
TITLE	SSA Application for a Type A Water Licence
SECTION	3: Overview of Activities in the SSA
SUBJECT	1: Regional Overview

PURPOSE

This section describes the proposed activities and pipeline components associated with the Mackenzie Gas Project in the Sahtu Settlement Area (SSA). It applies to both the construction and operation phases, and contains typical drawings, artist's impressions and photographs.

An introduction to the existing biophysical and human environment baseline setting is also included in this section, as is a discussion of primary mitigation strategies to reduce potential effects or development concerns that might be associated with the project.

SUMMARY OF REGIONAL ACTIVITIES

A 1 km wide corridor has been identified for the NGL and gas pipelines through the SSA. Within this corridor, a preliminary pipeline route has been identified that extends across about 513.9 km of Sahtu Crown, private and Commissioner's lands. Of this total, about 230.9 km is located in the K'ahsho Got'ine District and 272.6 km in the Tulita District. The remainder crosses a 10.4 km segment of Sahtu private land in the northernmost portion of the Deh Cho Region (DCR).

Development Activities

As shown in [Figure 3-1](#) and the foldout map in [Appendix C](#), the proposed development activities in the SSA will involve constructing and operating:

- 288.2 km of parallel NGL and gas pipeline in a 50 m wide right-of-way
- 223.8 km of gas pipeline in a 40 m wide right-of-way
- 1.9 km of NGL pipeline in a 30 m wide right-of-way, extending from the 50 m right-of-way to an interconnection with the Enbridge (Norman Wells) pipeline system near Norman Wells
- gas compressor stations near Little Chicago and Norman Wells
- pipeline appurtenances such as valves, and cathodic protection at 32 sites

New permanent pipeline right-of-way will be required for about 224.9 km of Sahtu private land, 264.5 km of Crown land, and 24.5 km of land in the municipalities of Norman Wells and Fort Good Hope. An estimated 180.1 ha of additional temporary workspace will also be needed for construction purposes,

including about 78.1 ha on Sahtu private land, 90.4 ha on Crown land and 11.6 ha within municipal boundaries.

To support the proposed pipeline construction and operations activities in the SSA, various new infrastructure developments will be needed, including:

- stationary camps at Little Chicago (one for the pipeline and one for the facility site), Fort Good Hope, Norman Wells (one for the pipeline and one for the compressor station), and Little Smith Creek
- stockpiles, fuel storage and helicopter landing areas at Little Chicago (both pipeline and facility site), Fort Good Hope, Norman Wells (both pipeline and compressor station), Tulita, 12-Mile Point and Little Smith Creek
- 161 new roads totalling 427.2 km
- temporary barge landings at Little Chicago, Fort Good Hope, Tulita (West), 12-Mile Point, and Little Smith Creek
- a new airstrip at the Little Chicago facility site
- new helicopter landing area at Little Chicago
- communications facilities, including repeater towers, at various intervals along the pipeline right-of-way

Borrow Sites

To support construction activities in the region, an estimated 2,180,000 m³ of borrow materials will be required in the K'ahsho Got'ine District and 1,565,000 m³ in the Tulita District. Twenty-six borrow sites are being considered for potential development in K'ahsho Got'ine, of which 16 are situated on Sahtu private land. Two are in Fort Good Hope within municipal boundaries. In the Tulita District, 29 potential borrow sites are being considered, including 17 on Sahtu private land and two within municipal boundaries in Norman Wells. Together these 55 sites could provide 3,745,000 m³ of borrow material. Some of these sites might not be developed. As borrow material volumes and the locations in which the material is required are further refined, some sites will likely remain undeveloped.

Existing Infrastructure

In addition to the proposed development activities, existing services and transportation infrastructure will be used where practical, and with permission where required. Examples include:

- winter and ice roads operated by the GNWT

- commercial airports at Fort Good Hope, Norman Wells, and the town of Tulita
- two barge landing sites at Norman Wells
- bulk fuel storage at Norman Wells

Water Requirements and Sources

An estimated 607,700 m³ of water will be needed in the SSA during the primary pipeline construction seasons (see [Table 3-1](#)). These requirements are addressed in the Type A water licence application that has been submitted to the MVLWB.

The water will be used to build and maintain access roads and a right-of-way travel lane, as well as for HDD slurries, pressure testing and domestic purposes at the camps. Water will normally be transported by truck to sites from nearby lakes, rivers, and in certain cases, municipal systems.

