

6 SOCIO-ECONOMIC EFFECTS SUMMARY

6.1 Introduction

This section presents a summary of the socio-economic effects of project construction and operations on affected regions and communities.

Project effects were assessed on the following seven valued components:

- procurement, employment and regional economic effects
- demography, emphasizing effects on population mobility
- infrastructure, including effects on transportation, energy and utilities, housing, recreation and governance
- community wellness, including:
 - effects on individual, family and community well-being and delivery of social services
 - effects on health conditions and health care services
 - current health conditions as influenced by construction and operations
 - public safety and protection services
 - education attainment and services
- traditional culture, including effects on traditional harvesting and land use, and preservation of language and tradition
- nontraditional land and resource use, including effects on protected areas, and visual and aesthetic resources
- heritage resources

This section focuses on the project effects of each component in the:

- Inuvialuit Settlement Region
- Gwich'in Settlement Area
- Sahtu Settlement Area
- Deh Cho Region

- Northwest Territories industrial and commercial centres (ICCs), i.e., Yellowknife and Hay River
- Dene Tha' First Nation (DTFN)
- northwestern Alberta ICCs, i.e., High Level, Rainbow Lake and Zama City

Most of the socio-economic issues addressed in this section are overall project effects resulting from the combined influences of all project components and activities in the study area. The study area includes all previously mentioned regions, areas and communities, and the NOVA Gas Transmission Ltd. (NGTL) interconnect facility and Northwest Mainline (Dickins Lake Section) in Alberta. Where required, specific information on Alberta and the NGTL pipeline are presented separately.

6.2 Effect Attribute Categories

Project effects on the valued components in these areas and on selected communities in the areas are described in terms of direction, magnitude, geographic extent, duration and significance, as defined in Volume 1, Section 2, Assessment Method.

In this summary, effect attributes are presented in tables that aggregate these attributes for the regions (Inuvialuit, Deh Cho, northwestern Alberta industrial and commercial communities) and for each category of effects (economic, infrastructure, traditional harvesting). In these tables, short-term duration signifies construction effects, which will last for about four years. Long-term duration signifies operations effects, which will last a minimum of 25 years.

6.3 Procurement, Employment and Regional Economic Effects

Project effects on procurement and employment conditions are derived from interactions between demand and supply. The expected project influences on employment opportunities depend on territorial and local rates for participation in the labour market, employment and unemployment. The project will generate a large demand for goods, services and workers at various locations in the Northwest Territories, and marginal demand in northwestern Alberta. To the extent possible, labour and suppliers of goods and services in northern communities will respond to these demands. Where demand exceeds northern supply capacity, supply requirements will be met outside the Northwest Territories.

The appraisal of project-specific effects is based on:

- an overview of project procurement and employment opportunities
- expenditure estimates

- employment and labour income in the study area
- regional capacity constraints
- qualitative assessments of effects on northern wages and other northern employers

Timely implementation of mitigation measures to improve education and skills training levels and simplify bidding procedures, will expand labour force and business capacity.

6.3.1 Capital and Operational Expenditures

Over the main construction period from 2006 to 2010, project capital investment is estimated at \$6.2 billion. However, there will also be some capital investment before and after this construction period that will increase total project investment to \$7.2 billion. The largest expenditure will be for the natural gas pipeline, which will account for \$3 billion, or almost half of all expenditures. Table 6-1 gives the project investment by component over the four-year construction period.

Table 6-1: Project Investment by Project Component

Component	2006–2007 (\$M)	2007–2008 (\$M)	2008–2009 (\$M)	2009–2010 (\$M)	Total (\$M)
Niglintgak	36	155	107	49	346
Taglu	92	106	218	76	492
Parsons Lake	33	106	191	199	528
Gathering pipelines	140	213	157	39	549
Inuvik area facility	115	174	128	32	448
Natural gas liquids pipeline	121	183	135	34	472
Natural gas pipeline	754	1,145	841	210	2,950
Compression facilities	118	179	132	33	462
Total	1,409	2,261	1,907	671	6,247

NOTES:
Figures are millions of constant \$2003
Numbers might not add up because of rounding

The projected \$6.2 billion of spending over the four-year construction period can be broken down as follows:

- Inuvialuit Settlement Region – \$1.9 billion, or 31%
- Gwich'in Settlement Area – \$1.1 billion, or 17%
- Sahtu Settlement Area – \$1.7 billion, or 27%
- Deh Cho Region – \$1.6 billion, or 25%

The table and the calculations do not include the estimated \$86 million that will be spent in the winter 2008–2009 construction season on the NGTL interconnect facility and the NGTL Northwest Mainline (Dickins Lake Section). This portion will account for only about 1% of overall construction costs.

Although the total capital investment in all of the project components is valued at \$6.2 billion and all components are physically located in the Northwest Territories, most of the capital spending on goods and services needed to construct the project components will go to businesses located outside the Northwest Territories. It is estimated that 83% of the total capital expenditures will be completed outside the Northwest Territories. This is because of a lack of capacity of the regions in the Northwest Territories to undertake such a large project, given the small population base and workforce, and the limited number, size and scope of local businesses and contractors. As a result, much of the economic benefit associated with the direct purchases will be outside the Northwest Territories regions, where the goods and services are produced.

Of the \$1.9 billion of capital expenditures to occur in the Inuvialuit Settlement Region during construction, 2006 to 2010, an estimated \$328 million, or 17%, will be spent in the region. Similarly, of the just over \$1 billion of capital expenditures in the Gwich'in Settlement Area, \$353 million, or 33%, will be spent in that area. Of the \$1.7 billion in the Sahtu Settlement Area, \$61 million, or 4%, will be spent in that area. Of the \$1.6 billion in the DCR, \$48 million, or 3%, will be spent in that area. Of the \$86 million for the NGTL facilities, about \$58.6 million, or 68%, will be spent in Alberta. Although there will be no physical infrastructure built in the Northwest Territories ICCs, an additional \$103 million will be spent in those cities over the construction period.

Of the \$6.2 billion in capital spending, \$3.1 billion of total expenditures will be in Alberta, whereas about \$894 million will be in the Northwest Territories. Other capital expenditures will be outside these regions.

In total, annual average project operating expenditures in the Northwest Territories are expected to range from \$141 to 210 million and average \$169 million from 2009 to 2030. Peak spending will take place from 2016 to 2020, when the future drilling programs get underway at Parsons Lake and Taglu. There will be very limited operational expenditures in Alberta.

6.3.2 Employment and Income – Construction

Project construction will require a large workforce with a variety of skills, and most of the construction work will take place during four brief winter construction seasons. Given this construction scenario and the capacity limitations of the available Northwest Territories labour force, many of the required skills will not be readily available in the regions. As a result, most of the required project labour will have to be brought in from outside the Northwest Territories. It is estimated

that during project construction, an average of 2,921 Northwest Territories persons per year would be available to seek work on the project or related spinoff (indirect and induced) employment opportunities in northern communities (see Table 6-2).

Table 6-2: Estimated Maximum Potential Labour Pool Available for Project-Related Work in the Northwest Territories

Indicator	2006	2007	2008	2009	Average
Total unemployed persons (No.)	4,501	4,652	4,745	4,763	4,665
Will do rotational work (%)	62	65	63	60	63
Total unemployed persons adjusted for rotational work (No.)	2,790	3,039	3,009	2,846	2,921
NOTE: Percentages have been rounded, and adjusted number of unemployed people might not add up because of rounding					

Government of the Northwest Territories (GNWT) Labour Force Survey results include an indication of those who would accept rotational work, i.e., work and accommodation away from home for a designated period. This was used as an indicator of those who might be willing to accept project work, which will often be available only at locations remote from communities.

Direct employment demand for the Northwest Territories was estimated by comparing the job type and occupation requirements for each project component located in the region with the expected skills of the local labour force. Similar information related to the Alberta workforce is unavailable.

The Statistics Canada Inter-Regional Input-Output Model was used to estimate the total demand generated by the project for indirect and induced employment in the Northwest Territories. Table 6-3 summarizes project employment demand in the Northwest Territories.

Table 6-3: Total Estimated Employment Demand in the Northwest Territories

Indicator	Type of Demand	Number of Jobs					
		2006–2007	2007–2008	2008–2009	2009–2010	Total	Average
Modelled employment demand in the NWT without labour supply constraints	Direct	830	3,138	2,569	146	6,683	1,671
	Indirect	1,537	2,344	2,372	995	7,248	1,812
	Induced	457	698	684	289	2,128	532
	Total	2,823	6,180	5,626	1,431	16,059	4,015
Estimated project employment demand in the NWT with labour supply adjustments	Direct	563	1,282	1,168	146	3,160	790
	Indirect	466	540	507	373	1,886	472
	Induced	190	224	209	110	733	183
	Total	1,218	2,047	1,885	630	5,779	1,445
NOTE: Numbers might not add up because of rounding							

Table 6-4 summarizes the adjusted employment demand in each of the regions. As the construction season for the NGTL Northwest Mainline (Dickins Lake Section) pipeline is going to be limited to the 2008–2009 winter season, information related to adjusted employment demand for that year is provided.

