

### Effects of In-Water or Near-Shore Detonations of Explosives

Explosives might be required at selected watercourse crossings for trench excavation. Use of explosives in or near water can damage fish and other aquatic organisms. Detonation of explosives produces a compressive shock wave followed by a rapid decay to lower than ambient pressures (Wright and Hopky 1998). This rapid change in pressure can cause the swim bladder of a fish and other organs, such as the kidney, liver and spleen of a fish to rupture or haemorrhage.

Effects of in-water detonation of explosives will be limited to fish occupying overwintering habitat in Active I channels. The area of effect is limited to the immediate crossing location. No effects on fish are expected if there is no overwintering habitat at the crossing. Active II or vegetated channels, which account for more than 70% of the watercourses crossed by the pipeline, will not be affected. The exposure time is extremely short, that is, limited to the period of detonation.

Explosives might also be needed to develop borrow sites, though it is expected that borrow sites will be sufficiently far from fish-bearing waterbodies not to affect fish.

### Summary of Primary Mitigation – Fish and Fish Habitat

Table 8-27 provides a summary of the primary mitigation strategies related to potential effects on fish and fish habitat.

**Table 8-27: Mitigation Strategies for Fish and Fish Habitat**

Potential Effect	Primary Mitigation Strategies
Direct effects on fish habitat	<ul style="list-style-type: none"> <li>• Reduce the amount and duration of in-water activities.</li> <li>• Locate construction activities away from waterbodies where practical and according to regulatory requirements.</li> <li>• Whenever practical use clear span bridges or culverts on all-weather roads to cross Active I watercourses.</li> <li>• Avoid spawning, rearing or overwintering habitats, unless authorized.</li> <li>• Where practical, implement measures to avoid harmful alteration, disruption or destruction of fish habitat resulting from the project footprint.</li> <li>• Select the appropriate watercourse crossing technique for the watercourse.</li> </ul>

**Table 8-27: Mitigation Strategies for Fish and Fish Habitat (cont'd)**

Potential Effect	Primary Mitigation Strategies
Suspended sediments	<ul style="list-style-type: none"> <li>● Implement erosion and sediment controls such as grading and ditching to direct runoff through silt fences, sediment traps, vegetation, berms or isolation areas as appropriate for the location. Monitor effectiveness of erosion controls through routine inspection.</li> <li>● Set back facilities and developed areas from waterbodies.</li> <li>● Install temporary erosion-control structures before spring breakup.</li> <li>● Install long-term erosion-control structures on slopes and stream banks, where required.</li> <li>● Install ditch plugs on open cut crossings of Active I channels and keep them in place if necessary until pipe installation is complete.</li> <li>● Reduce disturbances near watercourse banks when practical.</li> <li>● Reclaim, stabilize and armour banks as necessary following pipeline crossing installation.</li> <li>● Plan work to avoid delays between ditching, pipe installation and backfilling.</li> <li>● Use native backfill where spawning or overwintering habitat is present downstream, wherever practical.</li> <li>● Undertake watercourse crossing construction in winter, where practical, during periods of low or no flow.</li> <li>● Locate borrow sites away from waterbodies where practical.</li> </ul>
Channel blockage from frost bulb	<ul style="list-style-type: none"> <li>● Increase burial depth of pipeline or use insulation at Active I channel crossing locations that are susceptible to heave or frost bulb growth where fall spawning or overwintering fish habitat is present.</li> </ul>
Blockage of fish passage by access roads	<ul style="list-style-type: none"> <li>● Use clear span bridges on all-weather roads to cross Active channel I watercourses whenever possible.</li> <li>● Notch or remove ice and snow bridges before spring breakup to ensure flow is not impeded.</li> <li>● Design culverts or flumes on all-weather roads to provide fish passage.</li> </ul>
Water withdrawals	<ul style="list-style-type: none"> <li>● Source water from lakes and other waterbodies based on criteria established by the DFO Protocol dated June 2004, or as otherwise authorized.</li> <li>● Record the volume of water withdrawal and ensure volumes comply with regulatory requirements.</li> </ul>

**Table 8-27: Mitigation Strategies for Fish and Fish Habitat (cont'd)**

Potential Effect	Primary Mitigation Strategies
Change in surface water flow	<ul style="list-style-type: none"> <li>● Implement drainage controls such as grading and ditching to direct runoff through silt fences, sediment traps, vegetation, berms or isolation areas as appropriate for the location.</li> <li>● Set back facilities and developed areas from waterbodies.</li> <li>● Install long-term structures on slopes and watercourse banks, where required, that reduce runoff velocities.</li> <li>● Reduce the amount of impermeable area at facility and infrastructure sites.</li> <li>● Reduce disturbances near watercourse banks when practical.</li> <li>● Reclaim, stabilize and armour banks as necessary following pipeline crossing installation.</li> <li>● Develop and implement site-specific drainage and storm water management plans where required.</li> </ul>
Wastewater discharge	<ul style="list-style-type: none"> <li>● Release water to the watershed in a controlled manner such that the effects to the receiving waterbodies are reduced.</li> <li>● Ensure quality of discharge waters meets appropriate water quality discharge criteria.</li> <li>● Dispose of wastewater at approved locations when wastewater cannot be appropriately treated for release to the watershed.</li> </ul>
Spills	<ul style="list-style-type: none"> <li>● Implement management practices, contingency plans and emergency response plans to prevent and address leaks and spills.</li> <li>● Employ a leak-detection system.</li> <li>● Use environmentally acceptable hydraulic fluid in hydraulic systems of machinery working in water.</li> <li>● For fuel tanks &gt; 4,000 L, store fuel in either double-walled tanks or in single-walled tanks with secondary containment systems as required by regulations.</li> <li>● Set back storage sites for fuels, lubricating oils, chemicals or other hazardous materials at least 100 m from any body of water or protect from flooding, unless otherwise authorized.</li> <li>● For pipeline activities, wash, maintain and refuel vehicles at least 100 m from any waterbody unless otherwise authorized.</li> </ul>

**Table 8-27: Mitigation Strategies for Fish and Fish Habitat (cont'd)**

Potential Effect	Primary Mitigation Strategies
Use of explosives	<ul style="list-style-type: none"><li>• Follow the <i>Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters</i> (Wright and Hopky 1998) if in-water use of explosives is required.</li></ul>



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TITLE	<b>GSA Crown Lands Application for a Type A Land Use Permit</b>
SECTION	8: Environmental and Resource Effects
SUBJECT	3: Human Environment

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## INTRODUCTION

This subject contains a description for socio-economics, traditional culture, non-traditional land and resource use, protected areas and heritage resources aspects of the human environment in the GSA and is presented under the following headings:

- People and the Economy
- Infrastructure and Community Services
- Individual, Family and Community Wellness
- Traditional Culture
- Non-Traditional Land and Resource Use
- Protected Areas
- Heritage Resources

The purpose of the human environment section is threefold:

- to present the relevant and currently available information on the recent historic background and existing circumstances of the communities and people that might be affected by the project
- to identify and address the human environment effects of the project on the communities and region
- to identify measures to mitigate any potentially adverse effects

The first part of the human environment section describes the baseline for the study area, that is, existing conditions in the communities and region that might be affected by construction and operations. Knowledge of these conditions is essential to understanding how communities in the study area might experience project effects. This is followed by an analysis of the relevant indicators and descriptions of the various project human environment effects, after general mitigation measures have been applied.

Forecasting changes the project will induce in baseline conditions will generate both adverse and positive effects. The effects of a project-induced substantial increase in income are an example. The extra income might be saved, invested or spent by individuals to improve their standard of living and family well-being, or might be spent on socially disruptive or destabilizing behaviour. In addition to this element of individual choice, the overall importance of many potential effects

depends on the attitudes and perceptions of affected communities, groups and individuals.

Complicating the process further is the combined effects of many project components on one component of the human environment. In fact, most human environment effects are, by nature, combined effects, because causality is not often clear enough to determine which component or activity results in what effect.

Because of the combined effects, and the complex and dynamic nature of human environment effects, that is, individual attitude and choice, the challenge continues beyond assessment to mitigation, or perhaps more appropriately, management, measures. The analysis assumes both an existing best practice management framework, and proposed new or enhanced mitigation measures. These are integrated with various project plans, agreements and programs relating to human environment issues and effects, such as:

- benefits plans relating to Canada
- benefits and access agreements with First Nations
- the proposed agreements between Imperial and the GNWT

The nature, scope and magnitude of many expected project-related human environment effects, will require management plans and programs addressing these effects to have a coordinated and collaborative response from:

- Imperial
- Aboriginal, territorial and federal government agencies
- affected communities and individuals

Most human environment effects are expressed as marginal changes in levels of existing conditions that involve many issues directly influenced by individual, community and government decisions and that are linked to public service delivery. As a result, these human environment effects cannot be managed by Imperial's decisions and actions alone, and are presented in a manner that reflects the shared responsibility focus of the mitigation measures.

For each subject area, mitigation measures are presented that reflect the complex and inter-related causes of effects and the requirement for shared responsibility in addressing them. The mitigation measures show the interfaces among parties where choices and decisions can be made to:

- share responsibility
- show the need for cooperative management among regulators, communities and affected people

- identify specific actions that could be taken

The results of these management actions are expressed as residual effects in the Assessment and Management part of the human environment subject.

## Human Environment Setting

This topic contains a description of the setting for socio-economics, traditional culture, non-traditional land and resource use, protected areas and heritage resources aspects of the human environment in the GSA. It provides information on Inuvik and the communities of Fort McPherson and Tsiigehtchic. Information on the Gwich'in community in Aklavik is included in Imperial's land use permit and water licence applications for the ISR.

The regional trends reflected in this topic generally apply to the GSA communities, although some community-specific trends are also addressed.

## People and the Economy

The GSA includes the regional commercial and administrative centre of Inuvik, which is ethnically mixed, and the smaller and largely Aboriginal communities of Fort McPherson and Tsiigehtchic. The 2003 estimated population of the GSA communities was 4,450, including a total of 3,435 in Inuvik (Table 8-28). Census data for 1991 and 2001 showed a 10% decline in population for Inuvik, little change in Fort McPherson and a 35% increase in Tsiigehtchic.

**Table 8-28: Census Counts and Population Estimates for the Gwich'in Communities**

Location	Census Population				Growth 1991-2001 (%)	2003 Estimated Population (No.) <sup>a</sup>
	1986	1991	1996	2001		
Northwest Territories	33,830	36,405	35,370	37,360	3	41,872
GSA total	4,257	4,109	4,336	3,850	-6	4,450
Inuvik	3,389	3,206	3,296	2,894	-10	3,435
Fort McPherson	760	759	878	761	1	808
Tsiigehtchic	108	144	162	195	35	207
NOTE: <sup>a</sup> Estimates were calculated by the GNWT Bureau of Statistics by allocating both death and mobility data at the community level, using information from a variety of sources.						
SOURCE: GNWT Bureau of Statistics (2003c, 2004a)						

Census data for 2001 indicated that 90% or more of the Fort McPherson and Tsiigehtchic populations were Aboriginal (mostly Dene). In Inuvik, only 59% of

the population was Aboriginal – largely Inuit, with fewer Gwich'in Dene (Table 8-29).

**Table 8-29: Ethnicity in the Gwich'in Communities (2001 Census)**

Location	Total Population (No.)	Non-Aboriginal (%)	Aboriginal (%)	Aboriginal Components (Total = 100%) <sup>b</sup>				
				Inuit (%)	Dene (%)	Métis (%)	Multiple (%)	Other Aboriginal (%)
NWT	37,360	50	50	21	57	19	1	2
Inuvik	2,894	41	59	65	26	9	1	3
Fort McPherson	761	7	93	2	75 <sup>a</sup>	6	4	6 <sup>a</sup>
Tsiigehtchic	195	8	90	6	66	14	9	6

NOTE:  
<sup>a</sup>Estimated, as the 25% figure given in the Census data for other Aboriginal is incorrect (too large).  
<sup>b</sup>Not all percentages add up to 100% due to rounding.

SOURCE: GNWT Bureau of Statistics (2003d)

Table 8-30 shows data for the relative participation, employment and unemployment rates of males and females, and the differential changes in these rates between 1991 and 2001. The data shows, generally, that for the Aboriginal communities, the employment rates of both males and females increased between 1991 and 2001, the participation rates fell somewhat for males and increased somewhat for females, and the unemployment rate fell for males, with little change for females.

**Table 8-30: Participation, Employment and Unemployment in the Gwich'in Communities**

Location <sup>f</sup>	Gender	1991 <sup>g</sup>				2001 <sup>g</sup>				Difference (2001 minus 1991)		
		Pop. (No.) <sup>a</sup>	Part. (%) <sup>b</sup>	Empl. (%) <sup>c</sup>	Unempl. (%) <sup>d</sup>	Pop. (No.)	Part. (%)	Empl. (%)	Unempl. (%)	Part. (%)	Empl. (%)	Unempl. (%)
NWT	Male	13,540	83	73	12	13,810	80	72	10	-3	-1	-2
	Female	12,145	73	65	10	13,130	74	67	8	1	2	-2
NWT Aboriginal communities <sup>e</sup>	Male	2,425	73	54	27	2,470	66	52	23	-7	-2	-4
	Female	2,010	59	46	22	2,225	58	48	17	-1	2	-5
GSA total	Male	1,555	81	68	15	1,375	78	72	9	-3	4	-6
	Female	1,375	72	64	11	1,355	71	65	9	-1	1	-2
GSA Aboriginal communities total	Male	305	69	42	34	335	61	49	22	-8	7	-12
	Female	275	56	47	19	325	60	51	18	4	4	-1

**Table 8-30: Participation, Employment and Unemployment in the Gwich'in Communities (cont'd)**

Location <sup>f</sup>	Gender	1991 <sup>g</sup>				2001 <sup>g</sup>				Difference (2001 minus 1991)		
		Pop. (No.) <sup>a</sup>	Part. (%) <sup>b</sup>	Empl. (%) <sup>c</sup>	Unempl. (%) <sup>d</sup>	Pop. (No.)	Part. (%)	Empl. (%)	Unempl. (%)	Part. (%)	Empl. (%)	Unempl. (%)
Inuvik	Male	1,235	84	74	11	1,040	84	79	6	0	5	-5
	Female	1,100	75	68	10	1,030	75	70	7	0	2	-3
Fort McPherson	Male	270	68	43	35	270	59	46	22	-9	3	-13
	Female	235	58	47	15	265	60	49	16	2	2	1
Tsiigehtchic	Male	50	70	40	29	65	69	62	22	-1	22	-7
	Female	40	50	50	50	60	58	58	29	8	8	-21

## NOTES:

<sup>a</sup>Pop.-population<sup>b</sup>Part.-participation rate, which is the percentage of population, aged 15 years and older in the labour force<sup>c</sup>Empl.-employment rate, which is the percentage of population, aged 15 years and older employed during the week before the survey<sup>d</sup>Unempl.-unemployment rate, which is the percentage of the labour force that was unemployed during the week before the survey<sup>e</sup>All study area communities in the Northwest Territories except Inuvik, Norman Wells, Yellowknife, Hay River and Enterprise<sup>f</sup>Statistics for very small communities are uncertain and should be considered with caution.<sup>g</sup>Because census data is independently randomly rounded (all numbers end in a 5 or 0), totals might not add to 100, especially in small communities.

SOURCE: Statistics Canada (1991, 2001)

Male and female participation rates both declined in the GSA between 1991 and 2001, by 3.0% among males and 1.0% among females. The male decline was seen predominantly in Fort McPherson. Inuvik females experienced a 5.0% decline, whereas the participation rates of Fort McPherson and Tsiigehtchic females increased somewhat.

Positive trends are evident in data on employment and unemployment rates for the Gwich'in Aboriginal communities. While there is no clear pattern in the participation rate, the employment rates increased and the unemployment rates decreased between 1991 and 2001 in the Aboriginal communities, but the employment rate in Inuvik decreased (Table 8-31). The unemployment rate decreased markedly after 1994 (GNWT Bureau of Statistics 1999, 2002a). Comparisons between 1991 and 2001 census data suggest that females over age 15 are becoming a larger component of the labour force, especially in the two smaller Aboriginal communities (Statistics Canada 2003).

In the GSA, there is substantial representation in management and business, sales and service, and trades and transport occupations (Table 8-31). The proportion employed in clerical, and processing and manufacturing occupations declined

between 1991 and 2001, whereas employment in management and business, and government service occupations increased. There are essentially no differences between the occupational distributions for the GSA and the Northwest Territories, probably because Inuvik dominates the GSA distribution.