Table 3-1: Water Requirements in the SSA

Purpose	Annual Quantity (m ³)	Total Quantity (m ³)
Access roads	112,400	337,200
Right-of-way travel lane	332,000	996,000
Camps	163,300	326,600
Pressure testing	N/A	13,500
HDD	N/A	17,600
Total	607,700	1,690,900

About 84 potential water sources are being investigated for use in the SSA, including 52 in the K'ahsho Got'ine District and 32 in the Tulita District (see [Table 3-2](#) and [Figure 3-2](#)). About 65% of these sources are on Sahtu private land. Some can be accessed from several points on the pipeline right-of-way. The largest potential source is the Mackenzie River.

Table 3-2: Location of Potential Water Sources in the SSA

Location	Approximate Kilometre Post (KP)		Number of Sources
	From	To	
K'ahsho Got'ine District			
Little Chicago Area	187.2	229.9	15
Ramparts Plateau Area	229.9	322.3	21
Fort Good Hope Area	322.3	346.8	10

Table 3-2: Location of Potential Water Sources in the SSA (cont'd)

Location	Approximate Kilometre Post (KP)		Number of Sources
	From	To	
K'ahsho Got'ine District (cont'd)			
Taintu River Area	346.8	377.3	3
Chick Lake Area	377.3	404.1	2
Paige Mountain Area	404.1	418.0	1
Total			52
Tulita District			
Paige Mountain Area	418.0	431.7	2
Oscar Creek Area	431.7	476.4	10
Norman Wells Area	476.4	495.6	0
7 Creeks Area	495.6	525.0	2
Bear Rock Area	525.0	605.6	8
Big Smith Creek	605.6	626.9	3
Little Smith Creek	626.9	686.3	6
Total			32 ^a
NOTE: ^a One water source is on SSA private land within the Deh Cho Region (KP-692.9).			

Water Use and Deposits

Water will be obtained from the Mackenzie River and various lakes in the SSA for building winter access roads and the pipeline travel lane.

No additives to or treatment of the water will be required for building the access roads and travel lane. The water will be trucked to the sites and used to help freeze and form the travel or work surface. In spring, the ice and snow will melt and flow into the natural drainage system. Any fuel spills will be handled in accordance with the project spill contingency plan (SCP). The collected materials will be managed in accordance with the applicable regulatory requirements (see [Section 11](#)).

Domestic wastewater from the camps will be treated to meet the appropriate regulatory standards. Camp sewage will either be treated on site or transported to an approved off-site location, in compliance with the applicable environmental and health standards. Off-site transport and disposal of sewage will occur primarily when smaller staffing requirements exist, such as during the operations phase.

Water for pressure testing the pipelines is expected to be obtained from sources within the SSA. This water will be mixed with a freeze depressant. After the tests are completed, the freeze depressant will be separated from the water or the mixture will be salvaged or disposed of in an environmentally appropriate manner. A number of alternatives are being investigated for disposal, including recycling, flaring or evaporation.

Figure 3.1 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.

Figure 3.2 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.

TITLE	SSA Application for a Type A Water Licence
SECTION	3: Overview of Activities in the SSA
SUBJECT	2: Project Setting

SETTING FOR PROJECT ACTIVITIES IN THE SSA

This subject provides a summary of the regional biophysical and human environment setting for the development activities that will occur in the SSA. Detailed regional information is provided in [Section 8](#).

BIOPHYSICAL SETTING

The biophysical information in this subject incorporates information from desktop studies and reconnaissance-level field investigations in 2002, 2003, and 2004. The desktop studies included a review and analysis of available literature, government data, aerial photos, and satellite imagery. The reconnaissance surveys were conducted along the pipeline route, at proposed facility sites, and at various infrastructure sites. Detailed fisheries and wildlife studies, as well as air quality monitoring and sound level surveys, were also undertaken at certain locations (see [Section 8](#) for regional data and sections 4, 5, 6 and 7 for site-specific information).

Air Quality and Climate

The pipeline corridor and all facilities in the SSA are located within a 250 x 375 km area designated as Central Airshed.

Average annual temperatures in the SSA range from -7.8°C in Fort Good Hope to -6.0°C in Norman Wells. Temperature extremes can range from -55.6°C in the winter to 35.0°C in the summer. Total annual precipitation ranges from 281.9 mm in Fort Good Hope to 316.6 mm in Norman Wells. Winds at Norman Wells reflect the channelling effect of the Mackenzie River Valley, with a strong west-northwest and east-southeast component.

