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16.0 SUBJECT OF NOTE: HUMAN ENVIRONMENT

16.1 Introduction

16.1.1 Context

This section of the Developer's Assessment Report (DAR) for the NICO Cobalt-Gold-Copper-Bismuth Project (NICO Project) consists solely of the Subject of Note (SON) for the human environment. In the Terms of Reference (TOR) for the NICO Project's DAR issued on 30 November 2009, the Mackenzie Valley Review Board (MVRB) identified the human environment as one of several priority valued components requiring a high level of consideration by the developer (MVRB 2009a). A SON does not have the same priority or expected level of detail as the 3 Key Lines of Inquiry (KLOI), but represents issues that require serious consideration and substantive analysis.

All effects on the human environment are assessed in detail in this SON; however, issues addressed in the following other KLOI and SON may overlap with this SON:

- KLOI: Water Quality (Section 7);
- KLOI: Caribou (Section 8);
- KLOI: Closure and Reclamation (Section 9);
- SON: Air Quality (Section 10);
- SON: Water Quantity (Section 11);
- SON: Vegetation (Section 14);
- SON: Wildlife (Section 15); and
- Section 18: Biophysical Management and Monitoring Plans.

Other related issues are described in Section 4: Engagement and Section 5: Traditional Knowledge.

16.1.2 Purpose and Scope

The purpose of the SON: Human Environment is to assess the effects that the NICO Project may have on land use (traditional and non-traditional), heritage resources, and socio-economics and to meet the TOR issued by the MVRB (2009a). The TOR for the SON: Human Environment are shown in Table 16.1-1. The entire TOR document is included in Appendix 1.I, and the complete table of concordance for the DAR is in Appendix 1.II of Section 1.

The SON: Human Environment includes an assessment of direct effects on the land use and heritage resources in the immediate study area and the socio-economic effects in the communities surrounding the NICO Project. It includes the Tłı̨chǫ and Métis making traditional use of any part of the environmental assessment study area, as well as communities in the environmental assessment study area. The primary communities assessed in this SON include the four communities of the Wek'èezhìi Settlement Area: Behchokǫ̀, Gamètì, Wekweètì, and Whatì; and Yellowknife. In addition, the Yellowknives Dene communities of N'Dilo and Detah are included for potential employment and contracting benefits and for comparative purposes. This assessment includes

potential NICO Project-related changes to economic (e.g., employment and training opportunities), social (health and wellness), and cultural (heritage resources and land use) components of the environment.

The effects assessment will evaluate all NICO Project phases, including construction, operation, as well as closure and reclamation. Indirect and cumulative effects have been incorporated throughout this section, where applicable. The effects from the NICO Project must be considered in combination with other developments, activities, and natural factors that influence the human environment.

Information from other components of the DAR, including air quality, water quality, water quantity, fish and aquatic resources, vegetation, wildlife, and closure and reclamation, as well as information from existing developments, is incorporated in the effects assessment for the human environment. More detailed information on the requirements in the TOR for this SON is provided in Table 16.1-1.

Table 16.1-1: Subject of Note: Human Environment Concordance with the Terms of Reference

Section in Terms of Reference	Requirement	Section in Developer's Assessment Report
3.2.3	**Developer's assessment boundaries** The developer will describe and provide rationales for:	
	• An overall environmental assessment study area and the rationale for its boundaries;	16.2.1, 16.3.1
	• Fortune's chosen spatial boundaries for the assessment of potential impacts for each of the valued components considered; and	16.2.1.2, 16.2.1.3, 16.3.1.1, 16.3.1.2
	• The temporal boundaries chosen for the assessment of impacts on each valued component.	6.3.2, 16.2.3.3
3.2.4	**Description of the Existing Environment**	
	The developer is encouraged to provide a description of the methods used to acquire the information used to describe baseline conditions.	16.2.2, 16.3.2
3.4	**Impacts on the Human Environment** The Mackenzie Valley Resource Management Act lists social impacts, cultural impacts, impacts on heritage resources and impacts on wildlife harvesting in the definition of impacts on the environment. In addition, the Guiding Principles of Part 5 of the MVRMA require the consideration of the social, economic and cultural well being of residents and communities of the Mackenzie Valley during every environmental assessment. The Review Board's Socio-economic Assessment Guidelines provide a context for assessing impacts on the human environment. The developer is encouraged to work with communities and responsible government authorities to identify valued components of the human environment, appropriate indicators and sources of information to measure change, pathways by which change may likely occur, and mitigation and monitoring strategies that may be required to maximize benefits and minimize adverse impacts. Mitigation may not be entirely the responsibility of the developer, as governments and communities have social, economic and cultural protection mandates. However, it is primarily the responsibility of the proponent of the project to initially document these issues in its Developer's Assessment Report. The developer will:	

Table 16.1-1: Subject of Note: Human Environment Concordance with the Terms of Reference (continued)

Section in Terms of Reference	Requirement	Section in Developer's Assessment Report
3.4 (continued)	• Describe employment, training, and business opportunities from the NICO Project, and any plans to maximize opportunities for Wek'èezhìi Settlement Area residents, Aboriginal peoples and other Northerners.	16.2.4, 16.2.11.2.1
	• Estimate the total economic activity to be generated by the development (e.g., employment and income generation including multiplier effects and taxes) and associated socio-economic impacts, with a focus on the distribution of beneficial and adverse impacts. Include a description of any plans or strategies to mitigate adverse socio-economic impacts.	16.2.4, 16.2.5, 16.2.11.2.1 16.2.11.2.2
	• Describe the social impacts of the NICO Project, focusing on community wellness and population health issues at regional, community, family and individual levels.	16.2.7, 16.2.8 16.2.11.2.3, 16.2.11.2.4
	• Describe potential cultural impacts, including potential impacts on physical heritage resources, traditional land use (including hunting, fishing, gathering, use of the traditional Įdaà Trail and any impacts on activities at Hislop Lake).	16.3.4, 16.4.2, 16.4.3, 16.4.4, 16.4.5
	• Describe research methodology (see http://www.pre.ethics.gc.ca/english/policystatement/introduction.cfm).	Annex K, 16.2.4.1, 16.2.5.1
	• Describe commitments and plans to monitor, evaluate and manage impacts on the human environment.	16.2.13.1, 16.3.7, 16.4.8
3.6	**Cumulative Effects** Pursuant to paragraph 117(2)(a) of the *Mackenzie Valley Resource Management Act*, the Review Board considers cumulative effects in its determinations. Cumulative effects are the combined effects of the development in combination with other past, present or reasonably foreseeable future developments and human activities. In addressing cumulative effects, the developer is encouraged to refer to Appendix H of the Review Board's Environmental Impact Assessment Guidelines. The developer will:	
	• Describe and provide rationale for which past, present or reasonably foreseeable future developments and human activities are being considered in the cumulative effects assessment.	16.2.3.3.1
	• Identify which of the valued components may be affected by other past, present or reasonably foreseeable future developments and human activities.	16.2.10, 16.2.11.2
	• Assess the likelihood, duration and magnitude of the combined effect of these human activities on the identified valued components.	16.2.11.2
	• Describe any mitigation measures proposed to reduce or avoid the predicted effects, specifying if and how adaptive management will be used, and provide an assessment of any residual cumulative impacts.	16.2.11.2
Appendix A	**Existing Environment**	
	Human Environment Describe the following:	
	• Any other physical infrastructure present in the environmental assessment study area, including habitations, roads, buildings, quarries, power lines and industrial works.	16.2.1.3, 16.2.2.4

Table 16.1-1: Subject of Note: Human Environment Concordance with the Terms of Reference (continued)

Section in Terms of Reference	Requirement	Section in Developer's Assessment Report
Appendix A (continued)	• Available information pertaining to the project area from land use planning in the Wek'èezhìi Settlement Area.	16.2.1.3, 16.2.2.5, Annex L
	• The availability and average training or skill levels of people in the local Wek'èezhìi Settlement Area and the other Aboriginal and Northern resident regional labour pool.	16.2.2.6, 16.2.2.8
	• The local and regional business capacity available to support the Project.	16.2.1.3, 16.2.2.3, 16.2.2.4, Annex K
	• Current socio-economic conditions and relevant trends in the potentially-affected communities and the Wek'èezhìi Settlement Area as a whole, using appropriate indicators of well-being and quality of life.	16.2.2
	• A summary of historic and present land use in the study area, including identification of traditional land use groups, areas used and traditional travel routes and timings.	16.2.2.10, 5.3, Annex B
	• Traditional harvesting activities, relevant species (wildlife, fish and plants), observed trends and any traditional values expressed about harvested species.	5.3, 16.2.2.10
	• Known physical heritage resources locations, areas of high potential for unfound physical heritage resources and cultural values associated with the environmental assessment study area.	16.3.2
	• Other current economic activities in the environmental assessment study area.	16.2.2.5
Appendix K	**Human Environment**	
Appendix K1	**K1 Employment and business opportunities** *The developer will assess the potential impacts of the NICO Project on the economy of the Mackenzie Valley, with a focus on the Wek'èezhìi Settlement Area generally and each potentially-affected community.* In assessing access to employment and business opportunities, the developer will provide the following:	
	Employment 1) An estimate of human resource requirements for the development that includes a listing of all direct and contract employment requirements by skills category for each phase of the life of the NICO Project. The developer will identify the skill-levels that each position requires, and shall include employment in all aspects of the operation of the mine, including for example transportation and monitoring activities.	16.2.4.2 Appendix 16.II
	2) An assessment of the likely percentage of direct employment for Northern and Aboriginal residents at the NICO Project, in light of the current and likely future (extending for the expected 15 year life of the mine) labour pool context (i.e., likely available numbers of workers in light of total regional economic activity), and identification of any target goals for Northern and Aboriginal employment.	16.2.4.2 16.2.11.2.1

Table 16.1-1: Subject of Note: Human Environment Concordance with the Terms of Reference (continued)

Section in Terms of Reference	Requirement	Section in Developer's Assessment Report
Appendix K1 (continued)	3) A qualitative description of any barriers to direct or contract employment, advancement and retention for Mackenzie Valley residents, with particular emphasis on Wek'èezhìi Settlement Area residents, other Aboriginal and Northern people and women where possible. This description must include employee availability and employability in light of minimum skill requirements and an investigation of current training opportunities for community members. The developer will also discuss:	16.2.4.2
	a. estimates of current skills gaps in the available labour pool that require additional training programs;	16.2.4.2
	b. hiring and retention policies related to minimum education levels, criminal records and drug and alcohol use; and	16.2.4.2, 16.2.13.1.7
	c. any identified barriers to maximizing regional and Aboriginal employment.	16.2.4.2
	4) The developer's plans, strategies and commitments for maximizing direct employment, advancement and retention of Wek'èezhìi Settlement Area residents, other Aboriginal and Northern people.	16.2.4.2
	5) Employment policies for Aboriginal and other Northern women including training initiatives, measures for security and safety at the mine site and anti-harassment policies.	16.2.4.2.4
	6) A description of any plans, strategies or other commitments the developer has to support increasing the mine-ready workforce, support career paths in mining, and assist training programs in related support activities. The developer will outline how these strategies will create or contribute to training opportunities for Northern and Aboriginal persons in general, and its employees in particular, over the life of the mine. The developer will also identify when any committed-to mitigations will be enacted, keeping in mind the lead time required for job-ready training programs.	16.2.4.2, 16.2.4.2, 16.2.7.2.2, 16.2.11.2.1, 16.2.13.1.5
	7) A discussion of whether and how the developer's strategies and commitments for maximizing employment of Aboriginal and Northern residents will extend to its contractors.	16.2.4.2.6
	Business Opportunities 8) An estimate of all contractor and subcontractor goods and services that the NICO Project will require, by project phase, as well as an estimate of what percentage of required goods and services can feasibly be sourced from local and regional businesses.	16.2.4.2, 16.2.11.2.1
	9) The developer's policies, plans, and commitments associated with maximizing contracting to Aboriginal and Northern-owned and operated businesses, with emphasis on assisting business development initiatives and joint ventures with Wek'èezhìi Settlement Area-based businesses.	16.2.4.2
	10) An assessment of any barriers to maximizing the utilization of Northern businesses.	16.2.4.2, 16.2.12
	11) The developer's prediction for any training, education or other improvements necessary to maximize local and regional business capacity to benefit from the NICO Project.	16.2.4.2.6, 16.2.13

Table 16.1-1: Subject of Note: Human Environment Concordance with the Terms of Reference (continued)

Section in Terms of Reference	Requirement	Section in Developer's Assessment Report
Appendix K2	**K2 Distribution of beneficial and adverse socio-economic impacts** *The developer will provide the following information and analysis:*	
	1) Qualitative and quantitative estimates of all beneficial and adverse economic impacts from the NICO Project, including at minimum:	16.2.4, 16.2.5, Appendix 16.I
	a. capital costs associated with placing the NICO Project in operation, broken down by major components (estimates should be in 2009 dollars Cdn. and may be in a +/- 20% range);	16.2.5.2.1 Appendix 16.I
	b. annual operating costs during the life of the NICO Project (estimates should be in 2009 dollars Cdn. and may be in a +/- 20% range);	16.2.5.2.2
	c. federal, territorial and municipal taxes that the developer may remit by year, as well as from linked economic development (a +/- 20% range is acceptable);	16.2.5.2.4
	d. total employment impact on the Wek'èezhìi Settlement Area and Mackenzie Valley, including a prediction of employment multipliers from the development; and	16.2.4, 16.2.5.2.5
	e. a prediction of any adverse impacts the development may have on public infrastructure maintenance and associated costs, depending upon availability (with emphasis on the potential realignment of the winter road through the Wek'èezhìi Settlement area).	16.2.6, 16.2.11.2.3
	2) Discussion of any plans, strategies or other commitments the developer has to help potentially-affected communities avoid over-exposure to cyclical economic fluctuations, with a focus on:	16.2.9 Appendix 1.III
	a. potential social and economic effects of mine closure (including unforeseen early closure or project hiatus) on potentially-affected communities and the Wek'èezhìi Settlement Area; and	16.2.9
	b. any plans to assist post-closure transition for mine employees.	16.2.9, 16.2.11.2.6 16.2.13.2
	3) Discussion potential role of the NICO Project on the following:	
	a. socio-economic impacts potentially resulting from increased disposable income and larger reliance on the wage economy;	16.2.7, 16.2.11.2.4
	b. any impacts on social services provision, infrastructure and costs (e.g., emergency medical care or family social services); and	16.2.6, 16.2.7.2.6, 16.2.11.2.3, 16.2.13.1.8
	c. whether and how the project may create or contribute to impacts on other organizations and businesses servicing the region through mobilization of local skilled labour away from smaller NICO Project communities and associated impacts on maintenance of infrastructure and basic service provision.	16.2.2.4, 16.2.6.2.2
	4) The developer's policies, strategies, plans, and commitments, alone or in combination with other parties, for the mitigation of any adverse socio-economic impacts.	16.2.4.2, 16.2.7.2, 16.2.13.1

Table 16.1-1: Subject of Note: Human Environment Concordance with the Terms of Reference (continued)

Section in Terms of Reference	Requirement	Section in Developer's Assessment Report
Appendix K3	**K3 Social impacts** *While conducting a social impact assessment, the developer will describe:*	
	1) Potential impacts associated with the development on community wellness and population health issues such as:	16.2.7
	a. population in- and out-migration;	16.2.7.2.1
	b. alcohol and drug access and use;	16.2.7.2.3
	c. sexually-transmitted infections rates;	16.2.7.2.4
	d. crime rates;	16.2.7.2.5
	e. access to childcare;	16.2.7.2.6
	f. language retention and other key indicators of cultural maintenance;	16.2.7.2.7
	g. education completion rates by level; and	16.2.7.2.2
	h. community cohesiveness and pride in cultural identity.	16.2.7.2.8
	The description of community wellness and population health issues may consist of a review of publicly available quantitative statistics and key informant interviews with community health providers and social service providers where possible.	16.2.2.9, 16.2.7, Annex K
	2) How each identified potential impact may affect individual potentially-affected communities.	16.2.4, 16.2.5, 16.2.6, 16.2.7, 16.2.8, 16.2.9
	3) The physical, mental, and cultural health of mine workers and mine workers' families, considering potential impacts of long-distance commuting and greater engagement in the wage economy based on a review of select and pertinent peer-reviewed studies and through key informant interviews with Wek'èezhìi Settlement Area residents currently working at mines in the NWT. This discussion should identify any alternative shift rotations considered by the developer, with the rationale for the chosen rotation.	16.2.7, 16.2.13.1.2
	4) Human resources management plans and programs the developer will offer at the mine site to identify and mitigate potential social problems associated with the NICO Project, that will include but not be limited to discussion of:	16.2.13.1
	a. increased income and money management;	16.2.13.1.1
	b. potential stressors associated with long-distance commuting and stress management programs;	16.2.13.1.2
	c. substance abuse and treatment policies;	16.2.13.1.3
	d. cross cultural training and avoidance of cross-cultural conflicts at the worksite; and	16.2.13.1.4
	e. "home" – community and family - support programs.	16.2.13.1.8
	5) Potential impacts on public safety, especially in regards to the use of the NICO access road and the potential realignment of the winter road through the Wek'èezhìi Settlement Area and identification of mitigation to minimize the potential for vehicle accidents.	16.2.8
	6) Any lessons learned about short and long-term social and economic impacts of previous mine developments in the Mackenzie Valley and the Canadian North, and how the developer has incorporated such lessons into its impact assessment and mitigation commitments for the NICO Project.	16.2.9

Table 16.1-1: Subject of Note: Human Environment Concordance with the Terms of Reference (continued)

Section in Terms of Reference	Requirement	Section in Developer's Assessment Report
Appendix K4	**Cultural impacts** *The analysis of heritage resources is inclusive of both sites and objects of cultural significance, and cultural impacts include both tangible and intangible aspects of culture.*	
Appendix K4a	**K4a Physical heritage resources** The developer will report on:	
	1) Consultation with traditional knowledge holders, archaeologists, anthropologists, and the Prince of Wales Northern Heritage Centre, that the developer conducted during its cultural impact assessment, indicating how such interactions influenced:	16.3.2.1
	a. heritage resource survey locations;	16.3.2.2.3, 16.3.2.2.4
	b. the identification of locations of known or high potential for heritage resources; or	16.3.2.2
	c. heritage resource management plans.	16.3.7
	2) Identification of all known archaeological and heritage resources, sites or areas of cultural significance, and areas of high potential for unfound heritage resources in the environmental assessment study area.	16.3.3.3
	3) All recommended mitigation measures that consultation produced for the protection of local known and high potential areas of physical heritage resources and other sites of cultural significance, and associated developer's commitments or reasons for not adopting recommendations.	16.3.3.2, 16.3.5
	4) Describe how the developer will involve the Wek'èezhìi Settlement Area residents in heritage assessments and monitoring of impacts on culture.	16.3.7
	5) Describe any potential impacts from the NICO Project on physical heritage on Hislop Lake and any other point on the Įdaà Trail.	16.3.3.3
Appendix K4b	**Traditional land use and wildlife harvesting** The developer will:	
	1) Describe any potential impacts of the NICO Project on traditional harvesting activities for Aboriginal residents of Wek'èezhìi Settlement Area communities, including changes from impacts to wildlife, changes in all-season access from Wek'èezhìi Settlement Area communities due to the NICO access road, and any changes in access by non-resident hunters.	16.4.2, 16.4.6
	2) Provide a prediction of the total impact of the NICO Project on traditional activities, and on the potential for increased or reduced harvesting success.	16.4.2, 16.4.6
	3) Identify all mitigation commitments by the developer, alone or in combination with other parties, to minimize adverse impacts on traditional land use and resource harvesting, or to compensate for losses that the developer cannot prevent. This should include discussion of:	16.4.2, 16.4.3, 5.4.3
	a. how access along the NICO access road will be monitored and, if feasible, managed; and	16.4.2.1, 16.4.2.4
	b. any plans for any ongoing monitoring, adaptive management and harvester compensation.	16.4.2.1, 16.4.2.4, 5.4.3

Table 16.1-1: Subject of Note: Human Environment Concordance with the Terms of Reference (continued)

Section in Terms of Reference	Requirement	Section in Developer's Assessment Report
Appendix K4b (continued)	4) For visual and audible changes perceptible from the Įdaà Trail:	
	a. describe and illustrate any potential visual impacts to the viewshed as seen from Marian River and Hislop Lake;	16.4.3, Section 3 (Photos 3.2-1 to 3.2-4)
	b. describe any other points along remainder of the Įdaà Trail where the NICO Project will be visible or audible, illustrate and describe how it will look and sound;	16.4.3, 16.4.4
	c. describe any measures taken to minimize these sensory disturbances; and	16.4.3, 16.4.4
	d. describe how any remaining sensory changes will affect the traditional authenticity of users' experiences along the Įdaà Trail.	16.4.3, 16.4.4
	5) Describe potential impacts from the NICO Project on traditional activities at Hislop Lake.	5.4.2, 16.4.5
Appendix K5	**K5 Human environment monitoring and management plans** 1) Describe any commitments, plans and strategies to engage with responsible authorities and potentially-affected communities in monitoring impacts on the human environment such as:	16.2.13.1
	a. success of local and regional residents and Aboriginal people in gaining employment at the NICO Project, and the success of training initiatives;	16.2.13.1.5
	b. success of local and regional businesses in providing goods and services to the NICO Project, with identification of gaps to maximizing engagement;	16.2.13.1.6
	c. employee retention;	16.2.13.1.7
	d. worker and family wellness;	16.2.13.1.8
	e. the contribution of the NICO Project to beneficial and adverse social impacts at the regional and local levels across a spectrum of appropriate indicators to be determined in collaboration with Wek'èezhìi Settlement Area communities and government authorities; and	16.2.13.2
	f. impacts on wildlife harvesting and practice of traditional culture on the land.	16.2.13.3
	2) Identify relevant existing initiatives monitoring community wellness and investigate how it will engage with, contribute to, and consider results from these programs in its ongoing monitoring and adaptive management programs.	16.2.13.1.8, 16.2.13.2
	3) Describe how results from monitoring the human environment will be evaluated and reported to regulators, responsible authorities and potentially-affected communities.	16.2.13.1
	4) Describe the adaptive management systems will be in place to deal with issues identified during monitoring.	16.2.13, 16.2.13.1.8
	5) Provide a summary table listing all human environment monitoring and management systems and where they are described in the Developer's Assessment Report.	16.2.13.1

Table 16.1-1: Subject of Note: Human Environment Concordance with the Terms of Reference (continued)

Section in Terms of Reference	Requirement	Section in Developer's Assessment Report
Appendix L	**Cumulative Effects** The following items are required for consideration of cumulative effects:	
	1) In terms of cumulative effects, predict:	
	b. potential socio-economic changes, cultural changes and changes to community well-being from the NICO Project in combination with the potential realignment of the winter road through the Wek'èezhìi Settlement Area, using publicly available data;	16.2.3.3.1
	c. potential socio-economic changes, cultural changes and changes to community well-being from the NICO Project in combination with other with other industrial developments using publicly available data including:	16.2.11
	i. existing and proposed diamond mines;	16.2.3.3.1, 16.2.10, 16.2.11.2.4
	ii. the proposed Yellowknife Gold Project; and	16.2.3.3.1, 16.2.11.2.4
	iii. the proposed Mackenzie Gas Project.	16.2.3.3.1, 16.2.11.2.2
	2) Determine any other past, present and reasonably foreseeable human activities or developments that may affect the same valued components as the NICO Project.	16.2.11
	3) Predict the combined impact of the NICO Project in combination with the impacts of the other developments identified above.	16.2.11
	4) Identify means for Fortune, either on its own or cooperatively with others, to reduce or avoid the predicted cumulative effects.	16.2.11
	5) Describe the residual cumulative effects following mitigation.	16.2.11
	6) Provide the rationale for including the developments that are chosen for examination on specific valued components, as well as a description of and rationale behind the chosen geographic cumulative effects study area and temporal boundary.	16.2.3.3.1

Valued components represent social, economic, cultural, biological, and physical properties of the environment that are considered to be important by society. Assessment endpoints represent the key properties of the VC that should be protected for their use by future human generations, while measurement endpoints are quantifiable (i.e., measurable) expressions of changes to assessment endpoints. For socio-economics, measurement endpoints can be considered a subset of VCs.

Concerns about the NICO Project as described in the TOR were raised in meetings with individuals, communities, and government that have an interest in the NICO Project, and through Fortune's own engagement process (Section 4). Taken together, these concerns reflect societal goals, or VCs, that are linked to people's perspectives on the potential effects from the NICO Project on their lives and communities. The VCs provided the substantive focus for both the socio-economic baseline study and the assessment of Project-related effects. Fortune has been working with communities and responsible government authorities for several

years to identify these socio-economic VCs, and more formally since late 2008 when the first scoping sessions for the NICO Project began. Project effects are measured against potential changes to these VCs as a result of the NICO Project.

The assessment endpoints for socio-economic and cultural VCs were determined (Table 16.1-2). In addition, the measurement endpoints used to evaluate the assessment endpoint are presented. Information concerning cultural impacts related to physical heritage resources, traditional land use, and wildlife harvesting is provided below. A baseline report describing non-traditional land use is also available in Annex L.

Table 16.1-2: Summary of the Assessment and Measurement Endpoints for the Subject of Note: Human Environment

Valued Component	Assessment Endpoints	Measurement Endpoints
Economic Impacts (Employment and Business Opportunities, Distribution of Beneficial and Adverse Economic Impacts)	Persistence of Long-term Social, Cultural, and Economic Properties	• capital and operating costs • government revenues • business activity • employment and income • labour pool capacity • education, training, and opportunities for youth • community infrastructure and services • social disparity • economic effects of closure
Social Impacts		• population demographics • substance abuse • crime rates • health care • childcare • training and education • family and community cohesion • public safety
Cultural Impacts		• language use • heritage resources • tourism potential and wilderness character • access to wildlife • availability of wildlife

Assessment endpoints are general statements about what is valued over the long-term, and encompass the notion of sustainability. For example, protection of heritage resources and continued opportunities for traditional use of wildlife resources may be assessment endpoints for surface water, wildlife, archaeology, and traditional use. Identification of assessment endpoints for VCs in the DAR was determined primarily from the outcome of the community, public, and regulatory engagement processes. For socio-economic VCs, the significance of effects from the NICO Project is determined for assessment endpoints that reflect the collective issues among the SON: Human Environment in the DAR (i.e., consideration of the social, economic, and cultural well being of residents and communities).

Measurement endpoints are defined as quantifiable (i.e., measurable) expressions of changes to the assessment endpoint (e.g., changes to educational access, employment, and income). Effects to long-term

social, cultural, and economic values are predicted through the analysis of measurement endpoints. Measurement endpoints also provide the primary factors for discussions concerning the uncertainty of impacts to socio-economic VCs, and, as such, are the key variables for study in monitoring and follow-up programs.

Measurement endpoints for VCs of the socio-economic and cultural environment include employment, income, training, quality and capacity of community and regional infrastructure, family and community cohesion, tourism potential and wilderness character, and heritage resources.

16.1.3 Content

To present the required material in an organized and readable format, the SON is divided into 3 main components as follows:

- social and economic impacts, which includes, employment and business opportunities, and socio-economic impacts as defined by the TOR (MVRB 2009);
- physical heritage resources; and
- traditional land use and wildlife harvesting.

Social and economic impacts and physical heritage resources are organized such that it moves from introductory or background information, through study area descriptions, into the existing environment and detailed effects assessment, and concludes with a clear description of the predicted impacts of the NICO Project as outlined in Table 16.1-3. The TOR contents are addressed in this report by a table of concordance that cross-references the TOR to the information; location in this DAR is contained in Table 16.1-1.

The intent of the Traditional Land Use (TLU) and TK section within Section 16 of the DAR is to provide information to inform the TLU and TK portion of the SON for the Human Environment, and to meet the TOR issued by MVRB for the NICO Project (MVRB 2009). This section summarizes TLU information reported in Section 5 (Traditional Knowledge) that is relevant to areas where traditional activities may be impacted, as well as areas specifically identified in the TOR such as the Marian River, Hislop Lake, and the Įdaà Trail. This section also provides a summary of the effects on TLU and wildlife harvesting assessed in other sections of the DAR.

In addition to the content included in this SON, the following Appendices and Annexes are included to provide additional detailed information:

- Appendix 16-1: Economic Report for NICO Project
- Appendix 16-2: Estimated Human Resources Requirements for Operations
- Annex K: Baseline Socio-economic Environment for the Proposed NICO Project

Table 16.1-3: Organization for Social, Economic and Physical Heritage Resource Assessment

Section	Content
Sections 16.1 to 16.2.1	**Introduction** – Provides an introduction to the human environment SON by defining the context, purpose, scope, and study areas, and providing an overview of the SON organization
Section 16.2.2	**Existing Environment** – Provides a summary of the existing conditions for the NICO Project area

Table 16.1-3: Organization for Social, Economic and Physical Heritage Resource Assessment (continued)

Section	Content
Section 16.2.3	**Pathway Analyses** – Provides a description of the pathway analyses used to identify the activities that have primary linkages to potential effects of the NICO Project on the human environment
Sections 16.2.4 to 16.2.9	**Effects to the Human Environment** – Provides a detailed assessment of the potential effects of the NICO Project on the human environment
Section 16.2.10	**Residual Effects Summary** – Provides a description of the potential effects of the NICO Project on the human environment that remain after implemention of mitigation measures and reclamation
Section 16.2.11	**Residual Impact Classification** – Provides a summary of the impact classification for the residual effects on the human environment identified in the environmental assessment
Section 16.2.12	**Uncertainty** – Provides a discussion of the uncertainty related to the effects and impact assessments on the human environment completed in the environmental assessment
Section 16.2.13	**On-going Engagement and Follow-up** – Provides a summary of the proposed on-going engagement and follow-up programs that will be implemented to evaluate the actual impacts of the NICO Project on the human environment

16.2 Social and Economic Impacts

16.2.1 Study Areas

16.2.1.1 General Setting

The NICO Project is situated northwest of the eastern arm of Great Slave Lake in the Northwest Territories (NWT) at Longitude 63° 33' North and Latitude 116° 45' West. The NICO Project is about 50 kilometres (km) northeast of the nearest community, Whatì, and about 160 km northwest of Yellowknife (Figure 16.1-1). The NICO Project is in the Wek'èezhìi Settlement Area of the NWT and is surrounded by, but not within, Tłı̨chǫ lands (Figure 16.1-1; Figure 16.1-2). Leases held by Fortune Minerals Limited (Fortune) before the Tłı̨chǫ Land Claim Agreement were excluded from the agreement. Other nearby communities include the Tłı̨chǫ capital of Behchokǫ̀, about 80 km south of the NICO Project site, Gamètì located 70 km northwest of the NICO Project, and Wekweètì, located about 100 km northeast of the site.

16.2.1.2 Regional Study Area

The Regional Study Area (RSA) is comprised of the NWT (Figure 16.1-1), where it is used to support the effects evaluation on the socio-economic environment, particularly from an economic perspective (e.g., government revenues, employment), and also from the view of transportation of goods and materials, including the concentrate to Hay River. The RSA is also the scale used to determine cumulative effects of adjacent land use activities and other developments in the region. The RSA is intended to predict the larger scale direct and indirect effects from the NICO Project on valued components (VCs) or populations with wider distributions. For the economics assessment, a third study area considered is "beyond regional," which considers the procurement of goods and services, the transportation of the concentrate outside of the NWT, and national revenues (taxes and royalties).

LEGEND

- NICO PROJECT
- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED NICO PROJECT ACCESS ROAD
- PROPOSED TŁĮCHǪ ROAD ROUTE
- RAILROAD
- TERRITORIAL/PROVINCIAL BOUNDARY
- WATERCOURSE
- WATERBODY

200 0 200

SCALE 1:10,000,000 KILOMETRES

REFERENCE

Base data obtained from Atlas of Canada, DMTI, and ESRI.
Projection: Canada Lambert Conformal Conic

FORTUNE MINERALS LIMITED
NICO DEVELOPER'S ASSESSMENT REPORT

TITLE

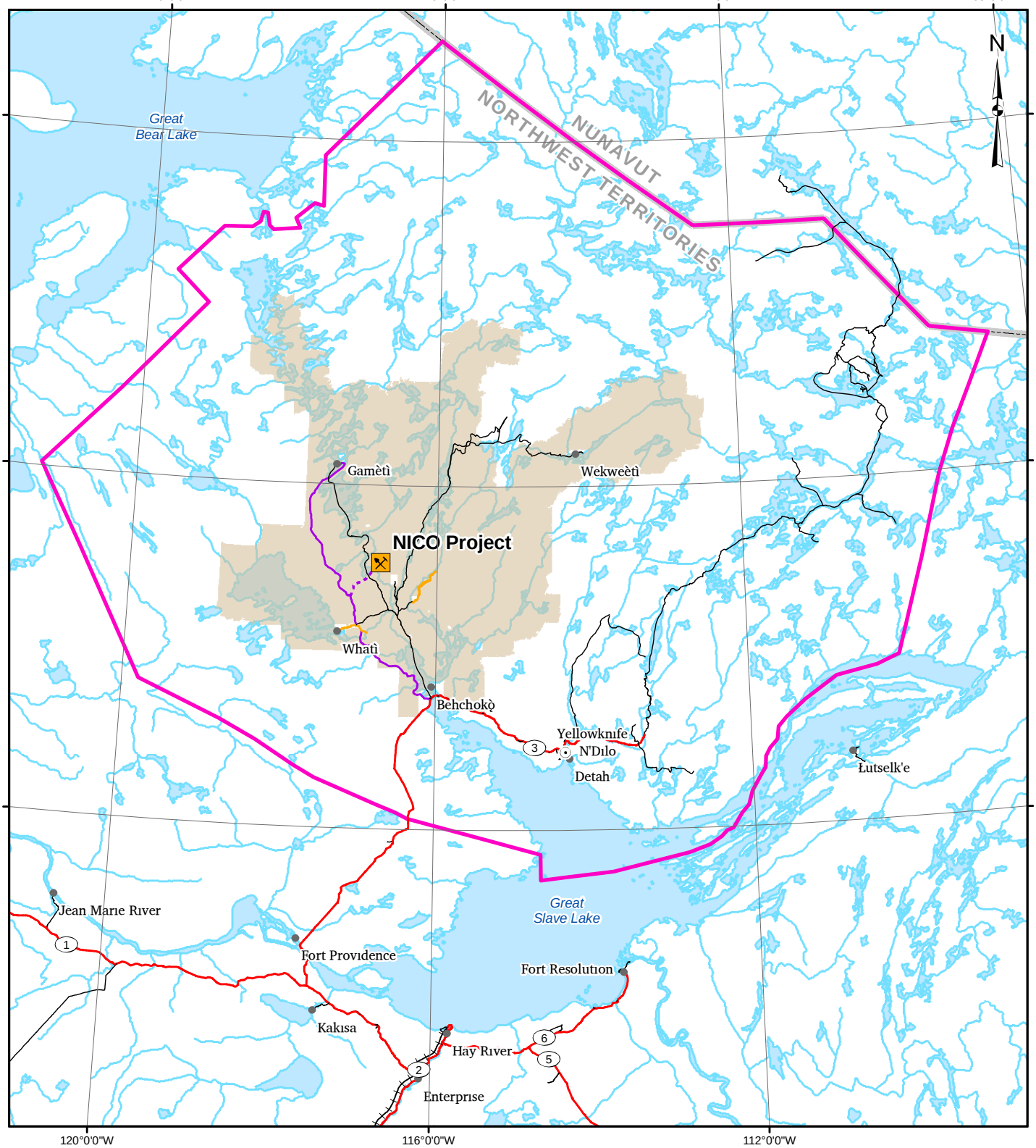
REGIONAL STUDY AREA FOR SOCIO-ECONOMICS

Golder Associates
Edmonton, Alberta

FILE No. E-SocioEc-002-GIS			
PROJECT No. 09-1373-1004		SCALE AS SHOWN	REV. 0
DESIGN	RM	08 Feb. 2011	
GIS	BS	07 Apr. 2011	
CHECK	GRA	11 May 2011	
REVIEW	GRA	11 May 2011	

FIGURE: 16.1-1

I:\CLIENTS\FORTUNE_MINERALS\08-1373-0017\Mapping\MXD\SocioEc\E-SocioEc-002-GIS.mxd



LEGEND

- NICO PROJECT
- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED NICO PROJECT ACCESS ROAD
- PROPOSED TŁĮCHǪ ROAD ROUTE
- RAILROAD
- TERRITORIAL/PROVINCIAL BOUNDARY
- WATERCOURSE
- WATERBODY
- LOCAL STUDY AREA
- TŁĮCHǪ LANDS (WEK'EEZHII SETTLEMENT AREA)

100 0 100

SCALE 1:3,500,000 KILOMETRES

REFERENCE

Base data obtained from Atlas of Canada, DMTI, and ESRI.
Projection: Canada Lambert Conformal Conic

FORTUNE MINERALS LIMITED
NICO DEVELOPER'S ASSESSMENT REPORT

TITLE

LOCAL STUDY AREA FOR SOCIO-ECONOMICS

Golder Associates
Edmonton, Alberta

FILE No. E-SocioEc-001-GIS			
PROJECT No. 09-1373-1004		SCALE AS SHOWN	REV. 0
DESIGN	RM	01 Dec. 2010	
GIS	BS	07 Apr. 2011	
CHECK	GRA	11 May 2011	
REVIEW	GRA	11 May 2011	

FIGURE: 16.1-2

I:\CLIENTS\FORTUNE_MINERALS\08-1373-0017\Mapping\MXD\SocioEc\E-SocioEc-001-GIS.mxd

Fortune has chosen to include the Yellowknives Dene communities of Detah and N'Dilo for the effects assessment in this SON. These communities expressed their wish to be considered for potential benefits from the NICO Project, particularly for possible jobs and contracting opportunities. In conformance with the TOR, these populations are collectively considered "potentially-affected communities." These communities, and the individuals that live and work in them, can contribute to the NICO Project workforce and may provide goods and services to the NICO Project. They are included in the RSA.

16.2.1.3 Local Study Area

The socio-economic local study area (LSA) is the geographical region that may experience impacts from the NICO Project (Figure 16.1-2). The LSA for assessing impacts to the human environment includes the following physical communities and their residents:

- the Tłı̨chǫ region (Wek'èezhìi Settlement Area);
- the communities of Whatì, Gamètì, Wekweètì, and Behchokǫ̀;
- the City of Yellowknife; and
- Tłı̨chǫ and Métis people resident of, or making traditional use of, any part of the environmental assessment study area.

The LSA is also in the North Slave administrative region of the NWT. The LSA includes both direct effects to the socio-economic environment from the mine footprint and small-scale indirect effects from activities associated with the NICO Project.

This section briefly describes the study area communities of Behchokǫ̀, Whatì, Gamètì, Wekweètì, Detah, N'Dilo, and Yellowknife, as well as the Métis and the Wek'èezhìi Settlement Area. Details are mainly limited to their respective population, location, government services, and businesses, as appropriate. Further explanation and details on demographics, economy, business, employment, health, education, services, and other socio-economic VCs are provided in the Baseline Socio-Economic Environment report (Annex K).

16.2.1.3.1 Behchokǫ̀

Behchokǫ̀ had 2026 people in 2009, 90 percent (%) of whom identified themselves as Aboriginal (NWT Bureau of Statistics 2010a). As the largest of the Tłı̨chǫ communities, Behchokǫ̀ is also the largest Dene community in Canada. The community is located 105 km northwest of Yellowknife on the Mackenzie Highway 3. Before the 2003 Tłı̨chǫ Agreement (Tłı̨chǫ Government 2003), Behchokǫ̀ was known as Rae-Edzo (although the Tłı̨chǫ have always called it Behchokǫ̀). Behchokǫ̀ is actually 2 communities, Rae and Edzo, which are located 15 km away from each other by road.

While various residents are employed with Tłı̨chǫ companies, local government, and the diamond mines, some continue to engage in traditional activities for their livelihoods, often to supplement formal employment (Tłı̨chǫ Government 2010a, internet site). About 38% of residents hunted and fished in 2009 and 73% of households consumed country food for at least half of their diet in 2008 (NWT Bureau of Statistics 2009a, 2009b). Almost 90% of residents speak an Aboriginal language (mainly Tłı̨chǫ) (NWT Bureau of Statistics 2009c).

Behchokǫ̀ has several Tłı̨chǫ businesses (Annex K, Appendix III), including 2 fuel service stations, a towing company, a bus company (for scheduled service to communities along the Mackenzie Highway), restaurant,

hotel, dentist, and charter air services. The Royal Canadian Mounted Police (RCMP) office in Behchokǫ̀ had 8 officers as of July 2010 (D. McLeod, Behchokǫ̀ RCMP, 2010, pers. comm.). Behchokǫ̀ has a community health centre with several staff, including 2 registered nurses, 1 nurse-in-charge, 3 nurse practitioners, 7 community health nurses, 2 public health nurses, 1 licensed practical nurse for long-term care, and other support staff (R. Hewlett, Tłı̨chǫ Community Services Agency, 2010, pers. comm.). It also had 2 ambulances with 7 staff as of July 2010. Behchokǫ̀ also has a Friendship Centre, a Culture Centre, and a senior's care centre (Jimmy Erasmus Senior's Home has a total of 8 beds currently filled to capacity) (R. Hewlett, Tłı̨chǫ Community Services Agency, 2010, pers. comm.). In addition to its elementary school and high school, Behchokǫ̀ has preschool and daycare programs.

16.2.1.3.2 Whatì

The population of Whatì was 497 in 2009 (NWT Bureau of Statistics 2010a). The community of Whatì changed its name from Lac La Martre on 1 January 1996. Whatì is located on Lac La Martre, 103 km northwest of Yellowknife on a winter road that is open from about February to April. Daily scheduled flights from Yellowknife fly to Whatì year-round.

A total of 47% of Whatì's population hunted and fished and 78% of households reported eating country food for at least half of their diet in 2008 (NWT Bureau of Statistics 2009a, 2009b). About 93% speak an Aboriginal language (mainly Tłı̨chǫ) (NWT Bureau of Statistics 2009c).

Services include a Kindergarten to Grade 12 school, a Catholic church, a RCMP detachment (2 officers), a grocery store, and a convenience store (Tłı̨chǫ Government 2010b, internet site). Whatì has a health centre with 2 registered nurses, 1 nurse-in-charge, and 2 support staff (R. Hewlett, Tłı̨chǫ Community Services Agency, 2010, pers. comm.). No ambulance service exists. Community members work in the stores, in government and administration, public works (maintenance, construction, road clearing, etc.), in the daycare centre, or as nurses, among other positions. Most interviewees in the baseline study said that they liked the quiet and traditional life that Whatì offers (Annex K).

16.2.1.3.3 Gamètì

The community of Gamètì is located 126 km northwest of Yellowknife along a winter road that is open from about February to April. The community is centered in a string of lakes that form a route between Great Slave Lake and Great Bear Lake. The population of Gamètì was 295 in 2009 (NWT Bureau of Statistics 2010a). Gamètì's airport was built in 1991 just 3 km northeast of the community; the airport has a gravel runway and an air terminal building (GNWT Department of Transportation 2007). A scheduled air service runs daily except Saturdays.

For the Tłı̨chǫ and Sahtu Dene people, fishing, hunting, and trapping remain an important part of the local economy (Tłı̨chǫ Government 2010c, internet site). In 2009, 38% of the population reported that they hunted and/or fished (NWT Bureau of Statistics 2009b). In 2008, 73% of households consumed country food for at least half of their diet and 93% speak an Aboriginal language (mainly Tłı̨chǫ) (NWT Bureau of Statistics 2009b, 2009c).

The community falls into the Behchokǫ̀ -Whatì social services catchment area (Tłı̨chǫ Government 2010c, internet site). Services in Gamètì include a community store, hotel and restaurant, fire station, health centre, and school. Since the school runs from kindergarten to grade 10, the remaining 2 years must be completed in Whatì,

Behchokǫ̀, Yellowknife, or elsewhere. Similar to most small communities in the NWT, power is generated by diesel. The Gamètì health centre has 2 full-time registered nurses and a community health representative, with programs in adult health, school children health, and pre-natal screening (R. Hewlett, Tłı̨chǫ Community Services Agency, 2010, pers. comm.). Plans are to establish an RCMP detachment in 2011. The RCMP detachment in Yellowknife responds to calls from Gamètì, and operates a rotation of 4 days in and 4 days out for 2 officers (D. McLeod, Behchokǫ̀ RCMP, 2010, pers. comm.).