**Table 8-31: Labour Force by Standard Occupational Categories in the Gwich'in Communities**

Occupation <sup>a,b</sup>	Gender	Northwest Territories		GSA Total		Gwich'in Aboriginal Communities		Inuvik		Fort McPherson		Tsiigehtchic	
		1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001
Labour force, 15+ years	Total (No.)	20,070	20,785	2,180	2,045	370	400	1,810	1,645	315	320	55	88
	Male (No.)	11,225	11,115	1,215	1,085	220	210	995	875	185	160	35	50
	Female (No.)	8,845	9,670	965	960	150	190	935	770	130	160	20	38
All occupations	Total (No.)	19,675	20,425	2,155	2,015	360	385	1,795	1,630	305	305	55	80
	Male (No.)	11,030	10,935	1,200	1,075	205	205	995	870	175	160	30	45
	Female (No.)	8,645	9,490	955	955	205	205	800	765	130	150	25	40
Management, business, finance and administration occupations	Total (%)	18	21	17	23	7	19	19	23	8	18	0	25
	Male (%)	19	19	18	20	7	15	21	21	9	13	0	22
	Female (%)	16	24	15	11	6	11	17	26	8	7	0	25
Clerical occupations	Total (%)	17	9	16	9	13	4	17	10	11	5	18	0
	Male (%)	6	3	5	5	0	5	6	5	0	6	0	0
	Female (%)	32	16	32	8	39	8	31	17	27	10	100	0
Natural and applied sciences, and related occupations	Total (%)	4	7	3	6	0	5	3	6	0	3	0	13
	Male (%)	6	11	4	9	0	10	5	9	0	6	0	22
	Female (%)	1	3	1	5	0	5	1	3	0	7	0	0
Health occupations	Total (%)	3	4	4	5	0	3	5	6	0	3	0	0
	Male (%)	1	1	2	2	0	5	2	2	0	6	0	0
	Female (%)	6	7	7	0	0	0	9	10	0	0	0	0
Social services, education, government service and religious occupations	Total (%)	9	12	8	13	8	17	8	12	10	16	0	19
	Male (%)	6	7	5	6	5	0	6	7	6	0	0	0
	Female (%)	14	17	12	26	13	26	12	16	15	27	0	25

**Table 8-31: Labour Force by Standard Occupational Categories in the Gwich'in Communities (cont'd)**

Occupation <sup>a,b</sup>	Gender	Northwest Territories		GSA Total		Gwich'in Aboriginal Communities		Inuvik		Fort McPherson		Tsiigehtchic	
		1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001
Art, culture, recreation and sport occupations	Total (%)	2	2	2	2	0	0	2	2	0	0	0	0
	Male (%)	2	2	2	1	0	0	2	1	0	0	0	0
	Female (%)	2	3	2	0	0	0	2	3	0	0	0	0
Sales and service occupations	Total (%)	18	22	19	21	15	23	19	20	18	25	0	19
	Male (%)	15	18	14	16	5	12	16	17	6	16	0	0
	Female (%)	23	27	25	32	29	32	24	24	35	33	0	25
Trades, transport and equipment operators, and related occupations	Total (%)	16	17	18	19	19	25	18	17	20	23	18	31
	Male (%)	27	30	30	34	34	41	29	33	34	38	33	56
	Female (%)	2	2	3	5	0	5	4	1	0	7	0	0
Occupations unique to the primary industry	Total (%)	5	4	4	3	19	5	1	2	20	7	18	0
	Male (%)	8	8	6	4	29	7	1	3	29	9	33	0
	Female (%)	1	1	1	0	6	0	0	1	8	0	0	0
Occupations unique to the processing, manufacturing and utilities industries	Total (%)	4	1	5	1	6	3	4	1	7	3	0	0
	Male (%)	7	2	7	2	5	5	7	1	6	6	0	0
	Female (%)	1	0	2	0	6	0	1	0	8	0	0	0
Occupations not classified elsewhere	Total (%)	3	0	2	0	3	0	2	0	3	0	0	0
	Male (%)	4	0	4	0	5	0	4	0	6	0	0	0
	Female (%)	1	0	0	0	0	0	0	0	0	0	0	0

NOTES:  
<sup>a</sup>Number and percentage of population, aged 15 years and older  
<sup>b</sup>Because census data is independently randomly rounded (all numbers end in a 5 or 0), totals might not add to 100, especially in small communities.

SOURCE: Statistics Canada (1991, 2001), prepared by GNWT Bureau of Statistics

The 2001 gender comparisons for standard occupational categories for the Gwich'in total and Gwich'in Aboriginal communities present very similar patterns. In both, females are generally under-represented in management and business, science, trades and transport, and primary industry occupations. They are over-represented in clerical, sales and service, and various government service occupations. Female representation increased between 1991 and 2001 in

management and business, government service, and trades and transport occupations. Their involvement in clerical, management and business, and health occupations declined.

Data for 1999 showed that the potential labour supply (those unemployed, and those not in the labour force but who are looking for work) was 32% of the working-age population in the GSA Aboriginal communities. The profile of this potential labour supply indicated that 83% said they needed training. In Inuvik, the potential labour supply was only 14% of the working-age population (Table 8-32).

**Table 8-32: Profile of Working Age Population in the Gwich'in Communities (1999)**

Profile Category	NWT Aboriginal Communities <sup>a</sup>	GSA Total	Inuvik	Gwich'in Aboriginal Communities	Fort McPherson	Tsiigehtchic
Population 15+ (No.)	5,821	3,078	2,347	731	628	103
Potential labour supply (No.)	1,797	568	336	232	199	33
Potential labour supply <sup>b</sup> (%)	31	18	14	32	32	32
Need training <sup>c</sup> (%)	53	59	52	83	83	82
Would do rotational <sup>c</sup> (%)	73	55	47	81	83	67
Male <sup>c</sup> (%)	60	52	51	54	57	27
Aboriginal <sup>c</sup> (%)	94	86	81	99	99	100
Less than high school <sup>c</sup> (%)	68	59	57	67	69	58
NOTES:						
<sup>a</sup> All study area communities in the Northwest Territories, except Inuvik, Norman Wells, Fort Simpson, Yellowknife, Hay River and Enterprise						
<sup>b</sup> Percentage of population, aged 15 years and older						
<sup>c</sup> Percentage of potential labour force						
SOURCE: Calculated using GNWT Bureau of Statistics (1999)						

Average employment income in Inuvik in 2001 was over \$39,000 per year (Table 8-33). The corresponding figure for Fort McPherson was just under \$24,000 per year and for Tsiigehtchic slightly over \$20,000 per year. Average personal income grew from 1996 to 2001 in both Inuvik and Fort McPherson.

The cost of living in the GSA was about 50% higher than in Edmonton in 2001. In 2001, food prices in the GSA were 47% higher than in Yellowknife (GNWT Bureau of Statistics 2004b).

**Table 8-33: Employment Income and Income Support Beneficiaries in the Gwich'in Communities**

Location	Average Employment Income <sup>d</sup>			Number of Income Support Beneficiaries <sup>a</sup>			
	1996 (\$) <sup>e</sup>	1999 (\$) <sup>e</sup>	2001 (\$)	1996 (No. /1,000) <sup>e</sup>	1999 (No. /1,000) <sup>e</sup>	2001 (No. /1,000) <sup>e</sup>	2003 (No. /1,000)
Northwest Territories	33,748	35,450	38,497	102	86	59	51
NWT Aboriginal communities <sup>b</sup>	22,228	23,551	26,135	-	-	-	90
GSA total <sup>c</sup>	30,794	32,806	36,021	123	125	64	51
Inuvik	33,220	35,656	39,125	103	102	60	50
GSA Aboriginal communities	20,872	20,014	23,123	185	193	76	62
Fort McPherson	20,872	20,014	23,700	194	193	79	52
Tsiigehtchic	-	-	20,443	138	194	63	48

NOTES:  
<sup>a</sup>Average monthly number of recipients and dependents per 1,000 population, calculated based on population estimates for 1996 to 2002 (prepared by GNWT Bureau of Statistics)  
<sup>b</sup>Does not include data for Sachs Harbour.  
<sup>c</sup>GSA totals do not include Tsiigehtchic for 1996 and 1999.  
<sup>d</sup>Dollar amounts not adjusted for inflation.  
<sup>e</sup>A hyphen indicates data not available, or held confidential because of low frequencies

SOURCES: GNWT Bureau of Statistics (2002a, 2003f)

### Physical Infrastructure and Community Services

This section describes physical infrastructure and community services of the GSA.

Inuvik serves as the transportation hub for Fort McPherson and Tsiigehtchic. Inuvik has scheduled flights, the all-weather, but seasonally restricted, Dempster Highway and barge-based resupply in the summer (Table 8-34). Fort McPherson and Tsiigehtchic have an all-weather highway connection to the south with seasonal restrictions.

In addition to the highway connections, Fort McPherson and Tsiigehtchic have scheduled seasonal air service with Inuvik during breakup and freezeup. All three Gwich'in communities have marine resupply. There is no bus or rail service to any of these communities.

Water, and liquid and solid waste disposal services are available in the Gwich'in communities. Inuvik and part of Fort McPherson have piped water and sewage service. In Tsiigehtchic, water is delivered to households by truck and liquid waste disposal by pumpout from a holding tank or by "honey bags" for which there is scheduled pickup (MACA 2002). Power in Inuvik is supplied by natural

gas and diesel-fuelled generators, whereas there are only diesel-fuelled generators in Fort McPherson and Tsiigehtchic (Northwest Territories Power Commission 2002). The main heating fuel is P-50 fuel oil. However, Inuvik also uses locally supplied natural gas from the Ikhil gas field about 50 km north of the town.

All of the GSA communities have telephone, television, radio and newspapers, as well as publicly accessible Internet connections and microwave transmission systems (MACA 2002).

**Table 8-34: Transportation Infrastructure in the Gwich'in Communities (2001)**

Transportation Mode	Inuvik	Fort McPherson	Tsiigehtchic
<b>Road</b>			
Road access	All-weather road, seasonally restricted	All-weather road, seasonally restricted	All-weather road, seasonally restricted
Average daily traffic (No. of vehicles)	2001 = 1,120 2000 = 1,120	2001 = 80 2000 = 80	2001 = 80 2000 = 80
Highway	Dempster Highway No. 8	Dempster Highway No. 8	Dempster Highway No. 8
Road surface	Paved, dust-controlled gravel, untreated gravel	Paved, dust-controlled gravel, untreated gravel	Paved, dust-controlled gravel, untreated gravel
Typical opening and closing dates (1997-2000), winter roads and ice bridges	November 28 to April 29	November 13 to May 1	November 13 to May 1
<b>Rail</b>			
Rail access	None	None	None
<b>Water<sup>a</sup></b>			
Marine resupply deliveries per week	7	None	None
Ownership of facility	T, P	P	T
Resupply facility classification	A	C	C
Small boating facilities	Jet float dock, private docks, boat launch	Beach landings	Jet float dock, steel frame dock
<b>Air<sup>b</sup></b>			
Runway length	1,829 m	1,067 m	-
Runway surface	Asphalt	Gravel	-
Owner	GNWT	GNWT	-

**Table 8-34: Transportation Infrastructure in the Gwich'in Communities (2001)  
(cont'd)**

Transportation Mode	Inuvik	Fort McPherson	Tsiigehtchic
Air (cont'd)			
Largest aircraft able to use runway	B737	Dornier 228	-
Weather and communication type	FSS	CARS	-
Navigational aids	ILS, DME, NDB	NDB	-
<p>NOTES:</p> <p><sup>a</sup>Water Transportation is designated by the following letters:</p> <ul style="list-style-type: none"> <li>• T-facility owned by federal government</li> <li>• P-privately owned</li> <li>• AIR&gt;10,000 t cargo and fuel in and out per year, protected access at all water levels, secure moorage for loading and unloading, access for heavy equipment, secure marshalling and storage site</li> <li>• CPI&lt;2,000 t cargo and fuel in and out per year, access for loading and unloading 4 hours/day, access for heavy equipment, secure marshalling and storage site</li> </ul> <p><sup>b</sup>Air Transportation is designated with the following letters:</p> <ul style="list-style-type: none"> <li>• CARS-community airport radio station</li> <li>• DME-distance measuring equipment</li> <li>• FSS-flight service station</li> <li>• ILS-instrument landing system</li> <li>NDB-nondirectional beacon</li> </ul>			
SOURCE: GNWT Transportation (1995, 2000, 2001)			

Table 8-35 shows that the percentages of households needing major repairs in Fort McPherson and Tsiigehtchic are considerably higher than in the Northwest Territories as a whole, and Inuvik is just above the territorial average. The number of people per household is declining in Inuvik and Fort McPherson, but the reverse is true in Tsiigehtchic (Statistics Canada 2003, Northwest Territories Housing Corporation 2000).

Homelessness is a concern in Inuvik, where some spend rent money on substance or gambling addictions (Inuvik Housing Authority personnel 2002, personal communication). Current economic growth conditions in the Mackenzie Delta have created a housing shortage in Inuvik. The director of the Inuvik Housing Authority reported a severe housing shortage there in 2002 because of the economic growth conditions. The vacancy rate was 0% and rental costs increased from \$200 to \$500 per month within the first few months of 2002. This is a hardship for those with fixed incomes or who do not own their own homes. Fort McPherson and Tsiigehtchic do not have these problems.

**Table 8-35: Housing and Repairs Needed in the Gwich'in Communities (2001)**

Location	Total Houses (No.)	Needs Regular Maintenance <sup>a,d</sup> (%)	Needs Minor Repairs <sup>b,d</sup> (%)	Needs Major Repairs <sup>c,d</sup> (%)
Northwest Territories	12,565	52	32	16
Inuvik	1,015	45	36	18
Fort McPherson	240	54	27	21
Tsiigehtchic	60	50	17	25
NOTES:				
<sup>a</sup> Regular maintenance refers to such conditions as requiring painting or furnace cleaning.				
<sup>b</sup> Minor repairs refers to such conditions as missing or loose floor tiles, brick or shingles, or to defective steps, railing or siding.				
<sup>c</sup> Major repairs refers to such conditions as defective plumbing or electrical wiring, or structural repairs to walls, floors or ceilings.				
<sup>d</sup> Not all percentages add up to 100% due to rounding.				
SOURCE: Statistics Canada (2003)				

### Individual, Family and Community Wellness

This section describes the study area in terms of the concept of community wellness. Community wellness refers to the physical, emotional, social and economic well-being of all components of a community, including individuals and families as a functioning whole.

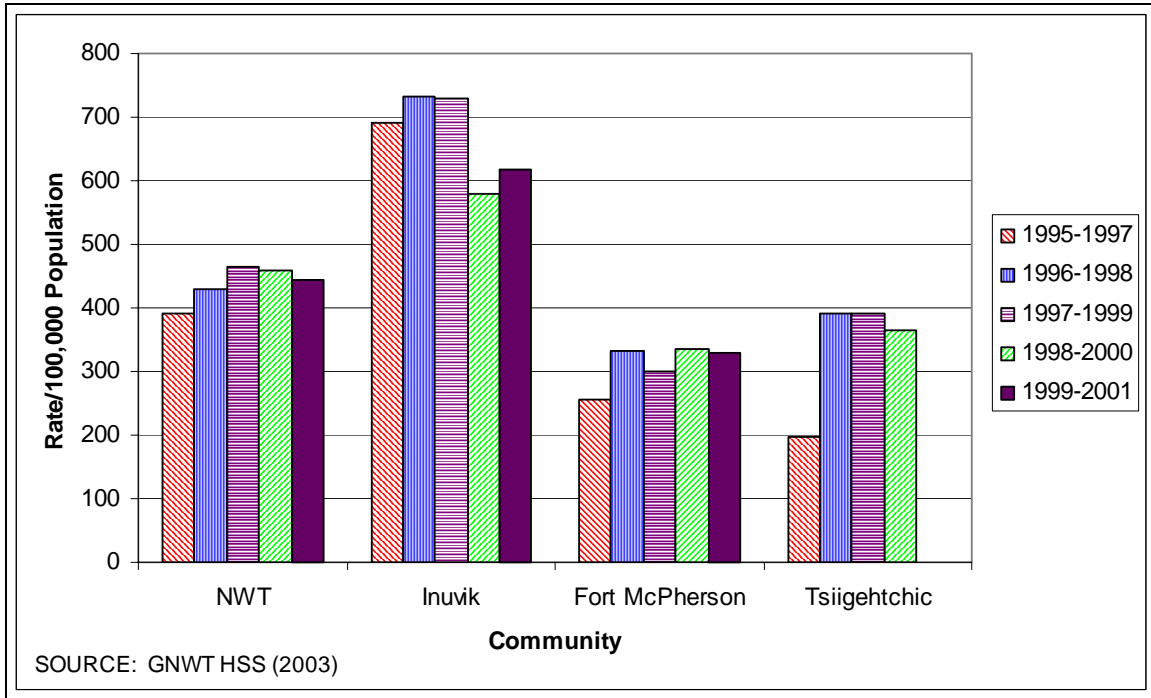
#### Community Well-Being and Delivery of Social Services

Alcohol abuse is reported by RCMP and social service personnel to be a factor in most of the problems they deal with. The hospitalization data in [Figure 8-4](#) for Inuvik, averaged twice the rates for Fort McPherson and was above the territorial level. However, the Inuvik rates, unlike those for Fort McPherson, are tending to decline.

