ENVIRONMENTAL IMPACT STATEMENT
for the
MACKENZIE GAS PROJECT

Volume 6: Part C

Socio-Economic Impact Assessment

Déline
Community Report

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1 INTRODUCTION

1.1 Background and Purpose

The purpose of this report on Déline is to respond to the Joint Review Panel (JRP) request for a community-specific presentation of the environmental impact statement (EIS) socio-economic impact assessment (SEIA). For consistency and ease of use, the report is similar in structure to the regional-level material contained in the existing EIS, Volumes 6A and 6B. The report presents a community focus on a stand-alone basis, with the intent of meeting the needs of, and facilitating review by, the applicable community without substantial reference to other EIS documentation. A corresponding Volume 4B has been prepared to present the socio-economic baseline conditions on a community-specific basis.

1.2 How to Use this Report

In order to help the reader to locate content that may be of particular interest and to allow linkages for a given topic between the baseline information in Volume 4B and the effects assessment in Volume 6C, as well as to the existing Volumes 4 and 6 of the EIS, the following concordance table provides cross-references for the topics in each volume. The numbering has changed in Volume 6C from the EIS to accommodate new sections.

Table 1-1: Environmental Impact Statement Topic Areas

Topic	EIS, Volume 4	Volume 4B	EIS, Volumes 6A and 6B	Volume 6C
Introduction	1.0	1.0	1.0	1.0
Geographic Area of Interest	–	–	–	2.0
Public Participation	–	–	–	3.0
Project Expenditures	–	–	2.0	–
National Economic Effects	–	–	3.2	–
Population Composition and Dynamics (Demography)	2.2.1, 2.3.1, 2.4.1, 2.5.1, 2.6.1, 2.7.1, 2.8.1, 2.9.1	2.2	3.3	4.2
Economic Activity	2.2.2, 2.3.2, 2.4.2, 2.5.2, 2.6.2, 2.7.2, 2.8.2, 2.9.2	2.3	3.1	4.1
Labour Force	2.2.3, 2.3.3, 2.4.3, 2.5.3, 2.6.3, 2.7.3, 2.8.3, 2.9.3	2.4		
Income Sources and Amounts	2.2.4, 2.3.4, 2.4.4, 2.5.4, 2.6.4, 2.7.4, 2.8.4, 2.9.4	2.5		

Table 1-1: Environmental Impact Statement Topic Areas (cont'd)

Topic	EIS, Volume 4	Volume 4B	EIS, Volumes 6A and 6B	Volume 6C
Cost of Living	2.2.5, 2.3.5, 2.4.5, 2.5.5, 2.6.5, 2.7.5, 2.8.5, 2.9.5	2.6		
Transportation Infrastructure	3.2.1, 3.3.1, 3.4.1, 3.5.1, 3.6.1, 3.7.1, 3.8.1, 3.9.1	3.3	4.1	5.2
Utilities, Energy and Communications	3.2.2, 3.3.2, 3.4.2, 3.5.2, 3.6.2, 3.7.2, 3.8.2, 3.9.2	3.4	4.2	5.3
Housing	3.2.3, 3.3.3, 3.4.3, 3.5.3, 3.6.3, 3.7.3, 3.8.3, 3.9.3	3.5	4.3	5.4
Recreation	3.2.3, 3.3.3, 3.4.3, 3.5.3, 3.6.3, 3.7.3, 3.8.3, 3.9.3		4.4	5.5
Governance	3.2.4, 3.3.4, 3.4.4, 3.5.4, 3.6.4, 3.7.4, 3.8.4, 3.9.4	3.2	4.5	5.1
Health Conditions	4.2.1, 4.3.1, 4.4.1, 4.5.1, 4.6.1, 4.7.1, 4.8.1, 4.9.1	4.2	5.3	6.2
Health Care Facilities and Services	4.2.2, 4.3.2, 4.4.2, 4.5.2, 4.6.2, 4.7.2, 4.8.2, 4.9.2	4.3	5.2	6.1
Family and Community Conditions (Community Well-Being)	4.2.3, 4.3.3, 4.4.3, 4.5.3, 4.6.3, 4.7.3, 4.8.3, 4.9.3	4.4		
Human Health Risks	–	–	5.4	6.3
Accidents and Malfunctions	–	–	–	6.4
Social and Protection Facilities and Services	4.2.4, 4.3.4, 4.4.4, 4.5.4, 4.6.4, 4.7.4, 4.8.4, 4.9.4	4.5	5.5	6.5
Education and Training	4.2.5, 4.3.5, 4.4.5, 4.5.5, 4.6.5, 4.7.5, 4.8.5, 4.9.5	4.6	5.6	6.6
Traditional Harvesting	5.2.1, 5.3.1, 5.4.1, 5.5.1, 5.6.1, 5.7.1, 5.8.1, 5.9.1	5.2	6.2	7.1
Trapping	5.2.2, 5.3.2, 5.4.2, 5.5.2, 5.6.2, 5.7.2, 5.8.2, 5.9.2	5.3		

Table 1-1: Environmental Impact Statement Topic Areas (cont'd)

Topic	EIS, Volume 4	Volume 4B	EIS, Volumes 6A and 6B	Volume 6C
Aboriginal Language	5.2.3, 5.3.3, 5.4.3, 5.5.3, 5.6.3, 5.7.3, 5.8.3, 5.9.3	5.4	6.3	7.2
Nontraditional Land and Resource Use	6.0	6.0	7.0	8.0
Heritage Resources	7.0	7.0	8.0	9.0
Cumulative Effects	–	–	9.0	–
Monitoring and Follow-Up	–	–	10.0	10.0
References, Glossary	end	end	end	end
NOTE: – = not included, or not discussed				

1.3 Approach

This SEIA is designed to focus on how the project may affect the wellness of a community. Wellness is often the most highly valued aspect of community life, and depends on the well-being of individuals, families and the community as a whole. Community wellness may be significantly enhanced by project benefits, and be vulnerable to adverse effects.

The effects assessment is focused on addressing community concerns, with the aim of designing and implementing the project using procedures that optimize beneficial effects and reduce effects the communities believe to be undesirable.

A community-driven approach requires:

- knowledge about the characteristics of the communities that may be affected
- understanding of the interests and concerns of these communities

Knowledge of community characteristics has been obtained by collecting information from residents who are informed about a particular circumstance. Information on interests and concerns was gained in the meetings and community consultations held with residents of Déline and the other communities in the Sahtu Settlement Area (SSA).

1.4 How the Effects Assessment is Conducted

Communities experience socio-economic effects in accordance with two primary interactions:

- physical, social or economic interaction between the project components activities or personnel, and community residents and their economic, social or cultural resources and pursuits

- supplying workers or business services to the project, which generates income for firms and individuals. The spending or investment of this income will have both positive and negative effects.

These community-specific reports do not address cumulative effects since this is not an appropriate analysis to conduct at the community level.

1.5 Data Limitations

To the extent feasible, assessment information in the EIS, Volumes 6A and 6B has been supplemented by data and information available at the community level. In order that regional and community presentations are internally consistent and comparable, only limited new data is presented.

Many of the communities in the Northwest Territories have relatively small populations, which means that data collected by Statistics Canada and other agencies, at the community level, is either suppressed or has limitations to maintain confidentiality and privacy. As a result, in several instances, information and analysis is constrained to a regional-level discussion.

For the reasons described above, this report therefore contains a significant amount of information common to all SSA communities. However, the report also contains some community data previously collected but not presented in the EIS. Where distinct community-specific effects have been identified, they are provided in this report.

This approach is consistent with input from the public participation program for the EIS. During issues scoping meetings with individual communities and the subsequent regional workshops, it was found that the majority of issues were commonly held among communities. Not only were some issues similar among communities in any region, but many concerns were common across the study area.

1.6 New Information

In its letter of December 3, 2004, the JRP requested additional information related to the effects assessment. This volume contains the following new information:

- the geographic area of interest of each community is addressed by relating project facilities and activities to communities that have either stated an expressed geographic interest during project studies and consultations, or whose interests are documented in public plans or agreements. This exercise was undertaken to respond to a request from the JRP. In the process of identifying the geographic area of interest, some overlap of interests between communities occurs. Consequently, the geographic area of interest might not exactly represent an individual community's point of view. Further, it is only one of several factors taken into account in the effects assessment.

- the public participation program (EIS, Volume 1, Section 3) has been summarized by providing an overview of the important meetings and consultation events, quantifying the extent of participation, and listing the key issues identified for each community

- the human environment aspects of accidents and malfunctions scenarios have been developed. The description of accidents and malfunctions is the same for all communities.

Traditional knowledge (TK) studies are being conducted under contract with community and regional groups in all areas, and the results of these studies, when available, may provide additional information on the issue of geographic areas of interest. However, this information will be available only if TK study groups choose to disclose it.

1.7 Summary of Socio-Economic Effects on Déline

Déline, the second largest predominantly Aboriginal community in the SSA, is about 84 km distant from the nearest project related activities and 105 km from the nearest construction camp. Accordingly, it will experience effects of the project only if some residents choose to accept project-related employment, or if residents participated in activities on lands near the pipeline or infrastructure. This would likely necessitate their working or participating in activities outside the community. If this should happen, the economic and employment effects of the project will likely be beneficial.

Project effects are assessed for direction, magnitude, duration and geographic extent. These are commonly referred to as attributes. The direction of a project effect is evaluated as neutral, adverse or positive, while the magnitude of an effect can be no effect, low, moderate or high. Low-magnitude effects would be barely discernible, while high-magnitude effects would represent noticeable changes in the community. The duration of an effect can be short term (occurring during the Construction Phase only) or long-term (lasting into the Operations Phase). The geographic extent of an effect can be local (experienced by the community only) or regional (experienced throughout the SSA) in extent. Virtually all construction effects are short term, and those Déline may experience may be local or regional in extent.

A socio-economic effect is only considered significant if the effect will be:

- high magnitude, short term, and regional, beyond regional or national in extent

- high magnitude, long term and any geographic extent

- moderate magnitude, long term, and beyond regional or national in extent

The following is a summary of some of the expected project effects for the SSA, some of which might be experienced in Déline. Not all attributes are described in the following text. Please the see the appropriate sections of this report for full descriptions.

- Procurement, employment and income is expected to have high-magnitude positive effects regionally and beyond in the short term. During operations, these positive effects will be low in magnitude, and regional and beyond regional in extent.

- Moderate effects region-wide on transportation are expected, adverse on road and marine transportation, but positive and adverse on air transportation. These will last only for the short term.

- Only low-magnitude in-migration to Déline is expected, and thus adverse local, short-term effects on housing and accommodation supply will not be noticeable.

- Spending of project earnings may lead to some increased alcohol and substance abuse and associated problems in the short term, with likely adverse, low-magnitude, local effects on both well-being conditions and social services. Effects on protection services are expected to be similar.

- Effects on health conditions and health care services are expected to be adverse, of moderate magnitude and experienced only locally for the short term.

- Project employment opportunities may motivate some students to leave school early and perhaps some to return to school. Therefore, effects on education attainment may be low in magnitude, positive and adverse, and experienced locally for the short term. No effects are expected on education services.

- Regionally, low-magnitude adverse effects on traditional harvesting are expected in the SSA Aboriginal communities. Similarly, low-magnitude adverse effects on traditional culture are expected. These will be only short term.

- Because the project is located some distance from Déline, potential project effects on nontraditional land use and resources, visual and aesthetic resources, and protected areas are not expected.

- As there will be no project components in the Déline area, project effects on heritage resources are not expected.

2 GEOGRAPHIC AREA OF INTEREST

2.1 Boundaries

This section describes the areas of interest for the SSA communities. The area of interest is defined as the geographic or spatial extent of most community socio-economic activity, and this area has been used to identify the most important potential project effects likely to impinge upon a given community. This area of interest can extend beyond the community within, or even outside, the region.

The Sahtu Land Use Planning Board (SLUPB) was tasked with developing a land use plan for the Sahtu that guides the conservation, utilization and development of the land. The Board's mandate extends over all lands within the SSA, exclusive of municipalities. A preliminary draft of the plan was released in 2002. The limitations of the draft plan were summarized in the document on page 11:

> *The Sahtu Land Use Planning Board is being careful not to fill in the gap left by the absence of the intermediate plan types at this point in time. Given the large size of the Sahtu Settlement Area, and the fact that there were no previous land use plans for the locale, the Sahtu Land Use Planning Board has necessarily kept this preliminary draft land use plan at the regional scale. It is suggested that during subsequent five-year review and implementation periods, the Sahtu Land Use Planning Board should consider assisting with the preparation of more detailed plans (i.e., Integrated Resource Management Plans and Resource Management Plans) in areas of high use and where conflicting values occur. These intermediate land use plans could take place at watershed level or perhaps within geopolitical boundaries such as a District.*

The draft plan stated (p. 7):

> *This preliminary plan is just the beginning . . . Over the next year we will be meeting with communities, government and industry to ensure that the plan meets the needs of the majority of the people.*

Unfortunately, the SLUPB has not had a quorum for over a year. The work needed to articulate the geographic areas of interest of the Sahtu, on the basis of land use planning, has not taken place.

Prior to ratification of the Sahtu Dene and Métis Comprehensive Land Claim Agreement in 1994, the Sahtu Dene and Métis engaged in a debate about how they would organize themselves once the agreement was settled. Two competing philosophies were discussed and there were those individuals who wanted to create an Inuvialuit- or Gwich'in-type of structure and the others who wanted to

design a structure that would reflect paragraph 5.2.10 of the Land Claim Agreement which states, *Self government negotiations will address the desire of the Sahtu Dene Métis to have self-government exercised as close to the community level as possible.*

One of the obligations in the Land Claim Agreement is the right for the five Sahtu communities to negotiate self-government. Progress has occurred in Déline and more recently Tulita). It is anticipated that the remaining Sahtu communities will do so within the next four years. Once this process has been achieved, the SSA will theoretically have five Aboriginal-public governments, and the existing organizations and structures will evolve into new government regimes.

In the interim and in the absence of a dynamic land use planning exercise, the current roles and responsibilities of each of the existing organizations are defined by the Sahtu Master Land Agreement and the authorities assigned to the district land corporations pursuant to Chapter 7 of the Sahtu Dene and Métis Comprehensive Land Claim Agreement. The interim points of contact for the SSA are the Sahtu Chiefs and the District Land Corporation Presidents.

Within the Déline District, the area of local interest extends west to Bennett Field site on the Bear River.

2.2 Project Facilities in the Area of Interest

Table 2-1 indicates the specific project components and the approximate construction timing relevant to the Déline area.

Table 2-1: Project Components and Construction Timing Relevant to the Déline Area

Project Component	Construction Schedule	Location
Anchor fields (includes flow lines)	N/A	N/A
Gathering pipelines	N/A	N/A
Gathering facilities	N/A	N/A
Pipelines	2006–2009	N/A
Pipeline facilities	2006–2009	N/A
Barge landing sites	2006–2007	N/A
Stockpile and storage sites	2006–2008	N/A
Camps	2006–2008	N/A
All-weather roads	2006–2009	N/A
Airstrips and airports	2006–2007 (new)	N/A
Borrow sites	2006–2009	N/A
NOTE: N/A = not applicable		

3 PUBLIC PARTICIPATION

Public participation activities for the EIS with the community of Déline can be summarized as follows.

The EIS public participation program consisted of two *rounds* of public participation activities. Each round consisted of community meetings, followed by a regional workshop. Round 1 focused on issues scoping, where communities were provided with information about the project, and asked to identify their concerns. Round 2 focused on identifying and verifying possible project effects, based on issues identified in Round 1, and suggesting measures to manage or mitigate the negative effects, and optimize the positive effects.

During Round 1, representatives from the Déline Renewable Resource Council participated in community meetings in Déline on March 11, 2003. Round 1 concluded with a regional EIS technical workshop held in Norman Wells on June 4 to 5, 2003. Representatives from the leadership organizations of Déline attended, along with representatives from leadership organizations from Colville Lake, Fort Good Hope, Norman Wells and Tulita, regulatory agencies, and the project team. They discussed the issues that arose in each community from the preceding community meetings and clarified which issues were common or unique across the different communities.

On December 3 to 4, 2003, Déline began participating in the second round of public participation activities at a regional introductory session workshop held in Norman Wells. Representatives from the leadership organizations of Déline attended, along with representatives from Colville Lake, Fort Good Hope, Norman Wells and Tulita, and the project team. The introductory session gave attendees the opportunity to hear the perspectives of participants from other communities in the region about possible effects and suggested mitigation measures, and to refine the participation process for the rest of Round 2. Following the introductory session workshop, representatives from the Elders and youth, hunters' and trappers' committee, Déline Land Corporation, Déline Renewable Resource Council, and the Déline Band participated in community meetings in Déline on February 20, 2004. In addition, Déline community members attended an open house in Déline on February 20, 2004. As in the afternoon meeting of February 20, at the open house, community attendees were encouraged to consider the possible effects of the project and to suggest mitigation measures. Round 2 concluded with a regional confirmation meeting, attended by representatives from Déline, Colville Lake, Fort Good Hope, Norman Wells and Tulita, held in Norman Wells on May 11 to 12, 2004. The confirmation meeting served to review and discuss input heard at the preceding community meetings, and confirm that project representatives had correctly understood it.

In addition to the above consultation activities, community consultations with Déline leadership organizations were carried out during the application for the necessary biophysical permits and scientific research licenses and for a proposed TK study in the SSA.

Community participation activities were not restricted to those described previously. Initiatives by the individual project proponents to fulfill their community relations commitments provided additional opportunities for project representatives to interact with the communities.

General Issues Identified

For a complete listing of all the issues and their respective suggested mitigative measures identified for Déline, please see Volume 1, Section 4 of the EIS. The following is a representative selection of the issues identified for Déline:

- increased access to fish habitats potentially depleting fish resources and increased pressure to sensitive harvesting areas
- need for cross-cultural awareness training to respect the differences in the respective lifestyles
- crossing the Great Bear River might disrupt water levels or fish activities in the River or in Great Bear Lake
- concern that the project will introduce another boom-and-bust cycle into the community
- concern that project money will increase the drug and alcohol use in the community

4 PEOPLE AND THE ECONOMY

4.1 Procurement, Employment and Regional Economic Effects

4.1.1 Effect Pathways

The expected influences of the project on procurement, employment and regional economies of the Northwest Territories are shown in Figure 4-1. In broad overview, project effects will derive from interactions of demand and supply. The project will generate a large demand for goods, services and workers at project locations in the Northwest Territories. Qualified and competitive suppliers of goods, services and workers in northern communities and regions will respond to the demand if possible and within their capacity limitations. Where demand exceeds northern supply capacity, the project will look beyond the Northwest Territories to meet supply requirements.

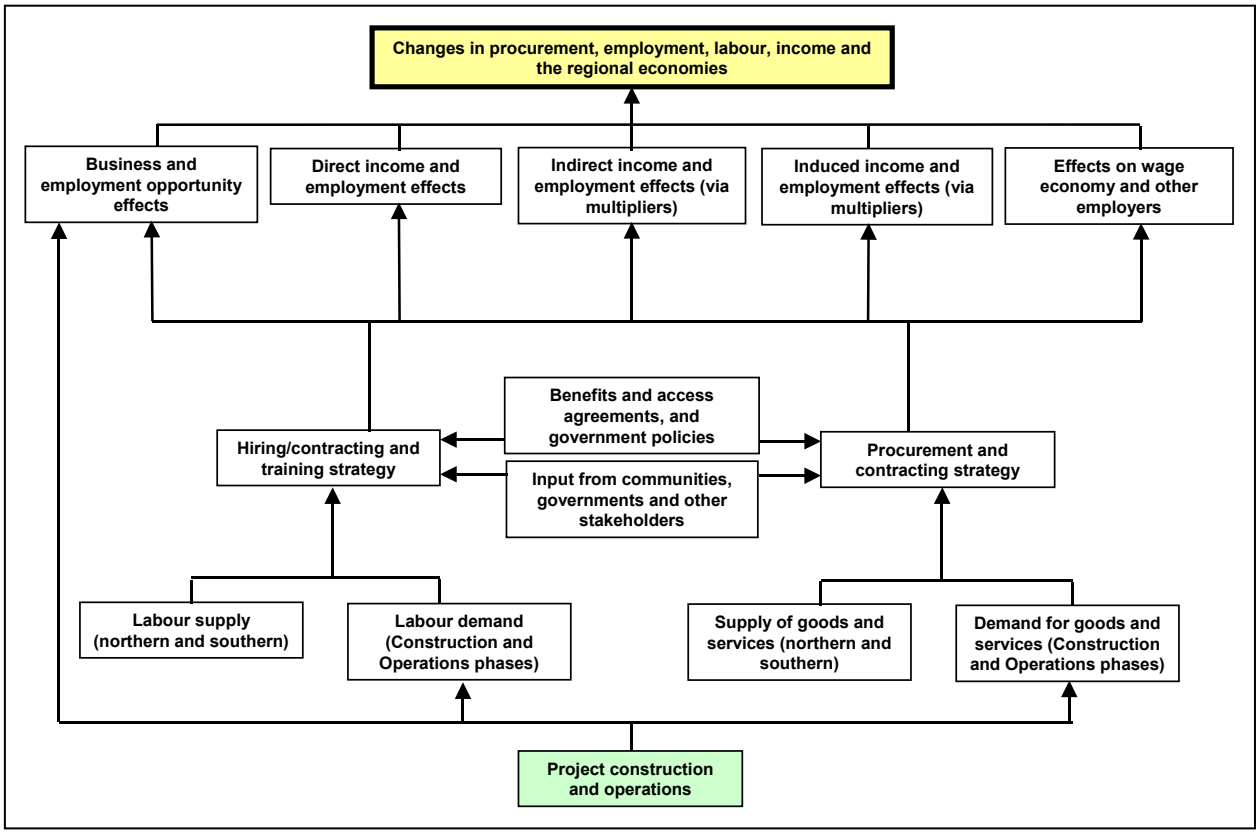

Figure 4-1: Project Effects on Regional Economies and the Northwest Territories Economy

Addressing purely labour considerations first, labour demand and labour supply, the pending benefits and access agreements, the benefits plans pursuant to the *Canada Oil and Gas Operations Act* (*COGOA*), the Northwest Territories Socio-Economic Agreement, and inputs from communities and other stakeholders will influence educational upgrading, training, hiring and contracting strategies. These strategies will have multiple regional effects on:

- direct, indirect and induced employment and income
- capacity development
- the wage economy
- other employers

The influences driving effects on goods and services are similar to those for labour. The supply of goods and services and the demands for them, and benefits and access agreements, the Northwest Territories Socio-Economic Agreement, the *COGOA* benefits plans, and inputs from communities and other stakeholders will affect procurement and contracting strategies. These strategies will have multiple regional effects on:

- business opportunities
- revenue and capacity development
- direct, indirect and induced income and employment
- the wage economy and other employers

This analysis of the effect pathways for project effects on regional economies, and employment and expenditures therein, is based on both quantitative and qualitative data. There are empirical indicators for most of the links in the diagram. It is clear that project-induced demands will affect the supplies of, and the demands for, employees, goods and services in study area regions and communities.

Although project effects on individual community labour, goods and services were not provided in the regional analysis, it is reasonable to assume that community effects will largely be influenced by the community labour force and business capacity. In turn, availability, qualifications and interest of local labour force, and suppliers of goods and services will affect local capacity as will mitigation measures designed to expand capacity, and qualifications of local businesses and labour force.

4.1.2 Assessment and Management of Project-Specific Effects

The assessment of project-specific effects includes:

- an overview of procurement and employment opportunities associated with the project

- a description of the methods used to assess procurement, employment, income and regional economic effects

- an assessment of expenditure, employment and labour income in the study area, taking into consideration capacity constraints that exist in the study area as a whole and the individual regions therein

- a qualitative assessment of effects on northern wages and other northern employers

The assessment of expenditure, employment and labour income has been extracted from a more detailed economic assessment of project effects on the economies of the study regions, the Northwest Territories, Alberta and the rest of Canada, entitled *Predicted Economic Impacts of the Proposed Mackenzie Gas Project* (Ellis Consulting Services 2004). This assessment and the extracts from it are presented for the regional but not the community level, because most community data is too small to meet the quantitative requirements of statistical modelling procedures.

The assessment of project-specific operations effects includes an evaluation of direct, indirect and induced employment, and labour income in the region. Both employment and labour income are generated because of operations activities scheduled over the life of the project, and ongoing capital and drilling activities scheduled over the life of the project.

4.1.2.1 Procurement and Employment Opportunities

Table 4-1 and Table 4-2 show the direct and indirect project-related opportunities available to qualified business and individuals.

Table 4-1: Project Procurement Opportunities

Business Opportunity	Typical Goods and Services Required
Communication	• Voice: telephone, cellular, satellite, VHF or UHF radios • Data: Internet, internal company systems • Satellite and cable television
Community accommodation and related services	• Apartments, hotels and motels • Restaurants • Taxi, laundry and dry-cleaning services

Construction	• Drilling
	  • drilling engineering and geologist
	  • drilling supervision
	  • drilling and completion rigs
	  • coiled tubing unit

	• Oilfield services
	  • cementing
	  • drilling fluids
	  • directional drilling
	  • bit supply
	• Facilities
	  • concrete, crushed rock, sand, gravel and ready-mix products
	  • forms, rebar, cribbing, cement finishing and masonry products
	• Pipelines
	  • timber for pipeline skids and survey laths
	  • welding services and supplies, such as acetylene and oxygen
	• Construction services
	• Surveying
	• Welding and inspection services
	• Building trades
	  • electrical, mechanical, instrumentation, insulating and pipefitting
	• Building materials and supplies
	  • wire, fittings and pipe
	• Civil construction services
	• Crane services
	• Heating, ventilation and air conditioning supply, installation and maintenance
	• Environmental monitor services
	• On-site safety professional services

Equipment	• Heavy equipment supply and service • Drilling equipment and services • Small engine and equipment supply and service • Industrial supplies, steam and high-pressure water • Industrial rental services
Fuel and fuel storage	• Propane, diesel, aircraft fuels, gasoline, grease, lubricant oil, anti-freeze and chemicals • Propane and fuel storage tanks: storage, inventory management and fuel delivery • Oil spill response services and equipment • Super cargo services

Table 4-1: Project Procurement Opportunities (cont'd)

Business Opportunity	Typical Goods and Services Required
Logistics	• Safety equipment, supplies and training • Materials management, expediting, freight transport, flight planning • Hot shot services • Air transport, aircraft charters and maintenance • Vehicle sales, rentals, repairs and service • Charter boats and barges • Procurement, including customs brokers
Office	• Janitorial services • Office space, supplies, furniture, computers and other equipment • Administrative services: secretarial (word processing), clerical, accounting, bookkeeping and payroll • Travel reservation services • Banking services
Remote site services	• Camps, camp catering, camp supplies • Retail and wholesale grocery supply • Water delivery, sewage treatment, snow removal and garbage disposal • Security services
Safety and medical	• Emergency medical facilities, staff, supplies, air and ground ambulance, dentistry, optometry and prescription drugs • Occupation health services
NOTES: UHF = ultra-high frequency VHF = very high frequency	
SOURCE: Imperial Oil (2004e)	

Table 4-2: Project Employment Opportunities

Job Type	Specific Job Titles	
Construction		
Management or supervisory	• Construction manager • Superintendent • Foreman	• Assistant foreman • Assistant (lead hand)
Equipment operators	• Heavy equipment operator • Truck driver (oilfield or transport)	• Bus driver • Crane operator
Trades	• Welder • Electrician	• Mechanic • Pipefitter • Other similar trades
Labour, semi-skilled and unskilled	• Swamper • Welder's helper • Nozzleman • Labourer • Oiler	• Rigger • Painter • Parts runner • Mechanic's helper
Drilling		
Drilling supervision	• Drilling supervisor	• Drilling engineer

Table 4-2: Project Employment Opportunities (cont'd)

Job Type	Specific Job Titles	
Rigs and crews	• Rig manager • Derrickhand • Driller	• Motor man • Floor hand
Services	• Bit supplier • Directional drilling personnel • Coring personnel • Power tong crew	• Cementing crew • Wireline services personnel • Drilling fluids personnel • Well site geologist
Engineering and Technologists		
Engineer	• Mechanical • Chemical • Civil	• Geotechnical • Drafting
Technologists	• Instrumentation • Chemical • Information • Project manager	• Production operations • Mechanical • Petroleum • Electrical
Logistics Services		
Accommodation	• Camp manager • Camp attendant	• Camp maintenance trades and labourers
Food services	• Chef • Cook or baker	• Kitchen help • Food preparer
Health and safety	• Health, safety, environment coordinator • Safety professional (CRSP-certified)	• Emergency medical professional • First aid technologist
Logistics	• Expediters • Warehouse person • Parts person • Shipper and receiver	• Supercargo • Logistics coordinator • Logistics manager
Office support	• Office manager • Administrative assistant • Expenditures	• Flight planners • Contracts coordinator
Security	• Security guard (watchperson)	
Project Management		
Management	• Project manager • Production operations	• Engineering manager • Information manager
Procurement and purchasing	• Procurement manager • Purchasing agent	• Materials coordinator
Socio-economic specialists	• Field coordinator • Cultural relations coordinator • Employment and training counsellor	• Traditional knowledge specialist • Community consultation and socio-economic coordinator
Environmental specialists	• Environmental monitor • Renewable resource technician	• Wildlife technician • Biologist
NOTE: CRSP = Canadian registered safety professional		
SOURCE: Imperial Oil (2004e)		

Capital expenditures made in the SSA for goods, services and labour will be linked to project components and activities located in the region. This includes:

- two compressor stations, near Little Chicago and Norman Wells
- parts of natural gas liquid (NGL) and gas pipeline spreads located within the SSA
- seven infrastructure sites, including one located near Norman Wells, that will contain:
  - camps
  - fuel storage
  - pipe and materials stockpiles
  - equipment storage
  - barge landings and, in some instances, airstrips

Procurement and employment opportunities exist for qualified businesses and labour force in the SSA and other regions where the project will be located. However, given the small population base and resulting capacity limitations in the region, significant project-related employment and capital expenditures for goods and services are expected to go to sources located outside the study area.

4.1.2.2 Measures of Regional Economic Effects

Economic effects were assessed at a regional rather than a local level because a community-level assessment with any degree of accuracy would not be possible given small size, capacity constraints and data limitations for individual Northwest Territories communities, coupled with the magnitude, scope and complexity of a project of this nature. There are some exceptions where economic effects on regional centres can be estimated. Further, economic analysis for a project of this size, scope and capital cost is typically done at the territorial or provincial level. A regional analysis for this project was undertaken by extrapolating the territorial input-output model results, coupled with knowledge of the Northwest Territories regions and use of regional demographic models developed by Ellis Consulting Services of Yellowknife.

The regional economic project effects were analyzed for both construction and operations. Three variables were measured to determine the effects for each phase. These variables included:

- project expenditures for each region
- employment on both a location and residency basis for each region
- labour income on both a location and residency basis for each region

Total estimated effects include the direct effects associated with the on-site construction and operations of the project, and the effects generated by the spin-off from this activity. The spin-off economic effects are referred to as *indirect* and *induced* effects, and are the result of the multiplier effects on the Northwest Territories, and other provincial and territorial economies.

Economic multipliers trace the effect of a change in output or demand for a good or service. For example, an increase in demand for a commodity will produce three effects that are described by economic multipliers:

- *direct* effects – effects on industries (firms) that expand production to satisfy increased demand. For building the project, they are the effects associated with supplying major components and with construction contractors.

- *indirect* effects – ripple effects as the construction contractors purchase additional required inputs from other firms. In this case, these are the firms that supply goods and services to the construction contractors or those operating the pipeline and fields, such as expeditors, located in various communities in the Northwest Territories.

- *induced* effects – as all these firms expand production, they hire more staff and pay out wages, thereby increasing the income received by households. Households, after withdrawing a certain part for taxes and savings, spend this income, which in turn increases demand for other commodities.

Estimates of economic effects generated were determined from simulations using project estimates of employment and expenditures supplied by the project proponents. The simulations were done using Statistics Canada's Inter-Regional Input-Output Model (I-O Model). The model simulates direct and indirect effects. A second model run was done to estimate induced effects. The Statistics Canada I-O Model produces results at the territorial or provincial level only. The allocation of Northwest Territories effects by region was done using data produced by Ellis Consulting Services.

All dollar values in this analysis are measured in constant 2003 dollars. All employment is expressed in jobs or person-years. All direct employment generated during construction is expressed as *jobs* because much of the work will be short term or seasonal, whereas all indirect and induced employment is expressed in *person-years*. All operations employment is expressed in *person-years* because it will be full-time or full-time equivalent (FTE) employment.

It is important to note that the results of the economic models should be viewed only as estimates and not absolutes. A major deficiency of most input-output models is that they are not subject to capacity constraints. In short, the input-output model operates as if there is sufficient unused industrial and labour market

capacity to meet all incremental demand resulting from new economic projects. In the case of the Northwest Territories, there is limited capacity. The problem is compounded because it is unlikely that new investments will be made to meet a short-term increase in demand generated by project construction that will take place only for three to four years. As a result, although the Northwest Territories might produce goods and services that will be demanded by the project, there will likely not be sufficient capacity to meet the normal market share met by Northwest Territories producers, plus the incremental demand generated by the project. This will mean proportionately more goods and services will have to be imported than is normally the case. As the input-output model is based on averages, it will tend to overestimate the actual effect on the Northwest Territories economy. Other information was used in this analysis to refine model results and help offset this problem.