Noise

Baseline sound level surveys were conducted about 1 km from the proposed Norman Wells compressor station, about 5 km from the Norman Wells airport and about 1.5 km west of an existing Imperial Oil facility north of Norman Wells. The survey was conducted over 24 hours in the summer. For short periods, aircraft caused sound levels to rise between 50 and 70 dBA. Thunder caused one spike in the sound record, giving a one-minute L_{eq} value of 58 dBA. The lowest hourly L_{eq} measured after data validation was 28 dBA. There were 11 occurrences of aircraft noise recorded during the survey.

Soils, Landforms and Permafrost

Moraines form the most common of the surficial units in the project area. The pipeline corridor traverses morainal sediments and lacustrine deposits occupying the floor of the Mackenzie Valley. Moraines are composed of glacial till of variable thickness and tend to be poorly drained. Till commonly has a high silt and clay content and contains a moderate to high proportion of ice or water. Glaciofluvial landforms such as eskers and kames were deposited by meltwater streams and are composed of sand and gravel. Thick units of glaciolacustrine sediments were deposited in glacial lakes following deglaciation. These fine-grained sediments are ice-rich and are commonly thaw unstable. Abundant fens and bogs occupy depressions and low-lying areas in moraine glaciolacustrine plains.

Soils found in the portion of the North Taiga Plains ecological zone situated north of Fort Good Hope, consist mainly of Orthic Turbic Cryosols. The remainder of the North Taiga Plains, between Fort Good Hope and the town of Tulita, consist of Orthic Turbic Cryosols and Gleysolic Turbic Cryosols. South of the town of Tulita, in the South Taiga Plains, the soils are dominated by Eutric Brunisols, Organic Cryosols and Gleysolic Static Cryosols.

The SSA is characterized by discontinuous permafrost. The annual active layer in permafrost areas typically ranges between 0.5 to 1.5 m deep and varies depending on local surface disturbance and temperature conditions. There is a general trend of increasing average temperature, that is, -8 to 0°C, for shallow permafrost from north to south depending on location and local conditions.

Low ice contents are expected in well-drained, coarse-grained sediments that are often clast supported and above the local groundwater table. Ice-rich permafrost is more commonly associated with sand and gravel below the local water table, silty clay fine sand deposits, such as fine-textured moraine, glaciolacustrine and lacustrine sediments and organic soils.

Vegetation

The area covered by the SSA falls in the South Taiga Plains and the North Taiga Plains ecological zones. The North Taiga Plains Ecological Zone is a zone of stunted forest that extends south from the Travaillant River to the Great Bear River. North of Fort Good Hope are large areas of uplands, characterized by open scrubby forest of black and white spruce, and large burned areas with regenerating mixedwoods. Between Fort Good Hope and the Franklin Mountains there are large, flat, glaciolacustrine plains covered by a patchwork of open black spruce forest and level, poorly drained areas dominated by Labrador tea, sphagnum and reindeer lichen. The slopes of the Franklin Mountains support mixedwood forests of white spruce, black spruce and Alaska birch. Another area of large burns occurs south of Norman Wells down to the Great Bear River.

The South Taiga Plains Ecological Zone contains the most diverse and productive vegetation types along the pipeline corridor. The zone extends south from the Great Bear River. In the uplands, there are closed forests of aspen, white spruce, Alaska birch and jack pine. In the more level, poorly drained terrain, there are extensive forests of open to scattered black spruce and tamarack.

The proposed pipeline route crosses 31 mapped vegetation types in the SSA. There are five vegetation types of concern, four vegetation communities of concern and six rare plant species that have been identified in the SSA in the North Taiga Plains Ecological Zone. There are six vegetation types of concern, four vegetation communities of concern and two rare plant species that have been identified in the South Taiga Plains Ecological Zone in the SSA.

Wildlife

The Sahtu Settlement Area supports a diversity of wildlife species. The region is home to about 39 species of terrestrial mammals, including ungulates, large carnivores, furbearers, and small mammals. Characteristic species include moose, woodland and barren-ground caribou, black bear, grey wolf, red fox, American beaver, and muskrat. Several of these species are economically important to communities within the SSA. Moose and caribou are important sources of food, while furbearers such as lynx, marten, beaver, muskrat and hare are trapped for their fur. Several terrestrial mammal species at risk occur in the SSA, including grizzly bear (northwestern population), wolverine, fisher, northern flying squirrel and river otter.