Table 6-4: Total Estimated Employment Demand – Adjusted Totals

Region	Number of Jobs					Total	Average
	2006–2007	2007–2008	2008–2009	2009–2010			
ISR	118	205	262	100		685	171
GSA	372	459	469	287		1,586	397
SSA	141	272	277	68		758	190
DCR	169	387	303	49		907	227
ICCs	419	723	574	127		1,842	461
Northwest Territories	1,218	2,047	1,885	630		5,779	1,445
Northwestern Alberta	–	–	400	–		–	400
NOTE: – = data not available Numbers might not add up because of rounding							

An estimated average of about 1,445 workers in all Northwest Territories regions are projected to be available to meet the demand for project-direct, project-indirect and project-induced jobs, assuming that project-related training is made available in the Northwest Territories regions before and during construction. The estimated project-related jobs would increase the employment rate from 70.6% to an average 75% in the Northwest Territories over the construction period, and the unemployment rate would fall from 16.3% to an average 15% during the same period.

It is estimated that project construction will lead to an increase of about \$300 million in labour income in the Northwest Territories during construction. This income will consist of \$157 million in direct project-related income and another \$111 million (indirect) and \$31 million (induced) earned by those producing goods and services for the project and its employees.

The largest effect during construction will be in Alberta, where about 10,200 direct jobs, 51% of all project jobs, will be created. The next largest effect will be in the Northwest Territories, where 3,200 jobs, 16%, will be created. In the Other Canada region, it is estimated that the construction period will provide residents with about 6,800 jobs. In total, it is estimated that about 20,300 direct jobs will be generated in Canada because of project construction, or about 5,100 jobs annually.

As Table 6-5 shows, project effects are expected to be positive and high magnitude during construction. In the Inuvialuit Settlement Region, Gwich'in Settlement Area, Sahtu Settlement Area and Deh Cho Region, effects are expected to be positive and significant.

Table 6-5: Economy – Project Construction Effect Attributes

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
ISR	Positive	High	Regional and beyond regional	Short term	Yes
GSA	Positive	High	Regional and beyond regional	Short term	Yes
SSA	Positive	High	Regional and beyond regional	Short term	Yes
DCR	Positive	High	Regional and beyond regional	Short term	Yes
NWT ICCs	Positive	Moderate	Regional and beyond regional	Short term	No
DTFN	Positive	Low	Regional and beyond regional	Short term	No
Northwestern Alberta ICCs	Positive	Low	Regional and beyond regional	Short term	No

NOTES:
 DCR = Deh Cho Region
 DTFN = Dene Tha' First Nation
 GSA = Gwich'in Settlement Area
 ICC = industrial and commercial centre
 ISR = Inuvialuit Settlement Region
 NWT = Northwest Territories
 SSA = Sahtu Settlement Area

The period 2009 to 2030 was selected as the most relevant timeframe for the analysis of operating effects because it is of sufficient duration to provide a good representation of the economic effects of project operations. During the initial years of project operations from 2009 to 2015, an average of 518 direct and spinoff jobs will be created annually in the Northwest Territories. However, because of the need for experienced and qualified workers for project operations, some of these positions will have to be filled from outside the Northwest Territories.

A peak of 643 jobs annually will occur during 2016 to 2020, when capital and drilling activities will take place in addition to normal project operations. However, over the entire period of 2009 to 2030, the number of direct, indirect and induced jobs created in the Northwest Territories will average about 500 jobs annually. The effects on Canada as a whole will result in an average of 1,180 jobs annually from 2009 to 2030.

As Table 6-6 shows, project effects are expected to be positive or neutral, and have low magnitude to no effect during operations in all regions except the Gwich'in Settlement Area. In the Gwich'in Settlement Area, effects are expected to be positive, of moderate magnitude and significant.

Table 6-6: Economy – Project Operations Effect Attributes

Location	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
ISR	Positive	Low	Regional and beyond regional	Long term	No
GSA	Positive	Moderate	Regional and beyond regional	Long term	Yes
SSA	Positive	Low	Regional and beyond regional	Long term	No
DCR	Positive	Low	Regional and beyond regional	Long term	No
NWT ICCs	Positive	Low	Local	Long term	No
DTFN	Neutral	No effect	Regional	Long term	No
Northwestern Alberta ICCs	Neutral	No effect	Regional	Long term	No
<p>NOTES: DCR = Deh Cho Region DTFN = Dene Tha' First Nation GSA = Gwich'in Settlement Area ICC = industrial and commercial centre ISR = Inuvialuit Settlement Region NWT = Northwest Territories SSA = Sahtu Settlement Area</p>					

To build business capacity, and optimize project-related procurement and expenditures in the Northwest Territories, a conceptual procurement plan has been developed. 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 in two key functions:

- internal employment and training coordination
- partnership, cooperation, support and involvement of many different stakeholders

Measures designed to prevent southern residents from moving to the Northwest Territories in the hope of securing project-related employment will help safeguard qualified Aboriginals and other northern residents from having to compete for project employment in northern communities with speculative in-migrants. Implementation of the Northern Procurement Plan, and the Education, Training and Employment Program will help ensure that positive effects are magnified.

6.3.3 Government Revenue

The project will generate large tax revenue for the federal government, Alberta government and GNWT during construction. The GNWT will retain only part of this gross revenue because part of the tax revenue will reduce the Formula Financing Grant (FFG).

The estimated effects of project construction on territorial and federal government revenue is expected to result in an increase in personal tax revenue of \$55.1 million, 40%, for the GNWT and \$81.3 million, 60%, for the federal government during construction. In total, over \$136.4 million in tax revenue will be generated by activity in the Northwest Territories and taxes paid by Northwest Territories residents. After the FFG impact is taken into account, it is estimated that the GNWT revenue will fall to \$9.8 million, 7%, and federal government net revenue will rise to \$126.5 million, 93%.

In Alberta, project construction is expected to result in an increase in provincial tax revenue of \$377.6 million and \$727.3 million in federal revenue. In total, over \$1.1 billion in tax revenue will be generated by activity in Alberta. Over \$1.9 billion in personal tax revenue will be generated by project construction in Canada.

Additionally, the federal government will earn revenue from all related activity in Canada and receive \$163 million in indirect taxes. In total, provincial and territorial governments will receive \$309 million in indirect taxes.

The project will represent an important new revenue source for the GNWT during construction and operations. However, as the analysis of net effects shows, after the change to the FFG is considered, the nominal increase in tax revenue is not substantial relative to existing totals (see Volume 6, Section 3.2.5.2 for details).

As shown in Table 6-7, project construction effects on government revenue are expected to be positive, low magnitude and not significant.

Table 6-7: Government Revenue Effects – Project Construction Effect Attributes for the Northwest Territories and Canada

Region	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Northwest Territories	Positive	Low	Regional and beyond regional	Short term	No
Canada	Positive	Low	National	Short term	No

Operations activity is expected to result in an average annual increase in tax revenue of \$122 million, 30%, for the GNWT and \$278 million, 70%, for the federal government during 2009 to 2030. In total, an average of \$400 million in tax revenue will be generated annually by activity in the Northwest Territories.

After the FFG impact is taken into account, it is estimated that GNWT revenue will fall to \$22 million, 5%, and federal government net revenue will rise to \$378 million, 95%.

Because of project operations activity, annual average tax revenue in Canada during operations is expected to result in an increase of \$127 million for provincial and territorial governments, and \$286 million for the federal government. Total annual tax revenue will increase to an average \$413 million outside the Northwest Territories because of operations activity.

As shown in Table 6-8, project operations effects on government revenue are expected to be positive, low magnitude and not significant.

Table 6-8: Government Revenue Effects – Project Operations Effect Attributes for the Northwest Territories and Canada

Region	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Northwest Territories	Positive	Low	Regional and beyond regional	Long term	No
Canada	Positive	Low	National	Long term	No

The large scale of the project, conducted in the context of the relatively small and still developing study area economy, means that all key economic indicators will be affected to a high degree and most will respond in a similar way. Although the effects on the national economy as a whole will be proportionally smaller, the attributes of most key indicators will also be affected in a similar way.

As shown in Table 6-9, project construction effects on national gross domestic product, employment and income effects are expected to be positive, high magnitude and significant.

Table 6-9: National Gross Domestic Product, Employment and Income Effects – Project Construction Effect Attributes

Region	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Northwest Territories	Positive	High	Regional and beyond regional	Short term	Yes
Canada	Positive	High	National	Short term	Yes

As shown in Table 6-10, project operations effects on national gross domestic product, employment and income are expected to be positive, high magnitude and significant in the Northwest Territories. Effects in Canada overall are expected to be positive, but only low magnitude.

Table 6-10: National Gross Domestic Product, Employment and Income Effects – Project Operations Effect Attributes

Region	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Northwest Territories	Positive	High	Regional and beyond regional	Long term	Yes
Canada	Positive	Low	National	Long term	No

6.4 Demography

The attraction that the economic benefits of the project will provide could also affect study area community populations. It is not expected that existing birth and death rates will be affected. All aspects of field development and project construction will create demands for labour and local business opportunities, and thus tend to encourage migration to regional and other centres of project activity. The possibility that increases in populations will overburden community infrastructure and services is a concern. Relevant mitigation measures include:

- southern workers, both male and female, will be hired for direct project-related positions in hiring halls, from contractor lists and via media advertising in selected provincial cities.
- Human Resources Skills Development Canada (HRSD) offices will provide the message that the only direct project hiring in the North will be qualified people who have lived in the North for at least one year and have a Northwest Territories medical card.