16.2.1.3.4 Wekweètì

In 2009, the population of Wekweètì was 140 (NWT Bureau of Statistics 2010a). Wekweètì was known as Snare Lake before the 2003 Tłı̨chǫ Agreement. The community is mainly accessible by scheduled flights from Yellowknife, with the exception of a few weeks (generally during February to March) when the winter road is open. The populations of Whatì, Gamètì, and Wekweètì all tend to decrease in the winter when their respective winter roads are open.

Among the Tłı̨chǫ communities, engagement in hunting and/or fishing is highest in Wekweètì, with 54% hunting and/or fishing in 2009. In 2008, 66% of households consumed country food for at least half of their diet (NWT Bureau of Statistics 2009a, 2009b; Tłı̨chǫ Government 2010d, internet site).

The community of Wekweètì has a small store, a hotel, and a few other services, similar to Whatì and Gamètì. No health centre exists. A lay dispenser[1] works on a part-time basis, a registered nurse stays in the community for 1 week every 5 to 6 weeks, and a doctor visits the community every 8 weeks (R. Hewlett, Tłı̨chǫ Community Services Agency, 2010, pers. comm.). The RCMP detachment in Yellowknife responds to calls from Wekweètì; like Gamètì, officers fly in/fly out on a regular basis (D. McLeod, Behchokǫ̀ RCMP, 2010, pers. comm.). As the school only goes from kindergarten to grade 9, those entering high school must move to Whatì, Behchokǫ̀, Yellowknife, or elsewhere. Most high school students chose either Whatì or Behchokǫ̀ based on family ties in either community (R. Thomas, Alexis Arrowmaker School, 2009, pers. comm.).

16.2.1.3.5 Yellowknives Dene

The Yellowknives Dene First Nation, including the communities of N'Dilo and Detah, is among the 5 First Nations that make up the Akaitcho Territory Government (the other 4 members are Salt River, Smith's Landing, Deninu Kue, and Łutselk'e First Nations). Their traditional lands are found in and around Yellowknife. The Yellowknives Dene also operate their own development corporation: the Det'on Cho Corporation, the economic arm of the Yellowknives Dene, currently has 20 business subsidiaries that provide goods and services to their local communities and the mining industry (Det'on Cho Corporation 2011, internet site).

Detah

In October 2010, the registered population of the Yellowknives Dene was 1363 (INAC 2010, internet site). About 260 of the 1363 people live in Detah (NWT Bureau of Statistics 2010a). Detah is located along the northern shore of Great Slave Lake and 27 km from the east side of Yellowknife Bay. It is reached by an all-weather road southeast from Yellowknife (the access road to Detah starts at about kilometre 10 of Ingraham Highway 4 from Yellowknife), or by a 6 km winter road.

[1] A local resident who is certified to administer emergency first aid.

Community members in Detah predominantly speak the Weledeh dialect of Tłı̨chǫ and Chipewyan (60% of the population) (NWT Bureau of Statistics 2009c; Tsetta et al. 2005). Similar to the Tłı̨chǫ, country food continues to contribute to family diets and livelihoods; in 2008, under half (43%) of Detah residents surveyed reported hunting and fishing activities and 70% consumed country food for at least half of their diet (NWT Bureau of Statistics 2009a, 2009b).

N'Dilo

N'Dilo is located 4 km north of Yellowknife, on the north end of Latham Island. In 2006, its population was 369 (NWT Bureau of Statistics 2010b). In 2008, 37% of residents hunted and/or fished, and 45% reported country food comprised more than half of their diet (NWT Bureau of Statistics 2010b). Like Detah, many N'Dilo residents (46%) speak an Aboriginal language (NWT Bureau of Statistics 2009c).

The road system in N'Dilo is mostly paved. The community is connected to the Yellowknife road network, which provides convenient access to the city's transportation and communications infrastructure. N'Dilo residents can access several education, health, and social services in nearby Yellowknife. Its emergency services are delivered by the City of Yellowknife. Recreation facilities located within N'Dilo include a ball diamond, a drum dance centre/hall, and a gymnasium (GNWT Department of Municipal and Community Affairs 2004). Residents can also access recreation facilities and services in nearby Yellowknife.

16.2.1.3.6 Yellowknife

Located on the north central shore of Great Slave Lake, Yellowknife is the political capital and administrative centre of the NWT. The population of Yellowknife in 2009 was 19 711, contributing about 45% of the territory's population (NWT Bureau of Statistics 2010a).

Yellowknife Airport serves as the NWT's principal airport and as an important transhipment centre. Scheduled air passenger and cargo service to the Tłı̨chǫ communities are mainly provided by Air Tindi, with additional charter services provided by Tłı̨chǫ Air, among others. Several helicopter companies also are based in Yellowknife. Yellowknife has no rail access, but does have a marine supply facility. The Northern Transportation Company Limited barges large volumes of fuel to Yellowknife from Hay River. The road system within Yellowknife is paved. Several all-weather roads provide access between Yellowknife and other communities. Highway 3 links Fort Providence with Behchokǫ̀ and Yellowknife. Funds received under the Canada Strategic Infrastructure Fund were used to upgrade the highway between Behchokǫ̀ and Yellowknife, the section of the road that has the highest traffic volumes within the Territory (Government of Canada 2003). Highway 4, known as the Ingram Trail, extends 70 km east from Yellowknife and provides access to recreational areas and several communities.

Yellowknife plays an important role as a driver for the NWT economy, since about half of the territorial businesses and almost half of its population lives in the capital city (GNWT Department of Industry, Tourism, and Investment 2009). Several mining companies have offices in Yellowknife; these include the diamond mining companies of BHP Billiton, Rio Tinto, and De Beers Canada Inc. (De Beers). Although manufacturing is not a major economic driver in the NWT, Yellowknife also has diamond cutting and polishing facilities, although only 1 was still operating in 2010. The Mackenzie Valley pipeline project also continues to move forward.

Yellowknife is also the central base for the territory's government and social services, including education, health, recreation, and cultural activities. Yellowknife houses the territorial legislature, and several territorial and federal departments.

16.2.1.3.7 Métis

The 2 Métis associations in the NWT are the Northwest Territory Métis Nation and the North Slave Métis Association (NSMA). The Northwest Territory Métis Nation is comprised of the indigenous Métis originally from the South Slave in the NWT. Their membership is politically represented by the Fort Resolution Métis Council, the Fort Smith Métis Council, the Hay River Métis Government Council, and the North Arm Métis Council of Yellowknife (Northwest Territories Métis Nation 2007, internet site). Members of the Northwest Territory Métis Nation live mainly in the communities of Fort Smith, Hay River, Fort Resolution, and Yellowknife (Northwest Territories Métis Nation 2007, internet site).

The NSMA was formed in 1996 to strengthen the cultural and political identity of the indigenous Métis of the Northern Great Slave area (MTS 2009). The NSMA represents the direct descendents of Métis who used and occupied land in the North Slave Region before 1921. As a non-profit organization, its objectives include the following:

- to negotiate and implement a land and resources agreement founded on the principles of self-government; and
- to promote the educational, economic, social, and cultural development of the members of the North Slave Region and the Treaty 11 area (MTS 2009).

The Northwest Territory Métis Nation and the NSMA each have included the Tłı̨chǫ area in their region of land claim interest. While the federal government has recognized the land claim of the Northwest Territory Métis Nation and are currently negotiating an Agreement-in-Principle on land and resource matters, they have not yet accepted the NSMA claim.

16.2.1.3.8 Wek'èezhìi Settlement Area

The Wek'èezhìi Settlement Area is the management area of the Tłı̨chǫ, traditionally defined as the Môwhí Gogha Dé Nîîtåée area. The boundaries of the region are outlined in the 2003 Tłı̨chǫ Land Claims and Self-Government Agreement (commonly referred to as the Tłı̨chǫ Agreement), signed by the Government of Canada, the Government of the Northwest Territories (GNWT), and the Dogrib Treaty 11 Council on 25 August 2003 in Behchokǫ̀ (Tłı̨chǫ Government 2003). It is the first combined land claim and self-government agreement in the NWT. The 4 communities of the Wek'èezhìi Settlement Area are Behchokǫ̀, Whatì, Gamètì, and Wekweètì.

Môwhí Gogha Dé Nîîtåée is the traditional use area of the Tłı̨chǫ, described by Chief Monfwi during the signing of Treaty 11 in 1921 (Tłı̨chǫ Government 2010e, internet site). Within this area, the Tłı̨chǫ exercise most of the rights set out in the Tłı̨chǫ Agreement. The Môwhí Gogha Dé Nîîtåée lands are owned by the Tłı̨chǫ Government and include approximately 39 000 square kilometres (km^2). The lands owned by each Tłı̨chǫ community government are considered to be large enough to provide for future expansion of the communities. A moratorium on dispositions of interest on Tłı̨chǫ lands is currently in place (Tłı̨chǫ Government 2010e, internet site); in 2009, a 2-year extension was granted to the Tłı̨chǫ to complete their land use plan by October 2011.

16.2.2 Existing Environment

In the TOR, MVRB identified the socio-economic environment as requiring a high level of consideration in the scope of assessment. For the DAR, MVRB requires a detailed assessment of potential NICO Project impacts that may affect the existing human environment, including the following:

- employment, training, and business opportunities from the NICO Project, and any plans to maximize opportunities for Wek'èezhìi Settlement Area residents, Aboriginal peoples, and other Northerners;
- total economic activity to be generated by the development (e.g., employment and income generation, including multiplier effects and taxes) and associated socio-economic impacts, with a focus on the distribution of beneficial and adverse impacts;
- social impacts of the NICO Project, focusing on community wellness and population health issues at regional, community, family, and individual levels;
- potential cultural impacts, including on physical heritage resources and traditional land use (including hunting, fishing, gathering, use of the traditional Įdaà Trail, and any impacts on activities at Hislop Lake); and
- commitments and plans to monitor, evaluate, and manage impacts on the human environment.

16.2.2.1 Methods

Detailed information on the existing socio-economic environment can be found in the socio-economic baseline report in Annex K. This report was prepared using data obtained from publicly available information (e.g., Census data, government reports, on-line academic articles, and internet sites) and primary data collection (interviews and focus groups). Most key informant interviews and focus group discussions were done during 2 field visits to potentially affected communities (Behchokǫ̀, Whatì, Gamètì, Detah, N'Dilo, and Yellowknife) in February 2009 and July 2010; some interviews were also done on the phone between September 2008 and November 2010.

Data were compiled and sorted according to VC, then detailed in the baseline report. The VCs were determined through discussions with Tłı̨chǫ representatives (i.e., key informant interviews), a summary of the MVRB scoping sessions, and a review of publicly available data on selected NWT social indicators. A summary of trends for 20 social indicators used in the NWT to monitor social conditions, which was prepared by the NWT Bureau of Statistics in 2003, also provided a reference point for the VCs.

Socio-economic data examined for the baseline report includes the annual Communities and Diamonds Report. The report is required by the GNWT socio-economic agreements, including those with BHP Billiton, Diavik, and De Beers. These reports began in 1999 and have been published annually ever since (current to 2008). The purpose of the annual Communities and Diamonds report is to monitor and identify socio-economic trends occurring in the communities of Behchokǫ̀, Gamètì, Whatì, Wekweètì, Detah, N'Dilo, Łutselk'e, and Yellowknife. This information is intended to help the communities, governments, and the diamond mine companies, among others, to better plan and to develop mitigation measures for socio-economic impacts that may result from mine construction and operations.

These reports are useful to observe trends over time. The data are publicly available from government sources, including the NWT Bureau of Statistics Community Surveys done every 5 years (the last one was in 2009) and the Statistics Canada Census of Population, also done every 5 years (the last one was in 2006). While these reports are instructive in developing a social baseline report, more recent or other information has also been published elsewhere, some of which is used in this section.

16.2.2.2 Demographics

16.2.2.2.1 Population

In 2009, the population of the LSA was 22 923, or 52.8% of the NWT overall (43 439 people). Most of the LSA population was based in Yellowknife (86%, 19 711 people). The population of the NWT has been experiencing very little growth and high out-migration.

The Tłı̨chǫ communities have been growing slightly more rapidly than Yellowknife and the NWT overall since at least 1996; population data was used starting in this year for comparative purposes since it predates diamond mining with began in the late 1990s. With the exception of Wekweètì (0.5% decline), the LSA communities have experienced modest growth (1% annually since 1996). Behchokǫ̀ is the largest of the Tłı̨chǫ communities, with just over 2000 people, or about 69% of the entire Tłı̨chǫ population (Table 16.2-1). During this period, the establishment of the Tłı̨chǫ Government (and new government jobs) occurred in conjunction with increasing mine-related employment with Tłı̨chǫ companies. As a result, more Tłı̨chǫ families were choosing Behchokǫ̀ as a base.

Table 16.2-1: Population of the Local Study Area and Northwest Territories, 1996 to 2009

Year	Population							
	Tłı̨chǫ	Behchokǫ̀	Whatì	Gamètì	Wekweètì	Detah	Yellowknife	NWT
1996	2 605	1 762	434	263	146	194	18 258	41 748
1997	2 601	1 757	436	273	135	199	18 306	41 635
1998	2 638	1 760	450	290	138	198	17 671	40 816
1999	2 650	1 760	467	285	138	201	17 483	40 654
2000	2 684	1 770	483	289	142	204	17 415	40 499
2001	2 710	1 785	492	290	138	214	17 772	40 844
2002	2 758	1 819	488	293	142	219	18 409	41 665
2003	2 801	1 870	479	300	151	214	19 210	42 561
2004	2 826	1 882	483	288	139	237	19 622	43 301
2005	2 887	1 943	488	292	140	240	19 644	43 399
2006	2 889	1 977	479	291	142	255	19 522	43 198
2007	2 937	2 001	492	295	140	257	19 674	43 545
2008	3 025	2 030	499	291	139	257	19 910	43 720
2009	2 955	2 026	497	295	137	257	19 711	43 439
Net Change	350	264	63	32	-9	63	1 453	1 691
Average Annual Change (%)	1.0	1.1	1.0	0.9	-0.5	2.2	0.6	0.3

Note: The population of N'Dilo is included in the population of Yellowknife.
Sources: 1996-2002: (GNWT 2008a); 2003-2004: (NWT Bureau of Statistics 2008); 2005-2009: (NWT Bureau of Statistics 2010a).
NWT = Northwest Territories; % = percent

Detah also experienced a high population growth rate (average annual rate of 2.2%) in recent years compared to the Tłı̨chǫ (note: as of 2006, the 369 additional members of the Yellowknives Dene living in N'Dilo are counted in the total population of Yellowknife; as a result, data for N'Dilo is limited). The remaining population of the Yellowknives Dene live outside of N'Dilo and Detah (INAC 2010, internet site).

In contrast, Yellowknife's population and the NWT overall have fluctuated over the past 12 years. Low growth was experienced between 1998 and 2001, a possible indication of out-migration, and higher growth between 2006 and 2008, due to in-migration. Between 1996 and 2009, most (97%) of the net change in the total population of the NWT was due to net increases in the Tłı̨chǫ population (21%) and Yellowknife (86%). Most of this growth occurred before 2005. The overall population in the NWT and its communities actually declined from 2008 to 2009, likely due to out-migration as a result of the economic downturn.

The trend toward a declining population is of some concern to the GNWT. An increasing population provides growth opportunities for NWT businesses and spreads the fixed costs of power generation, transportation, and other key economic drivers over a larger base, which can lower overall costs for NWT residents. The high cost of living in the NWT is a major deterrent to attracting new residents (GNWT 2010; NWT Bureau of Statistics 2009d). Communities in the NWT are small and spread out over a large area, which increases costs of power generation and transportation, as well as goods such as food and fuel. If the NWT can attract more economic growth and encourage people to move and stay in the territory, the government's position is that the overall cost of living could decrease over time. Other factors that act as deterrents include the weather (cold and long winters) and lack of diverse employment opportunities. To offset this trend, the GNWT 2010-2011 budget included $1.3 million to promote the territory as a preferred place to visit, live, and work (GNWT 2010).

16.2.2.2.2 Age, Gender, and Aboriginal Differences

Most residents of the Tłı̨chǫ communities and Detah (over 90%; data from N'Dilo was unavailable) self-identify as Aboriginal (NWT Bureau of Statistics 2010a). Yellowknife is the only RSA community with a higher proportion of non-Aboriginals (77%) than Aboriginals (23%) in the population (NWT Bureau of Statistics 2010a). About half of NWT's population is Aboriginal (21 889 in 2009) (NWT Bureau of Statistics 2010a). No data are publicly available about the Métis population.

The 2006 and 2009 populations of the LSA communities were compared by age and gender (Table 16.2-2). The NWT has a relatively young population. In 2010, 21.8% of its population was 0 to 14 years of age, compared to 16.5% for all of Canada, although Nunavut's share of population under 15 years of age was even higher at 31.5%(Statistics Canada 2010). In contrast, only 5.4% of the population of the NWT was 65 years of age or older in 2010, compared to 14.1% for Canada overall (Statistics Canada 2010).

The smaller populations of Gamètì and Wekweètì did not change enough between 2001 and 2006 to adequately assess whether particular segments of the population were growing faster than others. In Behchokǫ̀, the fastest growing segments between 2001 and 2006 were those aged 15 to 44, whereas in Whatì, those aged 25 to 64 were the fastest growing segments of the population (Statistics Canada 2001, 2006).

Table 16.2-2: Population by Age and Gender in the Local Study Area and Northwest Territories, 2006 and 2009

Population Segment	Tłı̨chǫ		Behchokǫ̀		Whatì		Gamètì		Wekweètì		Detah		Yellowknife		NWT	
	2006	2009	2006	2009	2006	2009	2006	2009	2006	2009	2006	2009	2006	2009	2006	2009
Males	1 440	1 560	985	1 069	240	271	145	153	70	67	120	128	9 510	10 094	21 225	22 476
Females	1 335	1 395	915	957	215	226	140	142	65	70	130	129	9 185	9 617	20 240	20 963
age 0-4	315	316	220	227	50	57	30	19	15	13	30	13	1 360	1 544	3 225	3 352
age 5-9	310	283	215	199	50	33	25	40	20	11	30	37	1 195	1 176	3 090	3 039
age 10-14	280	305	190	216	40	49	40	21	10	19	30	27	1 465	1 224	3 600	3 053
age 15-24	395	536	235	375	95	99	45	44	20	18	35	36	2 990	3 138	6 720	7 234
age 25-44	850	920	570	620	145	151	90	101	45	48	55	63	6 660	6 937	13 350	13 900
age 45-59	325	354	225	240	55	60	30	35	15	19	45	56	4 095	4 437	8 255	9 033
age 60 and over	245	232	150	149	45	48	30	35	20	x	25	25	940	1 255	3 220	3 828
Total Population	**2 775**	**2 955**	**1 895**	**2 026**	**460**	**497**	**285**	**295**	**135**	**137**	**245**	**257**	**18 700**	**19 711**	**41 460**	**43 439**

X = data suppressed; NWT = Northwest Territories

Sources: Statistics Canada (2006); GNWT Bureau of Statistics (2010a).

Several interviewees from Whatì and Gamètì expressed concern about what they saw as a declining elder population. This was not confirmed by the population numbers (Table 16.2-2). There was little change in numbers of those aged 60 years or more in Whatì and Gamètì from 2006 to 2009. Likewise, the population 60 years and over is a small component of the NWT overall, but growing slightly from 7.8% in 2006 to 8.8% in 2009. In contrast, interviewees from Whatì and Gamètì commented that while the size of the youth population seems stable, many families are having fewer children.

16.2.2.2.3 Population Change

Population change is a function of birth, death, and migration rates (both in and out of an area). Community mobility may suggest structural change in a population and provide clues about potential service and institutional needs (Adger 2000). For example, communities that experience high in-migration of temporary workers may want to explore ways to encourage more permanent jobs and housing; communities that experience low in-migration and an aging population may see a need for jobs and services that appeal to couples wanting to settle down and raise a family. Births, deaths, and migration patterns are important components of population change, with both short-term and long-term consequences for society. For example, population change and size affects funding and demand for housing, health care, education, and other services and infrastructure. The survival of small communities depends on a certain degree of population stability and/or growth. When considered alongside other data (e.g., cost of living, availability and capacity of health and education services, and employment patterns), this information can help determine whether community populations and demographics are changing, and if so, what some of the factors driving these changes may be.

With the exception of Yellowknife, which is not growing, most communities in the LSA are growing at a stable rate. Overall, the birth rate for the NWT remains much higher than the Canadian average as it has for many years; for example, in 2008 it was 16 births per 1000 residents for NWT compared to 11 births per 1000 residents for Canada (NWT Bureau of Statistics 2010c). While still higher than the Canadian average, the birth rate in the NWT population has been dropping for many years; for example, it has dropped from about 21 births per 1000 residents in 1995. At the same time, the death rate for the NWT has been increasing slightly, from about 3 deaths per 1000 residents in 1995 to 4.5 deaths per 1000 residents in 2008 (NWT Bureau of Statistics 2010c). This may be a reflection of the NWT's aging population, as well as other factors (e.g., in-migration of older demographic or out-migration of younger demographic). It is predicted that the natural increase in population (i.e., the number of births less the number of deaths) will continue to add to the overall NWT population, but at a decreasing rate. This trend will bring about a slower natural increase to the population (Conference Board of Canada 2010).

The NWT has a persistently negative net migration; on average, an estimated fewer than 200 people will relocate to the territory than will leave in 2010 (Conference Board of Canada 2010). One indicator of population mobility is the percentage of people 5 years and older who did not live in the same community 5 years earlier. About half (50%) of the NWT population moved during 2001 to 2006 (i.e., making an intra-territorial, intra-provincial, inter-provincial, and/or international move). In the same period, 7085 people moved into the NWT, while 7055 people left the NWT (Statistics Canada 2006). The resulting net gain of only 30 people indicates a stable population. It is also a positive contrast to the net loss of 3200 people experienced between 1996 and 2001 (Statistics Canada 2001, 2006; 2007, internet site).

Out-migration from the NWT and Yellowknife is still much higher compared to Detah and the Tłı̨chǫ communities, which is to be expected given that small and/or remote Aboriginal communities tend to value family

and kinship ties more than economic gain. The same is not the case for much of Yellowknife's population, the majority of which are non-Aboriginal, including many who have moved there for jobs. Even so, the NWT lost over 2000 people to out-migration from 1992 to 2006 (Statistics Canada 2007, internet site). This high movement was likely a result of people in search of employment and other opportunities elsewhere (e.g., Alberta's oil patch). It also suggests that many people are not choosing to stay and make a life in the NWT.

Some interviewees felt that there was a trend to people staying longer in the NWT with the increasing opportunities for employment and education over the past decade. For example, "The labour market has changed. People would leave after a couple of years of making money since Yellowknife was felt to be too expensive. There are more seniors now; retirees are increasing because of better medical services and community benefits" (G. van Tighem, City of Yellowknife, 2010, pers. comm.)

Among the Tłįchǫ, between 2003 and 2006, net change due to births and deaths was positive (i.e., more births than deaths) and less than the total population change. Only in 2005 did the total population change exceed the natural growth among the Tłįchǫ, most likely due to returnees in search of job opportunities.

Showing even greater movement compared to the Tłįchǫ communities, net out-migration has occurred in Yellowknife and the NWT for every year from 2004 until 2009. In 2008, the net migration rate was 879 people, showing a continued trend of people leaving the NWT overall (NWT Bureau of Statistics 2009e).

Several factors lie behind why more people are leaving the NWT than are arriving. These include work and education opportunities, and family commitments elsewhere. It is the higher cost of living in the territory compared to many other parts of Canada that drives much of the net out-migration. A recent survey of 1705 NWT diamond mine employees found that the main reason for wanting to leave the NWT was the cost of living (64%) (NWT Bureau of Statistics 2009d). For those who were not from the NWT, other common reasons included wanting to be closer to family (39%) and being tired of the weather (38%). For those from the NWT, the second most common reason for wanting to move after the cost of living (59%) was "time for a change" (46%). Of those who were already living in the NWT, 45% said that they were likely or very likely to consider a move from the NWT if the opportunity arose in the next year. Respondents originally from the NWT were less likely to consider leaving (36%, or 196 out of 539 respondents) than NWT residents who had moved to the territory (55%, or 247 out of 449 respondents).

The LSA population is predicted to be about 27 755 people by 2024, an increase of about 5109 people (22.5%) from 2009 (NWT Bureau of Statistics 2010a), with most of the growth occurring in Yellowknife. Population projections are based on historical cohort data for the past 10 to 15 years and do not include projections related to planned development (e.g., mining) (R. Mazan, NWT Bureau of Statistics, 2010, pers. comm.).

16.2.2.3 Economy

Natural resource development is important to the NWT's overall domestic economy, and to the LSA more specifically. In addition to its direct effect on the territory's production through mineral production and mine services, natural resource development also affects the transportation, wholesaling, and construction sectors. It has added thousands of jobs to the NWT's economy, has directly and indirectly raised income levels, and led to a surge in residential construction, retail activity, and government spending. Besides diamonds and gold, minerals, such as uranium, radium, silver, lead, zinc, copper, bismuth, cobalt, and tungsten, have also been mined in the NWT.

The oil and gas sector has been an important contributor to economic development of the NWT. The first oil well was drilled by Imperial Oil in Norman Wells in 1920; oil production began during World War II when oil was moved to a refinery at Whitehorse and then to Alaska. A major oil discovery in the 1980s led to the development of a pipeline from Norman Wells to Alberta. Exploration for natural gas increased in the 1960s, with the Pointed Mountain gas field near Fort Liard coming into production in the early 1970s, and onshore and offshore drilling activities occurring in the Beaufort Delta area in the late 1960s through to the mid-1980s.

Exploration in the Beaufort Delta was re-initiated in the late 1990s for onshore and offshore drilling of oil and gas. In December 2010, the National Energy Board approved the application for the construction and operation of the Mackenzie Gas Project through Canada's North, which has been discussed and debated since the Berger Inquiry of the 1970s (Berger 1977). The Mackenzie Gas Project includes the 1196 km long Mackenzie Valley Pipeline, 3 onshore natural gas fields, a 457 km pipeline to carry natural gas liquids from Inuvik to an existing oil pipeline at Norman Wells, and other related facilities.

While these developments have helped shape the economic fabric of the NWT, the main natural resource story of the past 20 years has been the development of 3 diamond mines: Ekati, Diavik, and Snap Lake. These mines more than offset the closure of the 2 major gold mining operations, the Con and Giant mines. After the discovery of kimberlite in 1991, exploration continued and the first diamond mine (Ekati) began production in 1998. The first diamond mines to open provided employment and secondary industries for local populations in the communities closest to their operations, and revenues for governments in the form of transfer payments.

By the end of the 2000s, a sizeable portion of the NWT Gross Domestic Product (GDP) was generated through mining activities. No other industry contributes a larger share to the territorial GDP (NWT Bureau of Statistics 2009e). With the increased mining and oil and gas activity during the past 10 to 15 years, the GDP of the NWT climbed from $3.3 billion in 2003 to $4.1 billion in 2009 (NWT Bureau of Statistics 2009e). The mining and oil and gas sector accounted for one-third (33%) of the GDP in 2009, with diamond mining emerging as a primary economic contributor.

Despite the recent downturn in resource commodities, such as oil, gas, and minerals, there are other proposals to develop natural resources in the NWT, including the aforementioned Mackenzie Gas Pipeline and the Taltson Hydroelectric Expansion Project. Resource development in the NWT provides employment for Aboriginal and non-Aboriginal residents, as well as for people from other regions in Canada, and even other countries. It generates revenues for government and provides individuals with income that adds to consumer spending in the NWT and throughout Canada.

While the NWT's economic growth set record levels before 2008, future growth will face some large challenges. With the recessionary effects felt throughout the world during 2008 to 2009, mining has experienced some slow-down, with recent layoffs and curtailing of production. The economic downturn has reduced demand for diamonds, which are the primary export for the NWT. Likewise, interest in the oil and gas sector has been slow to recover. Oil prices are recovering, but natural gas prices remain low.

16.2.2.4 Infrastructure and Services

The physical size of the NWT, its comparatively small population and economic base, and the remoteness of its communities present considerable challenges in infrastructure and services development, funding, and maintenance. The distance between communities in the NWT, and the difficulties recruiting and retaining professionals (e.g., medical and education) limit people's access to health care and education in their own

community. Consequently, heavy reliance is placed on the health care, education, and other social service systems in Yellowknife, as well as out-of Territory specialists. While some of these challenges will likely continue for years to come, several infrastructure changes are occurring in the NWT, including the Deh Cho Bridge (a cablestay bridge to span the Mackenzie River near Fort Providence and scheduled to open in the fall of 2011), new or improved roads, improved airport facilities, and more housing options, especially in Yellowknife.

Northern communities like Whatì, Gamètì, and Wekweètì are remote and are only accessible by air and winter road. Building materials and supplies must be shipped in from southern Canada or from major centres in the North that are not available locally. Supplies, such as food, fuel, and building materials, are sent to many communities on seasonal winter roads or by air. The remote geography and existing infrastructure often make the transportation of materials and supplies difficult and expensive. The cold climate limits the construction season and dictates the need for building materials that can withstand extreme temperatures; it also contributes to high home heating and electricity costs. There has always been a shortage of skilled labour in remote northern communities and the need to transport and accommodate construction crews from outside the community adds to the high cost of construction. The high cost of construction and maintenance make housing unaffordable for a large portion of the population without government support and intervention (CMHC 2008).

Infrastructure is essential to economic growth, health and well-being, education, and employment, particularly in the smaller communities. Community infrastructure includes a wide range of services and facilities, such as schools, roads, airports, communication networks, utilities, and public housing. These are developed, funded, and maintained by the GNWT. There is no central organizing body or single point of contact in the GNWT to deal with ambulance services (GNWT Department of Health and Social Services and GNWT Department of Municipal and Community Affairs 2006). Ambulance service needs include the following: co-ordination between local fire department and ambulance providers; more funding and training; establishment of minimum standards for competency, training, equipment, and capacity; and response protocol, particularly highway services (GNWT Department of Health and Social Services and GNWT Department of Municipal and Community Affairs 2006).

The NWT has 4 hospitals (in Hay River, Fort Smith, Inuvik, and Yellowknife). Stanton Territorial Hospital in Yellowknife provides specialist care for patients, including internal medicine, general and orthopaedic surgery, paediatrics, ear, nose and throat surgery, ophthalmology, radiology, and psychiatry (GNWT Department of Health and Social Services 2006a). These services are provided on-site or through community-based clinics (GNWT Department of Health and Social Services 2006a). Several health and social service facilities are available in the Tłįchǫ communities (Table 16.2-3).

Table 16.2-3: Health and Social Services Facilities by Community

Community	Facility	Description
Behchokǫ̀	Marie Adele Bishop Health Centre/Residence	Health Centre
	Jimmy Erasmus Centre	Personal Care Residence
	Behchokǫ̀ Social Services	Social Services Office
Gamètì	Gamètì Health Centre/Residence	Health Centre serviced by Whatì and Behchokǫ̀
	Gamètì Social Services	Social Services Office
	Community Wellness Centre	Health Station serviced by Whatì and Behchokǫ̀
Wekweètì	Wekweètì Social Services	Social Services Office
Whatì	Whatì Health Centre/Residence	Health Centre
	Whatì Social Services	Social Services Office

Source: GNWT Department of Health and Social Services 2010, internet site.

16.2.2.5 Land and Resource Use

Various land and resource use activities are taking place in the LSA and RSA. The non-traditional land use baseline report in Annex L, summarizes publicly available data describing non-traditional activities that occur near the NICO Project and within the non-traditional land use RSA. The boundaries of the non-traditional land use RSA follow those of the North Slave Region. The RSA covers 2 026 128 ha and includes the management area (Wek'èezhìi) of the Tłı̨chǫ Land Claim Agreement, Tłı̨chǫ Lands, the Tłı̨chǫ heritage area of Ezodzìtì, the city of Yellowknife, and the communities of Whatì, Gamètì, Behchokǫ̀, and Wekweètì. These communities are potential sources of non-traditional land users or service providers that may be affected by the Project. Among the land uses considered in Annex L, those summarized here include mining activities, power generation facilities, and tourism and recreation.

16.2.2.5.1 Mining

Mining activities within the RSA include the Diavik Diamond Mine, Ekati Diamond Mine, and Snap Lake Diamond Mine. In addition, the environmental impact assessment for the proposed Gahcho Kué Diamond Mine is currently under review with MVRB. If approved, this would become the 4th diamond mine in the RSA. The Gahcho Kué mine has a probable mineral reserve of 31.3 million tonnes (Mt), grading at 1.57 carats per tonne grade, for a total diamond content of 49 million carats.

The Ekati Diamond Mine is owned by BHP Billiton Diamonds Inc, and began producing in 1998. The mine has produced 3.5 million carats annually for the last 2 years. Total resource (open cut) is 64 Mt, grading 0.5 carats per tonne (BHPB 2007, internet site). It has an estimated operations phase of over 20 years.

The Diavik Diamond Mine is owned by Rio Tinto, and began producing in 2003. It has a current footprint of about 10 km^2 and is projected to produce about 100 million carats of diamonds over its operations phase of 16 to 22 years. The expected annual diamond production peak is about 10 million carats (Diavik 2010, internet site).

The Snap Lake Diamond Mine is owned by De Beers, and began producing in 2008. Resources include an annual carat production capacity of 1.4 million carats (De Beers 2009, internet site). It has an estimated operations phase of 20 years.

As of 2010, there were also 21 active land use files in the non-traditional land use RSA (Annex L) for mineral exploration. Within this RSA, there are several ongoing diamond exploration projects, including projects by ATW Resources, Consolidated Global Diamond Corp., Diamonds North Resources Ltd., Diamond Resources Ltd., Dunsmir Ventures Ltd., GGL Diamond Corporation, Kodiak Exploration Ltd., Lane Dewar, Peregrine Diamonds Ltd., SouthernEra Diamonds Inc., and Zinifex Canada Inc. Several gold exploration projects include those by Merc International Minerals and Viking Gold Exploration Inc., Tyhee Development Corporation's Yellowknife Gold Project, and Viking Gold Exploration Inc. at Morris Lake.

Within the LSA and still in the permitting phase, the Yellowknife Gold Project is owned by Tyhee NWT Corporation, a wholly owned subsidiary of Tyhee Development Corporation. An environmental assessment report is being prepared for submission in 2011, which will be followed by a Technical Review by MVRB (Tyhee Development Corp. 2010, internet site). The 2008 Measure and Indicated Resource described 11.2 Mt grading 3.52 grams per tonne containing 1.27 million ounces of gold, plus 3.6 Mt of Inferred Resources grading 3.21 grams per tonne containing 374 000 ounces of gold (Tyhee Development Corp. 2010, internet site).

16.2.2.5.2 Power

Diesel power and hydroelectric power is generated within the RSA. Diesel power facilities are in Yellowknife, Behchokǫ̀, Gamètì, Wekweètì, and Whatì. Hydroelectric facilities are located at Snare Rapids (140 km northwest of Yellowknife), Snare Falls (15 km southwest of Snare Rapids), Snare Cascades (2 km downstream of Snare Falls), Snare Forks (10 km southwest of Snare Cascades), and Bluefish (Prosperous Lake). A proposed expansion to the Taltson Twin Gorges hydroelectric facility, near Fort Smith, would include a 690 km transmission line into the RSA to provide power to the diamond mines in the region. This proposed project by Deze Energy is now on hold. The community of Whatì is also proposing a 12 megawatt run-of-river project on La Martre River, known as the Nailii Hydro Project.

16.2.2.5.3 Tourism and Other Recreation

Tourism and recreation are actively promoted by the GNWT. Exit surveys for the whole of the NWT suggest that the number of leisure tourists in 2008 and 2009 is about the same as in 2006 and 2007 (GNWT Department of Industry, Tourism, and Investment 2010). In 2009, the main reasons given for planning a trip to the NWT were its wilderness, isolation, landscape, and wildlife (70%), and having a general interest in the NWT (61%). Non-consumptive tourist activities are provided year-round. Land, air, and water tours provide opportunities to view scenic landscapes and wildlife, both in the Yellowknife area and in the larger region. Outdoor adventures include canoeing and kayaking on Great Slave Lake and on various rivers in the Yellowknife area.

The area around Yellowknife contains a large number of lakes of various sizes, providing opportunities for a variety of trips and expeditions. The GNWT Tourism and Parks website lists 9 recommended canoe routes in the Yellowknife area, accessible from the Ingraham Trail (GNWT Department of Industry, Tourism and Investment 2008, internet site):

- Hidden Lake;
- Jennejohn Part 1;
- Jennejohn Part 2;
- Lower Cameron River;

- Upper Cameron River;
- Pensive Lakes Wilderness Tour;
- Powder Point;
- Tartan Rapids; and
- Tibbit Lake.

Non-residents of the NWT also pursue sport fishing through several fishing lodges located within the non-traditional land use RSA and are summarized in Annex L.

The east arm of Great Slave Lake is promoted as a destination for scenery. Winter activities include snowmobiling, snowshoeing, and dog sledding. Tours offered along winter roads include these latter activities, as well as aurora viewing and wildlife viewing. Aurora viewing tours were first promoted in 1989 and became popular with Japanese visitors. The number of visitors peaked at about 13 000 in the winter of 2000-2001. Visitor numbers declined sharply the following year in the wake of world events. While the number of visitors has recovered, there is now competition from other locations, such as Fairbanks, Alaska, for the aurora viewing market.

Another component of the tourist market is Aboriginal culture and environmental education. In addition to cultural exhibits, and arts and crafts, there are the opportunities to combine outdoor adventure, fishing, or hunting based out of Aboriginal communities. Other activities include programmes in climate change, the sensitive ecology of the North, and living off the land.

16.2.2.6 Employment and Labour

Diamond mining and other resource-based activities since the late 1990s have increased demand for labour in the NWT. Employment of Northerners and Aboriginal workers in the NWT has been a challenge, because many of the skilled and qualified workers were already employed at the other mines. For example, De Beers has experienced difficulty achieving NWT Residency hiring targets at its Snap Lake Mine (De Beers 2009).

While labour participation and employment rates have increased in the NWT overall with mining and other resource-based activities, these rates are lower in the Tłı̨chǫ and Yellowknives Dene communities when compared to Yellowknife and the rest of the NWT. Unemployment rates have widely fluctuated on an annual basis in the smaller communities; still, similar to the participation rates, they have changed very little in Yellowknife and the NWT since 1986. Even with the same levels of education, in 2004, unemployment rates were about 5 times higher for Aboriginals than non-Aboriginals in the NWT (21% compared to 4%).

Fluctuating employment and participation numbers is typical of small, resource-based communities. Changes in industrial or extraction activities due to market changes (e.g., resource prices) may have a major negative effect on such communities. Smaller communities have fewer and limited job and career opportunities compared to larger centres. Lower educational attainment rates also are likely having an effect on the size of the labour pool. Some of those that are unemployed or not participating in the labour force face barriers to employment, such as literacy, adequate training and education opportunities, criminal records, and substance abuse issues (NAHO 2008).

Territorial governments, schools, and industry are seeking to address these challenges in an effort to increase the labour force and create more economic and employment opportunities for northern residents. A strong long-term need exists for skilled labour, especially in mining; it has become increasingly challenging to meet these needs in the North. Key informants suggest that those employable are already employed, and that, as a result, companies are hiring outside the NWT to fill skilled and professional level positions in their workforce. In 2008, an estimated 5000 new semi-skilled, skilled, and professional workers would be needed for the NWT over the following 5 years (MTS 2009).

While resource-based employment is under 10% in Yellowknife and the NWT overall, mining is an important economic sector given the small population base of under 45 000 (Statistics Canada 2006). Almost a quarter of the Tłı̨chǫ labour force and about 30% of the Detah labour force are working in resource-based industries (e.g., mining) (Statistics Canada 2006). Still, these labour participation numbers have not changed much since 2004; the greatest increases occurred in the 1990s and early 2000s when diamond mine construction and production was ramping up. As an example, the community of Behchokǫ̀ has seen some improvement during the past decade, but more recently (2009) its labour participation rate dropped below 50%, its lowest level since the late 1980s. It may be that some individuals in Behchokǫ̀ are simply giving up looking for work as a result of the economic downturn. Some interviewees for the baseline study felt that criminal records or poor work performance that led to termination may be preventing some from getting paid employment with the mines (e.g., J. Carter, Yellowknives Dene First Nation, 2010, pers. comm.; J. Drygeese, N'Dilo youth program, 2010, pers. comm.). Some interviewees also felt that some mining companies lean towards hiring non-Aboriginals from outside the NWT.

Other employment effects are present as a result of the resource extraction industry, both positive and negative. Employment opportunities in the resource extraction industries often require workers to leave their communities for weeks at a time, which creates social problems at the family and community levels. Some communities have reported that it has become difficult to fill important jobs in the community, such as community administrator positions, because they do not pay as well as mining jobs (NAHO 2008).

16.2.2.7 Education and Training

Residents of potentially affected communities have access to elementary, secondary, and post-secondary education and training that will provide them with the skills and knowledge necessary to participate in the wage economy. The Tłı̨chǫ have invested money they have received from resource companies to finance a scholarship fund. About $600 000 annually is being spent to send 150 students to college and university (NAHO 2008).

Both enrolments and graduation rates seem to be declining in the Tłı̨chǫ communities. Only 31% of Tłı̨chǫ students enrolled in 2007 went on to graduate compared to 59% for Yellowknife students. As a whole, fewer individuals in the Tłı̨chǫ and Yellowknives Dene communities have a high school diploma; for example, about half as many Tłı̨chǫ residents (34%, 690 people) compared to Yellowknife residents (84%, 13 251 people) held a high school diploma or more in 2009.

While increasing employment opportunities (especially in the mining sector) have influenced educational attainment overall, attainment of a high school diploma or greater is still much lower in the smaller LSA communities compared to Yellowknife and the NWT as a whole. The need to relocate for high school is a barrier for students in Gamètì and Wekweètì. Low attendance has contributed to lower levels of achievement and has

been related to factors such as inadequate parental supervision (working on rotation), problems in the home (e.g., alcohol), and other social conditions, like crowding that affects both school attendance and performance. Other administrative changes in NWT schools also have contributed to declines in enrolments (and records of official enrolments) in schools across the territory. For example, around the mid-2000s, schools in the NWT transitioned from half-day to full-day kindergarten, which may have discouraged some parents from enrolling their children in school before the age of 6; the Department of Education, Culture and Employment also discontinued funding of students over the age of 22 in 2006. (L. Graf, GNWT Department of Education, Culture and Employment, 2009, pers. comm.)

Not all communities have experienced the same level of educational achievement. While reasons for this remain unclear, 2 possible reasons include the need to complete secondary education away from home, and the community age structure. Neither of these explanations is completely satisfactory. The communities of Gamètì and Wekweètì require students to complete secondary school away from home. For its location next to Yellowknife, N'Dilo has direct access to 2 secondary schools. Yet, all 3 communities have similar rates of graduation. Age distribution may explain the difference in Wekweètì, as there are more middle-aged adults and seniors in the community, but it does not explain the situation in Gamètì. Other reasons may be the enticement of mine income and the lack of community role models (Davison 2007). Completion of school is also linked to role models for the students. There is no NWT-related information on whether students leave school for work.

At the request of mining companies in the NWT, the Mine Training Society has introduced its "Ready to Work North" course to prepare students with essential employability skills. The GNWT Department of Education, Culture and Employment course focuses on workplace literacy, teamwork, safety, and preparing students to deal with working a rotation schedule and the regular paycheque that comes with it (MTS 2008). Students are paid during training and may also be eligible for help with childcare costs (MTS 2008).

Early childhood and daycare programs and facilities in the Tłı̨chǫ communities include the Tłı̨chǫ Daycare, CJBS Daycare, and Aboriginal Head Start Preschool in Behchokǫ̀, Whatì Community Daycare, Gamètì Early Intervention Preschool, and Johnny Arrowmaker Daycare in Wekweètì. A 2005 study found that childcare facilities in the NWT were operating at capacity, with two-thirds of centres maintaining waiting lists; the highest unmet demand was for infant spaces within daycares and day homes, and pre-school spaces within pre-school programs (Alternatives North 2006). The 2010-2011 NWT Budget includes $600 000 to enhance early childhood programming in rural and remote communities by increasing access to early childhood consultants and increasing contribution funding for early childhood education programs. These programs will include culturally relevant education and support for Aboriginal languages (GNWT 2010).

