents determination of the scale and detailed assessment of cumulative cultural effects. As a result, a broad level identification and discussion of overarching issues has been provided in the previous sections. It is not comprehensive or complete. It is based on best available information and intentions with the understanding that future discussions between the proponents and the Nisga'a Nation will provide additional detail and clarification.

14.5.13.7 Conclusion

This section considered and rated the potential cultural effects related to schedule, camp environment, employment income, third party interest and use, and in-migration, possible relevant mitigation options, residual effects and their significance, which were carried forward in a cumulative cultural effects assessment. Effects specific to the proposed Project were assessed to be not significant (moderate) after application of mitigation measure such as a Social Sustainability Committee (or similar), intercultural training, Nisga'a language learning coordination, use of Nisga'a place names, and cultural monitoring. Residual effects related to the proposed Project were carried forward in the cumulative cultural effects assessment, which determined that combined components and activities of the NTL and KSM Projects would produce not significant residual cumulative effects on Nisga'a culture despite proposed mitigation measures between proponents of the three projects and relevant government agencies.

14.6 Archaeological Effects

Archaeological and historic heritage are non-renewable resources whose locations consist of the physical remains of past human activity. Archaeological sites are those heritage sites that pre-date 1846 AD and / or listed in the *Heritage Conservation Act (HCA)* (Government of BC 1996a), while historic heritage sites post-date 1846 AD. No known archaeological or historic heritage sites would be affected by the proposed Project during any phase of the proposed Project. Seven historic features were observed, which are associated with mineral exploration and / or recent historic occupation that post-date 1846. The majority of these features (n=5) consist of one or more blazed trees (i.e., trail markers associated with past mining exploration). The survey conducted by Rescan Environmental Services Ltd. (Rescan) (2010) interpreted a partially buried wooden board, nails, and wire as debris from a historic drill pad. The final feature identified was a section of telegraph line, built between 1910 and 1911, which served communities at the head of Alice Arm.

As yet unrecorded sites may be identified during any phase of the proposed Project, but the potential for such sites is rated as low. The total area of the archaeological LSA is 2,739.96 ha, and the total proposed Project facility footprint is 670.33 ha (24.5% of the LSA). According to the North Coast Timber Supply Area (NCTSA) model (Golder and Associates (Golder) 2000), there are 86 ha of lands assessed as having moderate archaeological potential and 7.05 ha of lands with high potential within the LSA.

Adverse effects on archaeological and heritage sites may occur where earth disturbances related to mine construction and operations take place. Land altering activities have the greatest effect on heritage VCs. Potential proposed Project effects to heritage VCs would occur during the construction phase, when the majority of land altering activities would occur. While some lands may be impacted during the operations phase, they would be localised to the mine pits and waste rock piles. Erosion control re-vegetation and vegetation management along the existing access roads and transmission line may impact lands not previously disturbed, increasing the potential for negative interactions during this phase. The closure and decommissioning phase of the proposed Project would be dominated by reclamation activities, and therefore land-altering activity is the primary issue, including re-vegetation and remediation of the lands.

Implementation of the Archaeological and Cultural Heritage Resources Management Plan (Section 11.2.3) will mitigate such impacts, including notification of the Nisga'a Nation during a possible chance find. The Archaeological and Cultural Heritage Resource Management Plan will guide identification, recording, assessment, consultation, and avoidance and / or data recovery mitigation options. If an archaeological site cannot be avoided through Project design changes or site protection and would be impacted, systematic data recovery (scientific archaeological excavation) will mitigate the impact. Systematic data recovery will collect and preserve information about the site for future generations. In addition to mitigating proposed Project effects on archaeological sites, mitigation procedures provide excellent educational opportunities for Nisga'a educational facilitators.

It is acknowledged that the Nisga'a Nation has interest in repatriation of Nisga'a Nation artefacts to the Nisga'a Museum. The NFA stipulates that repatriation of future discovery of Nisga'a artefacts be negotiated between NLG and the provincial government in a custodial agreement. Furthermore, the Nisga'a Land Use Plan (NLG 2002) indicates that heritage preservation is a priority for the Nisga'a Nation. Sites of heritage interest to the Nisga'a Nation include old village sites, trails, gravesites, house sites, oral history landmarks and culturally modified trees (CMTs).

14.7 Human Health

The effects of the proposed Project on Human Health (Section 10.0) were assessed for four VCs, including public health, visual and aesthetics, healthy living, and worker safety and health. The following section provides a summary of the Human Health effects assessment relevant to the Nisga'a Nation. Overall, there are no significant health-related effects due to the proposed Project. Section 10.0 provides additional detail on baseline information and health effects.

14.7.1 Public Health

The public health effects assessment evaluates potential environmental exposures from the proposed Project to the human environment (community). Determination of public health effects are based on the biophysical effects assessments completed for noise, air quality, country foods, drinking water quality, and recreational water quality. The information

provided here is evaluated in the context of potential pathways for exposure and, if any are identified, their potential effects on human health.

Noise begins to annoy people substantially when the sound level outside their home is around 55 decibel A-scale (dBA). There is little potential for human receptors in the environmental health LSA. Few (individual) short-term human receptors are assumed located within the environmental health LSA. Modelling results indicate that the maximum Sound Pressure Level (SPL) at the proposed Project boundary will increase by 5 dBA to approximately 45 dBA for construction and operations phases. Annoyance criteria (55 dBA) will not be exceeded at the proposed Project boundary or in other areas of the LSA and RSA as a result of the proposed Project.

Increases in exposure to air pollutants are expected for temporary or seasonal land users that are present in the LSA and RSA for one day or more. Trappers in the LSA are potentially closest to the proposed Project site and exposures will be highest for this human receptor group. Increases in exposure will occur for particulate matter greater than 10 micrometres in aerodynamic diameter (PM_{10}), particulate matter no greater than 2.5 micrometres in aerodynamic diameter ($PM_{2.5}$), sulphur dioxide (SO_2) and nitrogen dioxide (NO_2); however, it is unlikely that Ambient Air Quality Objectives (AAQOs) will be exceeded under worst-case conditions in maximum concentration conditions in the LSA or RSA. The highest increases will occur for NO_2 and 1-hour AAQOs are potentially exceeded in the area adjacent to the proposed Project fence line of the west side.

Exposure scenarios are used to calculate the risk factors for acute and carcinogenic effects. The risk factor calculations for acute effects were based on an assumed typical scenario for toddlers: who spend all their time in the region and could potentially be exposed via direct contact with soil; and who ingests surface water and country foods (traditional plant foods, wild game, and fish). Trap line TR0614T088 represents the closest known potential human receptor location. The model did not use any statistical boundaries in analysing the results so the likelihood of exceedance is extremely low. Exposures to all pollutants with AAQOs are predicted to meet or be below these objectives in the worst-case scenario. As such, health effects are unlikely for permanent, temporary or seasonal populations in the LSA and RSA for the three phases of the proposed Project. Actual exposure scenarios are likely much lower than is assumed in a screening level Human Health Risk Assessment (HHRA), because Nisga'a citizens are not permanent residents within this area. The likelihood of non-carcinogenic or carcinogen health effects occurring for these people as a result of the proposed Project is low.

Surface drinking water sources within the LSA are limited to the current Project site source in the Clary Creek Watershed and the proposed Project's drinking water source at Clary Lake. There are no potential pathways of exposure for nearby communities and no potential effects are expected. For all phases of the proposed Project, the proponent is committed to a water treatment system in the LSA, which is expected to operate to provincial standards and adjust drinking water quality for consumption to meet drinking water guidelines for all parameters. Predictions for mean arsenic and antimony concentrations are uncertain. The

model predicted federal drinking water quality guidelines could be exceeded; however, arsenic and antimony were not detected during baseline measurement and the predictions were based on an arbitrary concentration estimates. As such, drinking water quality health effects in the construction, operations, closure and post-closure phases are unlikely.

Recreational water quality is based on bacteria count in recreational water bodies. Sewerage effluent can be a potential source for bacterial contamination; however, there is a limited pathway for potential exposure as a result of the proposed Project. Initially in the construction phase, the existing septic field will be used; the pump will be upgraded and a membrane bioreactor system until will be installed once 150 people are resident in camp. A three-level treatment system will be installed in preparation for the 600 people resident in camp and this will allow safe discharge into the environment during the construction phase. The safe discharge will occur in Clary Creek, the Illiance River, and Alice Arm are downstream receiving water bodies. The proponent will conduct regular monitoring and maintenance, which will present limited opportunity for bacteria to reach the water bodies and a limited opportunity for ingestion. Recreational users in the water bodies are unlikely to encounter bacterial contamination in receiving water bodies; effects are unlikely.

Overall, residual effects of the proposed Project on the Public Health VC are not expected to be adverse and not significant for permanent residents and temporary and seasonal Nisga'a land users in the environmental health LSA and RSA.