However, these measures will be only partially effective because there will be many indirect and induced jobs during project construction.

The inherently uncertain nature of speculative in-migration makes construction effect predictions subject to a relatively low level of confidence. Operations effects are based on more reliable predictions of migrant response to longer-term and more stable economic conditions. The assumptions used in both cases were selected to provide planners with a high-side scenario so errors, if any, should not result in unexpected problems.

A residual population effect because of speculative in-migration to the regional centres of Inuvik, Norman Wells, Fort Simpson and Hay River is expected. The total amount of this effect is estimated to be about 800 people and will likely be correlated in time with the peak project activity in each area. It is expected that in-migrants will be distributed as follows:

- Inuvik – 450 in-migrants
- Norman Wells – 100 in-migrants
- Fort Simpson – 140 in-migrants
- Hay River – 125 in-migrants

Table 6-11 shows that project effects on population movement in most regions are expected to be adverse, in the sense of stimulating population movement, low to moderate magnitude, usually of short duration and not significant. In Inuvik, the effects could be adverse and positive, and are expected to be high magnitude.

Table 6-11: Population Mobility – Project Construction Effect Attributes

Region	Location	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	All of ISR	Adverse	Low	Regional	Short term	No
	Aklavik	Adverse	Low	Regional	Short term	No
	Tuktoyaktuk	Adverse	Moderate	Regional	Short term	No
GSA	All of GSA	Adverse	Low	Regional	Short term	No
	Inuvik	Positive and adverse	High	Local	Short term	No
SSA	All of SSA	Adverse	Low	Local	Short term	No
	Norman Wells	Adverse	High	Local	Short term	No
	Fort Good Hope	Adverse	Moderate	Local	Short term	No
DCR	All of DCR (except Hay River)	Adverse	Low	Regional	Short term	No
	Fort Simpson	Adverse	Moderate	Local	Short term	No
	Wrigley, Jean Marie River and Trout Lake	Adverse	Low	Regional	Short term	No
NWT ICCs	Yellowknife	Positive and adverse	Low	Local	Short term	No
	Hay River	Positive and adverse	Low	Local	Short term	No
Northwestern Alberta ICCs	High Level, Rainbow Lake and Zama City	Positive and adverse	Low	Local	Short term	No
<p>NOTES: DCR = Deh Cho Region GSA = Gwich'in Settlement Area ICC = industrial and commercial centre ISR = Inuvialuit Settlement Region NWT = Northwest Territories SSA = Sahtu Settlement Area</p>						

Low-level positive and adverse effects on population movements are expected in the Northwest Territories and northwestern Alberta ICCs, and neutral effects are expected in the DTFN communities.

During operations, effects on population will also be relatively small, only marginally affecting Inuvik and the ICCs. The transitional effect from peak construction demands will include initial operations and some ongoing drilling, possibly involving about 470 people during 2009 to 2015. This effect will stabilize during early operations, and by 2021 to 2025, will reach a level of about

420 people. About 60% of this effect is expected in Inuvik and a further 30% in the ICCs. However, the long-term distribution should change to about 50% for Inuvik and 40% for the ICCs.

Table 6-12 shows these effects will be positive but low magnitude in Inuvik and Norman Wells where the transition will be most marked. Effects in other areas are also summarized.

Table 6-12: Population Mobility – Project Operations Effect Attributes

Region	Location	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	All of ISR	Neutral	No effect	Regional	Long term	No
GSA	Inuvik	Positive	Low	Local	Long term	No
SSA	Norman Wells	Positive	Low	Local	Long term	No
DCR	Fort Simpson	Neutral	No effect	Local	Long term	No
NWT ICCs	Yellowknife and Hay River	Neutral	No effect	Regional	Long term	No
Northwestern Alberta	All	Neutral	No effect	Regional	Long term	No

NOTES:
 DCR = Deh Cho Region
 GSA = Gwich'in Settlement Area
 ICC = industrial and commercial centre
 ISR = Inuvialuit Settlement Region
 NWT = Northwest Territories
 SSA = Sahtu Settlement Area

6.5 Infrastructure

6.5.1 Transportation Infrastructure

Project effects on highway, railroad, barging, and air transportation infrastructure and services were assessed. Because of its size, the project is expected to cause increased demands on all transportation modes during construction.

The project proponents will commit to ensuring project transport requirements will have limited adverse effects on any region or community in the study area. This will be achieved by implementing timely maintenance and repairs to highways and winter roads damaged by heavy project traffic, and by chartering planes to avoid crowding travellers not related to the project.

Table 6-13 shows that with implementation of effective mitigation measures, project effects on transportation infrastructure are expected to be mostly adverse because of increased demands. However, all effects are expected to be low to moderate magnitude, of short duration and not significant.

Extensive transportation will not be required in any region during operations. As a result, it was not necessary to assess operations effects on transport infrastructure.

Table 6-13: Transportation Infrastructure – Project Construction Effect Attributes

Location	Mode of Transportation	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
BDR	Road	Adverse	Low	Regional	Short term	No
	Marine	Adverse	Moderate	Regional	Short term	No
	Air	Adverse	Moderate	Regional	Short term	No
SSA	Road	Adverse	Moderate	Regional	Short term	No
	Marine	Adverse	Moderate	Regional	Short term	No
	Air	Adverse and positive	Moderate	Regional	Short term	No
DCR	Road	Adverse	Moderate	Regional	Short term	No
	Marine	Adverse	Low	Regional	Short term	No
	Air	Adverse	Moderate	Regional	Short term	No
NWT ICCs	Road	Adverse	Low	Regional	Short term	No
	Marine	Adverse	Moderate	Regional	Short term	No
	Air	Adverse	Low	Regional	Short term	No
Northwestern Alberta	Road	Adverse	Low to moderate	Regional	Short term	No

NOTES:
 BDR = Beaufort Delta Region, which is the Inuvialuit Settlement Region and Gwich'in Settlement Region combined
 SSA = Sahtu Settlement Area
 DCR = Deh Cho Region
 ICC = industrial and commercial centre

6.5.2 Energy and Utilities Infrastructure

The communities in the study area have mostly satisfactory water sourcing and treatment facilities, waste disposal arrangements, power supplies and heating fuel supplies. The Tulita water supply, described as sometimes unsatisfactory in the spring, is an exception. All have telephone, television, Internet and radio access, receive newspapers and have mail delivered three to five times a week.

Project construction camps will be completely self-sufficient in terms of water treatment, sewage and solid waste treatment and disposal, and communications capabilities. The project will have no effects on utilities, energy sources or communication facilities in any community. All communities appear to have sufficient reserve power capacity to provide for any foreseeable demands created by in-migrants or transients the project might attract to the study area.

During operations, as during construction, the project will have no effects on the energy and utilities systems of any community. Accordingly, there is no need to detail project attribute effects on energy and utilities infrastructure during either construction or operations.

6.5.3 Housing

Project effects on housing and accommodation will include direct and indirect demands for short- and long-term accommodation. Demands for short-term accommodation will be greatly reduced by providing project construction camps for most direct hires, but might increase because of very temporary peaks and to meet the needs of in-migrants. Programs to discourage speculative in-migration, described in Section 6.4, Demography, will help reduce project construction accommodation pressures, and the housing sector could adjust by anticipating demand. In 2000, the GNWT commissioned a study that predicted overall housing needs through an appropriate timeframe.

As Table 6-14 shows, construction effects on housing are expected to be adverse in communities where less housing is available. These effects are expected to be high magnitude in Inuvik and Norman Wells, moderate magnitude in Tuktoyaktuk, Fort Simpson and Hay River, and low magnitude in other communities. Effects are local in extent and short term in these communities. Regional effects in the Inuvialuit Settlement Region, Gwich'in Settlement Area and Deh Cho Region are all low magnitude and short term. None are significant.

As Table 6-15 shows, operations effects on housing in the larger centres are expected to be positive and adverse, low magnitude, but not significant.

6.5.4 Recreation Resources

Camp facilities will meet the recreation needs of the vast proportion of project employees. The remaining employees will be based in the regional centres, most for relatively short periods. As indicated previously, there will also be speculative in-migration to the regional centres, in spite of planned mitigation measures. Except for Fort Simpson, these communities are well equipped with large-capacity recreation complexes and other facilities.

Existing facilities in Fort Simpson, barely adequate for the current population, are expected to experience adverse, high-magnitude effects from the likely project-induced increase in population (see Table 6-16). In all other areas, the project is expected to have no effect or low-magnitude, adverse effects. Effects are expected to be local or regional in extent, short term and not significant. In Inuvik, positive and adverse, low-magnitude, local and long term effects are also expected.

Positive effects are expected in a few communities where increased recreation fees and demand could defray the costs of increasing the hours facilities are open for use.