16.2.2.8 Income and Cost of Living

Increasing employment has also been accompanied by increasing average incomes in all LSA communities and the NWT as a whole. Although average incomes remain 30 to 40% lower in the Tłı̨chǫ communities compared to Yellowknife and the NWT overall, Tłı̨chǫ average incomes are rising more quickly than those living in Yellowknife and the rest of the NWT. Low income families are still prevalent in the LSA, since about 1 in 4 Tłı̨chǫ families earn less than $30 000 per year; however, this figure is decreasing, tending to higher incomes on average. The income gap is also narrowing in Tłı̨chǫ communities and widening in Yellowknife and NWT. Overall, the number of lower income earners is decreasing and the number of higher income earners is increasing

Income is also related to family composition, such as lone-parent families; these have been increasing in the NWT, from 15% in 1986 to 21% in 2006 (GNWT 2009a). Between 1986 and 2006, the percentage of lone-parent families also increased in Canada (from 13 to 16% of families) (GNWT 2009a). The representation of lone-parent families in the LSA between 2001 and 2006 has remained nearly constant or has increased slightly in the Tłı̨chǫ communities as a whole, in Yellowknife, and the NWT.

Hardships associated with lower income levels are exacerbated by high costs of living in the North. The costs of living are highest in the smaller communities where incomes are lowest. While the availability of subsidies for housing costs, food, and clothing help to keep these costs down in the Tłı̨chǫ and Yellowknives Dene communities, the cost of housing continues to increase in small and larger communities alike. Due to high and escalating costs of living, monthly income assistance payments have also increased in recent years. While average incomes have increased, the number of income assistance beneficiaries has decreased.

Food and clothing allowance rates in the Tłı̨chǫ communities are higher than in N'Dilo, Detah, and Yellowknife due to higher living costs. To reduce food costs, the GNWT 2010-2011 Budget includes a $450 000 investment in the commercial harvesting, processing, and marketing of fish and game (except caribou) to NWT consumers (GNWT 2010). The GNWT is also investing $250 000 in community-based agricultural development initiatives with the goal of increasing local food production to reduce expensive imports (GNWT 2010).

16.2.2.9 Health and Wellness

Overall, many indicators of health and wellness are improving in the NWT and in the LSA. Increased incomes through employment in mining along with other economic and educational opportunities have likely had positive effects. Health and wellness is also tied very closely to the availability of adequate services, which is discussed in greater detail in Annex K. Common health and wellness indicators are included below under the following categories: diseases, substance abuse (e.g., drugs and alcohol), crime, family violence, accidents, and housing.

16.2.2.9.1 Diseases

Many factors influence disease and illness, including genetics and family history, living and working conditions, lifestyle choices, and the environment. Increased rates of disease can affect health care systems and services, families, and communities, as well as education and employment (GNWT Department of Health and Social Services 2005). Health concerns in the NWT include diseases such as sexually transmitted infections, tuberculosis, diabetes, cancer, and respiratory diseases (related to smoking). Many health and social problems are associated with alcohol and drug use. In the NWT, the proportion of current smokers (i.e., both daily and occasional smokers) appears to be on a downward trend (from 44% in 1996 to 41% in 2006) (GNWT Department of Health and Social Services 2006b). For its specific mention in the TOR, greater emphasis is placed here on sexually transmitted infections.

Risky sexual behaviour has led to higher rates of sexually transmitted infections and unplanned pregnancies in the Tłı̨chǫ communities compared to Yellowknife and the RSA (see Annex K). The reported cases of sexually transmitted infections in the NWT increased for chlamydia and gonorrhea from 1998 to 2007, with much higher incidences compared to the rest of Canada. These infections can lead to long-term pelvic inflammatory diseases, infertility, and miscarriages, and can be passed on to unborn babies, affecting their eyes and lungs. Most of those affected are young. In 2006, over 60% of residents in the Tłı̨chǫ communities, Yellowknife, and the NWT that were infected with either chlamydia or gonorrhea were between the ages of 15 and 24 (GNWT 2008a). Between 1999 and 2003, the rate of sexually transmitted infections was over 2 times higher in the

smaller communities than the regional centres, and over 3 times higher than the rate for Yellowknife (GNWT Department of Health and Social Services 2005).

Between 1999 and 2003, females were nearly twice as likely as males to be diagnosed with a sexually transmitted infection. Females between 15 and 24 had the highest rate of sexually transmitted infections during this period (973.9 per 10 000 population). The findings reflect the fact that women are more likely than men to get tested for a sexually transmitted infection, as men tend to show fewer symptoms then women, and women are more likely to encounter the health care system through well-women clinics and infant/child programs (GNWT Department of Health and Social Services 2005).

According to the 2008 Community and Diamonds Report (GNWT 2009a), the increase in sexually transmitted infections may be due to factors such as the following:

- reduced supervision by parents because of work schedules;
- more alcohol and drug abuse because of higher incomes; and/or
- a general disregard for safe sex.

Human immunodeficiency virus causes acquired immunodeficiency syndrome, as it attacks the immune system in an individual. This results in a chronic and progressive loss of function, leaving infected people vulnerable to other infections and cancers. The virus is transmitted through unprotected intercourse, needle sharing, and exposure to contaminated blood in health care and other settings (GNWT Department of Health and Social Services 2005). There were 46 reported cases in the NWT between 1985 and 2008; of these, 35 cases involved men and 11 involved women. The number of human immunodeficiency virus infections, however, remains low in the NWT compared to Canada overall.

Hepatitis C, another disease of concern in the NWT, is a blood-borne infection spread by a virus through direct exposure to infected blood. This virus can cause serious liver infections, failures, cancer, and can result in the need for a transplant. Individuals who inject drugs or who have multiple sexual partners are likely to be at a higher risk of contracting hepatitis C. The number of hepatitis C infections in the NWT has decreased by 58% from 2001 (40 cases) to 2007 (17 cases) (GNWT Department of Health and Social Services 2005, 2008).

16.2.2.9.2 Substance Abuse

Substance abuse remains a concern according to several LSA residents who attended NICO Project scoping sessions and/or those interviewed for the baseline study. One concern expressed was that increased access to and from the communities would also increase drug and alcohol availability and abuse. Some studies suggest that increasing incomes obtained through mining jobs poses potential risks to the health of northern communities in terms of behavioural changes (e.g., alcoholism and drug abuse) (Gibson and Klinck 2005; NSMA 2001a). When combined with a lack of both financial experience and the responsibility to support a family, as is common for young, male workers, binge drinking can become a main channel for newly acquired earnings (NSMA 2001a).

From 1996 to 2006 in the NWT, for the Aboriginal population, the proportion of heavy frequent drinkers declined from 17% to 12%, while that of light frequent drinkers increased from 8% to 14%. In contrast, the proportion of heavy frequent drinkers increased from 9% to 13% among the non-Aboriginal population (GNWT Department of

Health and Social Services 2006b). Weekly binge drinking declined from 23% to 18% among males and from 27% to 16% among Aboriginals (GNWT Department of Health and Social Services 2006b).

Yellowknife's liquor status is unrestricted, Detah is a restricted community, and liquor is prohibited in all 4 Tłı̨chǫ communities (NWT Liquor Commission & Liquor Licensing Board 2009). While liquor prohibition has been in place in Whatì, Gamètì, and Wekweètì for many years, alcohol has only been prohibited in Behchokǫ̀ since 31 March 2009 (NWT Liquor Commission & Liquor Licensing Board 2009). Community level data about alcohol use is limited, but from a 2006-2007 survey of the Tłı̨chǫ communities, one-third of adult respondents (age 14 and over) claimed that they drank to get drunk a few times a month (CIET 2007). Among the youth (age 9 to 13), 17% had tried drinking alcohol, and one-third of those aged 12 to 13 had tried alcohol (CIET 2007). According to the RCMP, enforcing restrictions is difficult, and challenges with illegal bootlegging of alcohol are common in some communities (Scott Clark Consulting Inc. 2007).

Many negative health effects are also linked to drug and alcohol consumption. For example, an estimated 30% of women in the NWT drink while they are pregnant (GNWT Department of Health and Social Services 2006c). Aboriginal communities are affected by Fetal Alcohol Spectrum Disorder, with the incidence rate in some communities as high as 16%. Nearly 50% of Fetal Alcohol Spectrum Disorder children are placed in the care of child welfare, because families are unable to care for them (National Children's Alliance 2006).

16.2.2.9.3 Crime

Incidences of crime affect the health and wellness of communities. Crime affects whether people feel and are safe in and outside the home. Crime is directly linked to many social and economic issues and conditions within societies and communities. Based on 2009 data from Statistics Canada, among all Canadian territories and provinces, the NWT ranked second in Canada's Crime Severity Index. The index includes 6 indicators: homicide, sexual assault, aggravated assault, robbery, breaking and entering, and auto theft. Nunavut ranked first (Maclean's Magazine 2010).

Several short- and long-term challenges are associated with crime in the NWT (Criminal Intelligence Service Alberta 2007). The NWT law enforcement is dealing with increased drug and alcohol issues, violence, vandalism, and property crimes. Increases in crime incident rates have been accompanied by a period of increasing mineral exploration and deposit appraisal activity. Increasing crime rates (including violent crime) in the NWT and in smaller communities are affected, among other factors, by the prevalence of alcohol and drug use. For example, those that commit crimes are often under the influence of alcohol and drugs. The prohibition of alcohol in Tłı̨chǫ communities leads to higher rates of Liquor Act violations, contributing to a higher number of individuals with criminal records and inflated crime rates. Some residents are concerned that by increasing access to remote Tłı̨chǫ communities to facilitate economic development, crime will increase. The view is that crime rates are higher in Behchokǫ̀ compared to other Tłı̨chǫ communities due to its location along a permanent highway, which makes it easier for people to bring in alcohol and drugs, thus facilitating problem drinking and drug dealing, which lead to other crimes.

Figure 16.2-1 shows the number and rates of violent crime incidents by RCMP detachment in the LSA and NWT between 1998 and 2009. During this period, overall violent crime incident rates (incidents per 1000 people), increased by 37% in the NWT. Violent crime incident rates in Yellowknife generally have been under 50 per 1000 people. Between 1998 and 2009, rates of violent crime incidents also were higher in Behchokǫ̀ than in the NWT, Yellowknife, or Whatì. For example, in 2008, the violent crime rate was 86 in the NWT (63 in 1998), 42 in

Yellowknife (36 in 1998), 78 in Whatì (75 in 1999), and 181 in Behchokǫ̀ (119 in 1998). Violent crime rates in Behchokǫ̀ between 1998 and 2009 increased by more than 50%, especially from about 2005, reaching a high of 216 incidents per 1000 people in 2008. Violent crime incidents in Whatì have been declining to late 1990s levels since a high of 119 per 1000 people in 2005. Youth crime appears to be on the rise in Behchokǫ̀ and Whatì, particularly among males.

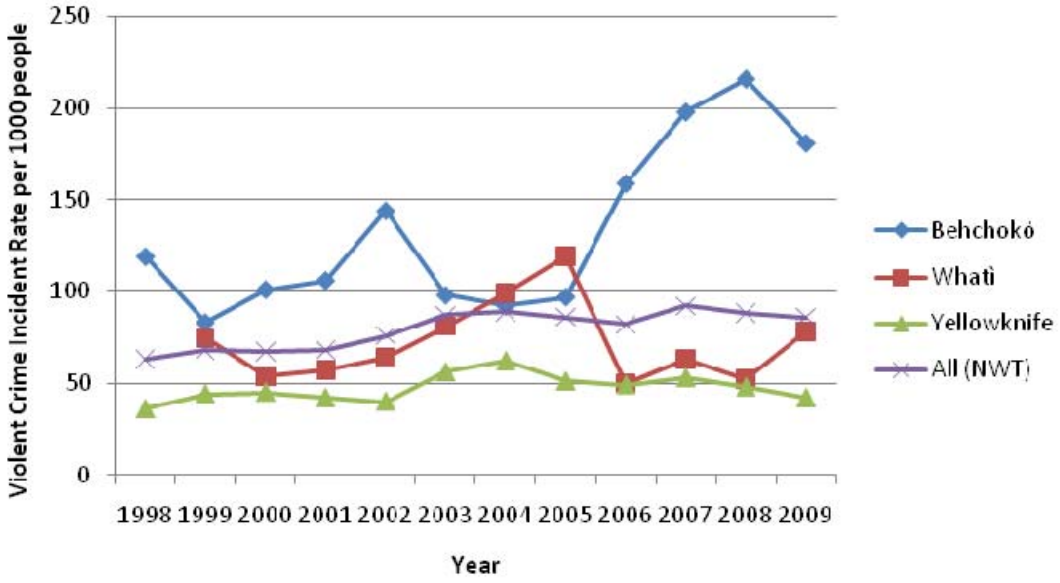


Figure 16.2-1: Violent Crime Incident Rates by RCMP Detachment 1998 to 2009

16.2.2.9.4 Family Violence

Family violence is a major concern in the NWT due to higher than national rates of violence against women, and especially Aboriginal women. The NWT faces several challenges in addressing family violence, including the isolation of many of its 34 communities. Some communities do not have social/counselling services, medical services, or shelters available for victims, and often depend on fly-in/fly-out services. Many women leave their homes and communities to access shelters or treatment centres elsewhere, thereby facing many additional challenges such as lack of housing, temporary treatment, and lack of community support. Overall, reported spousal assault cases are decreasing in the NWT despite a spike in 2007. Shelter admissions for women have changed very little in recent years, with no apparent trend. Due to the reluctance of many victims to report spousal assault, the number of cases is not always an indicator of the occurrence of family violence in a community. Women often end up returning to abusive relationships in their home communities (GNWT 2007).

16.2.2.9.5 Accidents

Vehicle collision rates are decreasing with, on average, fewer injuries over the past 20 years (GNWT Department of Transportation 2009). In 2008, there were 66 collisions, 24 injuries, and 1 fatality on Highway 3. Three of the 27 collisions that occurred on winter roads were on the Whatì winter road (2 were property damage and 1 was an injury collision), and 1 was on the Gamètì winter road (property damage) (GNWT Department of

Transportation 2009). The total number of alcohol-related collisions in the NWT has remained nearly constant since 1998, although the number of injuries has declined over time (GNWT Department of Transportation 2009).

16.2.2.9.6 Housing

Adequate, affordable, and suitable housing also are important to the health and well-being of families in all communities. Increasing problems related to housing adequacy has been the main contributor to increasing rates of households in core need in the Tłı̨chǫ and Yellowknives Dene communities. Affordability of housing is the most common housing problem in Yellowknife. Crowding in LSA communities has been decreasing, which has contributed to decreasing housing suitability problems. Factors contributing to less crowding include falling birth rates, increased incomes, which expand housing options for family members, and greater youth migration for education and work opportunities.

Although the percentage of homes owned has increased in Behchokǫ̀, home ownership decreased in the rest of the Tłı̨chǫ communities. Ownership has also increased in Yellowknife and the NWT overall since 1986. In Detah and N'Dilo, home ownership has been as low as 46% (Detah in 1996) and as high as 62% (N'Dilo in 1996). The most recent statistics show an even split between home ownership and those that rent in the Yellowknives Dene communities.

Housing costs include rent or mortgage payments, costs of heating, electricity, water, property taxes, land leasing, and insurance. These costs have increased in the past decade or so. In 2009, between 12 and 20% more Tłı̨chǫ households were paying at least $1500 on monthly housing costs since the mid-2000s. These costs have also increased in the Yellowknives Dene communities, as well as in Yellowknife and the NWT overall, since the mid-2000s. The 2010-2011 NWT Budget includes funds to update the cost of living rent reduction program, a program that reduces the cost of rent payable for tenants in public housing (GNWT 2010).

16.2.2.10 Trapping, Hunting, and Fishing

As employment opportunities increase and more emphasis is placed on entering the wage economy over time, there is growing concern about the maintenance of traditional activities and language. In the Tłı̨chǫ communities, trapping, hunting, and fishing are common activities. They are especially common in Wekweètì, the smallest and most remote community among the Tłı̨chǫ.

16.2.2.10.1 Trapping

Trapping activity has decreased in all Tłı̨chǫ and Yellowknives Dene communities in recent years surveyed. Exceptions include Behchokǫ̀ and Wekweètì, which saw increases in trapping of about 4% between 1998 and 2003. Since 1999, the percentage of the NWT residents that traps has remained stable at 6% (NWT Bureau of Statistics 2009a). Total pelt harvest decreased slightly from 23 967 pelts in the fiscal year 2006 to 23 868 pelts in the fiscal year 2007. Average prices per pelt fell for some important species (e.g., marten and lynx), resulting in a 6.6% reduction of the total value of pelts (GNWT 2008b).

Furbearer statistics from the Tłı̨cho communities are summarized in Section 15, with average harvests from 2004 to 2009 presented by community and by species. Total harvest over the entire period is also provided. Marten (*Martes americana*) is the most commonly harvested furbearer, at over 11 000 between 2004 and 2009. Muskrat (*Ondatra zibethicus*) and beaver (*Castor canadensis*) are also commonly harvested. These data include furs submitted to the Department of Investment, Trade and Tourism through the Genuine Mackenzie Valley Furs

Program, whereby the GNWT collects furs from trappers, provides advance payment, and sells the furs in bulk at auction. Thus, furs collected for domestic use are not reflected in these data.

16.2.2.10.2 Hunting

The total number of resident hunters and licences sold in the NWT has trended downward in recent years leading to decreasing harvest estimates for all commonly targeted species, such as moose, caribou, bear, wolverine, and wolf. Between 1998 and 2003, those 15 and older engaged in hunting or fishing in the NWT and in the LSA communities declined, with the exception of Behchokǫ̀ (increase of 10.6%) (NWT Bureau of Statistics 2009a). Hunting and fishing activity also seems to be on the decline in Detah, Yellowknife, and the NWT as a whole; for example, in the NWT, declining from 42% in 1998 to 39% in 2009, and in Detah, declining from 49% in 1998 to 39% in 2009 (Annex L). Still, these declines do not seem to have affected access to or consumption of country food, which increased between 2004 and 2009 in Tłı̨chǫ communities as a whole and in Detah (NWT Bureau of Statistics 2009b). About 75% of Tłı̨chǫ residents, and over half of Dene households eat country food as more than half of all fish and meat consumed (NWT Bureau of Statistics 2009b).

Non-resident hunters use the services provided by outfitters at several hunting lodges in the RSA. In addition to having their main camps, some outfitters will take clients to other remote locations and camps to hunt. Caribou is the most commonly hunted animal in the NWT by non-residents; however, due to declines to the Bathurst caribou herd (GNWT 2009b) and the government's decision to not issue any caribou tags in 2010, 3 lodges have closed (Camp Ekwo, Courageous Lake Caribou Camps, and Arctic Safaris). Other lodges are seeking to diversify their business through activities including ice road tourism, adventure, and ecotourism.

16.2.2.10.3 Fishing

Sport fishing is a popular tourist activity, with anglers representing almost 15% of all visitors to the NWT in 2006. Almost half of these visitors purchased services from outfitters and lodges. While fishing remains a popular tourism activity, the number of non-resident anglers decreased 35% between 1995 and 2005. The number of resident anglers also decreased 72% in this same time period. A report released in 2006 summarizes some reasons for the decline in sport fishing in the NWT, including post 9/11 declines in travel, increased flight and fuel costs, and the rising value of Canadian currency versus the U.S. dollar (St. Louis 2006).

Commercial fishing is also practiced in the RSA, especially on Great Slave Lake. The NWT commercial fishery has declined in recent years. The NWT commercial fishery has declined in recent years for reasons that include the rising cost of capital, operations and maintenance (e.g., fuel and labour) versus prices obtained from fish sales, competition from other markets, and inadequate training (GNWT Department of Industry, Tourism and Investment 2005).

16.2.2.11 Traditional Language Use

While over 90% of Tłı̨chǫ and Yellowknives Dene community residents speak a traditional (Aboriginal) language, the rate is decreasing. Detah and N'Dilo have seen the largest decrease in traditional language use and knowledge in the LSA, due in large part to its proximity to the predominantly English-speaking Yellowknife. Previous increases in Aboriginals that speak a traditional language in Yellowknife have been attributed to in-migration from smaller communities. More recent declines suggest that the Aboriginal population of Yellowknife is no longer speaking traditional languages. In the NWT, the ability to speak a traditional language in the Aboriginal population decreased by 26% between 1989 and 2009 (NWT Bureau of Statistics 2009c).

16.2.3 Pathway Analyses

16.2.3.1 Methods

Pathway analysis identifies and assesses the linkages between NICO Project components or activities, and the correspondent potential residual effects to VCs listed in Table 16.1-2. Potential pathways through which the NICO Project could affect VCs were identified from several sources including the following:

- review of the development description and scoping of potential effects by the environmental, socio-economic, and engineering teams for the NICO Project;
- scientific knowledge and experience with other mines in the NWT;
- engagement with the public, Aboriginal people, communities, and government; and
- consideration of potential effects identified from the TOR for the NICO Project.

The first part of the analysis is to produce a list of all potential effects pathways for the NICO Project (Section 6.4). Each pathway is first considered to have a linkage to potential effects on VCs. This step is followed by the development of environmental design features that can be incorporated into the development description to remove a pathway or limit (mitigate) the effects to VCs. Environmental design features include NICO Project design elements, environmental best practices, management policies and procedures, and social programs. Environmental design features are developed through an iterative process between the NICO Project's engineering and environmental teams to avoid or mitigate effects.

Knowledge of the environmental design features is then applied to each of the pathways to determine the expected amount of Project-related changes to the environment and the associated residual effects (i.e., effects after mitigation) on VCs. Changes to the socio-economic environment can alter economic measurement endpoints (e.g., income and government revenues) and social measurement endpoints such as education, health care, and community cohesion. For an effect to occur, there has to be a source (NICO Project component or activity) that results in a measurable environmental change (pathway) and a correspondent effect on a VC.

NICO Project activity → change in environment → effect on VC

Pathway analysis is a screening step that is used to determine the existence and magnitude of linkages from the first list of potential effects pathways for the NICO Project. This screening step is largely a qualitative assessment and is intended to focus the effects analysis on pathways that require a more comprehensive assessment of effects on VCs. Pathways are determined to be primary, secondary (minor), or as having no linkage using scientific and traditional knowledge (TK), logic, and experience with similar developments and environmental design features. Each potential pathway is assessed and described as follows:

- no linkage – pathway is removed by environmental design features so that the NICO Project results in no detectable environmental change and residual effects to a VC relative to baseline or guideline values;
- secondary – pathway could result in a minor environmental change, but would have a negligible residual effect on a VC relative to baseline or guideline values; or
- primary – pathway is likely to result in a measurable environmental change that could contribute to residual effects on a VC relative to baseline or guideline values.

Primary pathways require further effects analysis and impact classification to determine the environmental or socio-economic significance from the NICO Project on VCs. Pathways with no linkage to a VC or that are considered minor (secondary) are not analyzed further or classified in the DAR. This is because environmental design features will remove the pathway (no linkage) or residual effects to the VC, and it is determined negligible through a simple qualitative evaluation of the pathway. Pathways determined to have no linkage to a VC or those that are considered secondary are not predicted to result in significant effects on VCs. All primary pathways are assessed in the DAR.

16.2.3.2 Results

The potential pathways through which the NICO Project could affect VCs were determined (Table 16.2-4). Environmental design features incorporated into the NICO Project Description to remove a pathway or limit (mitigate) the effects to VCs are listed, and pathways are determined to be primary, secondary (minor), or as having no linkage. The following section discusses the potential pathways relevant to the socio-economic environment.

Table 16.2-4: Potential Pathways for Socio-economic Effects

NICO Project Component/ Activity	Effect Pathways	Environmental Design Features and Mitigation	Pathway Assessment
General construction and operation of mine and supporting infrastructure	The NICO Project may increase the tax base and gross domestic product for the Northwest Territories during construction and operation.	Development of the NICO Project Payment of taxes and royalties	Primary
	Workforce and procurement requirements during construction and operation of the NICO Project may increase employment for Aboriginal and northern residents in the local study area and Northwest Territories.	Recruitment strategies designed to increase employment for the Tłı̨chǫ and other Aboriginal and northern residents in the local study area and Northwest Territories Procurement policies Worker training programs Respectful work practices to attract and retain Tłı̨chǫ workers	Primary
	The NICO Project may increase demand and costs for public infrastructure (mainly airports and roads) from the transport of material and people to the NICO Project site.	Fortune will continue to seek input on proposed NICO Project Access Road modifications/closures, new roads, transportation routes, and travel times from communities and highways Fortune will actively seek, engage, and support meaningful consultation on issues and opportunities related to its business and operations A plan for ongoing consultation will be developed and vetted with nearby communities Fortune will continually evaluate both the process and the outcome of the ongoing consultation and communications activity to address and manage issues as they arise	Primary

Table 16.2-4: Potential Pathways for Socio-economic Effects (continued)

NICO Project Component/ Activity	Effect Pathways	Environmental Design Features and Mitigation	Pathway Assessment
General construction and operation of mine and supporting infrastructure	The NICO Project may increase demand for public (social, financial, and protective) services resulting from expenditure of employment income on unhealthy or unsafe lifestyle choices by some individuals.	Financial management workshops for workers and their families Workshops on alcohol and substance abuse, and family adaptation and coping mechanisms Zero tolerance towards alcohol and substance abuse Cultural awareness training Health and safety training Employee and Family Assistance Program will be offered to support all employees when working at the mine site	Primary
	Workforce and procurement requirements during construction and operation of the NICO Project may increase family and disposable income in the local study area and Northwest Territories.	Increased spending by wage earners and businesses Recruitment and training of Northwest Territories residents Procurement designed for northern businesses Contributions made to community development so that benefits are broadly distributed Specific strategies developed for the employment of the Tłı̨chǫ and other Aboriginal and northern women Impact and Benefit Agreement discussed and developed with the Tłı̨chǫ communities to protect valued social and cultural issues, and to address training, employment, and business opportunities	Primary

Table 16.2-4: Potential Pathways for Socio-economic Effects (continued)

NICO Project Component/ Activity	Effect Pathways	Environmental Design Features and Mitigation	Pathway Assessment
General construction and operation of mine and supporting infrastructure	The NICO Project may temporarily increase in-migration.	Preferential hiring preferences	Primary
	The NICO Project may increase demand for opportunities for education and training on NICO Project-related trades and careers.	On-the-job training programs Contribute to scholarships for local communities Support youth apprenticeship programs Given the long life of the NICO Project, the goal is create more trained workers with transferable skills for other local projects	Primary
	The NICO Project may lead to reduction in home and participation in community activities due to people working long hours away from home.	Work/life balance is considered in shift design Potential for shorter shift rotations may offer more opportunities for women with young children to enter workforce Employees from nearby communities will be better able to optimize values important to them outside the workplace, such as family and cultural activities Communication links provided for employees to maintain relationships with their families while at site, such as telephone and internet	Primary
	The NICO Project may affect the continued use of traditional languages and other indicators of cultural maintenance.	Cultural awareness programs More Tłįchǫ speaking counsellors for employees and their families Translation of policies and important documents to Tłįchǫ language	Primary

Table 16.2-4: Potential Pathways for Socio-economic Effects (continued)

NICO Project Component/ Activity	Effect Pathways	Environmental Design Features and Mitigation	Pathway Assessment
	Increases in traffic may cause an increase in the risk of collisions, particularly during the construction phase.	Measures that will be considered to reduce risk include driver training, road improvements (if determined to be necessary), strict controls on speeds, and advice to communities about approximate time trucks will be passing Worker transportation will be explored with a view to minimizing commuter traffic, especially at night	Primary
Closure of mine and supporting infrastructure	Closure and post-closure (including unforeseen early closure or project hiatus) of the NICO Project may have social and economic effects.	Plans, strategies, and other commitments to help potentially-affected communities avoid over-exposure to cyclical economic fluctuations Plans to assist post-closure transition for mine employees Form a mine closure committee during operations	Primary

16.2.3.3 Primary Pathways

All effects pathways are considered primary for linking NICO Project-related activities to effects on the social and economic environment (Table 16.2-4).

- Increased tax base and GDP: The NICO Project may increase the tax base for the NWT during construction and operation. Workforce and procurement requirements for the NICO Project may increase economic activity (GDP) in the LSA and NWT.
- Increased employment and procurement levels: Direct and indirect NICO Project employment opportunities would result in increased regional employment, as well as generating local and regional expenditures. The NICO Project should create employment and contracting opportunities for Aboriginal and northern residents in the LSA and NWT.
- Increased demand and cost for public infrastructure: The NICO Project may increase demand and cost for access and infrastructure (mainly airports and roads) from the transport of material and people to the NICO Project site.
- Increased demand for public services: The NICO Project may increase demand for public (social, financial, and protective) services resulting from expenditure of employment income on unhealthy or unsafe lifestyle choices by some individuals.
- Increased family and disposable income: The NICO Project should increase family and disposable income in the LSA and NWT. While lifestyle choices increase with income, many other (non-NICO Project related) factors influence behaviour at the individual, family, or community level.
- Temporary in-migration of workers: Specialized skills and trades needed for NICO Project construction may not be available in the NWT, and there may not be enough NWT labour for some job categories. Some in-migration will occur to the LSA and RSA, particularly for construction opportunities.
- Increased opportunities for education and training: The NICO Project may increase demand for opportunities for education and training on NICO Project-related trades and careers. This may also increase community and business capacity as workers develop greater skills and education gained through employment and training opportunities from the NICO Project.
- Reduced time in home and community: The NICO Project may lead to reduction in family and community activities and participation due to people working long hours away from home.
- Reduced use of traditional languages and other cultural indicators: The NICO Project may affect the continued use of traditional languages and other indicators of cultural maintenance.
- Increased public safety risk: Increases in traffic may cause an increase in the risk of collisions, particularly during the construction phase.
- Decreased jobs and revenues from closure: The closure and post-closure (as well as early closure or project hiatus) of the NICO Project could cause economic hardships for some individuals, families, and communities.

16.2.3.3.1 Reasonably Foreseeable Future Projects

Other human activities may substantially affect the socio-economic VCs, including past, present, and reasonably foreseeable future projects, and potentially resulting in cumulative effects (MVRB 2006). Potential exists for socio-economic cumulative effects with the addition of the NICO Project to mining sector activity in the NWT. These cumulative effects are explained below, along with a brief description of the reasonably foreseeable projects that were considered. In the effects assessment to follow, any relevant socio-economic cumulative effects are discussed and assessed.

Socio-economic cumulative effects result not just from interrelationships between large projects, but are also a function of government policy, trends in economic development, increasing mobility of people, and other factors. These changes can be positive, negative, or both. Changes to labour and financial needs may have a positive cumulative effect on training and education opportunities for individuals. These changes may also have a negative cumulative effect on cultural indicators such as community cohesiveness and pride in cultural identity. Also, the physical changes to the landscape, along with other changes in the LSA and the NWT related to other development, may have a negative cumulative effect on cultural and tourist landscapes. Collectively, these changes need to be assessed to predict the incremental and cumulative effects from the NICO Project and previous, existing, and reasonably foreseeable developments on the sustainability of the socio-economic and cultural environments.

Cumulative effects also include changes from natural processes in the socio-economic system and cultural environment that are not related to industrial development. One example would be the effects of climate change on wildlife habitat, which in turn could affect hunting, trapping, and fishing activities. A warmer climate could also cause changes in the NWT winter road system by decreasing the time available for road construction and operation, or by reduced ice thickness shortening the available travel period over lake surfaces. These changes could affect people's livelihoods and cultural values. It is the objective of the cumulative effects assessment to predict the contribution of these types of effects, in addition to NICO Project effects, to the amount of change in the VCs associated with the socio-economic and cultural environments.

Effects analyses for the future case are mostly qualitative due to the large number and degree of uncertainties. Uncertainties are associated with the rate, type, and exact location of developments in the LSA and RSA. They are also present in the direction, magnitude, and spatial extent of future fluctuations in the biophysical, cultural, and socio-economic environments, independent of project effects. Consequently, potential cumulative effects from reasonably foreseeable developments (future case) are discussed in the section on uncertainty (Section 16.7).

The reasonably foreseeable developments overlap geographically and/or temporally with effects from the NICO Project, with potential cumulative effects on social, cultural, and economic VCs. Potential linkages between socio-economic effects of the different projects are not as geographically constrained as they are for physical and biological effects. Most of these projects have either already implemented or plan to develop some form of socio-economic agreement with LSA communities.

The reasonably foreseeable projects proposed for the NICO assessment were projects or activities that:

- are required infrastructure for the NICO Project;
- are currently undergoing regulatory review;

- are nearing submission for regulatory review;
- have been officially announced by a proponent;
- are directly associated with the NICO Project under review; or
- may be induced by the NICO Project.

Using these criteria, the following proposed projects have been selected as a suite of major developments that may occur in the foreseeable future:

- the Proposed Tłı̨chǫ Road Route;
- the Nailii Hydro Project;
- the Yellowknife Gold Project at the Discovery Mine site;
- the Nechalacho Project at Thor Lake;
- the Damoti Lake Gold Project;
- the Gahcho Kué Project;
- the Taltson Hydroelectric Expansion Project;
- the East Arm National Park;
- the North Arm National Wildlife Area; and
- Mackenzie Gas Project

In addition to the direct effects from these developments and the NICO Project, there are associated indirect and induced effects from business-related activities. These activities include the following:

- goods and services providers;
- annual construction of the LSA and RSA winter roads; and
- the transportation of materials to the projects.

Most proposed projects could affect socio-economic VCs of the North Slave region during construction and operation; the East Arm National Park and the North Arm National Wildlife Area could specifically increase tourism.

The Taltson Hydroelectric Expansion Project will be a transmission line linking the Twin Gorges hydroelectric station on the Taltson River with the existing and proposed mines north of Great Slave Lake. The transmission line would be about 700 km long. Infrastructure required for the Taltson Hydroelectric Expansion Project includes the placement of transmission towers, several substations, and the clearing of a 30 m corridor in areas where trees have the potential to interfere with the transmission line. In March 2011, Dezé Energy filed a letter to the MVRB requesting more time to review the project and NWT market for power.

The proposed North Arm National Wildlife Area or Kwets`oòtłàà includes a 660 km^2 combination of mainland shoreline, numerous islands, and water located in the northern end of the North Arm of Great Slave Lake, and

adjacent to the community of Behchokǫ̀. In June of 2010, the Canadian Wildlife Service agreed to sponsor this area as a candidate National Wildlife Area. This area is currently at Step 4 of 8 in the Protected Area Strategy Process, where a formal request for interim protection has been made with the Federal government.

The proposed national park at the East Arm of Great Slave Lake is representative of the North Western Boreal Uplands, and would include McLeod Bay, Reliance, Pike Portage, the Lockhart River, and Artillery Lake at the East Arm of Great Slave Lake. Although there have been some recent advances in the Park proposal, the concept is now over 40 years old and the East Arm National Park may not be created until the NICO Project is well into the operations phase. There is also uncertainty in predicting the status of the existing fishing and hunting lodges and camps in the proposed park. The assessment assumes that the existing lodges would no longer allow hunting, but would remain as tourist lodges.

The Nailii Hydro Project would include a run-of-river hydro plant constructed on the La Martre River, downstream of the community of Whatì. The largest scale plan includes a 12 megawatt hydro facility connected to Whatì to reduce their dependency on diesel generated power, and a transmission line to the existing Snare Hydro Complex to distribute power to Behchokǫ̀ and Yellowknife. Surplus power could be made available to the NICO Project through a purpose-built transmission line.

Impacts from the Yellowknife Gold Project and the Nechalacho Project (Avalon Rare Metals Inc.) are difficult to anticipate. The Yellowknife Gold Project is located 90 km north of the City of Yellowknife on the former Discovery Mine site, an existing contaminated area (Tyhee 2010, internet site). Access would be via the winter access road route and by air. The Nechalacho Project is a rare elements deposit. This property will be located approximately 100 km southeast of the City of Yellowknife near Hearne Channel on the East Arm of Great Slave Lake. Mining products will be loaded into bulk transport containers, hauled to the seasonal dock facility along the north shore of Great Slave Lake and barged during the summer to a purpose-built hydrometallurgical plant, possibly located near the site of the old Pine Point mine on the south shore of Great Slave Lake (Avalon 2010, internet site).

The property for the Damoti Lake Gold Project is located approximately 20 km south of the Colomac Mine (Merc 2010, internet site), and will be accessed via the winter road to Colomac and Wekweètì. As the project is currently in the exploration stage and a mine plan has not yet been developed, there is uncertainty regarding the size and duration of the project.

The Mackenzie Gas Project includes the 1196 km long Mackenzie Valley Pipeline, 3 onshore natural gas fields, a 457 km pipeline to carry natural gas liquids from Inuvik to an existing oil pipeline at Norman Wells, and other related facilities.

16.2.4 Effects to Employment and Business Opportunities

16.2.4.1 Methods

The quantitative and qualitative information used in the socio-economic analysis (i.e., effects to employment and business opportunities, economic effects of closure, public and infrastructure, social health and wellness, and public safety) included the following:

- NICO Project human resource requirements (Appendix 16.II);
- NICO Project scoping meetings and community visits (Section 4);

- literature synthesis (Annex K);
- review and application of documented similar situations (Annex K); and
- expert subject matter interviews (Annex K).

16.2.4.2 Results

16.2.4.2.1 Employment

Human resource requirements includes a listing of all direct and contract employment requirements by skills category for each phase of the life of the NICO Project. Fortune must identify the skill-levels for each required position, including employment for mine operations (e.g., transportation and monitoring activities).

Several residents in the LSA have already been employed by the NICO Project during the exploration and environmental baseline assessment phases. From 2007 to 2009, Fortune contracted out several positions to Tłı̨chǫ residents. Positions included cook's helpers, housekeepers, general labourers, environmental assistants, and a heritage survey assistant. Fifteen Tłı̨chǫ residents (9 women, 6 men) were seasonally employed on various NICO programs between 2007 and 2009, earning an annual average of $44 180 ($18.46/h). This wage was about double the 2010 NWT minimum wage of $9.00/h. Between 1996 and 2008, a total of 10 Tłı̨chǫ, 3 Métis, and 3 Yellowknives Dene contractors worked on the NICO Project doing line cutting, core splitting, site preparation and maintenance work, claim staking, and winter road maintenance. Since 2005, 5 contractors (4 Tłı̨chǫ and 1 Yellowknives Dene) earned a total of $37 990 for activities that included site preparation, maintenance, and core splitting work.

The number and quality of jobs created during construction and operations will be substantial relative to the LSA population and current participation rates in the labour market. The NICO Project construction and operation activities will have incremental effects on employment levels (Table 16.2-5). Results are given in full-time equivalent (FTE) terms. This means that 1 person working full time for an entire year is counted as 1 FTE job. Likewise, 12 people employed full time for 1 month translates into 1 FTE job, as would someone working double time for half the year. In the table and accompanying text, "cumulative" refers to all years combined for that phase (i.e., construction, operations, or closure). The term "total" here refers to direct, indirect, and induced employment combined for the phase.

While a 3-year construction period is used for the economic assessment, including employment estimates, most of the site construction will occur during a 12-month period in Year 2. Only a small amount of work with on the concentrator is currently expected at the end of Year 1. Underground and Open Pit commissioning are anticipated to begin in Year 3. For economic purposes, commissioning is considered part of construction, while other components considered commissioning as part of operations.

Over the 18-year operational life of mine (LOM), the mine will be in operation 24 hours a day, 365 days a year. Full production is anticipated in Year 1 of operations, with production completion in Year 18. The number of FTEs will be reduced substantially by the end of Year 2, as the Underground mining will be completed after 2 years into operations. The main workforce rotation will consist of 4 crews working a staggered 12-hour shift, in a 2 weeks on and 2 weeks off rotation.

Mine closure will occur at the end of the mine life. It will consist of a substantial initial investment of labour and materials, followed by 20 years of ongoing maintenance and monitoring.

For all employment (direct, indirect, and induced), a cumulative total of 288 FTEs will be created during construction, 5818 FTEs during operations, and 150 FTEs during closure (Table 16.2-5). The total cumulative effect on employment for the entire NICO Project (construction. operations, and closure combined) is 6256 FTEs. Assuming the NICO Project is approved, the peak year for construction jobs will be in Year 2 with 133 FTEs; during operations, the Underground and Open Pit mining phase will generate the most jobs, with 233 annual FTEs. During the Open Pit mining only phase of operations (estimated at 16 years), 127 annual FTEs will be created. For direct employment only, 231 FTEs during construction and 2551 FTEs during operations will be generated as a result of the NICO Project. About 50 to 60 contractors will be needed during mine operations, which are included in the FTE calculations.

Table 16.2-5: Effect on Employment from Construction, Operations, and Closure (FTEs)

Employment	Construction (FTEs)				Operations (FTEs)			Closure (FTEs)
	Year 1	Year 2	Year 3	Cumulative	Underground and Open Pit Mining (Annual Average)	Open Pit (Annual Average)	Cumulative	Cumulative
Direct Employment	2.2	132.9	95.7	**230.8**	232.8	127.3	**2550.9**	**85.1**
Indirect Employment	0.0	0.0	0.0	**0.0**	83.4	78.3	**1443.5**	**39.9**
Induced Employment	0.5	33.2	23.9	**57.6**	163.6	91.4	**1824.0**	**24.6**
Total Employment	**2.7**	**166.1**	**119.5**	**288.3**	**479.7**	**297.0**	**5818.3**	**149.7**
Employment Multipliers	1.227	1.250	1.250	n/a	2.061	2.333	2.286	1.759

FTE = full-time equivalent; Direct employment is employment generated by the initial project expenditure, usually construction or operating outlays; Indirect employment is employment in supporting industries, or those providing inputs to the production or the construction process; Induced employment is employment created when increased labour income (from direct and indirect impacts) is spent.

From the input-output modelling, it was estimated that employment during construction will peak at 133 jobs (Table 16.2-5). This figure was determined by estimating the labour requirements in terms of total hours for the construction or upgrade of each building or component associated within the mine, including transportation infrastructure. Estimated human resources requirements and associated skill-levels for the operational LOM have also been determined by Fortune independent of input-output modelling (Appendix 16.II). According to Fortune's estimates independent of the economic modelling, a total of 174 workers of various professional and technical categories will be required for operations, including 36 underground mine workers.

Most operations jobs for the NICO Project will have minimum education requirements, including high school completion (or a General Equivalency Diploma) and technical or academic training. Some of the major qualifications for the NICO Project are as follows:

- about 24 jobs for professionals requiring a university degree (e.g., engineering, science);
- about 33 jobs requiring a trade certificate or journeyman qualification;
- about 27 jobs for those requiring a technical education; and
- about 78 jobs are expected to require a high school completion.

Hiring Preferences

From the NICO Project scoping sessions and correspondence received by MVRB from the LSA communities, concerns were expressed about hiring practices for operations, including the following examples:

- lack of employment potential beyond entry level jobs;
- few management level jobs;
- fewer actual jobs will result than claimed;
- opportunities will disappear after the diamond mines are gone;
- hiring practices risk creating divisions between “have” and “have-not” communities; and
- equitable employment including the following:
  - transparent hiring practices;
  - fair distribution of employment between Tłı̨chǫ and Métis;
  - equal employment opportunities for women;
  - equal employment opportunities between Tłı̨chǫ residents and southern Canadians; and
  - hiring preferences for Northerners by demographic (Tłı̨chǫ, Inuk, Métis, etc.).

To address these hiring preference concerns, Fortune will implement the following mitigation steps:

- Hiring preferences will be given to local northern and Aboriginal residents as part of Fortune’s commitment to provide employment and business opportunities to Northerners. Priority will be given to the residents of Tłı̨chǫ communities. With an attractive shift roster and the proximity of the site to the homes of community members, Fortune may be able to attract some experienced Tłı̨chǫ workers. They may also be able to recruit those who have not been able to take on rotational work due to concerns about corresponding effects on families.
- A Tłı̨chǫ human resources manager will be hired to lead the recruitment process from an office in Behchokǫ̀ to facilitate the ability to recruit people from the area. All job postings will be given to the Tłı̨chǫ community employment co-ordinators to give them first opportunity to source an appropriate candidate from their communities.