14.7.2 Healthy Living

Healthy living means making positive choices that enhance physical, mental, and spiritual health. Good nutrition, living in a supportive environment of care and respect, physical activity, smoking cessation, and ending negative lifestyle practices are all choices in healthy living. The proponent will integrate recommended approaches into the health and safety and camp operations program (e.g., provide healthy eating options at mealtimes) and make provisions for healthy living information to be disseminated to workers and their families. Workers participating in healthy eating, smoking cessation and similar activities will likely experience health benefits. The proponent will establish a framework for a worker social club that organises and coordinates events and activities for workers. Increases in physical and mental health are potentially noticeable on an individual level; however, an increase in healthy lifestyle opportunities for workers will have limited ability to affect the provision of health services in the Nass Valley Health Authority (NVHA) or Local Health Areas (LHAs) in the RSA. Effects of the proposed Project on public health (healthy living) will be positive but not significant based on the small numbers of potentially affected persons when compared to the size of the host community. Effects on local and regional LHA health statistics are likely to be negligible.

14.7.3 Worker Safety

Worker safety and health encompass risk factors that can cause injury or occupational disease. These are commonly refered to as Occupational Health and Safety (OH&S) hazards and include physical, chemical, ergonomic, and safety risk factors. Physical and

chemical risk factors are referred to as exposure agents. Occupational health and safety hazards differ between facilities and projects.

Although risks are associated with the mining industry in BC, it remains as one of the safest heavy industries and is a world leader in health and safety practices. Worker safety and health are top priorities for the proponent. The proponent is committed to compliance and adherence to the Occupational Health and Safety Plan (Section 11.2.13) to ensure the safety of individuals and the prevention of occupationally induced injury and illness.

WorkSafeBC (2011b) insurance base rates can be used compare the difference in hazard risk between any two or more industries. Representative base rates for construction activities at the proposed Project are General Construction Labour Supply ($3.39), Land Clearing, Excavation and Site Surface Preparation is ($3.62), and Ironworkers ($12.03). For operations, the WorkSafeBC (2011b) insurance base rates for open pit metal or mineral mining is $1.22. For both construction and operations, the insurance base rates are higher than for First Nations Operations ($1.01). This indicates that employment in the proposed Project construction and operations phases is in general more hazardous than current employment sources in Nisga'a Villages. Exceptions would be for Nisga'a people employed in general trucking ($5.01) and timber harvesting activities ($8.55) that are more hazardous than construction activities. Figure 14.7.3-1 depicts the different insurance base rates as proxies for employment-related risk during construction and operations phases.

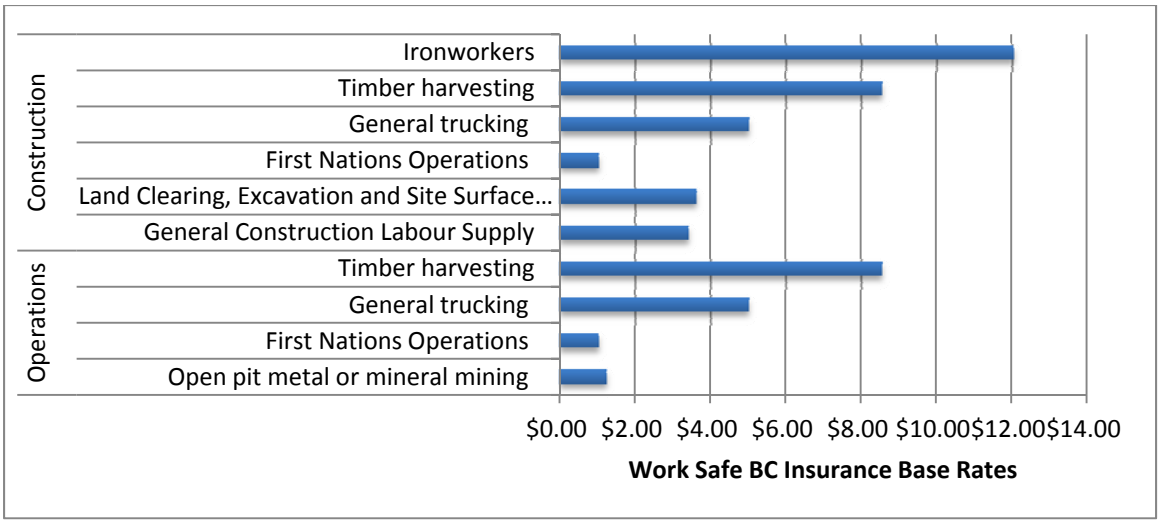

Figure 14.7.3-1: WorkSafeBC Insurance Base Rates for Construction and Operations Employment-Related Risk

In terms of injury rates, WorkSafeBC provides data by industry. Construction workers are classified within the Trades, Transport broad group category defined by WorkSafeBC with a recorded injury rate of 7.9 claims per 100 estimated PYs (WorkSafeBC 2010a). Assuming the construction phase requires 890 PYs of construction work effort, the proposed Project

may have an estimated 70 injuries (35 injuries per year). During operations, mine workers are classified within the Primary Industry broad group category with an injury rate of 4.8 claims per 100 estimated PYs (WorkSafeBC 2010b). Assuming the operations phase requires 1840 PYs of effort, the proposed Project may have an estimated 88 injuries (approximately six injuries per year).

The OH&S program provides materials for safety education and training and sets standards for the inspection and enforcement of occupational health issues at mines in BC. Prevention programs include:

- Workplace monitoring procedures;
- Musculoskeletal disease prevention for mining;
- Audiometric technician training and resources (to monitor effects of noise exposure); and
- Medical surveillance (to monitor potential health effects).

The proponent's health and safety training program will take into account employment history. Young workers and workers entering a higher risk industry will be engaged for follow-up when initially employed and beginning their new career. This is because they are unfamiliar with the hazards relating to their job and are sensitive to injury.

Mitigation success is rated medium, based on the assumption that commitment to increased education for the proponent and workers will lead to a good or very good risk rating when compared to other mining operations in the province.

Effects of the proposed Project on worker safety and health will be adverse but not significant (negligible). A minor significance rating has been determined based on the low frequency and effects likely distinguished within the worker sub-population. Effects will likely be indistinguishable in any potentially affected community or LHA.

14.8 Land Use Effects

14.8.1 Overview

This section describes the land use effects of the proposed Project on Nisga'a harvesters and resource rights defined in the NFA. Nisga'a land users may be affected by the proposed Project in terms of loss of land use area (related to the mine footprint), increased accessibility (due to year round maintenance), potential decreased resource availability of wildlife, fish, marine, water, and vegetation resources, diminished aesthetics, and increased traffic. Table 14.8.1-1 provides a summary of the potential effects of the proposed Project on NFA rights.

Table 14.8.1-1: Potential Project Effects on Nisga'a Final Agreement Rights

NFA Right	Loss of Land Use Area	Increased Accessibility	Decreased Resource Availability	Diminished Aesthetics	Increased Traffic
Fish allocation	n/a	Beneficial	Adverse	n/a	Adverse
Wildlife allocation	n/a	Beneficial	Adverse	n/a	Adverse
Water allocation	n/a	No effect	Adverse	n/a	No effect
NWA	Adverse (negligible)	Beneficial	Adverse	Adverse	No effect
Nass Area	Adverse (negligible)	Beneficial	Adverse	Adverse	No effect
Gits'oohl	No effect	Beneficial (negligible)	No effect	Adverse	No effect
Angling guide rivers	No effect	Beneficial (negligible)	No effect	No effect	No effect

Note: n/a - not applicable; NFA - Nisga'a Final Agreement; NWA - Nass Wildlife Area

14.8.2 Land Use Area

The proponent will be required to maintain a buffer around the mine site according to mine regulation for purposes of public safety. As such, traditional activities will be prohibited among both Nisga'a mine employees and Nisga'a land users in and around the mine site. The area occupied by the mine footprint, including a 500 m buffer, amounts to 1,980 ha. The NWA and Nass Area cover an area of 1,610,100 ha and 2,700,000 ha, respectively. The proportion of prohibited area in and around the mine site is 0.12% of NWA and 0.07% of the Nass Area. This represents a minimal loss to these NFA lands. It is recognised that all NFA lands are equally important to the Nisga'a Nation. However, it is anticipated that there are other alternative areas throughout NFA areas for Nisga'a citizens to engage in traditional activities besides the prohibited mine site area. The proponent commits to adaptive management as land-based issues arise from the loss of NFA land use areas as they arise. Table 14.8.2-1 summarises the proportion of loss of land use on NFA areas.

Table 14.8.2-1: Nisga'a Final Agreement Areas Lost Compared to Total Nisga'a Final Agreement Area

Type of NFA Land	Total Area (ha)	Area Lost (ha)	% Lost to Total
Nisga'a Lands	199,200	0	0
Category A Lands (Gits'oohl)	8	0	0
Nisga'a Recreational Tenure		0	0
Nisga'a Guide Outfitting Area		1,980	
Nass Wildlife Area	1,610,100	1,980	0.12%
Nass Area	2,700,000	1,980	0.07%

Note: ha - hectare; NFA - Nisga'a Final Agreement; % - percent

14.8.3 Increased Accessibility

Year-round maintenance activities associated with the proposed Project along the Kitsault transportation route, especially the Nass, Nass-Kinskuch, and Nass-Kwinatahl FSRs, may create positive and negative land use effects related to access. Increased accessibility will arise from snowploughing in winter months, grading, and vegetation management along the road ROWs in the spring. This may have a positive effect on Nisga'a citizens seeking access to land use and cultural sites for use and/or seasonal occupancy. For example, Nisga'a citizens use the FSR network for pine mushroom picking, hunting, fishing, and trapping. Furthermore, Nisga'a citizens have NFA-defined resource allocations and rights to access in the NWA and Nass area. Increased access along the network of FSRs could facilitate land and resource use year-round, especially in the winter months for steelhead fishing, snowmobiling, trapping, and hunting. Also, the mine site does not block important land-based access to Alice Arm for Nisga'a citizens. The proponent is working in collaboration with the Nisga'a Nation to develop the Transportation and Access Management Plan (Section 11.2.18).