There will be no effects on recreation facilities and use during operations, other than a low-magnitude, localized, adverse and positive effect in Inuvik and Norman Wells.

Table 6-14: Housing – Project Construction Effect Attributes

Region	Location	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	All of ISR	Adverse	Low	Regional	Short term	No
	Tuktoyaktuk	Adverse	Moderate	Local	Short term	No
	Aklavik	Adverse	Low	Local	Short term	No
GSA	GSA Aboriginal Communities	Adverse	Low	Regional	Short term	No
	Inuvik	Adverse	High	Local	Short term	No
SSA	All of SSA	Adverse	Low	Local	Short term	No
	SSA Aboriginal communities	Adverse	Low	Local	Short term	No
	Norman Wells	Adverse	High	Local	Short term	No
	Fort Good Hope	Adverse	Low	Local	Short term	No
DCR	Fort Simpson	Adverse	Moderate	Local	Short term	No
	Other DCR communities	Adverse	Low	Regional	Short term	No
NWT ICCs	Yellowknife	Adverse	Low	Local	Short term	No
	Hay River	Adverse	Moderate	Local	Short term	No
Northwestern Alberta ICCs	High Level	Adverse	Low	Local	Short term	No
	Zama City, Rainbow Lake	No effect	No effect	Local	Short term	No

NOTES:
DCR = Deh Cho Region
GSA = Gwich'in Settlement Area
ICC = industrial and commercial centre
ISR = Inuvialuit Settlement Region
NWT = Northwest Territories
SSA = Sahtu Settlement Area

Table 6-15: Housing – Project Operations Effect Attributes

Region	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Inuvik	Positive	Low	Local	Long term	No
Norman Wells	Positive	Low	Local	Long term	No
Fort Simpson	Positive	Low	Local	Long term	No
Yellowknife	Positive and adverse	Low	Local	Long term	No
Hay River	Positive and adverse	Low	Local	Long term	No

Table 6-16: Recreation Resources – Project Construction and Operations Effect Attributes

Region	Location	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	All of ISR	Neutral	No effect	Regional	Short term	No
	Tuktoyaktuk	Adverse	Low	Local	Short term	No
	Aklavik	Adverse	Low	Local	Short term	No
GSA	All of GSA	Neutral	No effect	Regional	Short term	No
	Inuvik	Positive and adverse	Low	Local	Short term to long term	No
SSA	All of SSA	Adverse	Low	Regional	Short term	No
	Norman Wells	Adverse	Moderate	Local	Short term	No
	Norman Wells	Positive and adverse	Low	Local	Long term	No
DCR	All of DCR	Neutral	No effect	Regional	Short term	No
	Fort Simpson	Adverse	High	Local	Short term	No
NWT ICCs	Hay River	Positive and adverse	Low	Local	Short Term	No

NOTES:
DCR = Deh Cho Region
GSA = Gwich'in Settlement Area
ICC = industrial and commercial centre
ISR = Inuvialuit Settlement Region
SSA = Sahtu Settlement Area

6.5.5 Governance

Governance encompasses both the authority to make decisions, and the ability to access and manage the funds required to make some decisions consequential. Governance is changing rapidly in the Northwest Territories.

With the signing of land claim agreements and the associated transfer of powers, Aboriginal groups are now mostly politically autonomous. However, their effective authority is often limited because they lack financial independence, and senior governments can still exert considerable influence.

Both the GNWT and the Aboriginal Summit are trying to expedite devolution of land and resources from the federal government to territorial authorities. 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.

The project will have various effects on governance. Project-induced changes might affect the traditional commitments of Aboriginal people. This, and population changes, might influence some leadership decisions.

The land claims agreements have increased decision-making demands on Aboriginal governing authorities and their leadership. The project will likely increase the number and importance of issues that Aboriginal authorities must now address, further challenging their energy and time.

As discussed previously, the project will produce considerable tax revenue that should exceed project-related increased demand for government expenditures. However, if devolution and revenue-sharing agreements are not final, tax revenue could occur too late to cover costs and could accrue to different levels of government.

Table 6-17 shows that project effects on governance are expected to be adverse, moderate magnitude, short term and not significant in the Northwest Territories during construction. During operations, these effects are expected to be positive but low magnitude. The project will have no effects on governance in northwestern Alberta.

Table 6-17: Governance – Project Construction and Operations Effect Attributes

Region	Phase	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
NWT study area	Construction	Adverse	Moderate	Regional and beyond regional	Short term	No
Northwestern Alberta ICCs	Construction	Neutral	No effect	Regional	Short term	No
NWT study area	Operations	Positive	Low	Regional and beyond regional	Long term	No

NOTES:
 ICC = industrial and commercial centre
 NWT = Northwest Territories

6.6 Individual, Family and Community Wellness

Wellness is used as a generic term, and includes physical, emotional and mental health, and relationship well-being. This section describes how the project is expected to affect:

- individual, family and community well-being and delivery of social services
- current physical and mental health conditions, and health care services
- human health conditions
- protection and policing services
- education attainment and facilities and services

6.6.1 Community Well-Being and Delivery of Social Services

Well-being refers to everything that affects life experience, including the circumstances of physical existence, the quality of relationships, and the threat of violence and crime. If family and community relationships are caring and supportive, the well-being of individuals is ensured. However, abusive and violent family relationships jeopardize the well-being of family members, and indeed, of all residents in small communities.

The well-being of individuals and groups can benefit because of employment opportunities and project spending that will provide increased income to spend on improving quality of life in the community or harvesting on the land. However, money spent on addictive substances could jeopardize family and community well-being, and overburden social services. Project-influenced relationships of Aboriginal workers with southern fellow-worker role models could have beneficial or adverse effects on behaviour affecting well-being.

The most frequent and persistent problems that communities now experience are substance abuse, primarily alcohol, and derivative violence, often in families. As most police, social workers and nurses report, alcohol is the root source of the vast majority of community wellness issues, and many health problems. The most effective control measures will require preventive initiatives by the project, the Government of the Northwest Territories and local communities.

Measures initiated by the project will include enforcing alcohol- and drug-free camps and workplaces, and proactive participation in community-based training programs in money management. These programs will promote financial responsibility and enable employees to place earnings in a savings account, thus reducing the money readily available to spend on alcohol.

It is recommended the GNWT ensure local RCMP detachments have adequate staff to consistently enforce prohibitions against over-serving and other liquor ordinances, to take into preventive detention persons so intoxicated as to be a danger to themselves or others, and to lay charges against violent abusers, irrespective of the wishes of the victims.

The most effective measures, available only to local communities, include local ordinances limiting the amount of alcohol that may be imported locally at one time, and focusing community concerns on the human and financial cost of alcohol abuse.

But despite these measures, increased income from project employment might add substantially to substance abuse-related problems, and to the burdens of the social services that must deal with these problems. Substantial immigration, particularly to regional centres, could also increase the demands on these services. Programs to discourage speculative in-migration, described in Section 6.4, Demography, will help contain such population increase.

Social services are delivered in all but the smallest of Northwest Territories communities through community wellness centres, where child welfare, substance abuse, income support and other social services can work with clients having multiple needs. Assessments of the adequacy or quality of staffing of community wellness centres have not been made, with the exception of a GNWT-funded study that found addictions services *in urgent need of immediate attention, expertise, direction, policy directives, leadership and rebuilding* (Chalmers and Associates 2002). Accordingly, the more wellness problems are prevented by effective measures against substance abuse, the less the workload on the social service workers, and the more effectively they can work with their remaining clients.

As Table 6-18 shows, project construction is expected to have neutral effects on well-being in Holman, Sachs Harbour, and adverse, low-magnitude effects in Yellowknife, Déline and Colville Lake. All other study area communities are expected to experience adverse effects of low, moderate or high magnitude, local extent and short-term duration. These well-being effects are judged to be not significant.

Table 6-18: Well-Being Conditions – Project Construction Effect Attributes

Region	Location	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	Aklavik, Tuktoyaktuk and Paulatuk	Adverse	High	Local	Short term	No
	Holman and Sachs Harbour	Neutral	Low	Local	Short term	No
GSA	GSA Aboriginal communities	Adverse	Moderate	Local	Short term	No
	Inuvik	Adverse	High	Local	Short term	No
SSA	Fort Good Hope and Tulita	Adverse	Moderate	Local	Short term	No
	Norman Wells	Adverse	Moderate	Local	Short term	No
	Déline and Colville Lake	Adverse	Low	Local	Short term	No
DCR	Wrigley	Adverse	Moderate	Local	Short term	No
	Fort Simpson	Adverse	High	Local	Short term	No
	Other DCR communities	Adverse	Low	Local	Short term	No
NWT ICCs	Yellowknife	Neutral	Low	Local	Short term	No
	Hay River, including Aboriginal satellite communities	Adverse	Low	Local	Short term	No

NOTES:

DCR = Deh Cho Region
GSA = Gwich'in Settlement Area
ICC = industrial and commercial centre
ISR = Inuvialuit Settlement Region
NWT = Northwest Territories
SSA = Sahtu Settlement Area

The northwestern Alberta communities are absent from these tables because potential beneficial and adverse effects of the project are expected to balance out, with neutral residual effects.