Barriers to Employment and Contracting

The TOR request a qualitative description of any barriers to direct or contract employment, advancement, and retention for Mackenzie Valley residents, emphasizing Wek’èezhìi Settlement Area residents and other Aboriginal and northern people and women, where possible. Whether potentially affected communities will benefit from the NICO Project due to possible employment and contracting opportunities depends on several factors. These include, among others, previous experience, employability and availability in light of minimum education and skill requirements, job seeking skills and support, access to employment markets, retention and advancement of workers, and criminal records. These and other employment and contracting barriers are

discussed below in the following categories: employability, availability, education and skills, advancement, retention, women, criminal records, drug and alcohol use, and other barriers.

Employability: Compared to the 3 existing diamond mines in the RSA, the NICO Project is relatively small in terms of needed workers and contractors, as estimated in the input-output analysis. The NICO Project will be unable to provide as many resources, options, and training opportunities as a larger mine, and will mainly require workers with prerequisite skills to do the job rather than using trainees. Nevertheless, Fortune is committed to finding ways to attract and retain LSA community members to work at the NICO Project, particular Tłı̨chǫ residents. As community interests and basic skills are well suited to the majority of skilled and semi-skilled positions required during mine construction, Fortune will focus its pre-employment training around developing skills in those areas.

Availability: The diamond mining companies have been recruiting workers from the LSA and other communities since the mid-1990s. Some concern has been expressed in the scoping sessions and interviews that most of those from the LSA who are eligible and available to travel for work are already employed in the mining industry.

Mining companies in the North have commitments to hire Aboriginal, Inuit, and northern residents. Many mining firms are large multi-national companies that have attracted competent and experienced employees over time, and have also invested considerably in work training. With a shrinking labour pool, the challenge going forward is worker availability. In 2005, the Canadian Metals and Minerals Industry released a report called “Prospecting the Future” (MITAC 2005). Assuming a high growth scenario, over the period 2005 to 2015, the report identified a national shortage of over 70 000 mining and metals workers to meet current and future demands, and to fill positions vacated by retirees. Additionally, a substantial portion of the mining workforce is over 50 years of age; as older workers retire, there will be shortages. A similar trend will likely occur in the NWT.

While the labour shortage situation presents a challenge for Fortune, there are some positive opportunities. Through the training efforts of various mining companies, an estimated 250 students in the NWT have graduated from heavy equipment training over the past decade. Some heavy equipment operators from the LSA may soon be available as Diavik plans to discontinue their Open Pit mining in 2012. This will release a substantial number of highly trained and motivated Aboriginal workers, as well as other northern workers, who can fill the vacancies as the NICO Project ramps up.

Education and Skills: One barrier to recruiting workers with the required education and skills for each position is small population of the LSA. For example, the Tłı̨chǫ have a total population under 3000 people. Few opportunities exist for training and personal/professional development without leaving the community. For several reasons such as isolation, the lack of road transportation, and expensive air travel, many Aboriginal people lack formal education or higher levels of training and education. Still, the level of education is improving overall. Several GNWT educational programs have been implemented over the past several years to provide a high school education in the communities; this is partly due to the motivation for students to seek higher paying jobs in the mining industry while continuing to reside in their home community and commuting to work.

Advancement: Advancement has been a challenge for Aboriginal workers, even with specific programs directed at Aboriginal workers with good potential to advance in leadership roles. For example, Diavik introduced a leadership development program in 2005 to help increase the number of qualified Aboriginal people at the supervisory and management level. In 2010, Diavik completed its fourth Aboriginal Leadership Development Program; 42 participants have now taken the program, including some from the Aboriginal-owned businesses

I&D Management Services Ltd. and Tłı̨chǫ Logistics. Yet, many challenges remain; even with this program, Diavik has had very few Aboriginal workers in supervisory positions and none in management positions.

Advancement for Aboriginal mine workers in the NWT has not been successful to date. Some reasons are culturally related. Many Aboriginal people from small communities, during rest periods, do not want to deal with others from the workplace. They may also get pressure over decisions made from community members who may also be relatives. Some have commented to Fortune and others, that they do not want to supervise their relatives and neighbours from their own communities as it may create family tensions or burden them with added responsibilities. Another possible barrier to advancement is the lack of progression planning. Plans are needed so that Aboriginal workers can see a path through to the next roles and get the appropriate training and experience.

These and other challenges aside, the feeling among businesses that were interviewed during the baseline study was that substantial progress has been made within the communities. Many Aboriginal businesses and administrations are advancing inside of their own government and with related community organizations. Those who enjoy and wish to work in supervisory or management positions have made choices to work more directly for their own organizations where they see a different opportunity to make a difference. The salaries may be less compared to mining jobs, but there are some positive trade-offs, such as being able to work close to home.

Retention: Despite considerable effort in the North to recruit Aboriginal workers as evidenced in the commitments in the Impact Benefit Agreements (IBAs) of many mining companies, there has also been substantial employee turnover in the Aboriginal population. Some turnover may be attributed to the work rotations and the anxiety of being absent from home and family for extended periods. Turnover may also be affected by stress and anxiety caused by misunderstandings between employees due to a lack of knowledge and tolerance about different cultural traditions. Some potential workers may not have previously been able to take advantage of employment opportunities due to family responsibilities and distance to the worksites or the inability to commit to the 2 week in and 2 week out shifts. Fortune is committed to finding ways to attract and retain residents of the Tłı̨chǫ communities and others from smaller communities in the LSA to work at the NICO Project. With the potential for shorter shift rotations for Tłı̨chǫ residents due to their proximity to the worksite, opportunities will increase for new entrants into the labour market.

Women: While opportunities for women to be employed in the mining industry have improved and more women are entering the mining industry workforce, an unbalanced gender distribution in the industry in Canada and globally still exists. One of the barriers has been the remote work in often isolated and severe conditions that may not appeal to some women. In the past, women have not been welcomed into the industry.

In the smaller communities of the LSA, like many other parts of Canada, women generally have the primary responsibility for caring for the family. One of the key barriers for (potentially) working mothers is the inability to secure appropriate childcare for the 2 week in and 2 week out work rosters that are the norm in the mining industry. Finding suitable childcare available on a 24-hour basis has been a challenge. Furthermore, some mothers with very close bonds with their children are unable to emotionally relinquish their care for a 2 week-period. Many women in the small communities also take a key role in providing care or support for family elders, which may preclude them from leaving home for any length of time. Although this has been explored by some companies, it has not been feasible to establish childcare at remote work camps due to the high risk for small children with health issues should they need immediate medical attention. Often weather may impede immediate transportation for a small child who needs advanced medical care.

While in the past there has been limited exposure for youth, including young women, to available work opportunities in the mining industry, some success stories are becoming prevalent. Women have been particularly successful in the diamond mining industry, for instance, as very competent truck drivers and heavy equipment operators. They have a good reputation for minimizing wear and maintenance on the vehicles.

The potential for shorter shift rotations may also offer more opportunities for women with young children to enter the workforce. Potential also exists for secondary employment that may be generated in the communities themselves as a result of the NICO Project. For example, skills learned on-the-job in administrative or technical work may be transferable to local positions, and provide even more flexibility for women to enter the workforce.

Criminal Records: The issue of criminal history continually comes up in LSA community meetings as a barrier to employment. Aboriginals are over-represented in provincial, territorial, and federal prisons. Aboriginal people perceive barriers in gaining employment with organizations that require a criminal record check as part of the recruitment screening process. To achieve a safe working environment, Fortune will also require a criminal record check for employment. A safe camp environment is needed for their employees in a remote area. Those who might have a recent, repeated history of violent crimes could result in harm to an employee on a worksite. Those with a history of drug trafficking will be screened to reduce drugs and alcohol from entering the workplace. For other criminal offences, Fortune will make every effort to find a balance of being as inclusive as possible with Aboriginal people who may have a criminal record and balancing the safety of the employees at the mine site.

Drugs and Alcohol: For safety reasons, zero tolerance for drugs and alcohol is essential at any industrial worksite. Workers may be moving around or otherwise come into contact with potentially dangerous equipment. Thus, it is essential that they are not impaired in any way to endanger themselves and others. Fortune is committed to maintaining a safe, healthy, and productive work environment for all employees, contractors, visitors, and guests. Fortune has zero tolerance for the unlawful manufacture, distribution, dispensation, possession, or use of illegal drugs, or the possession or use of alcohol, at any Fortune operation or field location. The company feels that every employee has a role to play in maintaining a safe, healthy, and productive work environment, and each employee has the responsibility to report for work in a condition suitable to carry out assigned duties in a safe and efficient manner.

Other Barriers: The scattered, remote communities with small populations and few road connections found within the LSA and throughout the North are also barriers. Without a critical mass of people in a community, it is difficult to offer advanced educational programs and other amenities enjoyed in many other towns of similar size in Canada. The cost of living in the NWT is also high compared to southern Canada, which is a deterrent for some people to remain in the North. High living costs makes life a bit more difficult even considering the various northern subsidies and allowances. These high costs include housing, home heating, fuel, groceries, transportation, and other amenities and services. Advanced training and education also become more difficult to achieve under these circumstances.

The North also has had a traditional culture based on the land, and has only become a cash economy in recent decades. Strong family ties and commitments preclude individuals from leaving their communities for either further education or employment. Remote mine sites where employees have to commute and are absent from their families for extended periods of time are challenging for many Aboriginal people as they experience pressure from young children and increasing responsibilities for elder family members. A continual struggle exists to preserve the traditional Aboriginal culture and to manage in a culture with different values. These and other cultural factors may preclude some community members from working on mine sites.

16.2.4.2.2 Business Opportunities

Due to the scale and specialty needs of some NICO Project activities, the NICO Project will require non-local resources (i.e., those most likely obtained from southern provinces). Likewise, much of the NICO Project infrastructure will be pre-fabricated or partially assembled away from the NICO Project, then shipped and finished at the site. Nonetheless, due to the long history of mining development in the North, several LSA contractors have the requisite human and material resources to bid on specific NICO Project activities during all phases.

Businesses in the LSA and other parts of the NWT currently serving the mining industry are interested in potential Project-related opportunities. Over the past 15 years, several mining companies in the North have been supporting Aboriginal or northern businesses and partnerships to develop companies to provide goods and services. Many are now considered successful, sustainable, and profitable businesses. A culture of entrepreneurship has been generated that will benefit the NICO Project and the residents of the North.

Possible LSA and RSA businesses for contracting to the NICO Project include long-haul trucking, logistics, catering, environmental monitoring, local transportation, air transportation, translation services, and facilitating training workshops. The close proximity of the NICO Project to several communities should foster secondary business development. Businesses that obtain NICO Project-related contracts will also create indirect employment for additional workers and businesses in the LSA. Business and corporate hiring policies that target Aboriginals and northern residents will positively affect labour force participation and employment of Aboriginals businesses.

Fortune will depend on several contract services to operate the mine. As shown by the input-output results, the demand for business services will create additional job opportunities. The input-output model is based on the structure of an economy at a single point in time. Should the structure change (i.e., if a different mix of goods and services become available within the NWT), then new opportunities for local participation will arise. Local businesses could partner with more experienced firms to provide the mine with goods or services. Fortune has identified the contract opportunities that local businesses are most likely to access. These include the following, along with the estimated numbers of positions:

- camp services (10 to 14 positions): catering, and accommodation management;
- transportation services (50 to 53 positions): truck operators (including those who will haul concentrate to Hay River) mechanics, and fuel services. The 50 positions will also include the following:
  - road construction (20 to 30 positions for 6 months during construction period only); and
  - road maintenance (3 positions for operations phase).
- mine support services (10 to 13 positions). The positions will include the following:
  - expediting/mine resupply;
  - environmental monitors;
  - communications;
  - external trainers on-site to conduct specialty training (e.g., conflict management, cultural awareness);

- community relations; and
- sub-office in Behchokǫ̀: administration, logistics, and mechanical.

In total, Fortune estimates that about 50 to 60 positions will be annually filled by contractors during the operational phase of the NICO Project, plus another 20 to 30 positions during construction. Fortune's hiring goal is that the majority of these contract positions (60 to 80%) be filled by Northerners, with the additional goal of 30 to 50% of these being Aboriginal. The LSA has capacity in most of these required businesses; thus, it is a reasonable goal that local businesses will fill many of these contracts. Expanding to the broader NWT business sector will increase capacity to cover all contracts. Much will depend on interest in the available contract work and the number of local people that Aboriginal and northern businesses can hire.

Fortune will work with Tłı̨chǫ businesses to support capacity-building in the region. Project-induced employment and business opportunities likely will be greatest in Behchokǫ̀ and Whatì, which have the best road access. Business opportunities for all potentially-affected communities will be enhanced through the use of the NICO Project contracting policy and practice. Goods and services will be acquired on a best value basis, which includes total cost, quality, technical suitability, delivery, and continuity of supply and services. To take advantage of project-related opportunities, local businesses will need to provide goods and services on a competitive basis.

The main Tłı̨chǫ and Aboriginal potential suppliers, both directly and indirectly relevant, are listed below.

Mining Suppliers

Potential Tłı̨chǫ and Yellowknives Dene suppliers to Fortune include the following:

- Behchokǫ̀ Development Corp, which was the business arm of the Dogrib Rae Band and has since joined other former band council business interests under the umbrella of the Tłı̨chǫ Investment Corporation.
- Kete Whii/Procon, a full service mining contractor and a joint venture partnership between Kete Whii Limited and Procon.
- Nishi Khon SNC Lavalin, a majority Tłı̨chǫ -owned, multidisciplinary engineering organization with its head office in Yellowknife.
- Tłı̨chǫ Air, which is 51% owned by the Tłı̨chǫ government and 49% owned by Air Tindi and provides passenger and cargo services to mining companies.
- Tłı̨chǫ Explosives Ltd. which provides a range of explosive products and services to support surface and underground mining, exploration, quarrying, pipeline, and construction industries in the North.
- Tłı̨chǫ Landtran Ltd., which is a Yellowknife-based carrier that offers transportation services between the NWT and the rest of North America. Its operations include trucking resupply of bulk fuel to the mining sector, specializing in moving cargo and bulk materials over seasonal ice roads to the diamond mines.
- Tłı̨chǫ Logistics, which provides mine site management, maintenance and remediation services, and bulk fuel trucking. Tłı̨chǫ Logistics was established in 1998 and now employs 400 people, with long-term contracts with 2 major mines (MTS 2009). Tłı̨chǫ Logistics also provides training and development for marketable skills that could be transferred to other industries.

- The Det'on Cho Corporation is the economic arm of the Yellowknives Dene, with 20 business subsidiaries that provide goods and services to their local communities and the mining industry (Det'on Cho Corporation 2011, internet site).

Other Businesses

In addition to these suppliers that serve the mining industry, several small community businesses offer services to local residents and visitors. Businesses in Behchokǫ̀ include the following (Tłı̨chǫ Government 2010f, internet site):

- Airware Network (satellite and wireless network delivered and managed by Nishi Khon Forestry Service);
- Behchokǫ̀ Towing Services;
- F.C. Services Ltd. (convenience store and gas station);
- First North Productions (audio/visual and printed media services);
- Frontier Coachlines (bus service to and from Yellowknife, communities along Highway 3, and connecting service with Greyhound);
- Northern Gas and Convenience;
- Our Video Store;
- The Northern Store (grocery store);
- Trappers Hideaway Restaurant; and
- Rabesca Resources Ltd. (e.g., hospitality, management consulting, cultural integration workshops).

Several additional businesses in other Tłı̨chǫ communities include the following:

- Whatì businesses include the Lakeview Bed and Breakfast and Convenience Store, and Wha Ti Ko Gha K'aode (Whatì Community Store) (Tłı̨chǫ Government 2010g, internet site).
- Gamètì businesses operated by the Gamètì Development Corporation include a motel, gas station, and Aurora Caribou and Fishing Camp. Other businesses include the Hottah Lake Lodge and the Rae Lakes General Store Ltd (Tłı̨chǫ Government 2010h, internet site).
- Wekweètì businesses include the Wekweètì Development Corporation, the Hozila Naedik'e General Store, Dechi Laoti First Nation Holding, and 5352 NWT Ltd. Other community services include the Wekweètì Hotel/Snare Lake Lodge, gas station, general store, taxi service, post office, and rental properties (Tłı̨chǫ Government 2010i, internet site).

16.2.4.2.3 Mitigation Measures for Employment and Contracting

To counteract these and other barriers, Fortune has developed several plans, strategies, and commitments for maximizing direct employment, contracting, advancement, and retention of Wek'èezhìi Settlement Area residents and other Aboriginal and northern people. General mitigation measures are, as follows:

- Fortune will be flexible with the entry requirements, where possible, and make every effort to support employees or community residents to upgrade their skills.
- Rosters may vary, influenced by the nature of the work, the level of responsibility, and the place of residence of the employee. A flexible shift roster, as well as the relatively close proximity of the mine, may be attractive to Tłı̨chǫ residents and potential new entrants to the labour market.
- Employees will be provided with free scheduled round-trip, work-related transportation from the following LSA communities: Yellowknife, Behchokǫ̀, Whatì, and Gamètì. Wekweètì will be fly-in only for any employees who reside there. A 22-person bus will travel between the Tłı̨chǫ communities and carry workers in and out of camp. The daily bus service (including weekends) will be scheduled for employees. Care and maintenance workers will be based out of Whatì and will be brought by bus to and from Whatì daily on 10-hour shifts. Contractors; however, will travel at their own cost. It is likely that contractors will drive to the site as they will be bringing their own work supplies and will be on a different schedule than mine employees.
- Equivalent skills and qualifications will be considered when recruiting and hiring. As long as safety can be maintained, and in accordance with specific position requirements, Fortune will try to hire workers at all levels of proficiency, including pre-literate workers. Fortune will attempt to overcome these challenges by incorporating essential skills into safety training, technical training, and production planning.
- Fortune will provide and encourage opportunities for apprenticeships where there are available journeymen and eligible apprentices.
- Fortune will seek opportunities to encourage and support Aboriginal workers who would like to pursue supervisory or management roles.
- Fortune will develop a strategy directed at women to create more opportunities or remove barriers to women working at the site.
- Fortune will communicate clearly their Criminal Record Check policy so that no one is unjustly denied a job due to a criminal record.
- Fortune will encourage employees and contractors affected by substance abuse to seek assistance with the assurance of their support and confidentially through that process.
- Fortune will make information available to LSA schools and other community organizations so that female youth, in particular, become more knowledgeable about the various types of available jobs and the required education and training to fill these positions.
- Fortune will provide summer employment for students on the NICO Project, giving priority to those from the Tłı̨chǫ communities.
- All contractors and employees will be expected to participate in a Cultural Awareness Training Workshop. This introductory course provides employees who participate in the program with basic awareness and skills to work in the northern environment with Aboriginal peoples and with peoples from a variety of cultures. It will address personal and perceived perceptions of bias, mutual respect, and understanding

one's own culture and that of others. This cultural sensitivity training is expected to reduce work-related stress in a cross-cultural work environment.

- An Employee and Family Assistance Program will be offered to support all employees when working at the mine site. More can be done to liaise with the communities to support the issues with shift rotations and the difficulties of home life. If an employee terminates their employment due to family or personal issues, then every reasonable opportunity will be given to re-hire the employee after a reasonable period. Consideration will be given to work with the provider to make available more Aboriginal speaking counsellors for employees and their families.
- Fortune will monitor the effectiveness of its local hiring and contract policies and programs. The territorial government will also play an important role with the implementation of programs that address barriers to hiring and retention (e.g., the various Mine Training Society programs and initiatives).

16.2.4.2.4 Employment Policies for Aboriginal and Other Northern Women

The TOR requires that Fortune outlines its employment policies for Aboriginal and other northern women including training initiatives, measures for security and safety at the mine site, and anti-harassment policies. In consultation with the Tłįchǫ people, Fortune will develop specific strategies for the employment of Aboriginal and other northern women. These strategies include an on-the-job training program during the construction phase, student achievement awards, work term placement opportunities, and summer employment with priority for students from the Tłįchǫ communities. Where possible, work rosters will be made flexible to provide opportunities to women who have not previously been able to seek employment outside of the community.

Security: It is imperative that all women feel safe and secure at the worksite. Trained security staff will be on-site overseeing any concerns. The enforcement of a zero tolerance policy for drugs and alcohol will contribute to a respectful and comfortable workplace. Arrangements will be in place for separate women's quarters to give women a more secure environment. Supervisory staff will be trained to be sensitive and communicative with women to maintain a respectful workplace. A buddy system will be in place for women who use the outdoor recreational trails.

In addition, access on-site by non-employees will be restricted. Most transportation to the site will be by company-operated vehicles. No other mines or industry are currently on, or expected to be on, the road to the site. Site access will be controlled by security professionals.

Safety: Work safety will be paramount on-site with qualified safety professionals providing direction and oversight. Safety will be the responsibility of all employees, contractors, and visitors. Training will be provided for all employees before commencing work to provide a safe work environment. Thus, training will be appropriate to each position.

Anti-harassment: Anti-harassment policy and procedures are currently in place. These will be communicated to all employees and contractors and strictly enforced. Communications links will be implemented for workers to report any incidents of harassment without reprisal. Fortune will implement a process for reporting any cases of harassment and how to manage and resolve the situation.

16.2.4.2.5 Training Commitments

The TOR requires that Fortune describe any plans, strategies, or other commitments meant to increase the mine-ready workforce, support career paths in mining, and offer training programs. Fortune must outline how these strategies will create or contribute to training opportunities for northern and Aboriginal persons in general, and its employees in particular, over the LOM. Fortune must also identify when any committed-to mitigations will be enacted, keeping in mind the lead time required for job-ready training programs.

Fortune is currently making plans and preparations to begin pre-employment training. The following mitigation steps for training will be implemented:

- Fortune will partner with the Mine Training Society, which has likewise teamed up with Aurora College, to consider the Underground Miner Training Program. This program has a $1.5 million simulator where students can learn how to operate underground mining equipment including, a 2-boom jumbo drill for production drilling, a scoop tram, an underground haul truck, and a roof bolter. Recruitment of an Aboriginal workforce will be accomplished through a dedicated open pit training program. Fortune also expects to develop an apprenticeship program where there are available journeyman and eligible apprentices.
- Fortune will support potential employees from the Tłı̨chǫ communities to attend Class 1 Driver Training in Fort Smith. Training will be focused on specific job skill development.
- Fortune will offer workplace orientation sessions in the community for new workforce entrants. Mine orientation will also include money management and adapting to mine lifestyle and work habits.
- Several people in the communities have had heavy equipment experience or training, although not necessarily with mining. If hired, they will be provided with site (Project) specific on-the-job training Community meetings will be held about training and job opportunities with the NICO Project. Community leaders will be consulted on recruitment and education support decisions. The company will complete community visits, on-site information presentations, and tours as the NICO Project is approved, as well as before and during construction.
- An IBA that is satisfactory to all parties is being considered with the Tłı̨chǫ communities. This agreement may include measures to protect social and cultural values as well as addressing training, employment, and business opportunities.
- A Tłı̨chǫ human resources professional will be hired to lead Fortune's recruitment program. Opportunities will be sought for new work entrants to be further developed for more advanced or diverse roles through on-the-job training and support for educational upgrading.

16.2.4.2.6 Contractor Strategies and Commitments

The TOR requires that Fortune discuss whether and how the developer's strategies and commitments for maximizing employment of Aboriginal and northern residents will extend to its contractors. Fortune intends to establish, enhance, and increase its business activities with Aboriginal and northern residents, and particularly with Tłı̨chǫ contractors. In keeping with its objective of contributing to the social and economic development of the NWT, through its contracting process, Fortune will try to provide opportunities in employment and career development for Aboriginal and northern residents.

The following mitigation steps will be taken to maximize contractor employment of Aboriginal and northern residents in the LSA, and more generally across the RSA:

- Preference will be given to Tłı̨chǫ businesses that have the capacity to perform the work, followed by Aboriginal, northern, and other companies, in this order of priority. Fortune's procurement practices will particularly benefit Tłı̨chǫ businesses, with human resource and labour force development activities directed to Tłı̨chǫ communities and people. This support will result in stronger communities and individuals with increased entrepreneurial, business, and technical skills.
- Fortune will expect its contractor companies to have and implement Aboriginal hiring policies and procedures similar to its own. Every effort will be made with all contractors to maximize hiring from the Tłı̨chǫ communities, Aboriginal people, and across the RSA. For this type of construction, some contractors traditionally employ unionized labour. To the extent possible, however, contractors will be expected to draw their labour from qualified local sources, support training and recruitment initiatives at the pre-employment phase, provide employee development, and focus on employee retention, particularly of Aboriginal people.
- Orientation meetings will be held with contractors to make sure that they understand Fortune's policies, procedures, and commitments. All contractor personnel will complete the orientation process on-site. Penalties will be built into the contracts to improve compliance.

16.2.5 Effects to Total Economic Activity

16.2.5.1 Methods

To predict the change in the economic VC, a NWT input-output model was used based on the latest available data at the time of the initiation of the study (Appendix 16.I). This model was used to measure the territorial economic effects associated with investment, construction, and mine operations. In this analysis, total effects are the sum of direct, indirect, and induced effects. Direct effects reflect initial expenditures after adjusting for leakages. Indirect effects measure the secondary business transactions that result from the first expenditures. Induced effects are third round effects from the spending of incremental labour income in the economy after removing a portion for taxes and savings. A complete accounting of definitions and a detailed account of the mixed endogenous–exogenous model method are available in Appendix 16.I, Economic Report.

Input-output models are best suited when investigating the economic effects of a change in production, especially where that change can be thought to occur without substantially altering the structural make-up of an economy. An input-output model uses the expenditure patterns from a producer (i.e., Fortune) to depict the effect of those expenditures on an economy. Essentially, this is a comparative study where the control case is defined as the current economy and the study case is a change in the existing production schedule of a firm or industry. This approach allowed for an assessment of the economic value of production, in this case, cobalt, gold, bismuth, and copper mining and milling activities. Expressing results on an annual basis during construction phase and the operational phases offsets the weaknesses associated with averaging changes over time. In addition, the use of a mixed model with known material and employment inputs helps to mitigate the shortcomings of economies of scale.

The NICO Project input-output model of the NWT economy is based on Statistics Canada's 2006 NWT input-output table, including 25 industries and 57 commodities. The model covers estimates of construction and operations costs including direct labour requirements, wages and salaries, and the cost of consumables (inputs

such as fuel and supplies). Both direct and indirect economic effects from the NICO Project can be predicted from this model. Direct economic effects are generated from those goods and services expenditures required to build, maintain, and operate a business (i.e., the NICO Project). Indirect economic effects are those generated by the new expenditures made by the directly-affected business sector as a result of their need to deliver their goods or services to the NICO Project. The majority of indirect effects flow from the manufacturer of goods because of their need to purchase more inputs. Indirect effects are typically low in the NWT regardless of the industry being studied because of its limited manufacturing base.

Both construction and operational effects were calculated by creating a mixed endogenous–exogenous model. This approach allows modification of the input structure of the expanding industry to reflect the output and input structure of the new development (NICO Project). This approach is appropriate when the proposed development's input structure widely differs from the current input structure of the affected industry. Inputs from the construction industry were exogenized (from outside the NWT) and modified to reflect the addition of mine construction.

For operations, economic effects of the NICO Project on the NWT's mining industry were evaluated using various commodity expenditures required for the NICO Project. Wages were modified to reflect new operational employment. The GDP component of "other operating surplus" was modified to achieve model balance.

Additional, if not entirely economic, benefits for NICO Project design and construction have not been considered for the economic study, although they are evaluated elsewhere in this SON. Examples of additional benefits include the additional training and experience gained from engineering design firms, suppliers, vendors, and particularly construction workers with improved productivity and workmanship. Improved business practices will also be introduced into the local communities and organizations through their involvement in project management.

Economic Assumptions

To calculate direct, indirect, and induced economic effects, the following assumptions were made:

- All effects are expressed as those over and above the status quo (no investment) case and are in 2010 Canadian dollars.
- Closure data had been originally presented in 2011 dollars. These were converted to 2010 Canadian dollars using a 5% discount factor to express future closure expenditures by net present value.
- Construction and operating costs of the Saskatchewan Metals Processing Plant in Saskatoon are excluded from this analysis as they occur outside the NWT.
- Construction costs were separated by Open Pit and Underground development, equipment, and the Mineral Processing Plant (the Plant). Open Pit and Underground development were assigned to the construction industry. Equipment was assigned to the manufacturing industry and all of it was assumed to be imported from outside the NWT.
- The Plant costs were broken down into construction and equipment (manufacturing) components based on experience with other mining projects.

- Annual construction labour costs from the NWT input-output tables were inflated to 2010 levels and multiplied by person years to calculate annual construction labour costs.
- Total labour, development, and equipment costs were subtracted from total annual investment. A combination of construction own-industry purchases and the GDP component of “Other Operating Surplus” were modified to insure model balance.
- Total operating costs were divided into the following categories: power, labour, fuel, lube, parts, tires, reagents, material, and freight. These were further divided by the number of annual periods (e.g., 18.3 years for total operations). Total revenue and types of positions were likewise annualized.
- The operating cost categories were grouped to various industries as follows:
  - power was assigned to the utilities industry;
  - fuel, lube, parts, tires, reagents, and materials were assigned to the manufacturing industry; and
  - freight was assigned to the transportation and warehousing industry.
- Only locally available inputs (within the NWT) were sourced. Where information on the source of inputs was lacking, the model’s default import leakages were used and all manufacturing inputs were treated as imports.
- Total annual input costs were subtracted from total annual revenues and the GDP component of “Other Operating Surplus” was modified to provide model balance.
- Closure impacts were estimated with final demand change through the construction and professional service industries to the territorial input-output model. Both the inputs and results are expressed cumulatively over the de-commissioning and monitoring period and the initial expenditure was adjusted downward to reflect imports from outside the NWT using default model leakages.

The economic fiscal module was based on the latest territorial and federal budgets to estimate government revenues. The following assumptions were used to calculate taxes:

- Provincial personal income tax was calculated by using the territorial personal income tax rate that would apply to average industry annual income. This is applied to model-generated labour income.
- Federal personal income tax was calculated by using the federal personal income tax rate that would apply to average industry annual income, as applied to model-generated labour income.
- Corporate income tax was calculated by applying the respective territorial and federal corporate tax rate to incremental corporate profits before taxes calculated by the model.
- Unincorporated business income taxes were calculated by applying the small business tax rate to incremental unincorporated business profits calculated by the model.
- Sales tax calculation was based on the ratio of territorial sales tax collected to retail trade gross output applied to incremental retail trade output calculated by the model.

- Fuel and tobacco revenues were calculated as a fixed ratio (based on territorial budget figures of tobacco and fuel tax revenues to total sales tax revenue) multiplied by estimated sales tax revenues.
- Property taxes were treated as a stable function of GDP at "factor cost" (i.e., excludes net indirect taxes).
- The direct operational property tax was assumed to be the effect of the new facility on property taxes within the general taxation area (i.e., the NWT, but excluding the City of Yellowknife, Town of Hay River, Town of Fort Smith, Village of Fort Simpson, Town of Norman Wells, and Town of Inuvik).

Input-Output Model Assumptions

Input-output models are recognized to have limitations, including the following:

- They are static, meaning they are based on the economy as it exists at a single point in time.
- They do not capture economies of scale, since they are linear. Adjustments are not made for the size, scale, or direction of any change to an economy.
- They do not reflect limitations of capital and labour.
- The data used to develop the relationships between industrial sectors are the result of surveys. They are treated as approximations of actual relationships due to unknown variability embedded in the mathematics.
- They do not capture environmental and social effects that are not easily expressed in economic terms. Such effects can be both positive and negative (quality of life may improve for some and not improve for others, depending on personal choices and values).
- They do not necessarily address well the ability of an economy to respond to increases in economic activity in the short-term. A large project can have a major effect on particularly smaller economies, which in turn can strain limited human resources, cause price changes, and make economic effects difficult to predict.

From the TOR, the developer will "Estimate the total economic activity to be generated by the development (e.g., employment and income generation including multiplier effects and taxes) and associated socio-economic impacts, with a focus on the distribution of beneficial and adverse impacts" (p. 17 of the TOR). The developer will also "Include a description of any plans or strategies to mitigate adverse socio-economic impacts" (p. 17 of the TOR). For economic effects, these were analyzed through qualitative and quantitative estimates of all beneficial and adverse economic effects from the NICO Project, including the following (p. 36 of the TOR):

- capital costs associated with placing the NICO Project in operation, broken down by major components (estimates should be in 2009 dollars Cdn. and may be in a +/- 20% range);
- annual operating costs during the life of the NICO Project (estimates should be in 2009 dollars Cdn. and may be in a +/- 20% range);
- federal, territorial, and municipal taxes that the developer may remit by year, as well as from linked economic development (a +/- 20% range is acceptable);
- total employment impact on the Wek'èezhìi Settlement Area and Mackenzie Valley, including a prediction of employment multipliers from the development; and

- a prediction of any adverse impacts the development may have on public infrastructure maintenance and associated costs, depending upon availability (with emphasis on the potential realignment of the winter road through the Wek'èezhìi Settlement Area)."

These economic effects are analyzed below with the exception of employment which has been addressed above. In the calculation of capital and operating costs most total and direct activity from the NICO Project occurs within the mining industry category. Indirect effects (industries providing inputs to the mining sector) are concentrated in utilities and transportation. Induced effects, which represent the additional effects of consumer spending of wages earned, are concentrated heavily in trade and personal services. As outlined in the economic assumptions, to be more current, all calculations are expressed in 2010 Canadian dollars.

Data for mine closure expenditures did not include detailed inputs and employment. As a result, closure impacts were calculated using a more traditional final demand change to the territorial input-output model. As is the case with operational and construction impacts, the initial expenditure was adjusted downward to reflect imports from outside the NWT.

In the economic effects tables and accompanying text, "cumulative" refers to all years combined for that phase (i.e., construction, operations, or closure). The term "total" here refers to direct, indirect, and induced costs or revenues combined for the phase. The associated tables show annual effects in addition to the overall totals.

16.2.5.2 Results

16.2.5.2.1 Capital Costs

During construction, the NICO Project will generate $226.8 million in expenditures, or gross output (Table 16.2-6). Construction costs are presented in total cumulative costs.

16.2.5.2.2 Operations Costs

During operations, in average annual expenditures, the NICO Project will generate $233.9 million for Underground and Open Pit Mining and $216.3 million for Open Pit Mining only (Appendix 16-1), with a total cumulative gross output of $3995.7 million for LOM (Table 16.2-7). Operations costs in Table 16.2-7 are presented in total cumulative amounts, including the cost of labour, consumables, sustaining capital, and additional mine development.

16.2.5.2.3 Closure Costs

During the closure period, the NICO Project will generate $47.3 million in total cumulative gross output (Appendix 16-I). These closure cost estimates include an initial outlay of $34.9 million (assigned to the construction industry), $0.759 million over 10 years for post-closure physical monitoring and maintenance (assigned to the construction industry), $0.728 million for chemical monitoring over 20 years (assigned to the professional, scientific, and technical services industry), and $0.200 million for post-closure water treatment over 10 years (physical maintenance of wetlands and equipment replacement assigned to the construction industry), if required.

Table 16.2-6: Total Cumulative Costs of Construction by Industry Category

Industry Category	Gross Output ($M)	GDP ($M)	Employment (FTEs)	Labour Income ($M)
Construction	215.9	16.5	230.8	16.5
Finance, Insurance, Real Estate, and Rental and Leasing	3.6	2.1	5.2	1.1
Retail Trade	1.2	0.7	15.2	0.6
Government Sector	1.0	0.6	5.7	0.5
Transportation and Warehousing	0.8	0.3	2.5	0.2
Accommodation and Food Services	0.8	0.4	8.0	0.3
Non-Profit Institutions Serving Households	0.8	0.6	12.7	0.6
Utilities	0.6	0.3	0.8	0.1
Operating, Office, Cafeteria, and Laboratory Supplies	0.5	0.0	0.0	0.0
Travel, Entertainment, Advertising, and Promotion	0.4	0.0	0.0	0.0
Information and Cultural Industries	0.3	0.2	0.9	0.1
Wholesale Trade	0.2	0.1	0.9	0.1
Health Care and Social Assistance	0.2	0.1	0.9	0.1
Professional, Scientific, and Technical Services	0.1	0.1	1.0	0.1
Administrative and Support, Waste Management, and Remediation Services	0.1	0.1	1.2	0.1
Other Services (Except Public Administration)	0.1	0.0	0.9	0.0
Transportation Margins	0.1	0.0	0.0	0.0
Crop and Animal Production	0.0	0.0	0.2	0.0
Forestry and Logging	0.0	0.0	0.0	0.0
Fishing, Hunting, and Trapping	0.0	0.0	0.1	0.0
Support Activities for Agriculture and Forestry	0.0	0.0	0.2	0.0
Mining and Oil and Gas Extraction	0.0	0.0	0.0	0.0
Manufacturing	0.0	0.0	0.1	0.0
Educational Services	0.0	0.0	0.4	0.0
Arts, Entertainment, and Recreation	0.0	0.0	0.7	0.0
Total	**226.8**	**22.3**	**288.3**	**20.3**

GDP = gross domestic product; FTE = full time equivalent

Table 16.2-7: Total Cumulative Costs of Operations (18 Years) by Industry Category

Industry Category	Gross Output ($M)	GDP ($M)	Employment (FTEs)	Labour Income ($M)
Mining and Oil and Gas Extraction	2997.8	1893.7	1893.7	2550.9
Transportation and Warehousing	288.3	98.3	107.9	861.5
Utilities	252.6	130.7	139.3	350.4
Finance, Insurance, Real Estate and Rental and Leasing	111.3	67.1	73.5	162.4
Operating, Office, Cafeteria and Laboratory Supplies	84.2	0.0	0.0	0.0
Government Sector	83.1	47.3	47.9	480.9
Retail Trade	33.5	19.9	20.5	441.9
Accommodation and Food Services	23.8	11.7	13.0	248.2
Non-Profit Institutions Serving Households	22.5	16.9	17.1	335.6
Travel, Entertainment, Advertising and Promotion	19.6	0.0	0.0	0.0
Construction	17.9	5.1	5.2	47.4
Information and Cultural Industries	15.3	10.5	10.7	48.0
Wholesale Trade	13.0	7.4	7.5	56.5
Professional, Scientific and Technical Services	7.8	3.9	4.0	49.9
Health Care and Social Assistance	7.8	3.4	3.6	33.0
Administrative and Support, Waste Management and Remediation Services	5.3	3.5	3.6	59.0
Other Services (Except Public Administration)	3.3	1.7	1.8	38.9
Transportation Margins	2.8	0.0	0.0	0.0
Manufacturing	2.2	0.4	0.5	3.8
Arts, Entertainment and Recreation	1.9	0.7	0.8	25.0
Educational Services	0.9	0.6	0.7	11.7
Support Activities for Agriculture and Forestry	0.4	0.4	0.4	6.1
Crop and Animal Production	0.3	0.3	0.3	4.6
Fishing, Hunting and Trapping	0.2	0.2	0.2	2.1
Forestry and Logging	0.0	0.0	0.0	0.4
Total	**3995.7**	**2323.8**	**2352.0**	**5818.3**

GDP = gross domestic product; FTE = full time equivalent

16.2.5.2.4 Revenues (Gross Domestic Product, Taxes, and Royalties)

The expansion in economic activity as a result of the NICO Project is expected to generate incremental government revenues (or fiscal effects) in the form of GDP, taxes, and royalties.

Gross Domestic Product

Gross domestic product is the "value added" portion of the NICO Project. It is the measure of the sum of all goods and services produced within a geographic area (in this case, the RSA), and is used to measure the "size" of an economy. In the economic assessment, GDP was included as part of gross output, representing value added or payments to final factors of production, and includes both profits and labour income. Inter-industry inputs are adjusted for leakages. Since construction takes place within NWT, gross output and GDP accrue within the same region.

The nearly $227 million in annual construction expenditures (Table 16.2-6) will increase total GDP by about $22 million for the RSA (Table 16.2-8). Thus, the GDP to gross output ratio for the NICO Project construction is estimated to equal about 10%. The average annual range of $216 million to $234 million in operations expenditures will increase total GDP by about $129 million for the RSA. Thus, the GDP to gross output ratio for the NICO Project operations is estimated to equal about 55%.

Table 16.2-8: Effect on Gross Domestic Product, Construction, Operations, and Closure ($M Canadian)

Gross Domestic Produce	Construction ($M)				Operations ($M)			Closure ($M)
	Year 1	Year 2	Year 3	Cumulative	Underground and Open Pit (Annual)	Open Pit (Annual)	Cumulative	Cumulative
Direct GDP	0.2	9.5	6.9	**16.6**	81.6	106.3	**1893.7**	**9.2**
Indirect GDP	0.0	0.0	0.0	**0.0**	15.0	13.4	**249.4**	**5.1**
Induced GDP	0.1	3.3	2.4	**5.8**	16.2	9.1	**180.7**	**2.4**
Total GDP	**0.2**	**12.8**	**9.2**	**22.2**	**112.8**	**128.8**	**2323.8**	**16.7**
GDP Multipliers	1.345	1.345	1.345	1.345	1.383	1.212	1.227	1.815

GDP = Gross Domestic Product

In the RSA, mine construction and operations will have incremental effects on direct, indirect, and induced GDP (Table 16.2-8). Direct cumulative GDP will amount to $16.6 million for the construction phase, and $1894 million for the operations phase. Total cumulative GDP for the construction phase will amount to about $22 million, and total cumulative GDP for the operations phase will amount to about $2324 million. Total cumulative GDP for the closure phase will amount to almost $17 million.

Taxes and Royalties

The estimated government revenues include direct, indirect, and induced effects on taxes and royalties, but these estimates are not adjusted for any changes to transfer payments.

Mining royalties are collected by the federal government (Indian and Northern Affairs Canada). Under the land claim agreements, the federal government provides the First Nations and their communities with a portion of the royalties received from the non-renewable resource extraction within the Territory and within the settled land claim areas. The revenue effect on the territorial government generated by the mining industry is complicated by the fact that its transfer payment is affected by incremental revenues. Analogous to a "have not" province

receiving equalization payments, under the Territorial Formula Financing Agreement, the NWT does not receive these mining royalties. Instead, a substantial portion of new revenues from both direct and indirect taxes are "clawed back" through a reduction in the annual transfer. The NWT depends on transfers from the federal government for over two-thirds of its revenues since per capita spending needs are far greater than the NWT's per capita revenue raising capacity. The main federal transfer, the Territorial Formula Financing grant, is designed to fill the gap between the NWT's spending needs and revenue raising capacity. The NWT generates only slightly more than 20% of its revenue needs from taxation. Under funding arrangements with Canada, the NWT keeps 100% of the money raised through tax rate increases, but a large part of the increase in own-source revenues that result from a growing economy is offset by a lower grant. The claw-back, on average, is less than 100%. The NWT realizes an average net benefit from the growth of tax revenues of 30%; the specific benefit depends on whether the NWT tax rate is above or below the national average rate for a given tax base.

The Territorial Formula Financing grant theoretically measures the difference between what the NWT would need to spend to provide similar levels of public services as the provinces and its ability to raise its own revenues at similar levels of taxation: Territorial Formula Financing grant equals Expenditure Requirements minus Revenue-Raising Ability. The NWT's revenue-raising ability takes into account various revenue sources; it measures how much the NWT could raise from these sources if it levied the same taxes as the provinces using national average tax rates. This revenue-raising ability is referred to as Eligible Revenues. All eligible revenues are applied to the formula as a 3-year moving average with a 2-year lag. An Economic Development Incentive is applied to Eligible Revenues, effectively excluding 30% of Eligible Revenues from the Territorial Formula Financing grant calculation. This is meant to provide a fiscal incentive for the NWT to promote economic growth. Without it, a dollar of increased tax revenue would simply be offset by an equal reduction in the grant. This does not equate to a 70% claw-back because the eligible revenues in the formula are determined using the NWT revenue capacity, not its actual revenues. Thus, the claw-back would be 70% only in a situation whereby actual revenues and revenue capacity were identical.