14.8.4 Resource Availability

14.8.4.1 Overview

This section describes the effect of potential changes in resource availability on the Nisga'a Nation and its NFA rights based on the main conclusions of effects reached in several biophysical assessments, including wildlife (Section 6.11), freshwater aquatic resources (Section 6.7), vegetation (Section 6.10), marine aquatic resources (Section 6.8), and hydrology (Section 6.5). Wildlife, moose, mountain goats, grizzly bears, and American marten are discussed based on Nisga'a hunting and trapping rights and interests. For fish, effects related to the proposed Project on Dolly Varden, coho salmon parr, and rainbow trout are described given their presence in and around the mine site and their important fish species to the Nisga'a Nation, including NFA allocations for coho salmon. Effects on marine biota in Alice Arm are summarised with links to Nisga'a marine harvesting rights in the intertidal bivalve area in the southern portion of Alice Arm. For vegetation, large cedar, pine mushroom, medicinal plants, and edible berry-producing plants are summarised given their importance to the Nisga'a Nation for cultural purposes and reasons. Finally, availability of water resources for the NFA-defined rights to flows in the Kwinatahl River is also discussed.

14.8.4.2 Wildlife Resources

14.8.4.2.1 Moose

The proponent included moose as a VC because this species has social, economic, and biological importance in the region. Moose are also identified as important to the Nisga'a Nation with NFA allocations as a percentage of the annual allowable harvest of moose within the NWA (from 50 to 120 moose annually). The moose population and habitat may be affected by the proposed Project in four main ways: 1) potential mortality from vehicle interactions, 2) habitat loss through vegetation and wetlands removal, 3) habitat

degradation, and 4) disturbance through noise disruption. Effects from proposed Project vehicle traffic and noise are of primary concern for Project-moose interactions.

During winter, moose are generally attracted to cleared road ROWs for ease of movement and salt, making them more susceptible to collisions with vehicles. It is expected the potential mortality risk of moose would be more pronounced along the FSRs compared to Hwys 37 and 113 since moose use the FSRs as travel corridors and the low traffic volumes along the FSRs. Areas of particular concern for moose include winter range habitat that currently does not have high levels of traffic related noise disturbance, such as the Nass FSR and the Nass-Kinskuch FSR. The clearing of snow in the winter along the FSRs would likely provide easier movement corridors for moose and may attract moose lingering in the lower-elevation portions of the LSA due to ease of travel. With increased traffic volumes, moose may change movement patterns to avoid roads and areas with increased people and associated disturbance. However, moose are sometimes attracted to human-populated areas that are usually avoided by predators such as wolves and bears. Furthermore, ungulates have demonstrated the ability to adapt to human presence if there are predictable patterns.

Habitat loss would occur during the construction and operations phases of the proposed Project, potentially causing moose displacement from the LSA. Approximately 113 ha or 24% of wetland habitat in the LSA would be removed from Project development, particularly from the TMF. Approximately 209 ha (or 11%) of the LSA is considered potentially suitable winter habitat for moose. Of this habitat, approximately 31 ha (or 15% of available in the LSA) would be lost of altered due to Project development. However, moose typically have large home ranges, and given the low occurrence of highly suitable winter habitat for moose in the LSA, it is not likely that changes in habitat availability in the mine site would affect populations.

Several management plans address the adverse effects of the proposed Project on moose, including the Transportation and Access Management Plan (Section 11.2.18), Reclamation and Closure Plan (Section 11.2.14 and Appendix 3.0-K), Noise Management Plan (Section 11.2.12), and the Wildlife Management Plan (Section 11.2.21). Transportation will be regulated and enforced, which may minimise the disturbance to moose related to traffic and noise. Posting appropriate speed limits and strict enforcement of those speeds and signage would be displayed along areas where wildlife crossing is likely to occur and on site access gates. There are also measures to help mitigate the attraction of moose to the access road by re-vegetating roadsides with native species that are not attractive to moose. The proponent also commits to implementing a wildlife accident monitoring and reporting system. There is also a no hunting and firearms policy among mine employees.

With proper management plans in place, implementation of an adaptive management strategy, and application of identified mitigation measures, the potential residual effects of the proposed Project on moose due to vehicular mortality and displacement are expected to be not significant (moderate) and not significant (minor), respectively. Section 6.11.9

provides additional detail on baseline information and effects related to the proposed Project on moose.

Given that the anticipated residual effects on the moose population are considered minor to moderate in magnitude, there may be a minimal corresponding effect on Nisga'a moose allocations in the NWA as defined in the NFA. That is, moose mortality related to vehicular accidents may cause a decline in the moose population, which would affect the number of Total Allowable Harvest (TAH) of moose, of which the NFA designates a percentage for Nisga'a harvest. However, the level of vehicular mortality is expected to be low, and, as such, there is a minimal effect on Nisga'a NFA allocations of moose (if any).

The displacement of moose may have an adverse or beneficial effect on Nisga'a harvesters depending on the direction of the displacement. The displacement is expected to be away from roadways (especially the FSRs). The existing moose habitat is in the lower elevation areas along Alice Arm and the Kitsault River estuary where noise effects from the proposed Project will affect moose marginally (if at all). If the moose population adjacent to the mine site redistribute to areas closer to Nisga'a Lands (i.e., movement toward the southeast), there may be fewer logistical constraints to accessing moose for Nisga'a harvesters. This may increase hunting success with fewer resources spent given less travel distance and time, which represents a net positive effect for Nisga'a moose harvesters in fulfilling their NFA rights. However, the overall Nisga'a moose allocation would not change, even though there may be a perception of increased resource availability among Nisga'a citizens given the localised redistribution.

If the displacement of moose is in a direction further away from Nisga'a Lands within NWA (i.e., north, south, or northwest) or away from roadways, the logistics of access become more challenging to Nisga'a harvesters with a corresponding adverse effect on their hunting ability and success. Nisga'a harvesters would need additional resources and time to reach the displaced moose population. The Kitsault mine site is already remote and requires several hours to access from Nisga'a Lands. If the moose population is displaced further from Nisga'a Lands, this may act as a prohibitive barrier requiring Nisga'a harvesters to select alternative moose hunting locations.

The proponent is committed to working with NLG in an adaptive management manner to address issues arising of moose mortality and displacement (if any). The Wildlife Management Plan (Section 11.2.21) identifies ongoing collaboration and coordination with NLG on wildlife issues arising from the proposed Project.

14.8.4.2.2 Grizzly Bear

The grizzly bear (*Ursus arctos*) has social, cultural, economic, and biological importance in the region. Grizzly bears are also specified as important to the Nisga'a Nation, which has NFA rights to a percentage of the annual allowable harvest of grizzly bears within the NWA (usually less than five grizzly bears per year).

Three potential direct effects on the grizzly bear were considered: mortality (interactions with humans and vehicles); habitat loss (foraging habitat removal); and the grizzly bear's response to features that function as attractants (for foraging). The greatest impact to the grizzly bear has been identified as human-bear interactions.

Direct mortality caused by vehicle collisions could occur along the access roads (Nass FSR, Nass-Kwinatahl FSR, Nass-Kinskuch FSR, and the Alice Arm Road), Hwy 37 and Hwy 113. Existing levels of wildlife accidents along Hwy 37 and Hwy 113 have the most prevalent hits occurring among moose, bears, and porcupines from 1991 to 2010. Grizzly bear mortality risk is expected to vary depending on the suitability of habitat adjacent to the roadway, where speed limits are generally higher (such as along highways) and where there are blind turns, or time of season.

Project development would likely displace grizzly bear from the immediate area and alter any movements through the site into adjacent habitat. Considering the amount of terrestrial habitat (440 ha) and wetland habitat (113 ha) removed from the proposed Project, and habitat value would be increased during post-closure reclamation, direct habitat alteration is not a primary issue for this species. Any habitat alteration would be a limited area of a bear's home range.

Mortality resulting from attraction to human-used sites can also contribute to overall mortality of bears, and pose safety risks to humans. Bears may become problem animals if they are attracted to human-created wastes and foods, requiring their relocation (which often results in mortality) or destruction. Problem bears may be destroyed to protect human safety, or may be relocated into territories that are either occupied by other bears or have relatively less suitable habitat (leading to lower survival rates).

There are several management plans that address adverse effects of the proposed Project on grizzly bears, including the Transportation and Access Management Plan (Section 11.2.18), Reclamation and Closure Plan (Section 11.2.14 and Appendix 3.0-K), Hazardous Materials Management Plan (Section 11.2.9), Noise Management Plan (Section 11.2.12), the Solid Waste (Refuse) Management Plan (Section 11.2.17), and the Wildlife Management Plan (11.2.21). There is also a no hunting and firearms policy for mine employees. Bear mortality caused by collisions with vehicles can be mitigated by imposing speed limits to all vehicles and ensuring that wildlife shoulders are wide to provide good visibility to drivers. Mitigation methods to dispose of garbage daily at the site through incineration or removal from the site are other effective strategies for reducing the potential for human-bear interactions.