Project effects on delivery of social services are expected to be adverse and high magnitude, but local, short term and not significant in Inuvik, Fort Simpson, Tuktoyaktuk and Aklavik (see Table 6-19). Moderate effects are expected in Fort McPherson, Tsiigehtchic, Fort Good Hope, Tulita and Wrigley, and low or neutral effects elsewhere. The northwestern Alberta communities have well-staffed social service offices, providing a range of important services. It is expected that these will be adequate to handle any increase in demands for social services that the project might cause.

Table 6-19: Delivery of Social Services – Project Construction Effect Attributes

Region	Location	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	Aklavik, Tuktoyaktuk and Paulatuk	Adverse	High	Local	Short term	No
	Holman and Sachs Harbour	Neutral	Low	Local	Short term	No
GSA	GSA Aboriginal communities	Adverse	Moderate	Local	Short term	No
	Inuvik	Adverse	High	Local	Short term	No
SSA	Fort Good Hope and Tulita	Adverse	Moderate	Local	Short term	No
	Norman Wells	Adverse	Moderate	Local	Short term	No
	Déline and Colville Lake	Adverse	Low	Local	Short term	No
DCR	Wrigley	Adverse	Moderate	Local	Short term	No
	Fort Simpson	Adverse	High	Local	Short term	No
	DCR other communities	Adverse	Low	Local	Short term	No
NWT ICCs	Yellowknife	Neutral	Low	Local	Short term	No
	Hay River, including Aboriginal satellite communities	Adverse	Low	Local	Short term	No

NOTES:

DCR = Deh Cho Region
 GSA = Gwich'in Settlement Area
 ICC = industrial and commercial centre
 ISR = Inuvialuit Settlement Region
 NWT = Northwest Territories
 SSA = Sahtu Settlement Area

Most employment numbers and opportunities generated by the project will end once construction and associated restoration activities are complete. A small number of technical operations maintenance staff will likely be stationed only in Inuvik and Norman Wells, perhaps with some maintenance staff in Fort Simpson. There could be some long-term positive effects on well-being and delivery of social services in the Beaufort Delta Region, but these will be low magnitude and not significant.

6.6.2 Health Conditions and Health Care Services

The health of individuals and groups can benefit because of employment opportunities and project spending that will provide increased income to spend on a better diet, climate-appropriate clothing, and housing arrangements or facilities. Project-influenced associations with new role models could also have health or safety benefits.

However, health might be adversely affected by:

- family violence and dangerous behaviour resulting from substance abuse
- project-influenced associations with negative role models
- exposure to contagious diseases

The mitigation measures that the project, government and communities should implement to reduce alcohol abuse, a frequent source of many accidental and violent injuries, are described in Section 6.6.1.

The settlement regions currently have relatively high sexually transmitted infection, accident and injury rates. Project employment could reduce accident rates because it might be less risky than some other northern winter activities. However, increased alcohol consumption, associated with increases in casual, unprotected sex in regional centres, might increase sexually transmitted infection rates. As well, the possible stresses of the long work hours of those on rotational employment, and of those left behind to parent children and run the household, might increase rates of mental disorders.

All project camps will have health care staff and facilities at levels suited to camp size. Health care staffing and facility equipment will be in place to ensure that injured and seriously ill patients can be stabilized for medical evacuation, even in small camps.

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

Health care needs and services are reciprocally related, each affecting the other. Project effects that reduce numbers of patients or improve the situations of health care workers will create a positive feedback process. For example, beneficial project effects on wellness could reduce the demands on nurses, enabling them to deliver better care. As indicated previously, there will be some speculative in-migration to the regional centres, in spite of planned mitigation measures, which could add to the demands on health care staff and facilities in these centres.

Table 6-20 shows that project effects on health conditions are expected to be adverse, and low or moderate magnitude in all communities except Fort Good Hope and Fort Simpson, where the effects might be high magnitude. All effects are expected to be short term, local in extent, except for the regional assessments, and not significant.

Table 6-20: Health Conditions – Project Construction Effect Attributes

Region	Location	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	All of ISR	Adverse	Moderate	Regional	Short term	No
	Tuktoyaktuk	Adverse	Moderate	Local	Short term	No
	Aklavik	Adverse	Moderate	Local	Short term	No
GSA	All of GSA	Adverse	Moderate	Regional	Short term	No
	Inuvik	Adverse	Moderate	Local	Short term	No
SSA	All of SSA	Adverse	Moderate	Regional	Short term	No
	Norman Wells	Adverse	Moderate	Local	Short term	No
	Fort Good Hope	Adverse	High	Local	Short term	No
DCR	Fort Simpson	Adverse	High	Local	Short term	No
	Wrigley	Adverse	Moderate	Local	Short term	No
	Other DCR communities	Adverse	Moderate	Local	Short term	No
NWT ICCs	Yellowknife	Adverse	Low	Local	Short term	No
	Hay River	Adverse	Moderate	Local	Short term	No
Northwestern Alberta	High Level	Adverse	Low	Regional	Short term	No
	Other northwestern Alberta	Adverse	Low	Local	Short term	No

NOTES:

DCR = Deh Cho Region
 GSA = Gwich'in Settlement Area
 ICC = industrial and commercial centres
 ISR = Inuvialuit Settlement Region
 NWT = Northwest Territories
 SSA = Sahtu Settlement Area

Table 6-21 shows that project effects on health care centres are expected to be adverse and low or moderate magnitude in all areas except Tuktoyaktuk, the Inuvik Hospital, Fort Good Hope and Fort Simpson, where the effects might be high magnitude. All effects will be of short-term duration, local in extent and not significant. Effects on the Inuvik Hospital in-patient program will be regional in extent, as will effects on the Yellowknife hospital and High Level health care facilities.

Table 6-21: Health Care Services – Project Construction Effect Attributes

Region	Location	Effect Attributes				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	ISR health centres	Adverse	Moderate	Local	Short term	No
	Tuktoyaktuk	Adverse	High	Local	Short term	No
GSA	GSA health care centres	Adverse	Moderate	Local	Short term	No
	Inuvik Hospital out-patient	Adverse	High	Local	Short term	No
	Inuvik Hospital in-patient	Adverse	Moderate	Regional	Short term	No
SSA	SSA health centres	Adverse	Moderate	Local	Short term	No
	Norman Wells	Adverse	Moderate	Local	Short term	No
	Fort Good Hope	Adverse	High	Local	Short term	No
DCR	Fort Simpson	Adverse	High	Local	Short term	No
	Wrigley	Adverse	Moderate	Local	Short term	No
	Other DCR communities	Adverse	Low	Local	Short term	No
NWT ICCs	Yellowknife Hospital	Adverse	Low	Beyond regional	Short term	No
	Hay River Hospital	Adverse	Moderate	Local	Short term	No
Northwestern Alberta	DTFN	Adverse	Low	Local	Short term	No
Northwestern Alberta ICCs	High Level	Adverse	Low	Regional	Short term	No
	Rainbow Lake and Zama City	Adverse	Low	Local	Short term	No

NOTES:
 – = not available
 DCR = Deh Cho Region
 DTFN = Dene Tha' First Nation
 GSA = Gwich'in Settlement Area
 ICC = industrial and commercial centre
 ISR = Inuvialuit Settlement Region
 NWT = Northwest Territories
 SSA = Sahtu Settlement Area

Activities during operations are not expected to affect health care facilities because the increased income and the work- and separation-related stresses will have ended with construction completion.

6.6.3 Project Environmental Effects and Human Health Conditions

Project construction camps will be self-contained, sourcing and treating water, and treating and disposing liquid and solid waste according to relevant government published standards. Relevant research and recent studies indicate that the project is expected to have no effects on air, water or soil quality during either construction or operations that could cause adverse effects on the health of humans, plants or animals.

Concerns were expressed in some communities about emissions from diesel trucks parked near communities with their engines idling. Relevant mitigation measures include using late-model vehicles that burn low-sulphur diesel fuel, and avoiding parking idling vehicles near communities. As Table 6-22 shows, the effects of diesel exhaust health risks are expected to be adverse, low magnitude, local and short term.

Table 6-22: Project Environmental Effects on Human Health – Project Construction Effect Attributes

Key Indicator	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Diesel engine exhaust	Adverse	Low	Local	Short term	No
Noise	Adverse	Low	Local	Short term	No

The commitment by project proponents to a maximum noise level of 45 dBA at 1.5 km from any project facility ensures that noise will have no effects on human health during operations. Noise effects are expected to be low magnitude and local in extent.

Table 6-23 shows the effects on human health of key substance indicators that could be produced during operations. All effects are expected to be adverse, low magnitude and local in extent during this phase.