Mining royalties are also problematic to estimate using input-output models. While input-output results are typically linear and proportional, mining royalties in NWT are levied at a graduated rate that increases by 1% for each additional $5 million in the mine output (increasing with the size and scale of the mine value) and royalty rates range from 0 to 14%. In this study, mining royalties are estimated by applying the ratio of mining royalties collected to mining industry gross output (about 3.3%) to the NICO Project gross revenue.

Annual mining royalties will amount to $5.4 million, which will accumulate to nearly $100 million ($99.1 million) over the operational LOM. Due to the limitations identified above, however, estimates of mining royalties should be treated with caution.

In the RSA and nationally, the NICO Project is expected to generate annual incremental taxes and royalties during the construction phase (Table 16.2-9). Total annual federal and territorial government revenues during construction will amount to $7.9 million.

In the RSA and nationally, once fully operational, the NICO Project is expected to generate annual fiscal effects during both operation phases, including the 2-year Underground mining period (Tables 16.2-10 and 16.2-11). During closure, these revenues will decline substantially (Table 16.2-12).

Table 16.2-9: Effect on Annual Government Taxes and Royalties during Construction ($M Canadian)

Government	Personal Income Tax	Corporate Income Tax	Taxes Unincorporated Business Profits	Property Taxes	Sales and Excise Taxes	Payroll Taxes	Mining Royalties	Total Revenue
Federal	4.351	0.140	0.135	0.000	0.563	0.000	0.000	**5.189**
Territorial	1.916	0.091	0.044	0.090	0.141	0.447	0.000	**2.752**
Total	**6.267**	**0.231**	**0.179**	**0.090**	**0.705**	**0.447**	**0.000**	**7.941**

Table 16.2-10: Effect on Annual Government Taxes and Royalties during Underground and Open Pit Operations ($M Canadian)

Government	Personal Income Tax	Corporate Income Tax	Taxes Unincorporated Business Profits	Property Taxes	Sales and Excise Taxes	Payroll Taxes	Mining Royalties	Total Annual Revenue
Federal	10.853	4.717	0.417	0.000	1.299	0.000	5.416	**22.702**
Territorial	5.801	2.455	0.109	0.458	0.359	0.817	0.000	**10.000**
Total	**16.654**	**7.172**	**0.527**	**0.458**	**1.658**	**0.817**	**5.416**	**32.702**

Table 16.2-11: Effect on Annual Government Taxes and Royalties during Open Pit Operations ($M Canadian)

Government	Personal Income Tax	Corporate Income Tax	Taxes Unincorporated Business Profits	Property Taxes	Sales and Excise Taxes	Payroll Taxes	Mining Royalties	Total Annual Revenue
Federal	5.566	7.524	0.250	0.000	0.700	0.000	5.416	**19.454**
Territorial	2.976	3.915	0.065	0.523	0.211	0.427	0.000	**8.117**
Total	**8.541**	**11.439**	**0.315**	**0.523**	**0.911**	**0.427**	**5.416**	**27.572**

Table 16.2-12: Effect on Government Taxes and Royalties during Closure ($M Canadian)

Government	Personal Income Tax	Corporate Income Tax	Taxes Unincorporated Business Profits	Property Taxes	Sales and Excise Taxes	Payroll Taxes	Mining Royalties	Total Annual Revenue
Federal	1.949	0.437	0.198	0.000	0.328	0.000	0.000	**2.912**
Territorial	1.093	0.227	0.052	0.068	0.203	0.172	0.000	**1.814**
Total	**3.042**	**0.665**	**0.249**	**0.068**	**0.531**	**0.172**	**0.000**	**4.726**

Total annual federal and territorial government revenues during operations will amount to about $33 million during the Underground and Open Pit phase, and about $28 million annually for the remainder of operations. Within the general taxation area (NWT), the territorial government also collects property taxes, which have been included in the total annual revenues. Property tax revenue is assigned to the general revenue fund to provide

territory-wide services. This figure is estimated to be about $0.5 million annually once the facility is fully operational. During closure, total cumulative federal and territorial government revenues will amount to just under $5 million.

16.2.5.2.5 Labour Income

In the RSA, mine construction, operation, and closure is expected to have incremental effects on labour income (Table 16.2-13). Labour income is included in GDP and includes wages, salaries, and supplementary labour income (employer contributions to pension plans and benefit packages). Cumulative direct labour income for the construction phase will be $16.6 million. Annual direct labour income for the operations phases will amount to $30.4 million (Underground and Open Pit) and $13.0 million (Open Pit). Cumulative direct labour income will be $275.1 million over the operations LOM. Total cumulative labour income for the construction phase will amount to $20.3 million, and total cumulative labour income for operations will amount to $478.9 million. Direct labour income during the closure period will be considerably reduced from operations, totalling $5.7 million, and cumulative labour income during closure will total $9.3 million.

Table 16.2-13: Effect on Labour Income, Construction, Operations, and Closure ($M Canadian)

Labour Income ($M)	Construction				Operations			Closure
	Year 1	Year 2	Year 3	Cumulative	Underground and Open Pit (Annual)	Open Pit (Annual)	Cumulative	Cumulative
Direct Labour	0.2	9.5	6.9	**16.6**	30.4	13.0	**275.1**	**5.7**
Indirect Labour	0.0	0.0	0.0	**0.0**	6.0	5.5	**102.1**	**2.5**
Induced Labour	0.0	2.2	1.6	**3.8**	8.8	5.1	**101.7**	**1.2**
Total Labour Income	**0.2**	**11.7**	**8.4**	**20.3**	**45.2**	**23.7**	**478.9**	**9.3**

16.2.5.2.6 Summary

The NICO Project, in general, will increase the amount of money that is available throughout the region through wages, business, and spending. It will add value to the GNWT through personal, corporate, payroll, and other taxes and payments. Direct payments to the affected groups such as the Tłı̨chǫ communities will add to the LSA and NWT economy.

Over the course of the construction phase the NICO Project will add the following total cumulative economic benefits to the NWT economy:

- 288 FTEs of employment within the NWT;
- $20.3 million in new wages and salaries (included in GDP);
- $22.2 million to the territorial GDP; and
- $7.9 million in federal and territorial government revenues.

During the 2-year Underground and Open Pit phase of operations, the NICO Project will add the following total annual economic benefits to the NWT economy:

- 480 FTEs of employment within the NWT;

- $45.2 million in new wages and salaries (included in GDP);
- $112.8 million to the territorial GDP; and
- $24.0 million in federal and territorial government revenues, including $5.4 million in mining royalties.

During the rest of the operations phase (16-year Open Pit), the NICO Project will add the following total annual economic benefits to the NWT economy on an annual basis:

- 297 FTEs of employment within the NWT;
- $23.7 million in new wages and salaries (included in GDP);
- $128.8 million to the territorial GDP; and
- $20.8 million in federal and territorial government revenues, including $5.4 million in mining royalties.

During the closure and post-closure phase (20 years), the NICO Project will have the following economic benefits to the NWT economy on a total cumulative basis:

- 150 FTEs of employment within NWT;
- $9.3 million in new wages and salaries (included in GDP) in NWT;
- $16.7 million in territorial GDP; and
- $4.7 million in federal and territorial government revenues.

16.2.6 Effects to Public Infrastructure and Services

16.2.6.1 Methods

In the pathways analysis as summarized in Table 16.2-4, the NICO Project may increase demand and costs for public infrastructure (mainly airports and roads) from the transport of material and people to the NICO Project site. These 2 pathways have been combined in this analysis due to their similarities and the government's role in their provision. The same qualitative methods were used to assess effects to public infrastructure and services as were used assess effects on employment and business opportunities (Section 16.2.4).

Infrastructure consists of the physical resources and social services used by people and communities. These include roads, water and wastewater facilities, schools, recreation facilities, and health care facilities. Infrastructure may also include social services such as counselling services, addiction services, homeless shelters, or emergency medical care. Changes in access to these physical and social resources and services can affect the health and quality of life of residents. The TOR also request a discussion of whether and how the NICO Project may create or contribute to impacts on other organizations and businesses servicing the region through mobilization of local skilled labour away from smaller NICO Project communities and associated impacts on maintenance of infrastructure and basic service provisions. This section assesses the potential effect of the NICO Project on the demand for physical infrastructure and social services.

16.2.6.2 Results

16.2.6.2.1 Public Infrastructure and Services

Little evidence exists that the NICO Project will affect the physical infrastructure or the provision of critical services in the LSA communities. Over the past decade, many of the necessary investments to accommodate the demand for products and services associated with the mining sector growth have already been made. Local businesses have already adjusted their operations and feel that they have capacity and can respond to any increases in demand, at least from an infrastructure perspective.

During construction, equipment and supply will be hauled to the NICO Project site locally using the Proposed NICO Project Access Road (NPAR), the existing Whatì and Gamètì winter roads, (if the alternative scenario is used), the Proposed Tłı̨chǫ Road Route (either seasonal or all-weather), and regionally using the NWT highway system. During a single winter season the estimated traffic will total about 2200 truckloads of equipment and supply during construction, and total distance travelled using the NWT highways is estimated to be 1 700 000 vehicle kilometres travelled/year. Project-related traffic during construction will be a 185% increase compared to baseline traffic on the existing winter road between Whatì and the Gamètì (Section 17).

During operations, trucks will access the NICO Project site locally using the NPAR and the Proposed Tłı̨chǫ Road Route, and regionally using the NWT highway system. The NICO Project will increase vehicle traffic during operations by about 18 vehicles per day (including 5 concentrate trucks and 4 supply trucks per day, with return trips). The concentrate will be hauled from the NICO Project site to Hay River, before being further transported by rail to the Saskatchewan Metals Processing Plant. The Proposed Tłı̨chǫ Road Route has been assumed to be operational during the entire operation phase of the NICO Project.

To reach the NPAR, loaded trucks will be using NWT highways. An increase in heavy traffic on the highways is expected to result in the need for more timely upgrades. To offset costs and the limited ability to raise revenues, GNWT arrangements are in place with the Government of Canada to replace community infrastructure or upgrade roads. This will be done whether or not the NICO Project goes ahead, but additional use may affect timing.

For costs associated with road maintenance, the NICO Project will have limited effect. Fortune will be paying royalties and taxes to all levels of government that will be allocated as appropriate, including most likely for road infrastructure. Road access that will be available as a result of the mine will have mainly positive economic effects. It will provide many LSA residents with better access to services. The road will also lower costs for goods that previously were only available to some Tłı̨chǫ communities on a short-term winter road or by air.

16.2.6.2.2 Labour Shortages for Local Services

The baseline study found that many small communities in the LSA are experiencing a shortage of locally available labour for community services. The remoteness of the small communities combined with other factors such as job opportunities elsewhere and lack of skilled trades people have affected the local labour supply. Several interviewees representing local businesses suggested, however, that current labour shortages do not impede their collective ability to operate. Most have adapted to a new labour reality by changing their operations and human relations practices to accommodate and retain staff. Furthermore, they do not feel that they are in competition with the mining industry, since they tend to rely on a different pool of labour and required skill sets. Many local businesses have innovative labour retention programs that could be adapted as a model for the mining industry.

Concerns have been expressed in the baseline study and scoping sessions that increased incomes from employment with the NICO Project will result in money being spent unwisely. If so, then the demand for social support services, such as policing, social services, and health care, will also increase. These services are already stretched, and it may be difficult to attract additional health care and other professionals to the small communities even if well compensated. Some existing capacity issues in firefighting, policing, and emergency services will have to be addressed, with or without the NICO Project. The NICO Project may also increase the need for housing as northern residents move (or more likely return) to communities where Fortune intends to recruit workers.

The NICO Project timing will minimize the risk of labour shortages in the potentially-affected communities. If any labour shortages occur, they will most likely be experienced only during the construction phase and the first few years of production. For example, Diavik plans to discontinue their open pit mining in 2012. This will release a substantial number of highly trained and motivated Aboriginal workers as well as other northern workers who can fill the vacancies as the NICO Project ramps up.

The NICO Project is also expected to have a negligible effect on provision of social services or volunteers and, in particular, fire-fighters. Fire-fighter numbers have already adjusted or are unchanged due to the other developments in the LSA. Communities demonstrating issues with retaining fire-fighters include Wekweètì and Whatì.

Fortune has proposed environmental design features that relate to demands on infrastructure, including any effect on social services from in-migration. Fortune will offer pick-up points throughout the LSA communities. The mine camp will include the necessary facilities to sustain the workforce at the site, including having medical personnel accessible on a continuous basis, reducing demand on transport of material and people. Fortune also offers a volunteer incentive that employees can apply for; these will be provided to those employees interested in volunteering their time for social or cultural programs or activities in their home communities.

16.2.7 Effects to Health and Wellness

16.2.7.1 Methods

From the TOR, the developer will “Describe the social impacts of the NICO Project, focusing on community wellness and population health issues at regional, community, family, and individual levels” (p. 17 of the TOR). The same qualitative methods were used to assess health and wellness effects as were used to assess effects on employment and business opportunities (Section 16.2.4).

16.2.7.2 Results

16.2.7.2.1 Population In- and Out-migration

Since diamond mining began in the 1990s, the anticipated influx of workers into the NWT from other regions has not occurred. Instead, out-migration from the NWT has been an ongoing concern since at least the mid-2000s. From 1995 to 2009, there were 3 years in which the NWT has gained through net migration, with 2 of those years occurring since operations began at the Ekati Diamond Mine in 1998. The development of the third diamond mine at Snap Lake had no effect on the migration trend.

Yellowknife is the centre of a continuing trend toward intra-regional migration in the NWT (intra-regional migration generally occurs when people move from small communities to larger towns and cities, although the reverse could be true as well). Overall, Yellowknife has increased from 28.6% of the territorial population in 1976

to 44.6% in 2003 (values adjusted for division of the NWT). Movement to other regional centres has occurred at a slower rate. It is unclear how the economic growth of the past decade or so has affected this movement of people. Previously, the 2 operating gold mines in Yellowknife and the Pine Point Mine near Hay River required workers to live in close proximity to those projects. One would have to relocate to access a job.

In contrast, the recent growth in the mining sector and the advent of fly-in/fly-out work schedules has allowed residents living in communities where economic opportunities were limited to gain employment and establish a career. As the mining sector has grown, the number of communities represented in mining has also grown. Residents from all regions of the NWT have come to smaller communities and Yellowknife in search of opportunities. As mentioned earlier, the Tłı̨chǫ communities are growing slightly more rapidly than Yellowknife and the NWT overall, in large part due to in-migration combined with favourable natural growth. This movement and new employment and educational opportunities should help preserve the population base in the LSA smaller communities.

For the NICO Project, there may be a need to use labour imported from the southern provinces. Typically during construction, a large influx of skilled contract workers will move from project to project; these workers generally do not intend to relocate and make a permanent home in the area.

Given these ongoing migration trends, the NICO Project is not expected to change the trends. With the revenues that mining may bring, some LSA community members, especially young people, may increasingly prefer to move closer to work. While this will likely be Yellowknife with greater opportunities for education, skills training, and employment, for some, this may mean out of the NWT entirely. Conversely, the NICO Project also will provide “close-to-home” employment and business opportunities for some LSA residents, offering incentives to continue to live in their home communities. As discussed, contractors for the NICO Project will be directed through the contractual arrangements to make every effort to use labour from the Wek’èezhìi Settlement Area.

16.2.7.2.2 Education Completion Rates

The socio-economic baseline (Annex K) shows that education and skill levels of NWT residents have greatly improved over the past 10 to 15 years with the combined efforts of community leaders, government programming, and the support of mining companies (e.g., secondary schools are now in nearly all of the communities, mining and trades training has increasing enrolments, and numbers of scholarships have increased). Still, while high school graduation rates are improving, particularly in Yellowknife, in some of the smaller communities, high school student enrolment and graduation rates have not improved much over the last few years; this may be related to some students moving to Yellowknife to finish their secondary education, some dropping out for unskilled jobs, or other factors. On the positive side, levels of education are higher among women in Aboriginal communities, which may improve their employment opportunities.

Education is not uniform in the NWT, particularly in the smaller communities where annual numbers of students enrolled and graduating tend to fluctuate from year to year. Nevertheless, during the past decade the number of students graduating from high school in the NWT has increased. Programs offered through Aurora College and the Mine Training Society have helped to increase the number of trades and technology graduates since the mid-2000s. Greater local access to culturally-appropriate education and training has also helped increase educational success and chances of finding good jobs.

While the level of education has risen and more Aboriginal people have advanced their education, the representation of Aboriginal workers in the NWT mining sector has not substantially increased over time. Part of

this may be attributed to the strong development of the Tłı̨chǫ government, which has employed people who may otherwise have sought employment in the mining industry. Moreover, not all of the training has been successful; thus, Fortune feels it will be more successful with targeted training and mentorship of those few candidates that have supervisory and management potential and want to advance their careers.

Greater training and education and increased incomes have their downsides from a local perspective. Increased education and experience levels also increase choice. People may leave their communities and take their newly acquired skills elsewhere, either within or outside of the NWT to various points of hire. While many people in smaller communities such as the Tłı̨chǫ do not want to move away for work, opportunities for long-term, full-time employment remain in the larger regional communities or Yellowknife (GNWT Department of Education, Culture and Employment 2008).

With mitigation steps that address some of these challenges, education completion rates are expected to be positively affected by the NICO Project. These steps will include the following:

- Employees will be brought in at a level so that the person is able to do the work and remain safe. Fortune will eliminate a minimum literacy requirement for employment for residents of the Wek'èezhìi Settlement Area. As long as safety can be maintained, workers will be accepted at all levels of proficiency, including pre-literate workers. Fortune will attempt to overcome these challenges by incorporating essential skills into safety training, technical training, and production planning.
- Opportunities will be sought for new work entrants to be further developed for more advanced or diverse roles through on-the-job training and support for educational upgrading. On-the-job training will be provided in as many situations as possible to provide opportunities for Tłı̨chǫ residents.
- Fortune will try to carry out relevant training programs that are offered in cooperation with other agencies in the Territory, such as the Mine Training Society and Aurora College. Discussions have begun with the Mine Training Society to seek training opportunities, although issues about academic preparedness still need to be addressed.
- Fortune will work diligently to engage with youth, particularly those who are Tłı̨chǫ. Fortune plans to attend career fairs, participate in classrooms, and develop relationships with schools. Summer employment will be offered to young people as well as work terms, and apprenticeship and training opportunities.
- Fortune will contribute to student achievement awards.

The possibility of well paying jobs should provide some incentive for students to remain in school and graduate. It may also provide additional incentive for further education such as a trade or university degree. The aim is to fill as many of the skilled positions and semi-skilled positions as possible with Aboriginal and northern workers during the NICO Project. Unskilled workers will receive on-the-job training to bring them up to an acceptable productivity level. As vacancies in skilled and semi-skilled positions occur, concerted efforts will be made to fill these positions with northern Aboriginal workers. While high school graduation or a General Equivalency Diploma are the minimum qualifications for entry level (unskilled jobs) for construction and operations, Fortune will consider the experiences of individuals not meeting minimum education requirements for entry level positions on a case-by-case basis.

16.2.7.2.3 Alcohol and Drug Access and Use

Communities in the LSA are concerned that the NICO Project will lead to increased access to alcohol and drugs and related social problems (e.g., family violence) (MVRB 2009b). Scoping session participants in Behchokǫ̀ stated that the Tłı̨chǫ need to address their existing social problems before approving new projects (MVRB 2009c). Increased road access is a concern to Whatì and other alcohol-free communities in the LSA. Concerns may also exist that workers flying in from other communities may not be respectful of the community prohibition of alcohol.

Lifestyle choices are largely individualistic, although they are influenced by internal and external factors (e.g., income availability, family and community support, the work environment, and options for study and training). They also depend to a large extent on historical patterns and culture. Substance abuse has been affected by several factors in the LSA and RSA for many years. Alcohol and drug consumption throughout the NWT was occurring before the existence of the diamond mines. Alcohol abuse has been in decline especially among Aboriginal males, although recent data is unavailable for drug and alcohol consumption. This consumption and substance abuse is anticipated to continue with or without the NICO Project, even if program interventions or other restricting factors are implemented. Additionally, substance abuse in the NWT will not disappear without dealing with related problems of poverty and homelessness.

Fortune is committed to maintaining a drug-free workplace and promoting high standards of health and safety, and recognizes alcohol or drug dependency as a treatable condition. Several mitigation and benefit enhancement strategies will be implemented to reduce potential negative effects of substance abuse, as follows:

- Fortune will provide workshops on money management, alcohol and substance abuse, family adaptation, and coping mechanisms.
- Employees who suspect they have an alcohol or drug dependency will be encouraged to seek advice and to follow appropriate treatment promptly before it results in job performance problems. Medical staff will advise and assist in securing treatment.
- Fortune will conduct “for cause” testing; circumstances might include such things as reasonable suspicion that an employee may be in violation of the policy, reports from any witnesses, bizarre, unsafe, or threatening behaviour on the employee’s part, or involvement in a work-related accident.
- No employee with alcohol or drug dependency will be terminated due to the request for help in overcoming that dependency or because of involvement in a rehabilitation effort; however, an employee who has had or is found to have a substance abuse problem will not be permitted to work in designated positions identified as being critical to the safety and wellbeing of employees, the public, or Fortune.

Due to its use of a strictly controlled camp environment, rotational work, and limited in-migration, the NICO Project is not anticipated to substantially increase drug or alcohol consumption, and other negative lifestyle choices. Even with these mitigation measures, some substance abuse can be expected to occur, particularly when an employee or contractor is off-site. This situation is not the responsibility of Fortune or within its power to prevent. Furthermore, Fortune acknowledges its need for the expertise of education, health, and social service workers and public programs in substance abuse efforts to assist in mitigating any negative outcomes. It also requires the support of the individuals involved, their families, and their communities. As such, Fortune will work

with LSA communities to develop and implement strategies to limit negative health outcomes such as increased alcohol and drug consumption.

16.2.7.2.4 Sexually-transmitted Infection Rates

As indicated earlier, over the past decade, sexually transmitted infections have gone up in the NWT, including in Yellowknife and small local communities. The LSA demographic makeup, such as a major influx of new residents, is not expected to change as a result of the NICO Project. Contact between employees from outside the NWT and local staff and contractors will be limited to the mine site. This suggests that the potential for any increase in sexually transmitted infections will be limited. Nevertheless, employees, contractors, and their families will not be immune to mistakes. Similar to controlling or reducing substance abuse, the responsibility for controlling the spread of sexually transmitted infections must be shared by the community, including individuals, families, the departments of Health and Social Services and Education, and all employers operating in the LSA. The NICO Project is anticipated to have a negligible to low effect on sexually transmitted infections in the LSA.

16.2.7.2.5 Crime Rates

Mining has brought jobs and increased incomes for residents of Tłı̨chǫ communities, leading to a greater quality of life for many residents. Increases in crime incident rates have also been accompanied by a period of increasing mineral exploration and deposit appraisal activity in the LSA.

It is unclear if this increased disposable income has also led to an increase in crime. According to the RCMP, for example, crime in Behchokǫ̀ has been a problem for many years, and mining jobs themselves may not have contributed to it (D. McLeod, Behchokǫ̀ RCMP, 2010, pers. comm.). What has been challenging for some residents, however, is the added financial responsibility that comes with steady employment and high incomes. Some of the hard drug (e.g., crack cocaine) and gang problems experienced in other Aboriginal communities (e.g., reserves) in Canada have not been felt to the same degree in Behchokǫ̀, and the prisoner count has been dropping over the past few years (D. McLeod, Behchokǫ̀ RCMP, 2010, pers. comm.).

Increased access to money has aggravated addictions and strained family structures. Income-earners must often work outside their communities for employment in resource extraction. Through participation at the mine, the income earned will continue to make drugs and alcohol more affordable. As indicated earlier, increasing crime rates (including violent crime) in the NWT and in smaller communities are affected, among other factors, by the prevalence of alcohol and drug use. The time away from home as a result of rotational work will reduce parental care, which could result in youth getting into more trouble. Thus, it is likely that crime will be adversely influenced from the NICO Project and other developments to some extent. Still, the close proximity of the NICO Project to the Tłı̨chǫ communities may have a positive effect on increased contact with other family and community members who are employed at the mine site, allowing for greater parental supervision compared to mines in other areas located farther away. This could have are effect of reducing crime, especially considering that young males are responsible for at least some of the recent spikes in crime rates in Behchokǫ̀.

While Fortune has limited or no control over crime rates off-site, in working with community leaders and government health and education officials, Fortune hopes to mitigate these potential negative outcomes. As a part of its interest to see the LSA communities prosper, Fortune will continue to engage with the communities and their leadership throughout the operational LOM. Sponsorship of community events and promotion of activities will improve life for community members. Fortune believes that its role in helping to bring greater health

and vibrancy to the LSA is their best approach to mitigating negative social outcomes, which includes the rate and severity of crime.

16.2.7.2.6 Access to Childcare

An important barrier for women who are the primary care givers entering the workforce is the inability to secure appropriate childcare. A 2 week in and 2 week out work roster is the norm for construction and operations in the NWT mining sector. As well as having a house sitter for 14 days, there is the issue of finding suitable childcare on a 24-hour basis. Some mothers have close bonds with their children and are unable to emotionally relinquish their care for 14-day periods. Many women also provide care and support for family elders, which may preclude them from leaving home for any length of time. Although explored by several companies, it has not been feasible to establish childcare at remote work camps due to the high risk for small children with health issues should they need immediate medical attention. Often weather may impede immediate transportation for a small child who needs advanced medical care.

Several known mitigation and benefit enhancement strategies will be implemented to reduce potential negative effects of limited access to childcare and to maximize women's participation in the NICO Project, such as the following:

- The potential for shorter shift rotations due to the proximity of the site to some LSA communities may offer more opportunities for women with young children to enter the workforce.
- Potential exists for secondary employment that may be generated in the communities themselves as a result of the NICO Project; this possibility may add flexibility for women to enter the workforce.
- Fortune will develop a strategy directed at women to create more opportunities or remove barriers to women working at the site.

16.2.7.2.7 Language Retention and Other Key Indicators of Cultural Maintenance

The traditional cultural environment is changing, but not to the extent that was anticipated at the onset of diamond mining in the 1990s. For example, one highly anticipated change was Aboriginal languages. The decline in the use of Aboriginal languages in the NWT was expected to worsen with the arrival of the diamond mines. Although in decline overall in the NWT, Aboriginal language loss has been slowing and may actually be increasing in use in certain regions, at least as a second language. Most students from kindergarten through grade 9 in the NWT have access to Aboriginal language programs, averaging 2 hours weekly of instructional time. Some high schools offer credit courses in these languages (GNWT Department of Education, Culture and Employment 2007).

As mentioned above, while the NICO Project will necessitate the use of English in the workplace, the NICO Project cannot directly influence the continued use of traditional languages at home or at school. Continued use of traditional languages in communities is not a direct function of the presence of the NICO Project. The use of traditional languages can be encouraged through a cultural awareness program. As a result, the NICO Project is expected to have only a minor and negligible effect on the use of traditional languages.

Although language is a secondary pathway and not carried through the effects assessment, mitigation measures for language retention and other key indicators of cultural maintenance have been developed, and include the following:

- Fortune will make every effort to support the culture and language on the worksite, including offering cultural sensitivity workshops, which will be done in collaboration with the Tłı̨chǫ.
- Any Tłı̨chǫ employee who does not have knowledge of the English language, either written or verbal, will be given reasonable opportunities, where the lack of language does not compromise the safety of the individual or of others or work performance.
- Tłı̨chǫ speaking counsellors will be hired for employees and their families, and translation of policies and important documents to Tłı̨chǫ language will be done, where feasible.
- Through policy development and practices, Fortune will also be sensitive to the culturally-extended family kinship ties; in other words, absence from the site for cultural or family needs will be considered on a case by case basis.

16.2.7.2.8 Community Cohesiveness and Pride in Cultural Identity

Traditional cultures in the NWT and LSA have been based on the land (see Section 5; Annex B). Strong family ties and commitments may preclude individuals from leaving their communities, either for further education or employment. Remote mine sites where employees have to commute and are absent from their families for extended periods of time (rotations) can be challenging; many Aboriginal people are experiencing pressure from young children and increasing responsibilities for elder family members.

Another issue that may potentially erode community cohesiveness and cultural pride is in-migration by new workers and contractors at the mine site. As already discussed, the anticipated influx of workers into the NWT has not occurred to the extent predicted with the first diamond mines. In general, most community members involved in mining are not leaving the NWT or even their home communities in many cases; proximity to family has been expressed as a reason to stay in their communities (NWT Bureau of Statistics 2009d). It is still felt, however, that cultural interactions at the worksite may introduce alternative worldviews and values. A continued struggle exists to preserve the traditional Aboriginal culture and to manage in a culture that has different values. While at the mine site, workers from the LSA will be exposed to other ideas and influences and new friendships will be cultivated. These influences may mean that a worker's social networks are changed and the community member behaves differently when back home. This may have the same effect as an influx of new workers into communities, as it introduces all mine employees to different worldviews and ways of living. This interaction also has the potential for benefits; for example, non-residents may introduce new ways to protect the environment.

While Fortune does not have responsibility for choices made by mine employees when back in their community, it can and does require that employees take cultural awareness and cross-cultural training. The importance of cultural factors has been learned through the experience within the mining industry over the past 15 years. It is more clearly understood how this may affect Aboriginal employee retention.

Fortune will take the following specific mitigation steps to reduce negative effects related to cultural interactions and to enhance links to community to the extent possible:

- through its employee benefits package, offer counselling and mentoring to employees who pursue it;
- allow employees to continue speaking their traditional language on-site if it does not pose a health or safety issue;

- provide quality accommodations for permanent employees on-site with individual rooms for quiet and privacy;
- provide quality food services with nutritional food, with options that will include country food, if feasible;
- provide communication links for employees to maintain relationships with their families while at site, such as telephone and internet; there will also be cell phone satellite coverage;
- provide indoor and outdoor recreation and leisure options on-site for a relaxing and healthy lifestyle while away from home;
- provide a family and employee assistance program should they encounter stress associated with their work or other family concerns, including relationships, family, youth, and elder care;
- hold annual open house days; community members and employee families will be invited to visit the site and see where people work;
- provide workshops on money management, alcohol and substance abuse, and family adaptation and coping mechanisms;
- provide cultural sensitivity training to all employees to reduce work-related stress in a cross-cultural work environment; and
- offer a volunteer incentive, which employees can apply for; these will be provided to those employees interested in volunteering their time for social or cultural programs or activities in their home communities.

16.2.8 Effects to Public Safety

The TOR request that Fortune provide details on potential impacts on public safety, especially in regards to the use of the NPAR and the proposed Tłı̨chǫ Road Route. Identification of mitigation to minimize the potential for vehicle accidents is also required. Details on public safety issues and assessment of effects have been provided in Section 17: Accidents and Malfunctions. Some of this information is summarized below.

Truck accidents on the local roads could result from vehicle factors (e.g., inadequate maintenance), driver factors (e.g., fatigue), and environmental factors (e.g., road conditions). A truck accident could lead to an off-site spill affecting the environment or a casualty collision (i.e., injury or fatality) affecting public users of the road. The likelihood of a transportation hazard scenario is estimated based on the exposure (vehicle kilometres travelled over a time period) and accident rates (collision rates, spill rates).

During construction, the trucks will travel about 100 km of the existing Whatì and Gamètì, or Tłı̨chǫ winter roads and about 10 km of the proposed NPAR. The transportation risk can be described using baseline historical data for the existing roads. NWT Department of Transportation (DOT) publishes annual reports on transportation statistics, including data on traffic volume (DOT 2009), collisions (DOT 2010), and spills (DOT 2007), for NWT highways and roads. NWT Environment and Natural Resources (ENR) also maintains a separate database on spills (ENR 2005, internet site). Two injury collisions and 4 spills were recorded on the Whatì and Gamètì winter roads between 2000 and 2009.

Although the historical spill and injury collision rates are incomplete, the available information suggests that they have been historically low. The NICO Project truck traffic will represent a minor increase in traffic compared to

the baseline. The highest increase is anticipated at Highway 3, KM 175, because of its low baseline traffic volume. The increase due to NICO Project truck traffic at this location is estimated to be about 5% during construction and 3% during operation.

Several mitigation measures will be considered to reduce the risk of accidents and improve public safety, including the following:

- offering driver training for truck drivers;
- making road improvements (if determined to be necessary) on the NPAR;
- applying and monitoring strict controls on speed limits;
- advising communities about approximate time trucks will be passing;
- minimizing commuter traffic, especially at night;
- implementing contingency and emergency response procedures, including for spill clean-up and medical emergencies, to reduce the consequences of an accident; and
- using only transportation contractors with proven safety records.

The mitigation measures applied for the local roads will also be applied to the regional highways. The transportation contractors are expected to perform better than average road users given the planned mitigation measures; thus, the injury, fatality, and spill rates are expected to be lower. If used, the existing winter roads will go over a number of lakes and streams, including the Marian River; however, frozen conditions will facilitate clean-up, use of the Proposed Tłı̨chǫ Road Route would eliminate the potential for spills on lakes. The following results from the accidents and malfunctions assessment (Section 17), using the NICO Project Risk Matrix, are provided as follows:

- The estimated likelihood of a truck accident on the regional highways leading to public injury is likely, but the public safety consequence is assessed as low; therefore, the level of risk to public safety is estimated to be moderate.
- The estimated likelihood of a truck accident on the regional highways leading to public fatality is unlikely, but the public safety consequence is high; therefore, the level of risk to public safety is estimated to be high.
- The estimated likelihood of a truck accident on the regional highways leading to spills affecting the environment is possible. The environmental consequence is low; therefore, the level of risk to the environment is estimated to be moderate.

Although the public safety consequence for a public safety consequence is high, this reflects the existing regional and national fatality rates for similar highway and air transportation activities. The residual risks for all hazard scenarios are expected to be acceptable within Territorial and Federal standards (Section 17).

16.2.9 Economic Effects from Closure

The TOR request that Fortune discuss any plans, strategies, or other commitments to help potentially-affected communities avoid over-exposure to cyclical economic fluctuations, with a focus on the following:

a) potential social and economic effects of mine closure (including unforeseen early closure or project hiatus) on potentially-affected communities and the Wek'èezhìi Settlement Area; and

b) any plans to assist post-closure transition for mine employees.

On the first point, early closure would shorten the productive LOM, although project hiatus could extend it. In either case, the operational benefits in terms of jobs and revenues would be reduced. Closure (decommissioning and monitoring) would accrue to the NWT earlier than planned. Potentially-affected communities will find themselves without a major employer following 2 years of reclamation and closure. This will introduce a period of transition, but should not be a period of hardship if the communities have been successful in increasing their resilience to economic change. An important factor will be what other opportunities are ongoing at the time, and whether any new opportunities have surfaced in the later years of the NICO Project's life. With the Mackenzie Valley Gas Project and several other mining and other resource development projects underway or planned in the RSA, there are several economic prospects over the long-term. These additional opportunities will be able to provide alternatives for potentially-affected communities to transfer their skills and experience obtained on the NICO Project.

Fortune understands that an important part of integrated closure planning must be transparency about its closure plans for the NICO Project, including unforeseen early closure or project slowdowns or stoppages. Sudden mine closures due to market fall downs or other reasons can be very disruptive to local communities. Consequently, advance notices about closure and other preparatory steps can help the government and local communities prepare better. Fortune intends to maintain its relationships with the LSA communities throughout the NICO Project. Management and other key personnel will continue to work closely with the communities as the NICO Project unfolds. On-going dialogue with potentially-affected communities and others will be held for a mutual understanding of the closing out phases and timing. Fortune will do its part to help the potentially-affected communities and the Wek'èezhìi Settlement Area become more resilient to outside change. Communities which can cope with and ultimately benefit from economic and social change will be better prepared to deal with the eventual mine closure, including unforeseen early closure or project hiatus.

As such, the entire mitigation strategy (with corporate commitments are summarized in Section 1, Appendix 1.III) is a plan designed to deal with what comes next for potentially-affected communities when the NICO Project ends. Increasing financial wealth, higher levels of education and skills training, enhanced business practices, and additional infrastructure will ultimately leave the LSA in an improved position compared to today.

To help potentially-affected communities adjust to economic fluctuations, including unforeseen early closure or project hiatus, and to assist the post-closure transition for mine employees, Fortune commits to the following measures:

- design and implement a targeted communications strategy, including a Media Management program, for an effective, on-going community consultation and engagement process (see Section 16.2.13);
- regularly meet with different business, educational, civil, and local government organizations to begin and/or maintain 2-way communication, including providing information on and discussing the NICO Project operations, lifecycle, and closure plans;
- hold company-community meetings with all 3 levels of government (community, territorial, federal), and build consensus through meaningful discussions that foster trust and collaboration;
- support sustainable communities to the extent possible by investing in communities and employees;

- improve employee and business capacity building through continued training and transferable skills development;
- develop a Human Resources Closure Plan and a Sustainable Development Strategy.
- form a mine closure committee during operations. The committee will consist of staff and employees, with responsibilities that include how to best support employees with mine downsizing and eventual closure. This committee will also deal with any issues related to unforeseen early closure or project hiatus; and
- establish a transition centre with the following tasks and objectives:
  - maintain a database of all employees and their respective skills and training;
  - provide access to government programs for further training or for Employment Insurance;
  - arrange financial planning and employment information sessions for all employees;
  - help with resume writing, job searching, and job interviewing skills;
  - contact other mining companies to recommend employees and contractors to other projects; and
  - involve all potentially-affected communities in the process.

16.2.10 Residual Effects Summary

The above analysis for the SON: Human Environment shows that the NICO Project offers many direct and indirect economic, social, and cultural benefits to the NWT. Although it is not a large development compared to the 3 existing diamond mines, the NICO Project will contribute overall to the labour, financial, physical, human, and social resources of both the NWT and the potentially-affected communities. Benefits will accrue notwithstanding various employment and contracting barriers, which include, among others, employability, availability, education and skills, advancement, retention, women, criminal records, and drug and alcohol use. Overall, the NICO Project will have few adverse effects on population (e.g., in-migration), business capacity, or public infrastructure and services. With the proposed mitigation measures as outlined throughout Section 16.4, most negative economic, social, and cultural effects from the NICO Project will be reduced to negligible levels.

On the economic side, the NICO Project will increase employment, personal income, business revenues, and tax revenues to all levels of government. In general, it will increase the amount of money flowing throughout the LSA through additional wages and business activities, with secondary benefits, such as improved public infrastructure and consumer spending. It will add value to the GNWT through personal, corporate, and payroll taxes, and add to the territorial GDP. Direct payments to affected groups such as the Tłı̨chǫ communities will also add to the economy. Revenues will be generated through employment, and provision of goods and services will give increased benefit. Increased (induced) spending by wage earners and businesses is also expected, which will help distribute some of the economic benefits, although most of this additional spending will be concentrated in Yellowknife due to the scarcity of retail stores in the smaller communities.

Some revenue leakages will occur; for example, some jobs and other financial benefits associated with concentrate processing will leave the NWT to the Saskatchewan Metals Processing Plant. Also, many workers will be hired from outside the NWT due to a labour shortage (i.e., trained mine workers). Alternatively, as some of the existing mines begin to wind down over the next few years, some experienced workers will be able to shift to the NICO Project. It is expected that some of these workers will be from the potentially-affected communities.

On the social side, the NICO Project is expected to contribute social benefits with increased labour force participation, especially for those potentially-affected communities closest to the mine site. Location of the NICO Project is a substantial benefit to the Tłı̨chǫ communities and even to Yellowknife. Since the closure of the Giant and Con mines, which were close to Yellowknife, other mines in the NWT have not been located within short driving distance to nearby communities. Since flexibility with shift rotation and time for cultural traditions will be considered for reasons related to this proximity, some Aboriginal and northern residents are expected to benefit. More women will also be able to participate in the NICO Project due to its closeness to their home communities. Additional training will be available and this will create opportunity for residents to become more employable for this and other projects through increased skills and work experience.

Other economic and social benefits are expected. Improved and new road access in the area will give some residents better access to services and goods that previously were difficult to obtain, either by short-term winter road or by air. There will also be the possibility of regularly scheduled road transportation. Workers with more disposable cash will have the ability to purchase more amenities such as vehicles and recreational vehicles for pursuing traditional cultural activities, such as trapping and hunting. They may make improvements to their housing or the quality of food and clothing. Additional income and time off during the 2-week rest periods will also allow some workers from the communities to engage more in traditional activities, including hunting, fishing, and trapping.

For the most part, due to its small size and scale, the NICO Project will have limited effects on social and cultural VCs. The NICO Project is not expected to either substantially increase or decrease education levels or health and wellness indicators. As shown in the Communities and Diamonds reports (e.g., GNWT 2008a; 2009a) and other reports and statistics, some of which were described in the exisitng environment section, these indicators generally have been improving since the first diamond mines began (e.g., higher incomes, more employment, less crowding in houses) While not all communities have experienced the same level of educational achievement, improved health, or reduced crime rates, for example, progress has been made overall in almost all of these areas.

16.2.11 Residual Impact Classification and Significance

The purpose of the residual effect classification is to describe the residual effects from the NICO Project on socio-economic and cultural VCs using a scale of common words, rather than numbers or units. The use of common words or criteria is a requirement in the TOR (MVRB 2009a).

16.2.11.1 Methods

The term “effect,” used in effects statements, has been changed to “impact” in this section on Residual Impact Classification. The term “impact” is only used during the classification process. Therefore, in the Residual Impact Classification section of the DAR, all residual effects are discussed and classified in terms of impacts to VCs.

Generic definitions have been provided for each of the impact criteria in the Assessment Approach (Section 6). The scale of classifications (e.g., high, low, local, regional, short-term, and long-term) for magnitude, geographic extent, and duration is dependent on each VC, and the associated effects statement (Table 16.2-14). To provide transparency in the DAR, the definitions of these scales are specifically based on the human environment. Although professional judgement is inevitable in some cases, a strong effort was made to classify effects using scientific principles, supporting evidence, and a conservative approach where uncertainties exist.

Table 16.2-14: Definitions of Terms Used in the Residual Impact Classification of Socio-economic Valued Components

Direction	Magnitude (Negative Impacts)	Magnitude (Positive Impacts)	Geographic Extent	Duration
Negative: A less favourable change relative to baseline values or conditions. **Positive:** An improvement over baseline values or conditions.	**Low:** The change to the VC has no impact on the socio-economic environment beyond that of a nuisance (annoyance) value. **Moderate:** The change to the VC modifies the socio-economic environment, but there is no deterioration in the system. **High:** The change to the VC is large enough to result in a severe deterioration of processes in the socio-economic environment.	**Low:** The change to the VC has a slight but discernible positive impact on livelihoods and socio-economic development. **Moderate:** The change to the VC creates a noticeable increase in opportunities for improving livelihoods, and enhancing socio-economic conditions. **High:** The change to the VC alters the opportunities for livelihoods and socio-economic development to the extent where the sustainability of the system is considerably improved.	**Local:** The impact will affect one more of the communities in the LSA. **Regional:** The impact will affect communities within and beyond the boundaries of the LSA, but within the RSA. **Beyond Regional:** The impact will extend beyond the Northwest Territories.	**Short-term:** The impact can be reversed at the end of construction. **Medium-term:** The impact can be reversed during different stages of operations. **Long-term:** The impact is reversible after the operational life of the NICO Project. **Permanent:** The impact on the receiving environment is effectively irreversible.

LSA = Local Study Area; RSA = Regional Study Area; VC = valued components

For socio-economic measurement endpoints, which are also VCs, the scales for magnitude are qualitatively defined (Table 16.2-14). Three magnitude scales are separated into positive or negative impacts.

- Low Magnitude
  - Negative: The change to the VC has no impact on the socio-economic environment beyond that of a nuisance (annoyance) value.
  - Positive: The change to the VC has a slight but discernible positive impact on livelihoods and socio-economic development.
- Moderate Magnitude
  - Negative: The change to the VC modifies the socio-economic environment, but there is no deterioration in the system.
  - Positive: The change to the VC creates a noticeable increase in opportunities for improving livelihoods, and enhancing socio-economic conditions.
- High Magnitude
  - Negative: The change to the VC is large enough to result in a severe deterioration of processes in the socio-economic environment.
  - Positive: The change to the VC alters the opportunities for livelihoods and socio-economic development to the extent where the sustainability of the system is considerably improved.