The residual effect of vehicular mortality on grizzly bear populations is anticipated to be not significant (moderate), and the residual effect of features causing attractants is expected to be not significant (minor). Because of the relatively small footprint of the proposed Project in the LSA compared to home range size of the grizzly bear, there is no anticipated residual effect on this species resulting from anticipated habitat loss. Section 6.11.10 provides detailed baseline information and effects of the proposed Project on grizzly bears.

Based on the conclusions of the wildlife assessment (especially related to vehicular mortality of grizzly bears), there may be a change to NFA allocations of grizzly bears to the Nisga'a Nation. The already low number of annual NFA entitlements of grizzly bears in the NWA (i.e., around two per year) highlights the importance of and proponent commitment to reducing and eliminating project-related mortality of grizzly bears to avoid diminishment of the Nisga'a allocation of grizzly bear.

14.8.4.2.3 Mountain Goat

The mountain goat (*Oreamnos americanus*) has been included in the proposed Project Application given concerns raised during consultation with the Nisga'a Nation and based on NFA rights to allocations of mountain goats based on a percentage annual allowable harvest (i.e., 30 to 130 per year). Although not common to the immediate area of the proposed Project, mountain goats can be found in mountainous terrain approximately 5 km from the site. Also, the access roads do not cross suitable mountain goat habitat or low elevation canyons areas that may be suitable during summer.

The proposed Project is anticipated to have three direct effects, including potential attraction to salt use along the access roads, potential mortality from vehicle traffic and human presence, and potential disturbance (displacement) from noise activity associated with the proposed Project. The proponent has developed management plans and mitigation measures to address potential effects of the proposed Project on mountain goats in the Transportation and Access Management Plan (Section 11.2.18), Noise Management Plan (Section 11.2.12), and the Wildlife Management Plan (Section 11.2.21), including enforcing speed limits, restricting access to only individuals working directly for the proponent, restricting hunting among mine employees, and monitoring and reporting of mountain goat sightings and accidents.

Based on the noise modelling results and the distance of the proposed Project from suitable mountain goat habitat (greater than 5 km), potential effects from Project noise (e.g., blasting and operational noise) is not expected to affect goat use of suitable habitat. The potential effect of salt attracting mountain goats to the roads is considered unlikely because identified ranges for wintering mountain goats are located greater than 5 km from the proposed access roads; salt is likely not limited in the area due to the close proximity of the proposed Project to the ocean. However, low elevation habitat use (out of identified range) could potentially result in mountain goats crossing haul roads, resulting in possible mortality due to collisions with mine traffic. With functioning management plans in place and implementation of an adaptive management strategy for the proposed Project, residual effects are not expected for mountain goats. Section 6.11.8 provides additional detail with baseline information and potential effects of the proposed Project on mountain goats.

Based on the conclusions of the wildlife assessment, there are no anticipated corresponding effects on Nisga'a allocations of mountain goats in the NWA as defined in the NFA. While there may be incidental mortality of individual mountain goats along the transportation route related to transportation activities of the proposed Project, this is not expected to translate into population-level effects, and, as such, will not affect the TAH. Displacement due to

industrial noise is not expected to affect mountain goats, which are located over 5 km from the mine site. It is assumed that noise disturbance from mine-related vehicular traffic will be relatively insignificant beyond 400 m and no helicopter flights in the area are expected. As such, Nisga'a harvesters will mostly likely not experience logistical challenges or benefits due to a lack of mountain goat displacement effects.

14.8.4.2.4 American Marten

The American marten (*Martes americana*) is common to the coastal forests of BC and representative of furbearers for the proposed Project. The harvest of furbearers is of importance to local residents, including Nisga'a Nation trap line holders. The American marten is one of the most common species trapped in the region. Three direct effects of the proposed Project on American marten were identified and discussed, including mortality, habitat loss or alteration, and response to features functioning as attractants (e.g., salt).

Direct mortality of American marten could occur as a result of tree clearing and vehicle interactions. Clearing of old growth forest during birthing periods (i.e., late March) could cause some incidental mortality of females and offspring. Another source of mortality may occur from vehicle interactions. American marten may become attracted to carrion from vehicle incidents, particularly small mammals such as hares, along access roads. Attraction to road sides may increase mortality risk from vehicles strikes.

Habitat loss is expected as a result of forest-clearing activities that would take place primarily during the construction phase. For the proposed Project, American marten habitat use has been modelled for winter conditions, as this is the limiting season that most heavily influences the animal's survival. Habitat modelling rated 856 ha (or 43%) of the LSA is suitable winter habitat for American marten. Of this habitat, approximately 312 ha (or 36% of available in LSA) would be lost or altered due to Project development. The amount of habitat lost or altered within the LSA represents approximately 60% of an average male home range size (525 ha) and one full female's home range size (316 ha).

It is unlikely that any of the mine features would act as an attractant to marten. However, individual martens have been attracted to buildings where there is food. New buildings may provide new habitat for potential prey species, such as small mammals, resulting in the creation of indirect attractants as a result of the mine's presence in the proposed Project setting.

With implementation of the mitigation measures in the management plans (including the Transportation and Access Management Plan, Wildlife Management Plan, Solid Waste Management Plan, Reclamation and Closure Plan, and Occupational Health and Safety Plan), and given American marten mobility, the residual effects of habitat loss and vehicular mortality are expected to be not significant (minor) and not significant (negligible), respectively. Section 6.11.7 contains additional detail regarding effects of the proposed Project on American marten, including mitigation measures and monitoring plans.

Based on the conclusions of the wildlife assessment, there are no corresponding anticipated effects on Nisga'a trap lines. None of the NFA-defined Nisga'a trap lines overlap with the proposed mine site or the transportation route; however, there are Nisga'a trap lines within 5 km of the mine site and transportation route (i.e., TR0614T090 to the north along the Illiance River, TR0614T094 to the northwest of the Kitsault River, and TR0616T006 to the east along the Cranberry River). Given the distance of the Nisga'a trap lines combined with the low-level, localised effects of the proposed Project on American marten, there are no anticipated effects of the proposed Project on proximate Nisga'a trap lines.

14.8.4.3 Fish Resources

14.8.4.3.1 Overview

Effects of the proposed Project on freshwater aquatic resources (Section 6.7) are assessed for four VCs, including Dolly Varden, coho salmon, rainbow trout, benthic macro-invertebrate (BMI). The former three VCs and their interactions with the proposed Project and its processes are summarised in the subsequent sections.

14.8.4.3.2 Exclusions

Steelhead (anadromous rainbow trout) and salmon species other than coho (i.e., pink, sockeye, Chinook, and chum salmon) were not included as VCs for the assessment of effects on freshwater aquatic resources. These species, though highly valued by the Nisga'a Nation, were not included as VCs because they do not occur in any of the freshwater lakes or streams within or downstream of the proposed Project footprint. The proposed Project is confined to the Lime Creek and Clary Creek Watersheds and neither of these watersheds supports anadromous runs of steelhead or any of the five Pacific salmon species. Coho salmon are included as a VC only because coho salmon fry have been found in lower Lime Creek. However, these fish are not natal to Lime Creek. Potential effects of the proposed Project on coho salmon are therefore, limited to potential changes in stream flow and water quality on rearing habitat for this life stage (see Section 6.7.3).

The assessment does not include potential effects on freshwater aquatic resources (including salmon) in the Nass, Cranberry, Skeena, Illiance, Kitsault, Kiteen, Tchitin, Tseax, Kitwanga or Meziadin rivers. This is because no mine components and no mine activities will occur in any of these watersheds during any phase of the proposed Project. The proposed Project is located entirely in the Lime and Clary Creek Watersheds; Lime Creek is a tributary of Alice Arm while Clary Creek is a tributary of the Illiance River, which itself is a tributary of Alice Arm. As this assessment will show, no effects of the proposed Project on the Illiance River, or its fish community, are expected to occur.

14.8.4.3.3 Dolly Varden

The proposed Project would be located in the Lime Creek and Clary Creek Watersheds; therefore, potential direct, indirect, and combined effects on Dolly Varden may occur during all phases of the proposed Project since Dolly Varden are known to exist in the lower reaches of both creeks and in the Illiance River downstream of Clary Creek. Potential direct

effects include mortality of fish and eggs from blasting. There are only two potential direct effects of the proposed Project on Dolly Varden: 1) blasting within the Kitsault Pit; and 2) increased fishing pressure due to the presence of anglers within the Kitsault mine workforce. The potential combined effects on Dolly Varden involve potential indirect Project effects to: surface water quality; stream flow; water temperatures in Lime Creek; and the potential change in the BMI community.

14.8.4.3.3.1 Blasting

The likelihood of potential direct effects of blasting on Dolly Varden and their eggs during construction and operations in the Kitsault Pit is negligible due to the distance of 6 km between the blasting site (i.e., Kitsault Pit) and Dolly Varden habitat in Lime Creek, which is several orders of magnitude greater than the setback distance guideline for fish and fish egg protection.