Important terrain features in the SSA include glaciofluvial landforms (such as eskers), river valleys, and cliffs. These areas represent a small part of the overall landscape, but provide important denning, nesting or foraging areas for wildlife. For example, gravel till deposits are often used as denning areas by foxes and wolves, while cliffs can be used by nesting peregrine falcons and golden eagles.

River valleys, such as the Mackenzie River valley and its main tributaries, are considered important wildlife habitat in the SSA and often provide critical winter range for wildlife, especially when surrounding uplands have been extensively burnt. Riparian forest and shrub habitats within valleys provide food, protective cover and thermal cover for wildlife. As a result, these areas typically support a higher diversity of wildlife than surrounding regions. Valleys can also act as important movement corridors for a number of wildlife species.

A high diversity of bird species occurs in the SSA. About 150 bird species occur in the region, of which 123 species occur as breeders and the remainder (mostly shorebirds, waterbirds and several raptors) as migrants. Characteristic species that migrate through the region include snow geese and tundra swans, while breeding species include several species of waterfowl, raptors, shorebirds and passerines, such as warblers, thrushes, sparrow and finches. Only 18 species occur as year-round residents (northern goshawk, ruffed grouse, spruce grouse, willow

ptarmigan, sharp-tailed grouse, great horned owl, northern hawk-owl, great gray owl, boreal owl, downy woodpecker, hairy woodpecker, three-toed woodpecker, black-backed woodpecker, gray jay, common raven, boreal chickadee, white-winged crossbill and common redpoll). Several species at risk occur in the SSA, including peregrine falcon, short-eared owl, and golden eagle, as well as numerous species of waterfowl, shorebirds and passerines.

The wetlands, lakes and watercourses within the SSA provide important nesting and migrating habitats for waterfowl and shorebirds. The Mackenzie River supports many migrating waterfowl in the spring, including snow geese and tundra swans. Upland habitats in the SSA, such as forests, shrublands and grasslands, support nesting hawks (such as sharp-shinned hawk and northern goshawk), owls (such as northern hawk owl and great gray owl), upland game birds (such as spruce grouse and ruffed grouse), woodpeckers (such as three-toed woodpecker and northern flicker), and various passerines (such as warblers and sparrows). Bogs and fens within the SSA are important nesting habitats for several birds, including sandhill crane and lesser yellowlegs. Raptors in the region tend to nest near wetlands, lakes, sandbars, watercourses and other permanent bodies of water where prey is abundant. They use cliffs or large trees near waterbodies for nesting, and open, remote areas for foraging.

The diversity of amphibians in the SSA is low. Only two species of amphibians, the boreal chorus frog and wood frog, occur in the region. The boreal chorus frog is considered '*sensitive*' by RWED (now ENR) (GNWT 2004). Little information is available on the distribution and abundance of amphibians in the SSA, including the pipeline corridor. Amphibian habitat (such as bogs, lakes, marshes, pools) is widespread in the SSA; however, other factors, such as climatic conditions, may limit the distribution of species throughout the region.

Hydrology

Sahtu Settlement Region is located within the central hydrologic region. In the SSA, this hydrologic region is dominated by the Franklin Mountains drainage basin. Flow varies considerably because of the steep topography and high groundwater contribution in the area. Streams typically have higher peak flow per unit area than in other regions, and many flow through the winter. Peak flow tends to occur in late May and early June from snowmelt, but can also occur in late summer or fall after intense rainfall. Watercourse crossings for the proposed pipeline are in low-lying areas adjacent to the Mackenzie River. The topography becomes much steeper eastward to the mountains.

Seventy-seven percent of potential watercourse crossing sites in the SSA were found to be vegetated drainages with poorly defined flow paths or with drainage dispersed through shrubs or trees. Ten percent of the potential crossing sites, which include 25 streams, are Active II Channels with discernible banks and substrate, though these are small streams that are expected to freeze to the bottom

in the winter. Twelve percent of the potential crossing sites, which include 31 watercourses, are Active I and Large River Channels. These include the Tieda River, Loon River, Hare Indian (Rabbitskin) River, Donnelly River, Great Bear River and Big Smith Creek, which might freeze only partly to the bottom in winter.