Demographic and Labour Market Estimates

To estimate the effects on the regional labour markets, labour market projections were developed for the affected regions using the latest labour market information (Government of the Northwest Territories [GNWT] Bureau of Statistics 2002a) and a demographic projection model developed by Ellis Consulting Services. The demographic model uses average birth and death rates, and is based on the 2001 census adjusted for the *undercount.* Historically in the Northwest Territories, there has been net out-migration. However, with the recent improvement in the economy, net migration has generally levelled off at a slightly positive rate. The demographic model adopted the recent trend and assumed no net migration for each region. The population estimates produced by the demographic model are based on the net natural increase (births minus deaths) only.

However, the model was adjusted to reflect expected exceptions to this rule at the regional centres of Inuvik, Norman Wells, Fort Simpson, Hay River and Yellowknife. The model adjustments were made recognizing that there will be some in-migration to these centres:

- to fill jobs in regional centres because of business, community services and government agency expansions

- to replace northerners that choose to leave existing employment to pursue higher-paying or more fulfilling work on the project

- on speculation that taking up temporary or permanent residence in the Northwest Territories will improve chances of finding direct project employment, or spin-off indirect or induced employment generated because of the project

It is assumed that people from within northern regions will fill some of these jobs, but people from outside the Northwest Territories will also be recruited. Some of the incoming population will fill term positions, and rotate to and from their primary residences. Others will move to the Northwest Territories for the duration of construction and of those, some will take up permanent residence in the Northwest Territories.

In 2002, the GNWT Bureau of Statistics undertook a labour force survey in the Northwest Territories. Two definitions of unemployment can be derived from the 2002 survey:

- the first, which is used for the monthly national labour force survey released by Statistics Canada, requires that a person be actively seeking work to be considered unemployed

- the second includes all people who *want a job*, regardless of the reason they are not actively seeking work. The *want a job* definition expands the number of unemployed because it draws into the labour force persons who have given up looking for work but want a job.

The *want a job* definition was adopted for this analysis because, in many of the small communities, people have given up looking for work because of perceived and real education barriers, and the small number of jobs that become available. It is expected that most people will be attracted back into the active labour market by the opportunities presented by the project and therefore the *want a job* definition is the more suitable measure of the potential size of the labour force. The *want a job* unemployed in the Northwest Territories represent the targeted labour market in the Northwest Territories.

However, it is recognized that there will be some currently employed northern residents that seek and find work on the project. These individuals could include employees of northern businesses contracted to undertake work on the project or they could be qualified people that choose to leave their current jobs to secure higher paying and possibly more fulfilling work on the project. No assumptions have been made in the economic modelling as to the size of this labour market. However, estimates of northerners leaving existing jobs in search of project employment have been considered in terms of effects on community and regional demographics in Section 4.2, Demography.

Definition of Migration

In this economic analysis, employment demands in the Northwest Territories and in all other provinces and territories are assumed to be satisfied from the local labour supply. However, in the Northwest Territories, this is limited by the capacity of the local labour market. Consequently, the project will lead to no

permanent in- or out-migration between provinces and territories, with the exceptions expected in the regional centres mentioned previously.

Although no permanent in- or out-migration is expected, there will be a significant movement of direct employees from designated points of hire in southern Canada to and from camps in the Northwest Territories. When in the Northwest Territories, they will live in camps and will not establish residency in the North. The effect of spending their wages and salaries will occur in their home communities in the south and not in the Northwest Territories. The movement of workers on a fly-in and fly-out basis is not considered in- or out-migration.

However, beyond these southern workers who will take up temporary accommodation in camps while working on construction, it is recognized that there will be some in-migration and establishment of residency (temporary and permanent) in Inuvik and, to a lesser extent, Norman Wells. Adjustments to the economic analysis to account for this in-migration are discussed in Section 4.2, Demography.

4.1.2.3 Expenditures – Construction

Project construction will occur over the four-year period from 2006–2007 to 2009–2010. Construction that occurs after 2009–2010 is included in Section 4.1.2.5, Employment and Income – Operations, which describes operations effects.

About 60% of the NGL pipeline, about 40% of the gas pipeline and two of the facilities will be located in the SSA. As shown in Table 4-3, this represents about $1.7 billion, 27%, of the total project capital investment for 2006–2007 to 2009–2010.

Table 4-3: Project Capital Investment in the Sahtu Settlement Area

Indicator	2006–2007		2007–2008		2008–2009		2009–2010		Total	
	($M)	(%)	($M)	(%)	($M)	(%)	($M)	(%)	($M)	(%)
Project total investment	1,409	100	2,261	100	1,907	100	671	100	6,247	100
SSA	433	31	657	29	483	25	121	18	1,694	27[a]
Spending outside the SSA	420	97	635	97	462	96	116	96	1,633	96[b]
Spending in the SSA	13	3	23	3	21	4	4	4	61	4[b]

NOTES:
a Percentage of total project investment
b Percentage of ISR portion of total investment
Figures in millions of constant $2003
Numbers might not add up because of rounding

The small labour force, and limited size and number of businesses in the region will make it necessary for construction contractors to recruit workers, and purchase goods and services outside the region. The economic activity associated with direct purchases outside the region will be leaked to where the goods or services are produced.

Even though nearly $1.7 billion of project capital investment will be located or put in place in the SSA, only a very small part of the value of goods and services needed for construction will be purchased in the SSA, and even less in Déline. Most of the direct project expenditures will take place outside the region.

It is estimated that $1.6 billion, 96%, of the total value of capital expenditures will be made outside the SSA. The remaining $61 million, 4%, of capital spending will occur in the SSA. These expenditures within the region will be subject to further leakages as the businesses in the SSA supplying these goods and services will buy inputs from businesses outside the region.

4.1.2.4 Employment and Income – Construction

Construction of the project components located in the SSA will require a large workforce, and most work will take place during four winter construction seasons. Given these construction realities and the capacity limitations of the available SSA labour force, many of the skills required will not be readily available in the region. As a result, it is expected that much of the required labour will have to be brought in from outside the region and the Northwest Territories.

Table 4-4 shows the 2002 Northwest Territories labour force indicator statistics used to determine the size of the labour force in the SSA potentially available to the project. Labour force participation is provided, along with employment and unemployment rates, using the *want a job* definition of unemployment. SSA residents that meet the unemployed *want a job* definition represent the main regional labour pool available to the project.

Table 4-4: Labour Market Indicators for the Sahtu Settlement Area – Before Project Effects

Indicator	Percentage (%)
Participation rate	79.6
Employment rate	62.6
Unemployment rate	21.4
SOURCE: GNWT Bureau of Statistics (2002a)	

Although those in the unemployed *want a job* category are the primary regional labour pool for the project, there are other SSA residents who are available and qualified, and will seek project employment. These people are currently employed in SSA communities and businesses. They have not been included in the demographic modelling because there is no way of accurately predicting their numbers.

Table 4-5 shows the estimated size and composition of the regional labour market during construction before project effects. This forecast was developed using a demographic model to estimate population change, and applying the *want a job* rates from the 2002 survey results to the population projections.

Table 4-5: Estimated Labour Force in the Sahtu Settlement Area – Before Project Effects

Indicator	2006–2007	2007–2008	2008–2009	2009–2010	Average
Total population (No.)	2,661	2,784	2,806	2,779	2,757
Net migration (No.)	0	100	0	-50	13
Population 15+ (No.)	1,958	2,082	2,119	2,112	2,068
Labour force (No.)	1,559	1,658	1,687	1,681	1,646
Employed (No.)	1,225	1,302	1,326	1,321	1,293
Unemployed (No.)	334	355	362	360	353
Not in labour force (No.)	399	425	432	431	422
Participation rate (%)	79.6	79.6	79.6	79.6	79.6
Employment rate (%)	62.6	62.6	62.6	62.6	62.6
Unemployment rate (%)	21.4	21.4	21.4	21.4	21.4
NOTE: Numbers might not add up because of rounding					

It is expected that during the peak winter construction season in 2007–2008, 100 persons could migrate to the SSA because of the project. It is assumed that half of these persons will leave the region when construction ends in 2009–2010. It is further assumed that all new in-migrants of labour-force age will be available to participate in project-related employment.

Table 4-6 shows an estimate of the maximum labour pool that could be available to fill direct project jobs, and jobs in other businesses that will supply goods and services to the project and its employees. Before project effects in 2006–2007, it is estimated that there would be 334 unemployed persons in the region. Because of in-migration, the number of unemployed available during construction is expected to increase to an annual average of 353 people.

Table 4-6: Estimated Maximum Potential Labour Pool Available for Project-Related Work in the Sahtu Settlement Area

Indicator	2006–2007	2007–2008	2008–2009	2009–2010	Average
Total unemployed persons (No.)	334	355	362	360	353
Will do rotational work (%)	87	90	87	86	87
Total unemployed persons adjusted for rotational work (No.)	291	320	315	308	308

NOTE:
Percentages have been rounded to the nearest whole number and the adjusted number of unemployed persons might not add up because of rounding

The annual average of 353 unemployed persons has been adjusted to reflect the number of unemployed persons who indicated in the 2002 regional harvesting and employment survey that they would or would not be willing to do rotational work. The willingness to do rotational work was applied to about half of the unemployed workforce that *want a job* because this condition only applies to direct project jobs, which make up about half of the total number of project-related jobs created.

There is some fluctuation in the percentage of unemployed workers willing to do rotational work. This fluctuation is attributed to the in-migration of 100 people to the region, some of whom will be of labour-force age and willing to undertake direct project rotational work.

A further consideration factored into the estimate of the SSA available unemployed labour pool was that a large pipeline and compressor station camp and staging area will be located near Norman Wells, and a second large pipeline construction camp and staging area will be located near Fort Good Hope. The locations of the camps and staging areas will be within daily commuting distance of Norman Wells and Fort Good Hope, potentially negating the need for rotational work by the available unemployed labour force in these communities.

It is estimated that during construction, an annual average of 308 people will be available to seek direct project employment, and jobs in businesses that provide good and services to the project and its workforce.

An estimate of direct employment demand for the region was derived by comparing the job type and occupation requirements for each project component located in the region to the expected skills of the local labour force.

The Statistics Canada I-O Model was used to estimate the total employment demand that will be generated by the project for indirect and induced employment in the Northwest Territories. The territorial estimates were then broken down into regions using project expenditure data.

Table 4-7 shows direct, and modelled indirect and induced employment estimates in the SSA, and more probable employment estimates, after taking into consideration the constraints of the available labour pool and existing businesses in the region. The employment estimates include direct project jobs, and new jobs in businesses supplying goods and services to the project and its employees. The regional distribution of Statistics Canada's I-O Model results was allocated on the basis of each region's share of capital expenditures.

Table 4-7: Project Employment Demand in the Sahtu Settlement Area

Indicator	Type of Demand	Number of Jobs					
		2006–2007	2007–2008	2008–2009	2009–2010	Total	Average
Modelled employment demand in the SSA without labour supply constraints	Direct	74	366	265	15	719	180
	Indirect	113	222	207	42	584	146
	Induced	37	63	56	11	166	42
	Total	223	651	527	68	1,469	367
Estimated employment demand in the SSA with labour supply adjustments	Direct	74	209	213	15	511	128
	Indirect	45	42	43	42	171	43
	Induced	22	21	21	11	76	19
	Total	141	272	277	68	758	190
NOTE: Numbers might not add up because of rounding							

It is estimated that with no limits to the size of the available labour force or business capacity, the project will generate an annual average demand of 367 jobs for residents of the SSA during construction. However, when available labour force is taken into account, the annual average demand for jobs in the SSA decreases to 190. What this means is that all qualified SSA residents that *want a job* should be able to find development-related employment.

Project-related employment will lead to a rise in household income in the region, as shown in Table 4-8.

Table 4-8: Estimated Project-Related Labour Income in the Sahtu Settlement Area

Type of Demand	2006–2007 ($M)	2007–2008 ($M)	2008–2009 ($M)	2009–2010 ($M)	Total ($M)	Average ($M)
Direct	3	11	11	1	27	7
Indirect	2	3	3	2	11	3
Induced	1	1	1	0	3	1
Total	7	15	15	4	41	10
NOTES: Figures in millions of constant $2003 Numbers might not add up because of rounding						

It is estimated that project construction will lead to an increase of $41 million in labour income in the region throughout the construction period. This will consist of $27 million in direct project-related income, and another $14 million earned by employees producing goods and services for the project and its employees.

Table 4-9 shows the effects of project-related employment on the regional labour market during construction. It is estimated that project-related employment will generate a demand for a potential maximum annual average of 190 jobs over the Construction Phase.

Table 4-9: Estimated Project Effects on the Labour Market in the Sahtu Settlement Area

Indicator	2006–2007	2007–2008	2008–2009	2009–2010	Average
Total population (No.)	2,661	2,784	2,806	2,779	2,757
Net migration (No.)	0	100	0	-50	13
Population 15+ (No.)	1,958	2,082	2,119	2,112	2,068
Labour force (No.)	1,559	1,658	1,687	1,681	1,646
Employed (No.)	1,366	1,575	1,603	1,389	1,483
Other employed (No.)	1,225	1,302	1,326	1,321	1,293
Project employment (No.)	141	272	277	68	190
Unemployed (No.)	193	83	84	292	163
Not in labour force (No.)	399	425	432	431	422
Participation rate (%)	79.6	79.6	79.6	79.6	79.6
Employment rate (%)	69.7	75.6	75.6	65.8	71.7
Unemployment rate (%)	12.4	5.0	5.0	17.4	9.9
NOTE: Numbers might not add up because of rounding					

It is estimated that the labour force participation rate in the region will remain constant at 79.6% during construction. Project-related jobs could increase the employment rate from an average of 62.6% (Table 4-5, shown previously) to 71.7% in the SSA during construction, and the unemployment rate will decrease from an average of 21.4% to 9.9% during the same period. For the years 2007–2008 and 2008–2009, a constraint was imposed where the unemployment rate was not allowed to fall below 5%, as this rate was considered to be *full employment.* There is also a noticeable increase in the unemployment rate in 2009–2010 to 17.4%, but this is an incomplete representation of the labour market situation in that year because although construction activity is complete, the project has not come to an end. It is entering the next phase, which includes start-up and ongoing operations employment, described separately in Section 4.1.2.5, Employment and Income – Operations.

4.1.2.5 Employment and Income – Operations

Norman Wells, the designated base for ongoing operations and maintenance of the natural gas pipeline and related facilities, is located in the SSA, along with portions of the NGL and gas pipelines and four compressor stations. The community of Déline is located some distance from project activities and will have no full-time operations positions based there.

As shown in Table 4-10, annual average direct employment associated with operations and maintenance of the pipelines and associated facilities will range from 24 to 31 jobs annually, and average 27 jobs from 2009 to 2030.

Table 4-10: Annual Average Direct, Indirect, Induced and Total Employment in the Sahtu Settlement Area

Type of Demand	Number of Jobs				
	2009–2015	2016–2020	2021–2025	2026–2030	Annual Average
Direct	31	23	24	24	27
Indirect	6	8	8	8	7
Induced	3	4	4	4	4
Total	40	35	36	36	38
NOTE: Numbers might not add up because of rounding					

Total employment in the SSA during operations, including direct as well as spin-off indirect and induced employment, will range from 36 to 40 jobs annually, and average 38 jobs from 2009 to 2030. Residents of the region are expected to fill some of these positions. However, because of the knowledge, experience and skills required for many of the positions, some will be filled by people from outside the region and the Northwest Territories.

To help build labour force capacity in the region, technical and trades training programs will be developed and delivered to regional residents before and during operations. With implementation of these training programs, it is expected that regional participation in the direct operations employment opportunities will increase throughout the life of the project.

Table 4-11 presents the estimated labour income associated with the jobs described previously in Table 4-10. It is estimated that annual average direct labour income will be just under $3 million from 2009 to 2030. During the same period, annual total direct, indirect and induced labour income generated in the region will average just over $3 million.

Table 4-11: Annual Average Direct, Indirect and Induced Labour Income in the Sahtu Settlement Area

Type of Demand	2009–2015 ($M)	2016–2020 ($M)	2021–2025 ($M)	2026–2030 ($M)	Annual Average ($M)
Direct	3.1	2.3	2.4	2.4	2.7
Indirect	0.3	0.4	0.4	0.4	0.4
Induced	0.1	0.2	0.2	0.2	0.2
Total	3.5	2.9	3.0	3.0	3.2
NOTES: Figures are millions of constant $2003 Numbers might not add up because of rounding					

4.1.3 Mitigation Measures

To build business capacity, and optimize project-related procurement and expenditures within the Northwest Territories, a conceptual procurement plan has been developed and is presented in Section 4.1.3.1, A Northern Procurement Plan.

To build capacity and optimize employment of Aboriginal and non-Aboriginal residents in the Northwest Territories, a conceptual program is also provided. This program includes principles and strategies that address education, training and employment.

Successful implementation of the plan will require project leadership by way of a project proponent employment and training coordination function, and the partnership, cooperation, support and involvement of:

- Aboriginal organizations
- northern communities
- education and training institutions
- relevant territorial and federal government agencies
- industry organizations
- contractors
- unions

Measures to reduce the number of southerners migrating to the Northwest Territories on speculation that this will improve their chances of securing project employment are addressed in Section 4.2.3, Mitigation Measures (Demography).

4.1.3.1 A Northern Procurement Plan

The project proponents are committed to using Aboriginal, other northern and other Canadian suppliers of goods and services if they are:

- able to meet or exceed specified safety, environmental, technical and quality standards, and project timing requirements
- internationally cost competitive at the place and time where the goods or services are required

Recognizing that construction and operations will primarily occur in the Northwest Territories, the project proponents will give preference to qualified, competitive Aboriginal and other northern businesses for certain goods and services. In some instances, Aboriginal or other northern businesses might be invited to bid first.

Principles

The project proponents will:

- provide full and fair opportunity for Aboriginal and other northern businesses to participate in business opportunities
- comply with relevant land claim settlements, and benefits and access agreements
- foster development of Aboriginal and northern business and human capacity that provides long-term benefits to the project proponents, such as meeting long-term sustained demand for goods and services
- ensure that suppliers of goods and services meet the project proponents' commitments to use Aboriginal and northern businesses

Strategy

The project proponents will:

- assess northern market supply capacities, including the potential to grow to meet specific needs
- provide lead time for Aboriginal and other northern businesses to develop the ability to qualify and effectively compete for the work
- prequalify Aboriginal and other northern businesses, and offer feedback and assistance in understanding how to fill gaps in their qualifications

- hold workshops on bidding procedures, safety management and fitness for duty, including alcohol and drug policies, to help Aboriginal and other northern businesses effectively pursue business opportunities

- facilitate northern sourcing by structuring work packages and subpackages, where appropriate, to better align with the capacities of qualified northern businesses

- require bidders on major contracts to submit, as part of their bid, a local content plan that specifies how they will optimize participation of Aboriginal and other northern businesses in executing their work

- give particular emphasis to local content plans when evaluating bids and subsequently awarding work and supply packages for the project

- continue open communications with Aboriginal and other northern businesses about project requirements, including timing, and specification of goods and services required by the project

- supply information about Aboriginal and other northern businesses to potential contractors, in support of local content plans

- offer to communicate with unsuccessful bidders to help them bid more effectively in the future

- support transferring technology and knowledge to Aboriginal and northern businesses

- monitor implementation of local content plans to ensure that procurement contractor commitments are met, and adhere to terms in the benefits and access agreements

Education and Training for Employment

This section outlines the principles and strategies that will be used to develop Aboriginal and other northern workers for, and employ them in, positions associated with construction and operations.

Principles

The project proponents are committed to the following:

- providing Aboriginal people and northern residents who are qualified, or who take the steps necessary to become qualified for work on the project, with the opportunity to work during construction, consistent with:

    - relevant land claims settlement agreements
    - benefits and access agreements

  - provisions of applicable human rights legislation
  - the Canadian Charter of Rights and Freedoms

- recognizing the role and responsibilities of governments, and cooperating with governments as they carry out their responsibilities

- early identification and communication of project employment opportunities

- taking a leadership role in the Pipeline Operations Training Committee (POTC), an initiative to develop and implement a system for early identification of education and training for potential trades and technical workers for pipeline operations and production operations for the three anchor fields

In 2004, the POTC initiative was used as the cornerstone for the oil and gas industry's Aboriginal Skills and Employment Partnership (ASEP) application to secure funding for support and development of Aboriginal workers for long-term jobs arising from a major project, and including opportunities from other projected activities in the oil and gas sector in the Northwest Territories. The oil and gas industry ASEP application group includes members from the Sahtu Dene Council, Inuvialuit Regional Corporation, Deh Cho First Nations, Gwich'in Tribal Council, GNWT, Shell, ConocoPhillips, the Aboriginal Pipeline Group (APG) and Imperial Oil.

General Strategy

The project proponents understand that contractors, unions, communities, educational institutions and government agencies share responsibility for developing and recruiting workers. They will take a leadership role, where appropriate, in coordinating:

- the participation of Aboriginal, government and educational institutions with business and industry organizations to:

  - promote understanding of northern employment opportunities relating to the project, and to the petroleum and pipeline industries

  - support worksite and life skills training and programs for workers

  - develop business management skills

- the participation of northern community organizations, contractors, labour groups and training agencies to effectively use government training support programs to assist with the timely development, communications and delivery of applicable training programs

- the participation of contractors, labour organizations, and oil and gas companies in the affected regions, to provide early and ongoing training opportunities, particularly for jobs and skills that will be sustainable after construction

- training of workers to operate northern production facilities and pipeline operations, through the POTC

The project proponents will participate in:

- identifying and communicating training and education requirements for project employment

- discussions with training institutions, school organizations and government agencies to share industry-specific needs to allow them to develop appropriate curricula, if required

- initiatives to encourage students to complete secondary school

- ensuring, where feasible, that qualified disadvantaged individuals or groups have full and fair access to training and employment opportunities without incurring unreasonable hardship for the project proponents

- encouraging northern and other contractor participation in providing meaningful employment for Aboriginal and other northern workers

The project proponents are committed to working with contractors, northern businesses, communities and government agencies to identify and capture opportunities for employment by:

- working with employment officers and staff in local communities, Aboriginal organizations and government agencies to help recruit qualified Aboriginal and other northern employees

- designing and implementing hiring practices to provide opportunities for qualified Aboriginal and other northern residents, such as considering equivalency to education requirements for some jobs

- working with major contractors, labour groups and subcontractors to identify and develop potential training opportunities and initiatives

- requiring contractors and subcontractors to structure Aboriginal and northern employment policies and plans, complete with reporting and monitoring systems, to comply with the project proponents' benefits plans and agreements, and with their commitments to use Aboriginal and other northern workers

- establishing on-the-job support systems and resources to help develop worksite and life skills

Strategy – Education

The project proponents will communicate employment and career opportunities and educational requirements by:

- emphasizing that completion of high school could lead to employment and career opportunities with the project, and elsewhere in the oil and gas production and pipeline industries

- working with contractors and schools to reduce the number of students leaving school for short-term construction employment, and recognizing Northwest Territories legislation for age requirements on construction sites

- recommending modification of school programming to allow for participation in the project that might include school leaves and some credit for work experience

- consulting with government and educational institutions with regard to developing equivalencies

- coordinating support from the project and available government funding for education and training of potential operations and construction workers, through the processes of the POTC and ASEP initiatives

- promoting job market understanding by various means, such as providing:

    - employment and career opportunities information
    - summer employment and job shadowing opportunities

- requiring key contractors to provide priority access to their training and employment opportunities for Aboriginal and northern workers that might:

    - provide a high degree of sustainability after construction
    - be transferable into other industrial sectors
    - offer opportunity for advancement

Strategy – Training

The project proponents will:

- work with construction and pipeline contractors, and within other oil and gas industry initiatives to provide training opportunities before and during construction, and into operations activities. The project proponents will ensure that project managers, contractors and unions support hiring, training and retention of Aboriginal and other northern workers.

- work with local communities to identify training candidates and training requirements

- communicate information about training program graduates to potential contractors

- facilitate development and implementation of support systems and resources for workers to help them adapt to the requirements and conditions of wage employment. Support systems will include life skills training, such as money management, workplace orientation and access to addiction counselling.

- support government programs to provide assistance to families and communities of workers

- require workers and managers to attend cultural awareness training

Strategy – Construction

The project proponents will:

- maintain job responsibilities and budget within the project associated with the education and training for employment opportunities to coordinate, liaise and negotiate with northern communities, Aurora College, territorial and federal government agencies, contractors, and unions regarding training and employment

- coordinate construction worker training with project labour, contracting and procurement strategies

- continue to meet to discuss and seek input, support and funding for a training and employment strategy for all phases of the project with:

    - affected northern communities
    - Aurora College
    - government agencies
    - pipeline contractor associations
    - individual contractors
    - relevant national and international trade unions

- take a leadership role in the development and coordinated use of new or existing community-focused databases, or both, of potential project workers. The databases are intended to facilitate plans for training and employment of qualified workers, primarily for the construction period. The databases will be subject to privacy and other applicable laws.

The databases will be compiled from in-community interviews with individuals interested in gaining employment during project construction and operations. The interviews should be conducted by, or under the direction of, the project, using a standard interview questionnaire developed for the project.

Information collected will include education levels, training, certificates or licences and work experiences. This information will go into a master community-specific database retained by the project. The databases will be used for:

- early and ongoing discussions with Aurora College, industry operators and contractors to identify the skill requirements to be captured in the community potential worker databases
- review and identify skill requirements, specific training needs and steps required to implement community-based and regional training programs
- determine project-related education and training needs in each community, and working with the communities and regions to provide access to them
- provide information to contractors on bid lists for preconstruction and construction work packages, along with the message of the project's commitment to optimize training and employment opportunities for qualified Aboriginal and other northerners, and the need for a local-content plan
- work with the POTC and ASEP initiatives to coordinate the education and training resources to develop qualified workers in time for work during construction and operations
- prioritize the range of training offered, giving special consideration to skills that are transferable and portable beyond the project
- work with Aurora College, municipalities and the GNWT to identify and use civil projects that might provide work experience opportunities for potential construction workers, e.g. equipment operators, site supervisors, safety advisors, where practical
- collaborate with relevant project contractors, GNWT Apprenticeship and Occupational Trades Division and educational institutions to develop and implement systems to capture, record and provide credit for applicable qualifying work hours for apprentices
- work with the existing Aurora College program and offer trainee positions on current project field programs to provide additional opportunities for training in areas, such as basic labourer skills, construction trades, heavy equipment operation and truck driving

- request that Aurora College work with the affected communities to develop training in basic labourer skills, construction trades, heavy equipment operation and truck driving, using local capital projects as training venues wherever possible. Community contributions might be in-kind provisions of training space, tools, and equipment that does not include a built-in markup.

- request that Aurora College adult educators in the communities provide literacy and math upgrading and basic trades preparation training in conjunction with practical training

- work with Aurora College, contractors and community resources to provide nonapprentice training and experience, e.g., heavy equipment operators and expediters, where practical, for the individuals to be hired by contractors for construction work

- work with Aurora College and community adult educators to consider scheduling the classroom sessions for apprenticeship training during the summer, when space is available in local communities and when instructors are potentially available outside their regular training program commitments

- require key contractors to work with the project, community resource personnel, Aboriginal organizations, Aurora College and others that might add value in recruiting and hiring qualified workers

- communicate training program details and expectations to candidates to promote their commitment to completing the program, and to verify that the training is consistent with their future employment or career objectives

- use experienced northern trainers, where practical

- assist in providing a student liaison when training is away from the home community, as appropriate. The responsibilities of this individual include:

    - assisting students with personal and family issues
    - chaperoning trainees away from home communities
    - helping remove barriers that might prevent students from attending classes and completing the training program

Strategy – Operations

The project proponents will:

- contribute to Aboriginal and other northern capacity development by enhancing opportunities to participate in natural gas field and pipeline operations employment opportunities as qualified and skilled workers

- enhance understanding of, and preparedness for, project-related training opportunities by working with:
  - appropriate territorial and federal government departments
  - Aboriginal organizations
  - existing government training agencies
  - secondary and post-secondary education institutions
- use public and private training resources, including Aurora College, Petroleum Industry Training Services (PITS) and training contractors, where appropriate
- support applicable industry, government and Aboriginal organization collaborative training opportunities
- provide information about training opportunities and project proponent expectations to all study area communities
- participate with the GNWT, Aboriginal organizations, Aurora College and other industry operators in the recruitment and selection process
- support opportunities for qualified mature students for pretechnical training or direct entry into the Northern Alberta Institute of Technology (NAIT) or the Southern Alberta Institute of Technology (SAIT)
- provide mentoring to trainees while on the worksite
- support existing Aboriginal student support programs at NAIT and SAIT
- provide, in collaboration with the members of the POTC, applicable and relevant employment opportunities for trades apprentices enrolled in POTC-sponsored training
- continue to ensure operation training requirements are reflected in the activities of the POTC, which consists of representatives of the project, industry, Aurora College, territorial and federal government agencies, Aboriginal organizations and the APG

POTC activities include:

- identifying and recruiting 13 trade apprentices, with the first intake of six apprentices in mid-2004 as employees of participants or contractors. The key trades desired are: electrician and instrumentation, millwright, and heavy-duty mechanic.

- identifying and recruiting 38 technical candidates for programs at NAIT and SAIT. The first candidates for the Aurora pretechnical program were accepted for fall 2004, and on successful completion, will begin programs at either NAIT or SAIT in fall 2005.

- continuing intakes for the trades and technical streams in the following two years to enable accepted applicants to complete the employment programs required for operations and maintenance of the anchor fields, pipeline and associated facilities. Many of the newly trained workers are expected to be involved in start-up of the respective operations. Others will earn experience in project proponents' existing operations that might enable them, at a later date, to join the operating and maintenance workforce for the territorial operations.

- providing and coordinating offers of employment for qualified apprentices, technical summer students and graduates

4.1.3.2 Employment

Principles

The project proponents will:

- emphasize preferential employment of qualified Aboriginal and other northern residents during all phases of the project

- promote Aboriginal and other northern worker involvement in a range of skilled, unskilled, technical and professional job classifications, and provide opportunities for advancement on the basis of qualifications and performance

- provide ongoing support for Aboriginal and other northern hires that recognizes cultural differences at the worksites and in camps

- provide a workplace where all individuals are treated in a fair, equitable and respectful manner while working on the project

Strategy

The strategy identifies the specific mechanisms and initiatives that the project proponents will use to optimize northern hiring objectives. To this end, the project proponents will:

- encourage and support efforts by the territorial government to set up community-based training programs in personal finance and money management, focusing on informed consumption, savings and investment choices for increased incomes

- provide in-camp training programs in personal finance and money management, focusing on informed consumption, savings and investment choices for increased incomes consistent with programs offered in the communities by the territorial government

- require contractors and subcontractors to:

  - meet the obligations undertaken by the project proponents as part of benefits and access agreements for preferential hiring and employment of qualified Aboriginal and other northern workers

  - provide cultural awareness training to workers and managers

  - respect the rights of local communities to privacy

  - provide, if requested, the opportunity for Aboriginal artisans to display and sell their handicrafts in the camps, reducing potential social disruption caused by project workers visiting local Aboriginal communities in search of handicrafts

  - support worksite and life skills training and programs for workers

  - articulate hours of work, work schedules, transportation to and from points of hire, transportation between camps and worksites, and camp lifestyle rules

- communicate employment opportunities and skill requirements to interested organizations, government agencies and communities, in an open, transparent and timely fashion, using such resources as local and regional print, radio and television media, and Internet-based electronic tools. This will be carried out in cooperation with Aboriginal and other community organizations and institutions.

- give priority to hiring qualified Aboriginal and other northern residents from study area communities

- encourage Aboriginal and other northern worker recruitment and employment for construction and operations by:

  - supporting development and use of existing and potential new databases as key sources of information about potential construction and operations workers

  - providing worker return transportation from designated points of hire to project work locations

- providing flexible work schedules, to accommodate traditional harvesting and other Aboriginal cultural, family and community needs, where practical, recognizing that work flexibility will be limited in the peak winter construction seasons

- considering equivalency to education or training in meeting qualification requirements for some construction and operations jobs

- supporting programs to offer, where appropriate, pre-employment training to northern residents who do not have the required qualifications

- providing formal worksite support programs and resources, and work with communities to promote development and retention of northern workers

- providing, where required, on-the-job support, such as:

  - workplace essential skills upgrading
  - a workplace mentor program
  - an Aboriginal-worker liaison program
  - cultural awareness training
  - pre-employment safety training
  - life skills guidance, such as money management, and alcohol and substance abuse prevention

- ensure that camp meals periodically include country food, e.g., fish, moose and caribou, that has been government-inspected or purchased from an inspected facility

- ensure contractors and subcontractors include the above-mentioned mechanisms and initiatives in their construction and execution plans

4.1.3.3 Northern Employment and Wages

The project proponents, local communities, chambers of commerce and Human Resources Skills Development (HRSD) will require information sharing, and to the extent practical, joint planning, to determine effective mitigation for the possible loss of qualified and employed northern workers to the project and potential wage increases, which is one consequence of this issue. This will also be necessary to recognize the potential extent of the effects in local communities and strategies designed to reduce the adverse effects.

