

PURPOSE OF ENVIRONMENTAL IMPACT STATEMENT

This Environmental Impact Statement (EIS) for the Mackenzie Gas Project has been developed over the last three years using a community, issue-focused approach that incorporates the input of those communities likely to be affected by the project. This is in keeping with the direction provided by the various regulatory agencies that are responsible for assessing and regulating energy developments in the Northwest Territories (see the Cooperation Plan, Northern Pipeline Environmental Impact Assessment and Regulatory Chairs' Committee [Chairs' Committee] 2002a). This EIS presents:

- an overview of the project, for the purpose of an environmental assessment
- a description of biophysical and socio-economic baseline conditions
- an assessment of potential impacts organized according to key questions and developed with community input
- a description of mitigation measures to reduce adverse biophysical and socio-economic impacts
- a summary of environmental management plans designed to reduce or manage adverse biophysical project effects, while enhancing beneficial effects to the communities of the Northwest Territories

The operator of each field will develop the anchor fields after individual approvals by the National Energy Board (NEB) have been received. The project proponents have agreed to participate in a common EIS submission and review process. As a result, the EIS submission has been prepared on behalf of the anchor field operators, the owners of the gathering system (including the natural gas liquid [NGL] pipeline), and the owners of the gas pipeline.

PROPONENTS OF THE MACKENZIE GAS PROJECT

Proponent Ownership

The Mackenzie Gas Project (the project) is being developed by:

- Imperial Oil Resources Ventures Limited, a subsidiary of Imperial Oil Limited, which will construct and operate the Mackenzie gathering system and the Mackenzie Valley pipeline on behalf of the gathering system and pipeline proponents. Imperial Oil Resources Limited currently holds the significant discovery licence for, and operates, the Taglu gas field.
- the Mackenzie Valley Aboriginal Pipeline Limited Partnership, which was formed by representatives of various Aboriginal groups to represent the

ownership interest of the Aboriginal people of the Northwest Territories in the Mackenzie Valley pipeline

- ConocoPhillips Canada (North) Limited (ConocoPhillips) and ExxonMobil Canada Properties (ExxonMobil), which jointly hold the Parsons Lake gas field. This field is 75% held by ConocoPhillips and 25% held by ExxonMobil, and is operated by ConocoPhillips.
- Shell Canada Limited (Shell), which holds and operates the Niglintgak gas field
- Imperial Oil, ConocoPhillips, ExxonMobil and Shell, which will develop the gathering system

PROJECT OVERVIEW

Project Components and Location

The purpose of the project is to develop three onshore natural gas fields (anchor fields) in the Mackenzie Delta, Northwest Territories, and to transport natural gas and natural gas liquids (NGLs) by pipeline to market. This will involve:

- drilling wells and installing and operating facilities, including:
 - well pads
 - flow lines
 - gas conditioning facilities
- installing infrastructure to support construction and operations activities, including:
 - barge landing sites
 - camps
 - fuel storage sites
 - stockpile sites
 - access roads
 - airstrips and helipads
 - borrow sites
- constructing and operating gas processing and separation facilities
- constructing and operating pipelines and associated pipeline facilities, including compressor stations, heater stations, metering and pigging facilities
- connecting with the existing Enbridge Pipelines (NW) Inc. (Enbridge) pipeline near Norman Wells

- connecting with an extension of the NOVA Gas Transmission Ltd. (NGTL) pipeline system at an interconnection facility to be built in Alberta near the Northwest Territories boundary
- decommissioning and abandoning components at the end of their operating life

The project has also been designed to accommodate some natural gas and NGLs from other sources in the Mackenzie Delta and Mackenzie Valley.

Figure ES-1 shows the project components in the production area. Figure ES-2 shows the project components along the NGL and gas pipeline corridor, and the ancillary NGTL project.

Design and Construction

Design and construction is expected to take about three years and is scheduled to begin in 2006 and end in 2009. Activities will include:

- completing detailed engineering design
- purchasing goods and services
- developing and constructing infrastructure sites, such as borrow sites
- drilling and completing wells at the anchor fields
- constructing gas conditioning facilities and flow lines at the anchor fields
- constructing the gathering system, pipelines and associated facilities

During construction, the project will have the most interaction with the surrounding natural environment and communities. Areas disturbed during construction that will not be used during operations, such as borrow sites and infrastructure sites, will be reclaimed after construction.

Figure ES.1 has been removed for the purposes of reducing file size and can be viewed as a graphic separately. This document can be accessed through the link in the Table of Contents reference web page.

Figure ES.2 has been removed for the purposes of reducing file size and can be viewed as a graphic separately. This document can be accessed through the link in the Table of Contents reference web page.

Operations

Operations are expected to begin in 2009. Activities will include:

- commissioning and start-up of the anchor fields, pipelines and associated facilities
- processing raw natural gas and transporting natural gas and NGLs to market by pipeline
- operating and maintaining anchor fields, including:
 - adding compression facilities
 - drilling wells
 - servicing wells
- operating and maintaining pipelines and facilities

Operations will continue while there is economic gas production in the region. Developing other natural gas fields in the Mackenzie Delta and Mackenzie Valley has the potential to extend the life of the pipelines and associated facilities.

Decommissioning and abandonment will begin after the commercial life of the fields has ended and will be completed according to the regulatory requirements at the time. Surface facilities could be removed and the surface reclaimed to an acceptable state. The abandonment and reclamation will include considering input obtained through public consultation and alternative uses of the sites being abandoned.

PROJECT SETTING

Biophysical Environment

Air Quality

The air quality within the project study area is typical of northern environments in Canada. The concentrations and deposition rates of airborne compounds are much lower than in southern Canada, where measurable baseline air concentrations are caused primarily by emission sources in the area.