The classification of residual impacts on the changes in measurement endpoints and associated primary pathways for each VC provides the foundation for determining environmental significance from the NICO Project on the socio-economic environment. Magnitude, geographic extent, and duration are the principal criteria used to predict significance (Table 16.2-14). Duration of impacts, which includes reversibility, is a function of socio-economic and cultural resilience, and these principles are applied to the evaluation of significance.

Classification of socio-economic residual effects and determination of significance generally follows the methods used for biophysical VCs; however, there are some differences in the selection and definitions of impact criteria. For socio-economic VCs, direction, magnitude, geographic extent, and duration are the criteria used to classify and evaluate the significance of impacts (Table 16.2-14). The assessment of significance considers the scale of these criteria (e.g., low magnitude, regional geographic extent, and long-term duration) and professional opinion, which is based on the context of the communities involved, and the informed value and judgements of interested and affected organizations and specialists. The assessment of significance also assesses the efficacy of the proposed environmental design features and mitigation (policies, practices, and investments) to limit negative impacts and foster positive impacts on the continued persistence of long-term sustainable social, cultural, and economic features of the environment.

Frequency was not considered (Table 16.2-14). For socio-economic conditions, the impacts are generally continuous; therefore, the criterion for frequency is typically not used. For positive impacts, reversibility is generally not desirable. Socio-economic impacts associated with a project are typically part of an ongoing process of interdependent economic and social change extending into the future, which generally cannot be

reversed to return to pre-project development conditions. In fact, it is usually not desirable because to do so implies job losses and other negative socio-economic effects. Consequently, the socio-economic manageability of potential effects is often considered rather than their reversibility, as few means exist to reverse social change that occurs as a result of a project.

Unlike the biophysical environment, the determination of significance from NICO Project impacts on the assessment endpoint for the socio-economic environment is completed on a subset of VCs (e.g., quality of life, employment, income, education, and community services), and typically, each VC is directly associated with an individual pathway (Section 6.6.3). Because people have an ability to modify the system across several spatial and temporal scales, each pathway can result in different levels of effects on individuals, communities, and the region. Consequently, it is more practical to independently classify and predict the significance of the impact from each pathway on a socio-economic VC than to classify the entire set of pathways and generate a single evaluation of significance on the socio-economic environment.

The following definitions were used to determine the significance of the impacts from the NICO Project on the subjects of note:

- **Not significant** - The impact is measurable at the individual, family, or community level, and strong enough to be detectable at the population level, but is not likely to result in substantial changes in the well-being of populations and communities.
- **Significant** - The impact is clearly distinguishable from baseline conditions and results in strong interest or concern, and/or results in substantial changes in the well-being of populations and communities.

In summary, the following information is used in the evaluation of the significance of incremental and cumulative (if applicable) impacts from the NICO Project on VC assessment endpoints:

- results from the residual impact classification of primary pathways;
- magnitude, geographic extent, and duration of the impact as principal criteria, with likelihood as a modifier; and
- application of professional judgment and understanding of social, economic, and cultural principles and mining effects on communities and regions.

16.2.11.2 Results

The results of residual impact classification and significance of primary pathways for incremental and cumulative changes to the human environment are discussed in 6 general categories: 1) Impacts to Employment and Business; 2) Impacts to Total Economic Activity; 3) Impacts to Public Infrastructure and Services; 4) Impacts to Health and Wellness; 5) Impacts to Public Safety; and 6) Economic Impacts from Closure (Table 16.2-4).

16.2.11.2.1 Impacts to Employment and Business

The NICO Project will have a positive impact on employment and business levels, as well as labour income. It will increase local and regional employment, including up to 133 annual FTEs during construction, up to 233 annual FTEs during the Underground phase, and up to 127 annual FTEs for the rest of the operations. Many of these will be filled by already trained workers from other mines, but first preference for hiring will go to the Tłı̨chǫ communities and other Aboriginal communities.

The long-term impact of the NICO Project on local (LSA) businesses also will be positive. Over the past decade, LSA businesses have adjusted their practices and human resource policies to attract and retain staff. The NICO Project will allow businesses to continue and even expand their operations. The NICO Project will also create several jobs and contracts that could be taken up by NWT residents. From a skills and experience gained perspective, the NICO Project's contribution to the labour force will last beyond the LOM. Other opportunities in the mining and oil and gas and other sectors in the NWT would likely absorb a skilled workforce.

The present labour supply, however, is not large enough to be able to accommodate most of the employment and contracting opportunities. New positions for LSA community members not already working in mining are anticipated to comprise a minor percentage of the construction and operational workforce. It is highly likely that workers from other parts of Canada also will be employed by the NICO Project, especially during construction. Through strong management practices that support local hiring, Fortune's hiring goal is that regional (NWT) or northern participation could grow to 50 to 60% of all operational jobs associated with the NICO Project; another hiring goal is that 30 to 50% of these jobs are taken by Aboriginal residents.

In summary, the likely impacts on employment and business opportunities are positive and of low to moderate magnitude, and will vary over the LOM. The positive impact of direct employment will be medium-term as the jobs and contracts, and their associated wages and salaries, will end upon mine closure. This impact is considered to be not significant due to the few additional employed workers and contractors that the NICO Project will hire from the LSA, particularly the smaller communities. Likelihood is considered to be high.

From a cumulative impacts perspective, due to its proximity to several mining and other existing and reasonably foreseeable developments in the LSA and RSA, the NICO Project will benefit local communities for employment and business opportunities. There will be continued employment for people already in the workforce and new employment opportunities for those not in the workforce. This geographic diversification also spreads the wealth of economic growth to regions that have not had a large presence in the mining sector. This should also reduce income disparity across the NWT and lower the cost of social services in these newly-impacted regions.

16.2.11.2.2 Impacts to Total Economic Activity

The NICO Project will have a positive impact on economics through an increased tax base and GDP. It will add value to the GNWT through personal, corporate, payroll, and other taxes and payments. Direct payments from an IBA to the affected groups such as the Tłı̨chǫ communities will add to the LSA and NWT economy. The economic effect of additional revenues for the LSA and NWT over a 1-year construction period and an 18-year operations period is substantial.

The territorial GDP and government revenues (taxes, royalties) will increase as a result of the NICO Project.

- During construction the NICO Project will annually add about $22 million to the territorial GDP and $8 million in federal and territorial government revenues.
- Total GDP for the construction phase will amount to about $22 million ($17 million direct).
- During the 2-year Underground and Open Pit mining operations period, the NICO Project will annually add about $113 million to the territorial GDP, and $24 million in federal and territorial government revenues.
- During the 16-year Open Pit mining operations period, the NICO Project will annually add about $129 million to the territorial GDP, and $21 million in federal and territorial government revenues.

- Total GDP for both operations phases will amount to about $2.3 billion ($1.9 billion direct).
- Annual mining royalties will amount to $5.4 million, accumulating about $99 million over the operational LOM.

The residual impacts of the NICO Project to taxes and GDP are predicted to be positive and of moderate magnitude in terms of its contribution to government revenues in the RSA. This impact is considered to be significant, and beyond regional. Once the NICO Project concludes, however, these benefits will come to an end; thus, the economic impact will be medium-term. Likelihood is considered to be high.

From a cumulative effects perspective, the economic impact of the NICO Project will be positive, and likely significant as well. As the other mines move towards the end of their life within the next 10 years, an economic slowdown may result in the NWT. The primary direct effect of new developments such as the NICO Project and the Mackenzie Gas Project will be the extension of industrial activity in the NWT. In general, economic development in the region is increasingly being planned in a context of improved understanding of effects, respect for Aboriginal culture, community self determination, sharing of industry learning and resources, and improvement of government services. The capacity to increase non-renewable resource extraction benefits to potentially-affected communities increases with every project proposed and developed, including the NICO Project. The experience of workers and businesses in the study areas with meeting requirements for this and other projects should particularly enhance Aboriginal capacity to realize economic benefits over time including experience that can be put to use in other parts of the economy as well.

16.2.11.2.3 Impacts to Public Infrastructure and Services

The NICO Project may increase demand for public infrastructure such as road access and for public (social, financial, and protective) services. The latter may result from expenditure of employment income on unhealthy or unsafe lifestyle choices by some individuals. The environmental design features for the NICO Project, however, will reduce costs and demands on infrastructure and services, including any increased demand on social services from possible in-migration (anticipated to be limited). The increased public infrastructure in terms of road improvements will benefit the LSA by facilitating movement of people and materials. This effect will be medium-term to long-term in duration.

The NICO Project will have a small measurable residual impact on in-migration, which may increase costs to build and maintain public infrastructure and services. It will also add some costs to the government to upgrade infrastructure and to monitor and regulate the NICO Project. The positive impacts of new infrastructure, however, will outweigh these negative aspects since the GNWT will be collecting significant revenues from the NICO Project.

As for the potential for increased demand for public (social, financial, and protective) services, Fortune will implement several policies and programs to mitigate this risk. Examples include financial management workshops for workers and their families, workshops on alcohol and substance abuse, and family adaptation and coping mechanisms, health and safety training, and the Employee and Family Assistance Program to support all employees when working at the mine site. These practices and policies will serve to reduce negative effects, including the demand for social, financial, and protective services.

In summary, the NICO Project will have a mainly positive (but also negative) impact on public infrastructure and services of low magnitude due to the proposed mitigation measures. This impact will be medium-term since it

will likely end when the NICO Project is completed. Some of the improvements to public infrastructure; however, such as the NPAR, may continue post-closure. After the closure phase (approximately 5 years after mine operations have stopped), the NPAR and Airstrip (if built) will no longer be required for the NICO Project. Fortune will offer the NPAR and Airstrip to the Tłįchǫ Government. If not wanted, then these facilities will be closed and reclaimed by Fortune. This impact is considered to be not significant, and likelihood is considered to be high.

From a cumulative impacts perspective, the NWT continues to expand and improve its public infrastructure and services, including roads and airports, to meet the demand of expanded economic development. Very moderate demographic growth is also driving the need for infrastructure and services. The Taltson Hydroelectric Expansion Project, if constructed, will increase power supply in the LSA and RSA. Other proposed mines in the LSA and RSA will add to existing road and air traffic, due to the transport of material and people to the project sites. Consequently, the NICO Project and existing and potential future projects are anticipated to have mainly positive and significant cumulative effects on public infrastructure and services.

16.2.11.2.4 Impacts to Health and Wellness

The health and wellness pathways are related to quality of life, and are discussed by corresponding category.

Increased family and disposable income: Labour income for all employees and contractors will increase as a result of the NICO Project. During construction, the NICO Project will add a cumulative $20 million in new wages and salaries; during the first operations period (Underground and Open Pit), cumulative wages and salaries will amount to $45 million annually, and during the second operations period (Open Pit), these will amount to $24 million annually. Total cumulative labour income for the entire operations phase will amount to $479 million. For those who will work on the NICO Project, cumulative direct labour income for the construction phase will be nearly $17 million. Annual direct labour income for operations will amount to $30 million (Underground and Open Pit) and $13 million (Open Pit); cumulative direct labour income will be $275 million over the operations period.

These labour income amounts, while positive, are not large for an economy the size of the NWT ($4.1 billion in GDP in 2009). Moreover, some of this income will be spent outside the NWT given that some of the workers will only be temporarily migrating from outside the NWT to work on the NICO Project. That said, any labour income generated as a result of the NICO Project will be meaningful to families and businesses in the LSA, which have come to depend on higher incomes compared to 20 years ago.

As a result of the increased labour income, the NICO Project is expected to increase family and disposable income in the LSA and NWT. Likewise, the NICO Project may continue the trend of reduced need for social assistance and other government transfers as a result of stable, year round employment. As a result, with the identified mitigation practices and policies in place, the impact will be positive and of low to moderate magnitude. The residual impact of the NICO Project on increased family and disposable income is predicted to be not significant, and likelihood is considered to be high.

The cumulative effect of the NICO Project and potential future projects will be positive for increased lifestyle choices, due to the increase in family and disposable income from additional employment and contracting opportunities.

Temporary in-migration of workers: The NICO Project is not expected to have a large impact on in-migration, although certainly some people will move to the NWT as a result of the development. Some construction- and operations-related employment will go to local workers. Specialized skills and trades needed for NICO Project

construction may not be available in the NWT, and there may not be enough NWT labour for some job categories. As a result, some in-migration may also occur to the LSA and RSA, particularly for construction opportunities. The possibility of working in a mine near the community for an extended period, possibly even a career move, may be attractive for those who left the community for opportunities elsewhere. Employment and contracting opportunities may encourage people to relocate to Yellowknife, or more likely provide an incentive for departed people to return to their home base in the LSA, including the Tłı̨chǫ communities. It is possible that the most accessible community to Yellowknife, Behchokǫ̀, will receive some in-migration, mainly extended family members and friends; available housing is also limited for newcomers. Experience with existing mines demonstrates that while the possibility exists for local in-migration, it is typically on a small scale.

On the other hand, the NICO Project may increase lifestyle choices, including greater mobility, as a result of the incomes associated with employment; consequently, some out-migration is likely. Likewise, most external full-time or temporary labour hired for the NICO Project will likely not remain in the NWT. Transportation of these and other staff between the mine site and LSA communities will be the responsibility of Fortune.

Given the limited accommodation in the Tłı̨chǫ communities and the fact that these communities consist mainly of the Tłı̨chǫ, it is unlikely that non-Tłı̨chǫ people will take up residence. The camp at the NICO Project work-site is also meant to reduce the possibility of in-migration. Due to a strict camp work environment, the relatively small number of employees and contractors, and the limited availability of housing, the potential for in-migration is considered low. With the mitigation in place the impact will be negative and of negligible to low magnitude. The residual impact of the NICO Project on in-migration is predicted to be not significant and likelihood is moderate.

From a cumulative impacts perspective, both intra-regional migration and out-migration are expected to continue along with continued mining and other developments in the NWT, including the NICO Project. These projects will help prevent an exodus of residents from the LSA communities that would otherwise occur as a result of the Ekati and Diavik diamond mines slowing production, and eventually closing in 2021 and 2022, respectively. Diavik also plans to discontinue their open pit mining in 2012. It is assumed that some workers who are from the LSA communities may be able to transfer their skills and education to work on the NICO Project. With the timing of the downsizing of these labour forces, some skilled workers from the LSA will be available to transition to the NICO Project, particularly for the Open Pit phase of operations. This will relieve the potential unemployed workforce in the area by providing new work opportunities.

The addition of Nechalacho Project would likely have a similar cumulative effect on in-migration of workers since it is predicted to be similar in size to these other projects. The Yellowknife Gold Project is relatively small, compared to most other mining projects in the NWT with a 7-year operational LOM. Its effect would be centred on Yellowknife, N'Dilo, and Detah and would likely have a small effect on migration in these communities. It is not known whether the Damoti Gold Project would have a neutral or positive effect on overall migration. Its timing suggests it would have a positive effect, however, because its opening coincides with closures elsewhere.

Increased opportunities for education and training: The NICO Project is expected to increase demand for opportunities for education and training on NICO Project-related trades and careers. The NWT labour supply may be lacking for some job categories, since specialized skills and trades are needed for the NICO Project. The NICO Project will contribute to the growth of a skilled local labour force in the NWT. This may also increase community capacity as workers develop greater skills and education gained through employment and training opportunities from the NICO Project. Training and education opportunities could be taken up by Tłı̨chǫ community members and other Aboriginal and NWT residents.

On the other hand, many of the workers will already have the requisite education and training from their experience on other mines. Additional training will vary with the interest and existing skill base of the employees. The impact is permanent as the work experience and skills gained will be transferable to other projects and even other (non-mining) sectors.

With the identified mitigation practices and policies in place, the impact of increased opportunities for education and training will be positive and of low to moderate magnitude, due to the estimated low numbers of those to be trained through their work or other involvement with the NICO Project. The residual impact of the NICO Project on opportunities for education and training is predicted to be not significant, and the likelihood is considered to be moderate.

Given these mitigation steps, any potential positive changes on education and training from a cumulative impacts perspective will also be moderate. Increased education completion rates and improved skills will be transferable to other existing and reasonably foreseeable projects.

Reduced time in home and community: Several studies on the impact of rotational work in mining have been undertaken by mining companies and the GNWT. In all cases, support systems have been put in place to assist employees with the periods of adjustment. The surveys of mine employees in the NWT shows that they have adjusted to the rotation and that participation in the wage economy has allowed them to pursue activities on the land, such as hunting and fishing, which they might not have been able to do without wage employment.

The NICO Project is expected to lead to some reduction in family activities and participation in community activities, due to people working long hours away from home. Working in a mine camp can be stressful due to the long distance to travel to and from home, and the time spent away from one's family and community. Mining is generally male-oriented and the rotations make it hard for women to work. Nonetheless, major changes are not expected to the typical rotational schedule for mining projects. These rotations appear to offer the best alternative for community members in the LSA who are already working or desire to work in mining. On the positive side. during time away from work, the 2-week period offers the worker time to engage in traditional activities such as hunting, fishing, and trapping and participate in family and community matters of social and cultural value.

With the identified mitigation practices and policies in place, the impact of reduced time in the home and community will be negative but of negligible to low magnitude. The residual impact of the NICO Project on reduced time in the home and community is predicted to be not significant, and the likelihood is considered to be moderate.

Reduced use of traditional languages and other cultural indicators: The pathways analysis raised the possibility of language being lost and other negative effects to cultural identity and cohesiveness as a result of employment with the NICO Project. The NICO Project may affect the continued use of traditional languages and other indicators of cultural maintenance. As discussed, traditional language loss has occurred, but not to the extent predicted when the diamond mines began.

Based on these observations and the mitigation proposed by Fortune, such as encouraging use of traditional languages at the worksite, when safe to do so, the NICO Project will have a negative effect of negligible to low magnitude. The residual impact of the NICO Project on traditional languages and other cultural indicators is predicted to be not significant, and the likelihood is considered to be moderate.

16.2.11.2.5 Impacts to Public Safety

The public safety pathway is related to increased traffic and associated risk of accidents. Increases in traffic may cause an increase in the risk of accidents. Through co-ordination with the GNWT and the LSA communities on traffic issues, and other mitigation policies, such as speed limit monitoring, driver training, and reducing commuter traffic at night, this risk should be minimized.

With the identified mitigation policies and practices in place, the impact of traffic and associated risk of accidents will be negative but of low to moderate magnitude. The residual impact of the NICO Project on impact of traffic and associated risk of accidents is predicted to be not significant, and the likelihood is considered to be moderate.

Concerning the cumulative impacts on public safety, as discussed above, the NWT continues to expand and improve its public infrastructure and services, including roads and airports, to meet the demand of expanded economic development. Other proposed mines and developments in the LSA and RSA will add to existing road and air traffic, due to the transport of material and people to the project sites. Additional traffic related to the NICO Project will add to cumulative effects of an increase in the risk of accidents. With appropriate mitigation measures, however, this risk should be minimized. Consequently, the NICO Project and existing and potential future projects are anticipated to have mainly negative impacts due to increased traffic and associated risk of accidents. This risk is predicted to be not significant, and the likelihood is considered to be of low to moderate magnitude.

16.2.11.2.6 Economic Impacts from Closure

The final pathway for socio-economic aspects of the human environment assesses closure and post-closure (including unforeseen early closure or project hiatus) of the NICO Project on social and economic impacts. As assessed in this section, employment and revenues will continue to accrue over the closure and post-closure period as mine decommissioning, reclamation, and monitoring jobs continue, although a much reduced scale compared to the operations phase.

During the closure phase, the NICO Project will provide up to 150 FTEs within the NWT, and many of these jobs will go local contractors. Cumulatively (over 20 years), almost $17 million will be added to the territorial GDP, including over $9 million in new wages and salaries. An additional $5 million in federal and territorial government revenues will be generated.

Besides these closure and post-closure economic benefits, the advantage of the NICO Project is that it will extend opportunities for local workers and contractors into the 2030s, and will help mitigate against job and contract losses as other mines begin to shut down in the 2020s. The skills and experience gained by those employed on the NICO Project will help offset the negative socio-economic effects which will be experienced by closure and post-closure (including unforeseen early closure or project hiatus) of the NICO Project.

Nonetheless, jobs and income earned during the closure and post-closure period will be substantially reduced compared to operational levels. Further, any slowdown or unforeseen early closure would also create some negative impacts on smaller communities in the LSA. With the identified mitigation policies in place, the impact of closure and post-closure will be negative but of low to moderate magnitude. The residual impact of the NICO Project on impact of closure and post-closure is predicted to be not significant, and the likelihood is considered to be moderate.

A summary of the residual impact classification and significance of primary pathways for the NICO Project is provided in Table 16.2-15.

Table 16.2-15: Summary of the Classification and Significance of Incremental and Cumulative Residual Impacts on the Socio-economic Environment

Pathway	Direction	Magnitude		Geographic Extent		Duration	Significance	
		Incremental	Cumulative	Incremental	Cumulative		Incremental	Cumulative
Increased tax base and gross domestic product	positive	moderate	moderate	beyond regional	beyond regional	medium-term	significant	significant
Increased employment and procurement levels	positive	low to moderate	low	beyond regional	beyond regional	medium-term	not significant	significant
Increased demand for public infrastructure	positive	low	moderate	local	regional	medium-term	not significant	significant
Increased demand for public services	negative	low	moderate	local	regional	medium-term		significant
Increased family and disposable income	positive	low to moderate	low	regional	regional	medium-term	not significant	not significant
Temporary in-migration of workers	negative	negligible to low	moderate	local	local	medium-term	not significant	not significant
Increased education and training	positive	low to moderate	low	local	local	medium-term	not significant	not significant
Reduced time in home and community	negative	negligible to low	low	local	local	medium-term	not significant	not significant
Reduced use of traditional languages and other cultural indicators	negative	negligible to low	low	local	local	medium-term	not significant	not significant
Increased traffic and risk of accidents (public safety)	negative	low to moderate	moderate	regional	regional	medium-term	not significant	not significant
Decreased jobs and revenues from closure/post-closure	negative	low to moderate	low to moderate	local	regional	medium-term	not significant	not significant

16.2.12 Uncertainty

The purpose of the uncertainty section is to identify the key sources of uncertainty and to discuss how uncertainty has been addressed to increase the level of confidence that impacts are not worse than predicted. Like all scientific results and inferences, residual impact predictions must be tempered with uncertainty associated with the data and current knowledge of the system. The baseline data are felt to be adequate for understanding current conditions and future changes not related to the NICO Project, and that there is a moderate to high level of understanding of NICO Project-related impacts on the human environment; however, there remains a degree of uncertainty surrounding the degree to which some effects may occur (e.g., magnitude and duration).

The following sources of uncertainty were considered in the analyses and predictions of socio-economic effects from the NICO Project.

- The socio-economic environment is influenced by many factors, including market and political (policy and program) changes over time, population changes and movement (in- and out-migration), anticipated infrastructure developments, and human initiatives in anticipating change. These factors influence the predictability of the outcomes of some of the effects of the NICO Project, and therefore, ultimately the effectiveness of mitigation programs and policies.
- As the socio-economic status of different communities, subpopulations, and individuals may vary, a socio-economic effect may have both positive and negative aspects. The level of uncertainty increases with each additional link (interaction) in a pathway.
- Maximizing skills development for employees required for the NICO Project cannot be predicted with high certainty. How many people will need to be trained or how effective the training will be is unknown. Programs need to address barriers to hiring and retention, such as training programs for LSA community residents and initiatives to support employment of women.
- The ability of individuals, families, and communities to cope with and respond to change differs and is influenced by a range of considerations often outside of the proponent's control. Consequently, mitigation is offered to increase the benefits to the population as a whole.
- Engagement with communities near the NICO Project is on-going. As these activities progress, additional concerns may be identified, which will be addressed at that time. Should new concerns be raised between the time of DAR submission and throughout the operational LOM, supplemental information will be provided.
- To accurately predict and effectively mitigate any socio-economic impacts on the VCs, the primary focus has to be placed on managing for potential effects over the NICO Project lifespan. Management of socio-economic impacts as a result of the NICO Project must include effective monitoring, responsiveness, and adaptability (adaptive management).

On this final point, the TOR requires that Fortune describe its adaptive management systems to deal with issues identified during monitoring. Adaptive management systems are needed where there is rapid knowledge acquisition, and the means are put in place to provide effective information flow and suitable processes for creating shared understanding and to facilitate adaptive learning. Fortune will incorporate knowledge from

multiple sources, make use of multiple systems models, and support new forms of cooperation among people interested in the NICO Project. Any opportunity for improvement will be acted upon accordingly. Fortune will liaise with relevant federal, territorial, and Tłı̨chǫ government agencies and relevant transportation, health, social, education, and other relevant regional agencies in the planning process and during construction and operations.

16.2.13 On-Going Engagement and Follow-up

Fortune has indicated that the NICO Project will have a Closure and Reclamation Plan that considers the human environment. The principle of the Closure and Reclamation Plan is that there will be on-going dialogue with people interested in the NICO Project to gain a mutual understanding of the closing out phases and the timing. Specifically, Fortune has indicated that there will be effective community consultation and engagement. The company will also meet with different business, educational, social, and local government organizations individually to initiate 2-way communication and provide information on the NICO Project's operations, lifecycle, and closure plans. Fortune will work to support sustainable communities as much as possible. Capacity building, training, and development will be designed for mobility. Employability will be a key element of the opportunities that are offered to employees or prospective employees.

As part of the closure planning, a closure committee will be formed in adequate time prior to closure to plan for some of the issues that employees would be facing because of the closure. The committee will consist, in part, of employees. Some of their key responsibilities will be to consider how to best support employees with the downsizing. A Transition Centre will be set up (specific location subject to negotiations with the Tłı̨chǫ) to include the following:

- create a database of all employees and their skills and training;
- practice interview skills;
- provide access to government programs for further training or for Employment Insurance;
- help transition employees to other mining projects;
- arrange financial planning and employment information sessions for all employees; and
- help with resume writing, job searching, and job interviewing skills.

Fortune has also stated that all communities will be involved in the process, that there will be meetings involving the communities with all 3 levels of government, and that there will be a building of consensus through meaningful discussions that foster trust and collaboration.

Fortune expects that Tłı̨chǫ communities will benefit from the economic and financial opportunities that the NICO Project will generate. Although the NICO Project will bring about changes to the socio-economic landscape of the region, most of these changes are anticipated to be positive. Through a strong and flexible mitigation strategy, the proceeds generated from the NICO Project's economic activities will leave LSA residents with a higher and more sustainable quality of life.

Fortune will try to increase participation over the LOM. No formal social-economic monitoring programs are proposed for the NICO Project. Fortune, however, will monitor the effects of its operations continually through its ongoing engagement with LSA communities, so that the information can be used to adjust policies, procedures,

mitigation and enhancement measures, and behaviours where deemed necessary. Results will also be discussed with nearby populations, as part of ongoing consultation and information exchange on the NICO Project.

Fortune has developed monitoring and management plans and policies as part of its commitment to on-going engagement and follow-up. These engagement and follow-up commitments are outlined below.

16.2.13.1 Human Environment Monitoring and Management Plans

The TOR require that Fortune describe any commitments, policies, and other strategies to engage with responsible authorities and potentially-affected communities in monitoring impacts on the human environment. As mentioned in the TOR, these can include the following:

- success of local and regional residents and Aboriginal people in gaining employment at the NICO Project, and the success of training initiatives;
- success of local and regional businesses in providing goods and services to the NICO Project, with identification of gaps to maximizing engagement;
- employee retention;
- worker and family wellness;
- the contribution of the NICO Project to beneficial and adverse social impacts at the regional and local levels across a spectrum of appropriate indicators to be determined in collaboration with Wek'èezhìi Settlement Area communities and government authorities; and
- impacts on wildlife harvesting and practice of traditional culture on the land.

These specific commitments, plans, and strategies from the TOR are discussed in the following subsections.

16.2.13.1.1 Income and Money Management

Mining has brought jobs and increased incomes to the community, leading to a greater quality of life for many residents. The added financial responsibility that comes with steady, high incomes has been challenging for some residents. Therefore, money management courses will be provided at the NICO mine site, and also offered in each Tłı̨chǫ community. Every employee will be on direct deposit to simplify their receipt of wages. To accomplish this, Fortune will assist every new employee in opening a bank account if they do not already have one.

16.2.13.1.2 Stress Management and Support Programs

The TOR requires that Fortune discuss the physical, mental, and cultural health of mine workers and mine workers' families, considering potential impacts of long-distance commuting and greater engagement in the wage economy based on a review of select and pertinent peer-reviewed studies and through key informant interviews with Wek'èezhìi Settlement Area residents currently working at mines in the NWT. The TOR also request that Fortune outline any community and family support programs.

While some issues are beyond the direct control of a mining company, Fortune recognizes that much can be done to liaise with employees and the LSA communities to reduce the negative effects of long-distance

commuting and shift rotations. The main strategy will centre on Fortune's Employee and Family Assistance Program, which will support all employees when working at the mine site. This program will be designed for those who encounter stress associated with their work or other family concerns including relationships, family, youth, and elder care. Consideration will be given to work with the provider to make available more Aboriginal speaking counsellors for employees and their families. Also, if an employee terminates their employment due to family or personal issues, Fortune will try to re-hire the employee after a reasonable period.

The NICO Project will also be providing transportation by road for the employees in the communities that are accessible by road (i.e., Whatì and Behchokǫ̀ early in the NICO Project and likely Gamètì later on as the road goes through to the community). This proximity to their home community will allow some employees to optimize family and cultural values important to them outside the workplace.

Other specific mitigation steps will be taken to reduce negative effects associated with long-distance commuting and stress management, and to support community and family relationships, including the following:

- Fortune will provide quality accommodations on-site with individual rooms for quiet and privacy.
- Fortune will provide quality food services with nutritional food in consultation with the employees.
- Fortune will provide communication links for employees to maintain relationships with their families while at site, such as the internet (e.g., Skype, e-mail). There will also be cell phone satellite coverage. Computers will be available for ongoing learning and training through computer based programs.
- Fortune will provide indoor and outdoor recreation and leisure options on-site for a relaxing and healthy lifestyle while away from home. A Recreation Co-ordinator will be responsible for scheduling a varied daily program that will appeal to those looking to exercise before or after their shift. A gymnasium will be part of the living complex to provide workers with opportunities for exercise.
- The living complex will be decorated with traditional art from the Tłı̨chǫ communities. A library will be part of the living complex with reading materials and movies, some of which will be based on the Tłı̨chǫ culture.
- Fortune will hold annual open house days to invite community members and employee families to visit the site and see where people work.
- Fortune will provide workshops on money management, alcohol and substance abuse, and family adaptation and coping mechanisms.
- Fortune will provide cultural sensitivity training to all employees so as to reduce work-related stress in a cross-cultural work environment.

16.2.13.1.3 Substance Abuse and Treatment Policies

Fortune is committed to maintaining a drug-free workplace and promoting high standards of health and safety. This commitment is jeopardized when any person uses illegal drugs or alcohol on-site, comes to work under the influence of alcohol or drugs, or possesses, distributes, or sells illegal drugs in the workplace. Furthermore, substance abuse can endanger the safety, quality, and effectiveness of Fortune's operations, adversely affecting its employees, customers, and reputation.

It will be a violation for any employee to use, possess, distribute, manufacture, sell, trade, or otherwise engage in the illegal use and/or consumption of prohibited and mood altering substances (including, but not limited to, alcohol, marijuana, and other illegal substances) at or in the workplace. Fortune will conduct “for cause” testing. Such circumstances might include such things as reasonable suspicion by a supervisor that an employee may be in violation of the policy, reports from any witnesses, bizarre, unsafe, or threatening behaviour on the employee’s part, or involvement in a work-related accident.

Fortune recognizes alcohol or drug dependency as a treatable condition. Employees who suspect they have an alcohol or drug dependency will be encouraged to seek advice and to follow appropriate treatment promptly before resulting in job performance problems. The NICO Project medical staff will advise and assist in securing treatment. No employee with alcohol or drug dependency will be terminated if they request help in overcoming that dependency or because of involvement in a rehabilitation effort. An employee who has had or is found to have a substance abuse problem, however, will not be permitted to work in designated positions identified by management as being critical to the safety and wellbeing of employees, the public, or Fortune.

16.2.13.1.4 Cross-cultural Training

Fortune will promote positive regard for all people. The goal of cross-cultural training and avoidance of cross-cultural conflicts at the worksite will be to develop positive and constructive relationships between Aboriginal and non-Aboriginal people; promote the understanding of Aboriginal people, their culture, and their communities; promote healthy and productive cross-cultural partnerships; and increase employees’ knowledge of the Aboriginal culture. Fortune will employ the services of elders from the Tłı̨chǫ communities for this purpose as well as Aboriginal companies. Training opportunities that are being reviewed currently include the following:

- community education;
- community wellness events;
- cross-cultural strategic planning and training;
- front-line skill development;
- peer support and counselling;
- professional development;
- team building and facilitating community partnerships; and
- workplace wellness training.

16.2.13.1.5 Employment and Training

Fortune will implement human resources information systems to effectively capture any changes to recruitment, vacancies, training received, shifts and rosters, and any information related to employees. While information about any individual will be confidential, cumulative summaries will be developed monthly and reported on a regular basis.

All employees will be asked, at hiring time, to self-disclose information on their ethnicity, place of residence and Aboriginal status to determine the total number of workers and the numbers and percentages of those from the Tłı̨chǫ communities and other Aboriginal or northern resident workers. During construction these will be

monitored on a “number of days worked” basis. Training hours will be tracked and reported by categories such as on-the-job training, external training, and apprenticeships.

In addition, an IBA to be negotiated with the Tłı̨chǫ will be a comprehensive tool to include hiring and training of Aboriginal people.

16.2.13.1.6 Local Businesses

All business providing goods and services to the NICO Project will be will be tracked including types of business participating in construction and the value of the business. Semi-annually, this information will be reviewed and gaps identified to maximize Aboriginal business participation.

Issues and concerns associated with the socio-economic environment will be addressed through plans that support the Environmental Health and Safety management system, such as the community relations plan. Potential adverse effects will be monitored such as new business opportunities that, while positive for contractors and their employees, may generate a shortage of local skilled workers in the community. The NICO Project will also create potential benefits, such as those associated with increased income and quality of life for workers and local businesses.

In addition, an IBA to be negotiated with the Tłı̨chǫ will be a comprehensive tool that will address the benefits for local and regional businesses. Implementation and monitoring of the IBA will assist organizations and businesses servicing the region, particularly helping them to counter mobilization of local skilled labour away from the Tłı̨chǫ communities and associated impacts on maintenance of infrastructure and basic service provision. This can be done through training, rotational flexibility, and other measures to be developed with the smaller communities in the LSA.

16.2.13.1.7 Employee Retention

Employee retention will be monitored and analyzed monthly through human resource information systems. The company will review hiring and termination of workers to determine an annual rolling forward turnover rate. This statistic will be reviewed regularly to determine the underlying causes of turnover to seek mitigation strategies other than those already in place, such as the cultural sensitivity workshops and company communications channels, the availability of an Aboriginal hiring manager, and Aboriginal liaison. Particular attention will be given to address any increase in turnover rates for Aboriginal people.

16.2.13.1.8 Worker and Family Wellness

The Department of Health and Social Services and Health Canada provide funding to support NWT community wellness programs. These programs work to improve the well-being of NWT children, families, and communities. Fortune will meet with the local staff of the service providers and agencies on an ongoing basis to both provide and share relevant information. The site medical staff will make on-going contact with local health officials to both report any relevant concerns and also to make Fortune aware of any issues.

Through its adaptive management system, Fortune will incorporate knowledge about worker and family wellness from multiple sources, make use of multiple systems models, and support new forms of cooperation among people interested in the NICO Project. When an opportunity for improvement is found, it will be acted upon accordingly. At the site level, Fortune will monitor concerns brought forward by the medical staff, by community employees, and information gathered at community visits.

Worker and family wellness will be specifically monitored in several ways, including the following:

- Monthly reports from the Employee and Family Assistance program will be prepared, advising the number and type of contacts and any notable patterns or concerns.
- Fortune will communicate and collaborate with community health care providers in the potentially-affected communities for any concerns or changes to worker and family wellness that might require mitigation. These changes may be noted by indicators such as increased clinic visits, the number of new cases opened, increased alcohol and drug addiction issues, and any changes to the number of children in care in a community.
- Worksite medical personnel will provide support services to those with health issues. They will also monitor Fortune's commitment to healthy diet and nutrition and the availability of country food.
- Fortune will monitor time lost due to illness.
- Statistics on the termination of Fortune employees related to homesickness, rotational employment, and emotional stress factors will be gathered through exit interviews and follow up.

16.2.13.2 Contributions to Beneficial and Adverse Social Impacts

The TOR also require that Fortune describe the contribution of the NICO Project to both beneficial and adverse social impacts at the regional and local levels, as part of their monitoring and management plans. This is to be done across a spectrum of appropriate indicators to be determined in collaboration with Wek'èezhìi Settlement Area communities and government authorities.

The NWT Bureau of Statistics has overall responsibility providing socio-economic statistics across the NWT; an annual scan is released on socio-economic trends that may be helpful to monitoring. While this information will be used to monitor the NICO Project, Fortune is committed to its own monitoring of socio-economic effects. Regular and systematic monitoring will provide information on whether impact predictions were accurate and whether mitigation measures were effective. Fortune will also work closely with other mining companies in the area who publish socio-economic reports (e.g., such as the Communities and Diamonds reports) and discuss cumulative effects. Fortune will work in partnership with government and Aboriginal organizations to collect, analyze, and interpret information related to the impacts of the NICO Project. The monitoring will be done through proactive policies and procedures early in the NICO Project.

A Socio-economic Monitoring Plan will be designed to determine the effectiveness of Fortune's mitigation measures. The Socio-economic Monitoring Plan will supplement, not duplicate, areas covered by the IBA to be negotiated for this project. Moreover, the Socio-economic Monitoring Plan must provide for engaging the potentially-affected communities of Behchokǫ̀, Whatì, Gamètì, and Wekweètì. In particular, the plan will be designed to include the following:

- determine the effectiveness of the measures in reducing adverse effects and enhancing positive ones associated with the NICO Project;
- show where adjustments in those measures need to be made; and
- help Fortune adjust, augment, or replace measures to correct any adverse effects.

A key feature of the Socio-economic Monitoring Plan will be its ability to be modified and improved through experience and input. The plan will provide a process whereby changes in the plan can be made should unexpected adverse trends become apparent during the lifetime of the NICO Project. The plan will direct those responsible for its implementation to undertake the following actions throughout the lifetime of the NICO Project:

- verify the accuracy and completeness of the socio-economic effects described in the DAR;
- monitor the effectiveness of planned mitigation measures;
- identify additional adverse effects;
- review the effectiveness of data gathering;
- modify the Socio-economic Monitoring Plan to improve its effectiveness; and
- share information about the effectiveness of the plan with Fortune personnel, contractors, community service agencies, and Tłı̨chǫ community residents.

A Committee to oversee the effectiveness of Fortune's mitigation procedures and monitor socio-economic effects will be convened after a favourable decision to proceed with the NICO Project is given. The Committee will be comprised of representatives from interest groups affected by the construction, operation, and closure of the NICO Project. Representatives will include Fortune personnel (including the Manager of Community Relations), Department of Health and Social Services, the RCMP, representatives from some or all of the Tłı̨chǫ communities, and representatives of associations and organizations, and territorial, regional, and local and Tłı̨chǫ governments. Those who serve on the Committee must agree to contribute to data gathering and information sharing in their "sphere of influence" (i.e., the community in which they live or the organization in which they work).

Data will be generated and evaluated through several internal company systems. These include the human resources information system, the environmental health and safety management system, and the financial system. Required results and reporting schedules will be determined and defined by the regulators upon approval of the NICO Project, and reports will be provided as required. Reporting with the Tłı̨chǫ government will be defined at the time of the IBA negotiation. Semi-annual visits will be made to each potentially-affected community. During these visits, information meetings will be held to verify that appropriate results are provided to the communities and that ample opportunity is provided to ask questions and seek clarification.

In its ongoing work with the Tłı̨chǫ, Fortune has been communicating with the Tłı̨chǫ Government's Kwe Beh Working Group, recently established to manage relationships with mining companies in Mowhi Gogha De Niitl'ee. Representation from the Tłı̨chǫ will be selected and/or authorized by the Tłı̨chǫ government, and currently includes staff members, 2 Chiefs, and a Tłı̨chǫ Assembly representative. The Kwe Beh Working Group reports directly to the Chief Executive Council. Its objectives include the following:

- build relationships to the companies and implement the agreements;
- ensure smooth communication with the mining and exploration companies;
- manage the Tłı̨chǫ Government involvement in the environmental assessment regulatory process;

- build the capacity of the Tłı̨chǫ Government to manage mining files;
- prepare agendas for meetings with mining companies and prepare Chief Executive Council for meetings with mining companies;
- prepare for negotiations with mining companies;
- build strong relationships to workers in the mines, listening to the workers, and providing support to them in their jobs; and
- ensure strong relationships with the communities on mining issues.

Fortune will continue to build its relationship with the Kwe Beh Working Group, whose mandate includes matters of direct relevance to the NICO Project.

16.2.13.3 Impacts on Wildlife Harvesting and Practice of Traditional Culture

Potential impacts on wildlife will be managed by the site environmental staff and also meetings and interviews with local residents. Many government-supported programs for monitoring wildlife include those done by the Department of Environment and Natural Resources. Fortune will work closely with regional experts. The GNWT conducts an annual scan, including the practice of traditional culture on the land, which is reported on by community. Fortune will monitor this indicator in the LSA. They will also monitor the situation through community meetings and employee input.

For monitoring and mitigation plans related to the potential effects of the NICO Project on traditional resources, please refer to the terrestrial resources assessments (Section 8, Section 14, and Section 15) and the Fish and Aquatic Habitat Assessment (Section 12).

16.3 Physical Heritage Resources

This section presents the impact assessment on heritage resources for the NICO Project. Heritage resources (archaeological and historic sites and their contexts) are protected by legislation in the NWT. In the NWT, heritage resources are protected by the Northwest Territories Archaeological Sites Regulations (NTASR) and the Mackenzie Valley Land Use Regulations (MVLUR); the requirements surrounding these heritage resources are identified in the Northwest Territories Archaeological Sites Regulations (GNWT 2001).

The *Mackenzie Valley Resources Management Act* defines heritage resources as “archaeological or historic sites, burial sites, artifacts, and other objects of historical, cultural or religious importance, and historic or cultural records”. Archaeological artifacts are further defined by the NTASR as “any tangible evidence of human activity that is more than 50 years old, in respect of which an unbroken chain of possession cannot be demonstrated”. As such, an archaeological site is defined as those locations where archaeological artifacts are found or have been recovered. The MVLUR specifies what procedures are to be followed in the event that a previously unreported archaeological site is accidentally encountered or disturbed.

Baseline studies or Heritage Resource Impact Assessments (HRIAs) are required by the government of the NWT to be conducted in advance of development to verify that any heritage resources present are identified and properly managed. Archaeological field investigations in the NWT can only be conducted under a NWT Archaeology Permit issued by the Prince of Wales Northern Heritage Centre (PWNHC). The NICO Project was

assessed for effects on heritage resources, under the Northwest Territories Archaeologist Class 2 Permit 2009-003.