The project proponents will:

- continue discussions between project proponents, local communities, Aboriginal organizations, chambers of commerce, major contractors, unions and HRSD regarding construction workforce requirements, a strategy(s) to meet the workforce requirements, and how to reduce adverse implications for northern communities, businesses and governments

- work with their prime contractors and potentially affected communities, where feasible, to develop ways to share use of local utilities and infrastructure maintenance service providers in recognition of the communities' reliance on these services

The project proponents recommend that local chambers of commerce, and public and community service providers develop a unified strategy on:

- how to retain key personnel with critical skills required by the project

- how to identify, attract and retain qualified replacement workers to fill jobs vacated by those in the local workforce that leave to pursue project employment

- working with HRSD offices in the North and south to identify replacement workers with the required skill sets and experience

4.1.4 Residual Effects – Construction

With timely implementation of the mitigation measures identified previously, business and labour force capacity in the SSA and the communities therein will expand. There will be substantial capital expenditures and project-related procurement in the region that could represent in the order of 27% of total project capital expenditures in the Northwest Territories (Table 4-3, shown previously). In addition, labour force participation and employment rates will increase, and employment and labour income are expected to increase substantially.

As Déline is located some distance from project activities, it will experience restricted procurement, employment and labour income effects. It is expected that Norman Wells will experience greater procurement, employment and labour income effects than all other communities in the SSA.

In the SSA, the duration of capital expenditures, procurement and employment effects will be most noticeable during the winter construction season of 2007–2008. However, the economic effects will continue throughout the four-year construction period. The increase in capacity among the labour force and regional businesses, potentially ones based in Déline, is expected to continue well beyond

construction. Table 4-12 shows that construction effects in the SSA, which includes Déline, are expected to be positive and high in magnitude.

Table 4-12: Procurement, Employment, Income and Regional Economic Effects – Construction Effect Attributes for the Sahtu Settlement Area

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
SSA	Positive	High	Regional and beyond regional	Short term	Yes

4.1.5 Residual Effects – Operations

With timely and ongoing implementation of the mitigation measures described above, business and labour force capacity in the region will expand. There will be ongoing operations and maintenance expenditures, and project-related procurement in the region and elsewhere in the Northwest Territories. Regional labour force participation in direct, indirect and induced jobs is expected to be small.

Table 4-13 shows that operations effects in the SSA, which includes Déline, are expected to be positive and low in magnitude.

Table 4-13: Operations Expenditures, Employment, Income and Regional Economic Effects – Operations Effect Attributes for the Sahtu Settlement Area

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
SSA	Positive	Low	Regional and beyond regional	Long term	No

4.2 Demography

4.2.1 Effect Pathways

The effect pathway diagram in Figure 4-2 illustrates the projected influence of the project on birth, death, and in- and out-migration rates. All aspects of field development and project construction, which will create demands for labour, and needed goods and services, might initially affect all three rates. These demands will create an inflow of southern workers, both those with employment contracts and those looking for work, and with some bringing their families. As well, northern workers will be hired and purchases made from northern businesses. These directly employed southern and northern workers will contribute to indirect and induced income and employment effects. Quality-of-life expectations will be affected by increased demands for labour, goods and services, and by the direct, indirect and induced income and employment effects.

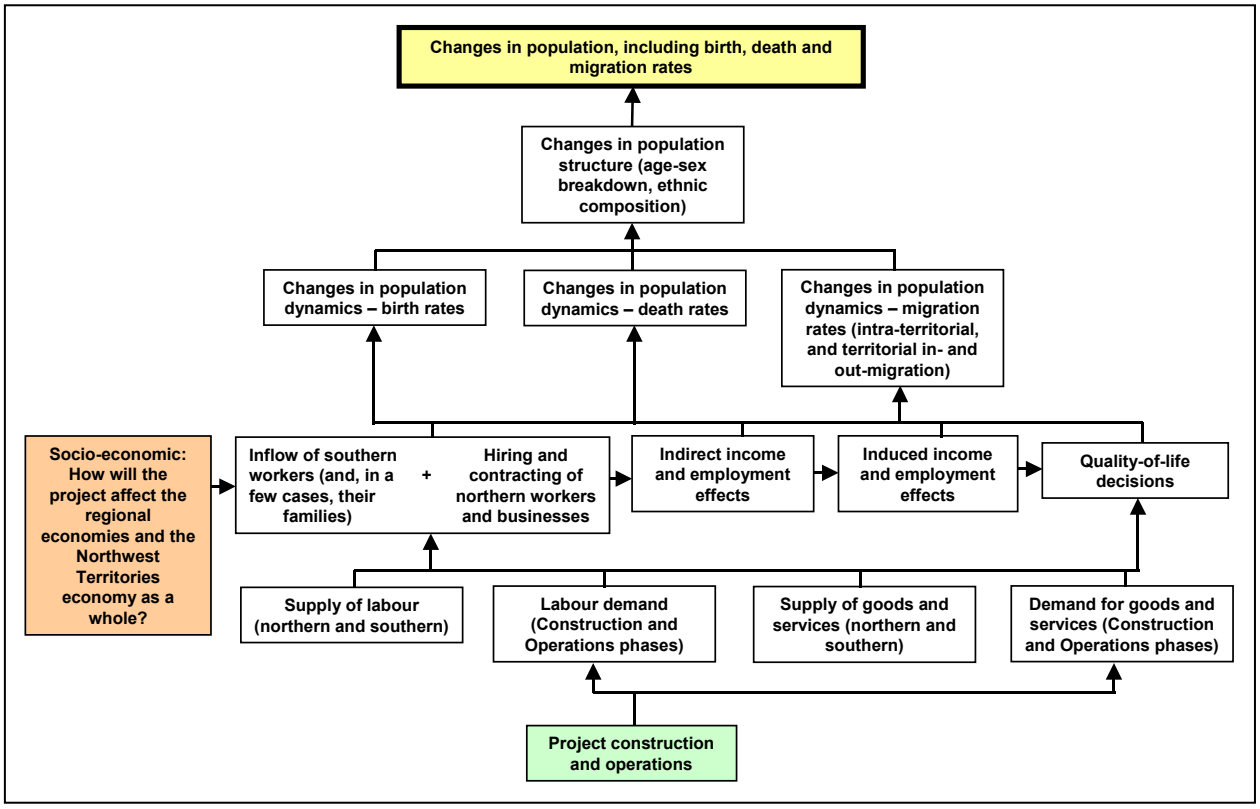

Figure 4-2: Project Effects on Population, including Birth, Death, and In- and Out-migration Rates

The importance of population change to the SEIA is as a key link between economic opportunities and social effects. Increases in population will increase demands on a wide range of public services and could affect social conditions. These effects will be addressed in subsequent sections.

This analysis of the effect pathways for project effects on in-migration from the provinces and population movement within the Northwest Territories is largely conceptual; there are empirical indicators for only a few of the links. As a result, the following analysis is largely based on current baseline information and the experience of other development projects.

4.2.2 Assessment and Management of Project-Specific Effects – Construction

The project sites and related activities in the SSA are not expected to attract substantial migration from outside or inside the Northwest Territories because the SSA communities are accessible only by air or winter road. This is particularly true of Déline, because of its relative isolated location from the regional centre and project activities. This will preclude the community from any in-migration pressures associated with the project, which in turn will limit effects on other social components, including housing, infrastructure and education.

However, there will still be some pressures associated with inter-regional migration within the SSA. Specifically, some Déline residents, particularly those who earlier lived in Fort Good Hope or possibly Norman Wells, might be attracted back by employment or the excitement of the unusual activity.

Project efforts will focus on reducing inter-regional movement.

4.2.3 Mitigation Measures – Construction

The mitigation measures targeting potential migrants from within the Northwest Territories will emphasize that the prospects of good employment will be as good in their home communities as in the more central locations to which they might be attracted. This will involve the following actions:

- project representatives will continue to visit every community in the study area, on more than one occasion, to describe the employment opportunities available, and the terms and conditions of employment
- project or community representatives will interview interested individuals, and document qualifications and interests in relevant databases. Interested parties will be able to provide new or updated information for the databases.
- project or community representatives will provide database information to project contractors
- employment procedures for northern residents will be described in English and Aboriginal language news programs, and the dates when project representatives are scheduled to visit the individual communities will be advertised in advance

- transportation to and from the point of hire on a rotational work schedule will be provided, as will accommodation at job sites

- information will be provided regarding housing availability and rental costs in communities to which Northwest Territories residents might be attracted

4.2.4 Residual Effects – Construction

Because Déline is about 85 km from project activities and infrastructure, and even further from the regional centre of Norman Wells, no net migration to Déline is anticipated. It will not be possible to eliminate all population movement and project effects in the SSA, but they will be unnoticeable in the community of Déline. Table 4-14 shows that the residual effects are expected to be adverse and low in magnitude in the SSA, which includes Déline.

Table 4-14: Population Mobility – Construction Effect Attributes for the Sahtu Settlement Area

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
SSA	Adverse	Low	Local	Short term	No

4.2.5 Operations Effects

Only about 10% of the operations and maintenance jobs created during operations will relate to the activities in the SSA, restricting the amount of inter-regional mobility. Additionally, none of the jobs will be based in Déline, limiting any operations effects on population mobility. As no effects on population mobility are expected in Déline during operations, no mitigation is required and no residual adverse effects are expected.

5 INFRASTRUCTURE AND COMMUNITY SERVICES

5.1 Transportation

5.1.1 Effect Pathways

This section provides information about expected influences of the project on transportation infrastructure quality and availability in the Northwest Territories. The general project effects on highway, railroad, barging and air transportation infrastructure and services will be:

- direct, indirect and induced demands for short-term transportation services
- increased supply, because the project will provide for some of its own needs
- elevated demands on some local community transportation infrastructure, including operations and maintenance
- upgraded and increased operations of regional transportation infrastructure

The combined effects of project-induced increases in freight and passenger traffic, and the responses of transport infrastructure and service providers, will:

- determine effectiveness and capacity of infrastructure facilities and services
- result in changes to transport infrastructure facilities, services and use

Figure 5-1 shows that during construction, the project will induce increased demands on all transportation modes because of the many construction activities, in addition to increased project-related and -stimulated travel. The project will also encourage transportation infrastructure maintenance and improvement. These influences, along with project effects on the regional and territorial economies, will affect road, rail, marine and air infrastructure and services. These effects will stimulate community input and findings from project monitoring. The findings, along with the effects on transport infrastructure and services, and project effects on local governance, will influence transport infrastructure and services funding.

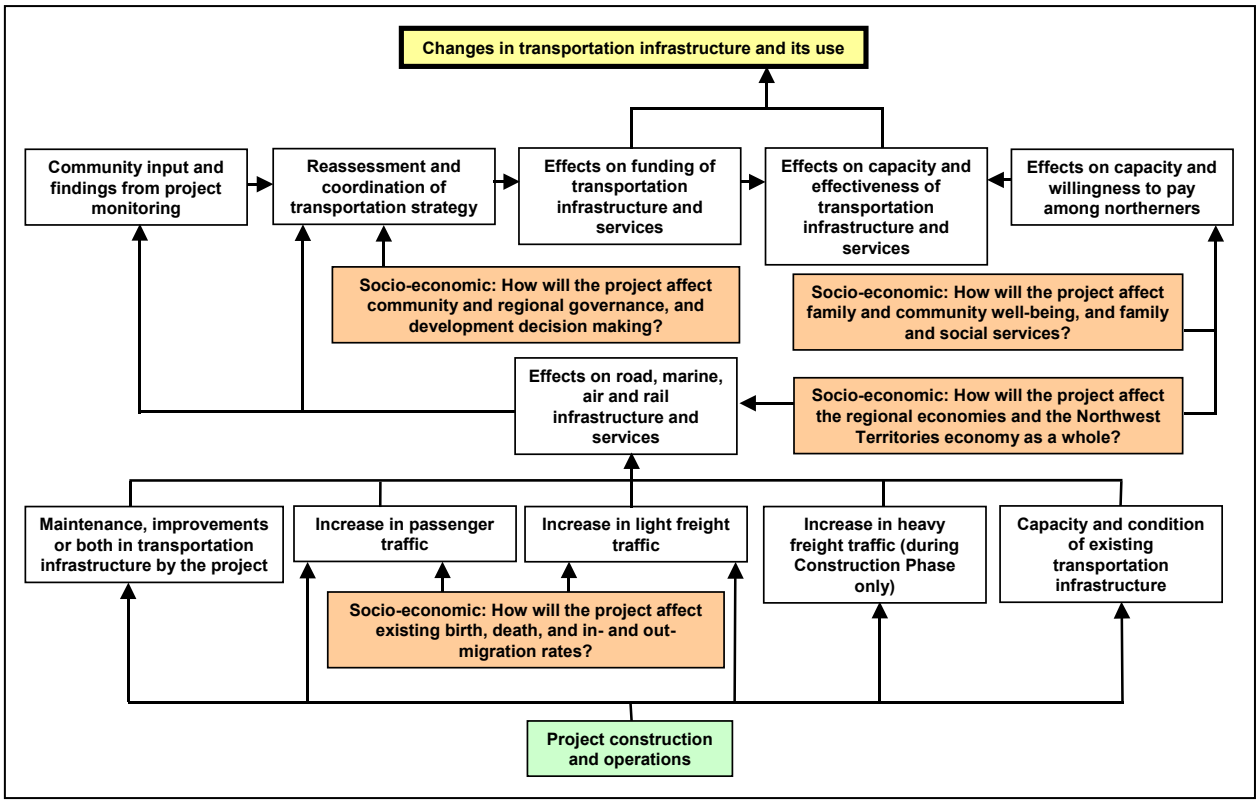

Figure 5-1: Project Effects on Transportation Infrastructure and Services

The level of funding will affect transport capacity and effectiveness. Also affecting capacity and effectiveness will be project effects on:

- construction-related transport and travel
- the regional and Northwest Territories economies
- people's quality of life and need for public services, which will drive the travel needs and affordable travel interests of northern residents

Project-induced changes in transportation infrastructure and usage will thus be a function of the levels of funding, and the freight and passenger demands on these facilities and services.

Analysis of the effect pathways for project effects on transportation is largely conceptual; empirical indicators exist for only a few links. However, it is clear that project-induced changes in demand for freight and passenger movement, population size and income levels will be important driving forces that affect transportation infrastructure and use in the study area communities.

5.1.2 Assessment and Management of Project-Specific Effects – Construction

Déline is relatively isolated from the proposed development and its effects on transportation, with the exception of winter road use. In the SSA, Norman Wells is the focal point for marine and air traffic, and will be one of the communities that experiences project-related transportation effects. To a lesser extent, Norman Wells is also a centre for winter road transport. Although it has no all-weather road, it does have a winter road connection to the south via Wrigley, and to the north and east. Many of the passengers and some of the freight (mostly air) arriving from outside this region stop in Norman Wells, before making it to outlying communities, such as Déline. A clear exception is freight being hauled directly to Déline via the winter road.

According to present planning, most project freight will be moved by barge. Perishable foods for the construction camps will be flown in, and other foods and camp supplies not delivered by barge will be trucked in via the winter road. The result will be the potential for a modest increase in traffic on the winter road between Wrigley and Tulita, where the road to Déline begins, and Tulita and Norman Wells. Given that the mitigation measures outlined below are implemented, traffic increases in the region will not be enough to interrupt transportation services to, or motor vehicle safety for, residents of Déline that use the winter road south or north of Tulita.

Participants at the Sahtu regional confirmation meeting in May 2004 suggested that conversations with the Royal Canadian Mounted Police (RCMP) should start now to develop an emergency preparedness plan for transportation incidents. They felt that by starting these conversations now, there could be an increase in the coordination of road and safety maintenance efforts among the GNWT, project proponents and Sahtu communities.

5.1.3 Mitigation Measures – Construction

All of the effects described in the preceding section are manageable, provided that:

- there is adequate and timely planning
- needed human and financial resources are available

Joint planning, information sharing, cooperation and coordination among the project proponents, project transportation and logistics functions, local communities and GNWT Transportation will be essential.

A timely, cooperative planning effort by the project proponents, relevant transportation logistics managers, GNWT Transportation, local community leaders and, in some cases, GNWT Municipal and Community Affairs, is required to design mitigation measures for the expected project effects on transportation.

These efforts must focus on the steps to be taken, development of effective protocols and procedures, and the resources required to implement them.

Agreements between the project and the GNWT, and between the project and applicable municipalities, will be negotiated and will include provisions for the project's use of permanent and seasonal roads. The agreements will consider:

- coordination of road maintenance activities, recognizing:
  - the timing of highway and winter road maintenance
  - the need to install and maintain ice roads and bridges
  - access restrictions
- coordination of road upgrading where required
- options that could include making contributions in kind, such as constructing winter roads, maintaining and repairing highways, or contributing to a portion of maintenance costs

Other general mitigation measures will include:

- continuing discussions with barge service providers to provide them with ample lead time to ensure sufficient capacity to meet community requirements and project demands
- continuing discussions with air transportation providers to provide them with ample lead time so that northern carriers can expand their aircraft inventories to meet existing community requirements and project demands
- coordinating with the GNWT and other responsible authorities to provide construction air and barge traffic demand projections, including provisions for assessing the need for, and completing, upgrading and other improvements to regional and municipal airports, airstrips and barge landings
- using pilot vehicles when transporting oversized truck loads (on public roads), where appropriate
- observing road bans before winter freezeup and during spring breakup, unless otherwise approved
- posting and enforcing speed limits for project vehicles on project access roads, and having project vehicles adhere to speed limits on public roads
- developing plans for truck traffic routes, as required
- providing bus transportation of construction workers, where required

- sharing information about new borrow sites in the region with GNWT Transportation and local communities for negotiation of post-project use of, and responsibility for, those sites

5.1.4 Residual Effects – Construction

As indicated in preceding discussions, without carefully planned mitigation, project effects on air travel, air and barge freight services, and travel on winter roads in the region could be disadvantageous to SSA residents, including Déline residents. However, these adverse effects are relatively preventable, given effective planning that is suitably implemented. At the same time, it is acknowledged that there likely will be occasional disruptions because of unforeseen circumstances. The moderate level of disruptions to transportation services in the SSA, particularly the regional hub of Norman Wells, has the potential to trickle down and affect Déline residents. Effects on the road and marine modes of transportation are expected to be moderate in magnitude during the Construction Phase in the SSA (see Table 5-1). Effects on air travel are expected to be positive and adverse, and moderate in magnitude during construction.

Table 5-1: Transportation – Construction Effect Attributes for the Sahtu Settlement Area

Mode of Transportation	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Road	Adverse	Moderate	Regional	Short term	No
Marine	Adverse	Moderate	Regional	Short term	No
Air	Positive and adverse	Moderate	Regional	Short term	No

5.1.5 Operations Effects

Road, marine and air transport traffic, which will increase during construction, will decline dramatically once construction is complete. Project operations effects on transportation in Norman Wells and therefore the SSA, and are expected to be a fraction of that during the construction years. Therefore, there will be no need for additional mitigation beyond winter road maintenance, and awareness and enforcement of speed limits for heavy truck traffic using these roads. No residual adverse project effects are expected in Déline during operations.

5.2 Energy and Utilities

5.2.1 Effect Pathways

Figure 5-2 shows the expected influences of the project on community infrastructure, and availability of utilities and energy in the Northwest Territories. In summary, the project might have effects on infrastructure, utilities and energy supply in some study area communities.

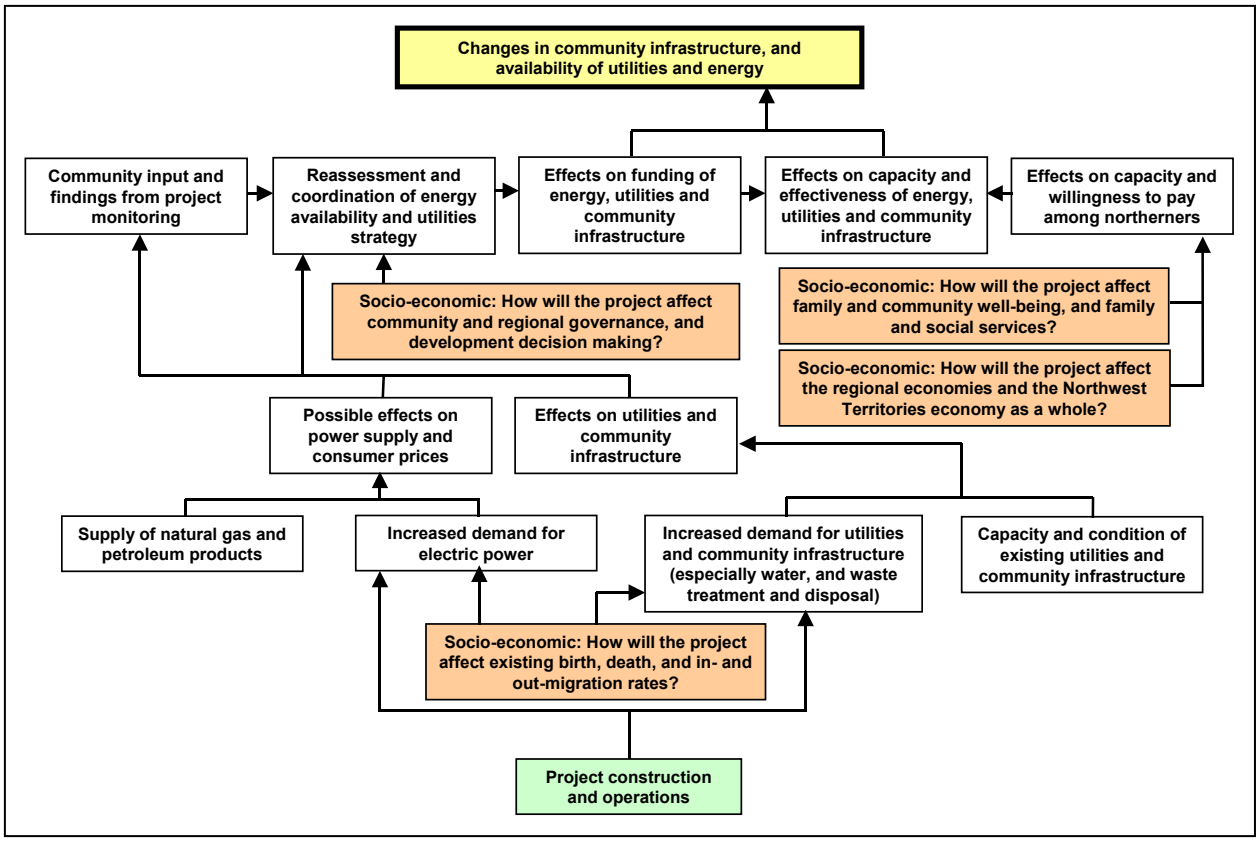

Figure 5-2: Project Effects on Community Infrastructure, and Availability of Utilities and Energy

During both construction and operations, there could be effects on power supply and consumer prices because of:

- demand for electric power
- the available supply of natural gas and petroleum products
- project demographic effects

Likewise, utilities and community infrastructure might be affected by:

- project-induced increases in demands on utilities and community infrastructure, especially water and waste disposal
- the capacity and condition of the existing utilities and community infrastructure
- project demographic effects

Whether or not project effects will result in a community population increase, and if so how large an increase, is central to this assessment.

These two potential effects, i.e., power supply and prices, and utilities and infrastructure, will affect community input to, and findings from, project monitoring and reassessment of the energy availability and utilities strategy. This reassessment, also affected by potential project effects on community and regional governance, will drive funding of energy, utilities and community infrastructure. Project effects on quality of life, social infrastructure, and the regional and Northwest Territories economies will affect the capacity and willingness of northern residents to pay for energy and utilities. The effects on funding, and on ability and willingness to pay, will jointly affect the capacity and effectiveness of energy, utilities and infrastructure. This, along with effects on funding of energy, utilities and infrastructure, will induce changes in energy availability, community infrastructure and utilities.

Project-induced changes in energy, utilities and infrastructure will be a function of the levels of funding, and the community and regional demands on energy, infrastructure and utilities.

The effect pathway of the project on communications infrastructure is not presented here, but it is generally similar to that described previously. The project will affect the demands for communications facilities and services, and the ability and readiness of northern residents to pay for them. These will affect the funding available, and the capacity and effectiveness of these services that, jointly, will determine the changes in the availability of the communications services.

5.2.2 Assessment and Management of Project-Specific Effects – Construction

As there will be no net migration into Déline, and the community is not located near any construction camps or proposed development, there will be no adverse effects on nontransport infrastructure in Déline during either construction or operations.

5.2.1 Mitigation Measures – Construction

As no adverse project effects on nontransport infrastructure are expected in Déline, no mitigation measures will be required.

5.2.2 Residual Effects – Construction

As no adverse effects on nontransport infrastructure are expected in Déline, no residual effects are expected.

5.2.3 Operations Effects

No adverse effects on nontransport infrastructure resulting from project activities during operations are expected in Déline. Therefore, no mitigation measures will be required and no residual effects are expected in Déline from operations.

5.3 Housing

5.3.1 Effect Pathways

Figure 5-3 shows the expected influences of the project on housing availability and quality in the Northwest Territories. In summary, project effects on housing and short-term accommodations will be:

- direct and indirect demands for short- and long-term accommodation
- reduced short-term accommodation demands through provision of construction camps
- potentially increased demand if some existing short- and long-term accommodation becomes unsuitable because of shortages of the skilled trades required to perform major repairs

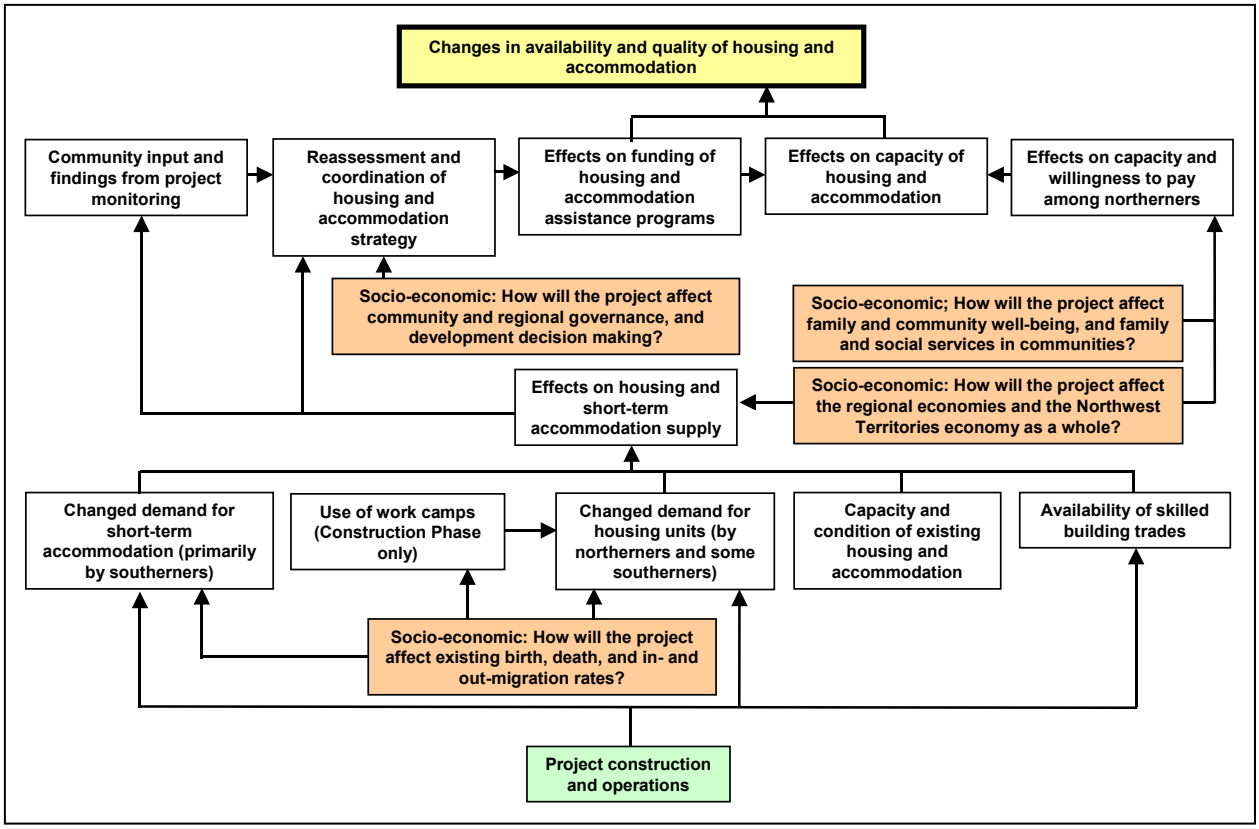

Figure 5-3: Project Effects on Availability and Quality of Housing

The resulting effects on short-term accommodation and housing, and project effects on the regional and Northwest Territories economies, might be apparent in relevant inputs from communities and findings from monitoring project effects.

This information could prompt reassessing and coordinating the current GNWT housing and accommodation strategy, which might affect funding for repairs, and housing and accommodation assistance programs. These, in association with northern residents' capacity and willingness to pay for housing, driven by project influences on the regional economy and quality-of-life expectations, will influence housing and accommodation capacities.

As a result, two influences, i.e., the capacities of housing and accommodations, and funding of housing assistance programs, will determine changes in the availability and quality of housing and accommodation.

Analyzing the effect pathway for project effects on housing is largely conceptual; there are empirical indicators for only a few links. However, project-induced changes in population size and income levels could be important driving forces that affect housing availability and conditions in the study area communities.

5.3.2 Assessment and Management of Project-Specific Effects – Construction

Project-induced changes in population size and income levels are important driving forces that affect housing availability and conditions. There will be limited net migration into Colville Lake, Tulita and Déline, and increased incomes can potentially be used to improve existing housing conditions. It is expected that there will be limited noticeable effects on housing in Déline.

5.3.3 Mitigation Measures – Construction

As no adverse project effects on housing are expected in Déline, no mitigation measures will be required.

5.3.4 Residual Effects – Construction

As no adverse effects on housing are expected in Déline, no residual effects are expected.

5.3.5 Operations Effects

No adverse effects on housing resulting from project activities during operations are expected in Déline. Therefore, no mitigation measures will be required and no residual effects are expected in Déline from operations.

5.4 Recreation Resources

5.4.1 Effect Pathways

Figure 5-4 shows the influences of the project on increased incomes of some Aboriginal workers and in-migrant non-Aboriginal workers, along with potential direct project effects on preservation of traditional language, culture and knowledge. There may be effects on the culture and lifestyle preferences of some northern workers and their families. Some might become new users of nontraditional cultural and recreational facilities such as community recreation centres, playgrounds, sports fields and libraries.

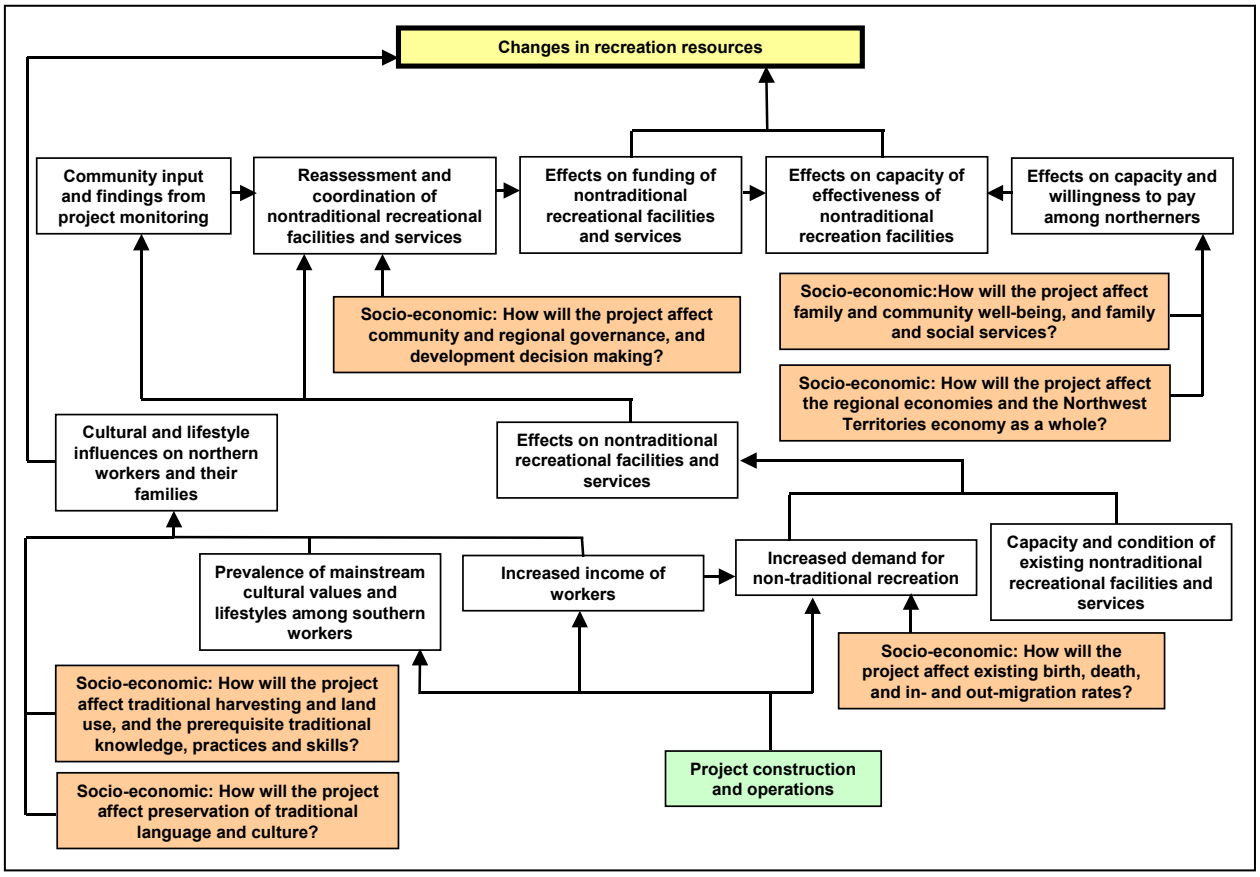

Figure 5-4: Project Effects on Recreation Resources

Project-induced increased demands for recreation from in-migrants and new northern users, and the capacity and condition of existing recreation facilities and services, will determine project effects on these facilities and services. This might drive community input and findings from project monitoring and, with evolving governance arrangements, could promote reassessment of recreation facilities and services. This reassessment might influence funding for recreation facilities and services, thus affecting the capacity and adequacy of these facilities.