Table 6-23: Project Environmental Effects on Human Health – Project Operations Effect Attributes

Key Indicator	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
SO ₂ , NO _x , CO	Adverse	Low	Local	Long term	No
Particulate matter	Adverse	Low	Local	Long term	No
Benzene and BTEX	Adverse	Low	Local	Long term	No
Potential acid inputs	Adverse	Low	Local	Long term	No
Noise	Adverse	Low	Local	Long term	No
NOTES: SO ₂ = sulphur dioxide NO _x = nitrogen oxides CO = carbon monoxide BTEX = benzene, toluene, ethyl benzene and xylene					

6.6.4 Public Safety and Protection Services

Prompt, efficient policing services are a mainstay of violence-free community relationships. Many RCMP detachments in the study area report that they are currently overburdened. During construction, policing burdens will be affected by having to address increased problems in the communities the police serve, occasional problems in camps and the size of the local detachment.

Successful control of alcohol abuse will be the most effective way to reduce policing problems. The relevant measures are the same as those listed in Section 6.6.1, Community Well-Being and Delivery of Social Services.

Increased substance abuse and derivative problems might result from the elevated earnings the project will bring. Accordingly, as shown in Table 6-24, project construction effects on local policing are expected to be adverse, ranging from high magnitude in Inuvik and Fort Simpson, to medium and low magnitude in the other study area communities. The geographic extent will be local in most cases and duration short term, so these effects are judged to be not significant.

Table 6-24: Protection Services – Project Construction Effect Attributes

Region	Location	Effect Attributes				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	Tuktoyaktuk	Adverse	Moderate	Local	Short term	No
	Other ISR communities	Adverse	Low to moderate	Local	Short term	No
GSA	Inuvik	Adverse	High	Local	Short term	No
	Other GSA communities	Adverse	Low	Local	Short term	No
SSA	Norman Wells and Fort Good Hope	Adverse	Moderate	Local	Short term	No
	Other SSA communities	Adverse	Low	Local	Short term	No
DCR	Fort Simpson	Adverse	High	Local	Short term	No
	Jean Marie River, Wrigley, Trout Lake	Adverse	Moderate	Local	Short term	No
	Other DCR communities	Adverse	Low	Local	Short term	No
NWT ICCs	Hay River	Adverse	Moderate	Local	Short term	No
	Yellowknife	Adverse	Low	Local	Short term	No
	Neighbouring Aboriginal communities	Adverse	Low to moderate	Local	Short term	No
Northwestern Alberta	Assumption	Adverse	Low	Regional	Short term	No
	High Level	Adverse	Moderate	Regional	Short term	No
	Rainbow Lake and Zama City	Adverse	Low	Local	Short term	No

NOTES:

DCR = Deh Cho Region
 GSA = Gwich'in Settlement Area
 ICC = industrial and commercial centre
 ISR = Inuvialuit Settlement Region
 NWT = Northwest Territories
 SSA = Sahtu Settlement Area

Most employment and economic opportunities generated by the project will end once construction is complete. A small number of staff will be required for technical operations and pipeline maintenance, and will likely be stationed in Inuvik and Norman Wells, perhaps with some maintenance staff in Fort Simpson. Accordingly, there could be low-magnitude, local, long-term effects in Inuvik, but there will be no need for mitigation measures and no residual effects on policing services during operations elsewhere.

6.6.5 Education Attainment and Services

Education attainment and services in the study area will likely be affected by the project. Some adolescents will respond to employment opportunities by leaving school prematurely, and some former dropouts might return to qualify for more training. Children of in-migrants could increase enrolment pressures. Some teachers might resign in favour of project employment. Thus, enrolment pressures and project-related changes in education and training programs might increase or decrease.

The schools, project personnel and community members will urgently seek to discourage adolescents from dropping out. Previously described measures to discourage in-migration to regional centres will be relevant as well in keeping enrolments at manageable levels.

Table 6-25 shows that in Inuvik and Fort Simpson, both positive and adverse effects on education attainment are expected. Effects will be moderate magnitude, regional in extent and short- to long-term duration. Fort Good Hope is expected to experience positive and adverse, moderate-magnitude, local and short-term effects. Low-magnitude, regional and long-term effects are expected in Norman Wells and Fort Simpson. All other communities will likely experience positive and adverse effects on education attainment, which are local, low magnitude and short term, except for Tuktoyaktuk, Fort McPherson and Tsiigehtchic, where effects are expected to be long term.

The project will have no adverse effects on education attainment in northwestern Alberta during construction or operations.

As Table 6-26 shows, neutral, local and regional, short- or long-term effects on education services are expected in most communities. Positive and adverse effects in Tuktoyaktuk, and positive and neutral effects in other ISR communities are expected. In all cases, effects will be low magnitude, local, and short or long term. In Inuvik, effects will likely be positive and neutral, low magnitude, regional, and short to long term. No effects are significant.

The project will have no adverse effects on education facilities and services in northwestern Alberta during construction or operations.

Table 6-25: Education Attainment – Project Construction and Operations Effect Attributes

Region	Location	Effect Attributes				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	Tuktoyaktuk	Positive and adverse	Low	Local	Short term to long term	No
	Other ISR communities	Positive and adverse	Low	Local	Short term	No
GSA	Inuvik	Positive and adverse	Moderate	Regional	Short term to long term	No
	Other GSA Aboriginal communities	Positive and adverse	Low	Local	Short term to long term	No
SSA	Norman Wells	Positive and adverse	Low	Local	Short term	No
				Regional	Long term	No
	Fort Good Hope	Positive and adverse	Moderate	Local	Short term	No
	Other SSA Aboriginal communities	Positive and adverse	Low	Local	Short term	No
DCR	Fort Simpson	Positive and adverse	Moderate	Regional	Short term	No
			Low	Regional	Long term	No
	Wrigley, Jean Marie River	Positive and adverse	Low to moderate	Local	Short term	No
	Other DCR Aboriginal communities	Positive and adverse	Low	Local	Short term	No
NWT ICCs	Yellowknife	Positive and adverse	Low	Local	Short term	No
	Hay River	Positive and adverse	Low	Local	Short term	No

NOTES:
DCR = Deh Cho Region
GSA = Gwich'in Settlement Area
ICC = industrial and commercial centre
ISR = Inuvialuit Settlement Region
SSA = Sahtu Settlement Area

6.7 Traditional Culture

Survival by harvesting food resources nourished by the land is the ethos, the essential centre, of Aboriginal cultures. These cultures are sustained today by community influences that communicate preferences and needs, and encourage harvesting of traditional foods. Sustaining the knowledge, lore and skills necessary for harvesting these foods depends on motivation and the time to engage in these activities.

Harvesting and seasonal wage employment are now symbiotic, because low incomes from trapping necessitate wage employment to pay for the expensive equipment now needed for efficient harvesting. The project will provide wage employment that will support harvesting-equipment requirements.

**Table 6-26: Education Facilities and Services – Project Construction and Operations
 Effect Attributes**

Region	Location	Effect Attributes				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	Tuktoyaktuk	Positive and adverse	Moderate and low	Local	Short term to long term	No
	Other ISR communities	Positive	Low	Local	Short term	No
		Neutral	Low	Local	Long term	No
GSA	Inuvik	Positive and neutral	No effect	Regional	Short term to long term	No
	Other GSA communities	Neutral	No effect	Local	Short term	No
SSA	Norman Wells	Neutral	No effect	Regional	Short term to long term	No
	Other SSA communities	Neutral	No effect	Local	Short term	No
DCR	Fort Simpson	Neutral	No effect	Regional	Short term to long term	No
	Other DCR Communities	Neutral	No effect	Local	Short term	No
NWT ICCs	Yellowknife and Hay River	Neutral	No effect	Local	Short term	No

NOTES:
 DCR = Deh Cho Region
 GSA = Gwich'in Settlement Area
 ICC = industrial and commercial centre
 ISR = Inuvialuit Settlement Region
 NWT = Northwest Territories
 SSA = Sahtu Settlement Area

Project employment could jeopardize harvester lore and disciplines by bringing Aboriginal and non-Aboriginal workers together on the job, and by pre-empting harvesting activities, because of time needed for long-rotation employment cycles. Some Aboriginal people might experience the paid work more rewarding than harvesting, promoting interest in a southern lifestyle. However, Aboriginal workers could also react negatively, strengthening their appreciation of the traditional relationships and the lifestyle they enjoy at home.

Elders are powerful influences for sustaining tradition. The project will support their efforts and help meet the traditional food requirements of communities by supporting hunting leaves to Aboriginal workers to secure important harvests, where practical.

The effect of the project on cross-generation transference of traditional language, and knowledge of and identification with traditional culture, are central to questions about language and cultural retention. As in the case of resource

harvesting, project influences might either strengthen or weaken language and culture.

In 1999, 72% of Deh Cho Aboriginal community residents reported fluency in an Aboriginal language, as did 68% in the Sahtu Aboriginal communities. Only about 28% reported fluency in the Inuvialuit Settlement Region and the Gwich'in Settlement Area. Fluency declined by 11% between 1989 and 1999 in the Northwest Territories as a whole. Fluency in Aboriginal language is severely undermined by use of English in the media, schooling and most work situations. Although an Aboriginal language is spoken at home in many communities, this is often not the case in the Beaufort Delta Region, where only 29% know their Aboriginal tongue. Project employment will likely have little effect on language and cultural retention in this area.