Groundwater

In the northern half of the SSA, the pipeline corridor crosses the Anderson Plain. In the southern half, the pipeline traverses both the Mackenzie Plain and the Franklin Mountains physiographic regions. In the Anderson Plain, in the zone of extensive discontinuous permafrost, groundwater contributions to watercourse flow are seasonal, with no or negligible contributions made in winter. Permafrost varies from extensive discontinuous to intermediate discontinuous and largely controls groundwater movement in the Mackenzie Plain. However, karst processes are dominant in the Franklin Mountains, and these also influence the adjacent Mackenzie Plain, by maintaining all-year flow in spring-fed rivers and streams. Karst features include sinkholes and perennial springs, some with high discharge rates. The karst landscapes of the Franklin Mountains and associated lowlands make up an important hydrogeological region in the zones of extensive discontinuous and discontinuous permafrost.

Water Quality

Waterbodies along the proposed pipeline route through the SSA fall within the lower Mackenzie River sub-basin. The waters of this sub-basin typically have higher levels of turbidity and moderately low total dissolved solids (TDS) concentrations and conductivity. These parameters are influenced by the discharge regime. For example, turbidity and colour tend to be low over the winter, highly variable in spring, and peak over the summer. Conversely, conductivity and TDS concentrations are highest in the winter and decline in the open water period.

Fish and Fish Habitat

The Mackenzie River and its tributaries throughout the region support both anadromous (species that move between the Beaufort Sea and upstream spawning or overwintering habitats) and resident fish species. About 31 fish species are potentially present in SSA watercourses. Of these species, 12 are fall and early winter spawners and likely to be present in the Mackenzie River and use its tributaries to spawn. Fall spawners include all the salmonid species except Arctic grayling. Fall spawning generally occurs in the larger watercourses with perennial flow in order for the eggs to survive through winter conditions. The remaining species are spring or summer spawners. Spring spawning normally occurs in small tributaries that would be dry or frozen to the bottom in the winter.

The majority (about 77%) of the waterbodies crossed by the pipeline route within the SSA are classified as Vegetated Channels, which means that they have poorly defined flow paths, can exhibit ephemeral flow, and are unlikely to provide habitat for large or small-bodied fish species.

HUMAN ENVIRONMENT SETTING

This topic discusses various aspects of the human environment in the SSA, including traditional culture, heritage resources, logistics, employment, the economy, infrastructure, and community services. It includes feedback from the public involvement program, interviews and a review and analysis of available literature and government data. A detailed discussion is provided in [Section 8](#).

People and the Economy

The SSA is divided up into three districts that include four predominantly Aboriginal communities, and one predominantly non-Aboriginal community.

- Fort Good Hope and Colville Lake are located in the K'ahsho Got'ine District
- The town of Tulita and the predominantly non-Aboriginal community of Norman Wells are located in the Tulita District
- Déline is located in the Déline District

The 2003 estimated population of the SSA communities was 2,504, including 797 in Norman Wells. Census counts between 1991 and 2001 show increases for the Aboriginal communities of Colville Lake and Tulita.

Census data for 2001 indicates that more than 90% of the populations of Fort Good Hope, Déline, the town of Tulita and Colville Lake were Aboriginal (mostly Dene). In Norman Wells, 29% of the population was Aboriginal, mostly Dene and Métis.

The labour force activity for both male and female participation rates in the SSA increased between 1991 and 2001, by 4% for males and 7% for females. Male and female employment rates increased between 1991 and 2001 in the Sahtu Aboriginal communities. Although the female employment rates increased in Norman Wells by 9% during this period, the male rates fell by 8%. The unemployment rates of both males and females in the SSA fell by 5% between 1991 and 2001, driven primarily by declines in Fort Good Hope and the town of Tulita.

In 2001 in the SSA, trades and transport, sales and service, and management and business occupations were well represented. Between 1991 and 2001, the proportions in management and business, science, government service, sales and service, and primary industry occupations increased, but the proportion in clerical,

and trades and transport occupations declined. During the same time, the percentages of men increased in management and business, government service, science, and trades and transport occupations. The occupational distribution in the SSA was similar to that in the Northwest Territories in 2001, except for the higher proportion in trades and transport occupations in the SSA.