Changes in the recreation resources might result from:

- effects of demands of project-induced in-migrants
- effects of cultural and lifestyle influences on northern workers and their families
- capacity and effectiveness of recreation facilities

The capacity and effectiveness of recreation facilities are related to:

- the funding available for these facilities
- the capacity and willingness of northern residents to pay for recreation and culture facilities and services
- the demands of new in-migrants

This analysis of the effect pathways for project effects on recreation resources is largely conceptual; empirical indicators exist for only a few links. Project-related in-migration and increases in income could be important driving forces affecting recreation resources.

This section does not deal with participation in activities or use of resources for which capacity and utilization information is either unavailable or less directly linked to the causal factors previously described. These activities could include various outdoor pursuits such as hiking, boating, camping and snowmobiling. To the extent that these activities relate to designated areas or the tourism sector activity, they are discussed in Section 7, Nontraditional Land and Resource Use.

5.4.2 Assessment and Management of Project-Specific Effects – Construction

The adequacy of the facilities in all the study area communities during construction will depend on how much increase there is in the local population and in recreation demand at that time. The discussion of population increase in the overview (see Section 4.2, Demography) and subsequent region-specific discussions is relevant here as well.

As there will be no net migration into Déline, no adverse effects on recreational facilities and services in Déline are expected.

5.4.3 Mitigation Measures – Construction

As no adverse project effects on recreation resources are expected in the Déline area, no mitigation measures will be required.

5.4.4 Residual Effects – Construction

As no adverse effects on recreation resources are expected in the Déline area, no residual effects are expected.

5.4.5 Operations Effects

No adverse effects on recreation resources resulting from project activities during operations are expected in Déline. Therefore, no mitigation measures will be required and no residual effects are expected in Déline from operations.

5.5 Governance

5.5.1 Effect Pathways

Figure 5-5 shows the expected influences of the project on community and regional governance in the Northwest Territories. Existing influences, independent of the project, include:

- existing governance arrangements in the North
- changes occurring in the context of land claims and self-government
- the legacy of previous proponent interactions with northern communities

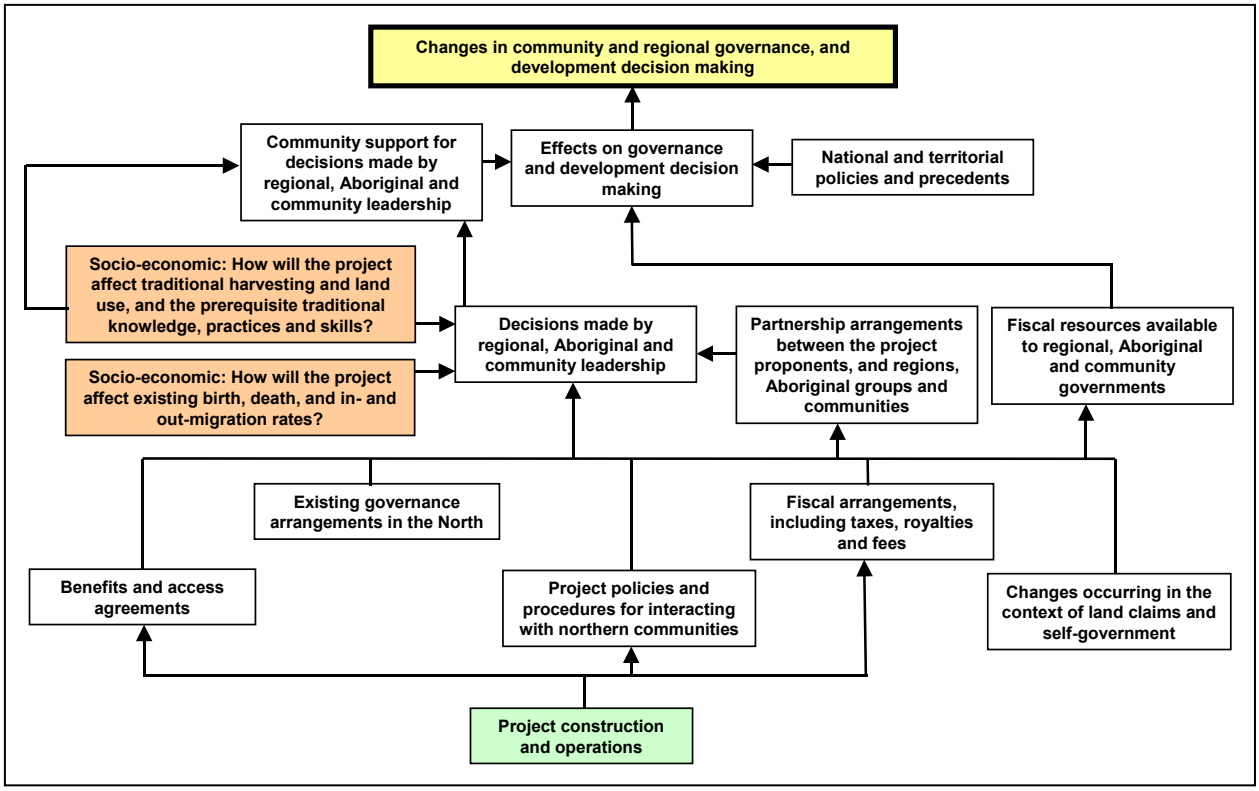

Figure 5-5: Project Effects on Community and Regional Governance, and Development Decision Making

Additional project construction influences will include:

- benefits and access agreements signed by the project proponents with the regions and the GNWT
- the fees, taxes and royalties that might accrue to governments in the study area
- project policies and procedures for dealing with northern communities

Collectively these will influence:

- partnership arrangements between the project, and northern regions, Aboriginal groups and communities

- decisions made by senior governments, and regional, Aboriginal and community leaders

Possible project effects on the traditional commitments of Aboriginal people and population dynamics will also influence leadership decisions. The decisions made by leaders, along with potentially changing traditional cultural valuations, will determine community support of leadership decisions. This degree of support, along with the funding available to the decision-making bodies, and national and territorial policies and precedents, will have effects on governance and decision making, which might induce changes in governance and development decision-making procedures.

What has been analyzed in this section is a process of change that is perhaps always occurring in democratic decision making. Relevant influences change, and as they change, people's expectations and reactions change as well. The result might be to stimulate changes in governance. One of the most powerful sources of change is an increase or decrease in available funding that is not just based on external political influences, but is often dependent on economic influences as well.

In the recent past, non-Aboriginal interests, e.g., government, industry, religious bodies and others, have exercised great influence against which Aboriginal people have had little recourse. With the signing of land claim agreements and the associated transfer of powers, Aboriginal groups now have more political control in their regions.

Throughout the community participation process for the EIS, and with the project consultation program in general, Aboriginal communities have been demanding that their mastery in their own houses be respected. They have also asserted their respective desire and intent to work with project representatives, and the territorial and federal government representatives in addressing effects associated with pipeline construction and operation. These desires and intentions were expressly registered at such meetings as the two nongovernmental organization (NGO) workshops in December 2003 and March 2004, the Inuvialuit Settlement Region–Gwich'in Settlement Area regional technical workshops in April 2003 and February 2004, the Sahtu confirmation meeting in May 2004, and the Deh Cho regional technical workshops in October 2003 and May 2004.

Signing of these agreements and transfers of power have increased the number and complexity of demands on Aboriginal governing authorities, and have inevitably increased the numbers of people with authority to make decisions. The project will likely increase the numbers, or the salience of issues for the regions and communities, further challenging the capacities of regions and communities to deal with these issues.

Despite these very significant ongoing changes, senior governments could still exert considerable influence because the Aboriginal bodies are not yet financially independent.

5.5.2 Relevance to the Project

Two governance issues are most important to the project:

- Which levels of government have the authority, funding and human resources to deal with the range of possible project effects?
- Will the levels of government charged with the responsibility for dealing with possible project effects have sufficient resources, with sufficient lead time, to deal with likely project effects on the physical and social infrastructure of the communities and regions that might be affected by the project?

In this context, physical infrastructure refers to:

- all of the facilities, roads, barge landings, airstrips and other items that might require maintenance or repair
- all of the facilities that might have a shortened lifespan because of project-related activities

Social infrastructure refers to the health, social wellness and education facilities and services that might require enhancement or expansion because of project-related activities.

The remainder of this section focuses on:

- currently evolving changes in governance in the Northwest Territories
- how these changes might affect the sources, adequacy and timeliness of funding needed for project effects

Governmental decision making related to review and approval of the project itself is not addressed in this document. This process is complex and has been determined by the regulator's *Cooperation Plan for the Environmental Impact Assessment and Regulatory Review of a Northern Gas Pipeline Project through the Northwest Territories* (Northern Pipeline Environmental Impact Assessment and Regulatory Chairs' Committee 2002). The analysis in the EIS focuses on the post-decision governance implications of the project.

5.5.3 Changing Governance – Devolution and Self-Government Negotiations

The existing governance relationships between the federal and territorial governments, and the Aboriginal people, their organizations and communities in the Northwest Territories are in the process of change through ongoing negotiations. These changes are recognized in the effect pathway diagram in the influences identified as *Changes occurring in the context of land claims and self-government* and *National and territorial policies and precedents*. These ongoing processes involve negotiations to achieve devolution of authority, and to confer self-government responsibilities on Aboriginal peoples.

Devolution refers to ongoing negotiations between the Government of Canada, the GNWT and the Aboriginal Summit that will transfer the current Indian and Northern Affairs Canada (INAC) control over land, water and resources to northern governments. The Aboriginal Summit is a negotiating body composed of virtually all the organized Aboriginal groups in the Northwest Territories except the Deh Cho First Nation, which is not participating at this time.

The self-government negotiations primarily involve the GNWT, the Government of Canada and each of the Aboriginal settlement areas. There are ongoing self-government negotiations between the GNWT, Government of Canada and Sahtu people.

Further relevant information on Aboriginal self-governance is contained in the region-specific discussions on governance in the EIS, Volume 4, Socio-Economic Baseline.

5.5.4 Assessment and Management of Project-Specific Effects

The GNWT and the Aboriginal Summit are trying to expedite devolution of land and resources from the federal government because royalty and tax revenue from diamond, mineral, and oil and gas production are now flowing out of the Northwest Territories to Ottawa. The territorial government still spends more than it collects to address Northwest Territories' needs to expand and improve community and regional infrastructure, education, and health and social services to provide for a rapidly growing population. However, under the current fiscal arrangements, the GNWT cannot take full advantage of the increased revenue potential related to resource development. By gaining province-like powers over

Northwest Territories lands and resources, the GNWT could have substantial additional resources available for addressing growth-related needs and concerns.

Because of the self-government process, the regional and community governments will have the responsibility and authority to deal with some of the effects of development.

The local communities, Aboriginal governments, GNWT and project managers will all have responsibilities for managing the social and physical infrastructure needs, and the human implications of this project. This shared responsibility for effects management is a consequence of the nature of socio-economic issues. The project proponents will cooperate with communities and different levels of government but cannot, and should not, make unilateral decisions in areas that are the responsibility of others. Figure 5-6 illustrates that all parties must cooperate to achieve the common objective of optimizing project effects on people.

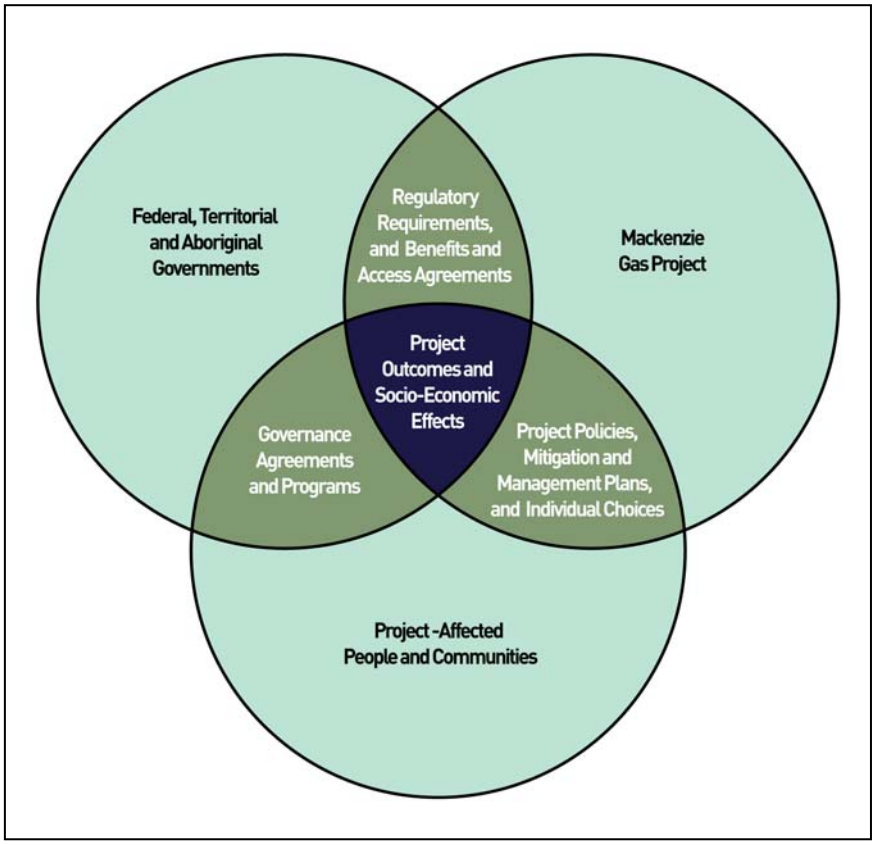

Figure 5-6: Shared Responsibility for Effects Management

Some important and difficult issues with respect to effects management will involve measures requiring substantial funding. The ongoing devolution and self-government negotiations will provide access to additional funding, if the relevant final agreements are signed and implemented in time. The GNWT will then receive royalty and tax revenue from development projects. Regional and community governments will be able to access needed funding following final signing of self-government agreements, once they are authorized to pass the necessary legislation.

Although it is possible that the devolution agreement could be implemented before construction, this is far from certain. It is problematic whether any self-government agreements will be implemented by the time construction begins. Both the GNWT and current settlement area governments might be challenged to adequately fund their social (health, social wellness and education services) and physical infrastructure (facilities such as roads, barge landings and airstrips) needs.

Therefore, given the likely time frames for implementing both self-government and devolution agreements, the magnitude and timing of funding needed to provide for project-related public service demands are pressing concerns.

The project will provide a substantial source of revenue to the various levels of government from:

- benefits and access agreements
- direct taxation
- payment of royalties

During construction, the project will generate $136 million in personal taxes from activity in the Northwest Territories. The GNWT share, after adjustment for the Formula Financing Grant (FFG) is taken into account, is estimated to be $9.8 million. Estimates of corporate tax flows have not been included. During project operations, total taxes generated from activity in the Northwest Territories will amount to about $399 million annually. Again, the GNWT share, after the FFG is taken into account, is estimated to be $22 million. The GNWT share varies from 7% of the total during construction to only 5% during operations.

Before implementation of a final devolution agreement, the largest part of this revenue will accrue to the federal government. However, the likely costs of the project for infrastructure and services will impinge on the local, regional and territorial governments. The communities and regional authorities that will experience project-related effects on infrastructure will not have the resources to pay for needed increases and public services expenditures under current programs and budgets.

It is timing that becomes a pressing issue. The costs of possible public service and infrastructure enhancement and repair will be incurred and must be paid before or during construction. These costs are difficult to predict in advance and governmental budgetary processes take long lead times. Although payments for benefits and access, and some direct tax revenue will begin with the onset of construction, governments will begin to receive most of project royalty fee and tax revenue only during operations.

Expenditures on social and physical infrastructure will likely be necessary before and during construction, and project taxes and royalty fees to government will only maximize during operations, when any unusual public expenditure demands will fall to a minimum. Therefore, it is both a timing and an incidence issue. Project revenue to governments might arrive too late and might not accrue to the level of government that will experience demands for increased expenditures.

This issue is an ongoing one that is currently the subject of much deliberation and negotiation. However, the project and the associated regulatory review process will bring it into the public eye. The project proponents can do little to address the main concerns, beyond recognizing and providing for their own direct needs and fulfilling their obligations as corporate citizens.

This suggests the need for a front-end funding agreement among governments so that needed social and physical resources are in place with the onset of construction, and can be maintained during the construction years. The affected parties should negotiate agreements at the community, regional, territorial and federal government levels, specifying the sources and uses of this needed funding. Failure to achieve and implement these agreements will likely cause hardship to people living in areas where construction effects will be experienced. In recent years, the GNWT has often publicly suggested that the FFG should be amended to ensure greater revenue sharing related to resource development.

These effects are essentially the same throughout the Northwest Territories study area, and therefore no regional-specific effects are presented.

This section has focused on high-level decision-making issues and the fiscal implications of these decisions. The potential project effects on the human resources necessary to deliver governance are discussed under employment effects in Section 4, Procurement, Employment and Regional Economic Effects, and in various other sector-specific sections dealing with public service delivery, e.g., health care and social services delivery.

5.5.5 Residual Effects

The result of ongoing devolution and self-government negotiations will be empowerment of community and regional governments, in terms of much increased authority and fiscal autonomy. This has relevance for timely restoration and enhancement of physical and social infrastructure, where these are necessary during construction. Table 5-2 shows that adverse project effects on governance are expected to be moderate magnitude in the Northwest Territories and limited to construction. In the longer term, the demand for government programming responses will return to near normal and revenue streams will be enhanced. Therefore, the capacity and autonomy of regional governments should increase.

Table 5-2: Governance – Project Effect Attributes for the Northwest Territories Study Area Communities

Phase	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Construction	Adverse	Moderate	Regional and beyond regional	Short term	No
Operations	Positive	Low	Regional and beyond regional	Long term	No

6 INDIVIDUAL, FAMILY AND COMMUNITY WELLNESS

6.1 Community Well-Being and Delivery of Social Services

6.1.1 Effect Pathways

As indicated in Figure 6-1, project activities might attract transient job seekers and northern residents from other areas, and will employ many people. They will stay in work camps and will periodically return to their families. Those employed will have increased income to spend, in ways that can affect the quality of life and well-being of individuals, families and communities. They can affect demands on family and social services as well. Project-related migration trends and work camp life can also affect family and community quality of life, and family and social services.

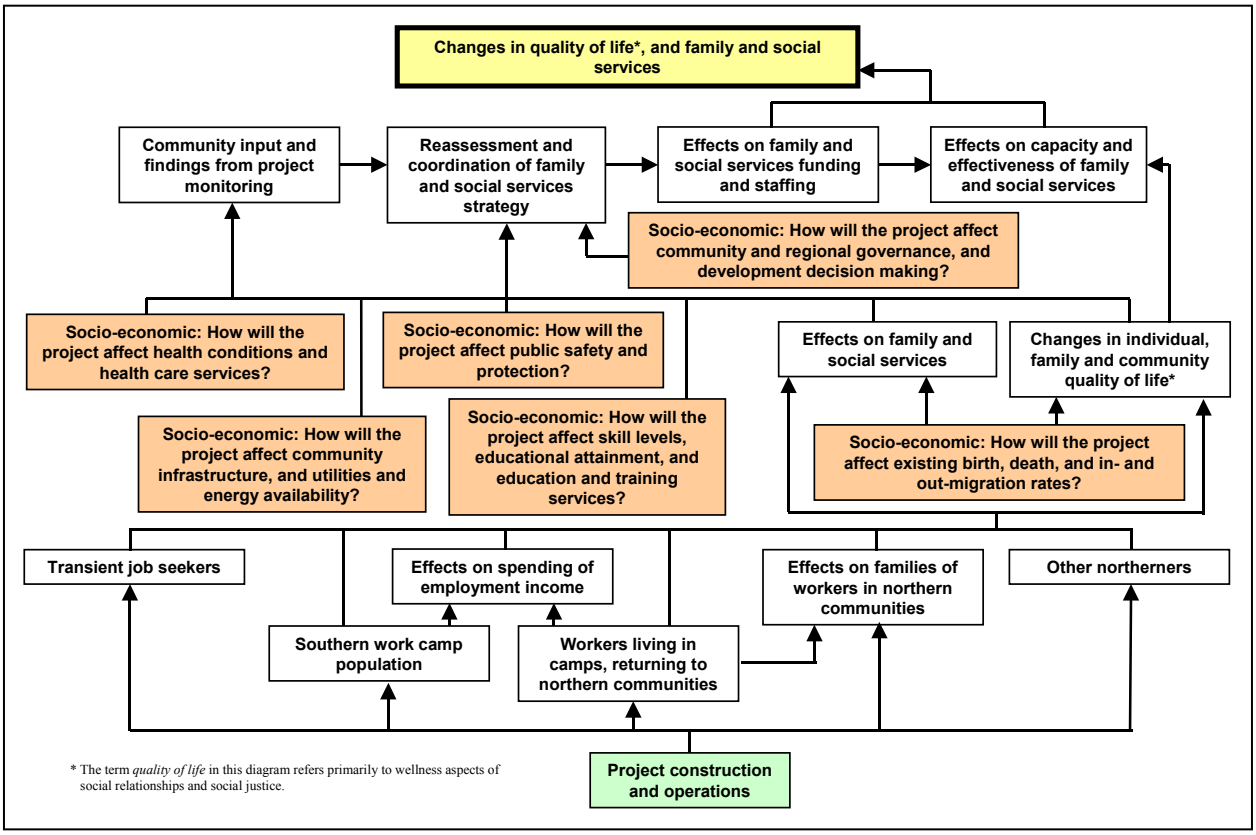

Figure 6-1: Project Effects on Family and Community Well-Being, and Family and Social Services

Many other possible project effects, discussed elsewhere in this report, and quality-of-life conditions and effects on family and social services, will affect assessments of conditions coming from community sources and project monitoring. These other influences include effects on:

- community infrastructure and utilities
- physical and mental health
- health care services
- public safety and protection services

The assessments of conditions from community sources and project monitoring, and changes in community well-being, demands on social services and regional governance influences will stimulate reassessment of delivery procedures. Reassessment will affect funding and staffing of family and social services, and the resulting changes will affect the capacity and effectiveness of family and social services delivery, as will changed service demands resulting from changes in quality of life.

Changes in family and social services delivery, and hence changes in individual, family and community wellness, will be brought about by the interaction of staffing and funding changes with:

- effects on family and social services capacity and effectiveness
- changes in demands from increased income

This analysis of the effect pathway for community well-being and social services delivery is largely conceptual; there are empirical indicators for only a few links.

The primary analytically relevant driving forces affecting well-being conditions include:

- income levels, particularly how individuals spend increased disposable income
- duration of work period separations from home
- family and community levels of stress
- availability of alcohol

Well-being conditions, and migration and resourcing responses to changes in demand are the primary drivers affecting the workloads of social service personnel, and thus the delivery of social services.

The effects of income on well-being might be beneficial. Increased income can lead to purchases of amenities that make possible more comfortable, enjoyable living, and more efficient resource harvesting. During 2001 and 2002, many

people in the Beaufort Delta Region (BDR) communities bought large diesel pickup trucks, snow machines, boats and outboard motors with their earnings. There were increased sales of home entertainment equipment, appliances and furniture. Under these conditions, the quality of life and effective resource harvesting might both improve, and demands on family and social service agents might be modest. These positive influences tend to increase as work and income stabilizes, and families learn to manage their increased income.

However, increased earnings can make possible increased gambling or spending on alcohol that might jeopardize the purchase of necessities. Substance abuse can have serious adverse effects on family and community relationships, and well-being.

Workers experiencing lengthy work-induced separations want and need rest and recreation upon returning home. Their spouses, having managed the household and child-rearing alone, need and look forward to sharing these responsibilities with the workers upon their return. Such incompatible needs can often lead to more serious conflicts. When stresses and mistrust in families or communities are combined with new sources of conflict and easy access to alcohol, the result can be abusive and violent relationships. Family and community solidarity and well-being, and indeed community social controls, can suffer.

In-migration increases the number of people who might become social service clients. Excessive demands, beyond the effective response capabilities of social service agents, can be associated with these conditions. Such adverse effects also increase the demands on policing services (analyzed in Section 6.5, Public Safety and Protection Services). Under these conditions, resourcing (primarily staffing levels) can determine the relative adequacy of the treatment that clients receive.

6.1.2 Assessment and Management of Project-Specific Effects – Construction

The project will provide health care facilities in every construction camp, but these will have no effect on nonhealth-related wellness problems. Because of the relationship between increased income and increased alcohol abuse, widely cited by residents and leaders in public participation workshops, RCMP officers, and social workers, the project will have some adverse effects on community wellness. Alcohol abuse will result in various forms of family abuse and violence in the community, and in emotional and family relationship problems experienced by victims of abuse and violence. Social services delivery will thus have to deal with the effects of increased alcohol abuse, and perhaps increased gambling as well. Participants in all of the regional technical workshops linked increased income from the project with expected increases in alcohol and drug abuse. The result is expected to be increased social disorder and conflict, and increased policing burdens for the RCMP.

Concerns have been voiced in some Aboriginal communities that project workers should be kept away from their communities, fearing that such visits would prove to be disruptive.

Some individuals might experience such heavy gambling losses that insufficient money remains to pay for food, clothes, utilities, rent and other important financial obligations. This situation could be exacerbated when construction is complete. Those individuals who do not find another job or have not saved sufficient money during their employment could experience stress from lack of income and employment, which, in turn, could also affect their families.

Project effects on well-being conditions will largely be influenced by:

- income levels and related spending patterns
- length of work separations from home
- family and community levels of stress and mistrust
- ready availability of alcohol
- access of southern workers to some Aboriginal communities

Volume 4 of the EIS provides relevant evidence on the limited effectiveness of social services for substance abuse prevention in the SSA, and the steps advocated in a GNWT-commissioned study to improve this service.

To plan realistically for possible project effects, it must be assumed that adverse effects on wellness will likely be more severe in those communities where the indicator rates presented in the EIS, Volume 6, Section 5.2.2, Existing Baseline Conditions (Community Well-Being and Delivery of Social Services) are high. In these communities, it appears that community social controls and social support are relatively weak. The project-related increases in income, which most Northwest Territories communities will experience, will likely lead to increased alcohol consumption and abuse, and to various consequences that might challenge community resources. According to the indicator data, and the reports of many nurses, social workers and RCMP officers, communities differ considerably in their resources for dealing with additional stresses, jealousies and conflicts. Such communities will have heightened vulnerability to adverse project effects on community wellness.

The rates of alcohol abuse, violence in the home and children taken into care are the most potent available indicators of impaired family wellness. The significance of the indicator rates shown in Volume 4 of the EIS can be best assessed by comparing them with the rates for the other communities. The Déline rates for alcohol-related offences, spousal assaults, young offenders and property crimes are lower than these rates for the Sahtu region as a whole. The rates for alcohol-related hospitalizations, children taken into care and violent crimes are higher than the regional rates.

The project will likely pose challenges to the well-being of study area communities and residents, and the delivery of social services. Participants at the regional technical workshops recognized the pressures that the project might place on social service agencies and communities. At the second NGO workshop in March 2004, those attending questioned whether existing agencies could deal with the increase in problems that might result from the project. Any incremental project effects might thus be seen as seriously disruptive, unless they are forestalled by implementing suitable mitigation measures.

Because the expected problem conditions result from poor spending decisions that lead to disruptive behaviour, as workers and their families learn to better manage income, the positive influence of economic opportunities on wellness conditions increases. This tendency is expected to be greater as the length of employment increases, especially relative to operations opportunities.

Déline will be 84 km from the pipeline at its nearest location, and 105 km from the closest construction camp. As a result, this community will be insulated from southern construction workers and their influences. Only those Déline residents who work on the pipeline will encounter southern workers, together with other residents who may meet people from many different locations when travelling. The primary source of project effects on Déline will thus be the experiences of local people who work on the pipeline, the unusually high incomes they earn, and how they spend their earning.

GNWT Health and Social Services (HSS) personnel might have to deal with a variety of problems resulting from increased alcohol abuse, and perhaps increased gambling. Problems of abuse, and family and community relationships can increase with greater alcohol abuse. With increased gambling, more families might experience such heavy losses that they have insufficient money to pay for food, utilities, rent and other important financial obligations.

6.1.3 Mitigation Measures – Construction

Different mitigation measures are indicated to address project-induced effects on family and community wellness, and on delivery of social services. Measures that are effective in mitigating effects on family and community wellness will also reduce effects on the delivery of social services. Similarly, improvements in the quality of social services and their delivery will help to contain the effects on wellness.

The mitigation measures for wellness threats will be less effective than those described for social service delivery. The measures to inhibit wellness-threatening behaviour are dependent on the decisions and actions of many individuals, whereas the social services delivery measures can be implemented administratively. However, project effects tending to increase family and community wellness problem rates will add to the workloads of service providers.

Because of the extent to which alcohol abuse is associated with abusive and violent relationships (RCMP officers in numerous communities 2002 and 2003, personal communication), measures to reduce alcohol abuse will reduce wellness problem rates. Effective measures to reduce alcohol abuse will involve efforts by the project, communities and GNWT.

The most effective efforts to protect wellness are those which communities themselves might implement. At the Sahtu regional confirmation meeting in May 2004, a Sahtu Elder expressed the most eloquent concern about present wellness conditions and management of possible project effects:

> *Things are not right on our land, our environment, wildlife and culture. Drugs and alcohol have always been an issue for us, not enough has been said about it. They have disrupted our lives. When we were hunting and trapping, we had good lives. We want something done about the drugs and alcohol in our communities, but nothing ever seems to happen. We're the ones that have to repair our damages, not anyone else. If the Elders don't let go of the alcohol, and be good role models, we won't be able to help our youth. Who will help us fix our problems? We are grateful to live on this land, but now we have a vulnerable lifestyle, and we need communication to live in peace. When we didn't have alcohol, we had a good life. Now, we're dishonest with one another. We need to work together to fix the damages of the past, and to be good role models for future generations.*
>
> *Now money doesn't help us – it just leads to the abuse of alcohol and drugs. We need to work together to help support one another. So, let's start working together to end the abuse of alcohol and drugs. We continue talking and talking about this, but we don't know what will happen to our people, to our land. We need to continue to educate one another on the effects of what will happen. Need to have compassion for one another – it is the only way to fix things. Nobody wants to see anything damaged – no damage to our wildlife and our fish. Let's support one another*.

The project will implement the following measures to contribute to this shared responsibility:

- initiate a program such that workers can choose to assign part of their wages to a savings account, to reduce the potential for negative lifestyle choices
- establish on-the-job support systems and resources to help develop worksite and life skills, such as:
    - workplace essential skills upgrading

  - a workplace mentor program
  - an Aboriginal worker liaison program
  - cultural awareness training
  - pre-employment safety training
  - life skills guidance, such as money management, and prevention of alcohol and substance abuse

- respect a community's right to privacy and discouraging workers from entering any community which asks for privacy

- provide, if requested, an opportunity for Aboriginal artisans to display and sell their handicrafts in the camps, reducing potential disruption caused by project workers visiting local Aboriginal communities in search of handicrafts

- encourage and support efforts by the territorial government to set up community-based training programs in personal finance and money management, focusing on informed consumption, savings and investment choices for increased incomes. These programs should be made available in the construction camps.

- support government programs to provide assistance to families and communities of workers

- ensure contractors and subcontractors implement alcohol, drug and other safety programs that meet project proponent requirements

- inspect the luggage of workers upon arrival for work

- enforce policies for alcohol- and drug-free workplaces and camps

- provide a workplace where all individuals are treated in a fair, equitable and respectful manner, specifically including issues of harassment, privacy and acceptable social relationships

- apply actions for noncompliance with camp policies, which could be up to and including dismissal

Participants at each regional technical workshop supported these measures.

The communities could:

- enact a bylaw, if one does not already exist, that limits the amount of alcohol that can be purchased or imported per trip

- police themselves in respect to alcohol and drug use

- implement a realistic campaign to inform residents of the human and financial costs to the community of substance abuse, enlisting the whole community, and particularly the moral authority of the Elders, in this effort

The territorial government could:

- initiate community-based training programs in personal finance and money management, focusing on informed consumption, savings and investment choices for increased incomes
- ensure that all community wellness centres in the study area are adequately staffed
- implement the recommendations to improve treatment services contained in the Chalmers & Associates (2002) study of substance abuse
- formally establish a consistent RCMP policy for detaining those so inebriated as to be at risk of physical injury to themselves or others
- ensure adequate staffing of community RCMP detachments to consistently enforce alcohol control policies and take action against bootleggers
- formally establish a consistent law enforcement policy in which the RCMP are empowered to lay charges in all cases of physical abuse, irrespective of the wishes of the victim
- plan (GNWT HSS) for the likely increase in the stresses and family conflicts often associated with employment absences, and provide additional training to GNWT HSS personnel to help them better prevent and effectively deal with these conditions
- prioritize the need for child and Elder care support in communities with a substantial number of females employed in rotational positions
- promptly act on the GNWT HSS initiatives that address the frustrations, concerns and professional needs of GNWT HSS service providers in communities, to improve the morale and effectiveness of its personnel

The recent GNWT Strategic Plan states (GNWT 2004: 5):

> *Creating an environment that supports healthy people is truly a shared responsibility and requires each of us to do our part. This means that governments must deliver effective public policies and adequate resources to support social programs. It means that communities should support individual members to achieve healthy lifestyles and behaviour. It also means that families and individuals must make healthy lifestyle choices . . .*

Dealing with community well-being problem conditions is the responsibility of social service personnel and the RCMP. The mitigation measures needed to safeguard the morale and effectiveness of GNWT HSS personnel are detailed in *Health and Social Services Action Plan, 2002 to 2005* (GNWT HSS, no date). The measures designed to enhance the effectiveness of RCMP officers are reported in Section 6.5.3, Mitigation Measures (Public Safety and Protection Services).