The alcohol-related offence rate in Inuvik exceeded that for Fort McPherson, in part because Inuvik is the location of the local liquor store. The Inuvik rate decreased from 1997 to 2001, whereas the offence rates for Fort McPherson increased. After 2000, the rate for drug offences decreased in Inuvik. A sustained increase was evident in Fort McPherson between 1997 and 2001 (RCMP local detachments 2002).

The rates of spousal assaults in Inuvik were generally above the rates for the other study area regions in the Northwest Territories (RCMP local detachments 2002).

Between 1997–1998 and 2002–2003, the number of children taken into care in both Fort McPherson and Inuvik increased steadily, with the Fort McPherson rate twice that of Inuvik by 2002–2003 (HSS 2003).

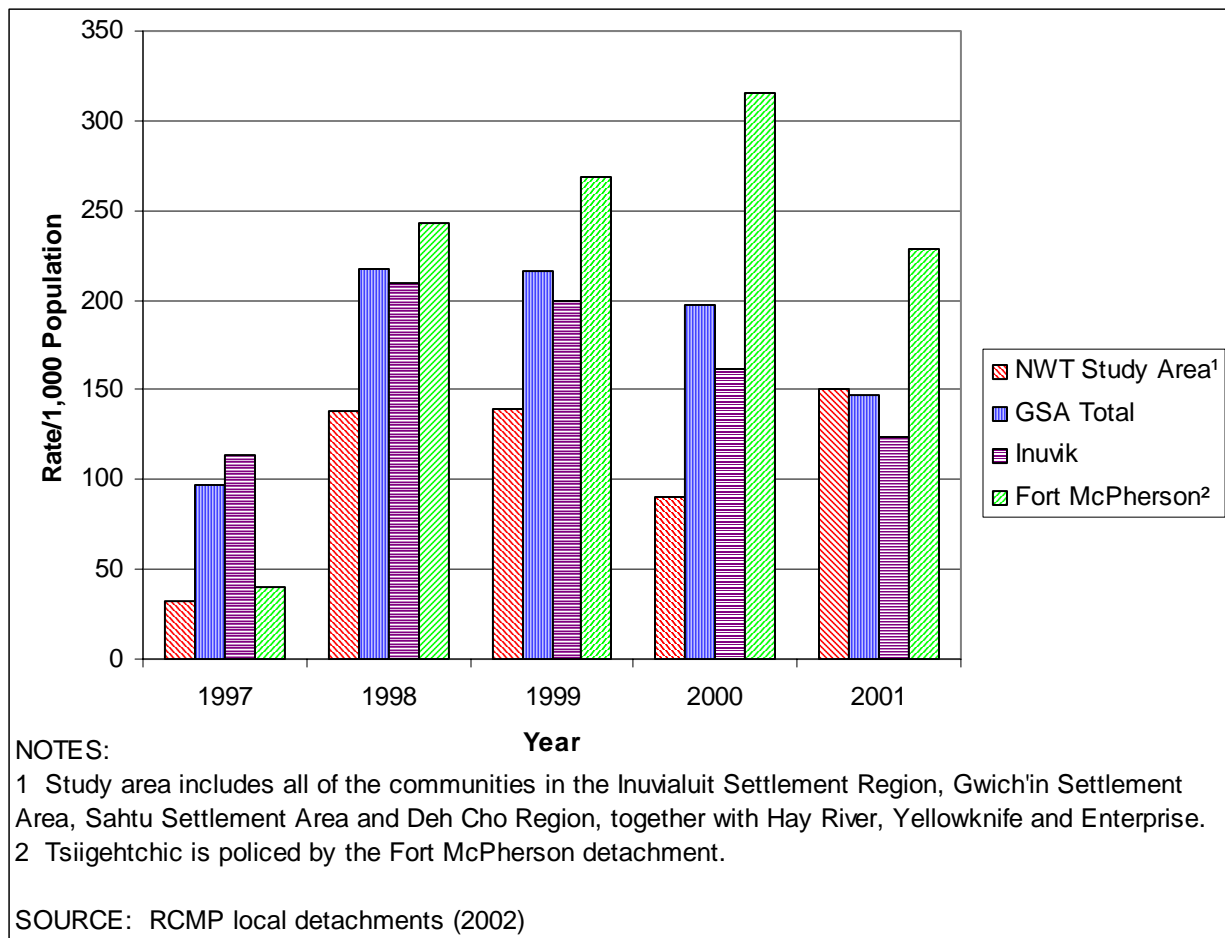


**Figure 8-4: Rates of Hospitalization for Alcohol-Related Illnesses in the Northwest Territories and Gwich'in Communities**

*Young Offenders Act* offence rates rose between 1998 and 1999 in the GSA, fell until 2001 and then rose again. The rates for Fort McPherson were higher than for Inuvik in every year but 1997 (Figure 8-5).

Violent crime and property crime rates fell in Inuvik between 1997 and 2000, as did property crimes in Fort McPherson. Rates of violent crimes in Fort McPherson were inconsistent during this period (GNWT Bureau of Statistics 2003b).

The executive director of the Northwest Territories Seniors' Society reported that Elder abuse is an issue in the Northwest Territories (Northwest Territories Seniors' Society executive director 2002, personal communication). A toll-free hotline received over 800 calls during 2001 from all over the Northwest Territories, reporting abuse and other seniors' problems.



**Figure 8-5: Young Offenders Act Offences in the Gwich'in Communities**

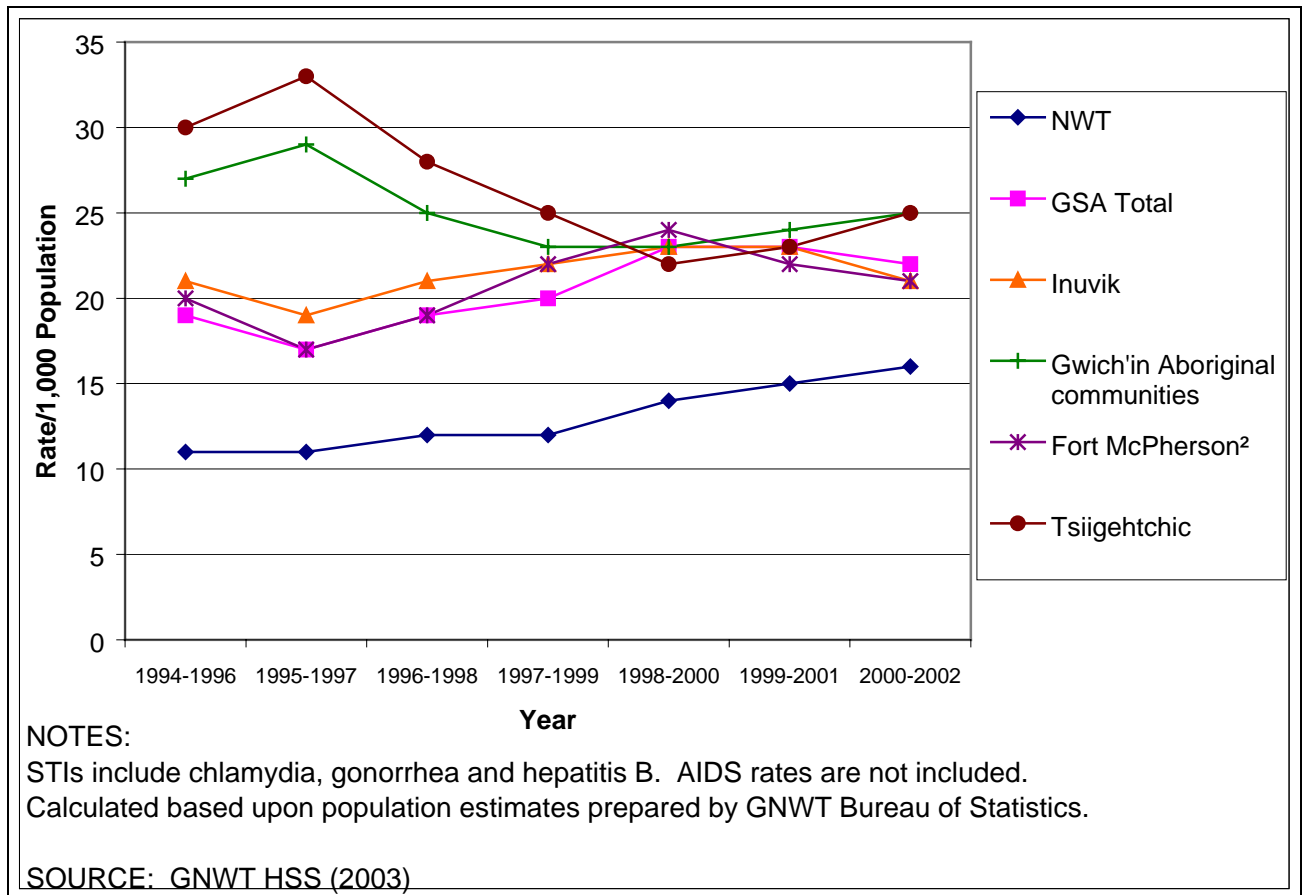
**Health Conditions and Health Care Services**

Among the health concerns in the North including the GSA are smoking, sexually transmitted infections (STIs), babies with fetal alcohol syndrome and fetal alcohol effects (FAS/FAE) and higher incidents of diabetes.

Smoking, whether directly inhaled or second-hand, is recognized as being a major cause of illness and death. The smoking rate among adults was 53% in Inuvik, 59% in Fort McPherson and 65% in Tsiigehtchic in 1999. The Northwest Territories-wide rate was 42% (GNWT Bureau of Statistics 1999). The Northwest Territories Workers' Compensation Board banned smoking in all work places on May 1, 2004, and many municipalities had restricted smoking before this legislation.

Available three-year averaged data for physician treatments show that the Inuvik rate of respiratory diseases (628 per 1,000 population for 2000-2002) is well in excess of the territorial rate (481 per 1,000 population) (HSS 2003).

Three-year average rates for STIs, for both sexes and all ages, in Inuvik were distinctively higher than the Northwest Territories rate. Since 1994–1996, rates in Inuvik and Fort McPherson stayed basically the same, and the rate in Tsiigehtchic decreased, unlike the Northwest Territories rate, which increased (Figure 8-6).



**Figure 8-6: Sexually Transmitted Infections in the Gwich'in Communities**

An inevitable consequence of alcohol abuse among females is the substantial and possibly growing number of babies with FAS/FAE. There are currently no statistics on FAS/FAE babies in the Northwest Territories.

Data for physician treatment of infectious and parasitic diseases indicate that all three GSA communities tend to experience rates that are well below territorial levels (HSS 2003).

Accidental injury and death rates are elevated in Aboriginal communities. The 1994 to 1998 average rates per 1,000 population of accidental deaths because of injuries were lower for Inuvik and Fort McPherson than for the Northwest Territories as a whole. For 1994 to 1998, an average of 19% of deaths were

accidental in Inuvik and 33% of deaths were accidental in Fort McPherson (GNWT Bureau of Statistics 2003a).

The suicide rate in 1999 for the Gwich'in communities, 18 per 100,000 population, was 50% higher than the Northwest Territories as a whole, 12 per 100,000 population (GNWT Bureau of Statistics 2001a). Suicide is a major and growing concern in the Northwest Territories, both because the incidence of suicide is so high relative to the rest of Canada, and because so many are teenage suicides.

Data since the late 1990s show that the rates of mental disorders treated by physicians were lower in the GSA communities than in the Northwest Territories as a whole (HSS 2003). Within the GSA, the rates tended to be highest in Inuvik, next highest in Fort McPherson and lowest in Tsiigehtchic. In recent years, reductions have been evident in all three communities.

Health care services for the Gwich'in communities are served by the Inuvik Regional Health and Social Services Authority (IRHSSA). The Authority runs the Inuvik Regional Hospital, a new facility that opened in 2003, and a public health unit. Social services typically include child protection and foster care, income support, mental health, and addictions counselling. A family violence shelter in Inuvik serves those who come as walk-ins or from other communities. Air ambulances are stationed in Inuvik to ensure speedy response to medical emergencies in the other communities. Fort McPherson and Tsiigehtchic have health centres (HSS 2004). Services that are not available from the IRHSSA might be sought in Yellowknife or outside the Northwest Territories, upon referral of IRHSSA staff.

### **Public Safety and Protection Services**

There are RCMP detachments in Inuvik and Fort McPherson. The Inuvik RCMP detachment consists of 12 officers. The Fort McPherson detachment of five officers is also responsible for policing Tsiigehtchic.

Inuvik has a professional fire chief and a volunteer firefighter unit, whereas Fort McPherson and Tsiigehtchic have volunteer fire departments. All three communities have current emergency plans (GNWT Municipal and Community Affairs 2002).

### **Education Attainment and Services**

Between 1994 and 2001, the proportion of the adult population with high school graduation was essentially unchanged in each community, as in the Northwest Territories as a whole. The graduation rate in Inuvik was 71% in 2001. Increasing percentages of Inuvik, Fort McPherson and Tsiigehtchic residents received post-secondary training (GNWT Bureau of Statistics 2003e).

Table 8-36 shows gender differences in the highest educational attainment in the Gwich'in communities in 2001. This data shows that in the total GSA, as in the study area Aboriginal communities as a whole, more females than males were high school graduates. However, this was not the case in Tsiigehtchic, the smaller GSA Aboriginal community.

The highest proportion of students with post-secondary education, including trades, technical, college and university training, are found in Inuvik, where the rates for males and females are identical, at 61%. Fort McPherson males and Tsiigehtchic females had the lowest rates, at 30% and 33%. Note that in such small communities, better educated community members might have left the community to access better employment opportunities elsewhere. On the other hand, predominantly non-Aboriginal service delivery persons, such as teachers, nurses, RCMP and some managers, comprise greater percentages of the total in small communities than in larger ones, thus possibly elevating rates of post-secondary training.

**Table 8-36: Education Attainment in the Gwich'in Communities (2001)**

Location <sup>b</sup>	Gender	High School Graduate (%)	Some Post-Secondary Trades Training (%)	Some College or University Education (%)	Some Trades Training, College or University (%)
NWT	Males	64	30	26	56
	Females	66	22	34	56
NWT Aboriginal communities total <sup>a</sup>	Males	43	25	11	37
	Females	44	20	18	38
GSA total	Males	62	33	22	55
	Females	65	26	29	55
GSA Aboriginal communities total	Males	39	24	12	36
	Females	42	22	15	37
Inuvik	Males	70	36	25	61
	Females	72	28	33	61
Fort McPherson	Males	38	19	11	30
	Females	77	40	27	67

**Table 8-36: Education Attainment in the Gwich'in Communities (2001) (cont'd)**

Location <sup>b</sup>	Gender	High School Graduate (%)	Some Post-Secondary Trades Training (%)	Some College or University Education (%)	Some Trades Training, College or University (%)
Tsiigehtchic	Males	46	46	15	62
	Females	33	17	17	33

NOTES:  
<sup>a</sup>All communities in the Northwest Territories study area except Inuvik, Norman Wells, Fort Simpson, Yellowknife, Hay River and Enterprise  
<sup>b</sup>Percentages frequently do not sum to 100 for two cumulating reasons: Statistics Canada random rounding of frequencies, and small community populations

SOURCE: GNWT Bureau of Statistics (2001b)

By 2004, all the Gwich'in communities had Kindergarten to Grade 12 schools. All of the schools had substantial excess capacity (Table 8-37).

The Inuvik Aurora College campus offers a wide range of diploma and certificate courses and programs. Adult basic education and career development courses are provided at the community learning centres in Fort McPherson and Tsiigehtchic in response to effective demand.