In the SSA Aboriginal communities, average employment income dropped between 1996 and 1999, then increased between 1999 and 2001 to almost \$24,000 per year. This was in contrast to the strong growth in average employment income in Norman Wells, reaching over \$51,000 in 2001. The average number of monthly income support beneficiaries in all SSA communities declined markedly between 1996 and 2003 reflecting changes in government policy that introduced more stringent income support criteria (GNWT Education, Culture and Employment (ECE) regional superintendent 2002, personal communication).

The cost of living in the SSA was between 50 and 65% higher than in Edmonton in 2000. However, in Colville Lake, it was 110% higher in 1997. In the SSA, food prices were 60 to 73% higher than Yellowknife prices in 2001 and in Colville Lake was 113% higher in 1997 (GNWT Bureau of Statistics 2004).

Community Services

With the exception of Colville Lake, all of the SSA communities have television, radio, and newspaper and mail deliveries three to five times a week. Colville Lake has a courtesy mail bag that arrives from Fort Good Hope. Public internet access is available in Fort Good Hope, Déline and the town of Tulita, while public connections are available in Norman Wells. No internet connection is available in Colville Lake (GNWT Resources, Wildlife and Economic Development (RWED, now ENR) 1999; Northwestel personnel 2001, personal communication).

Twenty percent of housing in the Sahtu communities needed major repairs in 2001. The situations in Colville Lake and Norman Wells were better than in the Northwest Territories as a whole. The community with the highest percentage of housing needing major repairs was Fort Good Hope, at 35%.

In 2004, Norman Wells and Fort Good Hope have had serious housing shortages. The senior administrative officer for Norman Wells reported in April 2004 that the housing situation was quite strained and there were no vacancies in town that they were aware of (CBC 2004). A severe shortage was also reported as a major concern in Fort Good Hope in September 2002, when 110 people aged 18 to 26 years were actively looking for housing, according to personnel at the local housing authority (Fort Good Hope economic development officer 2002, personal communication). Even though the statistics would seem to indicate there was a population decrease in the community of Fort Good Hope over the last few years, continued exploration activity in the Colville Lake area and the poor physical state of houses in the community have lead to housing shortages. Conversely, housing conditions in Tulita were better.

The number of people living in SSA households is declining. Conditions in the community had improved in 2002 because people were having smaller families, and people with large families could be accommodated in the larger units (Tulita housing coordinator 2002, personal communication).

Physical Infrastructure

Norman Wells is the transportation hub for the SSA, with daily scheduled air service to Inuvik and population centres to the south. From this centre, scheduled air services fan out to all the smaller Sahtu communities, including Colville Lake.

Norman Wells has river-based marine resupply, but the only highway connections to the north or south are via the winter road. Thus, truck-based resupply is possible only during the winter from southern destinations. All of the small Sahtu communities have winter road connections with Norman Wells and thus with southern centres as well, permitting winter resupply. Riverside locations make summer marine resupply possible for Fort Good Hope and Tulita (GWNT Transportation 1995, 2000, 2001).

Water delivery and liquid or solid waste disposal services are available in the Sahtu communities. Norman Wells is the only community with infrastructure to deliver water or dispose liquid waste via pipes (50% of the community). With the exception of Colville Lake, whose residents still harvest water with a bucket or blocks of ice and use honey bags or outhouses, the other Aboriginal communities have their water and liquid wastes trucked to Norman Wells (GWNT Municipal and Community Affairs personnel 2002, personal communication).

Diesel-fuelled generators provide power in all the communities and the main heating fuel is P-50 fuel oil. However, central areas of Norman Wells also use locally supplied natural gas (Northwest Territories Power Commission 2002; GNWT Municipal and Community Affairs 2001; GNWT Municipal and Community Affairs personnel 2002, personal communication).

Traditional Culture

This topic deals with preservation of traditional culture. The focus of traditional values, lore, skills and disciplines has always been on survival in the environment that is home to the Sahtu. 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.

GNWT surveys from 1993, 1998 and 2002 show that 45% of the adult population in the Sahtu Aboriginal communities, including both Aboriginal and non-Aboriginal respondents, reported having hunted or fished in 1998. The percentages for all adult residents in the Sahtu Aboriginal communities increased between 1998 and 2002, from 46 to 53%. At the same time, there was a decline in harvesting in Norman Wells, from 44 to 38%.