Community well-being conditions and social services delivery likely to be affected by the project already represent considerable challenges to study area communities and residents. Therefore, any project-induced incremental effects can be perceived as particularly disruptive, unless they are prevented by implementing suitable mitigation. The most important of these responses can only be made by governments and by the communities themselves. This is considered to represent a very serious challenge, requiring a concentrated effort by all.

Measures will be implemented that might help sustain community wellness, and are available to the project. Workers assigning part of their wages to savings, and consistent RCMP adherence to a policy of enforcing liquor ordinances and preventive detention of impaired persons could substantially reduce individual and community wellness problems. However, most wellness problems are alcohol related, and alcohol and other substance abuse are behaviours for which western social science has no sure cures, and which many GNWT HSS personnel are ill-trained to address (Chalmers & Associates 2002).

The commitments which the project will implement to contribute to the shared responsibility for managing these issues were described previously. The mitigation measures described in Section 6.1.3, Mitigation Measures (Community Well-Being and Delivery of Social Services) are very important for the SSA. The steps available to the project to safeguard community wellness are less effective than those available to the GNWT and local communities. Therefore, it is essential that the GNWT, and especially the local communities, do all they can to control substance abuse, and any resulting conflict and violence. The government and communities should also focus on sustaining the family relationships that might be stressed by absences associated with camp-based employment.

6.1.4 Residual Effects – Construction

Increased income levels might well induce both positive and negative consequences. The benefits to community well-being could include improved lifestyles, depending on the consumption, savings and investment decisions made by individuals and families. The threats to well-being discussed in this section reflect the concerns expressed by the public and social services professionals, and the related judgement of the assessment team.

Because of the difficulties in controlling alcohol abuse, and the serious social consequences of such abuse, the best mitigation measures will only be moderately effective. As well, the stresses of long work shifts and extended work absences are inescapable for workers, and lone household management and child rearing are stressful for workers' spouses. When easy access to alcohol is added to the seriously conflicting needs of returned workers and their homebound spouses, abuse and violence might well result.

Implementing the recommended measures for social services delivery will increase the effectiveness of wellness centres in dealing with project effects, but an increase in the workloads of these centres is very likely. Because of the distance separating it from the nearest centres of project activities, the effects on wellness conditions in Déline, seen in Table 6-1, are expected to be adverse, low magnitude and local in extent.

Table 6-1: Well-Being Conditions – Construction Effect Attributes for Déline

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Déline	Adverse	Low	Local	Short term	No

High income levels from project jobs and family separations caused by camp-based employment could have adverse effects on wellness, and thus on the workloads of social workers. Whereas some will spend their increased income to improve traditional and nontraditional lifestyles, others will spend heavily on substance and gambling abuse. As a result, some high-income families will experience economic hardship, physical battering, and sexual and emotional abuse. *It is the women and children who will suffer most*, as many GNWT HSS staff have emphasized.

The craving for rest and enjoyment of industrial workers, home from long demanding work shifts, conflicting with the needs of their homebound spouses for help in parenting and household management, pose additional difficult challenges for social workers. The workloads of GNWT HSS personnel are expected to increase substantially in some SSA communities, and there are no ready solutions for the difficult problems they must address. As a result, there will be a very real risk that overburdened social workers might experience burnout.

Project effects on social service delivery in Déline are seen in Table 6-2, which shows that adverse, low-magnitude effects can be expected.

Table 6-2: Delivery of Social Services – Construction Effect Attributes for Déline

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Déline	Adverse	Low	Local	Short term	No

6.1.5 Operations Effects

Most employment and opportunities generated by the project will end once construction, associated cleanup and site restoration activities are complete. There will be an annual average of about 27 direct pipeline operations and maintenance jobs based in the SSA. However, this much-reduced level of income-generating opportunities, which will be relatively long term and stable in nature, is not expected to result in elevated wellness problem conditions. The population increase associated with this activity is expected to be modest, about 40 people in the SSA, predominantly Norman Wells, and should generate no noticeable additional demand for social service delivery.

As project effects will be restricted to construction, there will be no need for mitigation and no residual effects are expected in Déline during operations.

6.2 Health Conditions and Health Care Services

6.2.1 Effect Pathways

Project effects on the health conditions and effectiveness of GNWT health care services are addressed in this section. Both might be affected by several project-induced influences, shown in Figure 6-2.

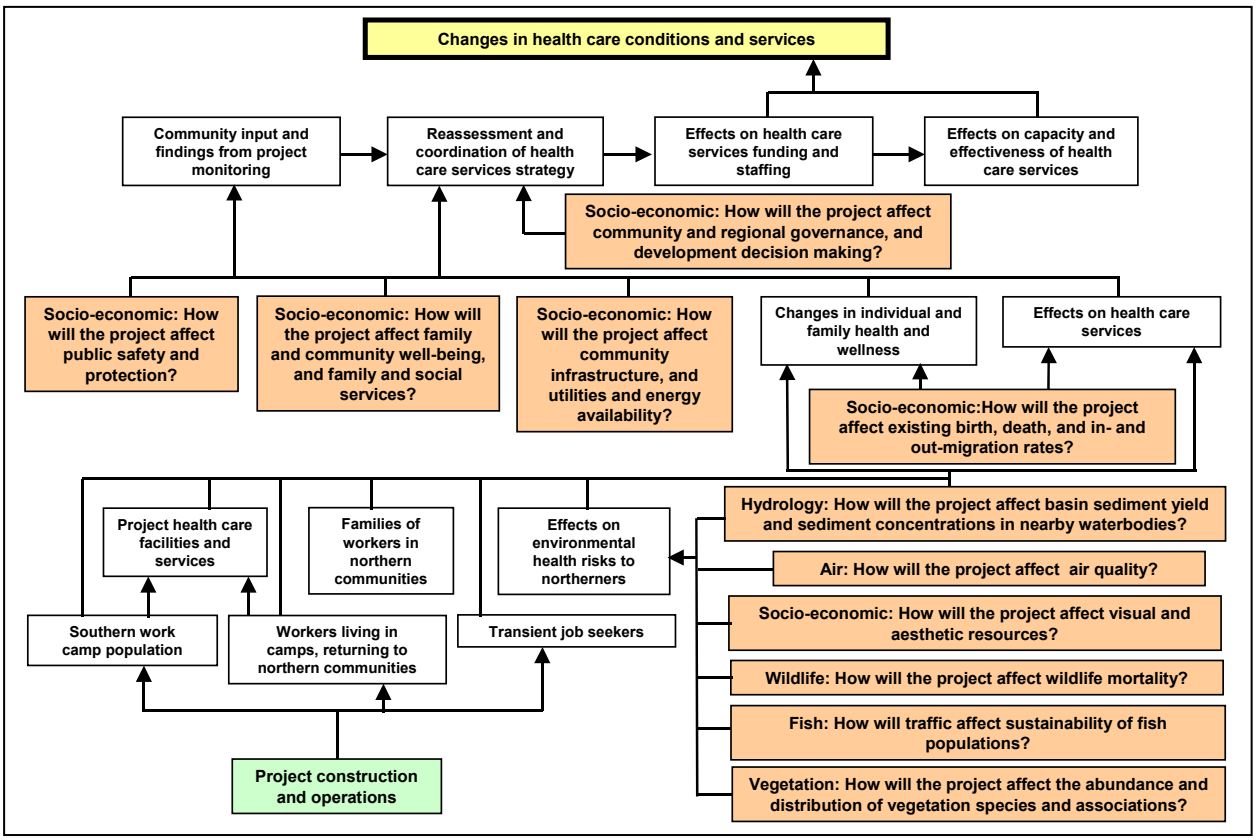

Figure 6-2: Project Effects on Health Conditions and Health Care Services

Project activities will lead to the association of northerners from study area communities with each other, with project workers from the south, and on occasion with transient job seekers. After a variety of such contacts, northern workers will return home. These project-related effects and associations with others, on or off the job, might adversely affect health through the following:

- exposure to contagious diseases, including sexually transmitted infections (STIs)
- increased consumption of unhealthy food

- possible influences on how project earnings are spent, i.e., excessively on alcohol, leading to vehicle incidents or family violence

- lessons learned from dangerous behaviour of role models

Project construction-related and -induced activities might benefit the health of individuals and groups when project earnings are:

- spent on improving traditional or nontraditional lifestyles
- spent on a better, more nutritious diet
- spent on better climate-appropriate clothing
- spent on healthier housing arrangements or facilities
- saved for future opportunities

When project-influenced associations with others result in knowledge from new role models that promote health or safety, health conditions will benefit.

Other possibilities that might affect health include project effects on:

- family and community well-being
- family and social services
- public safety and protection

The health of individuals can be affected by environmental health risks, resulting from possible project effects on:

- water quality
- ambient air quality
- health of wildlife, fish and vegetation species

Project-induced effects on GNWT health facilities and services can include increasing their workloads by providing treatment to persons affected by the project because of:

- ill health resulting from risks to human health from the quality of air, water or soil, game and other wild foods, and from noise

- illness brought home by camp workers that infects others in the workers' families

- any health condition of a camp worker which the camp health service could not address

- mental or emotional disorders induced by various conditions, including:

    - family separation

  - costs and inaccessibility of child care
  - other stresses associated with employment absences and workplace issues, including harassment, safety, low pay and undervalued work

- transient job seekers, attracted by the project, and their families who are ill or injured

Project-induced changes in health conditions or health centre workloads might give rise to community reactions and relevant project monitoring findings, possibly leading to a reassessment of the health care services strategy. Such a reassessment could influence health care funding and staffing, in turn affecting the capacity and effectiveness of health care services. Together, these could lead to changes in health care services, and to possible changes in health conditions in the local population.

This analysis of the pathways for project effects on individual health and health care services is largely conceptual; there are empirical indicators for only a few links. The primary, analytically relevant driving forces affecting health conditions are:

- project-induced or -related exposures to disease-causing contagion conditions

- project-induced or -related changes in income levels and associated spending patterns

- physical risk levels

- stress levels, which might increase emotional or mental disorders

The primary drivers affecting the workloads of health centres, and thus the delivery of health care services, are:

- local health conditions
- diseases of returning workers which spread to family members
- migration and resourcing responses to changes in demand

Any increases in the number of potential patients and resourcing, primarily staffing levels and staff morale, will determine the relative adequacy of the treatment that patients receive.

6.2.2 Assessment and Management of Project-Specific Effects – Construction

Throughout the study area communities, project influences affecting the health conditions of workers, their families and their fellow community residents will include:

- populations, both in communities and in camps
- income levels, which can have both beneficial and adverse effects, depending on spending and investment choices
- physical risk levels
- stress levels
- infectious disease conditions

Project influences affecting the health conditions of workers, their families and their fellow community residents in Déline may include:

- increases in income levels which might be spent on improving traditional or nontraditional lifestyles, or increasing socially detrimental behaviours
- reductions in incidents resulting from activities with high physical risk levels (seen in Volume 4 of the EIS) because project work might be safer than resource harvesting
- increases in relationship stresses between spouses because of their conflicting needs when one is absent from home for employment
- increases in infectious disease contagions, associated with having many local people in the camps and with increased travel between communities
- increases in mobility of people, possibly leading to increased numbers of casual sexual encounters and likely increased rates of STIs
- increases in numbers of the pre-existing dysfunctional conditions that currently exist in communities, including:
    - substance abuse
    - drug addiction
    - teen pregnancy
    - foetal alcohol syndrome/foetal alcohol effects (FAS/FAE)
    - sexual abuse
    - possibly human immunodeficiency virus (HIV) or auto-immune deficiency syndrome (AIDS) and hepatitis

- increases in stress levels among women residing in large work camps, where they are a minority, because of:

    - lack of privacy
    - potential for harassment
    - inability to maintain acceptable social relationships
    - concern regarding physical safety

There are lessons to be learned from the experiences and consequences of women's employment at the diamond mines. Although there are strict mine policies to the contrary, many women employed by the contractors who provide commissary and housekeeping services at the mines report being harassed and exploited, at times being asked to work overtime without overtime payment. Some women working at the mines also experience relationship issues with their stay-at-home spouses. Child protection workers report that there are some families in which both parents, having remote site employment, leave their children to fend for themselves when both are away at work. As increasing numbers of northern mothers are employed and families have moved to new communities where they have no relatives to give assistance, day care for children is often a problem. Most communities do not have a day care program, and where one does exist, the cost is often too high for Aboriginal mothers (Status of Women Council of the Northwest Territories 2003, personal communication; Native Women's Association of the Northwest Territories personnel 2003, personal communication).

As project-related employment might be at high levels in Déline, it is possible that the effects on both physical and emotional health conditions might be elevated, and demands on health service delivery might also increase. This could be the result of health conditions in the service area and resources staffing levels.

The project will provide health care facilities in conformity with the *GNWT WCB Safety Regulations* (GNWT Workers' Compensation Board 2000), which specify the health care staffing and facilities required for camps of varying sizes, depending on the distance of the camp from a health centre. The project and its contractors will implement *best-practice* levels of staffing and facility equipment, and thus ensure the capability of stabilizing trauma victims or seriously ill patients for air evacuation to hospitals, even in small camps.

Nevertheless, additional demands on local health centres for project-related treatments can be expected when:

- injured or ill northern workers, following treatment at camp facilities, are sent to their Northwest Territories homes until again able to work, as the local health centres must take over convalescent care

- workers who are not living in camps experience job-related injuries or illnesses
- there is an increase in mental or emotional disorders resulting from the stresses associated with project employment
- the misuse of alcohol potentially affects injury rates, relationship issues, STIs and unwanted pregnancies

If the Déline health centre was to be overburdened by increases in the patient load from the local community or a construction camp, the cases creating the heaviest nursing demands could be evacuated to a regional hospital. However, a critical issue in the Déline health centre might be the availability of adequate nursing staff. Some regions are already short of nurses because of present recruiting problems. Because the benefits formerly enjoyed by nurses in the Northwest Territories have eroded, their turnover rates have increased greatly. With frequent changes in health centre staffing, growing mistrust and strained provider–public relationships have developed in some communities between the nurses and community members. Both recruitment and community relationship problems would worsen if nurses were attracted by better-paying, project-related employment opportunities in work camps.

A combination of these various circumstances could overload health care staff. To deal with this possibility, backup plans should be in place for bringing in additional staff to help with unusual workloads from a facility that could temporarily spare some qualified staff.

The data in Volume 4 of the EIS indicates that in Déline the most recent rates for physician treatments of mental disorders, and for accidental injuries and deaths from injuries were lower than the SSA Aboriginal community rates. However, the rates for STIs and physician treatments of respiratory diseases and infectious and parasitic diseases were all higher than the SSA rates.

The greatest project effects on health conditions in Déline will typically originate with the people who take project-related employment opportunities and earn increased incomes. Both beneficial and adverse effects might result.

For some, earning substantial incomes may be associated with some risks to health. On occasion, a construction camp might be a site of elevated risk of disease contagion, with local workers and others in the camp, northerners and southerners, associating with each other. One result of increased travel between communities might be more casual sexual encounters, and higher rates of STIs.

Treatment of illnesses and accidental injuries will be the responsibility of the health care facility at each camp, until the patient returns to her or his home community. Some workers in camps might be at elevated risk of incidents.

Thereafter, the community health centre will have responsibility for continued treatment and dealing with any disease conditions brought into the community by returning workers. Territorial or southern hospitals will be required to deal with serious incidents or diseases that exceed the response capability of camp health care resources.

6.2.3 Mitigation Measures – Construction

Various mitigation measures are indicated to address project-related issues with respect to the health of individuals, families and communities, and health service workloads in either camps, local communities or with the GNWT HSS. As noted previously, effective mitigation should reduce the burdens of health centres and hospitals. Measures to reduce alcohol abuse are indicated because of the extent to which alcohol abuse is associated with violence and various forms of abuse, accidental and violent injuries, and often mental and emotional disorders. The measures proposed to reduce alcohol abuse and other health-related wellness concerns involving efforts by the project, communities and GNWT are described in Section 6.1.3, Mitigation Measures (Community Well-Being and Delivery of Social Services).

Given the size of the project, the number of contractors, camps and construction workers, and the need to comply with regulatory requirements and project proponent corporate standards, there is a need for a coordinated and consistent health plan for the project.

The project proponents will work with GNWT HSS to:

- design project health and work environment guidelines, procedures and protocols for:
  - medical alert and quarantine protocols
  - fitness to work assessments
  - assessment and care of ill or injured workers
  - camp food and waste handling and storage
- facilitate communications and cooperation among medical personnel in the camps, the GNWT HSS, environmental monitors and inspectors and the regional health authorities
- ensure joint planning, by construction camp operators, health care personnel and hospital administrators, of the relevant steps and procedures for accessing mental health counsellors or transferring a patient from the camp health care facility to a hospital, if this should become necessary. This planning will also cover situations when it is necessary to send several patients to the hospital at the same time.

- ensure construction contractors and subcontractors are bound to the guidelines, procedures and protocols developed by the project proponents and the GNWT HSS

- compile a comprehensive list of contacts containing the names and contact information of construction contractors, camp management and senior medical personnel, and share it with GNWT HSS in Yellowknife and the regional health authorities. The project proponents, construction contractors and camp medical staff will be provided with a comprehensive list of contacts for the GNWT HSS and the regional health authorities.

Based on the size of the camps, the medical staff at these facilities might include appropriate qualified nurses licensed in the Northwest Territories or experienced physician assistants qualified at the 6B level, and other qualified medical staff appropriate to camp size and location.

The GNWT HSS will identify and track appropriate public health indicators, including notifiable diseases.

Pre-employment fitness for work assessments and screening protocols will be standardized and implemented for all project and contractor employees. Screening and immunizations will be appropriate for the risks identified.

Section 6.1.3, Mitigation Measures (Community Well-Being and Delivery of Social Services) provides other complementary mitigation measures that should be undertaken by the project, the GNWT and local communities to reduce the potential for alcohol abuse.

Other measures the territorial government could take that are specifically relevant to health conditions and health services delivery, include:

- ensuring that all the health centres in the study area are fully staffed

- working with the project and other service delivery stakeholder representatives to develop the appropriate procedures for dealing overload situations in health centres and hospitals

- promptly and fully implementing the GNWT HSS initiatives that address the concerns and professional needs of GNWT health service providers in communities that are detailed in *Health and Social Services Action Plan, 2002 to 2005* (GNWT HSS, no date).

Because of the difficulties in controlling alcohol abuse, and the many health consequences of this abuse, the best mitigation measures will only be moderately effective. As well, the stresses of long work shifts over extended periods are inescapable for workers, and the long periods of lone household management and

child rearing are stressful for workers' spouses. Over-tired workers might have increased vulnerability to disease, which members of their families could catch. Increased alcohol abuse might lead to increased numbers of snowmobile and all-terrain vehicle incidents, which can be very serious.

These mitigation measures will be less effective for individual health than will those described for health care delivery. The measures for individual health are dependent on the decisions and actions of many individuals, whereas the health care delivery measures can be implemented administratively. However, project effects tending to increase health problem rates will potentially add to the workloads of health care services.

6.2.4 Residual Effects – Construction

Increased income levels might well induce both positive and negative consequences. The health benefits could include improved lifestyles, depending on the spending, savings and investment decisions made by individuals. The individual effect risks discussed here reflect the concerns expressed by the public and health care professionals, and the related judgement of the assessment team.

The health conditions and services likely to be affected by the project may represent considerable existing challenges to Déline residents. Therefore, any incremental effects might be perceived as particularly disruptive, unless suitable mitigation responses are implemented. Governments and the communities themselves must make the most important of these responses.

Déline will likely be at an increased risk of project effects on health conditions because of:

- increased levels of alcohol abuse, facilitated by increased incomes and ease of access to alcohol
- number of local people employed on the project
- contacts with persons in transit, at the airport or in hotels in town

The mitigation measures described previously will have less moderating effects for individual health than will those described for health care delivery, as the measures for individual health are dependent on the actions of many individuals, whereas health care delivery measures can be implemented administratively. However, project effects that increase health problem rates will inevitably add to the workloads of health care facilities.

The attributes of these project effects on health conditions in the SSA, which includes Déline, are seen in Table 6-3. These effects on are expected to be adverse and might be moderate in magnitude, restricted to the local community and last only during construction.

Table 6-3: Health Conditions – Construction Effect Attributes for the Sahtu Settlement Area

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
SSA	Adverse	Moderate	Regional	Short term	No

Implementing of the measures recommended by the GNWT HSS for nurses will increase the effectiveness of health centres in dealing with project effects on community health, but increases in the workloads of these centres are virtually inevitable. Accordingly, the attributes of these project effects on SSA health care services, which includes those for Déline, are as seen in Table 6-4. These effects are expected to be adverse, moderate in magnitude, local and last only during construction.

Table 6-4: Health Care Services – Construction Effect Attributes for the Sahtu Settlement Area

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
SSA health centres	Adverse	Moderate	Local	Short term	No

6.2.5 Operations Effects

Most employment and opportunities generated by the project will end once construction, associated cleanup and site restoration activities are complete. There will be an annual average of about 27 direct pipeline operations and maintenance jobs based in the SSA. However, this much-reduced level of income-generating opportunities, combined with their longer-term and stable nature, is not expected to result in an increase in wellness problems. The population increase associated with this activity is expected to be modest in the SSA, predominantly Norman Wells, and should generate no noticeable additional demand for health service delivery.

As project effects are expected to be restricted to construction, there will be no need for mitigation and no residual effects are expected in Déline during operations.

6.3 Human Health Risks

As Déline is approximately 85 km distant from the nearest project activities, there will be no effects on human health in this community from any project construction or operations activities.

A comprehensive evaluation of potential direct effects on human health from all components of the project during construction and operations is provided in Section 5.3 of Volume 6 of the EIS.

6.4 Accidents and Malfunctions

The following section provides information on potential accidents and malfunctions that could affect communities close to the project.

6.4.1 Introduction

Accidents and malfunctions can result from numerous causes, including pipeline and equipment failure, human error, and natural perils. It is necessary to have in place procedures to deal with the potential effects of accidents and malfunctions on people, property and the environment.

Prior to undertaking construction and operation of the project, the project proponents will be preparing a formal accidents and malfunctions assessment, as discussed in CAN/CSA-Z731-95, *Emergency Planning for Industry* (Canadian Standards Association 2002); which will include:

- *identification and documentation of worst-probable accidents and malfunctions involving the specific products being used or transported*
- *a determination of what can go wrong, its effects, its likelihood of occurrence, how often it could occur and the location of occurrence*
- *consideration of the dangers arising from human activity, such as fire, explosion, environmental contamination, hazardous substance release or pipeline ruptures, in addition to natural perils*
- *an evaluation of the potential for multi-accidents and malfunctions emergencies, e.g., natural gas line breaks, causing fires and explosions, which result in injury and property damage*
- *measures that could reduce or eliminate the potential for the accident or malfunction*

This assessment will be used as the basis for developing emergency response plans for the different components and phases of the project.

At this stage, the project proponents have identified the types of accidents and malfunctions that might occur as a consequence of project activities. See, for example:

- Section 10 of the application for approval of the development plan for the Taglu field
- Section 11 of the application for approval of the development plan for the Niglintgak field
- Section 11 of the application for approval of the development plan for the Parsons Lake field
- Volume 7, Section 5 of the EIS

In addition, the project proponents have considered the potential effects of accidents and malfunctions, and have identified those areas that would be particularly susceptible to such effects.

6.4.2 Identification of Potential Accidents and Malfunctions

The project proponents will use an assessment decision-making process to evaluate the potential for accident and malfunction occurrence during all phases and components of the project. This assessment decision-making process follows industry-proven practice, and federal expectations and standards, including:

- National Energy Board (NEB) All Company Letter, File 172-A000-73, Security and Emergency Preparedness and Response Programs (24 April 2002)
- CAN/CSA-Z731-03, Emergency Preparedness and Response Standard (Canadian Standards Association 2002)

The discussion of accidents and malfunctions, as presented in the balance of this section, follows common industry processes that include:

- identification of the accident or malfunction event(s)
- evaluation of who or what may be exposed (effects)
- impact or consequence of the accident or malfunction occurrence

Actions taken after identifying accidents and malfunctions may include modifying project engineering, construction and operations planning, revising engineering design, and including the potential accidents and malfunctions into project emergency preparedness response and preparedness plans. Critical in this planning is the understanding of the possible influences that local conditions may have on the capacity of the project to implement necessary emergency response,

and how those same local conditions, e.g., harvesting, cultural conditions and weather, may affect the long-term recovery requirements after the event has been brought under control, and the business and commercial considerations have been satisfied.

Project specific scenarios are developed to examine potential incidents in the context of site-specific locations and construction or operations conditions anticipated for the project. The scenario-based accidents and malfunctions assessments are used in the developing emergency response plans, and may also identify potential human health, community or social, environmental, and engineering and operations impacts and consequences.

Accident and malfunction identification involves identifying and understanding realistic events that may occur in connection with the various phases and components of the project. The possible categories of project accidents and malfunctions that may occur during engineering, construction or operations are as follows:

- materials design failure – metal and fabrication requirements for the project do not achieve the specified properties or are unable to endure the stress of the operating conditions, including climate
- construction accidents and malfunctions – impact to the facilities and pipelines during installation
- operations accidents and malfunctions – metal failure due to unanticipated operating conditions, inadequacy of engineering design features or change in operating conditions, and equipment malfunction
- third party – potential impact of nonproject-related activities on project components
- environmental hazards – soil settlement, thaw subsidence, frost heave, erosion and slope failure, flooding and scour at water crossings, and weather
- equipment events – traffic accidents and equipment failures

The potential accidents and malfunctions identified for the project as the basis for project engineering planning, and construction and operations emergency preparedness and response may include, but not be limited to, the following:

- Fire and explosion:
    - equipment operation at infrastructure facilities, borrow areas, along the pipeline right-of-way

- fuel loss during transfer, vehicle accident
- natural gas or NGL leak or pipeline rupture
- wildfire, threatening project personnel and equipment
- fuels or flammable materials storage, transportation or transfer
- vehicle or equipment accident
- NGL or natural gas pipeline rupture
- well blowout

- Hazardous materials loss or spills:
  - transportation accident, vessel or equipment failure on rail, truck or barge
  - materials transfer failure of equipment, e.g., valves, hoses, fittings and gauges
  - storage equipment failure of tanks, equipment, e.g., valves, fittings and gauges
  - pinhole leak, resulting in release of natural gas or NGLs
  - well blowout, resulting in loss of natural gas and NGLs
  - leak from facility piping, storage or processing vessels, resulting in release of natural gas or NGLs
  - rupture of pipeline gathering system and flow line, resulting in release of natural gas, NGLs
  - spills of lube oils (unused and waste), solvents, glycol, methanol, degreasers, and transmission and brake fluids
  - failure at equipment, hoses or tanks, resulting in release of untreated industrial and domestic wastewater
  - loss of containment in storage facility and release of hazardous waste
  - transportation accident, resulting in loss of or spill of hazardous waste
  - placement of hazardous waste into nonapproved community waste management facilities

- Vehicle or equipment accidents:
  - single vehicle accident with other project vehicle, nonproject vehicle, human or animal
  - multi-vehicle accident with other project vehicle, nonproject vehicle, human or animal
  - vehicle collision with project equipment or facility, or non-project equipment of facility
- Environmental hazards:
  - flooding of project facilities
  - slope erosion, causing pipe exposure, sediments into watercourses
  - slope failure and subsidence because of disturbance of permafrost conditions
  - effect of cold on equipment
  - unseasonable weather conditions, limiting access to facilities and project right-of-way

The possible project-related accidents and malfunctions, as presented in the above list, may impact or affect local biophysical and social components found along or traversing the pipeline right-of-way and associated facilities. The following section identifies the biophysical and social components being considered by the project in its accidents and malfunctions analysis.

6.4.3 Sensitive Biophysical and Social Components

Biophysical and social components were identified within the project area in order to determine possible impacts of project-related accident and malfunction events on the environment and communities. Information regarding the use of site-specific components, such as water sources and traditional harvesting areas, will provide the basis for the community-level planning activities to be included in project emergency response planning.

Biophysical components included:

- air quality
- noise
- soil and landforms (permafrost)
- vegetation
- wildlife

- water and aquatic environment

Social components included:

- community resources
- community wellness
- land and resources, in particular traditional harvesting activities and protected areas
- community safety

For any given accident or malfunction event, not all components would be affected. An explosion would likely not affect water quality, while a loss of containment may not affect air quality. However, either of those events could affect traditional land uses.

6.4.4 Potential Impacts of Identified Accidents and Malfunctions

This qualitative analysis summarizes the more common accident and malfunction events as:

- fire and explosion
- hazardous materials and fuels spills
- human error or equipment-related incidents

Environmental accidents and malfunctions are anticipated to influence project activities throughout all phases and components. Fires associated with the project may occur:

- along the right-of-way
- at facilities, camps or storage facilities
- in equipment or vehicles

Explosions may involve the:

- pipeline
- facilities
- wellheads
- camps
- storage facilities
- equipment or vehicles

Hazardous materials loss or spills may include:

- pipeline leaks or ruptures
- spills of hazardous materials, such as fuel, freeze depressants, wastewater, and drilling and completion fluids

Human error and equipment-related events may result from:

- collisions
- traffic noncompliance
- incidents with equipment

They may involve air, water or land vehicles. Preventative measures, or safeguards, will be put in place to reduce the likelihood of events that may impact the surrounding lands and communities.

The identified accidents and malfunctions are considered applicable for all project components and phases. Several events are considered to be more likely to occur than others, e.g., a fuel spill during construction is considered more likely to occur than a pipeline explosion, and therefore will require additional preventative planning.

The project proponents' accident and malfunction event planning assumes that the most common accident or malfunction will be a leak or spill of hazardous materials, with a focus on:

- fuels, such as diesel
- wellsite events (drilling or maintenance)
- natural gas and NGL release as a result of processing facilities or compressor station events (leaks or release from vessels or piping)
- natural gas or NGL release from the operating pipelines

6.4.4.1 Accident and Malfunction Effects

The possible consequence of an accident or malfunction will usually depend upon the:

- extent of the loss of pipeline or storage system integrity (leak or rupture)
- extent of loss to the infrastructure pipeline, compressor station or processing facilities (explosion, fire)
- location

- seasonal or weather variables at the time of the event

The consequences of an event are generally categorized as impact to:

- health and safety – the loss of life, injury or impairment of health to the public, an employee or a contractor as a result of event

- public and community disruption – the degree to which the general public and the local communities located close or adjacent to project components may be inconvenienced

- financial aspects – the economic loss associated with:

  - project schedule
  - drilling or processing facilities interruptions or pipeline system repair
  - additional operations costs
  - property damage

- biophysical components, such as air, water, soil, fauna or flora

The following sections discuss accident and malfunction events identified from this qualitative assessment that might occur during the life of the project, and identifies potential impacts of those events on the environment and communities.

Fire and Explosion

Of the possible accidents and malfunctions, the project proponents consider fire to have the greatest potential impact on communities and harvesting activities. Negative impacts from fire may include altered vegetation and wildlife habitat, which could affect the harvesting ability of communities. However, the impacts on vegetation and habitat may not be considered negative by the community, and those plants favoured by wildlife are early successional and colonize areas quickly after fire.

A fire could negatively affect air quality and community health, although a decrease in air quality is anticipated to be similar to short-term air quality impacts from wildfires regularly experienced in the project area. Land stability and access to the land may be affected, although access would only be restricted during and immediately after the fire. Effects on access will be dependent on the location of the event in relation to the community and harvest area, and the conditions at the time of the event. Fires associated with accidents and malfunctions may negatively impact air quality and community health. Potential impacts to local communities will be determined by:

- closeness to the community
- local weather conditions, e.g., wind direction

- the possible hazardous nature of the materials
- the time of the event

As the pipeline is below ground, external fires should not impact it. Following a right-of-way fire, ground stability and the insulating materials that are part of the pipeline integrity system will be checked to ensure maintenance of condition. Facility fire protection systems, gravel pads and firebreaks should allow for effective fire management at the facilities and infrastructure sites.

The effects of the explosion will depend on the magnitude and location of the explosion. In the event of an explosion, it is expected that the effect will be localized with a loud noise, a hole in the ground in the area of the explosion and a fire. This localized impact could result in the possible obstruction of surface drainage and possible burning of vegetation, which could threaten the local community or nearby residences if the fire is allowed to get out of control. Access to the area around the explosion and possible fire would be restricted during the event and repairs, which would impact a community's access to harvesting areas for a period of time. Effects on access will be dependent on the location of the event in relation to the community and harvest area, and the conditions at the time of the event.

Disturbance from the NGL-related explosion is expected to be similar to those attributed to the natural gas pipeline event. In all instances, the communication element of the project proponents' emergency response plan would be activated, and residents of any adjacent communities advised of the nature and seriousness of the event. Community and worker safety would only be affected if a person was in the immediate area of the explosion. Current pipeline routing makes it unlikely that there would be any major impacts to a community from a pipeline explosion.