**Table 8-37: School Profile Data for the Gwich'in Communities**

Location	School	Budgeted Full-Time Equivalent <sup>a</sup>				Grades Offered <sup>b</sup>	School Capacity <sup>b</sup>	Enrolment <sup>b,c</sup>	Utilization <sup>b</sup>
		Teachers (No.)	Support Staff (No.)	Admin. Staff (No.)	Other Staff (No.)				
Inuvik	Inuvik total	61	12	8	9	K to 12	1,276	799	63
	Samuel Hearne	29	-	-	-	7 to 12	682	361	53
	Sir Alexander Mackenzie	32	-	-	-	K to 6	594	438	74
Fort McPherson	Chief Julius	14	3	0	3	K to 12	350	220	63

**Table 8-37: School Profile Data for the Gwich'in Communities (cont'd)**

Location	School	Budgeted Full-Time Equivalents <sup>a</sup>				Grades Offered <sup>b</sup>	School Capacity <sup>b</sup>	Enrolment <sup>b,c</sup>	Utilization <sup>b</sup> (%)
		Teachers (No.)	Support Staff (No.)	Admin. Staff (No.)	Other Staff (No.)				
Tsiigehtchic	Chief Paul Niditchie	3	2	0	1	K to 12	88	45	51

NOTES:  
<sup>a</sup>2002 data  
<sup>b</sup>April 2004 data  
<sup>c</sup>Enrolment data is full-time equivalents, with two children attending Kindergarten counted as one higher-grade enrolment because kindergarten programs are half-day programs. GNWT Education, Culture and Employment typically anticipates planning for new space when a school reaches a capacity of about 85%. However, this might be misleading as the GNWT applies a space formula to older schools (not designed to the same criteria) that was designed for new schools. Older schools have larger entrances and hallways, which results in increased space, some of which is not useable and functional space.  
<sup>o</sup>K-Kindergarten

SOURCE: GNWT Education, Culture and Employment (2002, 2004)

### Traditional Culture

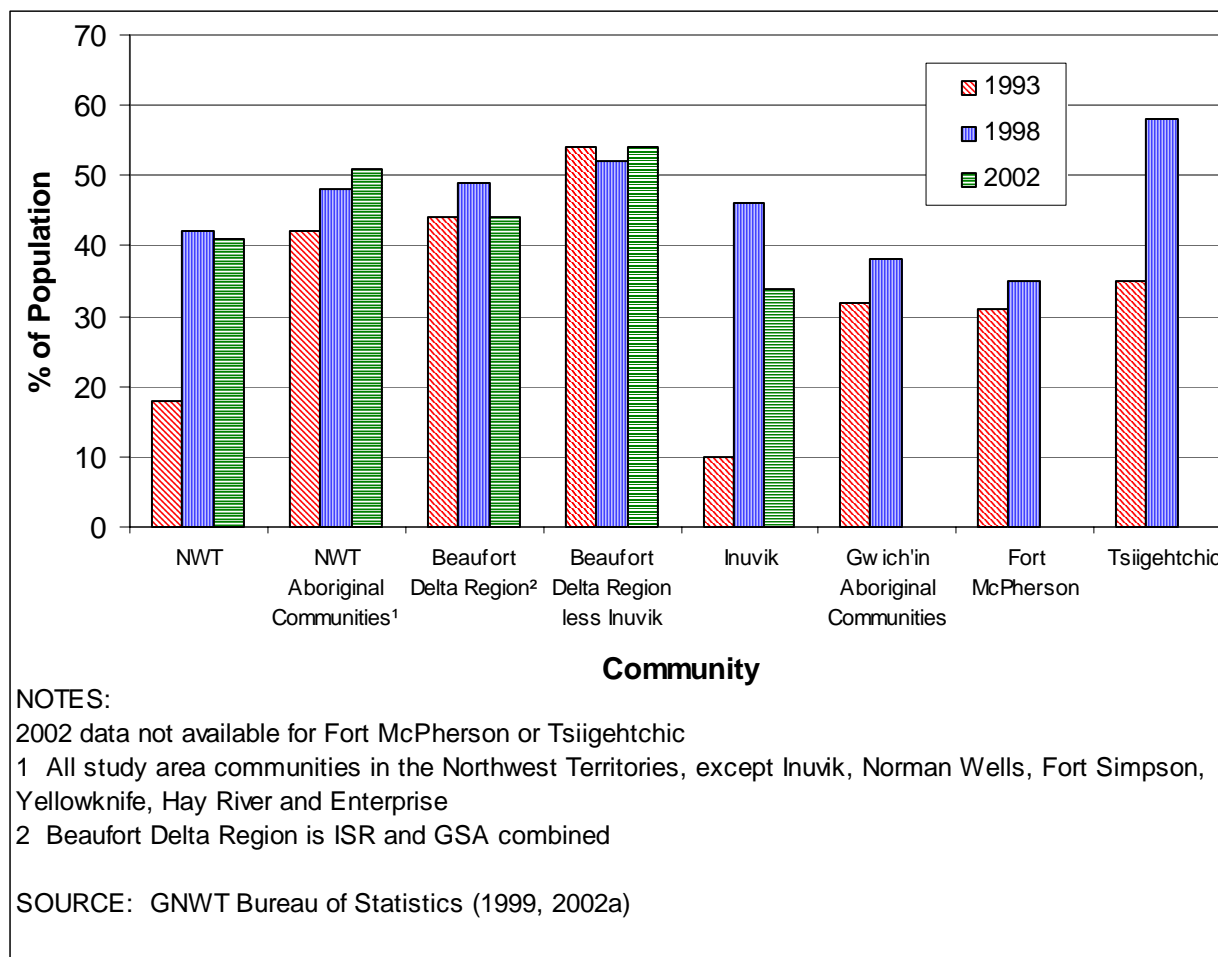
The focus of traditional values, lore, skills and disciplines has always been on survival in the environment that is home to the Gwich'in. Traditional culture thus involves:

- a language that labels things, indicating their value or importance
- a survival focus, including the knowledge, skill and discipline on which harvesting food and surviving on the land both depend

Traditional foods are recognized as important, both economically and nutritionally. In addition, traditional harvesting has immense symbolic and cultural significance to Aboriginal people, and this forms an additional strong inducement to participate in harvesting traditional foods.

Language retention is taken as an indicator of cultural retention because appreciation of traditional, deeper, spiritual relationships can only be comprehended in traditional language terms. Aboriginal languages are better adapted and more precisely suited to effective resource harvesting, although the lore, skills and disciplines can certainly be communicated in other languages.

Figure 8-7 shows the information from the GNWT surveys in 1993, 1998 and 2002. These surveys show that 38% of the adult population in the Gwich'in Aboriginal communities, including both Aboriginal and non-Aboriginal respondents, reported having hunted or fished in 1998.



**Figure 8-7: Adults Who Hunted or Fished in the Gwich'in Communities**

Two sets of survey data provide indications of the wildlife harvests in the GSA. The Gwich'in Renewable Resource Board (GRRB) collected more detailed and precise data for 1996 to 2000 which is publicly available (GRRB 1998, 2000). [Table 8-38](#) shows that the Gwich'in obtained a large harvest of wild game and fish in 2000, although the 1996 harvest was substantially greater. In 2000, the harvest rates were 0.65 caribou, seven fish, 1.4 geese and 0.03 moose per person (all ages).

**Table 8-38: Harvest Data for the Gwich'in Communities**

Species	1996					2000				
	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
Mammals	916	341	304	397	1,958	168	59	647	278	1,152
Whale	0	0	1	0	1	0	0	0	0	0
Caribou – woodland, barren-ground	902	334	286	391	1,913	134	53	635	273	1,095

**Table 8-38: Harvest Data for the Gwich'in Communities (cont'd)**

Species	1996					2000				
	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
Moose	13	2	14	6	35	34	2	11	5	52
Dahl's sheep	1	0	0	0	1	0	0	0	0	0
Bears – black, brown	0	5	3	0	8	0	4	1	0	4
Birds	8	1,808	351	102	2,269	116	3,161	304	20	3,601
Grouse, ptarmigan	4	3	11	88	106	116	25	0	20	161
Goose, swan	0	685	117	0	802	0	2,177	170	0	2,347
Duck	4	1,120	223	14	1,361	0	959	134	0	1,093
Fish	47	1,623	21,098	38,525	61,293	135	2,147	2,147	15,538	39,545
Char, whitefish, crookedback, grayling, trout, cisco, salmon	2	999	16,186	29,438	46,625	199	1,451	16,373	13,478	31,402
Other fish – walleye, herring, flounder, sucker, jackfish, coney, loche	45	624	4,912	9,087	14,668	35	696	5,352	2,060	8,143
SOURCE: Gwich'in Renewable Resource Board (1998, 2000)										

The harvested total edible weights of mammals, birds and fish were calculated applying figures from Usher (2000). The 1996 harvest yielded a total of 166,038 kg of edible meat, or about 99 kg per person and 116,147 kg of edible meat in 2000, about 69 kg per person.

The data show that compared with 1996 harvests, there were substantially smaller harvests of caribou and fish, and larger harvests of geese in 2000. The likely explanation for the reduced caribou harvest is that the herd was not as accessible in the first two quarters of 2000 as in winter 1996, although there was a larger harvest in the third quarter of 2000.

It might be that the goose harvest in the second quarter of 2000, substantially larger than in the second quarter of 1996, reflects added efforts made to compensate for the much smaller-than-usual caribou harvest.

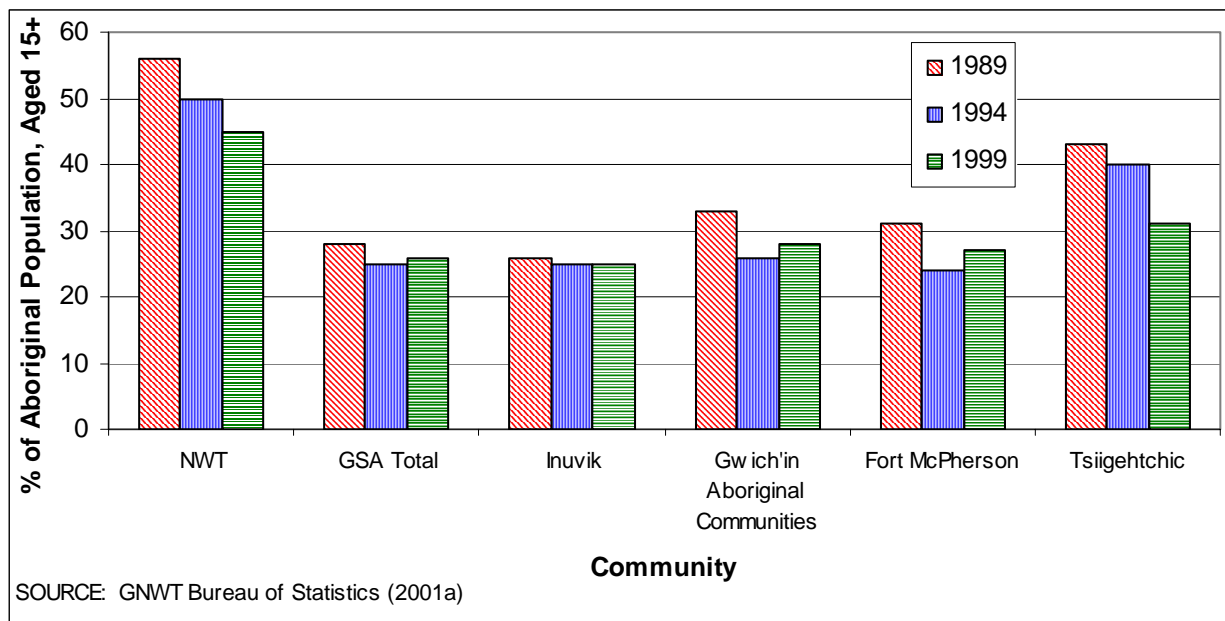
The monetary value for the GSA wildlife harvest was calculated based on the cost of replacing the edible weight with store-bought beef, chicken and fish. According to these calculations, the total replacement costs for the edible GSA wildlife harvests were \$2,073,117 for 1996 and \$1,493,380 for 2000.

A GNWT household survey found that 80% of the households in the Gwich'in Aboriginal communities in 1998 reported that at least half of the food they

consumed was country food. In Inuvik, the comparable figure was 31% (GNWT Bureau of Statistics 2002a, 2002b; GRRB 2000).

GNWT data documenting trapping activity by Gwich'in trappers indicates that the percentage of men aged 25 to 59 years who trapped fell from 82% to 14% between 1987 and 2002 for the Gwich'in Aboriginal communities (GNWT RWED, various years). There was also a decline in trapping in Inuvik. None of the communities have shown signs of returning to pre-1993 trapping levels.

Between 1989 and 1999, the proportion of residents of Fort McPherson and Tsiigehtchic aged 15 years and older who reported they could speak an Aboriginal language declined to about 28% (Figure 8-8). The proportion of Aboriginal language speakers among Inuvik Aboriginal adults remained at about 25%.



**Figure 8-8: Aboriginal Language Speakers in the Northwest Territories and Gwich'in Communities**

**Non-Traditional Land and Resource Use**

This topic addresses non-traditional use of land and resources within the GSA. Background information is provided on granular resources, timber resources, mineral resources, oil and gas activities, non-traditional resource harvesting, tourism and recreation, and other commercial activities.

### **Granular Resources**

Within the GSA, several borrow sites are located adjacent to the Dempster Highway, and there is an area of granular potential near Caribou Lake (GLUPB 2002). Existing borrow sites regularly used by the Town of Inuvik include:

- the Kenaston Pit located at Campbell Lake
- a pit near the Inuvik airport
- a pit about 20 km southeast of Inuvik (EBA Engineering Consultants Ltd. 1987)

### **Timber Resources**

There is currently no commercial timber harvesting in the GSA, with the exception of fuel wood harvesting by Gwich'in beneficiaries and some residents. It is highly unlikely that there will be any expansion of timber harvesting in the study area in the future because of the limited amounts of timber resources in the GSA.

### **Mineral Resources**

There are no mines or ore deposits of interest within the study area in the GSA. Several prospecting permits have recently been issued to Diamond Resources Ltd. along the eastern edge of the GSA.

### **Oil and Gas Activities**

The study area within the GSA crosses two oil and gas exploratory licences held by Devlan Exploration. The potential for discovery of oil throughout the GSA is low, although natural gas could be present (Gwich'in land use plan). The Ikhil gas field in the ISR supplies natural gas to the town of Inuvik.

### **Non-Traditional Resource Harvesting**

Resident and nonresident sport hunting is permitted within the GSA for:

- black bear
- moose
- barren-ground and woodland caribou
- wolf
- wolverine
- small non-furbearing mammals

Game bird hunting is permitted for ptarmigan and grouse. There are no designated guide-outfitter areas traversed by the study area in the GSA.

No commercial fishing licences have been issued in the GSA in the vicinity of the study area. Fisheries and Oceans Canada has issued some domestic fishing licences to residents in the GSA. A domestic fishing license allows non-Aboriginals to fish with a net for noncommercial purposes. However, it is believed that little, if any, domestic fishing occurs in the area.

Sport fishing is licensed by RWED, and is subject to the terms and conditions set out in the Gwich'in Comprehensive Land Claim Agreement (DIAND 1992). Inuvik residents sport fish in Point and Sunny lakes to the southwest of the study area in spring and summer and, to a lesser degree, during the winter.

### **Tourism and Recreation**

Recreational activities in the GSA are focused around the Mackenzie River. Many residents travel to Sunny and Point lakes to camp in the spring and summer. There is one cabin used by an Inuvik resident on Sunny Lake. Nonresident use of waterways within the study area is incidental. The study area traverses the abandoned Canadian National Telegraph line, along which some recreational use, such as snowmobiling, occurs.

### **Protected Areas**

Several designated protected areas where development might be limited fall within Crown lands in the GSA. The purpose of these zones is to protect important cultural and environmental resources. The Gwich'in land use plan identifies the following land designations:

- special management zones – these are areas where all land uses are permissible as long as conditions outlined in the Gwich'in land use plan are met
- conservation zones/heritage conservation zones – these are areas where industrial activities are generally not permitted

Final federal approval for the Gwich'in land use plan was received in August 2003, officially putting the plan into effect.