14.8.4.3.3.2 Angling Pressure

The proposed Project will require a workforce of 500 people during construction and 360 people during operations, some of who will be interested in fishing for Dolly Varden or other fish species in the creeks and rivers in the vicinity of the proposed Project during their free time. The presence of these anglers could result in the direct mortality of individual Dolly Varden in Lime Creek and could potentially extirpate the local population over time. As such, a no fishing policy would be enacted by the proponent for all workers and contractors while on-site. While poaching may still occur, this mitigation measure would effectively eliminate this potential direct effect to Dolly Varden in Lime Creek. Therefore, no residual effect would occur.

14.8.4.3.3.3 Water Quality

The parameters which are predicted (through modelling) to have exceedances over one or more of BC MOE (2006a; 2006b), CCME (2007),or proposed site specific guidelines at lower Lime Creek include:

- Sulphate (see previous note about the BC MOE guideline);
- Cadmium (95th percentile and maximum only);
- Mercury;
- Molybdenum;
- Nickel; and
- Selenium.

The proponent acknowledges that lethal or chronic health effects to Dolly Varden and other freshwater aquatic biota in Lime Creek due to water quality changes caused by the proposed Project would be unacceptable. As such, the proponent is committed to working with Environment Canada (EC), the BC Ministry of Environment (BC MOE), and NLG to determine if and what site-specific water quality objectives would be appropriate for each chemical with predicted exceedences. The proponent has provided suggested alternative

site-specific water quality objectives for each exceedence based on how the guidelines were derived and assessing their appropriateness for the local site-conditions in Lime Creek. The proponent is also committed to monitoring water quality in their mine effluent in Lime Creek and to providing water treatment of their mine effluent if required. Given these mitigation measures and management plans, the potential residual effect of changes in surface water quality in lower Lime Creek was assessed to have a not significant (minor) effect on Dolly Varden.

14.8.4.3.3.4 Stream Flow

Changes in stream flows related to Project design and activities may affect Dolly Varden spawning, egg incubation, and rearing in Lime Creek. Based on results from calibrated Flowmaster® models for riffle crest and for pool tail-out transects, despite up to a 29% reduction in discharge, average water depths at pool tail-outs and riffle crests in lower Lime Creek during September and October were predicted to decrease by only 6 to 15% and 5 to 14%, respectively, over the range of average and low flow conditions assessed. These reductions in water depth are insufficient to reduce the suitability of pool tail-outs and riffle crests for Dolly Varden spawning. Dolly Varden will continue to be able to use these habitats for spawning during construction and operation of the proposed Project with no likely reduction in spawning success from pre-mine, baseline conditions.

Only during average November and March flows do water depths in these mesohabitats exceed the preferred egg incubation depth range upper limit. Nevertheless, it is predicted that Dolly Varden egg laid in these mesohabitats during construction and operations of the proposed Project will have the same likelihood of survival to hatching as eggs laid at pre-mine flows. As such, this assessment indicates that the residual effect of flow reductions on Dolly Varden spawning success, egg survival, and annual recruitment will be not significant (minor).

14.8.4.3.3.4.1.1 Water Temperature

Potential changes in water temperatures in Lime Creek may occur during all phases of the proposed Project related to ponding and release of water from the development. Dolly Varden are a cold-water species with a relatively narrow range of preferred water temperatures. Water temperatures in lower Lime Creek in July and August are 11 degrees Celcius (°C) and 12.5°C, respectively, which are near optimal for juvenile Dolly Varden growth and survival in summer. Thus, a 1°C or 2°C increase in July or August water temperatures would cause water temperatures to exceed the optimal water temperature range for juvenile Dolly Varden rearing, and a 3°C increase would exceed the upper temperature limit of juvenile Dolly Varden.

The primary mitigation measure is the implementation of the mine's Water Management Plan (Appendix 6.4-B) to reduce or eliminate potential changes in stream flows in lower Lime Creek, which would reduce or eliminate potential changes in water temperatures. The potential residual effect of changes in water temperature in lower Lime Creek was assessed to have a not significant (negligible) effect on Dolly Varden, because the potential for

temperature extremes during critical periods for Dolly Varden is moderated by the cool, wet climate at Kitsault.

14.8.4.3.3.4.1.2 Benthic Macro-Invertebrates

Potential changes in BMIs drift in lower Lime Creek due to the potential combined, indirect effects of changes in water quality, changes in stream flow, and changes in water temperatures are difficult to predict with any certainty. However, it is predicted that no significant adverse effect to Dolly Varden would occur during any phase of the proposed Project because the flow reductions and changes in temperatures predicted to occur in Lime Creek are unlikely to be large enough to affect BMIs.

The potential residual effect of change in BMIs in Lime Creek was assessed to have a not significant (minor) effect on Dolly Varden. This was because the likely combined effect of potential changes in water quality, stream flows, and water temperature on BMI drift was considered to be low as a result of either mitigation measures proposed (e.g., site-specific water quality objectives and / or water treatment) or because of small predicted changes in habitat availability and suitability.

14.8.4.3.3.4.2 Conclusion

Overall, the significance of these potential indirect effects on individual Dolly Varden was predicted to be not significant (minor). This prediction was based on the assumption that the combined effects of changes in water quality, stream flows, water temperature, and BMI drift would not be distinguishable at the population level for Dolly Varden in lower Lime Creek. The Dolly Varden population in lower Lime Creek would be predicted to be sustained at its current level of abundance, distribution, and health during all phases of the proposed Project.

The only potential cumulative effect on Dolly Varden with a reasonable likelihood of occurrence is the potential residual effects from the deposition of mine tailings in Lime Creek during previous mining operations at the proposed Project. This potential cumulative effect is considered to be not significant (minor) because the presence of a Dolly Varden population in Lime Creek suggests that any previous residual effects of past mining activities and mine tailings deposition in Lime Creek have abated since previous mining concluded over 35 years ago. It is not apparent from metals concentrations in the current Dolly Varden population that any lasting effects of past residual effects from tailings deposition remain.

14.8.4.3.3.4.3 Links to Nisga'a Rights and Interests

The assessment of effects on freshwater aquatic resources (Section 6.7) identifies a potential interaction between potential changes in Dolly Varden health, growth, survival or recruitment and Nisga'a Nation Land Use. While Dolly Varden are not an economically valuable sport or commercial fish species in the Alice Arm area, it is an ecologically important species to the Nisga'a Nation as a wildlife fish (as defined in the NFA).

The NFA does not specifically reference or identify allocations for Dolly Varden; however, the Nisga'a Nation has a general right to harvest fish in the Nass Area, which overlaps with

the proposed Kitsault mine site area. As such, rating of the overall indirect effects of the proposed Project on Dolly Varden as not significant (minor) represents a minimal change to availability of Dolly Varden in the Nass Area to the Nisga'a Nation for harvesting. Therefore, there is no anticipated effect to Nisga'a ability to exercise its NFA right to fish Dolly Varden.

14.8.4.3.4 Coho Salmon

Coho salmon were selected as a VC because of the presence of coho salmon parr in the lower reaches of Lime Creek and their importance to the Nisga'a Nation, Aboriginal groups, federal and provincial regulators, and the public at large. There is only one potential direct effect of the proposed Project on coho salmon, namely mortality due to blasting in the Kitsault Pit. Potential indirect effects on coho salmon parr include changes in Lime Creek water quality, stream flow, water temperature, and benthic invertebrate drift and changes in Lime Creek flows.

Although the proposed Project has the potential to interact with individual coho salmon parr in lower Lime Creek, there is no potential direct, indirect, or combined Project effects on a coho salmon stock in Lime Creek. This is because it is highly likely that the coho salmon parr found in lower Lime Creek are strays from other rivers or streams in the Alice Arm area that have entered Lime Creek to seek refuge from predators in the ocean. Evidence for this assertion is based on the fact that there were no coho salmon parr found in Lime Creek upstream of the first cascade impediment to fish passage, even though the cascade is not an impediment to adult Dolly Varden that use Lime Creek for spawning, and adult coho salmon are larger and stronger swimmers than Dolly Varden.

There is no potential interaction between potential changes in coho salmon health, growth or survival and any social and economic VCs and Nisga'a Land Use. This is because, while coho salmon are an economically valuable sport or commercial fish species in the Alice Arm area, the number of coho salmon parr likely to be rearing in lower Lime Creek is too small to have an effect on the recreational, commercial or subsistence fisheries in the Alice Arm / Observatory Inlet area for coho salmon. Lime Creek is not the natal stream for the coho salmon parr present in the stream and, as a result, any potential indirect proposed Project effect on these coho salmon parr are unlikely to have an effect on any of Nisga'a fisheries.

The overall significance of potential indirect effects on individual coho salmon parr is not significant (minor). This is because some change in the growth and survival of individual coho salmon parr rearing and overwintering in lower Lime Creek may be slightly compromised, particularly by the combined effects of these four potential indirect effects. However, the overall significance of these potential indirect effects on the coho salmon stocks is negligible. Lower Lime Creek is not an ideal rearing and overwintering habitat for coho salmon because of the paucity of slow, deep pools with cover. Lower Lime Creek is also not a critical habitat for long-term sustainability of these stocks. The number of coho salmon parr rearing and overwintering in lower Lime Creek is likely to be negligible in comparison to the number of coho salmon parr rearing and overwintering in their natal stream(s).