An explosion involving hazardous materials, such as diesel fuel, would likely result in a fire. It is anticipated that such an event would have similar short-term impacts on local air quality as a pipeline explosion.

Harvesting areas and natural areas of particular value are unlikely to be affected by an explosion. However, access to the area around the explosion would be restricted during the event and repairs, which would impact a community's access to harvesting areas for a short time. Effects on access will depend on the location of the event in relation to the community and harvest area, and the conditions at the time of the event.

Hazardous Materials Loss and Spills

The effects of a hazardous material loss or spill will depend on the volume lost and location of the spill. Air quality could be negatively affected, particularly if a vapour cloud forms, and could have some impact on community and worker

safety, and community wellness. Wildlife in the area could also be affected. However, the vapour cloud would likely dissipate within hours, and thereafter would not pose a threat to human or wildlife health. Access to the area around the rupture and where the vapour cloud is located would be restricted for a short time, and could affect a community's access to harvesting areas. Soil and vegetation near the rupture would be negatively impacted. Land stability could be affected if the rupture were to occur on a slope or in a thaw-sensitive area, and could affect access routes to harvesting and traditional land use areas.

Communities could be affected by a hazardous material, e.g., diesel fuel, spill. Project activities involving fuel transport and transfer are the most likely situations where a loss of containment would occur. A spill to a flowing watercourse has the potential to distribute the material along the banks of the watercourse, necessitating additional cleanup efforts. The spill may result in short-term loss of community water intake until the plume from the spill has passed the intake point, and may prevent communities from harvesting from the watercourse. If the spill were to occur on land, the soil and vegetation would likely be negatively affected, particularly in the immediate area around the spill.

The pipeline trench will initially contain a potential leak from an NGL pipeline, and where it comes to surface and disperses over the land surface it is anticipated that it will contaminate soils and have possible short-term effects on vegetation.

Equipment Accidents

The effects of a transportation event will be dependent on the number of people involved and the location of the incident. The primary concern with a vehicle incident is community and worker safety. Vehicle incidents may involve more than a single vehicle, and may occur in or near a community. A vehicle incident could require the support of community resources, such as nursing stations or hospitals, and RCMP detachments. Community access to such resources could be negatively impacted for a short time.

Harvesting areas and natural areas of particular value are unlikely to be affected by a vehicle incident. However, access along the travel corridor where the incident occurred would be restricted for a short time, and could affect a community's access to harvesting areas.

6.4.5 Accidents and Malfunctions Event Probability

Data on accident and malfunction event occurrence for the oil and gas industry and the natural gas pipeline industry is tracked and maintained by regulatory authorities in Canada, the United States and Europe. The data allows for representation of probable accident and malfunction occurrence for:

- drilling activities

- operating pipeline systems
- transportation and worker incident and accident events
- the loss or spill of hazardous materials

Transportation, worker incident and spill events are not specific to the pipeline industry, but are considered relevant as they provide the basis for the consideration of events with a greater likelihood of occurrence because of increased traffic and equipment activity during construction.

6.4.5.1 Project Components Consideration

Drilling

Drilling programs at the anchor fields will incorporate applicable industry standards and will meet regulatory requirements. Information on potential drilling activity accidents and malfunctions is presented in the EIS supplementary information report, *Worst-Case Scenarios in the Inuvialuit Settlement Region*, submitted to the JRP in November 2004

Pipelines

Pipeline accident and malfunction events may be a leak of the product or a rupture that releases the natural gas or NGLs. The NEB, indicated that regulated pipelines such as the project pipeline have 0.049 rupture events per 1,000 km of natural gas pipelines and 0.063 ruptures per 1,000 km for liquids pipelines (approximately one event per 20 years) (NEB 2004). The data also indicates that many of the rupture events are because of external corrosion and stress corrosion events. The same data indicates fewer ruptures from material failure on new pipelines, attributable to improved quality of materials and construction methods.

Facilities

Probability data for facilities (gas processing, Inuvik area facility and compressor stations) is not as readily available as data used for drilling and pipeline probability assessments. For facility accident and malfunction assessments, the project proponents have assumed that events would be similar to those for the pipeline system. Probable events are anticipated to be as a result of operations or equipment malfunction, human error, or third-party damage.

6.4.5.2 Fire and Explosion

Fire may occur as a result of project activities or from an external nonproject-related source during any project phase. Project facility and infrastructure site emergency response systems are designed to industry standards that provide response capabilities in the event of a fire.

Data suggests that external fires may be a greater concern than project-related fires, and are very likely to occur within the project area during the life of the project. Between 1988 and 1999, there were 236 fires within a 300 km corridor centred over the pipeline route (Natural Resources Canada 2002). Lightning was the cause of 231 fires, human error the cause of four, and one was of unknown causes.

Facility gravel pads and metal buildings are anticipated to reduce or prevent the possible impact of fire on the integrity of the facilities and infrastructure sites. The depth of pipeline burial, in conjunction with clearing the right-of-way, will prevent fires from having an impact on pipeline integrity. However, fires associated with fuels or other hazardous materials will likely result in short-term smoke and facility disruption.

Explosions may be associated with various project components, including the pipelines, facilities, production wells, storage and infrastructure sites, and equipment and vehicles, and may occur during any project phase. Explosions may be caused by a variety of situations:

- improper handling of explosives required during construction
- pipeline failure, e.g., corrosion
- vapour release, e.g., of NGLs, or at fuel storage sites
- failed electrical grounding systems
- failure to follow hazardous conditions operating procedures, e.g., during pigging, material transfer

An explosion associated with fuel or other hazardous material would likely result in a fire, potentially causing smoke and facility disruption.

A pipeline explosion would result in the release of natural gas or NGLs, and ignition of the natural gas or NGLs would be likely. The NGLs will be a low vapour pressure product consisting of greater than 86% pentane plus (C_5+), butane (C_4) and a small component of propane (C_3). If there is any methane (C_1) or ethane (C_2) present, it will only be in trace amounts. If the NGL line were to explode, liquids would likely evaporate into a vapour cloud because of the pressure in the pipeline. If the explosion were to occur in a low-lying area, or if there was little wind, the vapour cloud could remain in the area for several hours.

6.4.5.3 Hazardous Materials Loss or Spills

Hazardous materials loss or spill assessments include transporting, handling, storing and transferring products identified from a review of Northwest Territories data from 2001 to 2004 (GNWT RWED 2001, 2002b, 2003, 2004), and include:

- chemicals
- fuels, e.g., gasoline and diesel
- lube oils, e.g., unused and waste
- untreated industrial and domestic wastewater
- other products, e.g., crude oil and drilling mud)

This data indicates that wastewater and fuels, followed by crude oil and drilling mud, comprised the greatest materials volumes lost over the three-year reporting period reviewed. This list of hazardous materials provided the basis for the project accident and malfunction assessments that will be conducted for all project phases and components. Accident and malfunction assessments for handling construction-related explosives and other chemicals, such as glycols and methanol, will be developed in consultation with suppliers.

6.4.5.4 Equipment Accidents

Accident events associated with equipment operations, materials transfer and transport can result in injury to personnel or obstruction to roadways. Data from Alberta Human Resources and Employment (2004) suggests that traffic loads and vehicle activity associated with construction sites (data is not specific to pipeline industry) is a common factor in increased traffic and vehicle accidents.

6.4.5.5 Environmental Hazards

Environmental hazards have the potential to impact project schedules and activities associated with all project phases and components. The US Department of Transport data for 2002 to 2003 indicates that of 180 incidents reported for gas transmission pipeline systems, 12 of the events were from natural or environment-related events (US Department of Transportation 2002, 2003). Events identified included:

- flooding
- stream bank failure and slumping
- soil and slope failures
- settlement

6.4.6 Summary

This section has identified, from industry data, accident and malfunction events of fire and explosion, loss of containment, and equipment incidents that may occur during all phases and components of the project. Of the events identified, fire and loss of containment, e.g., fuels or other hazardous liquids, have the greatest potential for long-term impacts on the environment, human health, community harvesting and social or cultural elements. Project emergency response preparedness planning, developed using proven industry processes, will incorporate the information identified in this response to ensure ongoing project accountability for the identified environmental and social components. This information is also included in the project proponents' Additional Information Report, provided in response to the JRP letter dated December 3, 2004.

6.5 Public Safety and Protection Services

6.5.1 Effect Pathways

As indicated in Figure 6-3, project activities could attract transient job seekers and northern residents from other areas, and will affect camp-based workers, their families and their spending patterns. These influences in combination, along with project-induced demographic effects, will affect public safety conditions and the demands on protection services. These two effects could lead to relevant community inputs and findings from project monitoring, and to potential reassessment of the public safety services strategy. Community inputs on project monitoring, and project effects on community wellness and wellness services might also influence this reassessment process.

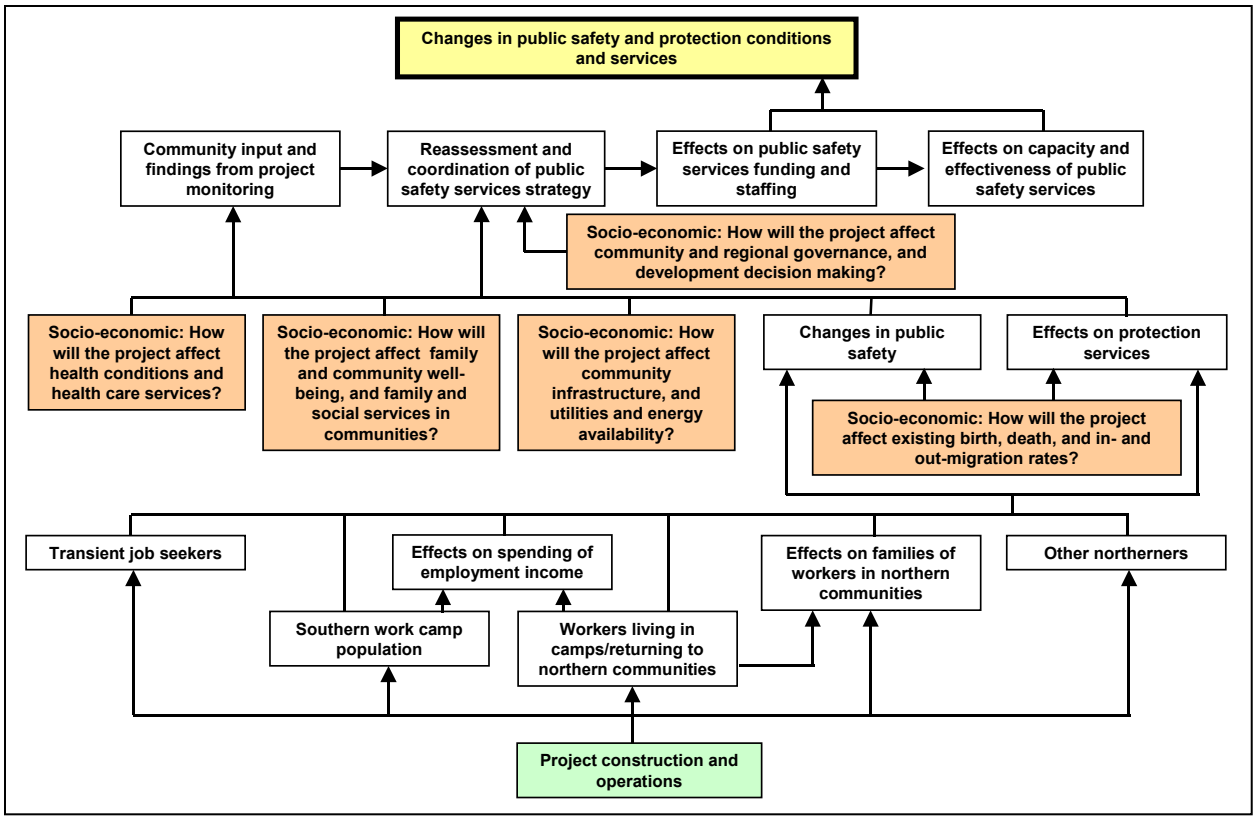

Figure 6-3: Project Effects on Public Safety and Protection Services

Reassessment of public safety services strategies might lead to effects on public safety services funding and staffing, which in turn would affect the capacities and effectiveness of these public safety services. Jointly, these can result in changes in public safety and protection conditions and services. Note that this analysis focuses on how policing is affected by the project. Project-related effects on community fire protection services should be undetectable and within the normal range of variation, for two reasons:

- most construction activities are scheduled during winter months
- the project will have emergency response plans, on-site equipment and personnel trained in fire suppression

This analysis of the effect pathways for project effects on public safety and protection is largely conceptual; there are empirical indicators for only a few links. It is clear that project-induced increases in income could result in increased substance abuse, increased violence and incremental demands on protection services.

The process, depicted in Figure 6-3 (shown previously), could be beneficial or adverse. Project-induced changes in public safety and protection services can lead to reassessments, with resulting increased capacity and effectiveness of public safety services. However, there are no familiar empirical examples of this.

6.5.2 Assessment and Management of Project-Specific Effects – Construction

The workload of an RCMP detachment in the Northwest Territories is sensitive to the incidence of alcohol abuse, the size of the population in the community(s) it serves and the number of officers in the detachment. During construction, camps will be sited in the service areas of many detachments. There will also be increased incomes, more substance abuse in most communities and perhaps modest increases in population in some. Many detachments will experience increased calls for service, from both the camps and the communities in their service areas.

The workloads of the Déline RCMP detachment will be affected by:

- the project effects on the Déline community
- the number of officers available for dealing with policing issues

Construction is expected to raise the levels of community incomes, increasing substance abuse in Déline. The effects are expected to be similar in nature to those for other regions. Participants in the first SSA regional technical workshop in June 2003 and the Sahtu regional confirmation meeting in May 2004 voiced concerns that there will be increased alcohol and drug abuse because of in-migration and increased income from project-related work.

The greatest threats to delivery of policing services result from increases in alcohol and drug abuse, brought about by an increase in project-related income levels. Dealing with the many problems associated with alcohol abuse can lead to police overwork and elevated stress. If these further affect the ability of RCMP officers to perform their duties, relationships with community residents might be compromised. A high RCMP officer turnover rate might ensue as police request transfers to other posts.

6.5.3 Mitigation Measures – Construction

The mitigation measures required to reduce project effects on the calls for RCMP services from construction camps will be somewhat different from those measures relevant to needs originating in the various communities. In this section, the measures appropriate to dealing with the direct construction and camp effects on RCMP are detailed first. This is followed by a description of the varied measures for reducing project effects on community wellness that will add to detachment workloads. The mitigation measures needed to control increased policing workloads in Déline should target alcohol abuse and overburdening of local detachments through incremental staffing.

Although the project can dependably organize and implement the mitigation measures under its control, this might be less true of those measures under GNWT and local community control. Governments are handicapped by funding protocols in dealing with clearly impending problems until after the problems have grown to troublesome proportions – as the current overloads of the RCMP in Yellowknife and Inuvik, and the limited effectiveness of the territorial substance abuse program demonstrate (Chalmers and Associates 2002).

Déline does not have restrictions on alcohol imports. The most effective efforts to discourage alcohol abuse are those which communities themselves might implement. As the statements by the Sahtu Elder quoted at the end of Section 6.1.3, Mitigation Measures (Community Well-Being and Delivery of Social Services), and by participants in other regions show, the idea of shared responsibility in dealing with substance abuse problems was an underlying component in many discussions at the regional technical workshops.

During the first SSA regional technical workshop in June 2003, participants noted that the amount of income available had a direct negative influence on homes where family violence is an issue. They highlighted the need for an alcohol and drug abuse prevention strategy. During the May 2004 Sahtu regional confirmation meeting, participants suggested that alcohol controls and related clear security policies be put in place in the camps.

6.5.4 Residual Effects – Construction

The important role of monitoring and related adjustment of mitigation and management measures was discussed previously and need not be repeated.

As indicated in Table 6-5, protection services in Déline, Colville Lake and Tulita might experience adverse, low magnitude, local and short-term project effects during construction because of:

- elevated income levels
- tendencies toward alcohol abuse

Table 6-5: Protection Services – Construction Effect Attributes for Déline, Colville Lake and Tulita

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Déline, Colville Lake and Tulita	Adverse	Low	Local	Short term	No

6.5.5 Operations Effects

Most employment opportunities generated by the project will end once construction, associated cleanup and site restoration activities are complete. There will be an annual average of about 27 direct pipeline operations and maintenance jobs based in the SSA. However, the smaller number of income-generating opportunities, combined with their longer-term and stable nature, is not expected to result in elevated wellness problem conditions. The population increase associated with this activity is expected to be modest, about 40 people in the SSA, predominantly Norman Wells, and should generate no noticeable additional demand for policing.

No in-migration is expected in any SSA community except Norman Wells. As project effects are expected to be restricted to construction, there will be no need for mitigation and no residual effects are expected in Déline during operations.

6.6 Education Attainment and Services

6.6.1 Effect Pathways

Figure 6-4 demonstrates how both delivery of education and training, and education and training achievements of northern residents might be affected by the project. During construction, the demands for labour, goods and services, and northern- and southern-available supplies of labour, goods and services will drive hiring, contracting and training strategies, and procurement and contracting strategies. These strategies will also be influenced by benefits and access agreements, government policies, and inputs from various stakeholders, including communities and governments. Jointly, these will induce:

- demands for improved skill levels and educational attainment
- effects on education and training services

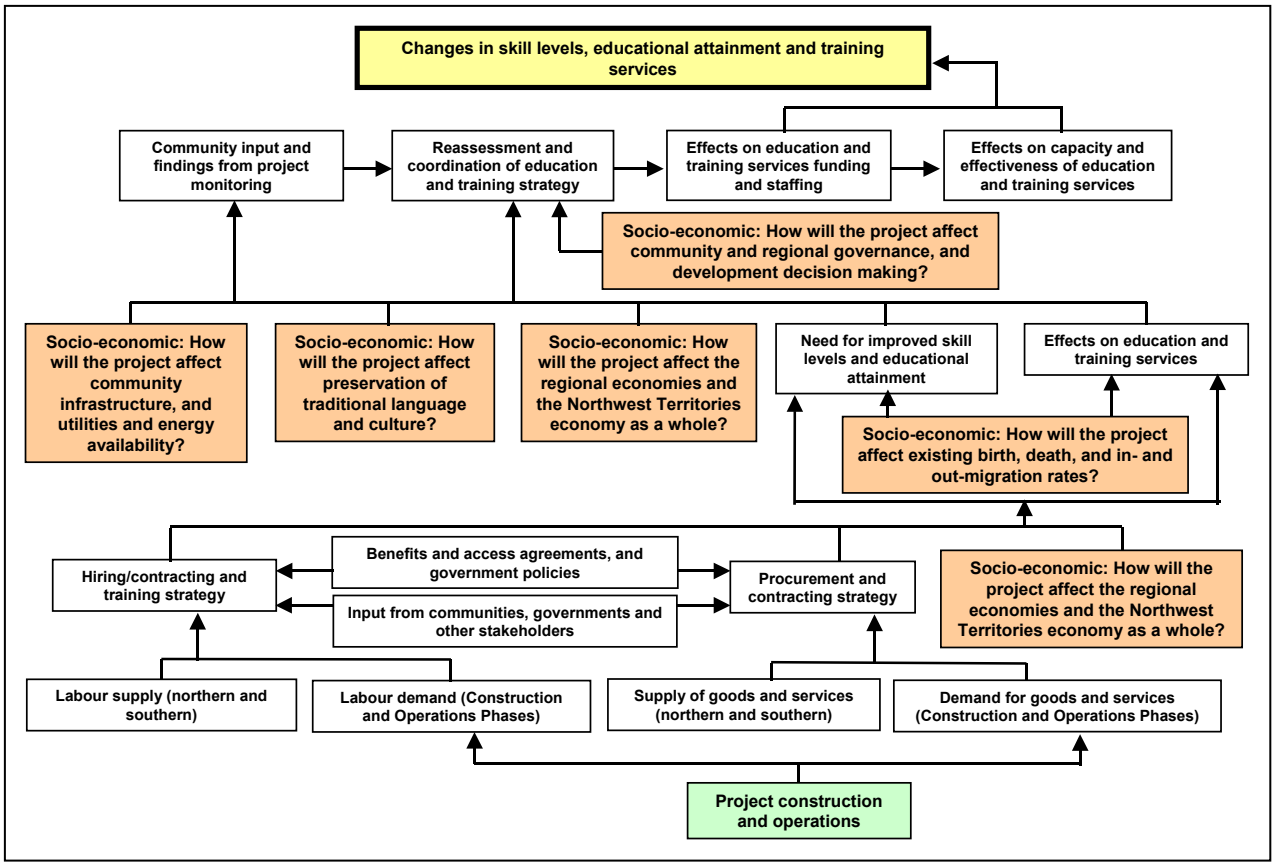

Figure 6-4: Project Effects on Skill Levels, Educational Attainment, and Education and Training Services

These two influences will affect community and project monitoring inputs, and the need for coordination of education and training strategies. Education and training services will also be influenced by community and monitoring inputs.

Education and training services in the study area might be affected by the project because of an increase or decrease in student enrollments, and changes to education and training programs offered. In turn, the changes could affect the numbers of teachers and training instructors required.

This analysis of the effect pathways for education and training services and attainments is largely conceptual; there are empirical indicators for only a few links. It is clear that the kinds of job and career opportunities generated by the project, and the resulting wages and opportunities to increase incomes will be important driving forces. These could affect the rates of retention of adolescents in school, education and training staff members, and the scope of education and training provided. The resulting effects can be beneficial or adverse.

Rates of high school completion and enrolling for post-secondary training will serve as relevant indicators of project effects on education attainment. The best indicators of recent and present education achievement are the rates of high school graduation, and of those with some post-secondary training among adults.

The GNWT Bureau of Statistics provides information on graduates and post-secondary training recipients for persons aged 15 years or over (although virtually all who graduate do so only at a later age). These rates of graduation and having post-secondary training per 1,000 people aged 15 years and over are thus indicators of education achievement, not actual rates of people who graduate or have advanced training at some time in their lives. These are valid indicators, however, increasing when the proportion of graduates increases in the population, for example, and declining when the proportion falls.

Possible project effects on education facilities and services translate into effects on classroom availability and teacher workloads. The project might affect enrollments through effects on migration, on school retention, and perhaps demands that additional subjects be taught. The utilization rate for a school, the actual number enrolled divided by the total capacity, is an appropriate indicator of the space resources available for responding to increased enrollment or pressures to increase subject offerings. It is assumed, generally, that additional teachers can be readily recruited if there is need and funding is available.

6.6.2 Assessment Criteria

Separate criteria are required for project effects on education attainment, and education facilities and services.

Positive project effects will:

- reduce the tendency for students to drop out of school or post-secondary training
- increase the tendency for dropouts to return to school and others to enroll in or complete post-secondary education or training programs

Adverse project effects will:

- increase the tendency for students to drop out of school or post-secondary training
- reduce the tendency for dropouts to return to school and others to enroll in or complete post-secondary education or training programs

With respect to education facilities and services, project effects are adverse if they:

- cause enrollment or staffing changes incompatible with currently available facilities
- reduce needed teaching staff
- lead to staff-student ratios in excess of GNWT Education, Culture and Employment norms

All other project effects on facilities and services are expected to be neutral.

Young peoples' tendencies to remain in school, drop out or return to school might be affected by such influences as:

- their present interests
- their perceptions of the earnings opportunity costs of remaining in school
- the future earnings opportunity benefits of returning to school
- the persuasions of people who might influence them

It is assumed that in regions with higher levels of education attainment, the tendency of young people to leave school early might be less than in regions with lower levels of education attainment.

Likewise, the tendency of persons or families to remain home or move to a regional centre is influenced by:

- their present interests
- their perceptions of the earnings opportunity costs of remaining at home
- the present and future opportunity benefits and costs of moving
- the persuasions of people who might influence them

Teachers' tendencies to continue teaching or to resign in favour of better-paying project employment opportunities are affected by very similar influences.

It is not possible to assess the net result of these various influences on young people, teachers or those considering moving to a regional centre. There have been no studies of people in situations resembling those resulting from the project to provide relevant guidelines. Accordingly, the strategy in this section is to identify and discuss the relevant influences with respect to leaving school early (dropping out), moving or resigning from teaching, in regionally relevant terms where possible.

However, because of the numbers or relevant operative influences and the lack of relevant prototypical examples, the final evaluations must be seen as informed but largely intuitive assessments.

6.6.3 Assessment and Management of Project-Specific Effects – Construction

The relevant issues include the potential project effects on education facilities and services, and project-induced employment and earnings opportunities on student enrollment.

The various project activities will create substantial employment opportunities for both men and women, including teenagers. Project effects on education services and attainment might include increased student enrollments from dropouts returning to school to get the education and pre-employment training needed to access jobs. Alternatively, enrollments might decrease if students leave school with the hope of securing well-paying project jobs. Either could give rise to staffing concerns if student enrollments affect educational funding and teaching resources.

Because of the temporary and seasonal nature of construction work, coupled with the qualifications and skills required to access these jobs, it is assumed that there will be no detectable loss of teaching staff that could be attributed to the project beyond the normal range of variation.

Interest in project-related employment will likely be driven by project information about employment opportunities and requirements delivered in each community in the study area. The effects of these efforts on education attainment will likely be to increase adolescent school dropouts somewhat, and to increase school retention, or some combination of both.

Note that Aboriginal young people with limited access to employment in Déline could improve their situations by moving in with relatives in Fort Good Hope or possibly Norman Wells.

There is currently enough surplus capacity in Déline classrooms, 47%, to accommodate any likely enrollment additions. However, there might be recruitment problems if additional staff is needed, or if some teachers resign to pursue project-created opportunities, but the likelihood of this is small. Indeed, if many students drop out of school to take project-induced employment, and others decided to return to school to qualify for advanced training, the reverse would be the case.

It is relevant to the POTC program that the second highest proportions of Aboriginal adults with high school graduation and post-secondary training are found in the SSA Aboriginal communities, in particular in Fort Good Hope.

6.6.4 Mitigation Measures – Construction

Measures will be designed to counter the attractions of perceived unrestricted access to project-induced economic opportunities for older students and also the disinterest in classes often found in this age group. The measures must emphasize the interesting and remunerative employment and career opportunities which high school and relevant post-secondary training or technical and trade certification would make accessible during and after the project.

The measures taken by the project proponents will include:

- before construction, continuing to promote awareness among residents and secondary school students in affected northern communities about construction and operations employment and career opportunities, and also the education and qualifications needed to access these opportunities

- working with school organizations, secondary schools and students to promote employment and career opportunities associated with the project, and the oil and gas and pipeline industries, while emphasizing the need to complete high school to qualify for these and other post-secondary learning, employment and career opportunities

- raising the level of understanding about oil and gas production and pipeline opportunities such that northern residents can make informed choices about employment and career opportunities

As seen in Section 4.1.3, Mitigation Measures (Procurement, Employment and Regional Economic Effects), the project proponents are involved in a variety of initiatives to prepare Aboriginal people, females and other northern residents for professional- and technical-level long-term employment opportunities.

To be successful, community support and involvement are essential. The POTC recognizes this. Its intent is to seek community input into both program development and delivery, and candidate recruitment.

Delivering a coordinated stay-in-school message must be the collective responsibility of the educators, families, community leaders and project proponents. This message will be reinforced when project representatives meet with the communities to inform them of the skills required to access project employment opportunities, and the need for education and training to acquire these skills. Emphasis must also be placed on recruiting and training women for nontraditional jobs, given the:

- educational attainment of women, which is often better than the attainment of men throughout the North

- under-representation of women in most job categories related to project requirements

The project will request that:

- HRDC, Aboriginal Human Resource Development Strategy Delivery Agents and training providers work with the project to develop training in basic labourer skills, construction trades, heavy equipment operation and truck driving, using local capital projects as training venues wherever possible

- education and training providers develop training programs specifically geared toward the long-term employment of women in these nontraditional occupations

- GNWT agencies (Transportation, and Municipal and Community Affairs) and private contractors cooperate with and support hands-on experience for the trainees

- education and training providers consider training in the summer season to avoid conflict with employment opportunities during project construction months. This will also permit using instructors who might be unavailable for this training during the regular school year.

In summary, through the cooperation and support of POTC members and northern communities, the training strategy can reinforce the stay-in-school message and provide long-term, transferable employment opportunities without adversely affecting existing educational institution resources and program delivery.

6.6.5 Residual Effects – Construction

Mitigation measures might fail to deter some adolescent students from dropping out of school to seek short-term project employment. However, some might be motivated to stay in school and some former dropouts to return to qualify for attractive employment.

As Table 6-6 shows, project effects on early school leaving are expected to be positive and adverse, low in magnitude, local and short term in Déline, Colville Lake and Tulita.

Table 6-6: Education Attainment and Services – Construction Effect Attributes for Déline, Colville Lake and Tulita

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Education Attainment					
Déline, Colville Lake and Tulita	Positive and adverse	Low	Local	Short term	No
Facilities and Services					
Déline, Colville Lake and Tulita	Neutral	No effect	Local	Short term	No

Likely effects on migration, and leaving school early and returning to school might tend to cancel each other out in respect to effects on education facilities and services, one tending to increase and the other to decrease enrollments. In any case, the duration of these effects is expected to be limited to construction.

6.6.6 Operations Effects

An annual average of about 27 direct operations and maintenance positions will be based in the SSA. The intent is to develop training programs, and to staff the operations and maintenance positions with fully qualified northern residents in due time.

The effect of this increasing employment of local people during operations, and of other likely opportunities, will be to demonstrate the benefits of completing high school and post-secondary training. However, virtually no operations effects on education attainment are expected in Déline.

No project effects on facilities and teaching services in Déline are expected because of the small population base, the low expected demands and existing unused capacity. Therefore, no mitigation measures will be required and no residual effects are expected in Déline from operations.

7 TRADITIONAL CULTURE

7.1 Traditional Harvesting and Land Use

7.1.1 Effect Pathways

Figure 7-1 shows the various ways in which project-related and -induced activities might affect traditional harvesting and land use. The effects of project influences can be positive or adverse, thereby strengthening or weakening traditional harvesting and land use.

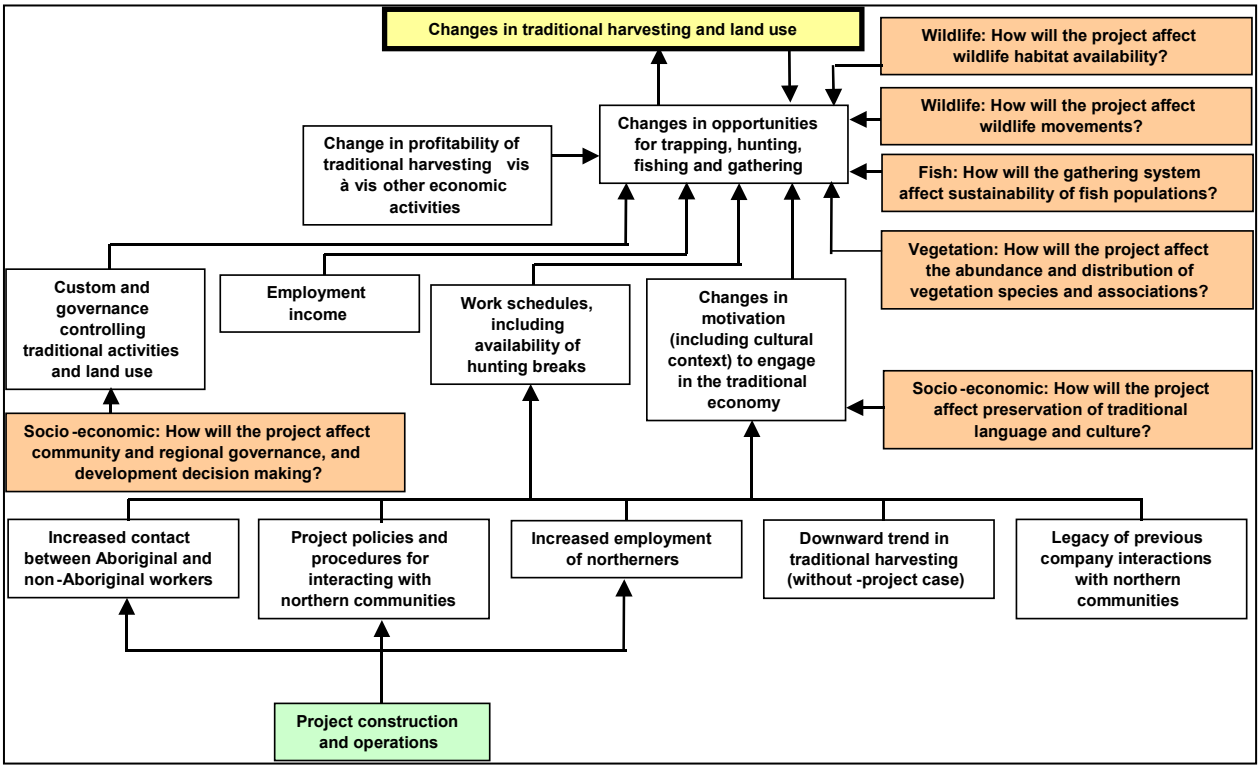

Figure 7-1: Project Effects on Traditional Harvesting and Land Use

Ongoing project consultations, and benefits and access agreement negotiations will determine policies and procedures for interacting with northern communities during construction. However, there will be an increase in employment of northern residents, and the number of Aboriginal and non-Aboriginal employees working together. Project policies and procedures – jointly with increased employment, Aboriginal and non-Aboriginal work-based associations, and the downward trend in traditional harvesting – can induce changes in motivation to engage in traditional harvesting and will determine project work schedules, including possible hunting leaves.