Non-traditional Land and Resource Use

Several borrow sites and related operations are located in the SSA part of the project area, especially near Norman Wells. A large quarry is located about 3 km east of Norman Wells, near the town landfill site. There is also an existing gravel pit between Norman Wells and the town of Tulita at the Little Bear River.

There are no major timber harvesting operations in the SSA near the project area. The lands traversed by the pipeline corridor have been rated as having low mineral potential. No deposits of interest have been identified near the project area in the SSA. The most prominent petroleum industry activity in the project area is the Norman Wells oil field, operated by Imperial Oil Resources N.W.T. Limited, and the associated Enbridge pipeline. In addition, several oil and gas exploratory licences are located near Norman Wells, the town of Tulita and Colville Lake. Some significant discovery licences are also held in the Colville Lake area.

Game hunting is permitted for:

- black bear
- moose
- caribou
- muskox
- wolf
- wolverine
- small nonfurbearing mammals

Game bird hunting is permitted for ptarmigan and grouse. GNWT RWED (now ENR) has recently established a limited-entry draw for muskox.

Sport fish species present include:

- Arctic grayling
- burbot
- Dolly Varden
- inconnu
- lake trout
- northern pike
- walleye
- whitefish

The Mackenzie highway and river are transportation corridor for trucks, barges and boats carrying goods to the valley communities. Residents use a variety of waterways in the SSA for recreational purposes. The Mackenzie River is travelled by boats for recreation by residents and to a lesser extent by nonresidents.

There are several tourism operators in the SSA. The SS Norweta tour boat travels up and down the Mackenzie River all summer. A number of local residents offer tourism opportunities in the summer.

Protected Areas

The Sahtu Preliminary Draft Land Use Plan (SPDLUP), released in January 2003, identifies several proposed special management areas and conservation areas (see [Figure 8-9](#)). The pipeline route traverses four proposed special management areas in the SSA:

- Yeltea and Manual Lakes
- Colville Lake Trail
- Lac à Jacques, Turton Lake and Sam Macrae Lake
- Mackenzie River

The right-of-way also traverses two proposed conservation areas in the SSA:

- Fort Anderson Trail
- Great Bear River

The SPDLUP notes that oil and gas exploration and development are acceptable activities in proposed special management areas but proposes that activities would be restricted or unacceptable in conservation areas. Approved and proposed land use plans from other northern regions have included provision for infrastructure corridors to accommodate linear developments.

The Willow Lake and River area, also referred to as Bracket Lake, is located just north of the Great Bear River. The pipeline corridor passes through this area. This area is currently under consideration for designation as an International Biological

Program site by the IUCN (World Conservation Union). The area was enlarged to include the potential highway and pipeline transportation corridor to monitor the natural recovery processes following human disturbance.

Heritage Resources

This topic provides an overview of the types of heritage resources that have been investigated with the SSA. No differentiation has been made with respect to whether these sites are located within Crown or private lands. The heritage resources that have been identified with the SSA are usually situated at, or near, the ground surface and as such, are highly 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 must be considered, prehistoric and historic sites are of primary concern with respect to this project.

The *Mackenzie Valley Resource Management Act* defines heritage resources as: archaeological or historic sites, burial sites, artefacts and other objects of heritage, cultural, or religious significance. Heritage and cultural records are also included in this definition. An archaeological artefact 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 artefact is found”. Therefore, under these definitions, examples of heritage resources include ancient campsites, lithic scatters, traditional gathering places, trap line trails, cabins, fossils, sacred sites, graves, culturally modified landscapes and objects of literature.

In conjunction with the previously recorded heritage resources that are near the proposed development areas a focused reconnaissance program resulted in identification of 48 heritage resources in the SSA. These included prehistoric archaeological, historic archaeological, and a wide array of cultural sites, including recent campsites, trails, cabins, deadfall traps and fishing camps. Palaeontological resources were also identified. Due to changes in the alignment of the corridor and other shifts in development component locations, some of these sites are now located in areas that are no longer part of the proposed development 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 development areas are adjusted.

Most of the sites were noted in areas located along river terraces, ridges, cutlines or trails and upland terrace slopes. The proposed development areas that have been investigated in the SSA consist mainly of watercourse crossings, infrastructure locations, access roads, granular resource extraction locations and

other geotechnical investigation areas. Field investigations focused on the parts of these areas identified by the local residents and the heritage resources team having moderate to high potential for discovering heritage resources. Areas where high levels of ground disturbance were anticipated from development activity were also targets of field investigation.