Expected project effects on traditional harvesting (see Table 6-27), and language and culture retention (see Table 6-28) are alike because of similar influences. No effects are expected on either Norman Wells or Yellowknife. Low-magnitude adverse effects are expected on language retention in all other communities because of lengthy exposure to English. Only low-magnitude adverse effects on harvesting are expected in most of these communities. The many job opportunities in the Beaufort Delta Region will have moderate adverse effects on harvesting in Tuktoyaktuk, Fort McPherson and Tsiigehtchic. In Sachs Harbour, Holman and Paulatuk, harvesting is so important that the project will have neutral effects.

Most employment numbers and opportunities generated by the project will end once construction and associated restoration activities are complete. With few technical operations and maintenance staff stationed at Inuvik, Norman Wells and Fort Simpson, these project effects will effectively end.

Table 6-27: Traditional Harvesting – Project Construction Effect Attributes

Region	Location	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	All of ISR	Adverse	Moderate	Regional	Short term	No
	Sachs Harbour, Paulatuk and Holman	Neutral	Low	Regional	Short term	No
	Tuktoyaktuk	Adverse	Moderate	Local	Short term	No
GSA	All of GSA	Adverse	Moderate	Regional	Short term	No
	GSA Aboriginal communities	Adverse	Low	Regional	Short term	No
	Inuvik	Adverse	Low	Local	Short term	No
SSA	SSA Aboriginal communities	Adverse	Low	Regional	Short term	No
	Norman Wells	Neutral	No effect	Local	Short term	No

Table 6-27: Traditional Harvesting – Project Construction Effect Attributes (cont'd)

Region	Location	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
DCR	All of DCR (except Fort Simpson)	Adverse	Low	Regional	Short term	No
	Fort Simpson	Adverse	Low	Local	Short term	No
NWT ICCs	Yellowknife	Neutral	No effect	Local	Short term	No
	Hay River	Adverse	Low	Local	Short term	No
Northwestern Alberta	DTFN	Adverse	Low	Local	Short term	No

NOTES:
DCR = Deh Cho Region
DTFN = Dene Tha' First Nation
GSA = Gwich'in Settlement Area
ICC = industrial and commercial centre
ISR = Inuvialuit Settlement Region
NWT = Northwest Territories
SSA = Sahtu Settlement Area

Table 6-28: Language and Culture Preservation – Project Construction Effect Attributes

Region	Location	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
ISR	All of ISR	Adverse	Low	Regional	Short term	No
	All ISR (except Aklavik)	Adverse	Low	Local	Short term	No
GSA	All of GSA	Adverse	Low	Regional	Short term	No
	GSA Aboriginal communities	Adverse	Low	Local	Short term	No
	Inuvik	Adverse	No effect	Local	Short term	No
SSA	All of SSA	Adverse	Low	Regional	Short term	No
	SSA Aboriginal communities	Adverse	Low	Local	Short term	No
	Norman Wells	Neutral	No effect	Local	Short term	No
DCR	All of DCR	Adverse	Low	Regional	Short term	No
	Fort Simpson, Fort Liard and Fort Providence	Adverse	Low	Local	Short term	No
NWT ICCs	Yellowknife and Hay River	Neutral	No effect	Local	Short term	No
Northwestern Alberta	DTFN	Neutral	No effect	Local	Short term	No

NOTES:
DCR = Deh Cho Region
DTFN = Dene Tha' First Nation
GSA = Gwich'in Settlement Area
ICC = industrial and commercial centre
ISR = Inuvialuit Settlement Region
NWT = Northwest Territories
SSA = Sahtu Settlement Area

6.8 Nontraditional Land and Resource Use

Effects of the project on the following valued components were assessed in the Inuvialuit Settlement Region, Gwich'in Settlement Area, Sahtu Settlement Area, Deh Cho Region and northwestern Alberta:

- land ownership
- granular resources
- timber
- mining
- oil and gas activities
- nontraditional resource harvesting, i.e., hunting, fishing and trapping by non-Aboriginal people
- other commercial activities, i.e., reindeer herding, agriculture
- tourism and recreation

Detailed baseline information on the existing conditions for nontraditional land and resource use in the project study area can be found in Volume 4, Socio-Economic Baseline.

Project effects on the administrative regions of the Mackenzie Valley were assessed for all project components, i.e., the production area, the gathering pipelines, the pipeline, associated facilities and infrastructure, and borrow sites. The effects of these developments on nine valued components were assessed. The effect attributes used in these assessments are defined in Volume 6, Socio-Economic Impact Assessment.

Table 6-29 identifies the combined effects of the project on each of the identified valued components, listed previously. It is apparent that the project components often have differing effects on the individual valued components. However, as the table shows, none of these effects is significant.

Table 6-29: Nontraditional Land and Resource Use – Project Construction and Operations Effect Attributes

Valued Component	Effect	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
Land ownership	Contravention of zoning bylaws or land access requirements	Neutral	No effect	N/A	N/A	No
Granular resources	Decrease in available land base for granular extraction	Neutral to adverse	No effect to low	Local	Short term to long term	No
	Change to existing granular operations	Positive or adverse	Moderate	Local to regional	Short term	No
		Positive	Low	Regional	Long term	No
	Loss of granular resources	Adverse	Moderate	Regional	Short term to long term	No
		Adverse	Low	Regional	Long term	No
Net effect on granular resources	Adverse	Low	Regional	Long term	No	
Timber resources	Decrease in available land base for timber resources	Adverse	Low	Local	Short term to long term	No
	Disruption to existing forest industry practices	Neutral	No effect	N/A	N/A	No
	Changes to existing timber harvesting practices	Adverse	Low	Regional	Short term	No
		Neutral to positive	No effect to low	Regional	Long term	No
Loss of timber resources	Neutral to adverse	No effect to low	Local to regional	Long term	No	
Mineral resources	Decrease in available land base for mining	Neutral to adverse	No effect to low	Local	Short term to long term	No
	Disruption to existing mining operations	Neutral	No effect	N/A	N/A	No
Oil and gas activities	Decrease in available land base for other oil and gas activities	Adverse	Low	Local	Short term to long term	No
	Changes in other oil and gas activities	Positive to adverse	No effect to low	Local to regional	Short term to long term	No
Nontraditional resource harvesting	Decrease in available land base for resource harvesting activities	Adverse	Low	Local	Short term to long term	No
	Change in nontraditional hunting and fishing success	Adverse	Low to moderate	Regional	Short term	No
		Neutral to adverse	No effect to low	Local	Long term	No
Change in resource harvesting opportunities	Positive or adverse	Low	Local	Short term to long term	No	
Other commercial activities	Decrease in available land base for other commercial activities	Neutral to adverse	No effect to low	Local	Short term to long term	No

Table 6-29: Nontraditional Land and Resource Use – Project Effect Construction and Operations Attributes (cont'd)

Valued Component	Effect	Effect Attribute				Significant
		Direction	Magnitude	Geographic Extent	Duration	
Other commercial activities (cont'd)	Change in other commercial activities	Neutral to adverse	No effect to low	Regional	Short term	No
		Positive to adverse	Low	Regional	Long term	No
Tourism and recreation	Decrease in available land base for tourism and outdoor recreation activities	Neutral to adverse	No effect to low	Local to regional	Short term to long term	No
	Change to tourism and recreation activities	Neutral to adverse	No effect to low	Local to regional	Short term	No
		Positive to adverse	No effect to low	Local to regional	Long term	No
	Change in quality of tourism and outdoor recreation	Neutral to adverse	No effect to low	Local to regional	Short term	No
		Positive to adverse	No effect to low	Local to regional	Long term	No
	Change to summer tourist and recreational boat traffic in the Mackenzie River and Mackenzie Delta	Neutral to adverse	No effect to low	Local to regional	Short term to long term	No
Marine operations	Disruption of current marine shipping and operation activities	No effect	N/A	N/A	N/A	No
NOTE: N/A = not applicable						

The effects expected to occur in northwestern Alberta differ slightly from those described previously. No effects are expected on the following valued components:

- granular resources
- changes to existing timber harvest
- changes in nontraditional hunting and fishing success
- tourism and recreation
- marine operations (ISR only)

6.8.1 Protected Areas

The areas for construction of the pipeline and associated project components will overlap with some areas designated for limited development. Construction of the various project components will result in a decrease in the undisturbed area in these areas. However, in all cases, the project will be developed to meet the recommendations or requirements of the various land use plans and regulations that apply.

The presence of additional temporary and permanent roads for the project could change access to other land uses in protected and proposed protected areas. This could result in changes to other land uses already present in these areas or an increase in other land uses. It is expected that other land users will also follow the requirements and recommendations of the applicable land use plan or regulation for development in protected or proposed protected areas.

The Northwest Territories Protected Areas Strategy has been reviewed and considered in the project effects assessment. Only two areas identified under the protected areas strategy are encountered by the project. There is potential for other areas along the pipeline corridor to be identified in the future under the protected areas strategy. However, the project has taken a landscape-based approach to the environmental and socio-economic impact assessments, resulting in a 30-km corridor centred on the pipeline. This approach provides an information base for assessing potential impacts of the project on any future areas identified in the corridor under the protected areas strategy.