The requirements for labour during operations are so modest that the project will have no noticeable effects on traditional harvesting and land use.

Traditional harvesting motivation might also be affected by possible project-induced changes in the transmission of TK practices and skills, and in Aboriginal language and culture preservation. Changes in opportunities for traditional harvesting, and thus changes in actual traditional harvesting and land use patterns, will be caused by project work schedules and induced changes in traditional harvesting motivation, together with:

- employment income
- customary and governance limitations on traditional harvesting and land use
- changes in the relative profitability of traditional harvesting and other sources of income
- project effects on the distribution and abundance of vegetation, fish and wildlife

Traditional harvesting and land use is driven by opportunities and motivation to participate. Opportunities are driven by:

- project effects on the land and wild food supplies
- changes in the time and resources available to engage in traditional activities

Motivation of Aboriginal harvesters could be affected by:

- strength of commitment to traditional culture
- favourable or unfavourable reactions to on-the-job associations with non-Aboriginal workers
- amount of income from other sources
- profitability of traditional harvesting relative to other income sources

The effect pathway diagram (see Figure 7-1, shown previously) provides a conceptual analysis of the influences affecting traditional harvesting and land use. However, there are empirical indicators for only a few of the links. As a result, the following analysis is mostly based on:

- relevant literature
- the experience and judgement of the analysts
- consultations with potentially affected groups or individuals

Information from project traditional knowledge studies has not yet been included as these studies are ongoing.

7.1.2 Assessment and Management of Project-Specific Effects – Construction

The project will affect traditional harvesting through effects on the relevant time and resources available to Aboriginal people for harvesting, and on their motivation to do the harvesting work. Large project demands for workers, and a range of employment opportunities, will be found throughout the study area. There is concern that increased employment could reduce time spent on harvesting activity. However, earnings from this well-paying employment also could make possible the purchase of new and better equipment, such as snow machines, all-terrain vehicles, boats and outboard motors, to make resource harvesting more efficient and more productive.

The opportunities presented by the project will affect the full-time, seasonal and recreational harvesters differently, and might cause shifts from one category to another.

Project effects on resource harvesting are best understood in terms of three broad groupings of harvesters:

- full-time
- seasonal
- recreational

To full-time harvesters, the most traditional type, harvesting activity is centrally important to their lives. It is key to their sense of identity.

The lives of seasonal harvesters are invested in both harvesting activity and monetary employment. Harvesting sustains their Aboriginal identity and supplies the food their families prefer. Wage work is seen as necessary to maintain their quality of life.

Recreational harvesters, like non-Aboriginal hunters or anglers, enjoy getting out, stalking game or catching fish, while gaining their livelihood from monetary employment. However, harvesting is still central to their sense of Aboriginal identity.

Project-induced employment can increase harvesting motivation among all three harvester types. Those who spend some of their earnings on harvesting equipment, e.g., boats, outboard motors, snowmobiles and rifles, will be eager to use their equipment. The full-time and seasonal harvesters will be most eager to invest in upgrading their equipment, whereas the recreational harvesters will likely be interested in a broader range of expenditure options.

For many Aboriginal people, harvesting is both a source of food and of cultural sustenance, and will not decrease because of wage employment. Alternatively, harvesting motivation might be reduced by substantial incomes, often earned in work activities and settings more physically comfortable than those associated with the dual economy harvesting component. Those most vulnerable would be the full-time harvesters who might be attracted by the number and diversity of jobs not previously available to them. Alternatively, the behaviour of non-Aboriginal supervisors or work associates and the work place culture will likely be less emotionally comfortable for most full-time harvesters than when they are out hunting. Depending on their experiences working on the project, seasonal harvesters might experience a strengthening of either their harvesting or their wage employment interests, or both.

The relative importance of these contradictory influences and motivations is determined by peoples' backgrounds, aptitudes, skills and obligations. The full-time harvesting commitment of a hunter on whom several households depend for game food will not likely be reduced by the prospect of employment. However, an older adolescent, who is a seasonal hunter because wild foods are needed to supplement inadequate, occasional wage income, might be tempted, by the right opportunities, to become a recreational hunter. An additional influence that can erode harvesting interest is seen in some areas where store food has a higher status than country food.

It is not possible to fully evaluate the importance of these competing influences and motivations. The increase between 1993 and 2002 in percentages of households primarily dependent on country foods also indicates continued demand and motivation for full-time and seasonal harvesters. If mitigation is effective and such harvesters respond with suitable decisions, potential harmful effects can be limited and benefits realized.

Many Sahtu people will want to and will obtain some form of project-related employment that could involve unusual demands on their time. If this results in reduced traditional harvests, it will affect the 83% of Déline households where at least half of their diet was country food in 1998.

This level of dependence might sustain the continuing obligation and motivation of many to continue harvesting wild foods. Important, as well, is the satisfaction of the Sahtu people when eating moose meat, and their testimony to the importance of this food harvest.

7.1.3 Mitigation Measures – Construction

Although the project can have both facilitating and inhibiting influences on traditional harvesting, project effects could accelerate the slow, ongoing decline in traditional harvesting activity. Mitigation should focus on inhibiting any such tendency. Relevant efforts can be made by the GNWT and the project. Local

communities can continue to expect and consume the traditional harvesting bounty, and encourage and reward the harvesters with praise and status.

GNWT Resources, Wildlife and Economic Development (RWED) has devoted much effort to facilitating traditional harvesting, including programs to *grubstake* trappers and send their furs to auction. It also publishes a trapper newsletter, and several well-illustrated, region-specific booklets showing how to butcher the game available in the area and how to cook the various cuts of the meat. It is recommended that these programs and publications be continued.

Given the significance of country food gift exchanges with relatives, friends and other communities, it is important to provide opportunities for bountiful harvests through participation in harvesting activities.

Measures that will be undertaken by the project proponents include:

- providing flexible work schedules to accommodate traditional harvesting and other Aboriginal cultural, family and community needs, where practical, recognizing that work flexibility will be limited in the peak winter construction seasons

- supporting community-based traditional lifestyle initiatives that promote traditional harvesting and positive relationships with communities, such as:

    - traditional harvesting training camps for young people
    - traditional skill proficiency demonstrations or competitions

- supporting cultural activities and events that are consistent with the project proponents' principles and practices for community involvement

It is expected that harvester compensation agreements will be negotiated. The purpose of the harvester compensation agreements is to address actual and potential future wildlife harvest loss resulting directly from project construction and operations. The specific terms and provisions of the agreements will be negotiated by the project proponents with the hunters' and trappers' committees or other relevant authorities in the settled land claim regions, and the affected communities in the SSA.

The bases for the project program are:

- prevention
- mitigation
- compensation
- dispute resolution

The project proponents will recognize or participate in industry common practices, especially in areas where there are multiple project activities, e.g., drilling and production facilities, the gathering system, pipeline, and other exploration and development activities, to reduce duplicate, overlapping or questionable claims.

7.1.4 Residual Effects – Construction

The harvesting component of the dual economy is sufficiently flexible to permit scheduling of harvest leaves. Table 7-1 summarizes the residual effects of the project on traditional harvesting. It is assumed that the project will support harvesting leaves, where possible, and that the GNWT will continue relevant programs.

Table 7-1: Traditional Harvesting – Construction Effect Attributes for the Sahtu Settlement Area Aboriginal Communities

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
SSA Aboriginal Communities	Adverse	Low	Regional	Short term	No

Because of the expected mix of beneficial and adverse effects on different people, the effects are expected on balance to be adverse but low in magnitude, local and short term in the SSA Aboriginal Communities, including Déline.

7.1.5 Operations Effects

Most employment and opportunities generated by the project will end once construction and site restoration activities are complete. There will be an annual average of about 27 direct pipeline operations and maintenance positions created in the SSA. However, project effects will be short term and restricted to construction. Therefore, no mitigation measures will be required and no residual effects are expected in Déline from operations.

7.2 Preservation of Traditional Language and Culture

7.2.1 Effect Pathways

Figure 7-2 shows the various ways in which project-related and -induced activities can affect language and culture preservation. The effects of project influences might be either positive or adverse, strengthening or weakening language and culture preservation. More likely, both effects might result from the same experience for different individuals. This question addresses how the project might affect survival of the prerequisites for successful language and culture preservation.

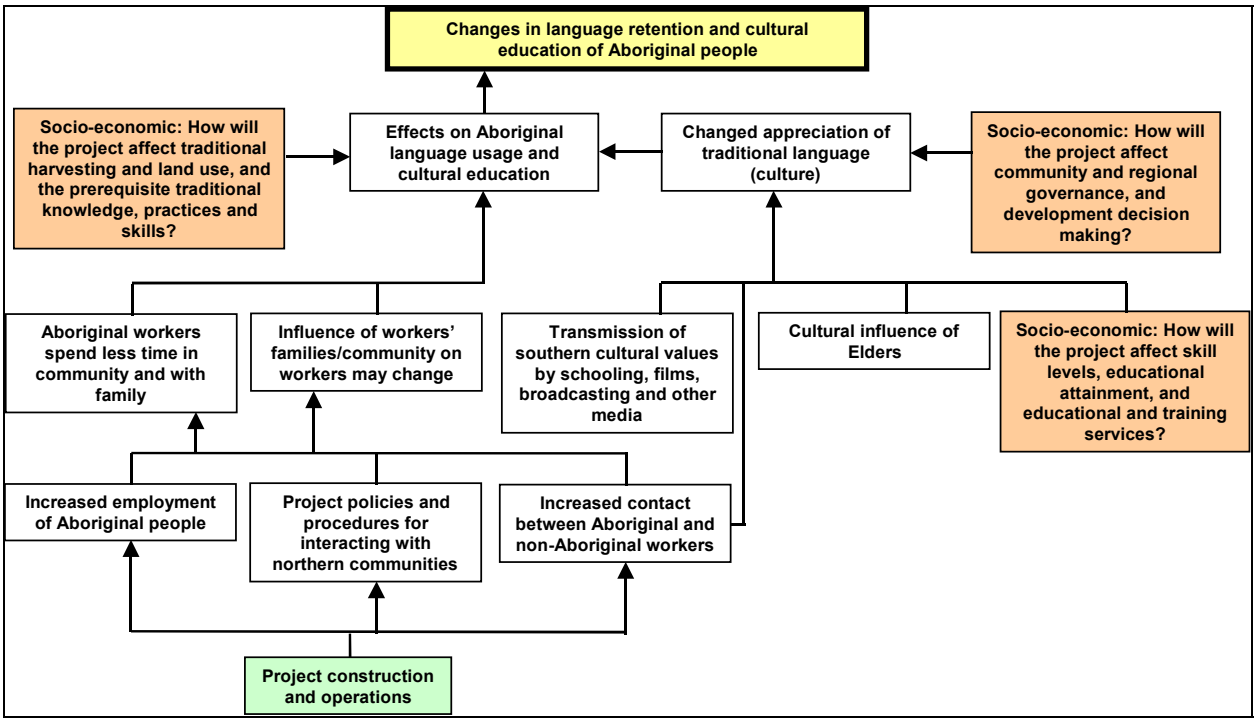

Figure 7-2: Project Effects on Traditional Language and Culture

Ongoing project consultations, and benefits and access agreement negotiations during construction activities will determine policies and procedures for interacting with northern communities. There will be an increase in employment of Aboriginal people, and an increase in their on-the-job associations with non-Aboriginal workers. These influences will reduce the time workers spend in their home communities with their families, and might change the influence of the family and community on workers. Collectively, these influences, plus project effects on traditional knowledge, practices and skills, and the harvesting that gives them functional importance, could affect Aboriginal language use and cultural education.

Influences unrelated to the project include transmission of southern interests and values through the school system, films, television and other media, and the competing cultural influence of the Elders. These influences, plus project effects on education and training services and achievements, and on community and regional governance, can induce changes in the appreciation of traditional language, culture and lifestyle. These changes could also affect Aboriginal language use and cultural preservation.

Therefore, possible changes in inter-generational transmission of language and culture will depend on:

- time spent with family and home community residents
- time spent with non-Aboriginal fellow workers
- the competing influences of southern media and schooling, and the Elders

Influences on the amount of time spent in traditional contexts will interact with influences affecting possible changes in appreciation of traditional language and culture. The current level of language and culture preservation is also important in affecting its resistance to erosive influences.

Analysis of the effect pathways for project effects on preservation of traditional language and culture is largely conceptual; there are empirical indicators for only a few links. As a result, the following analysis is largely based on:

- available current baseline data
- consultations with potentially affected groups and individuals
- the broad experience of the analysts

Data from ongoing traditional knowledge studies will be used to update this analysis as the studies are completed. It is likely that project-induced employment experiences and increases in income will add to existing influences, affecting transmission of traditional language and culture to future generations.

7.2.2 Assessment and Management of Project-Specific Effects – Construction

The project will affect language and culture preservation through effects on the time available for Aboriginal people to spend with others in their home communities. Their motivation to engage in shared activities, such as communal hunting, will also be important, because their language has particular relevance for these activities. Large project demands for workers, and likely a broad range of employment opportunities, will be found throughout most of the study area. Those responding to these opportunities will find their time with family and home community could be substantially reduced for two or more years. Their opportunities to speak their Aboriginal language will thus be reduced.

For some, project-induced employment and the resulting interactions with non-Aboriginal fellow workers might increase their valuation of traditional language and culture. For others, these relationships with fellow workers might be valued as friendly, interesting, challenging or giving promise of access to new opportunities. Substantial project-related earnings, often in work activities and settings more physically comfortable than those associated with traditional harvesting, might exacerbate this tendency.

However, there are also counterbalancing forces, including the strong influences of Elders favouring traditional ways, the support implicit in Aboriginal language taught in the schools, and also the mistrust many Aboriginal people feel from their dealings with some non-Aboriginal officials and individuals, perhaps a result of faulty communication.

There will be large project demands for workers and a broad range of employment opportunities in the SSA and elsewhere in the study area. Many residents will likely have project-related employment, and their time with family and home communities could be substantially reduced for two or more years. Opportunities to speak their Aboriginal language will be similarly reduced.

Some 68% of SSA Aboriginal community residents, including 93% of Déline residents, were able to speak North Slavey in 1999. However, there were declines of 20% in the SSA Aboriginal communities and 5% in Déline from the rates of fluency in the traditional language just 10 years earlier. This rapidity of fluency loss is indicative of the strength of English language influences – in schools, in the media and in dealings with government and other services – in the Northwest Territories.

Despite the present relative strength of language retention, it is believed that existing trends and influences on language and culture preservation are erosive, and influences deriving from project employment will tend to further this process.

7.2.3 Mitigation Measures – Construction

An implication of the trends described previously is that although the project can have both facilitating and inhibiting effects, project-related employment might add to the slow, ongoing decline in language and culture preservation. Relevant mitigation efforts can be made by the project and the GNWT. The project will take steps to reduce its effect on this process. Language and culture can be strengthened when local communities esteem Elders and the way of life they advocate, and honour those who are knowledgeable in traditional language and culture.

The project will implement the following initiatives:

- providing cultural awareness training to all workers on the project. The goal will be to provide the trainees with information on the traditional Dene cultures, and their values, norms and conceptions of human nature and suitable human behaviour. The result of this training is to facilitate smooth, friendly interaction between Aboriginal and non-Aboriginal employees at work and in camp and, more importantly, promote appreciation and respect for Aboriginal people and their culture.

- providing flexible work schedules to accommodate traditional harvesting and other Aboriginal cultural, family and community needs, where practical, recognizing that work flexibility will be limited in the peak winter construction seasons

- supporting community-based traditional lifestyle initiatives that promote traditional culture and positive relationships with communities, such as:

    - traditional harvesting training camps for young people
    - Aboriginal language proficiency demonstrations or competitions

- supporting cultural activities and events that are consistent with the project proponents' principles and practices for community involvement

- periodically providing country foods in the construction camps

- providing access to Aboriginal language reading material, and Aboriginal language radio and television broadcasts, tapes and CDs where available

- providing an opportunity for Aboriginal artisans to display and sell original handicrafts in camps, if local communities favour this. Such exhibits would enable camp workers to buy a memento of their northern work experience, provide Aboriginal craft-workers with a large market for their work and forestall any need for workers, wanting to buy Aboriginal handicrafts, to visit a local community.

The GNWT has encouraged local school boards to provide Aboriginal language instruction in schools. Aurora College offers several courses designed to help perpetuate traditional skills and activities. These programs should be continued.

7.2.4 Residual Effects – Construction

The residual effects of the project on language and culture preservation for the SSA Aboriginal communities are summarized in Table 7-2. These effects are based on the assumption that the required provision for Aboriginal preferences and interests in construction camps and the process for authorizing harvest leaves are in place, and that the relevant GNWT programs will be continued. Without this mitigation, language and culture preservation might suffer because it is the younger Aboriginal men who will be most vulnerable to the adverse influences previously described.

Table 7-2: Language and Culture Preservation – Construction Effect Attributes for the Sahtu Settlement Area Aboriginal Communities

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
SSA Aboriginal Communities	Adverse	Low	Local	Short term	No

Given the strength of English language influences in the Northwest Territories, the indications of decline in speakers of an Aboriginal language between 1989 and 1999, and the relatively short duration of project-induced influences, project effects are expected to be adverse and low in magnitude in the Aboriginal communities, which include Déline, undetectable from the language and culture preservation historical trend. The effects are expected to last only during construction.

7.2.5 Operations Effects

Most employment and opportunities generated by the project will end once construction, associated cleanup and site restoration activities are complete. There will be an annual average of about 27 direct operations and maintenance positions based in the SSA. However, project effects are expected to be restricted to construction. Therefore, no mitigation measures will be required and no residual effects are expected in Déline from operations.

8 NONTRADITIONAL LAND AND RESOURCE USE

This section provides a discussion of the potential effects of the project on nontraditional land and resource uses, protected areas, and visual and aesthetic resources, focusing on the community of Déline.

As part of the assessment of nontraditional land and resource use, a regional study area (RSA) was selected within which project effects are expected to be noticeable. The RSA selected for nontraditional land and resource use consisted of a 15-km buffer placed on the pipeline route. This resulted in a 30-km-wide corridor within which baseline information was gathered and project effects were assessed. The assessment found that all project effects are expected to be limited to the RSA or less. Further details on study areas for nontraditional land and resource use can be found in the EIS, Volume 6, Section 7, Nontraditional Land and Resource Use.

8.1 Project Effects on Nontraditional Land and Resource Use

8.1.1 Effect Pathways

The effect pathway diagram in Figure 8-1 illustrates the projected influence of the project on nontraditional land and resource use. These pathways will be used throughout the analysis of effects to determine what level of effects could occur.

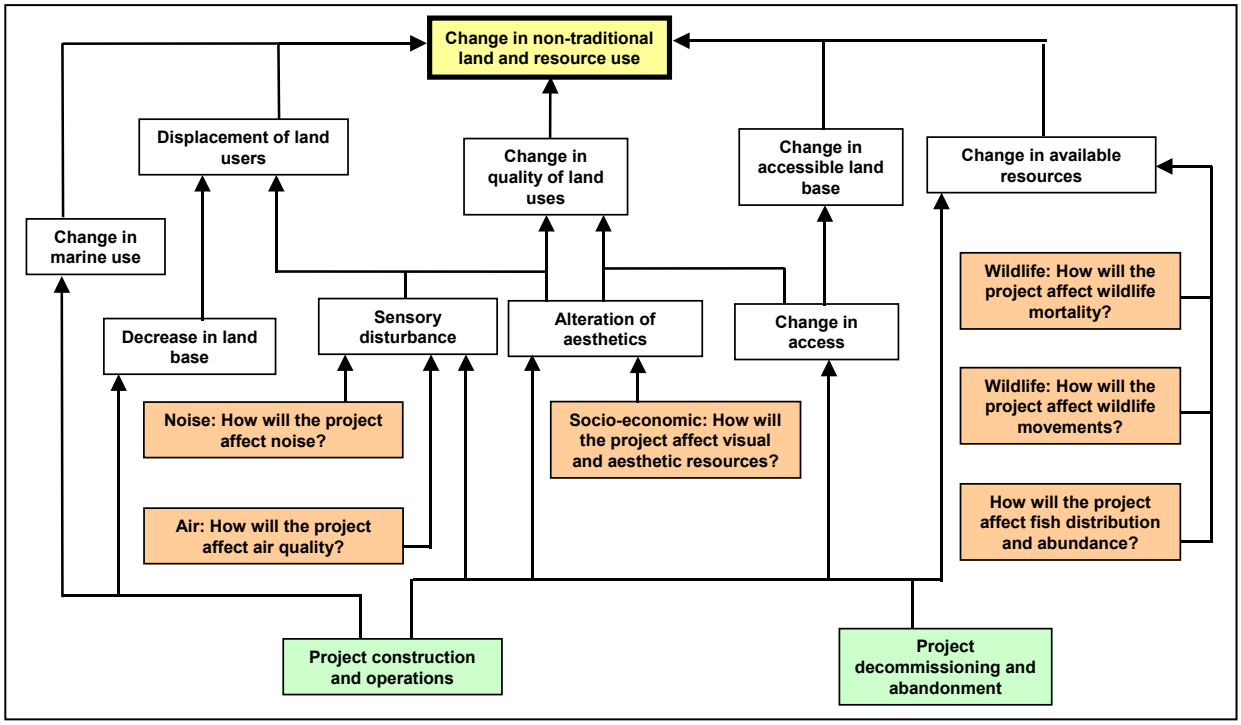

Figure 8-1: Project Effects on Nontraditional Land and Resource Use

The first level in the diagram shows the project phases, construction and operations, and decommissioning and abandonment. The second level identifies the key areas for potential project-specific effects of these activities on nontraditional land and resource use. These effects will directly apply to the valued components (VCs) for nontraditional land and resource use. The third level of the diagram shows indirect effects and will be discussed in terms of the VCs. The fourth or top level indicates that the expected outcome of all these direct and indirect effects will be a change in nontraditional land and resource use.

8.1.2 Assessment and Management of Project-Specific Effects

Déline is located approximately 84 km from the pipeline route. Because it is outside of the 30-km RSA, only a small amount of applicable baseline information was collected and no project effects on the community are expected.

8.1.3 Mitigation Measures

As no adverse project effects on nontraditional land and resource use are expected in Déline, no mitigation measures will be required.

8.1.4 Residual Effects

As no adverse effects on nontraditional land and resource use are expected in the Déline area, no residual effects are expected.

8.2 Project Effects on Protected Areas

8.2.1 Effect Pathways

The effect pathway diagram (see Figure 8-2) shows how construction and operations activities are expected to affect protected areas. The first level in the diagram shows the project phases, construction and operations, and the second level identifies the expected project-specific effects of these activities on protected areas. For example, construction activities in protected areas will lead to a decrease in available land base because of site clearing, and installation of the pipeline, facilities and associated infrastructure. Construction of new permanent and temporary roads for the project will lead to an increase in access to protected areas.

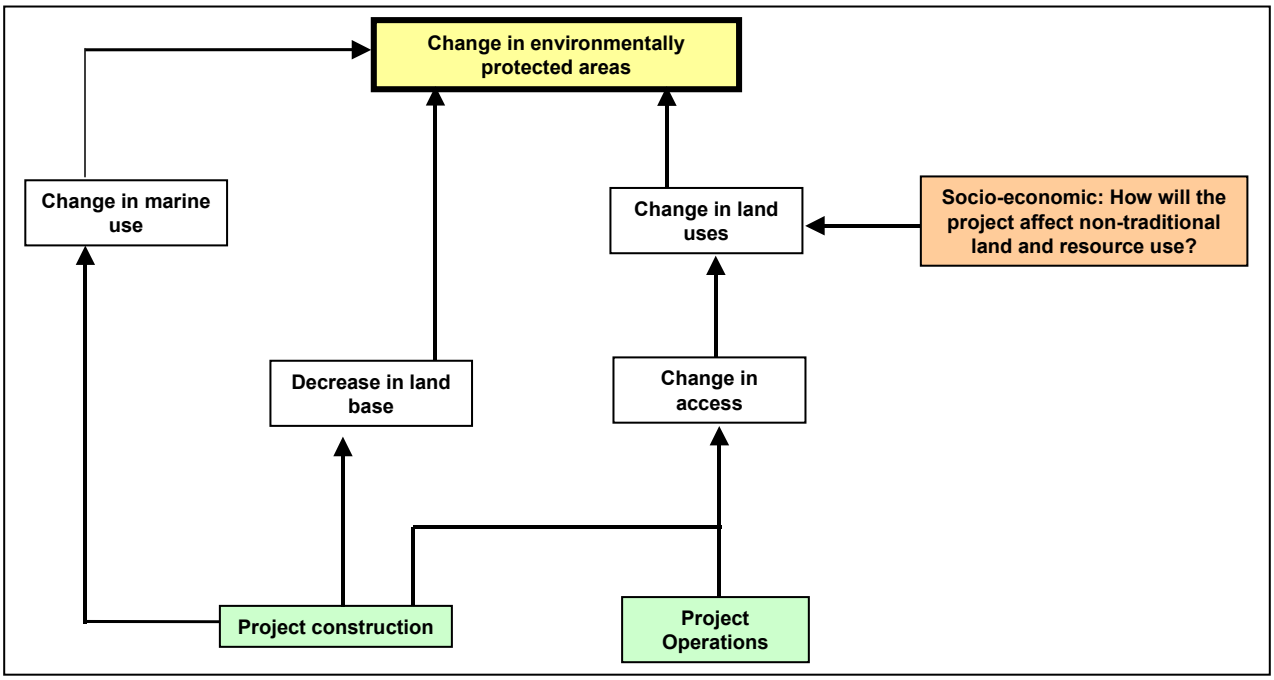

Figure 8-2: Project Effects on Environmentally Protected Areas

The third level in the diagram shows a change in land use in the protected areas as a potential indirect effect. The increased access because of the project could lead to increased use of the areas and new types of land uses could be proposed in these areas. The fourth level of the diagram shows the predicted effect – a change in environmentally protected areas.

The analysis used to assess the magnitude of effects on nontraditional land and resource use is largely qualitative. This is because of several factors, including the inability to quantitatively determine effects on VCs that are not easily defined by numbers. For example, although the project's encroachment on protected areas can be measured quantitatively, it is difficult to predict a numerical change in

recreational activities, or the change in perceived enjoyment. Therefore, professional judgment, supplemented by the results of the EIS public participation process and linkages with other disciplines, was used to determine effect predictions.

8.2.2 Assessment and Management of Project-Specific Effects

Déline is located approximately 84 km from the pipeline route. Because it is outside of the 30-km RSA, only a small amount of applicable baseline information was collected and no project effects on the community are expected.

8.2.3 Mitigation Measures

As no adverse project effects on protected areas are expected in the Déline area, no mitigation measures will be required.

8.2.4 Residual Effects

As no adverse effects on protected areas are expected in the Déline area, no residual effects are expected.

8.3 Project Effects on Visual and Aesthetic Resources

8.3.1 Effect Pathways

Figure 8-3 shows the predicted effect pathways for visual and aesthetic resources. The effect pathway diagram shows how construction and operations activities are expected to affect visual and aesthetic resources. The first level shows the direct effects. For example, construction will bring about the presence of equipment and activity in an area that has been previously undisturbed. This could cause sensory disturbance to people using the area or observing it from above.

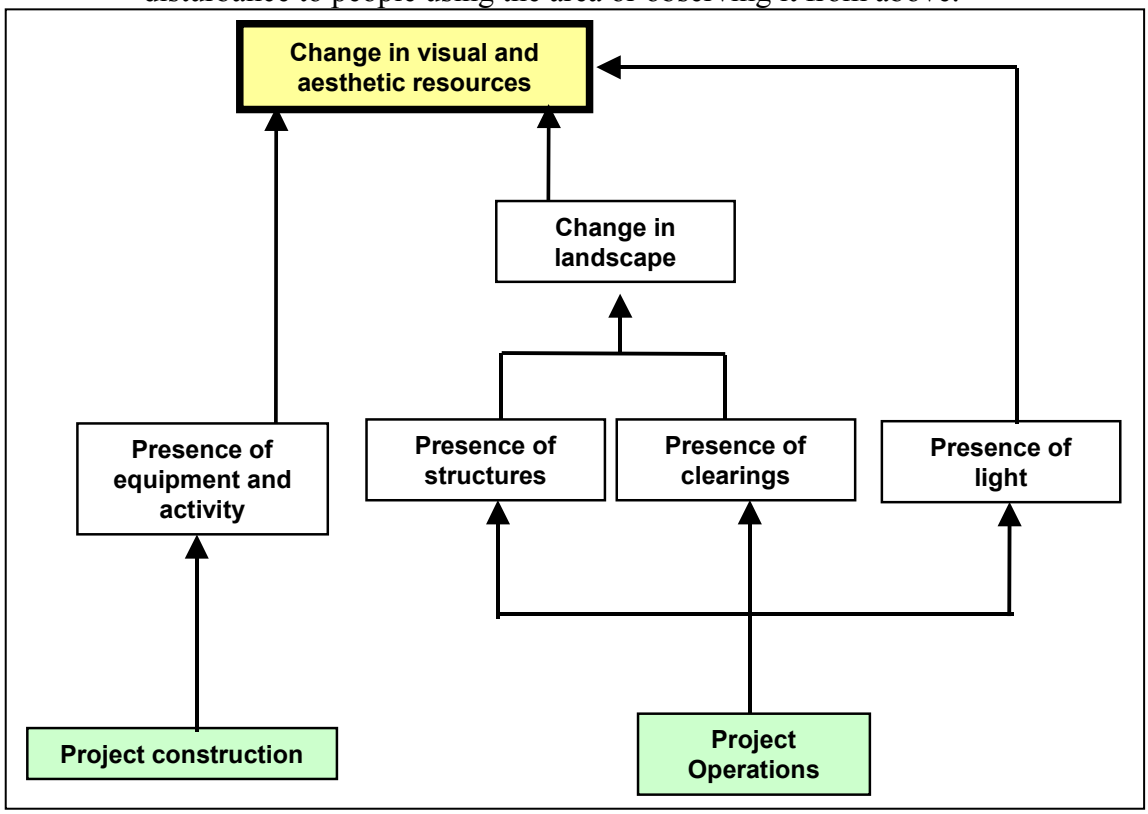

Figure 8-3: Project Effects on Visual and Aesthetic Resources

Operations will bring about structures, clearings and lights, which in turn will lead to a change in the landscape. There could be ice fog during cold weather, lights will be visible during the winter dark season and flares could be present.

Decommissioning will reduce the effect on visual and aesthetic resources by removing structures, traffic and the human presence of the project, except for the footprint left on the landscape. This could take longer to return to baseline conditions, because of the length of time required for revegetation in the northern climate.

8.3.2 Assessment and Management of Project-Specific Effects

Déline is located approximately 84 km from the pipeline route. Because it is outside of the 30-km RSA, only a small amount of applicable baseline information was collected and no project effects on the community are expected.

8.3.3 Mitigation Measures

As no adverse project effects on visual and aesthetic resources use are expected in the Déline area, no mitigation measures will be required.

8.3.4 Residual Effects

As no adverse effects on visual and aesthetic resources are expected in the Déline area, no residual effects are expected.

9 HERITAGE RESOURCES

The following information is a community-specific presentation of the heritage resource site data which is closest to the community of Déline.

Indirectly affected communities are those communities that are located well outside of the proposed development areas and pipeline corridor. Although community lands may not be directly affected by the project, ancillary effects may be noted within the community. As heritage resources investigations were completed only in association with the proposed development, it is unlikely that heritage resources will be identified with these communities.

The community of Déline is an indirectly affected community with respect to the project within the Déline District of the SSA. Heritage resource sites are known to be present in the Déline area, however no sites were investigated that were not immediately adjacent to the development zones.

9.1 Effect Pathways

Figure 9-1 shows a linkage diagram developed to understand the mechanisms through which the project could affect heritage resources.

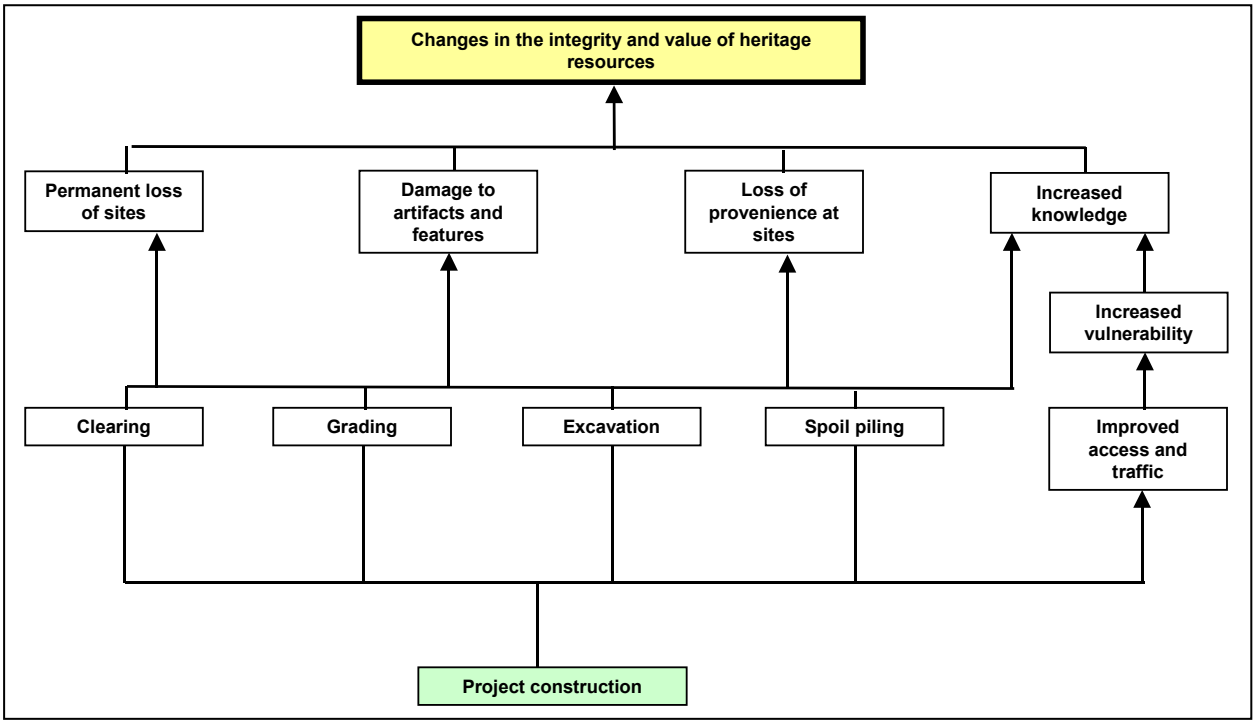

Figure 9-1: Project Effects on Heritage Resources

Heritage resources are nonrenewable resources that might be located at, or near, the ground surface and therefore are highly susceptible to any activities that result in disturbance to the ground. Consequently, the linkages between project development activities and potential effects on heritage resources focus on surface disturbances that will take place within the project footprint. They also include effects in a regional context because of potential indirect effects of the heritage resources investigation.