16.3.1 Study Areas

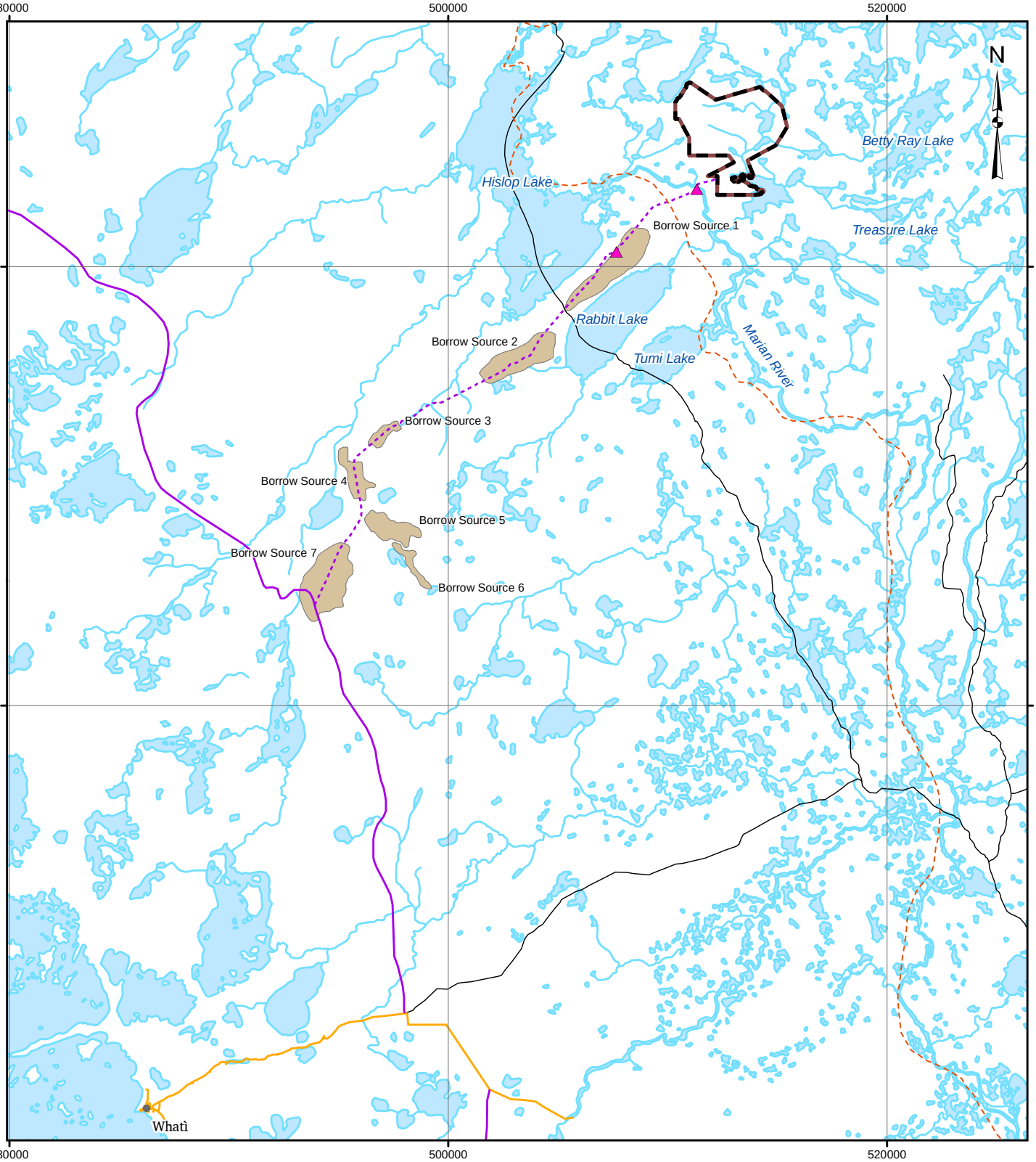
The effects on heritage resources from the NICO Project will occur directly within areas scheduled for land surface disturbance. The spatial scales and boundaries selected for the effects assessment of the NICO Project are described in the following sections.

16.3.1.1 Local Study Area

The LSA for heritage resources was defined as the NICO Project Footprint only. All areas to be directly affected by construction activities or mine operations are to occur within the NICO Project footprint, and no direct effects are expected to occur outside of the NICO Project footprint. As such, the NICO Project footprint will include all facilities within the NICO Project Lease Boundary (i.e., Open Pit and underground mine, CDF, Plant site, camp landfill, and an airstrip), an all-weather access road (NPAR), and 7 borrow areas (Figure 16.3-1). The borrow areas examined during the heritage survey were larger than those currently defined for the NICO Project. These larger borrow areas were examined to facilitate the identification of potential borrow sources which would not be in conflict with heritage resources. The LSA was selected to assess existing (baseline) conditions, and the immediate direct and small-scale indirect physical effects from all phases of the NICO Project on heritage resources.

16.3.1.2 Regional Study Area

The RSA for the heritage resources assessment was selected to encompass the previously recorded sites found in association with exploration and development activities in the vicinity of the NICO Project (Figure 16.3-2). The RSA ranges from west of the community of Whatì to Emille River in the east. North to south, the boundaries of the RSA are from Squirrel and Bea Lakes in the north to the Martre River in the south. The boundary for the RSA is approximately 42 by 63 km in size, and 262 622 hectares in area. This boundary was selected to quantify baseline conditions at a scale that was large enough to assess the maximum predicted geographic extent of direct and indirect aesthetic effects from all phases of the NICO Project on VCs. The assessment of the direct and indirect effects of the NICO Project on the LSA and the RSA is based on the results of the field studies that were conducted within the NICO Project footprint (Murphy 2010).



LEGEND

- PROJECT LEASE BOUNDARY
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED NICO PROJECT ACCESS ROAD
- PROPOSED TŁĮCHǪ ROAD ROUTE
- WATERCOURSE
- WATERBODY
- HERITAGE RESOURCE SITE
- ĮDAÀ TRAIL
- POTENTIAL BORROW AREA

5 0 5

SCALE 1:250,000 KILOMETRES

REFERENCE

Base data obtained from Atlas of Canada, DMTI, and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

FORTUNE MINERALS LIMITED
NICO DEVELOPER'S ASSESSMENT REPORT

TITLE

HERITAGE RESOURCES LOCAL STUDY AREA

Golder Associates
Edmonton, Alberta

FILE No. E-Archy-001-GIS			
PROJECT No. 09-1373-1004		SCALE AS SHOWN	REV. 0
DESIGN	MT	15 Feb. 2011	
GIS	BF	23 Feb. 2011	
CHECK	GRA	11 May 2011	
REVIEW	GRA	11 May 2011	

FIGURE: 16.3-1

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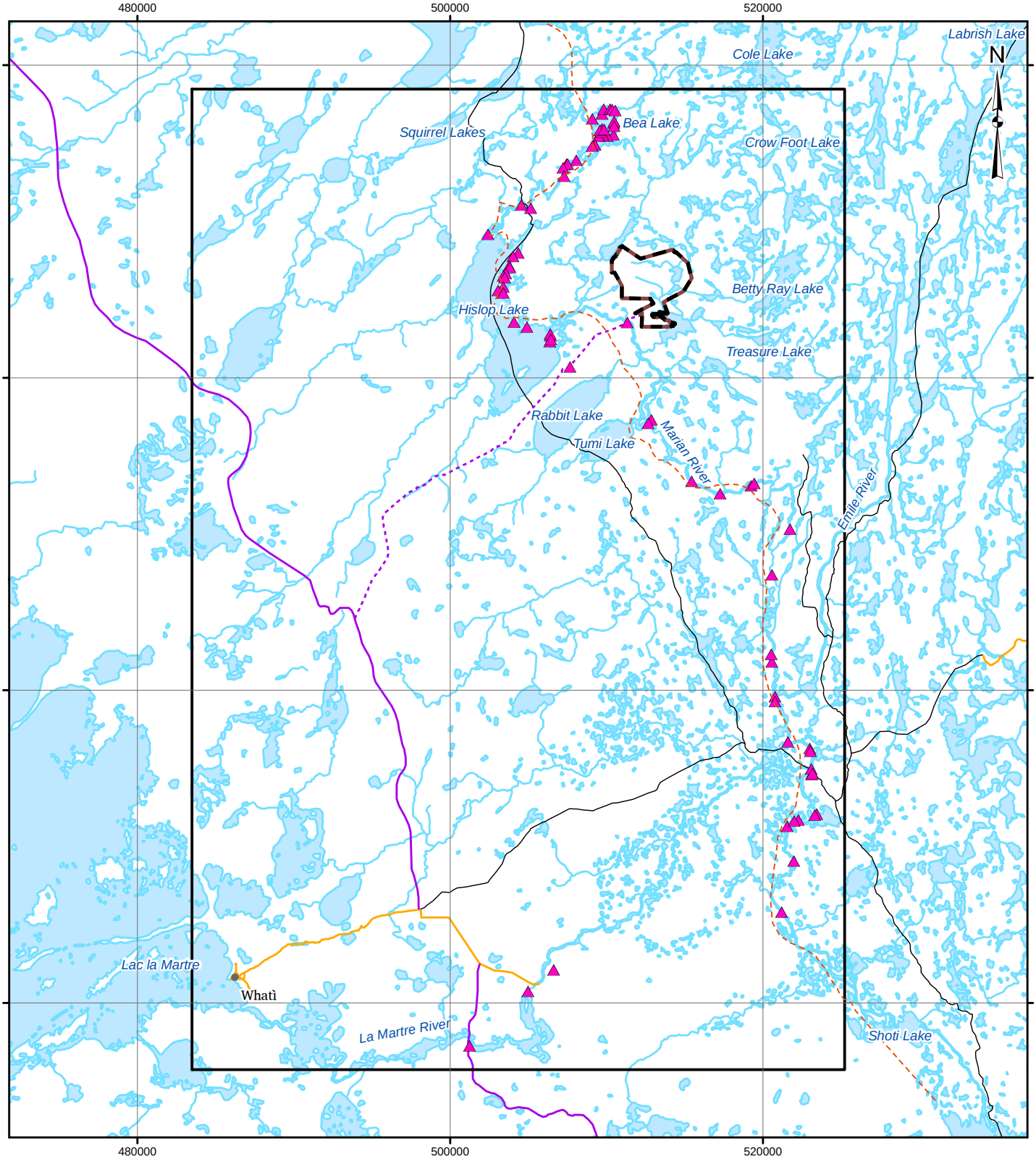

LEGEND

- PROJECT LEASE BOUNDARY
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED NICO PROJECT ACCESS ROAD
- PROPOSED TŁĮCHǪ ROAD ROUTE
- WATERCOURSE
- WATERBODY
- KNOWN HERITAGE RESOURCE SITE
- ĮDAÀ TRAIL
- REGIONAL STUDY AREA

7.5 0 7.5
SCALE 1:350,000 KILOMETRES

REFERENCE

Base data obtained from Atlas of Canada, DMTI, and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

FORTUNE MINERALS LIMITED
NICO DEVELOPER'S ASSESSMENT REPORT

TITLE

KNOWN HERITAGE RESOURCES REGIONAL STUDY AREA

Golder Associates
Edmonton, Alberta

FILE No. E-Archy-002-GIS			
PROJECT No. 09-1373-1004		SCALE AS SHOWN	REV. 0
DESIGN	MT	15 Feb. 2011	
GIS	BF	23 Feb. 2011	
CHECK	GRA	11 May 2011	
REVIEW	GRA	11 May 2011	

FIGURE: 16.3-2

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16.3.2 Existing Environment

16.3.2.1 Baseline Collection Methods

Procedures employed during the baseline studies were considered standard for projects of this nature in the region. The baseline studies included pre-field studies, field investigations, recommendation formulation, and reporting tasks. Pre-field studies consisted of review of existing archaeological studies conducted within the region, and a review of all available topographic and physical environmental data for the NICO Project area. These pre-field studies provided cultural context for the NICO Project, assisted in identifying landforms that held moderate to high potential to contain heritage resources, and provided a basis for designing the field investigation program. In-field investigations where designed to identify heritage resources within the NICO Project area, to assess their heritage importance, and to determine if potential developmental impact are likely. The last 2 tasks were designed to summarize and document the heritage resources baseline studies and, if necessary, recommend mitigative strategies.

16.3.2.2 Cultural Context

Although the amount of archaeological research that has occurred in the region is somewhat limited, the published and unpublished research indicates that the evidence of prehistoric use is similar to elsewhere in the North-Central Area of the Sub-Arctic Cultural region identified by Donald Clark (1991). Archaeological research in the western NWT began in the 1950s with reconnaissance undertaken by R.S. MacNeish in the Upper and Middle Mackenzie basin and the Great Slave and Great Bear Lake area (MacNeish 1951, 1953, 1955). Several researchers have subsequently modified and expanded upon the cultural sequence derived from McNeish's initial research. Such work includes field investigations of the Great Slave Lake (Noble 1971), research in the western Great Bear Lake and Mackenzie River basin areas (Cinq-Mars 1973; Clark 1975, 1977), and the research in the Coppermine River area (McGhee 1970; Cinq-Mars and Martijn 1981).

In addition to the published literature, several reports on HRIA investigations undertaken in the region in the last decade are also available. These include examinations of the proposed BHP diamond mine (Bussey 1994), the proposed Diavik diamond mine project (Fedirchuk 1995; Fedirchuk McCullough and Associates 1997), the Snare Lakes airport project (Wayman and Andrew 1994), and the proposed Damoti Lake Mine (Ronaghan 1997). Three additional studies are relevant to the current assessment and include: the Marian River Heritage Resource Inventory conducted by Tom Andrews of the PWNHC in 1992, and the 2 HRIAs conducted earlier for the present NICO Project (Paquin 2005; Ronaghan 2003).

16.3.2.2.1 Prehistory

The majority of the prehistoric archaeological sites recorded in the region are characterized by stone tools or the pieces of stone, called flakes or lithics, discarded in the process of manufacturing stone tools. Such sites are assumed to relate to prehistoric use of the study area. Syntheses of the prehistory of the region are available in Gordon (1975), Noble (1977), and Wright (1981). The currently accepted cultural sequence for the area is summarized in the following sections.

Northern Plano Tradition (8000 to 6500 BP)

The earliest recognized occupation of the NWT appears to represent a wide-ranging archaeological cultural entity known as the Northern Plano Tradition. This tradition is believed to represent an influx of people following the spread of vegetation and game into the area after the glacial retreat (Gordon 1996). Sites of this period tend

to be associated with major caribou water crossings and fisheries in the southern Keewatin District (Harp 1961), and with eskers in areas further west (Noble 1981). Northern Plano Tradition occupations are characterized by the use of lanceolate Agate Basin-like spear points or notched Acasta specimens, and with the extensive use of quartzite as raw material for stone tools.

Shield Archaic Period (6500 to 3500 BP)

A similar occupation pattern is maintained through the subsequent Shield Archaic Period (Wright 1981), which is characterized by both lanceolate and notched point styles. The Northern Plano Tradition and early Shield Archaic Period occupations correspond with a climatic period characterized by warmer and drier conditions than are present today.

Arctic Small Tool Tradition (3500 to 2500 years BP)

Around 3500 years ago the climate is thought to have achieved the cooler, wetter conditions typical of today. Associated with this change is the appearance of a new cultural tradition known variously as Pre-Dorset, the Arctic Small Tool Tradition or the Canadian Tundra Tradition (Noble 1981), which is believed to represent a distinctive caribou adapted Palaeo-Eskimo culture. Occupations by the Arctic Small Tool Tradition seem to focus on the use of sheltered points and protected bays on lakes, on eskers, and on islands. This adaptation employed smaller, thinner, well fashioned tools than previous groups. The tool assemblage includes lenticular and oval bifaces, small triangular and side notched points, burins, and most distinctively, the use of micro-core and micro-blade technology.

Taltheilei Shale Tradition (2500 to 200 years BP)

The final stages of the Precontact Period witnesses the development and spread of the Taltheilei Shale Tradition, which is ancestral to the Athabaskan speaking peoples that inhabit the region today (Noble 1981). During this period, considerable use was made of the siliceous shale originating along the eastern end of Great Slave Lake and elsewhere throughout the region. Lanceolate and small corner and side notched points are included in Taltheilei Shale Tradition occupations, but the biface, burin and microblade based tools common in the earlier assemblages are completely absent (Gordon 1977). The presence of the vein quartz, which is exposed in bedrock throughout the region, in archaeological assemblages may relate to these later prehistoric occupations; however, until archaeologists recover diagnostic specimens, it will remain unknown if persistent use of vein quartz can be associated with a particular time period.

16.3.2.2.2 History

The NICO Project is located on the traditional lands of the Tłı̨chǫ First Nation. The Tłı̨chǫ and other Dene groups in the region, such as the Yellowknives, employed traditional land use patterns that focused on the seasonal movements of the barren-ground caribou as well as on the widely dispersed resources of the boreal forest (Helm 1981). Small fur bearing animals were taken on a regular basis, with hare being an important winter food resource when big game was scarce. Bow and arrow, spears, deadfall, snares, clubs, and more recently, rifles have been used to hunt a variety of big and small game (Rogers and Smith 1981).

Aboriginal people used nets, spears, or hook and line to harvest fish, which was another important food resource that was seasonally abundant during spawning runs. On a seasonal basis, waterfowl and their eggs provided a substantial component of the diet. Waterfowl were taken using bow and arrows tipped with blunt points, or by being driven into nets (Rogers and Smith 1981). Aside from the seasonal collection of berries, vegetable foods

did not appear to represent a large component of Subarctic Dene diets; however, plants were used in the construction of living structures, canoes, snowshoes, sleds, weaponry, and a variety of domestic items.

Dene groups shared a similar loose social organization and were highly mobile, reflecting the seasonal distribution of the resources of the region. Easily transportable conical, skin covered tipi-like structures were used, as well as temporary rectangular pole and brush covered huts or lean-to shelters. Travel during the warmer months tended to focus on the use of canoes along rivers and lakes and, in the colder months, on the use of snowshoes and toboggans (Rogers and Smith 1981).

With the arrival of fur trade posts in the region in the late 1700s, conflict developed between the Mackenzie River Dene, which include the Tłįchǫ, and the more southerly based Yellowknives, who had better access to trade goods (Gillespie 1981). Resolution of this conflict was eventually achieved in the latter part of the 19th century, and subsequent amalgamation and intermarriage has reduced the former cultural distinctions between these groups. With the establishment of Fort Rae in 1825, the Tłįchǫ were provided a focal point for their trading activities, while the older more southerly posts continued to serve the Yellowknives (Gillespie 1981). In 1900, an extension of Treaty 8 incorporated the Slave of the Hay River and Great Slave Lake regions, the Tłįchǫ, the Chipweyan, and the Yellowknives of Great Slave Lake. Regional bands of the Tłįchǫ are identified according to the focus of their seasonal rounds of exploitation, which by the 1960s, tended to centre on the western portion of their traditional territory (Helm 1981). The nearest settlement to the NICO Project area is the Tłįchǫ community Whatì.

Métis canoemen and packers began moving into the Subarctic region in response to the fur trade in the late 18th century, and possibly due to social and economic upheaval on the Canadian prairies in the mid-18th century (Slobodin 1981; NSMA 2001a). These Métis were, typically, descendents of French or French Canadian men and Ojibwa or Cree women, with a minority of Scottish and Iroquoian descent. Throughout the fur trading period, the Subarctic Métis participated in a very wide variety of occupations and dominated the transportation industry that was the lifeline of fur trade expansion into the north and west (Slobodin 1981; NSMA 2001a).

During the fur trade expansion into the Great Slave-Mackenzie district, many of the French-Cree Métis took Dene wives. This had the effect of establishing social and economic alliances with local families, which would provide both personal and commercial benefits for Métis men when hunting, trapping, fishing, or trading (NSMA 2001a). It secured an important position for the Métis as intermediaries and interpreters for the fur trade companies, and allowed them to influence the needs and wants of the various parties involved in the fur trade economy.

The Marian River was an important travel route connecting the communities on the north shore of Great Slave Lake to a series of lakes and the barren grounds to the north. Consequently, it is possible that the area could contain heritage resource sites of historical and spiritual importance to both the Tłįchǫ and Métis elders. These heritage resources could include portage sites on the Marian River, historic fishing camps along river and lake shorelines, graves and burial sites, and other sites of spiritual importance.

16.3.2.2.3 Prefield Studies

Facilitated by the staff of PWNHC, a search of the national heritage resources site record database maintained by the Archaeological Survey at the Canada Canadian Museum of Civilization was conducted to determine if previously recorded archaeological sites are known from the vicinity of the NICO Project (PWNHC 2009). As a

result, it was determined that of the 73 heritage resource sites located within the RSA, only 2 are located within the LSA (Figure 16.3-1). Apart from a single site (KiPo 4) recorded during the HRIA for the NPAR (Paquin 2005), all of the sites were recorded by Tom Andrews of the PWNHC during a single heritage resource inventory project completed in 1992 (PWNHC 2009). This study provided an archaeological inventory of segments of the Marian River drainage, and the sites he identified represent the first heritage resource sites recorded within this basin.

The 72 sites recorded by Mr. Andrews exhibit a wide range of variation, reflecting prehistoric, and historic indigenous traditional use of the area as well as limited evidence of Euro-Canadian land use patterns (PWNHC 2009). In total, 12 prehistoric sites have been recorded in the RSA. The prehistoric sites include 10 campsites (that consist principally of scatters of stone artifacts and features indicative of domestic activities such as hearths), a portage/fishing station, and a single isolated find locale.

Twenty sites in the RSA contain both evidence of prehistoric occupation and use by indigenous people in historic times (PWNHC 2009). These consist of 15 sites that were recorded as campsites, 3 portages, and 2 portages found in association with campsites. The campsites all contained scattered prehistoric stone artifacts and hearths as well as more scatters of recent historic refuse. The remains of tipis and culturally modified trees were also recorded at several of the campsites. These latter sites suggest a considerable degree of continuity in land use patterns from prehistoric times through to the modern traditional land use patterns of the local aboriginal peoples of the area.

Thirty-seven sites located in the RSA have been ascribed to use by indigenous peoples in historic times and include a wide range of use types (PWNHC 2009). Thirteen are described as campsites and contain remains such as tipi rings and poles, a dog sled, culturally modified (axe cut) trees, a (log) fish cache, and recent refuse. Two campsite/burial sites were also recorded. One village consisting of 7 log cabins and related structures built sometime after 1900 was recorded. Andrews also recorded a trading establishment (the remains of a cabin and tent ring), constructed by Francis Yambi, ca. 1910, to facilitate trade with the Tłįchǫ people of the area. One culturally modified birch tree, showing evidence of bark removal for canoe repair during a specific journey in 1932 has been included in the inventory. Three portages over rapids, 2 portage/campsites, and 1 portage/fishing station consisting of well used trails were also recorded and were sometimes found in association with other features. One canoe cache, 1 sled cache, and a quarry have been included in the inventory, as well as 8 known burial sites and a cemetery. Finally a trapping trail/hearth site was recorded during the HRIA for the NPAR between Rabbit and Hislop lakes (Paquin 2005).

All of the sites relating to prehistoric and indigenous historic activities have been ascribed to Athapaskan speaking inhabitants of the region, specifically the Tłįchǫ. Three sites relating to Euro-Canadian activities in this area were also recorded during Mr. Andrew's inventory. These include a set of survey markers placed during J. Russell's 1925 survey of the Marian and Camsell rivers, and 2 campsites associated with prospecting and mining, which contain refuse related to the mineral exploration of the region.

As noted above, a review of the locations of NICO Project footprints and previously reported heritage resources sites indicates that the NICO Project is in potential conflict with 2 previously recorded sites, KjPo 44 and KiPo 4.

16.3.2.2.4 Field Investigations

The review of the field studies summarized above indicates that heritage resource sites should be expected to occur on bedrock points overlooking lakeshores, on small islands within lakes, and at the confluence of lakes and the Marian River. Likewise heritage resources would also be expected to occur at portages near rapids, landforms that provided prominent look-out locations, and bedrock exposures, which may contain veins of quartz or other suitable tool stone. With this in mind, the following areas where targeted for field investigations:

- all bedrock ridges and outcrops within the proposed mine footprint;
- the proposed Airstrip and area between the Airstrip and proposed mine footprint;
- the KjPo 44 site area on the Marian River;
- the KiPo 4 site area between Hislop and Rabbit lakes; and
- the proposed Borrow Sources 1, 2, 3, and 7.

These areas were examined either because of the potential for disturbance related to initiation of the NICO Project or because they were considered to have potential to contain heritage resource sites. Potential NICO Project developments that were omitted from the on-ground examination program include Borrow Sources 4, 5, and 6 (Figure 16.3-1) as these areas are poorly drained, containing muskeg and black spruce bog, and were considered to have low heritage resource potential.

The field component of the NICO Project HRIA took place between 25 to 29 August 2009. During the field program, 225 shovel tests were excavated. No previously unrecorded heritage resources sites were identified, and 2 previously reported heritage resources sites, KiPo 4 and KjPo 44, were revisited. KiPo 4 is a trapper's dogsled and/or snowmobile trail and is located within the proposed borrow source and could potentially be impacted during road construction activities (Paquin 2005). The material culture observed along the trail includes chainsaw cut stumps and tree blazes that indicate that the trail is rather recent in age. As a result, KiPo 4 was determined to be of low scientific significance as a heritage resource, and no further work was recommended. KjPo 44 is a portage trail located on the south bank of the Marian River at a set of rapids, approximately 4 km downstream of Hislop Lake (Paquin 2005). During the 2004 HRIA, 23 negative shovel tests were excavated within the proposed road rights-of-way, and it was determined that the bridge crossing and NPAR were not in conflict with any sites that may be associated with the portage entrance. As long as the NPAR and bridge do not deviate from the currently proposed rights-of-way, no impacts to this heritage resource are expected. Current plans have the bridge crossing within the corridor that was investigated. As KjPo 44 will not be impacted by the NICO Project, no further work was recommended.

The above summary presents the results of the HRIA conducted on behalf of Fortune for the NICO Project. A final report titled Heritage Resources Impact Assessment Fortune Minerals Limited NICO Cobalt-Gold-Bismuth-Copper Project was completed under Archaeologist's Permit 2009-003 (Murphy 2010).

16.3.2.2.5 Traditional Knowledge Integration

A review of ethnographic sources and TK studies conducted in surrounding areas has contributed to an understanding of the archaeology of the NICO Project area. Tłı̨chǫ First Nations members have assisted in the archaeological investigations conducted for the NICO Project. Pre-field planning included a meeting with a Tłı̨chǫ

Elder in Behchokǫ̀ to obtain guidance regarding the nature and importance of sites in the area. The Tłı̨chǫ Elder noted that many heritage resources sites are located in the region but that the NICO Project area was out of the way for people travelling between communities and was not used often. A local youth from Gamètì participated as an assistant during the field program and provided advice on the cultural importance of the landscape traversed during the investigations. The local youth indicated that use of the NICO Project area was limited with traditional activities being concentrated on the larger lakes and the Marian River. Similar information was collected from field assistants during the previous HRIAs that were conducted for the NICO Project (Paquin 2005; Ronaghan 2003).

As a result of the field program 4 historic and cultural use sites were recorded during the study. These sites are noted, but were not formally recorded as archaeological sites as they do not meet some or all of the criteria established for archaeological sites by the NTASR. These included a mine claim post, 2 hunting camps, and a possible portage trail. The hunting camps are located within borrow source 2 and 3, while the portage trail is located between Burke, Peanut, and Nico lakes. These sites are considered to be of limited scientific heritage resource value and no further work is recommended.

16.3.3 Pathway Analyses

In the context of this DAR, all known and undiscovered heritage resource sites are considered VCs and are protected under Federal and Territorial Law. These heritage resource sites vary in their importance depending on their cultural, historical, or research (scientific) value. Alteration of the landscape can result in damage or complete destruction of heritage resource sites unless steps are taken in advance to protect the resource and/or recover a sample of materials from the resource prior to impact. These alterations often involve displacement of artifacts resulting in the loss of valuable contextual information or may result in the complete destruction of artifacts and features leading to complete loss of data. Thus, any activity with the potential to cause ground disturbance may affect heritage resources. The heritage resources component of the DAR focuses on any Project activities that have potential to cause ground disturbance, thereby having the potential to affect heritage resources.

16.3.3.1 Methods

Pathway analysis identifies the linkages between NICO Project activities and their potential effects on heritage resources. A pathway analysis was completed for heritage resources sites for NICO Project-related pathways. The first step of the analysis identified the potential pathways, without considering if they will possibly occur. This was followed by a summary of mitigation practices or design features that remove the pathway or limit the effects on heritage resources. Knowledge of these possible mitigation strategies is then applied to the pathways to determine whether the pathways are no linkage, secondary, or primary. Each potential pathway is evaluated to determine if it could lead to ground disturbance that could directly or indirectly affect heritage resources.

16.3.3.2 Mitigation

Mitigation refers to the practices taken to reduce or avoid ground disturbance. Site avoidance and information recovery are the 2 mitigation options that are most commonly applied to heritage resources. The first option includes mitigation of design features, which refers to NICO Project design intended to avoid or reduce a negative effect. In this case, the locations of heritage resources sites would be taken into consideration at the design stage of the NICO Project to minimize potential conflicts. The second option is a form of mitigation practice that includes any activity used to reduce or avoid a negative effect. In this case, it usually refers to

mitigative excavations designed to limit knowledge loss. Mitigation design features and practices incorporated into the NICO Project to remove or limit effects to heritage resource sites are listed in Table 16.3-1. Those effects remaining after mitigation are referred to as residual effects.

16.3.3.3 Results

NICO Project environmental effects occur when there is a pathway between a project component/activity and a VC. Each pathway was evaluated to determine if it could lead to a change in environment (ground disturbance) that could affect a VC (heritage resources). Environmental effects from some pathways may be reduced or eliminated through mitigation. Pathway validation is the process of screening each pathway to assess its expected contribution to the overall project's residual effects on VCs after mitigation. In the pathway validation step, knowledge of the mitigation practices or mitigation design features is considered to assess how each pathway is affected by mitigation, and how residual effects may be reduced. Some pathways may not be affected by mitigation, while others may be reduced or eliminated. Each potential pathway is evaluated and characterized as follows:

- A no linkage pathway is a pathway which does not exist. In this case either the pathway was found to not have a connection to a VC, or it was removed by mitigation; therefore, the project causes no detectable (measurable) residual effect relative to baseline or guideline values.
- A secondary pathway is a pathway where mitigation measures result in only a minor change from baseline or guideline values. A secondary pathway has a negligible residual effect, but is not considered significant. In the case of heritage resources, this would occur when very few heritage resource sites or only heritage resource sites of low significance are affected by the NICO Project.
- A primary pathway is a pathway that contributes to residual effects on heritage resources.

No linkage, secondary, or primary pathways are determined using scientific knowledge, and experience with similar developments. No linkage and secondary pathways have no to negligible effects on the environment and therefore, are not carried forward into the effects assessment. A pathway is categorized as primary if a more detailed analysis is required to assess the effects. Residual effects assessment and classification would be required if a pathway is identified as primary. The pathway analysis for heritage resources is summarized in Table 16.3-1.

Table 16.3-1: Potential Pathways for Effects to Physical Heritage

Project Component/Activity	Effects Pathways	Environmental Design Features	Pathway Assessment
Proposed NICO Mine Site Development	Construction and Operation activity leading to ground disturbance that affects physical heritage resources	Completed archaeological assessment for areas that are considered likely to contain heritage resources Avoid previously recorded heritage resource sites Complete additional archaeological assessment for any changes to NICO Project footprint in areas considered to have moderate to high potential to contain heritage resources Monitor condition of known heritage resource sites near the NICO Project footprint Provide awareness training and a manual for recognizing heritage resources to construction crews	No Linkage
Proposed NICO Project Access Road	Construction activity leading to ground disturbance that affects physical heritage resources	Completed archaeological assessment for areas that are considered likely to contain heritage resources Avoid previously recorded heritage resource sites Complete additional archaeological assessment for any changes to NICO Project footprint in areas considered to have moderate to high potential to contain heritage resources Monitor condition of known heritage resource sites near the NICO Project footprint Provide awareness training and a manual for recognizing heritage resources to construction crews	No Linkage

Table 16.3-1: Potential Pathways for Effects to the Physical Heritage (continued)

Project Component/Activity	Effects Pathways	Environmental Design Features	Pathway Assessment
Proposed Borrow Source	Construction activity leading to ground disturbance that affects physical heritage resources	Completed archaeological assessment for areas that are considered likely to contain heritage resources Avoid previously recorded heritage resource sites Complete additional archaeological assessment for any changes to NICO Project footprint in areas considered to have moderate to high potential to contain heritage resources Monitor condition of known heritage resource sites near the NICO Project footprint Provide awareness training and a manual for recognizing heritage resources to construction crews	Secondary
Proposed NICO Mine Site Development, NICO Project Access Road, and Borrow Source	Construction and Operation activity leading to impacts on heritage resource Sites in the vicinity of the Įdaà Trail or Hislop Lake	Reduce visibility of the NICO Project components from identified physical heritage resource (Įdaà Trail, Hislop Lake) Monitor condition of known heritage resource sites near the NICO Project footprint Provide awareness training and a manual for recognizing heritage resources to construction crews	No Linkage

16.3.3.3.1 Pathways with No Linkage

A pathway may be classed as no linkage if the activity does not occur and as a result the pathway does not result in environmental effects (ground disturbance) to heritage resources, or if it has a negligible effect. As a result of the effects analysis, the following pathways were determined to be no linkage for linking NICO Project-related activities to environmental effects on heritage resources.

Construction Activity Leading to Ground Disturbance: Proposed NICO Mine Site Development

Construction and operation activities of the proposed NICO mine site avoid known heritage resources. No known heritage resource sites occur within the NICO Project footprint of the proposed NICO mine site. No residual effects would result because no physical effects on heritage resource sites would occur. Therefore, this pathway was determined to be no linkage.

Construction Activity Leading to Ground Disturbance: Proposed NICO Project Access Road

Construction activities of the proposed NPAR will avoid known heritage resources. Heritage resources sites KjPo 44 and KiPo 4 occur within the vicinity of the proposed NPAR. During the 2004 HRIA, 23 negative shovel tests were excavated within the proposed NPAR in the vicinity of KjPo 44. No artifacts were recovered from the shovel tests and it was determined that the bridge crossing and NPAR were not in conflict with any sites that may be associated with the portage entrance. In addition, the culture material observed in association with heritage resource site KiPo 4, the presence of chainsaw cut stumps and tree blazes indicate that the trail is recent in age (post 1960's). KiPo 4 was determined to be of low scientific heritage resources significance, and no further work was recommended. No residual effects would result because no effects to physical heritage resource sites will occur; therefore, this pathway was determined to have no linkage.

Construction and Operation Activity Leading to Impacts on Heritage Resource Sites in the Vicinity of the Ɉdaà Trail and Hislop Lake: Proposed NICO Mine Site Development, NICO Project Access Road, and Borrow Sources

Construction and operation activities of the proposed NICO Project will avoid known physical heritage resources in the vicinity of the Ɉdaà Trail and Hislop Lake. No ground disturbance is anticipated to occur outside of the LSA (i.e., NICO Project footprint). Hislop Lake and the physical heritage resources sites associated with its shoreline are located west and outside of the NICO Project footprint; as such, no impacts to physical heritage resources sites associated with Hislop Lake are anticipated. The Ɉdaà Trail is also located outside of the proposed mine NICO mine site, access roads and borrow source footprints, no impacts to the Ɉdaà Trail by NICO Project activities are anticipated. Although, the Ɉdaà Trail is bisected by the NPAR, no impacts to heritage resources sites are anticipated. Shovel testing conducted on the south bank of the Marian River as part of the assessment of KjPo 44, revealed no heritage resources in association with the NPAR and bridge rights-of-ways. No known heritage resource sites occur within the NICO Project footprint or the NPAR. No residual effects would result because no physical effects on heritage resource sites would occur. Therefore, this pathway was determined to be no linkage.

16.3.3.3.2 Secondary Pathways

In some cases, both a NICO Project component or activity and a pathway exist, but the change caused by the NICO Project is anticipated to be negligible. The following pathway was determined to be secondary pathway for heritage resources.

Construction Activity Leading to Ground Disturbance: Proposed NICO Project Borrow Source

Construction activities of the proposed NICO Project Borrow Source may impact a known heritage resource site, KiPo 4. At this time, the exact locations for the borrow material needed for the access road are not known. Culture material observed in association with the heritage resource site, presence of chainsaw cut stumps, and tree blazes indicate that the trail is recent in age (post 1960's). KiPo 4 was determined to be of low scientific heritage resources significance, and no further work was recommended. Therefore, this pathway was determined to be secondary, and no further assessment was done.

16.3.4 Effects to Physical Heritage Resources

No primary pathways were identified for heritage resources. No linkage pathways and secondary pathways were identified as contributing only negligible effect or no physical effects on heritage resource sites. Therefore, no residual effects are anticipated. As no primary pathways affecting heritage resources were identified, no cumulate effects would occur.

16.3.5 Residual Impact Classification and Significance

No residual impact classification was completed as no primary pathways were identified for heritage resources. Only no linkage and secondary pathways where identified for heritage resources, resulting in negligible effects to heritage resources.

16.3.6 Uncertainty

Only a limited amount of heritage resource work has been conducted within the RSA, and the majority of these investigations have been focused on the Marian River. The 2 HRIAs previously conducted for the NICO Project have only resulted in the reporting on one heritage resource site. Subsurface testing conducted at those areas targeted for field investigations resulted in no new heritage resource sites being found during the baseline studies of the NICO Project footprint. Information concerning the effects of construction and operation of the proposed mine, NPAR, and borrow pit on known sites are adequate enough to have a high confidence in the predictions concerning effects to the VC discussed in this section. Information concerning heritage resources sites in the RSA is less understood, due to the limited nature of previous investigations; however, it is anticipated that any sites uncovered during development activities could be successfully mitigated.

16.3.7 Monitoring

In addition to the awareness training and manual for recognizing heritage resources provided to construction crews, monitoring of the condition at known heritage resource sites near the NICO Project footprint will also occur. In the unlikely event that previously unrecorded heritage resources are uncovered during the construction of the Project, staff of the PWNHC will be contacted immediately. A heritage resource management plan would be developed with guidance from PWNHC at that time.

16.4 Traditional Land Use

16.4.1 Introduction

The purpose of this Traditional Land Use (TLU) and TK section within Section 16 of the DAR is to provide information to inform the TLU and TK portion of the SON for the Human Environment, and to meet the TOR issued by MVRB for the NICO Project. This section summarizes TLU and TK information reported in Section 5 (Traditional Knowledge) that is relevant to areas where traditional activities may be impacted, as well as areas specifically identified in the TOR such as Marian River, Hislop Lake, and the Įdaà Trail. A summary of TLU and TK information reported during Whatì and Gamètì interviews, and a summary of the literature review results relating to the Tłįchǫ and Métis of the North Slave Region (Métis), is found in Section 5 (Traditional Knowledge). Section 16 also refers to the assessment results of other disciplines relevant to TLU and TK, and associated monitoring and mitigation plans to meet the TOR. Relevant pathways are presented in Table 16.4-1.

Table 16.4-1: Potential Pathways for Traditional Land Use Effects

NICO Project Component/ Activity	Effect Pathways	Design Features and Mitigation	Pathway Assessment
General construction and operation of mine and supporting infrastructure	The NICO Project may affect the availability of wildlife (including fish) for harvesting or viewing.	Cultural awareness programs Impacts on wildlife will be managed by site environmental staff and through meetings and interviews with the local residents Hunting, trapping, or recreational fishing will be prohibited by staff or contractors at the NICO mine site, or when on the NICO Project Access Road for work purposes. The recreational use of all-terrain vehicles at site will be prohibited, so that people working on-site will not benefit from increased access to the region (e.g., construction or travel) Fortune is committed to having discussions with hunters and trappers who approach Fortune with a case that their hunting and trapping practices have been compromised by the NICO Project Fortune will hire Tłįchǫ people to perform the monitoring on-site whenever possible, and assist in the design of monitoring programs By relocating the hydrometallurgical facility and adjusting the process design, the amount of water used by the NICO Project will be decreased and less water will be discharged from the NICO Project The Co-Disposal Facility considered that it would have the smallest footprint of the 3 considered alternatives	Primary

Table 16.4-1: Potential Pathways for Traditional Land Use Effects (continued)

NICO Project Component/ Activity	Effect Pathways	Design Features and Mitigation	Pathway Assessment
	The NICO Project may affect traditional activities at Hislop Lake, and other locations.	Hunting, trapping, or recreational fishing will be prohibited by staff or contractors at the NICO mine site, or when on the NICO Project Access Road for work purposes. The recreational use of all-terrain vehicles at site will be prohibited, so that people working on-site will not benefit from increased access to the region (e.g., construction or travel) Fortune has added 2 water quality stations in Hislop Lake to satisfy concerns over water quality in that lake	Primary
	The NICO Project may be visually and audibly perceived from the Įdaà Trail, including the Marian River and Hislop Lake, and affect the experience of traditional authenticity by the trail users	Co-Disposal Facility designed so that it would not be higher than the surrounding hills and consequently the NICO Project will not visible from Hislop Lake or the Įdaà Trail Mufflers will be used on mining equipment Blasting will be limited to 1 blast/day	Primary
General construction and operation of mine and supporting infrastructure	The NICO Project may affect traditional harvesting activities for Aboriginal residents of the Wek'eezhii Settlement Area communities due to changes in access for resident and non-resident hunters.	Hunting, trapping, or recreational fishing will be prohibited by staff or contractors at the NICO mine site, or when on the NICO Project Access Road for work purposes. The recreational use of all-terrain vehicles at site will be prohibited, so that people working on-site will not benefit from increased access to the region (e.g., construction or travel) Fortune is committed to having discussions with hunters and trappers who approach Fortune with a case that their hunting and trapping practices have been compromised by the NICO Project	Primary

16.4.2 Summary of Effects on Traditional Harvesting Activities

The following section presents summaries of the assessment results for Section 8 (Caribou), Section 12 (Fish and Aquatic Habitat), Section 14 (Vegetation), and Section 15 (Wildlife) of the NICO Project DAR that are relevant to the TOR requirements for TLU and wildlife harvesting activities for Aboriginal residents of Wek'eezhii Settlement Area communities. Information summarized from Section 9 (Closure and Reclamation) has also been incorporated, as well as the applicable TLU and TK summaries for Section 5 (Traditional Knowledge). Assessment summaries include mitigation and monitoring plans, the potential impacts of the NICO Project on traditional harvesting activities, and impacts due to increased harvesting access by traditional and non-traditional harvesters along the NPAR. A detailed discussion of the potential effects of the NICO Project on the traditional resources used for traditional harvesting can be found in the respective sections identified above.

16.4.2.1 Caribou

Section 8 (Caribou) provides an assessment of NICO Project impacts on caribou. Section 9 (Closure and Reclamation) also provides a summary of the caribou assessment. Sub-sections of Sections 8 that have been used in this report to assess the potential impacts of the NICO Project on the TLU and TK portion of the SON for the Human Environment to meet the TOR are as follows:

- Section 8.1.3.2 Caribou Study Area;
- Section 8.5.5 Related Effects on People;
- Section 8.6 Residual Effects Summary; and
- Section 8.8 Environmental Significance.

Traditional Caribou Harvesting Summary

Gamètì and Whatì interview participants indicated that caribou harvesting ranges overlap the NICO Project and surrounding area. Whatì interview participants reported that caribou migration routes overlap the LSA (Section 5, Figure 5.3-2). Gamètì interview participants indicated that people may continue to hunt caribou in the NICO Project area (including the surrounding hills) post-closure. Gameti and Whatì interview participants also identified a caribou hunting area just south of the NPAR between Hislop Lake and Rabbit Lake. General Whatì hunting areas were also reported to be in larger areas that overlap the LSA and the NPAR. Interview participants from both communities indicated that caribou hunting occurs throughout the RSA. For a full presentation of TLU and TK NICO Project study results relating to caribou, including concerns, refer to Section 5 of the DAR.

Potential Impacts

Section 8.1.3.2 indicates that barren-ground and woodland caribou ecotypes have the potential to interact with the NICO Project. Based on annual and seasonal range estimates, the winter ranges of the Bathurst, Bluenose East, and Ahiak barren-ground herds have the potential to overlap with the NICO Project. The following 2 pathways identified in Section 8.1.3.2 relate to the potential effects of the NICO Project on caribou, and are considered in the context of TLU activities:

- direct effects from changes in habitat quantity and fragmentation from the physical footprint of the NICO Project and access roads; and

- indirect effects from the NICO Project, including sensory disturbances (e.g., presence of people, lights, smells, vehicles) that can change the quality of adjacent habitats, alter animal movements and behaviour, and ultimately influence survival and reproduction.

The presence of the NPAR may represent a barrier to some individuals within the population, particularly during the winter construction phase when vehicle traffic is predicted to substantially increase. For example, roads may contribute to fragmentation of populations through both increased mortality and modifications of behaviour that make animals less likely to cross roads (Trombulak and Frissell 2000; Dussault et al. 2006; Laurian et al. 2008). In some cases, roads appear to be “leaky barriers” (some animals do manage to cross successfully) but they may nevertheless restrict the regional-scale dynamics of species (Treweek 1999).

In addition to direct habitat effects, sensory disturbances produced from the NICO Project may indirectly affect caribou. The combination of direct (physical footprint) and indirect effects can create a zone of influence. Based on previously completed research it was assumed that the zone of influence was a 15 km radius around the NICO Project.