The pipeline and other components of the project encounter five special management zones under the Gwich'in land use plan 2003 within Crown lands in the GSA ([Figure 8-9](#)):

- Campbell Creek Special Management Zone
- Campbell Hills Special Management Zone
- Mackenzie River Special Management Zone

- Lakes Around Travaillant Lake Special Management Zone
- Transportation – Dempster Highway: Mackenzie River to Inuvik Special Management Zone

The proposed pipeline corridor passes near the Nagwichoonyik National Historic Site administered by the Gwich'in Tribal Council. The Nagwichoonyik National Historic Site is a 175-km-long stretch of the Mackenzie River from 1.0 km upstream of the Thunder River confluence down to Point Separation and extending 5.0 km inland. Nagwichoonyik is of great cultural, social and spiritual importance to the Gwichya Gwich'in.

The Campbell Lake area was considered for designation as an international biological program site because:

- it is important as habitat for rare plants
- it is a peregrine falcon nesting site
- it was an area of interest as a possible national wildlife area

Most of this area is now encompassed within the Campbell Hills Special Management Zone and the Gwich'in Territorial Park.

## Heritage Resources

The heritage resources that have been identified within the GSA are usually found at or near the ground surface and as such, are susceptible to any activities that result in ground disturbance. The three primary classifications of heritage resources, used by consulting archaeologists, are: palaeontological, prehistoric archaeological and historic archaeological sites. While all heritage resources are important, the prehistoric and historic sites are of primary concern with respect to this project.

The *Mackenzie Valley Resource Management Act* (Department of Justice 2002) defines heritage resources as archaeological sites, historic sites, burial sites, artifacts or other objects of heritage, cultural or religious significance. Heritage or cultural records are also included in this definition. An archaeological artifact is defined in the *Northwest Territories Archaeological Sites Regulations* (GNWT 2001) as “any tangible evidence of human activity that is more than 50 years old, in respect of which an unbroken chain of possession cannot be demonstrated”. Further, an archaeological site is defined as “a site where an archaeological artifact is found”. Therefore, under these definitions, examples of heritage resources include ancient camp sites, lithic scatters, traditional gathering places, trap line trails, cabins, fossils, sacred sites, graves, culturally modified landscapes and objects of literature.

Figure 8.9 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

Land within the GSA has been traditionally occupied by the Gwich'in people, also known as the Mackenzie River People (Heine et al. 2001). The Gwich'in people did not have permanent settlements until after contact with Europeans. They tended to revisit distinct hunting and fishing areas at various times of the year. For the Gwich'in people, first contact with the Europeans occurred around 1790. After this date, European trade became more prevalent. Subsistence and traditional activities still played a primary role in Gwich'in society.

Seven heritage resource sites previously recorded in the GSA are located relatively close to the one-kilometre-wide corridor. Four of these sites were visited during field studies in the summers of 2002 and 2003. In addition, 30 previously unrecorded heritage resource sites were identified in these two field seasons. Thirteen of the sites have been identified as being prehistoric in nature, consisting of stone debitage or tools. The remaining sites are historic in nature, and are indicative of hunting, trapping and travel through the GSA. These sites include the remnants of temporary dwellings and trails as well as evidence of other traditional uses in the area. Recommendations on the mitigation of potential conflicts of proposed developments with these site locations will be determined on a site-by-site basis as the proposed pipeline alignment shifts and other proposed study areas are adjusted.

The majority of heritage resource sites were observed in areas located along watercourse terraces, ridges, cutlines and upland terrace slopes.

The potential study areas surveyed in the GSA consists mainly of watercourse crossings, infrastructure locations, access roads, borrow sites and other geotechnical investigation areas. Field investigations focused on the parts of these areas identified by the local assistants and the heritage resources team as having moderate to high potential for discovering heritage resources. Areas where high levels of ground disturbance from project activity are expected were also targets of field investigation.

## **HUMAN ENVIRONMENT EFFECTS AND MITIGATION**

The potential effects of the proposed development activities are described next for the socio-economic, traditional culture, and non-traditional land and resource use. Protected areas are addressed in the site specific sections. Heritage resource effects and mitigation are explained in [Section 11](#).

The assessment of effects on most socio-economic components lacks specific guidelines and scientific thresholds as guidance. This is because of several factors, including the inability to quantitatively determine effects that are not easily defined by numbers on individuals, the economy, the communities and its services. For example, it is difficult to predict a numerical change in recreational activities, or a change in perceived enjoyment.

Therefore, qualitative methods were used to assess many, social, nontraditional land and resource use, and heritage resource effects. Input from the public participation process, professional judgement and linkages with other disciplines were used to make effect predictions in these cases.

## Definitions

The following terms are used throughout this assessment of the potential effects of the development on the human environment in the GSA.

- **Direction** – describes the ultimate long-term trend of the effect. There are three options for direction, including adverse, neutral and positive. For components such as traditional resource harvesting, project effects can be both positive and adverse, e.g., an increase in income could be spent to support new opportunities for hunters. However, project employment might decrease time available for hunting.
  - adverse – effect is worsening or is not desirable
  - neutral – effect is not changing compared with baseline conditions and trends
  - positive – effect is improving or is desirable
- **Magnitude** – describes the severity or intensity of the effect. Typical measurements of magnitude indicate gains or losses in features, e.g., less accommodation available or higher demand on recreational resources, or changes in conditions, e.g., ability of policing services to keep up with demands for service. The terms no effect, low, moderate and high are used to describe magnitude. Some effects could have a range of magnitude because of subjective factors.
  - no effect – effect does not occur
  - low – effect occurs that might or might not be detectable, but is within the normal range of variability
  - moderate – clearly an effect but unlikely to pose a serious risk or represent a management challenge
  - high – effect is likely to pose a serious risk and represents a management challenge
- **Geographic extent** – describes the measurement of area within which an effect occurs. The terms local, regional, beyond regional and national are used to describe the geographic extent of an effect.

- local – effect is limited to specific affected persons or communities
- regional – effect extends to several communities in the affected region
- beyond regional – effect extends beyond one region to include communities in more than one region of the study area, or to include commercial or industrial centres in the Northwest Territories
- national – effect extends nationally, or beyond the communities in the study area
- **Duration** – refers to how long an effect occurs, or how long the recovery period of that effect will be. Recovery is defined as a return to conditions that would exist if the project had not occurred. For socio-economic effects, it is not normally practical to be more precise than short-term and long-term.
  - construction – short-term
  - operations – long-term
- **Shared Responsibility for the Management of Effects** – Given the nature, scope and magnitude of potential effects and the complex inter-related causes of effects, a coordinated and collaborative management response from Imperial and other parties is necessary. These include measures that can be implemented by Imperial, either on its own accord or in cooperation with the GNWT, communities, local authorities, service providers and other third parties.

### **Procurement, Employment and Regional Economics**

This discussion addresses procurement, employment, income and regional economic effects in the GSA.

Estimates of economic effects were determined from simulations using employment and expenditures estimates supplied by Imperial. The simulations (of direct, indirect and induced economic effects) were done using the Statistics Canada I-O model. However, because the I-O model only produces results at the territorial or provincial level, the Northwest Territories effects were allocated to regions using data produced by Ellis Consulting Services (2004).

Capital expenditures made in the GSA for goods, services and labour will be linked to project components and activities located in the region. These include:

- the Inuvik area facility
- construction spreads E2 and D1 for NGL and gas pipelines
- infrastructure sites, including the construction camp near Campbell Lake

Procurement and employment opportunities in the GSA will exist for qualified GSA businesses and individuals. However, given the small population base and resulting capacity limitations in the GSA, significant project-related employment and capital expenditures for goods and services are expected to occur outside the region.

### Assessment and Management of Project-Specific Effects – Construction

#### *Expenditures – Construction*

Most project construction will occur over the four-year period of 2006-2007 to 2009-2010.

The Inuvik area facility is located in the GSA, along with about 40% of the NGL pipeline and about 15% of the natural gas pipeline. As shown in [Table 8-39](#), this represents about \$1.1 billion or 17% of the total project capital investment for 2006-2007 to 2009-2010.

**Table 8-39: Project Capital Investment in the GSA**

Indicator	2006-2007		2007-2008		2008-2009		2009-2010		Total	
	(\$M) <sup>c</sup>	(%) <sup>d</sup>	(\$M) <sup>c</sup>	(%) <sup>d</sup>	(\$M) <sup>c</sup>	(%) <sup>d</sup>	(\$M) <sup>c</sup>	(%) <sup>d</sup>	(\$M) <sup>c</sup>	(%) <sup>d</sup>
Project total investment	1,409	100	2,261	100	1,907	100	671	100	6,247	100
Spending in the GSA	96	35	128	31	109	35	20	26	353	33 <sup>a</sup>
Spending outside the GSA	180	65	291	69	199	65	57	74	726	67 <sup>a</sup>
GSA total <sup>d</sup>	276	20	419	19	308	16	77	11	1,079	17 <sup>b</sup>
NOTES:										
<sup>a</sup> Percentage of GSA part of total investment										
<sup>b</sup> Percentage of total project investment										
<sup>c</sup> Figures in millions of constant \$2003										
<sup>d</sup> Numbers might not add up because of rounding.										

The small labour supply, and the limited size and number of businesses in the region, that is, the lack of capacity of the region to undertake such a project, will require construction contractors to hire employees and purchase goods and services from outside the region. The economic activity associated with direct purchases outside the region will flow to where the goods or services are produced.

Almost \$1.1 billion of the project capital investment will occur in the GSA. Part of the value of goods and services needed to construct the project will be purchased in the GSA. It is estimated that \$353 million, or 33%, of capital investment will remain in the GSA. The remaining \$726 million, or 67%, of the capital expenditures will be made outside the GSA.

### ***Employment and Income – Construction***

Construction of the project components located in the GSA will require a large workforce and, although activities will occur year-round, most work will take place during four winter construction seasons, with only cleanup and demobilization occurring in year four. Many of the required skills will not be readily available in the GSA. As a result, it is expected that most required labour will be brought in from outside both the region and the Northwest Territories.

The 2002 Northwest Territories labour force indicator statistics were used to determine the size of the labour force in the GSA potentially available to the project. Labour force participation is provided, along with employment and unemployment rates. The unemployment rate includes persons actively seeking employment as well as those that *want a job* but who are not actively looking for work.

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

Table 8-40 shows the estimated size and composition of the regional labour market 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.

Some project-related in-migration was factored into the estimate on the assumption that some skilled and experienced employees in the GSA will resign their jobs and seek project-related employment. This will lead to vacancies that could be filled from within the region but will also create a demand for southern employees to move north. It was assumed that about half of these in-migrants will leave the territory at the end of construction in 2009-2010 and the remainder will stay in the North.

**Table 8-40: Estimated Labour Force in the GSA – Before Project Effects**

<b>Indicator</b>	<b>2006-2007</b>	<b>2007-2008</b>	<b>2008-2009</b>	<b>2009-2010</b>	<b>Average</b>
Total population (No.)	5,366	5,627	5,858	5,648	5,625
Net migration (No.)	0	237	213	-225	56
Population 15+ (No.)	4,395	4,614	4,813	4,651	4,618
Labour force (No.)	3,275	3,437	3,586	3,465	3,441
Employed (No.)	2,700	2,834	2,957	2,857	2,837

**Table 8-40: Estimated Labour Force in the GSA – Before Project Effects (cont'd)**

Indicator	2006-2007	2007-2008	2008-2009	2009-2010	Average
Unemployed (No.)	574	603	629	608	603
Not in labour force (No.)	1,121	1,176	1,227	1,186	1,178
Participation rate (%)	74.5	74.5	74.5	74.5	74.5
Employment rate (%)	61.4	61.4	61.4	61.4	61.4
Unemployment rate (%)	17.5	17.5	17.5	17.5	17.5

It is expected that over two peak winter construction seasons, that is, 2007-2008 and 2008-2009, 450 persons could migrate to the GSA because of the project. However, it is assumed that half of these persons will leave the region when the construction phase ends in 2009-2010. It was further assumed that all new in-migrants of labour force age will be available to participate in project construction.

Before project effects occur in 2006-2007, it is estimated that there will be 574 unemployed persons in the region. Because of in-migration and an increase in labour force participation, the number of unemployed individuals available during the construction period is expected to increase to an annual average of 603 people.

[Table 8-41](#) provides an estimate of the maximum labour pool in the GSA that could be available to fill direct project construction jobs, and jobs in other businesses that supply goods and services to the project and its employees.

The annual average of 603 unemployed persons has been adjusted to reflect the number of unemployed persons who 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.

[Table 8-41](#) indicates some fluctuation in the percentage of unemployed workers that are willing to do rotational work. This fluctuation is attributed to the in-migration of 450 people to the region, some of whom will be of labour-force age and willing to undertake direct project rotational work.

A further consideration in estimating the size of the available unemployed labour pool was the location of the Inuvik area facility and the pipeline construction camp proposed near Campbell Lake. Because the Inuvik area facility and the Campbell Lake camp are within daily commuting distance of Inuvik, this could eliminate the need for some rotational work in the region and potentially increase the size of the available labour pool in the GSA.

It is estimated that an annual average of 407 GSA residents will be available to seek direct project construction employment, and employment in businesses that provide goods and services to the project and its workforce.

**Table 8-41: Estimated Maximum Potential Labour Pool Available for Project-Related Work in the GSA**

Indicator	2006-2007	2007-2008	2008-2009	2009-2010	Average
Total unemployed persons (No.)	574	603	629	608	603
Will do rotational work (%) <sup>a</sup>	65	76	75	54	67
Total unemployed persons adjusted for rotational work (No.)	372	459	469	328	407
NOTE: <sup>a</sup> Percentages have been rounded to the nearest whole number and the adjusted number of unemployed persons might not add up because of rounding.					

An estimate of direct employment demand for the region was derived by comparing the job types and occupation requirements for each project component in the region to the expected skills of the regional labour force. Statistics Canada's I-O Model was used to estimate the total project-related demand for indirect and induced employment in the Northwest Territories. The territorial estimates were then broken down into regions using project expenditure data.

Table 8-42 shows direct, and modelled indirect and induced employment estimates in the GSA, and more realistic employment estimates that take into consideration the constraints of the available labour pool and existing businesses in the region. The employment estimates include direct project employment, and new jobs in businesses supplying goods and services to the project and its employees.

**Table 8-42: Estimated Project Employment Demand in the GSA**

Indicator	Type of Demand	Number of Jobs					
		2006-2007	2007-2008	2008-2009	2009-2010	Total <sup>a</sup>	Average
Modelled employment demand in the GSA without labour supply constraints	Direct	499	1,986	1,277	60	3,822	956
	Indirect	906	1,174	1,001	181	3,263	816
	Induced	228	300	249	46	822	206
	Total	1,633	3,459	2,528	287	7,907	1,977

**Table 8-42: Estimated Project Employment Demand in the GSA (cont'd)**

Indicator	Type of Demand	Number of Jobs					
		2006-2007	2007-2008	2008-2009	2009-2010	Total <sup>a</sup>	Average
Estimated employment demand in the GSA with labour supply adjustments	Direct	232	287	293	60	872	218
	Indirect	93	115	117	181	506	127
	Induced	46	57	59	46	208	52
	Total	372	459	469	287	1,586	397

NOTE:  
<sup>a</sup>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 1,977 jobs for residents of the GSA during construction. However, when the available labour force constraints are taken into account, the annual average demand for jobs in the GSA decreases to 397. What this means is that all qualified GSA residents who *want a job* should be able to find project-related employment.

Project-related employment will lead to a rise in household income in the region, as shown in [Table 8-43](#).

**Table 8-43: Estimated Project-Related Labour Income in the GSA**

Type of Demand	2006-2007 (\$M) <sup>a</sup>	2007-2008 (\$M) <sup>a</sup>	2008-2009 (\$M) <sup>a</sup>	2009-2010 (\$M) <sup>a</sup>	Total (\$M) <sup>a,b</sup>	Average (\$M) <sup>a</sup>
Direct	12	13	14	3	41	10
Indirect	6	7	7	11	30	8
Induced	2	2	2	2	9	2
Total <sup>b</sup>	19	22	23	16	80	20

NOTES:  
<sup>a</sup>Figures in millions of constant 2003 dollars  
<sup>b</sup>Numbers might not add up because of rounding.

It is estimated that project construction will generate \$80 million in labour income in the region throughout construction. This will be comprised of \$41 million in direct project-related income, and another \$39 million earned by employees producing goods and services for the project and its employees.

[Table 8-44](#) summarizes 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 397 jobs over the construction period. The increase in demand applies to the available portion of the GSA labour force.

It is estimated that the labour force participation rate in the region will increase from 74.5% in 2002 to 78.0% during construction because it is assumed that more people will be drawn into the labour force as the project draws closer. New training programs will become available and expectations for employment opportunities in the local communities will increase, leading to greater involvement in the labour market.