Potential cumulative effects to coho salmon due to potential residual effects of the proposed Project and potential residual effects of other past, present, or reasonably foreseeable future project or land uses are considered negligible. This included potential cumulative effects the deposit of mine tailings in Lime Creek and the straightening of the lower reach of Lime Creek during construction of the town of Kitsault because it is unlikely that a coho salmon run ever existed in Lime Creek. Similarly, no potential cumulative effect on coho salmon would occur from potential residual effects of the proposed Project and from ongoing or future commercial or recreational fishing because the coho salmon parr found in lower Lime Creek represent only a negligible portion of the coho salmon stock(s) from which they were spawned and because current coho salmon stocks in the north coast of BC appear to be healthy, suggesting that they are not being overharvested.

The Nisga'a Nation has NFA rights to coho salmon in the Nass Area with specific annual allocations based on 8% of the coho return to Canada (i.e., 3,200 to 19,200). There are currently no conservation concerns regarding coho stocks. Given the not significant (negligible) residual effect of the proposed Project on coho salmon parr, Nisga'a coho salmon entitlements are not expected to be adversely affected by the proposed Project. Furthermore, the Nass River and its tributaries are the main focus of Nisga'a salmon fisheries. Finally, as noted earlier, Lime Creek contains coho salmon parr, which are not harvestable or desirable by Nisga'a harvesters.

14.8.4.3.5 Rainbow Trout

The selection of rainbow trout as a VC was based on the presence of previously stocked, resident populations of rainbow trout in the Clary Creek Watershed, and the importance of rainbow trout to the Nisga'a Nation, federal and provincial regulators, the public, and the proponent. This is because the potential effects of the proposed Project are restricted to Clary Creek upstream of the impassable waterfalls located approximately 250 m upstream from the confluence of Clary Creek and the Illiance River. No potential effects on steelhead in the lower reach of Clary Creek downstream of these waterfalls or in the Illiance River are expected to occur.

Potential direct, indirect, and combined effects on rainbow trout may occur during all phases of the proposed Project. Potential direct effects of the proposed Project on rainbow trout include mortality of fish and eggs impinged or entrained in pumps placed in Clary Lake for potable water supply, fishing mortality from the mine construction and operations work force, alterations to fish passage at road crossings, and direct loss of fish habitat. Potential indirect effects on rainbow trout include changes in water quality due to tailings seepage, changes in water levels due to water withdrawals and changes in upstream catchment areas, changes in stream flows due to water diversions, and changes in BMI populations. Potential combined effects include the additive effects of potential changes in water quality, lake levels, stream flows, and critical habitat.

Loss of the fish habitat in the two Lake 901 inlet tributaries under, within, and downstream of the TMF was assessed to have a not significant (moderate) effect on rainbow trout. Furthermore, removal of the hung culvert on the Lake 901 outlet was assessed to have a

not significant (minor) positive effect on rainbow trout in Lake 901. This would be a positive residual effect because it would allow rainbow trout from Lake 493 and, potentially from Clary Lake, to immigrate upstream into Lake 901, which they currently cannot do, increasing gene flow. Potential residual effects on rainbow trout due to the predicted change in water quality in Lake 901 were assessed to be not significant (minor) during the construction phase and not significant (moderate) during the operations, closure, and post-closure phases. Potential residual effects of changes in water quality to rainbow trout in Clary Lake were assessed to be not significant (minor) for all phases of the proposed Project. Potential residual effects of lake level changes in Clary Lake on rainbow trout were assessed to be not significant (negligible).

The significance of potential residual effects to rainbow trout due to changes in stream flows in the Clary Creek Watershed were rated separately for the four locations at which residual stream flow changes were predicted to occur: 1) Lake 901 inlets downstream of the TMF; 2) Clary Lake outlet; 4) Clary Creek downstream of the Lake 493 and Lake 901 confluence; and 4) the Lake 493 outlet. Potential residual effects on rainbow trout due to flow reductions in the Lake 901 inlet tributaries downstream of the TMF were assessed to be not significant (moderate). Potential residual effects on rainbow trout due to flow reductions in the Lake 493 outlet were assessed to be not significant (minor). Potential residual effects on rainbow trout due to flow reductions in Clary Creek downstream of the Lake 901 and Lake 493 confluence were assessed to be not significant (minor). Potential residual effects on rainbow trout due to flow reductions at the Clary Lake outlet were assessed to be not significant (minor). Potential residual effects to rainbow trout due to residual effects to BMIs in the Clary Creek Watershed were assessed to be not significant (minor).

Potential cumulative effects on rainbow trout in Clary Lake due to the proposed Project and ongoing exploration activities at the Bell Moly deposit are unlikely to create cumulative effects to rainbow trout in Clary Lake due to changes in stream flows entering Clary Lake or the amount of BMI production in Clary Lake. This is because the amount of water needed for modern drilling is negligible in comparison to the volume of run-off entering Clary Lake at any given time of year. Similarly, modern drilling guidelines and Best Management Practices (BMPs) would effectively eliminate potential effects to benthic invertebrate communities downstream of the drill locations. The potential cumulative effect on rainbow trout in Clary Lake due to the combined effects on water quality changes from TMF seepage from the proposed Project and mine exploration drilling were assessed to be not significant (negligible).

Rainbow trout is not specifically mentioned in the NFA; however, the Nisga'a Nation has a general NFA right to harvest fish resources in the Nass Area within conservation, public health and safety measures, and legislation. Also, rainbow trout is noted as a wildlife fish (as defined in the NFA). This NFA right is given the same priority as recreational and commercial fisheries. The NFA specifies allocations of steelhead, the anadromous form of rainbow trout, (5% of total returns up to 1,000 steelhead); however, no potential effects on steelhead are expected to occur in the lower reach of Clary Creek downstream of these

waterfalls or in the Illiance River. As such, there is not anticipated effect on Nisga'a fisheries of rainbow trout and allocations of steelhead as granted by the NFA.

14.8.4.4 Marine Resources

Marine biota of Alice Arm encompasses planktonic organisms, benthic invertebrate infauna and epifauna, marine fish, and marine mammals. Changes in marine water quality have the potential to affect all type of marine biota. The proposed Project will not have any direct effects on marine biota since no activities related to the proposed Project will occur in marine waters or along the shoreline of Alice Arm. The proposed Project may change baseline freshwater quality and discharge from Lime Creek to Alice Arm during mining operations, which could potentially affect marine water quality and salinity characteristics near the mouth of the creek. Any changes in marine water quality or salinity are expected to be restricted to a very limited area near the creek's mouth given the large dilution of creek discharge in Alice Arm. Changes in marine water quality and salinity could affect the species composition of benthic infauna and epifauna near the creek's mouth thereby, affecting other marine biota; however, given the relatively small contribution of Lime Creek discharge compared to those of the Kitsault and Illiance Rivers, any changes to Lime Creek discharge are not expected to have measurable effects on marine biota.

Cadmium and copper concentrations in Lime Creek water discharged to Alice Arm are predicted to occasionally exceed BC marine water quality guidelines during the proposed Project. The small mixing factors required to meet guidelines (<7) indicate that effects on water quality and marine biota are expected to be negligible and the proposed Project effects on marine biots are predicted to be negligible. The closest Nisga'a marine interest, the intertidal bivalve harvest area as defined by the NFA, is located in the southern portion of Alice Arm extending into Observatory Inlet (15 km southwest of the proposed Project). Based on the negligible effects of the proposed Project on Alice Arm directly adjacent to Alice Arm and the distance of the nearest Nisga'a NFA-defined marine area, the proposed Project is not expected to affect Nisga'a marine rights, including marine resource availability and quality, and access to the intertidal bivalve area.

14.8.4.5 Vegetation Resources

14.8.4.5.1 Overview

Section 6.10 (Vegetation and Plant Communities) assesses effects of the proposed Project on six VCs, including: ecosystem composition; wetlands ecosystems; old forests; species at risk; ecological communities at risk; and cultural plants. The latter VC include those plant species or groups identified by the Nisga'a Nation as having social, economic, or traditional use importance, including large cedar, pine mushroom, plant species used for medicine, and edible berry-producing plant species. Loss of baseline ecosystems of cultural plants would occur throughout the proposed Project footprint as a direct consequence of vegetation clearing and surface disturbance associated with the proposed Project. The following section provides a summary of the main conclusions of the Cultural Plant VC in Section 6.10.

14.8.4.5.2 Large Cedar Model

The Nisga'a Nation in the coastal region has used and continue to utilise Red- and Yellow-cedar for traditional and cultural purposes. A total of 235 ha (12%) of potential large cedar trees occur in the LSA (which is 1,980 ha), predominantly in the Mountain Hemlock Moist Maritime Leeward Variant (MHmm2). The proposed Project would potentially remove 35 ha or 15% of large cedars available in the LSA.

14.8.4.5.3 Pine Mushroom

The Coastal Western Hemlock Wet Submaritime Submontane Variant (CWHws1) has been documented to support pine mushroom habitat with an elevational range of 140 m to 625 m. In the proposed Project, the CWHws1 occurs in the RSA and the Coastal Western Hemlock Wet Submaritime Montane Variant (CWHws2) occurs in the LSA. Due to the combination of soil, site, elevation, and vegetation features, the biogeoclimatic (BGC) unit and site series most likely to produce pine mushrooms in the proposed Project area is the CWHws2, site series 03 (Western Hemlock (WH) - lodgepole pine - feathermoss). Using these criteria, pine mushroom habitat only occupies 2% of the CWHws2 variant. The potential effects to pine mushroom habitat by proposed Project clearing is <1 ha, approximately a loss of 1% of available pine mushroom habitat in the LSA.