Incremental local and regional effects from the NICO Project, roads, and other developments can accumulate to influence the quality of available habitat and the number of animals that the landscape can support (i.e., carrying capacity). Analyses showed that cumulative impacts from historical pre-disturbance conditions through to a scenario with the NICO Project and reasonably foreseeable developments were low in magnitude (i.e., less than 10%).

The above-mentioned pathways were associated with changes to habitat quantity, habitat quality, behaviour, survival, and fecundity. The duration of cumulative and incremental impacts from the NICO Project on caribou population abundance and distribution, and traditional and non-traditional use of caribou for the majority of pathways is anticipated to be reversible over the long-term (approximately 2 caribou life spans). Direct disturbances to habitats within the development footprint will be irreversible within the temporal boundary of the assessment. Overall, the NICO Project should not have a significant adverse affect on the persistence of caribou. There is a moderate degree of uncertainty associated with this prediction, which is primarily related to the duration of impacts and the variability inherent to long-term predictions in ecology; however, conservative estimates in a number of analyses and models consistently generated low magnitude of effects, which indicates that the predicted impacts were not underestimated.

The decrease in the availability of caribou for harvesting from direct and indirect effects from the NICO Project is predicted to be within the range of baseline values. People should not observe a change in the availability of caribou due to effects from the NICO Project, relative to current natural changes in population size. Effects are expected to last from construction until 5 to 10 years after closure, and should be regional in geographic extent.

Access

Section 8.5.5 states that summer access to the LSA is currently limited to aircraft, quads, or watercraft that must be portaged using existing trail networks. The existing winter road provides some vehicle access (Section 8, Figure 8.1-1), between approximately late January and mid-April (DOT 2011, internet site). The construction of the NICO Project, the NPAR, and the Proposed Tłı̨cho Road Route will provide year-round access by vehicle to the region. The monitoring and mitigation plan, discussed below, indicates that Fortune will not permit hunting at the NICO site, nor by its staff or contractors on the NPAR road while travelling to and from the site; however, the proposed Tłı̨cho Road Route, as well as the NPAR may still be used to hunt caribou.

In January 2010, the GNWT implemented a total ban on caribou hunting in a new no hunting conservation zone established north of Yellowknife where the Bathurst caribou herd resides during the winter. The no hunting zone includes the area between the existing winter road to Gamètì, east to the Hoarfrost River that flows into the East Arm, and north to Nunavut (ENR 2010a). This hunting ban has since been modified to a limited harvest of Bathurst caribou for aboriginal hunters, through an agreement by the Tłı̨cho Government, the GNWT, and the Wek'èezhii Renewable Resources Board (see ENR 2011 for the most recent status of this agreement). These restrictions will extend at least until the winter of 2012-2013.

Considering that the caribou hunting season is typically between 15 August and 30 April in the NWT, and that caribou are only present in the caribou effects study area in winter, an all-season road would provide little advantage over winter roads with regards to access. Should harvesting on the Proposed Tłı̨chǫ Road Route and NPAR road reach a level of concern, the Tłı̨chǫ Government or the Wek'èezhii Renewable Resources Board could enact regulations to control the harvest. For example, further restrictions could be placed on hunting seasons, bag limits for resident harvesters, and a no-hunting corridor could be implemented similar to that in place for the Ingraham Trail.

Considering the proven ability of the Tłı̨chǫ Government to manage caribou harvesting, that the existing winter roads already provide access to the barren-ground caribou range, and that barren-ground caribou are only present in the region during winter, the harvest of caribou from the Proposed Tłı̨chǫ Road Route and NPAR is not expected to exceed that from the existing winter roads (in the absence of a caribou hunting ban).

Regarding the environmental significance of the potential effects of Project on caribou, the evidence from the analysis of the primary pathways predicts that the incremental and cumulative impacts from the NICO Project and other developments should not have a significant adverse impact on the persistence of the Bathurst population (Section 8.8.2). Subsequently, cumulative impacts from development also are not predicted to have a significant adverse effect on continued opportunities for use of caribou by people that value these animals as part of their culture and livelihood (Section 8.8.2).

Mitigation and Monitoring

In addition to the assessment provided in Section 8, mitigation and monitoring plans have been proposed in a summary of wildlife considerations in Section 9.4.4.4 (Closure and Reclamation). Environmental design features and mitigation, as well as current wildlife management practices used on the Ekati, Diavik, and Snap Lake mine sites will be implemented at the NICO Project to limit wildlife injury and mortality. Environmental design features and mitigation that will be implemented at the NICO Project include the following:

- blasting will be temporarily suspended when wildlife are spotted within the "safe zone";
- the CDF will be regularly monitored for wildlife activity and wildlife hazards;
- reflectors or other deterrents will be installed to discourage wildlife from crossing the roads;
- at closure, Borrow Sites, the Plant area, stockpile areas, etc. will be re-contoured to reduce hazards to wildlife;
- ditches will be contoured at closure as appropriate to remove any hazards to wildlife; and
- wildlife deterrent actions will be implemented by knowledgeable and trained personnel.

Fortune will not permit hunting at the NICO site, nor by its staff or contractors on the NPAR road while travelling to and from the site; however, the Proposed Tłı̨chǫ Road Route as well as the NPAR may still be used to hunt caribou. Environmental design features and mitigation are also applicable to the Other Wildlife section below.

Section 8.10 of the DAR describes the Wildlife Effects Monitoring Program (WEMP). The principal goal of the WEMP is to provide information required for the NICO Project Environmental Management System to adaptively manage the NICO Project to protect wildlife, caribou, and caribou habitat. Additional details on the WEMP are found in the discussion on the potential effects of the NICO Project on other wildlife life species, Section 16.4.2.4 below.

16.4.2.2 Fish

Section 12 (Fish and Aquatic Habitat) provides an assessment of the NICO Project on effects on fish and aquatic habitat. The sub-sections within Section 12 applicable to an assessment of potential project impacts on fish and aquatic habitats that were used to inform the TLU and TK portion of the SON for the Human Environment to meet the TOR are as follows:

- Section 12.6 Residual Effects Summary, which includes Related Effects to People

Traditional Fish Harvesting Summary

Interview participants from both communities reported fishing activities within the LSA and RSA (Section 5: Figures 5.3-5 to 5.3-8). A Whatì Elder reported that an unnamed lake in the NICO Project area used to be good for fishing when travelling there in the past. Gamètì interview participants said there are still many good fishing places in the general vicinity of the NICO Project, such as Lou Lake. Whatì interview participants also reported Lou Lake as a fishing area. Gamètì interview participants noted that fishing was at one time good in Peanut Lake and Nico Lake within the LSA. Fishing was also reported to occur outside that LSA; most relevant to the NICO Project TOR are the waterbodies of Hislop Lake and the Marian River. Lac La Martre was also noted as an important fishing waterbody. For a full presentation of TLU and TK NICO Project study results relating to fish and water, including concerns, refer to Section 5 of the DAR.

Potential Impacts

Effects of Dust Deposition

Windborne dust and air emissions from NICO Project facilities may result in increased deposition of dust in the surrounding area. Based on modelling, the predicted maximum (95th percentile) total suspended solidss (TSS) concentrations ranged from 5.9 milligrams per litre (mg/L) in Burke Lake to 11.7 mg/L in Peanut Lake during construction phases. During operations, the predicted maximum TSS concentrations ranged from 9.0 mg/L in the Marian River to 27.9 mg/L in Nico Lake. TSS concentrations generally peaked during the operation phase, decreasing at closure and approaching baseline values during post-closure. The largest maximum TSS concentrations were for Nico Lake (27.9 mg/L) and Peanut Lake (17.2 mg/L) during the operation phase. For the Marian River, the furthest downstream site under examination in this assessment, TSS concentrations are anticipated to remain similar to baseline values with the application of the NICO Project to the landscape. Residual Effects of TSS from dust and particulate deposition on fish and fish habitat are generally expected to be localized in the immediate vicinity of the NICO Project (i.e., Nico and Peanut Lake) and temporally restricted to the period during and after freshet. Further, the increases in sediment would be too small to produce measurable effects on fish and fish habitat beyond the range of baseline conditions. Although it will settle out of the water column fairly quickly, the high water levels, wave action, and currents will move the sediment off any

sensitive habitat areas in the nearshore areas of lakes (e.g., spawning shoals or vegetation) into the deeper main basin of the lake. Also, there are numerous beaver ponds between Peanut Lake and Burke Lake (i.e., in the Peanut lake outflow) that will likely trap and contain the majority of suspended sediments before entering Burke Lake and downstream waterbodies (Naiman et al. 1998). In summary, residual effects of TSS from dust and particulate deposition are expected to be localized in the immediate vicinity of the NICO Project (i.e., Nico and Peanut lakes) and temporally restricted to the weeks during and after freshet during construction and operation phases. As the NICO Project timeline approaches closure and TSS concentrations are reduced, residual effects should be eliminated from all waterbodies upon the post-closure phase.

Effects of Changes in Metal Levels

The existing water quality environment includes elevated levels of arsenic and iron in water in Nico Lake. With the application of the NICO Project, metal concentrations in water (total and dissolved) generally remain below site-specific water quality objectives (SSWQOs). However, total aluminum concentrations are predicted to exceed objectives during at least one phase of the NICO Project in Nico, Peanut, and Burke lakes. Elevated total aluminum concentrations are predicted for operations and active closure in Nico Lake, construction through to active closure in Peanut Lake, and during the operation phase and active closure in Burke Lake. The maximum concentration of total aluminum will be 1.31 mg/L and will be during the operation phase in Nico Lake. Total iron concentrations are also expected to exceed SSWQOs in Nico and Peanut lakes. Elevated total iron concentrations are predicted for operations and active closure in Nico Lake, and for the operation phase in Peanut Lake. The predicted maximum concentration (conservative estimate) of total iron will be 3.3 mg/L and will be during the operation phase in Nico Lake.

However, the effects of metal, such as aluminum and iron, generally manifest under low pH condition (e.g., Vuorinen et al. 1993; Peuranen et al. 2003), and the pH values of lakes within the NICO Project watershed are anticipated to remain neutral-to-alkaline for the duration of the NICO Project. Suter and Tsao (1996) recommended a chronic guideline for fish of 3.3 mg/L and for invertebrates (daphnids) of 1.9 mg/L. These thresholds were calculated on the basis of circumneutral pH, and are above the maximum predicted concentration for total aluminum for the NICO Project (1.31 mg/L). For iron, levels between 8 to 10 mg/L are generally considered to be high, leading to severe degradation of fish habitat (Amisah and Cowx 2000). Although total iron concentrations were predicted to exceed SSWQOs in Nico Lake (potentially as high as 3.3 mg/L in Nico Lake during operations), dissolved concentrations of all metals, including iron, are predicted to remained under SSWQOs for the NICO Project. The risks posed by metals, such as iron and aluminum, to the aquatic environment are determined by the amount of biologically available metal (i.e. the free ion) (reviewed in Golder 2010).

The primary input source of most metals for Nico and Peanut lakes will be in particulate form, as part of the runoff and accumulation of dust (i.e., total suspended particulate deposition) produced from the NICO Project. Sources of dust deposition and air emissions modelled in the application case include blasting activities, haul roads, the Plant, activities at the Open Pit and other ancillary facilities, and vehicle traffic along the NPAR and the Proposed Tłı̨chǫ Road Route. Environmental design features and mitigation have been incorporated into the NICO Project to reduce potential effects from dust deposition. For example, the watering of roads, Airstrip, and laydown areas during the non-winter period will facilitate dust suppression. In addition, programs will be implemented to review power and heat use to reduce energy use and emissions. Although these environmental design features and mitigation should reduce dust deposition and air emissions, assumptions incorporated into

the model are expected to contribute to conservative estimates (i.e., high) of air emission concentrations, surficial deposition rates, and metal concentrations in water.

Thus, with the application of the NICO Project, it is anticipated that changes to concentrations of metals due to dust deposition may affect the condition of the aquatic ecosystem for Nico Lake and Peanut Lake, but that the fish abundances and general condition of the lakes should remain within the range of baseline values (i.e., <10% effect size). Effects should be largely restricted to operation and active closure phases and to Nico Lake. It is anticipated that changes to metal concentrations in Burke Lake will not noticeably affect the ecological condition of the lake, including the persistence of populations for species generally considered more tolerant to disturbance. Tolerant species (e.g., northern pike and white sucker) typically characterize the assemblages of NICO Project lakes.

As the NICO Project timeline approaches closure and dust deposition concentrations are reduced, residual effects to water quality and the aquatic ecosystems should be noticeably reduced. Metal concentrations will be below site specific water quality objectives at post-closure. Although there is uncertainty associated with the anticipated time required for a complete recovery of Nico and Peanut lakes, the condition of aquatic habitat and the ecological health of the ecosystem will improve immediately and recover rapidly (e.g., Amisah and Cowx 2000). This prediction is consistent with trends in water quality and sediment chemistry pre- and post-fire in the region that show rapid responses in aquatic habitat following disturbance.

Risk to Aquatic Health

An aquatic risk assessment was completed for the NICO Project to determine the potential impacts on aquatic life (including aquatic plants, plankton, benthic invertebrates, and fish) from NICO Project-related emissions to surface waterbodies. The assessment was based on water quality predictions for Nico Lake and downstream waterbodies (i.e., Peanut and Burke lakes, and the Marian River). It considered chemical releases associated with dust generation and deposition to surface water as well as water discharges to surface water. Potential aquatic health impacts were determined during the construction, operations, closure, and post-closure phases of the NICO Project.

Overall, for all chemicals of potential concern and all phases of the NICO Project, the NICO Project-related risks to aquatic life are concluded to be either negligible, or low and likely negligible. Risk was considered to be negligible if calculated hazard quotients were less than target risk levels of 1, which is consistent with standard practice in risk assessment. Risks were considered low and likely negligible if hazard quotients were greater than 1 but less than or equal to 10 and based on the results of a magnitude of effect assessment which considered background concentrations and the degree of conservatism used in the derivation of the risk levels. In general terms, negligible risk indicates that there is unlikely to be adverse health impacts to aquatic life as a result of the Project. Low and likely negligible risk indicates a possibility of adverse health impacts to the most sensitive aquatic species.

Of the reasonably foreseeable projects identified in the DAR, none are expected to result in changes to water quality. Particular concern has been expressed by the Tłı̨chǫ government, Tłı̨chǫ citizens, and in the TOR (MVRB 2009) with respect to the potential cumulative effects due to the Rayrock and Colomac mines. However, given that impacts to aquatic health are considered negligible downstream of Burke Lake and the former Rayrock mine site is located at least 15 km downstream of Burke Lake, the cumulative effects on aquatic life are

considered negligible. The former Colomac mine is located in another drainage system which eliminated the potential for a cumulative effect with the NICO Project.

Related Effects to People

A measurable change in the abundance and distribution of sport fish populations is predicted for Nico Lake, and possibly Peanut Lake, which may influence the availability of fish for harvesting for traditional and non-traditional users. The magnitude of the decrease from the NICO Project on fish populations is expected to be within the range of existing conditions. Current fishing pressure in NICO Project lakes appears to be low and indicates that fishing pressure is unlikely to be a limiting factor for these populations. Therefore, the small decrease in the availability of fish for harvesting from NICO-Project related effects is predicted to be within the range of baseline values (i.e., people that fish in the region should not observe a change in the availability of animals due to effects from the NICO Project, relative to current natural changes in population sizes).

Increased angler access from the NPAR road may also affect populations of sport fish in the Hislop Lake-Marian River system (i.e., lake whitefish and walleye). The NPAR crosses the Marian River, and will pass Hislop Lake at which point the lake can be visited by anglers using the existing winter road portage that will intersect with the NPAR, by either snowmachine, all-terrain vehicles, foot, or 4x4 truck. However, Hislop Lake is a shallow, turbid lake, and is generally not considered an important fish-bearing waterbody. Due to the nearby proximity of Lac la Martre, a popular fishing destination, angler access by traditional and non-traditional users should remain within the range of existing conditions for Hislop Lake. It is predicted that only a few anglers will take advantage of increased access to Hislop Lake (i.e., change will be undetectable).

In summary, residual effects to people are expected, although changes to sportfish fish population sizes and opportunities for traditional and non-traditional users should be within range of baseline values (<10% magnitude). If angling pressure increase to the point where it is expected to affect fish populations, the impacts could be mitigated through changes in the sport fishing regulation for the affected waterbody. The duration of the effect will approximate the duration of the NPAR, from opening to closure of the road, or extend beyond closure if the NPAR is decommissioned with the mine. The spatial extent of effect may extend to the regional study area, including the Marian River and Hislop Lake.

Access

The Proposed Tłı̨cho Road Route will increase angling access to Lac La Martre given that the road will be open for travel for both winter and summer seasons; however, the all-land alignment of this road and the NPAR road will generally limit direct access to other lakes along the route. The NPAR will pass only a small number of lakes, the more notable being Hislop Lake, identified in Section 5 as used for traditional fishing, and Rabbit Lake. These lakes may be visited by anglers using the existing winter road portage that will intersect with the NPAR. Given that there will also be increased access to Lac La Martre, it is predicted that anglers will likely not stop to fish at Hislop and Rabbit lakes when Lac La Martre is nearby.

Mitigation and Monitoring

The fish assessment in Section 12 included proposed mitigation and monitoring plans (i.e., Aquatic Effects Monitoring Program [Section 18, Appendix 18.I]). Although the NICO Project may result in measurable changes to angler access in the region, effects will be reduced using appropriate environmental design features and mitigation. To manage the possible effects of increased fishing from new angler access, Fortune will not permit recreational fishing by their staff or contractors at the NICO mine site, or when on the NPAR for work purposes

(e.g., construction or travel). If concerns regarding over-fishing along the NPAR do arise, non-traditional fishing may be managed through waterbody-specific regulations (for example, the lakes along the Ingraham Trail have restrictions on possession of trout) (ENR 2010b). Traditional fishing may be managed by the Wek'èezhii Renewable Resource Board. Importantly, the NPAR will be decommissioned following closure so that access will be restricted into the future, unless otherwise negotiated with the Tłı̨chǫ Government.

Fortune has also made a commitment to the following mitigations and monitoring plans:

- Fortune will have a monitoring program in place to check water quality;
- Fortune will be adding a baseline water quality station at Behchokǫ̀ that will be monitored prior to and during operation of the mine to demonstrate water quality;
- Fortune has added 2 water quality stations in Hislop Lake to satisfy concerns over water quality in that lake; and
- Fortune has committed to developing a monitoring program with the help of the Tłı̨chǫ that will examine the health of streams and lakes potentially affected by the mine.

16.4.2.3 Vegetation

Section 14 (Vegetation) provides an assessment of potential NICO Project impacts to vegetation. The sub-sections within Section 14 applicable to an assessment of NICO Project on traditional plant harvesting that were used to inform the TLU and TK portion of the SON for the Human Environment, and meet the TOR are as follows:

- Section 14.5 Related Effects to People
- Section 14.6 Residual Effects Summary
- Section 14.7 Residual Impact Classification

Traditional Vegetation Harvesting Summary

Both Whatì and Gamètì study participants indicated that many plants and berries are harvested in the vicinity of the Project (Section 5: Figures 5.3-1 to 5.3-4). Participants also noted that while people have harvested berries in the NICO Project area, they no longer travel large distances to collect berries and typically harvest closer to where they live.

In the vicinity of the NICO Project, Lou Lake was used as a staging area to harvest berries among the hills. It was also reported that blueberries, cloudberries, and cranberries (high and low bush) were harvested in the NICO Project area. Gamètì interview participants identified a campsite on the southwest margin of Lou Lake, but the campsite was not attributed to a particular traditional activity.

Potential Impacts

Section 5 reports that berry and traditional plants are harvested in the vicinity of the NICO Project. The area in which berries and plants were reported to be harvested is partially overlapped by terrestrial LSA (Sections 14, 15) surrounding the Project, as well as the NPAR LSA, which includes a 1000 metre (m) buffer on either side of the right-of-way. The NPAR LSA overlaps Hislop Lake and Rabbit Lake.

Section 14.5 indicates that the overall effect from the NICO Project on the use of vegetation resources is expected to be within the range of baseline conditions. Effects from dust deposition and air emissions on vegetation are also expected to be mostly confined to the NICO Project footprint. The RSA outside the LSA, as described in Section 14, is not expected to be impacted.

Section 14.7.2 (Table 14.7-2) reports the following 2 primary pathways relating to TLU:

- physical loss or alteration of vegetation from the NICO Project footprint affecting availability of traditional and economic use plant species; and
- residual ground disturbance causing permanent loss and alteration of vegetation (including listed, traditional use, and economic use plant species).

The impact from the physical loss or alteration to vegetation resulting from the NICO Project is expected to be negative, but at a low magnitude and at a local scale. The effect is expected to be long-term in duration and periodic in frequency, but reversible. The likelihood of the effect is highly likely. The impact from residual ground disturbance causing permanent loss and alteration of vegetation is expected to be negative, but with a low magnitude and at a local scale. The duration of the impact is predicted to be permanent and the frequency is isolated. The impact is expected to be irreversible and the occurrence is highly likely.

Section 14.7.2 indicates it is not certain that rare plants, traditional use plants, and timber resources will be present in the reclaimed landscape in the same proportion and abundance as they are in a future environment that is not influenced by the NICO Project. The magnitude of impacts to traditional use is expected to be low (at the local scale). Although reclamation will be integrated into mitigation and management plans for the NICO Project, subarctic terrestrial ecosystems are slow to recover following disturbance; therefore, the duration of these changes likely will be long-term, but given adequate time, the impacts are predicted to be reversible. For a detailed discussion of the assessment of traditional plants and assessment criteria, refer to Section 14.

Regarding the environmental significance of potential effects to plant communities, the results indicate that the NICO Project should not result in significant adverse impacts to the persistence of plant populations and communities, including listed plant species, and the use of traditional and economic use plants. Changes resulting from the NICO Project are predicted to result in low to moderate local-scale impacts to plant populations and communities, and should be reversible in the long-term (i.e., 50 to 75 years following closure) (Section 14.8.2).

Access

Typically, increased access to previously identified plant and berry harvesting areas will provide increased berry and plant harvesting opportunities by both traditional and non-traditional harvesters. Because the NICO Project is approximately 160 km northwest of Yellowknife, it would be unlikely that there would be a substantial increase in non-traditional harvesters. Fortune will restrict traffic onto the site at the gate for safety reasons. As a result, public access to harvesting areas within the NICO Project area will not be available during construction and operation phases.

Mitigation and Monitoring

Section 14.10 indicates that mitigation and monitoring programs implemented during NICO Project may be a combination of environmental monitoring to track conditions and implement further mitigation as required, and

follow-up monitoring to verify the accuracy of impact predictions and adaptively manage and implement further mitigation as required.

Environmental monitoring will include the implementation of a vegetation management plan and would be designed to work in conjunction with other programs such as soils (Section 13), closure and reclamation (Section 9). The details of the vegetation management plan are in Biophysical Management and Monitoring Plans (Section 18) and KLOI: Closure and Reclamation (Section 9). The monitoring activities would include the monitoring of re-vegetation following reclamation and weed surveys. Re-vegetation will likely be a combination of natural colonization and the application of suitable seed and fertilizer (Section 9). Specific environmental design features and mitigation strategies to potential pathways for effects on vegetation can be found in Section 14 (Table 14.3-1).

Fortune has also made the following mitigation commitments:

- Fortune will mitigate dust generation on the NPAR to minimize potential impacts on plant and animal life during the summer;
- Fortune will hire Tłı̨chǫ people to perform the monitoring on-site whenever possible, and assist in the design of monitoring programs; and
- monitoring programs will be designed to reduce uncertainty of effects related to changes from the NICO Project (Section 14.9).

16.4.2.4 Other Wildlife

Section 15 (Wildlife) provides an assessment of the NICO Project on impacts to wildlife. The sub-sections within Section 15 applicable to an assessment of NICO Project impacts on wildlife that were used to inform the TLU and TK portion of the SON for the Human Environment, and meet the TOR are as follows:

- Section 15.5 Related Effects to People
- Section 15.6 Residual Effects Summary
- Section 15.7 Residual Impact Classification

Traditional Wildlife Harvesting Summary

Interview participants indicated that areas immediately surrounding the LSA, most notably Hislop Lake and sections of the Marian River, are used for harvesting, as locations for camps and cabins, and as travel routes. Several areas were also identified overlapping the LSA and the NICO Project area. Past hunting and trapping areas were reported by both Whatì and Gamètì interview participants in areas overlapped by the LSA, and include trails used for hunting or trapping between Hislop Lake and the LSA, and trapping areas in the general vicinity of Peanut Lake and Nico Lake. Whatì interview participants also specifically identified 1 trapline or trail that overlaps the LSA near Peanut Lake, and 2 additional traplines or trails that overlap the NPAR. The first additional trapline or trail overlaps the southwest portion of the NPAR and the second is located perpendicular to the NPAR between Hislop Lake and Rabbit Lake. Gamètì interview participants indicated that trapping occurred near Lou Lake.

General areas currently used for hunting and trapping that overlap the LSA were identified by both Whatì and Gamètì interview participants. Gamètì interview participants specifically noted that hunting around the proposed

mine site is generally limited to moose and rabbits. Other areas used for hunting or trapping that are overlapped by the LSA include the areas near Burke Lake and Lou Lake, as well as the general vicinity of the NICO Project. Larger general hunting or trapping areas were reported by interview participants that overlap the LSA and the NPAR (Section 5: Figures 5.3-1 to 5.3-4). Areas overlapping the NPAR were primarily identified by Whatì interview participants.

Potential Impacts

Access to harvesting areas within the NICO Project area will not be available for traditional activities during the construction and operation phases of the NICO Project; and trails or travel routes identified by Whatì and Gamètì interview participants within the LSA may not be accessible during the construction and operation phases. Gamètì interview participants indicated that a travel route is located east of Hislop Lake and extends through the LSA (Section 5, Figure 5.3-12). Gamètì interview participants also identified 2 campsites within the proposed Lease Boundary (Section 5, Figure 5.3-12). Whatì interview participants identified a trapline/trail located between Peanut Lake in the proposed NICO Project Lease Boundary and Betty Ray Lake (Section 5, Figure 5.3-10).

A measurable change in the abundance and distribution of wildlife populations is predicted within 1 to 2 km of the NICO Project and other developments, which may influence the availability of animals for trapping and hunting (Section 15.5). This area overlaps the wildlife harvesting area described in Section 5 by both Whatì and Gamètì interview participants; however, Section 15.5 predicts that the decrease in the availability of wildlife for harvesting from NICO-Project related effects is predicted to be within the range of baseline values (i.e., people that hunt and trap in the region should not observe a change in the availability of animals due to effects from the NICO Project, relative to current natural cycles in populations).

Section 15.7 (Table 15.7-2) presents a summary of residual impact classification of the 4 primary pathways relevant to potential impacts on traditional harvesting. These primary pathways for incremental and cumulative effects on abundance and distribution of wildlife populations, and related effects to people, are as follows:

- physical footprint decreases habitat quantity and causes fragmentation;
- sensory effects (e.g., noise, presence, lights, smells) changes the amount of different quality habitats, and alters movement and behaviour of wildlife;
- improved access for harvesting can affect wildlife population sizes; and
- effects on population size and distribution changes the availability of animals for traditional and non-traditional use.

The following summarizes the residual effects of the NICO Project on 3 of the primary pathways. The remaining pathway relating to access is discussed separately below.

The effects of the NICO Project footprint on habitat quantity and fragmentation are expected to be negative. The magnitude of the impact is expected to negligible to low at the local level for the incremental geographical extent and regional at the cumulative geographical extent. The duration of the impact is expected to be long-term to permanent with a continuous frequency. The likelihood of the impact is expected to be highly likely, but reversible to irreversible.

Sensory effects are expected to have a negative impact, and to be negligible to low for the incremental magnitude and low to moderate for the cumulative magnitude. The incremental geographical extent is expected to be local to regional and the cumulative geographical extent is expected to be regional. The duration of the effect is expected to be long-term and the frequency is expected to be isolated or periodic to continuous, but reversible. The likelihood of the effect is expected to highly likely.

The NICO Project-related effects on wildlife population size and distribution are expected to change the availability of animals for traditional and non-traditional use. The effects are expected to be negative with a low incremental magnitude and low to moderate cumulative magnitude, both on a regional scale. The effect is expected to be long-term and continuous, but reversible. The likelihood of the effect occurring is likely.

As stated in Section 15.6.3, the decrease in the availability of wildlife for harvesting from direct and indirect effects from the NICO-Project is predicted to be within the range of baseline values. Effects are expected to last from construction until 5 to 10 years after closure, and should be regional in geographic extent. For more details relating to the wildlife assessment, refer to Section 15.

The resilience in the current state of wildlife populations suggests that the impacts from the NICO Project and existing and future developments should be reversible. Overall, the weight of evidence from the analysis of the primary pathways predicts that the incremental and cumulative impacts from the NICO Project and other developments should not have a significant adverse impact on the persistence of wildlife populations. Subsequently, cumulative impacts from development also are not predicted to have a significant adverse effect on continued opportunities for use of wildlife by people that value these animals as part of their culture and livelihood (Section 15.8.2).

Access

Section 15.5 reports that the NPAR will allow hunters and trappers more vehicle access, including snow machine access, into the region. During construction, effects to wildlife from harvesting will be limited to the winter season. Although the development of the Proposed Tłı̨chǫ Road Route and NPAR during operations will increase access into the region during the entire year, harvesting of wildlife would likely occur periodically. Territorial harvest numbers for moose, marten, and muskrat further indicate that harvesting pressure is unlikely to be a limiting factor for these populations in the NWT.

Section 15.5 reports egg collection during the breeding season is the primary use of water bird resources by traditional users. Because access in the region is limited during the summer period, the Proposed Tłı̨chǫ Road Route and NPAR may increase harvesting pressure on waterbirds.

Overall, it is predicted that the number of wildlife harvested in the region from improved access due to the NPAR will approach or slightly exceed the limits of baseline values. For further discussion of the wildlife assessment and assessment criteria, refer to Section 15.

Mitigation and Monitoring

Section 15.10 also indicates that upon approval of the NICO Project, a WEMP (Appendix 18.II) will be implemented to limit effects to wildlife and wildlife habitat, determine the effectiveness of mitigation, and test impact predictions. The principal goal of the WEMP is to provide information required for the NICO Project Environmental Management System to adaptively manage the NICO Project to protect wildlife and wildlife habitat.

Specific objectives of the WEMP include the following:

- provide a means for regulators and communities to participate in the development of wildlife effects mitigation and monitoring;
- consider and incorporate TK where possible;
- provide mine managers with clear reasons for making decisions regarding NICO Project environmental management;
- outline the proposed environmental design features, and mitigation policies and practices;
- assess the effectiveness of mitigation; and
- verify the accuracy of impact predictions made in the DAR, reduce uncertainty of impact predictions, identify unanticipated effects.

More information regarding the WEMP can be found in Appendix 18.II.

Fortune has also made a commitment to specific mitigations and monitoring programs as follows:

- Fortune is committed to having discussions with hunters and trappers who approach Fortune with a case that their hunting and trapping practices have been compromised by the NICO Project;
- Fortune will hire Tłı̨chǫ people to perform the monitoring on-site whenever possible, and assist in the design of monitoring programs;
- Fortune has also made a commitment of mitigating dust generation on the road to minimize potential impacts on plant and animal life;
- Fortune has already completed 3 site visits for the Elders, and plans more in the future, to assist in the design of site monitoring plans; and
- Fortune will not permit hunting, trapping, harvesting, or fishing by staff and contractors and will prohibit the recreational use of all-terrain vehicles at site, so that people working on-site will not benefit from increased access to the region (Section 15.5).

The Proposed Tłı̨chǫ Road Route and the NPAR may still be used to hunt wildlife. Should harvesting on the Proposed Tłı̨chǫ Road Route or NPAR reach a level of concern, the Tłı̨chǫ Government or the Wek'èezhii Renewable Resources Board could enact regulations to control the harvest. Agreements with the Tłı̨chǫ government will be required for further restrictions, monitoring, or management of the portion of the access road that is on Tłı̨chǫ Land.

16.4.3 Effects from Noise and Visual Disturbance to Users of the Į̨daà Trail

The following section presents a summary of the noise baseline results (Appendix 8.III) of the NICO Project DAR that are relevant to the TOR requirements for noise changes perceptible from the Į̨daà Trail. Also, an assessment of the visual impact of the NICO Project from the Į̨daà Trail is presented based on information provided by Fortune and design of the NICO Project.

Traditional Knowledge Related to the Įdaà Trail

The portion of the Įdaà Trail that is located west of the NICO Project follows the Marian River southwest of the NICO Project, Hislop Lake, west of the NICO Project, and then the Marian River again, northwest of the NICO Project (Section 5, Figure 5.1-3). This trail is very important to the Tłı̨chǫ people because approximately 20 sacred sites and 189 graves are reported to be located adjacent to the trail or directly along the trail.

Potential NICO Project-Related Visual Impacts

Fortune has indicated that the CDF was designed so that it would not be higher than the hills surrounding the NICO Project (Section 3.2.1, Photographs 3.2-1 to 3.2-4). As a result the NICO Project is not expected to be visible from Hislop Lake or the Įdaà Trail. Given that the Įdaà Trail follows the Marian River west of the NICO Project, it is assumed that the NICO Project will not be seen from the Marian River; however, the NPAR bridge will pass over the Marian River and thus will be visible from that section of the Marian River.

Mitigation and Monitoring

Visual impacts due to the NICO Project were not discussed during TK interviews in the communities. Fortune has indicated that the CDF has been designed not to be higher than the surrounding hills and, consequently, not be visible from Hislop Lake or the Įdaà Trail; also, by building the CDF, the Mine Rock Management Area has been eliminated, reducing the visual impact of the NICO Project. The Mine Rock Management Area would have been visible from Marian River and Hislop Lake prior to these changes.

Potential NICO Project-Related Noise Impacts

As presented in Appendix 8.III (Section 8.III.5.2 [Noise Assessment]), mine cumulative noise levels, as predicted from the Hislop Lake Cabins area on the northwest side of Hislop Lake will not be detectable. Similarly, it is predicted that mine operation noise levels will not be detectable from noise sensitive receptor locations identified as Įdaà Trail 1, located on the Marian River northwest of the NICO Project, or Įdaà Trail 2, located at the confluence of Hislop Lake and the Marian River along the southeast portion of Hislop Lake. The Įdaà Trail 3, Įdaà Trail 4, and Įdaà Trail Portage receptor locations (Appendix 8.III, Figure 8.III.1-1), located southwest of the NICO Project, are predicted to be over 3 A-weighted decibels (dBA), where the ‘A’ denotes a standard frequency weighting used to account for the sensitivity of the human auditory system, from a baseline level of 35 dBA, and thus likely detectable.

Appendix 8.III (Section 8.III.5.2), predicts cumulative noise levels from the NPAR to be greater than 35 dBA at the Įdaà Trail Portage and Įdaà Trail 2-4. Only Įdaà Trail Portage and Įdaà Trail 3 exceed 40 dBA. There is the potential for existing winter road traffic to contribute to elevated sound levels in the immediate vicinity of the road. The predicted access road noise levels from the Hislop Lake Cabins area on the northwest side of Hislop Lake will not be detectable.

As described in Appendix 8.III (Section 8.III.7.3), flights to the NICO Project site are expected to occur 100 and 200 times a year during construction, if the Airstrip is built, and once per year during operations (daytime hours only). The results show that there is the potential for elevated noise events during aircraft flyovers at the selected receptors. The events represent 1 instance per day when the noise will be substantially higher than background; however, the duration of each event is expected to be a few seconds not minutes or hours. In general, noise impacts from air traffic will be intermittent and infrequent.

It is not expected that the users of these locations will hear a blast, except on an overcast day, and depending on the frequency of the air vibration. People at Hislop Lake and on the Marian River (Įdaà Trail) may experience a small vibration from blasting.

Section 8.III.10 states that while noise will be generated by the NICO Project, the expected levels at identified noise receptors are within most of the relevant benchmarks established for remote areas. These benchmarks are guidelines selected for the Project, and do not indicate a regulatory requirement, as there are no environmental noise regulations in the NWT. In addition, the benchmarks are from guidance focused on human effects only.

Mitigation and Monitoring

As reported in Section 5, interview participants reported that caribou migration may change because of mining noise (Section 5.3.2.6). Whatì interview participants perceived that air, water, and noise pollution from new developments may harm the animals, fish, and birds (Section 5.3.1). The Métis of the North Slave Region have also reported concerns relating to developments and noise (NSMA 2001b).

Fortune has taken measures to minimize the effects of sensory disturbances including the following:

- mufflers will be used on mining equipment;
- blasting will be limited to 1 blast/day; and
- the predictions for the NICO Project are considered conservative and follow-up noise monitoring will be done once the NICO Project is in operation to verify the modelling and resulting disturbance area, but long-term monitoring should not be necessary (Appendix 8.III, Section 8.III.10).

As reported in Appendix 8.III (Section 8.III.10), the NICO Project meets most of the relevant noise benchmarks used in the assessment, with the exception of the 40 dBA limit at 1.5 km from the NICO Project. The noise benchmark used in the assessment was ERCB Directive 038: Noise Control (ERCB 2007). Since the benchmark used for the NICO Project is an Alberta criteria, this is not a regulatory requirement in the NWT. There are no similar NWT criteria; therefore, any exceedances do not represent compliance violations.

16.4.4 Sensory Effects on Traditional Authenticity for Įdaà Trail Users

The potential effects to the traditional authenticity for users of the Įdaà Trail considered the potential effects of Project-related noise and visual effects, as these effects have the potential to influence the wilderness character for users of the trail.

Users of the Įdaà Trail will be able to hear mine operations and traffic along the NPAR at portions of the Įdaà Trail southwest of the NICO Project, but not along portions of the Įdaà Trail along the southeast corner of Hislop Lake or at sensors located northwest of the NICO Project. Users of the Įdaà Trail will be able to hear incoming and outgoing aircraft from all Įdaà Trail noise sensitive receptor locations discussed in Section 8.III.7.3 (Noise Assessment).

The CDF was designed so that it would not be higher than the surrounding hills and consequently not visible from Hislop Lake or the Įdaà Trail. Given that the Įdaà Trail follows the Marian River west of the NICO Project it is assumed that the NICO Project will not be seen from the Marian River; however, the NPAR will pass over the Marian River and thus will be visible from river at the point of crossing.

16.4.5 Effects on Traditional Activities at Hislop Lake

The following section presents a summary of the potential NICO Project effects on traditional activities at Hislop Lake. In addition, this section presents a summary of Section 5 relevant to traditional activities at Hislop Lake.

Summary of Traditional Activities at Hislop Lake

During interviews, both Whatì and Gamètì interview participants reported the following information related to traditional activities Hislop Lake:

- trails are used for hunting or trapping from Hislop Lake to the LSA;
- trapping occurs within the Hislop Lake and Rabbit Lake areas;
- hunting or trapping occurs between Lac La Martre and the Hislop Lake, Rabbit Lake, and Tumi Lake areas;
- houses, cabins, and camps were reported along various sections of Hislop Lake, including a camp at the north end that was historically used year-round; and
- burial sites were reported within the RSA around Hislop Lake.

Whatì interview participants reported information relating to Hislop Lake as follows:

- hunting or trapping areas surrounding Hislop Lake including traplines identified northeast, southwest, and northwest of the lake; and
- an old traditional trail was reported to be located between Hislop Lake and Rabbit Lake, as well as a travel route marked from Lac La Martre to a camp at the southeast corner of Hislop Lake near the Marian River.

Gamètì interview participants reported information relating to Hislop Lake as follows:

- hunting or trapping from Hislop Lake to Otter Lake, northwest of the RSA; and
- a travel route extending east from Hislop Lake through the LSA.

Elders also added that they also lived and travelled along trails in the Hislop Lake area (DCI 1995: Appendix A). The portion of the Įdaà Trail that is located west of the NICO Project follows the Marian River southwest of the Project, Hislop Lake, west of the NICO Project, and then the Marian River again, northwest of the NICO Project. In addition, an historic seasonal village called K'agooti Kogolaa was located along the Įdaà Trail at Hislop Lake (Prince of Wales Northern Heritage Center no date, internet site).

Potential NICO Project Impacts on Traditional Activities at Hislop Lake

The potential impacts of the NICO Project on traditional activities relate to the potential effects to hunting and trapping, fishing, and plant harvesting. Other potential effects may relate to visual or noise disturbances experienced by users of the Hislop Lake area.

The potential impacts of the NICO Project on caribou and other wildlife resources required for hunting and trapping at Hislop Lake were assessed in Section 16.4.2.1 and Section 16.4.2.4 above. The potential impacts of the NICO Project on fish in Hislop Lake were assessed in Section 16.4.2.2 above; and the potential impacts of the NICO Project on plants for traditional harvesting were assessed in Section 16.4.2.3 above.

The potential impacts of NICO Project-related visual and noise impacts on users of the Hislop Lake area were assessed in Section 16.4.2.3 above.

16.4.6 Residual Impact Classification and Significance

A summary of the residual impact classification and significance of primary pathways relating to the TLU and TK portion of Section 16, as reported in Section 8 (Caribou), Section 12 (Fish and Aquatic Habitat), Section 14 (Vegetation), and Section 15 (Wildlife) of the NICO Project DAR, are summarized in Table 16.4-2.

Table 16.4-2 shows that NICO Project activities are not expected to have a significant adverse impact on opportunities to harvest caribou, other wildlife, fish, or traditional plants. The NICO Project will not be visible at Hislop Lake, or the Įdaà Trail, except for that part of the NPAR that crosses the Marian River. NICO Project-related noise (including blasting) will have a small effect to people at Hislop Lake or the Marian River. As a result, the NICO Project is not expected to have a significant adverse impact on traditional activities or harvesting success.

Table 16.4-2: Summary of Residual Impact Classification and Significance of Primary Pathways for Incremental and Cumulative Effects to the Human Environment

Pathway	Direction	Magnitude		Geographic Extent		Duration	Significance	
		Incremental	Cumulative	Incremental	Cumulative		Incremental	Cumulative
Effects on population size and distribution changes the availability of caribou for traditional and non-traditional use	negative	Low	moderate	regional	regional	long-term	not significant	not significant
Effects on population size and distribution changes the availability of animals for traditional and non-traditional use	negative	Low	low to moderate	regional	regional	long-term	not significant	not significant
Physical loss or alteration of vegetation from the NICO Project footprint affecting availability of traditional and economic use plant species	negative	low (not distinguished between incremental and cumulative)		Local (not distinguished between incremental and cumulative)		long-term	not significant	not significant
Residual ground disturbance can cause permanent loss and alteration of vegetation (including listed, traditional use, and economic use plant species)	Negative	low (not distinguished between incremental and cumulative)		local (not distinguished between incremental and cumulative)		permanent	not significant	not significant
NICO Project activities may affect availability of fish for traditional harvesting	Negative	Negligible to low	Negligible to low	Regional	Regional	Continuous	Not significant	Not significant

16.4.7 Uncertainty

The uncertainty regarding the assessment of potential effects of the NICO Project on traditional activities relates to the uncertainty of determining the potential effects of the NICO Project on the underlying resources required for the various traditional activities. Detailed discussions on uncertainty relating to the assessment of potential NICO Project-related effects on wildlife, fish, and vegetation are found in the respective assessments. A discussion of uncertainty related to the assessment of potential NICO Project-related effects to caribou and other wildlife is found in Section 8.9 and Section 15.9, respectively. A discussion of the uncertainty related to the assessment of potential effects of the NICO Project on fish and aquatic habitat is found in Section 12.9; and a discussion of uncertainty related to the assessment of NICO Project-related effects on vegetation is found in Section 14.9.

16.4.8 Monitoring

Monitoring related to traditional activities typically relates to monitoring the potential effects of the NICO Project on the terrestrial and aquatic resources required to support the activities, such as wildlife, vegetation, fish, and water. Detailed discussions on monitoring and follow-up can be found in the assessments of the respective disciplines as follows. Monitoring related to caribou and other wildlife can be found in Section 8.10 and Section 15.10, respectively. The monitoring of fish and fish habitat is discussed in Section 12.10; and a discussion of monitoring related to vegetation is found in Section 14.10. Section 18 outlines all biophysical monitoring and management plans.

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