The estimated project-related jobs will increase the employment rate from an average of 61.4% (Table 8-40, shown previously) to 70.0% in the GSA during construction, and the unemployment rate will decrease from an average of 17.5% to 10.2% during the same period. However, the noticeable increase in the unemployment rate in 2009-2010 is an incomplete representation of the labour market situation in that year because although construction activity is complete, the project has not ended. The next phase, which includes the much smaller but long-term, stable start-up and ongoing operations employment, is not reflected in this table.

**Table 8-44: Estimated Project Effects on the Labour Market in the GSA**

Indicator	2006-2007	2007-2008	2008-2009	2009-2010	Average
Total population (No.)	5,366	5,627	5,858	5,648	5,625
Net migration (No.)	0	237	213	-225	56
Population 15+ (No.)	4,395	4,614	4,813	4,651	4,618
Labour force (No.)	3,428	3,599	3,754	3,627	3,602
Employed (No.)	3,072	3,294	3,426	3,144	3,234
Other employed (No.)	2,700	2,834	2,957	2,857	2,837
Project employment (No.)	372	459	469	287	397
Unemployed (No.)	356	305	328	484	368
Not in labour force (No.)	967	1,015	1,059	1,023	1,016
Participation rate (%)	78.0	78.0	78.0	78.0	78.0
Employment rate (%)	69.9	71.4	71.2	67.6	70.0
Unemployment rate (%)	10.4	8.5	8.7	13.3	10.2

### Mitigation Measures – Construction

To build business capacity and optimize project-related procurement and expenditures within the GSA, a procurement plan is being developed. The procurement plan will demonstrate that Imperial is 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, Imperial 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.

In order to accomplish this, Imperial will:

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

To build capacity and increase employment of Aboriginal and other residents in the Northwest Territories, a program and principles, where applicable, have been provided. The program and principles address education, training and employment. To develop Aboriginal and other northern workers for, and employ them in, positions associated with construction and operations, Imperial is committed to the following:

- Aboriginal and other northerners who are qualified, or who take the steps necessary to become qualified for work on the project, will be provided with the opportunity to work during the construction phase, consistent with:
  - relevant land claims settlement agreements
  - benefits and access agreements
  - provisions of applicable human rights legislation
  - the *Canadian Charter of Rights and Freedoms*
  - the *Canada Oil and Gas Operations Act*
- 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 the early identification of, and 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 formed a key component for the NWT oil and gas sector's successful application to HRSDC under the Aboriginal Skills Employment Program (ASEP). ASEP supports training programs intended to provide early development for workers and potential workers for the construction phase of the project. The specific training courses will be planned on an annual basis.)
- emphasize preferential employment of qualified Aboriginal and other northern residents during all phases of the project
- promote Aboriginal and other northern worker participation 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 work sites and in camps
- provide a workplace where all individuals are treated in a fair, equitable and respectful manner while working on the project

Successful implementation of the plan will require project leadership by way of an 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
- workers

### **Residual Effects – Construction**

With timely implementation of the previously described mitigation measures, business and labour force capacity in the region will expand. There will be capital expenditures and project-related procurement in the region that could represent up to 17% of total project capital expenditures in the Northwest Territories (Table 8-39, shown previously). In addition, labour force participation and employment rates will increase because it is assumed that more people will be drawn into the labour force as a result of the project.

Inuvik is expected to experience positive effects from the procurement, employment and labour income effects than the smaller and more distant GSA communities because of its size, location and function as a regional transportation and administrative centre.

Construction effects will be positive, high in magnitude, and extend throughout and beyond the region. The capital expenditures, procurement and employment effects occurring during project construction will generate additional capacity among regional businesses and the labour force, and are expected to be positive for communities within the GSA. Some of this incremental capacity is expected to carry over into the operations phase.

### **Assessment and Management of Project-Specific Effects – Operations Phase**

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 will be generated because of project operations, and ongoing capital and drilling activities scheduled over the life of the project.

### **Employment and Income – Operations**

The Inuvik area facility and a part of the NGL and natural gas pipelines are located in the GSA. The Inuvik area facility is both a processing facility and a control centre for the production of natural gas and NGLs at the anchor fields.

As shown in [Table 8-45](#) annual average direct employment associated with operation of the Inuvik area facility will range from 69 to 168 jobs annually, with an annual average of 101 jobs from 2009 to 2030.

**Table 8-45: Annual Average Direct, Indirect, Induced and Total Employment in the GSA**

Type of Demand	Number of Jobs				
	2009-2015	2016-2020	2021-2025	2026-2030	Annual Average
Direct	96	168	72	69	101
Indirect	68	129	52	50	74
Induced	34	64	26	25	37
Total <sup>a</sup>	199	361	150	143	212
NOTE: <sup>a</sup> Numbers might not add up because of rounding.					

Total employment in the GSA during project operations, including direct as well as spin-off indirect and induced employment, will range from 143 to 361 jobs, with an annual average of 212 jobs from 2009 to 2030. Residents of the region are expected to fill many 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 has been developed and is being delivered to regional residents by Aurora College in association with the communities, GNWT and Imperial, before and during project operations. With implementation of these training programs, regional participation in direct project operations employment opportunities is expected to increase throughout the life of the project.

Table 8-46 presents the estimated labour income associated with the direct, indirect and induced labour income related to the project in the GSA. It is estimated that annual average direct labour income will be about \$4 million from 2009 to 2030.

**Table 8-46: Annual Average Direct, Indirect and Induced Labour Income in the GSA**

Type of Demand	2009-2015 (\$M) <sup>a</sup>	2016-2020 (\$M) <sup>a</sup>	2021-2025 (\$M) <sup>a</sup>	2026-2030 (\$M) <sup>a</sup>	Annual Average (\$M) <sup>a</sup>
Direct	8.8	14.8	6.7	6.4	9.1
Indirect	3.5	6.6	2.7	2.6	3.8
Induced	1.4	2.7	1.1	1.0	1.6
Total <sup>b</sup>	13.7	24.2	10.4	10.0	14.5
NOTES: <sup>a</sup> Figures in millions of constant \$2003 <sup>b</sup> Numbers might not add up because of rounding.					

During the same period, annual total direct, indirect and induced labour income generated in the region will range from about \$10 million to \$24 million, with an annual average of about \$14.5 million.

### Residual Effects – Operations

With timely and ongoing implementation of the mitigation measures described previously, 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 project operations employment, and ongoing capital and drilling activities are expected to be positive and moderate for GSA communities and will represent about half the total project direct operations phase employment in the Northwest Territories. Additional positive effects will include long-term spin-off jobs, such as maintenance services, created in the region, and other opportunities outside the region.

## Demography

This discussion addresses potential project effects on demography and population mobility in the GSA.

### **Assessment and Management of Project-Specific Effects – Construction Phase**

Project-induced employment and business opportunities will be greatest in the Beaufort Delta Region (BDR), and will be concentrated in Inuvik. The prospects of direct, indirect and induced employment opportunities, and the adventure of travelling to the North will attract some southerners to the BDR. Some northern residents will also likely be attracted by the excitement of the project and the prospect of employment. Inuvik will be the preferred destination, particularly of those who might find accommodation there with relatives.

### **Mitigation Measures – Construction**

The mitigation measures targeting potential southern in-migrants, based on common practices for influencing population movements associated with large development projects, will seek to convince the in-migrants that there will be few employment opportunities that can be accessed only in the Northwest Territories. This will involve the following procedures or actions:

- Southern workers will be hired for project- and operations-related positions in selected cities, from contractor lists and by media advertising for positions in the Northwest Territories. Hiring in the North will be restricted to Aboriginal and other northerners, that is Northwest Territories, Nunavut and Yukon residents that meet the definition of a northern resident.
- Human Resources Skills Development Canada (HRSDC) offices will be asked to publicize this restriction. They will also provide the message that the only direct project hiring in the North will be of qualified people that have lived in the North for at least one year and have a medical card for the Northwest Territories. This message will also be publicized through television and radio news programs, and newspaper advertisements.

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

- Imperial representatives will continue to visit every community in the development area to describe the employment opportunities available, and the terms and conditions of employment.

- Imperial 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.
- Imperial or community representatives will provide database information to project contractors.
- Recruitment procedures for northern residents will be described in English and Aboriginal language news programs, and the dates when Imperial 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 Inuvik, to which Northwest Territories residents might be attracted.

### **Residual Effects – Construction**

It will not be possible to eliminate all population movement to Inuvik. Although this growth in population might be viewed by some as disruptive and will increase the demand for some public services, it will also be viewed positively because of the potential for an increased tax base, and the new skills and capacity that it represents. Therefore, the effects during the construction period are expected to be both adverse and positive and high in magnitude.

It is estimated that the population of Inuvik could increase by a maximum of 450 people in the peak activity year of 2008. It is further estimated that 240 of these people will be single adults.

Effects on the populations in other GSA communities will likely be adverse and low in magnitude. The duration of the population mobility effects will be limited to the construction phase.

### **Operations Phase Effects**

Most of the operations and maintenance job and business opportunities created during the operations phase will relate to the Inuvik area facility. This facility houses the control centre for operating the gathering pipeline and the Inuvik area facility, accordingly, the greatest population effects will be experienced in Inuvik.

As anchor field development will continue into the early operations phase, the economic effects that might drive population migration to Inuvik will make a transition that initially includes ongoing drilling and construction to a more steady operations state. For this reason, two scenarios are presented. The first, or

transitional period, is related to the labour force demands expected during 2009 to 2015, and the second is related to 2021 to 2025.

It is expected that the population of Inuvik will transition from the 450-person peak construction increase to a level of about 280 people more than pre-project levels. By the time operations reach the post-commissioning period, these increments are expected to further attenuate to about 200 persons. It is important to note that these effects do not include normal growth that might occur because of factors other than the project.

The long-term, stable contribution of these levels of population effects to the local economy and community should be readily accommodated in the time frames available, and should require no mitigation and represent no residual adverse effect during the operations phase.

### **Physical Infrastructure and Community Services – Transportation Infrastructure and Use**

This description addresses potential project effects on transportation infrastructure and its use in the GSA.

This region has a single hub, Inuvik, for transportation, government and service delivery. It serves the other two Gwich'in communities, as well as communities in the ISR.

### **Assessment and Management of Project-Specific Effects – Construction Phase**

Inuvik is the regional focal point for road, marine and air traffic. In the GSA, passengers and freight arriving from outside this region stop in Inuvik.

Development-related freight hauling over the Dempster Highway to Inuvik will be minimal compared to the volume of project fuel, camps, modules, and drilling and construction equipment transported by barge to Inuvik. Nevertheless, some increase in truck traffic is expected, with a potential for increased road maintenance. Such an increase will likely be to the economic benefit of maintenance contractors in Inuvik and Fort McPherson.

### **Mitigation Measures – Construction**

The various measures that should be implemented by the project, the Department of Transportation and local communities, are detailed below.

All effects related to transportation 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 Imperial, project transportation and logistics functions, local communities, and DOT will be necessary for effective planning to reduce 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 Imperial and the GNWT, and between Imperial and the applicable municipalities will be negotiated and will include provisions for project use of all-weather and seasonal roads. The agreements will consider:

- coordination of road maintenance activities, which will recognize:
  - the timing of highway and winter road maintenance
  - installing and maintaining ice roads and bridges
  - access restrictions
- coordination of road upgrading where required

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 give 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 period air and barge traffic demand projections, including provisions for assessing the need for, and completing, upgrading and improving of, regional and municipal airports, airstrips and barge landings
- using pilot vehicles when transporting oversized truck loads on the Dempster Highway, 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 DOT and local communities for negotiation of potential post-project use of, and responsibility for, those sites

Some specific mitigation measures that might be implemented include using the marine bypass road in Inuvik for truck movements between the barge landing, the Inuvik area facility and the infrastructure site near Campbell Lake.

### **Residual Effects – Construction**

As indicated, the project might potentially affect the following services within the GSA.

- air travel
- air and barge freight services
- local roads and the Dempster Highway

However, these effects are relatively preventable. The effects are expected to be moderate in magnitude for the air and marine modes and low in magnitude for roads. In all cases they are expected to last only for the construction phase.

### **Operations Phase Effects**

The increased use of road, marine and air transport services will return to previous levels once construction is complete. Drilling programs will continue in the anchor fields and exploratory drilling might increase at that time, but effects on transportation systems will be much less than during the construction years, and largely confined to the winter months and the use of winter roads. Also, the project could result in some increase in transportation capacity. Mitigation measures will include:

- additional maintenance of winter ice roads
- awareness and enforcement of speed limits for heavy truck traffic using these roads

No residual effects are expected during the operations phase.

### **Physical Infrastructure and Community Services – Energy and Utilities**

This description addresses potential project effects on energy and utilities infrastructure and their use in the GSA.

### **Assessment and Management of Project-Specific Effects – Construction**

There will be a 1,350-person construction camp located near Campbell Lake in the GSA. It will be self-sufficient in terms of power, water supply, water treatment, sewage and solid waste treatment and disposal, and communications capabilities unless a commercial arrangement is made with the town of Inuvik whereby the project is permitted to use community infrastructure. Such arrangements will only take place if both parties stand to benefit, and the capacity of the infrastructure to meet current and future community needs is not compromised.

The project should have no adverse effects on nontransport community infrastructure, that is, utilities, energy sources or communications facilities, in Inuvik or other GSA communities. All communities have sufficient relevant capacities to provide for any foreseeable demands created by the projected level of in-migrants or transients the project might attract to the GSA.

### **Mitigation Measures – Construction**

Assuming the camp is self-sufficient regarding physical infrastructure, energy supply and utilities, it will have no effect on Inuvik or other GSA communities. Similarly, if the project enters into a mutually beneficial arrangement for camp use of Inuvik infrastructure, there should be no adverse effects on GSA communities.

### **Residual Effects – Construction**

As there will be no adverse effects on the non-transport infrastructure in any GSA community, there will be no residual effects.

### **Operations Phase Effects**

There will be no need for mitigation of project effects and no residual effects during the operations phase in the GSA.

## **Physical Infrastructure and Community Services – Housing**

This description addresses potential project effects on housing in the GSA.

### **Assessment and Management of Project-Specific Effects – Construction**

The projected need for additional dwellings for Inuvik is derived from population projections assuming that:

- nearly all oil and gas activity will generate the need for temporary accommodations, primarily in construction and exploration camps
- Inuvik will grow slowly but steadily over the next decade as governments, oil companies and construction firms relocate some staff to the region in anticipation of development, coupled with an increase in business capacity in Inuvik as the regional service centre

Ellis Consulting (2002) projected the need for a cumulative total of about 150 additional dwellings in Inuvik by the end of 2006, and about 230 additional dwellings by the end of 2009.

There will be a concentration of indirect and induced project-related employment and business opportunities in Inuvik. It is expected that the excitement associated with the project and employment prospects might attract some migrants from Tsiigehtchic, and potentially from Fort McPherson. Their destination will be Inuvik, particularly if they have local relatives to provide accommodation. Also, other projects have shown that when a demand for housing occurs, prices increase, thereby negatively affecting those on fixed income, many of whom are single mothers or widows.

Housing in Inuvik is very limited and in 2000, 18% of the housing was in need of major repairs. Any substantial number of in-migrants moving in with relatives in Inuvik for a short-term could have adverse effects on housing in the community.

It is expected that as many as 450 persons could migrate to Inuvik during peak construction activity. However, an expansion of both permanent housing units and temporary accommodation is also expected to occur by that time.

### **Mitigation Measures – Construction**

Imperial recognizes that direct and indirect project-related demand on short-term accommodation in Inuvik could surpass existing capacity. As a result:

- a self-contained camp will be provided for all project construction activities in the GSA. The camp will be sized to accommodate peak direct workforce and others indirectly involved in the project, such as project managers, inspectors, environmental monitors, consultants and regulators.
- mitigation measures should reduce demand for housing and increase the housing supply in Inuvik. The mitigation measures for minimizing the project-related migration that will elevate housing demand are described in the Demography topic.

To increase the housing supply in the GSA, the GNWT could:

- initiate or provide incentives for major housing repairs needed to ensure that the existing housing shortage is not exacerbated by increased deterioration, causing some occupied housing to become unliveable
- initiate or provide incentives for needed repairs to abandoned housing where feasible to make it liveable again, therefore expanding the supply of available housing
- provide tax or other incentives to prompt construction of new housing in communities where there is limited housing

It is expected that many owners of short-term rental housing will be eager to upgrade and expand their accommodations in anticipation of project-induced demand.