Table 6-30 summarizes the expected project effects on protected areas throughout the project area, as discussed previously.

Table 6-30: Protected Areas – Combined Project Construction and Operations Effects

Effect	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Loss of available land base in protected areas	Neutral to adverse	No effect to low	Regional	Short term to long term	No
Disturbance to protected areas	Adverse	Moderate	Local and regional	Short term	No
	Adverse	Low to moderate	Local and regional	Long term	No
Disturbance to Beluga Management Zone 1A	Adverse	Low	Local	Short term	No

6.8.2 Visual and Aesthetic Resources

Table 6-31 summarizes the expected combined effects from the project on visual and aesthetic resources in the project area, as discussed previously.

Table 6-31: Visual and Aesthetic Resources – Combined Project Operations Effects

Effect	Effect Attribute				Significant
	Direction	Magnitude	Geographic Extent	Duration	
Effect of change in landscape on people travelling in the area or on local land users	Adverse	Low to moderate	Local to regional	Long term	No

6.9 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 disturbing the ground. They are defined and managed by GNWT legislation in the Northwest Territories and the Alberta Historical Resources Act in Alberta.

Based on community and regulatory input, the key issues relating to heritage resources include loss or damage to historical, cultural, archaeological and palaeontological resources. The methods employed for the project-focused field reconnaissance and heritage resource impact assessment (HRIA) are considered standard for archaeological projects of this type in the region.

Field studies consisted of a reconnaissance-level survey of:

- parts of the three anchor fields and segments of a 1-km-wide corridor along the pipeline route selected by the project team
- 67 potential locations for project-related infrastructure sites
- 159 potential borrow sites

A total of 114 heritage resource sites were found, 28 in the Inuvialuit Settlement Region, 32 in the Gwich'in Settlement Area, 34 in the Sahtu Settlement Area and 20 in the Deh Cho Region. Thirty-two of these sites were rated as high in significance, 37 as medium and 45 as low.

The following tables identify heritage resources that were determined to be of high or moderate significance in specific regions investigated during the 2002 and 2003 focused reconnaissance programs:

- Table 6-32: High Significance Heritage Resources – Inuvialuit Settlement Region
- Table 6-33: High Significance Heritage Resources – Gwich'in Settlement Area
- Table 6-34: High Significance Heritage Resources Investigated – Sahtu Settlement Area
- Table 6-35: Moderate Significance Heritage Resources – Deh Cho Region

Table 6-32: High Significance Heritage Resources – Inuvialuit Settlement Region

Heritage Resource	Type	Landform Association	Project Component	Significant
03MGP-ISR 01	Prehistoric camp site	Terrace near the mouth of an unnamed creek	Gathering pipelines	High
03MGP-ISR 02	Prehistoric lithic	Low ridge near a channel of Mackenzie River	Gathering pipelines	High
03MGP-ISR 05	Prehistoric lithic	Shore of a small unnamed lake	Gathering pipelines	High
03MGP-ISR 06	Historic burial	Near Mackenzie River and Lucas Point	Gathering pipelines	High
03MGP-ISR 08	Prehistoric lithic scatter	Elevated terrace between two unnamed lakes	Borrow site access road	High
03MGP-ISR 09	Rock cairns	Elevated gravel terrace between two unnamed lakes	Parsons Lake, borrow site	High
03MGP-ISR 11	Prehistoric lithic scatter	Small knoll on the floodplain of an unnamed creek	Parsons Lake	High
03MGP-ISR 12	Palaeontological site	Slope near a draw leading to a plateau	Parsons Lake	High
NhTv 001	Prehistoric lithic scatter	Elevated terrace above Mackenzie River	Niglintgak	High
NhTt 007	Prehistoric lithic scatter	Gravel ridge near an unnamed creek	Gathering pipelines	High
NgTu 010	Historic scatter and burials	Tip of Tununuk Point on the bank of Mackenzie River	Production area infrastructure	High
NgTt 016	Historic burial	Terrace overlooking Mackenzie River	Production area infrastructure	High
NeTs 004	Large rock feature and lithic scatter	High gravel ridge above an unnamed creek near Peter Lake	Borrow site	High
NgTt 011	Prehistoric lithic scatter eroded bone fragments	Airstrip at Tununuk Point on Mackenzie River	Production area infrastructure	High
NgTt 012	Prehistoric burial site	Gravel ridge near Tununuk Point	Production area infrastructure	High

The tables provide information on these findings for the four territorial regions, showing:

- heritage resource identification number
- type of resource
- landform association
- project component where it was found
- significance rating

Table 6-33: High Significance Heritage Resources – Gwich'in Settlement Area

Heritage Resource	Type	Landform Association	Project Component	Significant
MkTI 001	Traditional trail	Mackenzie River, Travaillant Lake, Trout Lake	Borrow site access road	High
MITm 002	Historic cabin	Wood Bridge Lake	Pipeline corridor	High
MiTk 002	Historic camp site, burial	Slumping slope near the confluence of the Mackenzie and Travaillant rivers	Infrastructure	High
MiTk 004	Historic cabin	Near the confluence of the Mackenzie and Travaillant rivers	Infrastructure	High
MjTk 001	Historic camp site, cabin	Travaillant Lake	Infrastructure	High
03MGP-GSA 03	Historic camp and trail	Between a small lake and a small creek from Campbell Lake	Borrow site access road	High
03MGP-GSA 16	Prehistoric lithic scatter	Trending Ridge above Thunder River	Pipeline corridor	High
03MGP-GSA 17	Prehistoric lithic scatter	Elevated terrace above Thunder River Valley	Pipeline corridor, borrow site	High
03MGP-GSA 18	Prehistoric lithic scatter	Low-lying level area near an unnamed lake	Pipeline corridor	High

Table 6-34: High Significance Heritage Resources – Sahtu Settlement Area

Heritage Resource	Type	Landform Association	Project Component	Significant
LbRn 008	Indigenous historic burial	Terrace near the mouth of Saline River	Pipeline corridor	High
LeRo 004	Traditional cabins	Small unnamed lake	Borrow site	Moderate to high
03MGP-SSA 01	Historic burials	Knoll	Infrastructure	High
03MGP-SSA 02	Historic burial	Terrace along the confluence of the Mackenzie and Tieda rivers	Borrow site access road	High
03MGP-SSA 06	Prehistoric lithic scatter	Beach on Hare Indian River	Pipeline corridor	High
LcRo 003	Historic cabins	Elevated terrace above Mackenzie River	Infrastructure	High
MgTf 004	Prehistoric lithic scatter	Elevated terrace	Borrow site	High
LcRo 006	Prehistoric lithic scatter	Shore of Mackenzie River	Infrastructure	High

Table 6-35: Moderate Significance Heritage Resources – Deh Cho Region

Heritage Resource	Type	Landform Association	Project Component	Significant
JIRi 008	Historic camp	Flat plains near converging cut lines	Pipeline corridor, borrow site	Moderate
JfRd 002	Traditional trap line, trail	Shore of Trout River	Pipeline corridor	Moderate
KIRm 002	Historic cabin	Edge of Mackenzie River	Pipeline corridor	Moderate
KIRm 010	Historic cabin	Mackenzie River	Pipeline corridor	Moderate
KeRj 024	Historic camp	Bank of Willowlake River	Pipeline corridor	Moderate
KbRh 001	Prehistoric lithic scatter	Small knoll	Borrow site	Moderate
KbRh 002	Traditional trap line, trail	Small unnamed lake	Borrow site	Moderate
KaRf 001	Historic cabins	Shore of Mackenzie River	Borrow site	Moderate
JIRh 007	Traditional trap line	Low terrace above Nadia Creek	Pipeline corridor, borrow site	Moderate
03MGP-DCR 05	Traditional trap line, traps	Bank of Willowlake River	Pipeline corridor	Moderate

These lists do not include resources of limited significance, i.e., modern camp or potential trails. In addition, moderate significance resources, i.e., historic camp or traditional trails, were not included in the summary for the Inuvialuit Settlement Region, Gwich'in Settlement Area and Sahtu Settlement Area. They were included in the Deh Cho Region list (see Table 6-35) because no resource in the Deh Cho Region was rated more than moderate significance.

No archaeological field studies were done in Alberta during the 2002 and 2003 heritage resources program. However, a preliminary search of the site file records at Alberta Community Development revealed that no previously recorded historical resources are situated near project development sites.

Because of the location-specific nature of heritage resources, it is necessary to know the specific location of both the heritage resources and the development footprint proposed, to ascertain the full extent of project effects. Until a final design and location for the various project elements is available, the precise areas that would be subject to ground disturbance cannot be specified. Consequently, although the significance of those resources investigated can be made with a reasonable level of confidence, predictions on the precise effects of the project must await completion of a full HRIA.

Based on findings to date, it is expected that most of the adverse effects could be managed by mitigation measures implemented before development impact, as outlined in Volume 6, Section 8.9.1, Heritage Resource Management Plan. The project proponents are committed to completing a thorough heritage resource assessment that will discuss the effects of the project, and will abide by any regulatory requirements established by the GNWT and Alberta Community Development relative to heritage resources.

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