14.8.4.5.4 Medicinal Plants

Approximately 10% of the LSA has a high medicinal plant species potential. The ecosystem units with the high cultural plant potential are the WH – amabalis fir - bramble (/01 - AB) in the CWHws2 and the Mountain Hemlock (MH) – amabalis fir - bramble (/04 - AB) in the MHmm2. The majority of the LSA has a moderate medicinal plant potential (50%) and 6% has low potential. A total of 369 ha (31%) of medium and high ranked classes for medicinal plants capability would be potentially affected by the proposed Project. Following reclamation in the Conceptual Reclamation Case, there is a potential net loss of 193 ha of high and medium ranked cultural plant species potential areas representing a 16% loss.

14.8.4.5.5 Edible Berry-Producing Plants

Crowberry - Bog blueberry - Alpine azalea (MHmm2/00 - CA) is ranked with a high potential to produce edible berry plant species. The majority of the proposed Project area has a moderate potential (35% of the LSA) to contain edible berry producing plant species. Approximately 1% of the LSA has a high potential and 24% of the LSA has low potential to contain edible berry-producing plant species. The proposed Project would potentially affect 274 ha (38%) of medium and high ranked habitat with the potential to produce berries. Following Project reclamation in the Conceptual Reclamation Case, there is a potential net loss of 96 ha of high and medium-ranked berry-producing potential areas for an overall 13% loss.

14.8.4.5.6 Mitigation Measures and Residual Effects

The following mitigation measures are proposed to address the potential effects of the proposed Project on culturally significant plants: minimisation of proposed Project footprint;

2) Timber Salvage Plan (including discussions with Nisga'a Nation regarding mutually beneficial options for the end use of high quality cedar trees); maintenance of soil salvage; and reclamation following mine closure.

Considering the brownfield status of site, historical reclamation success of the area, planned cedar tree salvage, and the relatively small proportion of available cultural plant habitat to be removed compared to the regional and local land base, the potential residual effect of the proposed Project on cultural plants is rated as not significant (minor).

14.8.4.5.7 Links to Nisga'a Rights and Interests

The Nisga'a Nation has interests in vegetation resource availability in and around Nisga'a Lands. Chapter 15 of the NFA defines Nisga'a rights related to forest resources on Nisga'a Lands; however, it does not include areas in the NWA and Nass Area. The Nisga'a Nation may be indirectly affected by the removal of cultural plants, which may affect the level of availability for use by the Nisga'a citizens. However, given the minimal potential loss of cultural plants (i.e., 235 ha of large cedar, <1 ha of pine mushroom, 193 ha of medicinal plants, and 274 ha of edible berry-producing plants), there is no anticipated adverse effect on Nisga'a harvesters and Nisga'a harvesting ability. The cedar salvage plan with the Nisga'a Nation may also result in a net beneficial effect with increased availability of cedar for cultural customs and creation of cultural artefacts, such as totem poles and canoes. The current status of the mine site as a brownfield site may already function as a deterrent for Nisga'a citizens in their consideration and selection of vegetation harvesting sites. Furthermore, there are more popular gathering areas with greater resource availability closer to Nisga'a Lands and Villages (e.g., Kwinamuck Lake for pine mushroom harvesting).

14.8.4.6 Water Resources

The Nisga'a Nation has NFA-defined water entitlements to the Nass River, including its tributaries, one of which is proximate to the mine site (i.e., 10% of the flows in the Kwinatahl River). Furthermore, NLG and Nisga'a citizens at open houses have expressed an interest in protecting water resources, especially those that enter Alice Arm. This section provides a summary of the main results of the hydrology assessment (Section 6.5) with linkages to relevant Nisga'a rights and interests.

The watersheds that may be potentially affected by the proposed Project include: Lime Creek (including Patsy Creek); Clary Creek; and Lower Illiance River. A watershed model was developed to simulate monthly groundwater and surface water flows at various locations in the vicinity of the proposed Project. The watershed model was used to assess the potential effects on hydrology within the Lime / Patsy Creek and Clary Creek Watersheds for all phases of the proposed Project.

The proposed Project would not have measurable effects on the quantity of water in Nass River and its tributaries or Kitsault River. The Lower Illiance River is within the hydrology RSA as Clary Creek is one of its tributaries. The Lower Illiance River, downstream of Clary

Creek, has no interaction with the mining activities and, therefore, does not warrant detailed investigation due to the limited potential effects resulting from the proposed Project.

The majority of the potential proposed Project effects on water flows are expected in the Lime / Patsy Creek Watershed where most of the mine facilities will be located, including: the TMF; the Waste Rock Management Facility (WRMF); the Kitsault Pit; the south diversion channel; and the Patsy Creek diversion. Potential effects of the proposed Project on water flows and lake levels are expected within the Clary Creek Watershed mainly due to freshwater withdrawal to support mining operation (Clary Lake levels) and altered runoff characteristics from the footprint of the TMF. Table 14.8.4-1 provides a summary of the percent change in annual, low, and high flows in the Lime / Patsy and Clary Watersheds.

Table 14.8.4-1: Summary of Residual Effects for Hydrology

Project Phase	Residual Effect	Direction
Lime / Patsy Creek Watershed		
C, O and D/C	Decreased annual flows (-14% to -20%)	Negative
PC	Increased high flows (5% to 11%)	Negative
C, O, and D/C	Decreased low flows (-13% to -40%)	Negative
Clary Creek Watershed		
C, O, D/C and PC	Decreased annual flows (-4% to -8%)	Negative
C, O, D/C and PC	Decreased low flows (-17%)	Negative
C, O, D/C and PC	Decreased lake levels (-2% to -6%)	Negative

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

This means that although on an average annual basis there could be a 40% reduction in water flow in the upper section of Lime / Patsy Creek Watershed, the magnitude of this reduction would be highly localised to Patsy Creek which is void of fish, and the effect would be reversible during the post-closure phase of the proposed Project. The main mitigation measure is implementation of a water management plan. Overall, the residual effects of the proposed Project on hydrology are not significant (moderate) on the Lime / Patsy Creek Watershed and not significant (minor) for the Clary Creek Watershed. Section 6.5 provides additional information on changes to water quantity and flow related to the proposed Project.

None of the rivers discussed in the hydrology assessment are included in the NFA under the water entitlements. The assessment indicates the hydrological effects of the proposed Project do not extend to the Nass River (the main source of the Nisga'a water entitlement defined in the NFA). The Kwinatahl River (which is located more than 2 km from the mine site) will remain unaffected by mine-related activities, including changes in water flow. The Nisga'a water entitlements on the Kwinatahl River are taken further upstream closer to Nisga'a Lands. As a result, the effects of the proposed Project on hydrology are not anticipated to affect Nisga'a water-related rights.

14.8.5 Aesthetics

14.8.5.1 Overview

Nisga'a land users accessing the area around the Kitsault mine site may experience a diminishment in their enjoyment due to a decline in aesthetics including air quality, noise, and visual quality. Key conclusions from Section 6.2 (Atmospheric Environment - Air Quality and Climate), Section 6.3 (Atmospheric Environment - Noise), and Section 10.2.3 (Visual and Aesthetic Resources) are summarised in this section with a discussion of linkages to Nisga'a rights and interests.

14.8.5.2 Air Quality

The assessment of atmospheric environment modelled air quality effects of the proposed Project for important residential and land use area proximate to the proposed Project. The air quality modeling results indicate that there is a negligible effect on Nisga'a land-based interests close to the proposed Project, including Nisga'a Category A Lands (Gits'oohl).

The maximum predicted ambient concentrations for the proposed Project of total suspended particulates (TSP), PM_{10}, $PM_{2.5}$ SO_2 and carbon monoxide (CO) concentrations comply with the appropriate air quality criteria. Only concentrations of NO_2 one-hour average are likely to have any residual air quality effects. The affected area is small and is adjacent to the proposed Project fence line on the west side. NO_2 concentration at longer averaging times are predicted to meet the relevant air quality objectives. With implementation of the Dust Management Plan, utilisation of modern, maintained mining equipment, limited vehicle and equipment idling, and establishment of speed limits, the residual air quality effects are considered to be adverse in direction, intermittent, reversible, and not significant (minor). Section 6.2 provides more detail on the effects of the proposed Project related to air quality.

Given that Nisga'a citizens and the public other than mine employees will be restricted from entering the mine site and the air quality modelling results did not predict an effect on air quality in the area Gits'oohl, there is no anticipated diminishment of land use enjoyment for Nisga'a land users related to air quality.

14.8.5.3 Noise

Noise and vibration generation during the construction and operations phases fall into three categories including (a) instant, (b) intermittent, or (c) continuous periods, with levels that vary from low to high. The mining operation, including blasting, crushing, hauling, waste disposal, and ore processing are anticipated to be the main source of instant or intermittent noise. Ore handling and processing would generate continuous noise associated with ore crushing, grinding, classifying, and screening.