### **Residual Effects – Construction**

The resulting effects of the project on temporary and permanent housing in the GSA Aboriginal communities are expected to be adverse and low in magnitude. However, in Inuvik the high magnitude of the adverse effects on temporary and permanent housing will require collaborative mitigation by Imperial, GNWT, the town of Inuvik and private developers. These effects will primarily occur during the construction phase.

### **Operations Phase Effects**

Most of the employment opportunities generated by the project will be temporary construction-related jobs that will end when construction and reclamation activities are completed. However, ongoing project operations and maintenance will create direct, indirect and induced job opportunities for northern residents. At the start of project operations, southerners will likely fill most operations and maintenance positions, but as northern trainees become qualified, they will fill most of these jobs. As a result, there could be an incremental demand for about 70 residences in Inuvik by 2020. The capacity of the local housing sector should easily meet this need over that time. In fact, this ongoing demand could lessen any decline in the market related to the drop-off from construction demand effects. Therefore the effects in Inuvik are expected to be positive and low in magnitude. No effects are expected in any other GSA community.

### **Individual, Family and Community Wellness – Community Well-Being and Delivery of Social Services**

This discussion focuses on potential project effects on community well-being and delivery of social services in the GSA.

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

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

### **Assessment and Management of Project-Specific Effects – Construction Phase**

Of all the GSA communities, Inuvik will probably experience the greatest project effects, at least in terms of numbers of employment opportunities and elevated income levels. While increased income will have beneficial effects on the well-being of some families, there might also be adverse effects on family and community well-being, including increased alcohol-related offences.

Also, Inuvik will be within 20 km of a 1,350-person camp. Workers at this camp will arrive and depart using the Inuvik airport. There might be other opportunities, as well, for some of these workers to associate with local residents, which might be a source of some wellness problems.

### **Mitigation Measures – Construction**

There are mitigation measures which Imperial can and will implement in order to manage potential adverse effects on community well-being in the communities within the GSA.

Certain mitigation measures will be implemented and will be mandatory for all workers. Imperial will:

- respect a community's right to privacy and discourage workers from entering any community that asks for privacy
- enforce policies for alcohol-and drug-free workplaces and camps, including a requirement that all contractors and sub contractors also enforce policies that meet Imperial's requirements. In addition, Imperial will establish support systems and resources for the prevention of alcohol and substance abuse
- inspect or search the luggage of workers upon arrival for each work rotation
- conduct cultural awareness training
- provide a workplace where all individuals are treated in a fair, equitable and respectful manner, specifically including issues of harassment and privacy
- conduct pre-employment safety training

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

Certain mitigation measures will be offered to workers on a voluntary basis as part of on-the-job support to help improve worksite and life skills. These include:

- a program to help develop life skills and upgrade non-technical workplace effectiveness skills
- an Aboriginal worker liaison program
- a workplace mentor program
- programs on life skills guidance such as money management and the opportunity to assign part of one's wages to a savings account as a means to reduce the potential for negative lifestyle choices

Certain mitigation measures will be developed in cooperation with others and could be offered for both camp workers and members of the GSA communities. These include:

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

The steps available to safeguard community wellness are shared responsibility among Imperial, the GNWT and local communities. Therefore, the GNWT and the local communities should do all they can to control substance abuse, and any resulting conflict and violence. The government and communities could also focus on sustaining the family relationships that might be stressed by absences associated with camp-based project employment.

Because of Inuvik's location in the GSA and its central role as a service centre for the GSA, many of the wellness issues will express themselves there. As a result, effective mitigation is considered to represent a very serious challenge, requiring a concentrated effort by all.

During a January 2004 open house in Tsiigehtchic, a community member suggested that Imperial representatives should discuss ways to maintain and

improve the quality of life with community organizations. Persons attending open house meetings in Fort McPherson and Tsiigehtchic in February 2004 advised that there should be consultations with local communities relative to programs and strategies to control substance abuse.

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 and Associates (2002) study of substance abuse
- plan (HSS) for the likely increase in the stresses and family conflicts often associated with employment absences, and provide additional training to 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 HSS initiatives that address the frustrations, concerns and professional needs of HSS service providers in communities, to improve the morale and effectiveness of its personnel

The GSA 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 with 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 in this effort the whole community, and particularly the moral authority of the Elders.

The mitigation measures for wellness threats might 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, potential project effects tending to increase family and community wellness problem rates will inevitably add to the workloads of service providers.

It is important to acknowledge that the community well-being conditions and social services delivery likely to be potentially affected by the project already represent considerable challenges to study area communities and residents. Therefore, any project-induced effects will be 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 Imperial such as offering workers the opportunity to assign part of their wages to savings. The most effective efforts to protect wellness are those which communities themselves might implement. Many wellness problems in the GSA communities are alcohol related. Few HSS personnel are fully-trained to address substance abuse behaviours (Chalmers and Associates 2002).

### **Residual Effects – Construction**

As stated previously, increased income levels might have both positive and negative consequences within the community. The community well-being benefits could include improved lifestyles, depending on the consumption, savings and investment decisions made by individuals. The risks of effects on individuals discussed in this section reflect the concerns expressed by the public and social service professionals, and the related judgment 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 absences from work are expected. Household management and child rearing could be more 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 result. Implementing the recommended measures for social services delivery will increase the effectiveness of wellness centres in dealing with potential project effects on community wellness, but an increase in the workloads of these centres is inevitable. Accordingly, there is the potential for project effects on GSA wellness services might be adverse and high in magnitude.

In Inuvik, the potential adverse effects are predicted to be high in magnitude and require the collaborative mitigation measures described previously. In the other GSA communities, the effects will likely be moderate in magnitude but not pose a serious risk to local residents. In all cases, effects are expected to last only for the construction phase.

The problems social service workers in the GSA have trying to deal with the conflicting needs of families under stress, often exacerbated by alcohol abuse, might be very difficult. The potential project-related increase in the number of needful clients could overburden social service delivery personnel in Inuvik

during construction, potentially having a high magnitude adverse effect. However, potential project effects are expected to affect social service delivery in Tsiigehtchic and Fort McPherson only marginally (moderate magnitude), and effects are expected to last only for the construction phase.

### **Operations Phase Effects**

Most employment opportunities generated by the project will end once construction and site reclamation activities are complete. The smaller numbers and long term nature of income-generating opportunities, and limited and stable nature of population increases post construction are not expected to result in elevated wellness problem conditions, or affect social service delivery in the GSA. As the project effects will be restricted to construction, there will be no need for mitigation and no residual effects during the operations phase.

### **Individual, Family and Community Wellness – Health Conditions and Health Care Services**

This description focuses on potential project effects on health conditions and health care services in the GSA.

#### **Assessment and Management of Project-Specific Effects – Construction Phase**

Inuvik might be a site of increased disease contagion from the association of many local people with transients and people in the camps, and with increased travel between communities. Such contacts represent possible disease vectors. In addition, as Inuvik will be the transport centre for all project activities in the GSA, with many people passing through, it might be a scene of increased casual sexual encounters, which might increase the rate of STIs.

In addition, Imperial is aware of local concerns about potential project effects on increases in communicable diseases and health conditions generally, on health service delivery, and about relevant preventative measures. A related issue is that alcohol and drug abuse create dangerous situations for health care givers attending to inebriated people, and also makes it difficult for care givers to attend to the needs of others.

Alcohol consumption will likely increase during the construction phase, potentially intensifying the workload of nurses and affecting the quality of treatment their patients receive.

Inuvik alone among the GSA communities will likely gain some in-migrants, despite implementation of measures to control such population movement. Any increase in population will also add to health care workloads in Inuvik.

An implication of this discussion is that health conditions and health care delivery might deteriorate somewhat in the GSA, particularly in Inuvik.

### **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, or with HSS or local communities.

Measures to reduce alcohol abuse, described earlier, are important because alcohol abuse is often associated with violence and various forms of abuse, accidental and violent injuries, and mental and emotional disorders.

The number of HSS staff will experience increased demand for their services. Imperial will work with HSS to:

- design project health and work environment guidelines, procedures and protocols for:
  - medical alert and quarantine protocols
  - fitness for 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, 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 one or more patients from the camp health care facility to a hospital, if this should become necessary
- ensure construction contractors and subcontractors are bound to the guidelines, procedures and protocols developed by Imperial and HSS
- provide HSS in Yellowknife and the regional health authorities with a comprehensive list containing the names and contact information of construction contractors, camp management and senior medical personnel.

Imperial, construction contractors and camp medical staff will be provided with a comprehensive list of contacts for the HSS and the regional health authorities.

All camps will have qualified medical staff, supplies, equipment and transportation appropriate to camp size and location.

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.

The territorial government could take measures that are specifically relevant to health conditions and health services delivery in the GSA, such as:

- ensuring that all the health centres in the study area are fully staffed
- working with Imperial and other service delivery stakeholder representatives to develop the appropriate procedures for dealing with health crises in construction camps, and overload situations in health centres and hospitals
- promptly and fully implementing HSS initiatives that address the concerns and professional needs of GNWT health service providers in communities detailed in *Health and Social Services Action Plan, 2002 to 2005* (HSS, no date).

Changes in population demographics resulting from in-migration were noted previously. Therefore, the mitigation measures described previously in the Demography section are relevant, and are presumed in this discussion.

Because of the difficulties in controlling alcohol abuse, and the many health consequences of this abuse, mitigation measures will likely be only moderately effective. As well, the stresses of long work shifts over extended periods are inescapable for workers, and the periods of lone household management and child rearing will likely be stressful for some workers' spouses. Over-tired workers might have increased vulnerability to disease, therefore potentially exposing members of their families. 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 could potentially increase health problem rates and will add to health care workloads.

### **Residual Effects – Construction**

The health conditions and services likely to be affected by the project represent considerable existing challenges to GSA communities and residents. Therefore, any project effects would be incremental, unless suitable mitigation responses are

implemented. Governments and the communities themselves must undertake key mitigation measures in response to any incremental needs related to health conditions or services.

Most project effects on health in the GSA will be experienced in Inuvik because of:

- potential for increased levels of alcohol abuse, facilitated by ease of access to alcohol
- number of local people employed on the project
- presence of transient job seekers who might be attracted by the project

Generally, in Inuvik and the smaller communities, the potential effects on health conditions might be adverse and moderate in magnitude. However, they are expected to be restricted to local communities and last only for the construction phase.

Making suitable cooperative arrangements between the construction camp health care services and the Inuvik Hospital can substantially reduce the possible direct effects of project construction camps on Northwest Territories health care services. Inuvik now has a new hospital and no explicit provision was made to provide hospital care for a project work force, but the effectiveness of cooperative planning is virtually guaranteed by existing arrangements for airlifting patients who cannot be treated in Inuvik to another hospital in the Northwest Territories or the provinces.

Similarly, implementation of the measures recommended by HSS for nurses will increase the effectiveness of health centres in dealing with project effects on community health, but an increase in the workloads of these centres is very likely. The burden will fall disproportionately on out-patient services at the Inuvik Hospital, which is essentially serving as a health centre. As noted, air-lifting patients to southern hospitals can deal with any overburdening of in-patient services.

Potential effects are expected to be adverse and, in the case of the Inuvik Hospital out-patient services might be high in magnitude. The effects on hospital in-patient services are expected to be only moderate in magnitude but regional in extent because of the hospital's regional role. In both cases they will last only for the construction phase.

### **Operations Phase Effects**

Most employment opportunities generated by the project will end once construction and site reclamation activities are complete. The smaller numbers of income-generating opportunities, combined with their longer-term and stable

nature, are not expected to result in negative effects on health conditions or healthcare services. As the project effects will occur during construction, there will be no need for mitigation and no residual effects in the operations phase.

### **Individual, Family and Community Wellness – Public Safety and Protection Services**

This discussion focuses on potential project effects on public safety and protection services in the GSA.

#### **Assessment and Management of Project-Specific Effects – Construction**

The workloads of RCMP detachments in this area will be affected by:

- potential project effects on the GSA communities
- the construction camp near Campbell Lake
- the numbers of officers available to deal with policing issues

The construction phase is expected to raise the level of community incomes, increasing substance abuse and attracting in-migrants to Inuvik. The workload of RCMP detachments is sensitive to:

- the incidence of alcohol abuse
- the size of the population in the communities served
- the number of RCMP members serving Inuvik and other GSA communities

Inuvik will be the highway, airport and barging transportation hub for the northern-most part of the project and will experience the inevitable resulting increases in policing workload. Highway access from the south will facilitate arrival of some transient job seekers. Easy access to Inuvik by boat or from other GSA communities will accommodate local opportunity seekers and those attracted by the heightened activity in this regional centre.

Thus, the population of Inuvik is expected to increase temporarily, and the population of Fort McPherson might increase as well. The increase will be from:

- travelers in town on project-related business
- southerners exploring business opportunities
- people attracted by the activity and opportunities stimulated by the project who obtain employment

No noticeable change in population is expected in Tsiigehtchic.

All of these people will be away from home, and the familiar and relatively effective personal social controls of their home communities. Transients unsuccessful in finding employment in Inuvik could also add to policing burdens. Workers headed for home after a long work rotation might spend time drinking in Inuvik if weather delays them in transit.

Inuvik, and to a lesser degree Fort McPherson and Tsiigehtchic, will potentially see increased incomes, and the increased availability of alcohol and drugs which increased travel to Inuvik might facilitate. This might result in increased substance abuse by local and non-local people, which could add substantially to domestic and other calls for police service.

### **Mitigation Measures – Construction**

The mitigation measures required to reduce project effects on the calls for RCMP services from the GSA communities will be somewhat different from those measures relevant to needs originating in the construction camps. 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 could add to detachment workloads.

Project transportation activities could affect RCMP workloads. Imperial will undertake the following measures to ensure that:

- safety is the highest priority for the project
- transportation equipment is regularly inspected for safety
- safety is taken into account when planning contractor delivery schedules

Imperial will be responsible for security at project camps and for setting policies regarding behaviour in project camps. Imperial will continue discussions with the RCMP regarding project activities and plans that could influence RCMP work loads, communications between camp management and the RCMP, and the efficiency of RCMP responses to calls for service from the camps.

The general purpose of this consultation would be to improve communication between camp management and the detachment, and forestall possible misunderstandings, to reduce the likelihood of incidents requiring police action and improve the efficiency of RCMP response to calls for service from the camp. The topics on which understandings should be reached include:

- communication procedures, including after-hours communications
- precise specifications of the reason for a call, the urgency of the call and the details relevant to how the RCMP should be prepared to respond

- indication of normal response time and best possible response time to an emergency

Incremental staffing might be needed to control increased policing workloads in communities affected by the project.

The mitigation measures that are normally effective in controlling in-migration were described previously. The effectiveness of such mitigation is important in respect to protection services, because increases in migration can increase the numbers of calls for service to which the local RCMP must respond.

Measures to reduce alcohol abuse, described in the Health Conditions and Health Care Services section, could be undertaken by local communities and the GNWT.

One of the most effective measures to reduce project-induced overburdening of police services in all centres with a liquor store would be to establish the practice, before the construction phase, of firmly enforcing the provisions of the *Liquor Act*. This would include taking into protective custody those so inebriated as to be a danger to themselves or others.

Control of alcohol abuse and reducing demands for policing services in Inuvik cannot be based on restricting the alcohol supply because of the local liquor store, bars and restaurants that serve alcohol to customers. However, it could be possible to restrict the amount of alcoholic beverages that can be purchased at one time. Presently there are no restrictions on liquor sales in Inuvik.

Charges can be laid under the GNWT *Liquor Act* for over-serving patrons in a bar or restaurant, but these charges are laid inconsistently and the rates of charges laid in Inuvik have declined steadily. Consistently laying these charges, when there is cause, would help reduce the number of problems with inebriated people that police must address.

### **Residual Effects – Construction**

The existing chronic alcohol-related problem conditions in the study area suggest that mitigation measures of the GNWT and local communities have not been effective.

Policing services in Inuvik are expected to experience potential effects that are high in magnitude and will need to be monitored as noted previously. Fort McPherson and Tsiigehtchic might experience some increase in policing burdens because of likely increases in substance abuse during the construction phase, but these should be low in magnitude. In both cases, any effects are expected to be restricted to individual communities, and last only for the duration of the construction phase.

### **Operations Phase Effects**

Most employment opportunities generated by the project will end once construction and site reclamation activities are complete. The smaller numbers of income-generating opportunities, and limited population increases are not expected to result in substantial additional demand for protection service delivery. As the project effects will occur during construction, there will be no need for mitigation and no residual effects in the operations phase.