9.2 Context

9.2.1 Environmental Context

The environmental context information for the separate communities has been presented and discussed in detail in other sections of the EIS, Volume 6. In general, the SSA falls within the North and South Taiga Plains Ecological Zones, which are dominated by the Mackenzie River and its tributaries, and consists of a series of low-lying plains with a diverse array of fauna and flora. It represents the transitional zone between the boreal coniferous forest to the south and tundra to the north.

9.2.2 Cultural Context

9.2.2.1 Prehistory

The sequence of prehistoric (11,000 to 220 before present [BP]) occupation of the Déline area is not well defined, in part because of the sparse number of sites recorded in the region and because little evidence is available to assign age to any of these sites. Consequently, the sequence of occupation outlined previously for the Gwich'in Settlement Area (GSA) also applies to this portion of the SSA.

9.2.2.2 History and Cultural Groups

The SSA is part of the traditional lands of the Athapaskan-speaking Dene people. These lands comprise the Mackenzie Valley lowlands between the Blackwater and Travaillant rivers, from the Mackenzie Mountains and Foothills in the Yukon to the Anderson Plain west of Great Bear Lake.

Before contact with Europeans, the Aboriginal people of this region were similar in terms of technology and language, and were geographically mobile. These designations might appear to reflect administration and ethnographic convenience rather than self-identification. However, they were considered distinct enough by their neighbours to be designated as separate peoples when the first fur traders and explorers arrived in the region (Savishinsky and Hara 1981).

Although these regional groups had many cultural similarities, they recognized homeland use areas attributed to distinct local bands (Sahtu Heritage Places and Sites Joint Working Group 2000), including the:

- Sahtu Dene group of the Great Bear Lake area
- K'ahsho Got'ine of the Fort Good Hope–Colville Lake area
- Shuta Got'ine of the area west of the Mackenzie River and south of Norman Wells
- K'aalo Got'ine between Mackenzie River and Great Bear Lake

However, all groups had access to, and use of, the entire traditional lands of the Sahtu. Today, the SSA is divided into three administrative districts:

- K'ahsho Got'ine
- Déline
- Tulita

The ways in which these people view and understand the land are preserved and passed on through oral tradition. Subject matter includes:

- knowledge of the environment
- animal behaviour
- cultural values
- making tools and equipment
- interacting with family members and neighbours

The land is where this knowledge is passed on, and special places become aids for recalling stories and related knowledge (Sahtu Heritage Places and Sites Joint Working Group 2000). Special places might include:

- burial sites, which are considered sacred
- landmarks that identify travel routes
- landscape features that figure prominently in Sahtu Dene stories

These stories and other traditional land use information sources often include information on modes of travel and transportation. In particular, trails are important to archaeologists because many have key sites along them, including burials, and many are still used. Therefore, their heritage value is significant. The Sihoniline ?ehtene, or Loon River, to Fort Anderson Trail is one example. It was one of the main routes to the barrenlands, used to access areas for summer and fall caribou hunting. Roderick MacFarlane, a Hudson's Bay Company trader, also used this trail to travel to Anderson River to choose a location for Fort Anderson (Sahtu Heritage Places and Sites Joint Working Group 2000). Locational details

about the trail, said to have many key sites located along it, will aid in locating the trail that crosses the pipeline corridor.

Traditional knowledge studies also contain valuable information that assists in understanding artifact and feature distribution within a heritage resource site. For example, information gathered from the SSA advises that taboos prohibited women from associating with hunting gear, thereby explaining why items such as projectile points would have been made, stored and discarded away from living areas or around hearths where women commonly spent a good deal of their time (Hanks and Pokotylo 1989). Tulita Elders provide advice on the types of hearths that archaeologists may find. Sunken or pit hearths relate to hide smoking. Hearths at ground level relate to drying meat or fish. Hearths elevated on a boulder might reflect a winter occupation where a packed snow and spruce bough floor surrounded the fire (Hanks and Pokotylo 1989).

The settlement patterning data in traditional land use studies is also invaluable for archaeologists. For example, the published literature indicates that except for a few days around Christmas and Easter, the Good Hope trading post was deserted during the winter months, while the people were in their winter camps. Winter and spring were for working because travel into the interior was easier. Summers at Fort Good Hope were a bit of a holiday (Berger 1977).

Currently, five regional cultural groups make up the Sahtu:

- Hare
- Slavey
- Sahtu Dene (Bear Lake)
- Mountain Dene
- Métis

The Slavey and Mountain Dene live primarily in Tulita District, and the Métis live throughout the region (Sahtu Heritage Places and Sites Joint Working Group 2000). The following is a brief overview of these cultural groups.

Slavey

The traditional lands of the Slavey extend from the Mackenzie Valley to Great Bear River, and from the Liard River to Hay River. The Slavey now occupy the southern extent of the SSA and live primarily in Tulita. As the Slavey represent the major cultural group of the Deh Cho Region (DCR), their cultural and historical background is discussed in the EIS, Volume 6, Section 8.5.1, Environmental and Cultural Context (Heritage Resources – DCR).

Mountain Dene

The Mountain Dene, or Shuta Got'ine, historically used the area west of Mackenzie River and east of the Mackenzie Mountains. Although several bands, known by anthropologists as *Mountain Indians*, were associated with this region, the Shuta Got'ine was likely part of a larger group associated with the Nahanni or Kaska Dene (Gillespie 1981). Relatively little is known of the lifestyle of the Mountain Dene in the Mackenzie Mountains before 1957, when the first documentation by non-Aboriginal people occurred. What is known is gathered from annual cycles of trade visits and periods of residence at Fort Norman. Trading patterns, starvation, disease and intermarriage with the Hare and Slavey influenced the shifts of these people within their traditional lands (Gillespie 1981). The Shuta Got'ine represents those bands that have traded in Fort Norman, now known as Tulita, or *where the waters meet*, since the early 1800s.

The rugged terrain the Mountain Dene inhabited included alpine tundra, fast-moving rivers and valleys with an intermittent cover of spruce with some birch and aspen. Game animals included moose, woodland caribou and Dall's sheep. Fish, hare and squirrel were also frequently harvested (Gillespie 1981). Meat was often cached for winter, when it was more difficult to hunt. In the fall, families would travel to Tulita, where they would trade dry meat, fish and trap in the region until January, and then return to the mountains to hunt caribou.

Toboggans and dogs were not used for winter travel until the mid-1800s. Although canoes were made from spruce bark, the moose skin boat remained the most distinctive trait in Mountain Dene culture and was the favoured method of transport from the mountains to the Tulita area. Other cultural aspects of the Mountain Dene did not differ greatly from other Athapaskan groups in the region. Lodges were constructed in a simple lean-to style or with caribou hide, and sheltered two to four families (Gillespie 1968). Caribou, sheep and moose hides, and squirrel skins were used for clothing.

Métis

The Métis are the descendants of non-Aboriginal and Aboriginal parents, usually with Dene maternal and Euro-Canadian paternal ancestry. Since about 1850, the Métis in the SSA have participated in traditional subsistence activities, and worked as interpreters, trappers, provisioners and at trading posts. The Métis were most recognized for their role in transporting goods via canoe, York boats and steamboat (Slobodin 1981b). Today, the Métis live throughout the Mackenzie region in many communities, although they have a collective identity based on a shared heritage.

During the Berger Inquiry (Berger 1977) into the Mackenzie Valley pipeline, the Dene and Métis insisted that outstanding land claim issues be resolved before further development was planned for the Mackenzie Valley. Negotiations to settle these claims began in October 1991, and the final agreement was signed in 1994 (Simpson 2002).

9.2.3 Baseline Conditions

Baseline conditions and investigations within the Déline area are similar to those described in the EIS, Section 8.4.2, Baseline Conditions (Heritage Resources – SSA).

9.2.3.1 Pipeline Corridor and Associated Facilities

Areas examined during the 2002 and 2003 field reconnaissance included a variety of landforms within the pipeline corridor. Several previously recorded sites were identified in the prefield research as being associated with the pipeline corridor. These sites, and those recorded as part of the project, are variable in type and age. They include:

- palaeontological finds
- historic camps
- burials
- prehistoric sites
- traditional use sites

The 2002 and 2003 field programs only investigated heritage resources clearly associated with the proposed development areas. As such, there are no heritage resources within the program data in the Déline area.

9.2.3.2 Infrastructure

While numerous infrastructure locations were inspected in the SSA as part of the 2002 and 2003 focused reconnaissance, none are located in the area of Déline. As a result, no heritage resources within the Déline area were investigated in association with project infrastructure sites.

9.2.3.3 Borrow Sites

Fifty-eight proposed borrow sites were inspected in the SSA as part of the granular resource component of the 2002 reconnaissance, and an additional 18 were inspected in 2003. All of the potential borrow site locations are outside of the Déline area and consequently no heritage resources were investigated in the Déline area associated with project borrow sites.

9.3 Project-Specific Effects

During the 2002 and 2003 field seasons, the archaeological team recorded previously unknown heritage resource sites, and also revisited previously recorded heritage resource sites, some of which are currently outside of any proposed impact areas because of changes in the configuration of the project components. As no project components are within the Déline area, no heritage resource sites were investigated in this area of the SSA.

9.4 Mitigation Measures

As no project effects on heritage resources are expected in the Déline area, no mitigation measures will be required.

9.5 Residual Effects

As no project components are located near Déline, no residual effects are expected.

10 MONITORING AND FOLLOW-UP

10.1 Introduction

The purpose of this section is to describe the proposed Socio-Economic Monitoring Plan. This plan is intended to meet regulatory requirements for follow-up on effects identified previously in this volume. A project of this magnitude will generate a range of positive and negative effects during construction. Because of the nature, scope and magnitude of the expected project-related effects, and in recognition of shared responsibility for effects management, the mitigation measures, management plans and programs that address the effects will require a coordinated and collaborative response from the project proponents and their contractors, affected communities (including Déline), and territorial and federal government agencies. Mitigation measures, management plans and programs will need to be monitored throughout project construction and initial operations to:

- determine their effectiveness in reducing adverse effects and enhancing positive effects
- enable adjustments to be made where necessary
- develop new mitigation plans and programs, where required

The proposed Socio-Economic Monitoring Plan applies only to the Mackenzie Gas Project. The NOVA Gas Transmission Ltd. (NGTL) ancillary project in Alberta will develop and implement its own socio-economic programs, in consultation with affected parties.

10.2 Objectives

The objectives of the Socio-Economic Monitoring Plan are to:

- verify the accuracy and completeness of the socio-economic effects described in this volume and identify any additional effects
- determine the effectiveness of mitigation measures, management plans and programs in reducing or eliminating potential adverse effects
- determine the effectiveness of mitigation measures, management plans and programs in enhancing socio-economic benefits associated with the project
- adjust or develop new mitigation measures, as required
- provide direct and timely feedback to project managers, contractors, affected communities and government agencies

10.3 Monitoring Plan Strategy

10.3.1 Key Elements

The plan will use and supplement reporting required by regulators, the public, GNWT, and Aboriginal organizations and agencies.

The plan will use participative monitoring methods, recognizing that managing many socio-economic issues can only be effective if done with full cooperation of the project proponents, affected communities and government agencies. Decisions about suitable actions will require joint consideration by multiple stakeholders.

Regional-level committees will be created to monitor and report on:

- selected project-related effect indicators
- the effectiveness of mitigation measures, management plans and programs
- any unexpected effects that are identified

It is expected that three such committees would be required, one each for the BDR (ISR and GSA combined), the SSA and the DCR. Monitoring committee composition should be based on the project-related effects selected for monitoring, and the agencies responsible for mitigating and managing the effects.

The monitoring committees will function as working groups and should be limited in size. Committee membership will be selected in consultation with affected communities, and the committees could have representatives, or could access information from:

- the project
- communities
- regional health care and social services authorities
- local or regional RCMP detachments
- the pipeline working groups
- the GNWT, e.g., policy, resourcing and trans-regional issues coordination regarding:
    - transportation
    - economic development
    - education, culture and employment
    - health and social services
- local businesses
- local schools and Aurora College

Monitoring activities under the plan need to reflect the potential for community, regional and territorial socio-economic circumstances to change because of:

- normal growth
- the influences of other economic and political developments during construction and operations

Monitoring and analysis must attempt to distinguish between these effects and those of the project. The indicator information collected must be directly linked to the project.

An independent facilitator could be on each monitoring committee. The facilitator's responsibilities could include:

- arranging and facilitating committee meetings
- recording and circulating meeting minutes and assignments
- preparing annual monitoring reports for the committee
- liaison with the facilitators associated with the other regional committees to:
    - ensure consistency of purpose, process and intended outcomes
    - compare results

The monitoring committees should meet at least twice a year, more frequently if required.

As the project enters operations, and project-related activities and effects decrease, monitoring committee meetings could be reduced in frequency, until it is determined that the monitoring plan and committee are no longer needed.

Initial steps in developing and implementing the plan include:

- development of a conceptual plan
- meetings with study area communities to discuss the conceptual socio-economic monitoring plan, and the proposal for the regional committees to execute the plan
- regional workshops to identify and seek consensus on the conceptual plan, including:
    - project-related effects to be monitored
    - indicator data to be collected and reported on
    - composition of regional monitoring committees
    - schedules and locations of committee meetings

- nominating and selecting committee members in each region, to be completed at least six months before construction starts

- initial committee meeting in each region, scheduled before construction starts, to review and agree on the committee's mandate, tasks, process, schedules and intended outcomes

- developing operating budgets for the committees and determining responsibility for costs

The regional committees will be active before and during project construction. When project operations begin, it is expected that committee activities will decline, as described in Section 10.5, Project Effects Measurements – Operations.

10.4 Project Effects Measurements – Construction

The plan to monitor socio-economic effects during construction would include the list of effects identified previously in this volume. The process would require committee agreement on:

- project effects to be monitored

- indicator data for each effect

- frequency with which data readings are to be taken

- process of evaluating the indicator data and deciding what, if anything, needs to be done in addition to mitigation measures in place

- frequency with which the evaluations will be made

- period during which the effects are to be monitored

Four broad categories of project socio-economic effects were identified for monitoring. Each of these categories includes several topics. The committees might wish to focus on selected effects of concern because too many categories and subtopics could be unmanageable.

The four broad categories are:

- economic effects, including migration
- infrastructure, community service and governance
- individual, family and community wellness
- traditional culture

The indicator data for these effects includes relevant statistical data and reliable qualitative data. Primary reliance should be on quantitative data, with qualitative data used to help interpret the quantitative data. Where possible, simultaneous collection and analysis of quantitative and qualitative data is preferable, because each can serve as a check on the reliability of the other. Selecting indicators should take into account the availability of preproject baseline data, comparability across regions, and existing administrative data collection and reporting protocols.

The committee, or its designate, will write a report at the end of each construction year that describes:

- actual versus predicted effects
- effectiveness of mitigation and optimization measures
- recommendations for further mitigation or optimization measures, if warranted
- concerns that were addressed, related to socio-economic effects
- what management adjustments were made and with what effect

The committee, or its designate, will produce a final report describing:

- issues and challenges encountered during construction and first two years of operations
- responses
- effects of responses

This report will have relevance:

- when any project component is expanded or enlarged
- during future construction of a similar project, or similar project components

10.5 Project Effects Measurements – Operations

At the end of construction, and after the associated cleanup and site restoration, most employment and opportunities induced by the project will end. There will be ongoing well drilling activities, and operations and maintenance activities associated with the anchor fields, pipelines and associated facilities. The employment levels associated with these operations activities will be a small fraction of the peak construction workforce.

Therefore, throughout operations, there will be no substantial residual effects on infrastructure, family and community wellness conditions and services, or preservation of any aspects of traditional culture. There will be no resulting need for mitigation measures, and no need for committees to monitor project effects.

The operations and maintenance employment generated will contribute to local capacity in only a few communities and will be long term. Training and employment for the long-term positions will be captured in indicator data before and during the first year or two of operations. Similarly, northern procurement for operations and maintenance of the anchor fields, pipelines and associated facilities will be established over the initial one or two years of operation. Beyond this period, project effects are expected to be largely undetectable and there would be limited value in continuing the socio-economic monitoring activities. The committees might choose to continue monitoring socio-economic information. However, the project's role will decline.

Ongoing reporting of benefits data will take place, consistent with any relevant requirements of project benefits and access agreements and the GNWT Socio-Economic Agreement.

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GLOSSARY

abandonment and reclamation	The act of permanently stopping operations, removing facilities and restoring land to a productive state.
Aboriginal person	Any Indian, Inuit or Métis person who was born in the Northwest Territories or who is descended from an Aboriginal person born in the Northwest Territories.
Aboriginal community	A small community that is not a regional centre, in which 80% or more of the population is Aboriginal.
Aboriginal Summit	Negotiating body composed of virtually all the organized Aboriginal groups in the Northwest Territories, except the Deh Cho First Nation, which is not currently participating.
adverse effect	The impairment of, or damage to, the environment or health of humans, or damage to property, or loss of reasonable enjoyment of life or property.
aesthetic resources	The visual appearance of the natural landscape.
AIDS	The abbreviation for auto-immune deficiency syndrome.
anchor fields	The three natural-gas fields, Niglintgak, Taglu, and Parsons Lake, whose production will provide the initial volume of gas shipped in the project pipelines.
APG	The abbreviation for Aboriginal Pipeline Group.
archaeological site	Where an archaeological artifact is found.
artifact	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.
ASEP	The abbreviation for Aboriginal Skills and Employment Partnership.
baseline	A surveyed condition that serves as a reference point to which later surveys or assessments are coordinated or correlated.
BDR	The abbreviation for Beaufort Delta Region.

biophysical	Referring to the air, noise, aquatic (groundwater, hydrology, water quality and fisheries) and terrestrial (soils, landforms, permafrost, vegetation and wildlife) conditions in the project area.
borrow site	An area that could be excavated to provide material, such as gravel or sand, to be used, where required, by the project.
BP	The abbreviation for before present.
COGOA	The abbreviation for *Canada Oil and Gas Operations Act*.
combined effects	The total effect of the three anchor fields, the gathering system and the pipeline corridor.
compressor station	A facility containing equipment that is used to increase pressure to compress natural gas for transportation in a pipeline.
Construction Phase	The phase of a project preceding the Operations Phase, during which project facilities and infrastructure are assembled and installed, and connected and tested to ensure that they operate as designed.
country food	Food traditionally harvested and eaten by local Aboriginal residents.
critical habitat	The habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species, according to the *Species at Risk Act.*
CRSP	The abbreviation for Canadian registered safety professional.
cumulative effects	Changes to the environment caused by an action, including projects and activities, in combination with other past, present and future human actions.
DCR	The abbreviation for Deh Cho Region.
debitage	Remains of stone tool manufacture and use.
decommissioning	The act of taking a processing plant or facility out of service and isolating equipment, to prepare for routine maintenance work, suspending or abandoning.

devolution	Ongoing negotiations between the Government of Canada, the GNWT and the Aboriginal Summit that will transfer the current INAC control over land, water and resources to GNWT or Aboriginal settlement area governments.
direct economic effect	Effect on industries (firms) that expand production to satisfy increased demand created by the project.
direct employment	Employment related to a direct economic effect.
direction	Referring to an effect, the ultimate long-term trend of the effect. It can be adverse, neutral or positive, or a combination of these.
duration	Referring to an effect, how long an effect will occur for, or how long it will take a valued component to recover from an impact.
EIS	The abbreviation for environmental impact statement.
employment rate	Percentage of persons 15 years of age and over who are employed.
environmental effect	Any effect of any project-induced change on: • economic conditions • social and cultural conditions • the current use of lands and resources for traditional purposes by Aboriginal people • any structure, site or thing that is of historical, archaeological, palaeontological or architectural significance Also, any change to the project that might be caused by the environment.
environmental impact assessment	The process of evaluating the biophysical, social and economic effects of a proposed project.
environmental impact statement	A report containing the environmental impact assessment.
environmentally protected areas	Areas with special designations that, through legislation or other means, are protected in some form or are given special status.

environmentally sensitive area	An area designated in regional or local land use plans, or by a local, regional, provincial or federal government body as being sensitive to disturbance, or identified by an applicant as being sensitive for some reason.
facilities	Structures of the gathering and gas pipeline systems, including compressor and pump stations, block valves, pigging facilities, heater stations and meter stations.
FAS/FAE	The abbreviation for foetal alcohol syndrome/foetal alcohol effects.
FFG	The abbreviation for formula financing grant.
five-year mobility status	Referring to migration, the relationship between a person's usual place of residence on the census date compared to the previous five years.
FTE	The abbreviation for full-time equivalent.
gas conditioning facility	A facility located at each anchor field, which collects raw gas from the wells, and dehydrates and conditions the product for transport through the gathering system.
gas pipeline	The proposed gas pipeline that would extend from the Inuvik area facility, parallel to the NGL pipeline along the Mackenzie River to Norman Wells, and continue south to connect to an extension of the existing Alberta system south of the Northwest Territories–Alberta boundary. Also known as the *Mackenzie Valley Pipeline*.
gathering pipelines	Four pipelines, also known as laterals, that transport natural gas and NGLs from the anchor fields to the Inuvik area facility. These include the Niglintgak lateral, Taglu lateral, Parsons Lake lateral and Storm Hills lateral.
gathering system	A system of pipelines and associated facilities that include four gathering pipelines, the Inuvik area facility, the NGL pipeline and related facilities, such as valves, pig launchers and receivers.
geographic extent	Quantitative measurement of the area within which an effect occurs.
GNWT	The abbreviation for the Government of the Northwest Territories.

granular resources	Sand, gravel, clay, quarry materials and silt.
grub stake	Investment in consumables and other supplies required to support traditional harvesting.
GSA	The abbreviation for Gwich'in Settlement Area.
heritage resources	Cultural, historic, archaeological and palaeontological resources, including pre-contact and post-contact features.
historic archaeological resources	Sites, artifacts, structures and documents that relate to the influx of Euro-Canadians in the region, and date to the last 250 years.
HIV	The abbreviation for human immunodeficiency virus.
HRDC	The abbreviation for Human Resources Development Council.
HRSD	The abbreviation for the Department of Human Resources Skills Development.
HSS	The abbreviation for Health and Social Services, a department of the Government of the Northwest Territories.
human health	A state of complete physical, mental and social well-being, and the ability to adapt to the stresses of daily life.
human health assessment	Determining the effect of hazardous substances, environmental factors and exposure conditions on local and regional populations, including qualitative and quantitative analyses.
INAC	The abbreviation for Indian and Northern Affairs Canada.
indirect economic effect	The result of project contractors and suppliers purchasing additional required inputs from other firms.
indirect employment	Employment related to an indirect economic effect.
induced economic effect	The result of firms expanding production because of direct and indirect effects, hiring more staff and paying out wages, thereby increasing household income. Households, after withdrawing a portion for taxes and savings, spend this income, which in turn increases demand for other commodities.

induced employment	Employment related to an induced economic effect.
infrastructure	Basic facilities, such as transportation, communications, power supplies and buildings, which enable an organization, project or community to function.
international migrants	Individuals who move between countries.
inter-provincial migrants	Individuals who move between provinces and territories.
intra-territorial migrants	Individuals who move within communities in the Northwest Territories.
Inuvik area facility	The processing facility to be located near Inuvik where gas and liquids will be processed and separated, then delivered to the gas and NGL pipelines.
I-O Model	The abbreviation for the Statistics Canada input–output model.
ISR	The abbreviation for Inuvialuit Settlement Region.
JRP	The abbreviation for Joint Review Panel.
km	The metric symbol for kilometre.
labour force	Individuals 15 years of age or older that are working or actively seeking employment.
lateral	A gathering pipeline that connects the production area facilities to the Inuvik area facility.
leakage	Portion of investment in a region or jurisdiction that results in the import of a good or service.
lithic	Of, or pertaining to, stone.
local study area	A 1-km-wide buffer or corridor around each of the three lease areas, gathering pipelines rights-of-way, facility infrastructure sites, gas pipeline right-of-way and borrow sites.

Mackenzie Gas Project — A project that will develop three onshore natural gas anchor fields in the Mackenzie Delta and transport natural gas by pipeline to market in northwestern Alberta by 2009. The project comprises the anchor fields, wells, gathering pipelines and associated facilities, work camps, material stockpiling and shipping sites, roads, borrow sites, and other associated infrastructure.

magnitude — Relating to an effect, the severity or intensity of the effect. It is rated as low, moderate or high.

Métis — A person with a mixture of Aboriginal and non-Aboriginal ancestry.

migrants — Individuals who move to a different community.

migration — Moving from one jurisdiction to another to establish a permanent residence in the new jurisdiction.

mitigation — The elimination, reduction, or control of a project's adverse effects, including restitution for any damage to the environment caused by such effects through avoidance, replacement, restoration, compensation or other means.

monitoring — Periodic inspection to meet the following objectives:

- observe and report on compliance with approval conditions
- confirm effectiveness of approved protection measures
- verify the accuracy of impact predictions
- identify any effects not predicted in the impact assessment

movers — Individuals who have changed their community of residence.

NAIT — The abbreviation for Northern Alberta Institute of Technology.

NEB — The abbreviation for the National Energy Board.

natural gas — A compressible mixture of hydrocarbons with a low specific gravity that occurs naturally in a gaseous form.

natural gas liquids	Hydrocarbons that are gaseous in the reservoir, but that will separate out in liquid form at the pressures and temperatures at which separators normally operate. The liquids consist of varying proportions of butane, propane, pentane and heavier fractions, with little or no methane or ethane.
NGL	The abbreviation for natural gas liquid.
NGL pipeline	The pipeline connecting the Inuvik area facility with the Enbridge Pipeline facilities at Norman Wells.
NGO	The abbreviation for nongovernmental organization.
NGTL	The abbreviation for NOVA Gas Transmission Ltd.
Niglintgak field	The anchor field to be developed by Shell Canada Limited, which includes three well pads, one gas conditioning facility, flow lines and supporting infrastructure. The gas conditioning facility might be barge-based or land-based.
Niglintgak lateral	The gathering pipeline connecting the Niglintgak gas conditioning facility to a connection point on the Taglu lateral at the outlet of the Taglu gas conditioning facility.
nonmigrants	Individuals who move only within their community or do not move at all.
nonrenewable resources	Resources, such as fossil fuels, i.e., oil, gas, coal and minerals, that occur naturally but cannot be replaced once exploited.
nontraditional land use	Land and resource use for residents and nonresidents of the Northwest Territories, including hunters and fishers, tourists, and government and industry representatives.
nontraditional resource harvesting	Includes hunting, fishing and trapping pursued by non-Aboriginal residents for domestic, sport or commercial purposes.
Operations Phase	The phase of a project during which the pipeline and associated facilities are operated.
palaeontological sites	Sites bearing evidence of multi-cellular invertebrate and vertebrate faunal remains, and plant materials that have been fossilized or otherwise preserved.

Parsons Lake field	The anchor field to be developed by ConocoPhillips Canada (North) Limited and ExxonMobil Canada Properties. Initially, the field will consist of the north pad, which will have one pad for the well sites and gas conditioning facility. A second well pad will be developed five to 10 years after the north pad.
Parsons Lake lateral	The gathering pipeline connecting the Parsons Lake gas conditioning facility to a connection point at the Storm Hills pigging facility.
participation rate	Percentage of persons 15 years of age and over who are in the labour force.
pipeline corridor	The 1-km-wide area that centres on the combined right-of-way for the gas and NGL pipelines, from the Inuvik area facility south to the NGTL interconnect facility in Alberta, defined for the purpose of the EIS biophysical baseline and effects assessment studies.
PITS	The abbreviation for Petroleum Industry Training Service.
POTC	The abbreviation for Pipeline Operations Training Committee.
potential acid input	The sum of the wet and dry deposition of sulphur and nitrogen compounds that have the potential to contribute to acidification of the receiving environment.
potential labour supply	Composed of people who are unemployed and those not in the labour force who do want a job, less those who, because of disability, age, illiteracy, lack of education, skills or training and lack of interest in employment, could be considered unemployable.
prehistoric archaeological resources	Archaeological sites, objects and affiliated materials that represent occupation by Aboriginal peoples before the arrival of European goods, people and the historic records that characterize their culture (in North America).
production area	The area that encompasses all project components located north of the Inuvik area facility, including the Niglintgak, Taglu and Parsons Lake fields, the gathering pipeline and associated facilities, infrastructure, and the 1-km buffer area surrounding each of these project components.
project components	The three anchor fields, Niglintgak, Taglu, and Parsons Lake, the gathering system and the gas pipeline.

project proponents	The five organizations (Imperial Oil Resources Ventures Limited, the APG, ConocoPhillips Canada (North) Limited, Shell Canada Limited and ExxonMobil Canada Properties) that are undertaking the Mackenzie Gas Project.
project-specific effect	An effect caused by the project. Such effects are sometimes referred to as direct effects as they only include the project's contribution to the effect (as opposed to cumulative effects, in which case other projects would contribute to the effect).
project, the	The abbreviation for the Mackenzie Gas Project.
RCMP	The abbreviation for Royal Canadian Mounted Police.
reclamation	The process of re-establishing a disturbed site to a former or other productive use, not necessarily to the same condition that existed before disturbance. The land capability might be at a level different, i.e., lower or higher, than that which existed prior to the disturbance, depending on the goal of the process. Reclamation includes the management of a disturbed site and revegetation where necessary.
regional study area	A 15-km-wide buffer around the three anchor fields, on either side of the gathering pipelines rights-of-way and on either side of the gas pipeline right-of-way.
renewable resources	Natural resources, e.g., forests, fresh water, fish, that can renew themselves and are normally replaced or replenished by natural processes. These resources are not depleted by moderate use.
resident, northern	A Canadian citizen or landed immigrant who has been living in the Northwest Territories (NWT) for at least one year and has a NWT health card.
residual effects	Environmental or socio-economic effects that remain after mitigation. Effects that are present after mitigation has been applied.
right-of-way	The pipeline easement in which the pipeline will be installed and operated. The pipeline right-of-way width for the project will vary from 30 to 50 m, depending on pipe size and the number of pipes to be installed in the trench.
RSA	The abbreviation for regional study area.

RWED	The abbreviation for Resources, Wildlife and Economic Development, a department of the Government of the Northwest Territories.
SAIT	The abbreviation for Southern Alberta Institute of Technology.
SEIA	The abbreviation for socio-economic impact assessment.
SLUPB	The abbreviation for Sahtu Land Use Planning Board.
social infrastructure	Health, social wellness and education services that might be affected by project-related activities.
socio-economic effect	Any effect of the project on a social or economic condition or service, including direct effects as well as effects resulting from a change in the environment.
specific effects	Effects of a specific component or activity of a project.
SSA	The abbreviation for Sahtu Settlement Area.
STI	The abbreviation for sexually transmitted infection.
Storm Hills lateral	The gathering pipeline connecting the Storm Hills pigging facility to a connection point at the inlet of the Inuvik area facility.
study area	The area within the spatial boundaries of the scope of the socio-economic effects assessment.
Taglu field	The anchor field to be developed by Imperial Oil Resources Limited, consisting of one site that will include the well pads, gas conditioning facility, flow lines and supporting infrastructure.
Taglu lateral	The gathering pipeline connecting the Taglu gas conditioning facility to a connection point at the Storm Hills pigging facility.
TK	The abbreviation for traditional knowledge.
traditional knowledge	Cultural knowledge that is based on direct observation or information passed on orally from other community members, developed from centuries of experience of living off the land.

UHF	The abbreviation for ultra high frequency.
unemployment rate	Percentage of the labour force that is unemployed.
utilidor	An insulated linear container for municipal utility services such as water and sewerage.
valued component	Characteristic or feature that represents important socio-economic conditions identified by assessment specialists, communities or stakeholders.
VC	The abbreviation for valued component.
VHF	The abbreviation for very high frequency.
visual resources	Land, water, vegetation, animals and structures that are visible on the land.
waterbody	A body of water up to the high-water mark, including canals, reservoirs, oceans and wetlands, but not including sewage or waste treatment lagoons.
well-being	Everything that affects the experience of life, including the circumstances of physical existence and the quality of relationships.
wellness	Includes physical, emotional and mental health, and relationship well-being.