Prediction of the proposed Project noise levels was based on an established noise mapping model. The model addresses outdoor sound propagation, which is a complicated interaction between sound waves and the environment through which they pass. Sound is attenuated by absorption in the air and it is bent (refracted) by winds and by thermal gradients. It is

blocked by the surrounding hills, which act as effective noise barriers, diminishes with distance, and can be muted by nearby forest or amplified by reflections due to hard ground.

The permissible noise levels of 55 dBA for daytime and 45 dBA for night time were adopted for this proposed Project. The noise modeling results indicate that Nisga'a land users will not experience noise and vibration effects from mine site operations beyond a distance of 1.5 km from the Kitsault (i.e., baseline levels of 40 dBA). Based on the modelling forecast, the proponent predicts that the proposed Project would comply with PSLs at the fence line. Therefore, no noise and vibration residual effects are anticipated, and thus the proposed Project would not significantly affect the acoustic environment and land use enjoyment by Nisga'a land users. Section 6.3 provides additional detail on the effects of noise and vibration generated by the proposed Project and related activities.

14.8.5.4 Visual Quality

A visibility assessment was conducted using three-dimensional viewshed modeling using Environmental Systems Research Institute (ESRI) ArcGIS 9.3. The viewshed model, which assumed the height of a person of 1.8 m, was conducted to determine visible areas based on single point locations. The model was based on topography and assumed that there were no trees between the observer and facility. Thus, this analysis represents a very conservative approach because trees can reach heights of 15 m.

The Kitsault mine site will not be visible from local roads or potential viewpoints (i.e., Alice Arm Road or Alice Arm or Kitsault Townsite). Due to the mountainous conditions of the local and regional topography the mine site facilities are only visible from sea level looking up Lime Creek where it flows into Alice Arm. From this view point, the South Embankment and WRMF are the main facilities visible. In general, portions of the mine site are visible from various view points at higher elevations (i.e., from neighbouring mountains). The Northeast Embankment can also be seen from several areas along the Alice Arm Road. The mine site facilities would also be visible from the top of Gwunya Falls; however, it would not be visible from the bottom of the falls due to the steep local topography.

The proximity of the various areas identified as important in terms of visual landscape following a review of Nisga'a rights and interests and the mine site with respect to local and regional topography are described below:

- The mine site facilities would not be directly visible from Gits'oohl due to the local topography. Emissions from the mine site may be visible due to its proximity;
- The mine site may be partially visible from one of the mountain tops located within the Nisga'a commercial recreation tenure but not from the rivers or Observatory Inlet due to the mountainous topography;
- The mine site facilities will not be visible from the Kwinamuck Lake recreation site due to the distance (more than 20 km away) and the regional topography. Traffic associated with the mine site may be visible from the Kwinamuck Lake recreation site; and

- The mine site facilities will not be visible from either the Illiance and Kitsault rivers due to the local topography; however, portions of the mine site may be visible from the top of the ravines.

The effects on visual and aesthetic resources can be partially mitigated, including: Managing and controlling emission in all stages of the project; restricting project vehicles to posted speed limits; monitoring dust levels; and coordinating off-road vehicle use.

The residual visual effects are not significant (minor) negative physical change in visual landscape and visual aesthetics associated with increased local and regional road traffic during construction, operations, and decommissioning / closure. There is also a not significant (negligible) residual effect associated with increased light, emissions and dust from vehicles and equipment during construction, operations, and decommissioning / closure activities.

14.8.6 Transportation

Desk-based information on NFA rights and the issues and concerns raised by NLG and Nisga'a citizens forms the basis of predicted effects of the Kitsault transportation route on the Nisga'a Nation. The stand-alone Road Use Effects Assessment (RUEA) (Appendix 8.0-C) provides additional detail and information on transportation effects on Nisga'a rights and interests. This section provides a summary of the results provided in the RUEA report. The transportation of materials, equipment, concentrate, and personnel to and from the mine site during life of the mine may adversely affect the following Nisga'a Nation rights described in the NFA:

- Nisga'a Nation wildlife harvesting rights in the NWA;
- Nisga'a Nation fish harvesting rights in the Nass Area;
- Nisga'a Nation access to NWA and Nass Area; and
- Nisga'a Nation heritage sites, especially the Grease Trail.

14.8.6.1 Wildlife

The transportation of materials, equipment, concentrate, and personnel to and from the mine site may adversely affect wildlife in terms of increased mortality or injury due to collision with mine-related vehicles. This may affect Nisga'a wildlife allocations as defined in the NFA, which are dependent on the viability of wildlife populations in the region. The Nisga'a Nation has a right to specific percentages of the TAH for three species (i.e., moose, grizzly bear, and mountain goat). Nisga'a Nation allocations have ranged from 46 to 125 for moose, two for grizzly bears, and 34 to 130 for mountain goats per year. Of particular concern and focus to NLG are moose, whose population in the Nass Valley, according to NLG reports, has been depressed since 2007. As such, mine traffic collisions with moose resulting in mortality are of special concern to the Nisga'a Nation, as this may exacerbate an already existing problem. Existing recorded moose mortalities along Hwy 113 are low (i.e., ten moose hits in seven years). The introduction of mine-related traffic represents a small

percentage increase from the existing traffic in recent years (i.e., 11% during construction and 3.8% during operations along Hwy 37). Based on implementation of relevant mitigation measures and management plans and the marginal increase in mine-related traffic, the residual effect of transportation on wildlife is expected to be not significant (minor for grizzly bear and mountain goats and moderate for moose). As such, Nisga'a Nation rights to wildlife allocations are expected to be minimally affected by mine traffic along the Kitsault transportation route.

14.8.6.2 Fisheries

Spills into water bodies from accidents involving mine traffic may adversely affect Nisga'a Nation fishery resources. The Nisga'a Nation has rights to a percentage of the salmon and steelhead return to Canada within the Nass watershed as defined in the NFA. Spills into important water bodies, especially the Nass River, may have substantial adverse effects on fish health, resulting in possible lethal and sub-lethal effects, with a potential corresponding reduction in Nisga'a Nation fish entitlements, depending on the size and substance of the spill. The spill may also adversely affect adjacent Nisga'a Nation pine mushroom harvesting areas, especially near Kwinamuck Lake. Furthermore, molybdenum concentrate will be transported in supersacks that can withstand several roll-overs during an accident. As such, the release of molybdenum into the receiving environment is not predicted. Based on implementation of appropriate mitigation measures and the low risk of accidents resulting in spills along the road infrastructure, the residual effect on water quality is rated as being not significant (minor). As such, the proposed Project is expected to have a low-level impact on Nisga'a Nation rights to salmon and steelhead entitlements and pine mushroom activities along the Kitsault transportation route within the Nass Area.

14.8.6.3 Access

While the Nass-Kinskuch, Nass-Kwinatahl and Nass FSRs are property of the Crown permitted for maintenance to the proponent, the NFA defines Nisga'a Nation rights to access Crown roads throughout the NWA and Nass Area. Where access is prohibited to the public, alternative access needs to be provided to Nisga'a citizens to exercise their NFA rights. During vehicular accidents and spills, Nisga'a Nation traffic may be temporarily delayed or impeded from accessing different land use sites along the Nass FSR and Hwy 113. With the application of relevant mitigation measures and management plans, the residual effects of transportation on access are rated to be not significant (minor). As a result, mine-related transportation activities are expected to have a minimal adverse effect on Nisga'a Nation access rights defined in the NFA.

As part of the Special Use Permit (SUP) issued by BC MFLRNO, the proponent is also responsible for maintaining the FSRs leading to the Kitsault mine site, including winter snow clearing and spring maintenance activities. This is anticipated to increase the accessibility of these FSRs to local and regional land use groups. The level of interest is not expected to increase substantially based on the level of maintenance with greater interest generated by the possible upgrading of the Cranberry Connector to highway status during a future

government project, if and when funding becomes available. As such, the interest by third parties is not expected to interfere with Nisga'a citizen NFA-based land use and access.

14.8.6.4 Grease Trail

The Kitsault transportation route intersects with the Grease Trail, an official Nisga'a Nation heritage site as defined in the NFA, at the Nass River crossing. Traffic-related effects on this heritage site are predicted to include possible third party access to the Grease Trail. Given that no substantial road upgrades or ground disturbance are anticipated, there is no anticipated physical degradation or damage to this heritage site. The residual effects are determined to be not significant (negligible) after implementation of suitable mitigation measures, including communication with Nisga'a Nation about issues as they arise. As such, the protection of Nisga'a Nation heritage interests in the Grease Trail as defined in the NFA is not expected to be affected by mine traffic along the Nass-Kinskuch FSR.

14.8.6.5 Human Safety

Safety of Nisga'a citizens traveling along Hwy 113 to / from Nisga'a Villages and Terrace may be adversely affected by transportation-related effects, including vehicular accidents and spills. There is an anticipated increased risk of injury and / or death related to accidents with mine traffic. These are discussed in detail in the Road Use Effects Assessment (Appendix 8.0-C). Based on the small increase in mine-related traffic during construction and operations and the implementation of safety measures to address accident risk, the residual effect on human health and safety is considered to be not significant (minor). As such, Nisga'a Nation safety will be minimally impacted.