### **Individual, Family and Community Wellness – Education Attainment and Services**

This discussion focuses on potential project effects on education attainment and services in the GSA.

#### **Assessment and Management of Project-Specific Effects – Construction Phase**

An important issue that Imperial is aware of is that young people might drop out of school to take high-paying, short-term, construction-related jobs.

The many project-induced activities will create attractive employment and earning opportunities likely to appeal to current and previous students aged 15 and older in the GSA communities. Some will drop out of school. As a commercial, industrial and governmental service centre, Inuvik will be the likely destination of many project personnel and short- or longer-term migrants attracted by jobs or curiosity. Even with relevant mitigation measures in place, Inuvik might experience in-migration in excess of normal variation. Thus, the Inuvik school system might experience increased enrolment pressures.

There is presently enough surplus capacity in Inuvik classrooms to accommodate any likely enrolment increases. There might be recruitment problems if additional staff is required, or if some teachers resign to pursue project-created opportunities. On the other hand, if in-migration is contained and many students leave school to take project-induced employment, the reverse would be the case.

Fort McPherson might also experience some in-migration, particularly by relatives of local residents. Although possible effects on school enrolments will likely be negligible, these cannot be entirely ruled out. Hence, it is relevant that the school there is reported to have about 35% unused capacity.

The Aurora College campus in Inuvik draws students from all over the BDR. There is presently ample capacity to accommodate increased enrolments because of project-related in-migration to Inuvik.

### **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.

Measures could be designed by GNWT Education, Culture and Employment to make it unnecessary for young people to choose between project employment and continuing their education. This could be accomplished by:

- modification of school programming to allow for participation in the project, which may include school leaves and some credit for work experience
- collaboration between government, educational institutions and Imperial with regard to developing classroom and on-the-job learning equivalencies

Measures taken by Imperial to publicize the opportunities that will come with school completion and with further training 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 described previously in the mitigation measures under Procurement, Employment and Regional Economic Effects, Imperial is involved in a variety of initiatives to prepare Aboriginal people, females and other northern residents for professional and technical level, long-term employment opportunities.

Delivering a coordinated stay-in-school message must be the collective responsibility of educators, families, community leaders and Imperial. This message should inform young people 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 females for non-traditional jobs, given the:

- educational attainment of females, which is often better than that of males throughout the North
- under-representation of females in most job categories related to project requirements

Imperial will request that:

- HRSDC, 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 towards the long-term employment of females in these non-traditional occupations.
- GNWT agencies (DOT and MACA) 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.

### **Residual Effects – Construction**

According to current estimates, because of project construction, 450 people are expected to in-migrate to Inuvik. Among the families included in that total, there could be about 65 school-aged children. The size of the Inuvik population and current levels of unused capacity in Inuvik schools will result in little effect on education resources, or facilities and services.

However, even well-designed measures to discourage migration from outlying communities to centres of project activities will only reduce, not eliminate, such migration, which will likely target Inuvik. Based on this migration, there might be potential effects on these two sources of population increase on Inuvik school facilities and services.

Mitigation measures might also fail to deter some adolescent students from dropping out of school to seek short-term project opportunities. Accordingly, the post-mitigation project effects on adolescent students might be noticeable in Inuvik. If there were both project-induced in-migration and early school-leaving, the effects on education facilities and services would tend to cancel each other out, one tending to increase and the other to decrease enrolment. These effects are expected to last only for the construction phase.

### **Operations Phase Effects**

Though most employment opportunities generated by the project will end once construction and site reclamation activities are complete, there will be some operations employment available. Initially, southerners will fill many of the direct operations and maintenance jobs, but the goal of Imperial, the GNWT and Aurora College through the POTC is to plan and facilitate an operations phase training program for interested and qualified northern residents. The intent of the program is to provide training and industrial work site experience for northern students so that they can be gradually integrated into the project operations and maintenance workforce, and ultimately fill most of the positions.

The effects of this increasing employment of local people in the operations phase, and of other likely opportunities, will be to demonstrate the benefits of completing high school and post-secondary training. This effect will be particularly true in Inuvik. There will likely be many good job prospects in Inuvik, and the Samuel Hearn High School and the new Aurora College facility will both be sufficiently large to provide enhanced training services.

### **Traditional Culture – Traditional Harvesting and Land Use**

This discussion focuses on potential project effects on traditional harvesting and land use in the GSA.

#### **Assessment and Management of Project-Specific Effects – Construction Phase**

The project might affect traditional harvesting through project-related demands on harvesters' time, the resources needed for efficient harvesting, and the motivation of Aboriginal people to do the often demanding work of harvesting.

Project demands for workers and a range of employment opportunities exist throughout the study area. This increased employment might reduce time spent on harvesting activities. However, earnings from well-paying employment could make it possible to purchase new and better equipment, such as snow machines, all-terrain vehicles, boats and outboard motors, to make resource harvesting more efficient and productive.

Project-induced employment could increase harvesting motivation among various types of harvesters. Those who spend some of their earnings on harvesting equipment will be eager to use their new 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 a source of food and of cultural sustenance, and will not decrease because of wage employment. Many believe that harvesters will still find time to hunt (participant at the second ISR–GSA technical workshop in February 2004).

However, harvesting motivation might be undercut by substantial incomes, often earned in work activities and settings more physically comfortable than those associated with harvesting. 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.

It is not possible to fully evaluate the importance of these competing influences and motivations. Undoubtedly, many Gwich'in people will want to and will obtain some form of project-induced employment that could involve unusual demands on their time. If this results in reduced traditional harvests, it would affect the majority of Fort McPherson Tsiigehtchic households where at least half of their diet is country food. However, this level of dependence might ensure the continuing obligation and motivation of many to continue harvesting.

### **Mitigation Measures – Construction**

Although the project can have both facilitating and inhibiting influences on traditional harvesting, project effects could add to the slow, ongoing decline in traditional harvesting activity. Mitigation should focus on inhibiting any such tendency. Relevant efforts can be made by Imperial and the GNWT. Local communities can continue to expect and consume the traditional harvest, and encourage and reward the harvesters with praise and status.

Measures that will be undertaken by Imperial include:

- providing Aboriginal workers with 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 cultural activities and events that are consistent with Imperial's principles and practices for community involvement
- supporting community-based traditional lifestyle initiatives that promote traditional harvesting and positive relationships with communities

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 meat. These programs and publications should be continued and potentially expanded.

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.

Harvester compensation agreements will address actual and potential wildlife harvest loss resulting directly from project construction and operations. The specific terms and provisions of the agreements will be negotiated by Imperial with the renewable resource councils or other relevant organizations.

### **Residual Effects – Construction**

Much harvesting is sufficiently flexible to permit scheduling of harvesting leaves. Imperial will support harvesting leaves for Aboriginal workers to the extent practical, and with the assumption that the GNWT will continue relevant programs, which will ensure that any potential effects in the GSA will be low in magnitude. With implementation of the mitigation effects discussed here, effects in Fort McPherson and Tsiigehtchic are unlikely to substantially affect traditional harvesting.

As indicated, the residual effects after mitigation are expected to be broadly similar throughout the GSA. It is expected that traditional harvesting activity in the Aboriginal communities will be affected. However, in Inuvik, the effects on resource harvesting are expected to last only for the duration of the construction phase.

### **Operations Phase Effects**

Though most employment opportunities generated by the project will end once construction and site reclamation activities are complete, there will be continued operations and maintenance jobs in the GSA. Since most of the project effects on traditional harvesting and land use are expected to occur during the construction phase, there will be no need for mitigation and no residual effects during the operations phase.

## **Traditional Culture – Preservation of Traditional Language and Culture**

This discussion focuses on potential project effects on preservation of traditional language and culture in the GSA.

### **Assessment and Management of Project-Specific Effects – Construction Phase**

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. Project demands for workers, and a broad range of employment opportunities, will be found throughout most of the GSA. Those responding to these opportunities will find that 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 sharpen 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 some Aboriginal people feel from some dealings with some non-Aboriginal officials and individuals.

With only 28% of GSA Aboriginal community residents able to speak the Gwich'in language in 1999, the use of English is much more widespread than use of Gwich'in. Therefore, existing trends and influences to further erode traditional language preservation can be stronger than those sustaining language and culture preservation. However, project-related employment might marginally add to the slow, ongoing decline in language and culture preservation.

### **Mitigation Measures – Construction**

Imperial recognizes that 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.

Imperial will implement the following initiatives:

- providing cultural awareness training to all workers on the project (The goal will be to provide southern workers with information on traditional Gwich'in culture: its values, norms and conceptions of human nature and suitable human behaviour. This training will promote appreciation and respect for Aboriginal people and their culture, and facilitate smooth, friendly interaction between Aboriginal and non-Aboriginal employees at work and in camp.)
- providing Aboriginal workers with 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
- supporting cultural activities and events that are consistent with Imperial's 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 handcrafts 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 market for their work and forestall any need for workers, wanting to buy Aboriginal handcraft, 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.

### **Residual Effects – Construction**

Assuming that the required provision for Aboriginal preferences and interests in construction camps and flexible work schedules are in place, and that the relevant GNWT programs will be continued, the effects will likely be limited. Effects are expected to last only for the construction phase.

English language influences are already so strong in Inuvik that no project effects on language and culture preservation are expected. Project effects are expected to be low in magnitude in the GSA Aboriginal communities of Fort McPherson and Tsiigehtchic.

In the GSA as a whole, the effects are expected to be low in magnitude. The effects will last only for the duration of the construction phase.

### **Operations Phase Effects**

Though most employment opportunities generated by the project will end once construction and site reclamation activities are complete, there will be some continued operations and maintenance jobs in the GSA. However, since most of the project effects on traditional language and culture are expected to occur during the construction phase, there will be no need for mitigation and no residual effects during the operations phase.

## **Non-Traditional Land and Resource Use**

### **Borrow Resources**

Project construction activities could block access to existing borrow operations. Project effects will only be adverse if existing operations are temporarily closed or inaccessible for community use during construction. However, because extensive borrow resources are required for the project, it is more likely that current use and access to existing operations, while not in use by the project, will increase substantially. There will also be positive effects related to increased northern benefits because of expansion of existing, and development of new, borrow sites.

Removal of some of the granular resources from borrow sites will be permanent. This will result in a depletion of the total amount of borrow materials presently identified in the GSA. The percentage of borrow resources that will be depleted in the GSA cannot be determined at this time because a detailed study of gravel supply in the GSA has not been conducted. Review of historical borrow materials inventories indicate that adequate borrow materials should be available for the project without removing all available materials.

During the life of the project, additional borrow resources might be required periodically for maintenance and repairs. The amounts required would be less than that needed for construction of project components. Because borrow resources will continue to be removed during operations, the overall effect will increase. However, the primary effect from the project will occur during construction.

Following decommissioning of the project, borrow materials used for the project, such as facility or infrastructure pads, might again be available for use by local communities.

### **Timber Resources**

The project will have no effects on commercial forestry operations in the GSA because there are none occurring along the right-of-way or at the site of other project components. There is an unlikely possibility that existing timber harvesting practices for local firewood supply could be disrupted because of restricted access to areas in and around facilities, infrastructure sites, borrow sites and within the right-of-way during construction. Also, clearing of timber along the pipeline right-of-way and at other project sites will result in a small decrease in the available supply of firewood and construction materials for local residents, unless the removed timber is put aside for local communities.

During operations, there could be a positive effect for timber harvesters because of increased access to timber, particularly the increased access provided by the all-weather access road to the Inuvik area facility.

### **Mineral Resources**

There are currently no mining operations within the GSA. Therefore, there will be no project effects on mining during construction. Several prospecting permits have recently been issued along the eastern edge of the GSA. The owners of these claims will be contacted to determine their plans and ensure there will be no conflicts with the project.

### **Oil and Gas Activities**

Oil and gas activities in the vicinity of the project components could be adversely affected during construction activities because of blocked or restricted access to lands with existing exploratory licences or significant discovery licences. However, it is more likely that other oil and gas operations will plan their activities around the project, and the level of oil and gas activity could be encouraged and increased because of the promise of an efficient method of moving product. Construction of new roads could cause an increase in oil and gas activity.

On occasion, intermittent ground operations activities could temporarily block access to lands in the immediate vicinity of the pipeline. Few of these instances are expected.

### **Non-traditional Resource Harvesting**

Restricted access to lands crossed by the pipeline or occupied by other project components could disrupt non-traditional resource harvesting at locations where construction activities are occurring. Fish and wildlife species inhabiting or migrating through the study area could also be displaced by construction activities and noise. This could lead to a decrease in harvest success and thereby affect non-traditional resource harvesters.

Following construction, non-traditional resource harvesting should return to normal in the area of most project components, except during intermittent ground operations activities that could temporarily displace wildlife or block access to lands in the immediate vicinity of the activity. At the Inuvik area facility, increased noise from machinery and increased human activity during operations could also cause sensory disturbance to wildlife. The potential dispersion of wildlife species in the vicinity of the facility could result in a decrease in harvest success if there is hunting in this area, thereby adversely affecting resource harvesters by requiring them to hunt in different areas.

Presence of the pipeline right-of-way and all-weather or winter access roads associated with the project could provide increased access to wildlife or fisheries resources, resulting in a positive effect to local resource harvesters. Although regional harvesting levels are not expected to increase because of improved access, it could result in a change in the locations where harvesting occurs.

During decommissioning of the project, there will be an increase in traffic, noise and emissions from heavy machinery. These activities could also have indirect adverse effects on resource harvesting by causing a displacement of wildlife.

During construction and operations, there is the potential that collisions with vehicles on access roads could cause some mortality to wildlife. This should not lead to a decrease in harvest success, but traffic effects of the project can be reduced by decreasing the number of vehicles that must travel on access roads (for instance by using multi-person vehicles such as buses whenever practical) and providing suitable training to project employees to encourage them to drive with caution.

If the many workers required to construct the pipeline take part in hunting or fishing in their free time, there could be effects to other resource users. The project will have hunting and fishing prohibitions in place for workers based in construction camps. However, if workers choose to hunt or fish away from the camps on their personal time before or following the rotation of their shift, the local hunting and fishing regulations will apply to them, as they will to any other northern visitor.

Operations staff requirements will be much smaller than construction workforce requirements. The initial staff population will be a mix of northern and southern workers to ensure that adequate skills and experiences are available for the startup and initial operations period. It is anticipated that, as northern worker capacity and capabilities grow, many of the operations positions will be staffed by northerners and that, in time, northerners will take over most of the operations duties from southern workers. Most of these northerners will be community residents who already partake in resource harvesting.

Many workers who accept operations positions in remote regions, such as northern Alberta or the Northwest Territories, enjoy outdoor recreational pursuits

such as hunting and fishing. However, the impact on local resource harvesting will be minimal. Operations staff will likely consist of a combination of resident and rotating shift workers. The amount of time available for recreational hunting and fishing will be limited for shift workers due to the nature of rotating shift work (12-hour shifts with two weeks on and two weeks off). The ability of shift and resident workers to hunt or fish will be subject to local NWT hunting and fishing regulations, including a mandatory guiding requirement for hunting during the first two years of residency.

### **Tourism and Recreation**

Tourism and recreation could be adversely affected by pipeline construction activities because of restricted access or a change to existing travel routes. Most tourism activities occur during the summer months and pipeline construction will take place primarily over the winter. However, there will be some construction activities during summer months for development of infrastructure sites and borrow sites. Sensory disturbance because of increased traffic, noise and emissions during construction could adversely affect the quality of other recreation activities, particularly those winter activities enjoyed by local community members, such as snowmobiling or cross-country skiing. However, it is expected that these activities will primarily occur near established communities and there will be less recreational use in the more remote areas in the GSA affected by the project. Following completion of construction activities, there could be a positive effect to recreation because of access to previously inaccessible areas along the right-of-way, particularly south of Inuvik.

Noise produced by construction and operations activities could affect tourism and recreation, particularly near the Inuvik area facility. However, it is expected that few tourism activities will occur in the local vicinity of the facility because of its remote location. Following completion of construction activities, there could be a positive effect to recreation because of access to previously inaccessible areas along the access road to the Inuvik area facility. In addition, tourism in the GSA could be positively affected if there are tours of the facility during operations.

If the many workers required to construct the pipeline take part in community tourism or recreation in their free time, there could be effects to other tourists or recreational users. Controls will be set in place to limit construction worker participation in these activities. The construction workers will be provided with ample recreational opportunities within camps. Participation in tourist or recreation activities outside camps while workers are on shift will not be permitted. However, if southern workers partake in tourist activities during their free time, such as the days before or after work assignments, the tourism industry would benefit from an increased volume of visitors.