The natural background air quality includes gaseous and particulate emissions from:

- terrestrial and marine sources
- remote volcanic activity
- forest fires

Anthropogenic emission sources include:

- ground, marine, e.g., barge traffic, and aircraft transportation
- oil and gas exploration and development
- home heating by fuel oil, natural gas or wood combustion
- crude oil production facilities near Norman Wells
- oil and gas facilities in northwestern Alberta
- electric power generation

The current concentrations of gases or compounds in the study area are either below detection limits or are effectively zero.

Bedrock and Surface Geology

The production area lies in the Mackenzie Delta region, a physiographic subdivision of the Arctic Coastal Plain. The surficial geology at Niglintgak and Taglu is predominantly of modern deltaic origin, whereas Parsons Lake lies in the Pleistocene Coastal Plain.

Bedrock in the delta area is sedimentary, composed primarily of Tertiary shale and sandstone. Preglacial, glacial and postglacial deposits overlie the bedrock. Depth to bedrock ranges from 70 m near Inuvik, to more than 150 m near the seaward limit of the modern delta.

The pipeline corridor includes parts of three ecological zones:

- Transition Forest
- North Taiga Plains
- South Taiga Plains

Transition Forest and North Taiga Plains Ecological Zones

The Transition Forest and North Taiga Plains ecological zones are primarily underlain by Upper and Middle Devonian shale. Surficial deposits include hummocky moraine and glaciolacustrine silt and clay. Bogs, fens and thermokarst depressions filled with organic-rich silts and clays occur along the northern half of the pipeline corridor, whereas the southern half is characterized by extensive organic deposits and associated wetlands.

The terrain is generally flat and featureless, except for a few areas of hummocky topography with drumlins or eskers (glacial deposition features). Elevation ranges from 90 to 300 m. The highest point is north of Fort Good Hope, whereas the lowest is in the narrow lowlands adjacent to the Mackenzie River.

South Taiga Plains Ecological Zone

The South Taiga Plains Ecological Zone is underlain by Cretaceous bentonitic shale and sandstone, with occasional sinkholes and limestone outcrops near the Norman and McConnell ranges.

The terrain has level to undulating topography with an elevation of about 150 m in the North Taiga Plains Ecological Zone, and rolling topography with elevations between 150 and 450 m in the South Taiga Plains Ecological Zone.

Soils

Soils in the production area are dominated by ice-rich soils (Cryosols), organic soils, poorly drained soils (Gleysols) and soils subject to flooding and erosion (Regosols). Soils between Inuvik and Norman Wells have largely developed on mineral parent materials. Organic soils have developed over glaciolacustrine deposits and in small areas of alluvial and glaciofluvial materials along the Mackenzie Valley.

The soils between Norman Wells and Willowlake River are thicker and less influenced by permafrost, particularly in the southern half of this area. However, as much as 40% of the soils show evidence of some permafrost activity. Within this region, 90% of the soils are developed on mineral parent materials, with 45% on morainal plains and 30% on bedrock and colluvium. Organic soils occur in about 10% of this area.

In the pipeline corridor, organic soils typically occur in low-lying plains between upland ridges and hills on morainal deposits and glaciolacustrine plains. The peat layer in these soils is typically more than 1 m thick and is developed from sedge, moss and tamarack vegetation. Permafrost is common in bog and forest peatlands.

Permafrost

Permafrost underlies about 65% of the Mackenzie Delta. Its distribution results from past and present climates, hydrogeological characteristics and surface organic cover. Niglintgak, Taglu and part of Richards Island are in the intermediate, discontinuous permafrost zone. Most of the production area from Taglu south is in the continuous permafrost zone. Parts of the production area south of East Channel of the Mackenzie River, including Parsons Lake, are in the continuous permafrost zone. Permafrost thickness ranges up to 600 m in the continuous permafrost areas, but is less than 100 m in the discontinuous permafrost areas of the active delta.

Permafrost along the pipeline corridor ranges from about 600 m deep, at its northernmost extent to 10 m or less in northwestern Alberta. The annual active layer ranges from 0.5 to 1.5 m deep. Localized patches of isolated permafrost

occur in the Fort Simpson area. South of 60°N, to the NGTL interconnect facility, less than 10% of the land area is underlain by permafrost.

Hydrology

The Mackenzie Delta is the largest Canadian delta. Surface waters of the delta include major channels, i.e., West, Middle and East channels, and minor tributary channels of the Mackenzie River and deltaic lakes. Most of the Mackenzie River flows through Middle Channel and Kumak Channel.

Waterbodies in the production area range from ephemeral drainages to large channels, lakes and coastal bays of the southeastern Beaufort Sea.

Waterbodies near Niglintgak and Taglu include Big Lake, Kimialuk Lake, Yaya River and several Mackenzie River channels, i.e., Middle, Kumak, Kuluarpak, Harry and East channels. Waterbodies in the Parsons Lake area include Parsons Lake, East and West Hans lakes, and Zed and Hans creeks.

The freshwater delta floodplain lakes are recharged through spring flooding by the Mackenzie River's sediment-laden waters. The duration of spring flooding, and the amount of connection between a floodplain lake and the delta channels determines the physical, chemical and biological properties of these lakes.

The Mackenzie River is the largest north-flowing river in North America, flowing about 4,000 km from the Finlay River headwaters in British Columbia to the Beaufort Sea. The drainage basin is the second largest in North America and sixth largest in the world, draining 20% of Canada's land mass.

The two largest tributaries of the Mackenzie River north of the Northwest Territories–Alberta boundary are the Liard and Great Bear rivers.

Rivers crossing the pipeline corridor exhibit an annual flow pattern determined by snowmelt and freezing. The maximum monthly discharge occurs between May and June. Mean monthly discharge decreases throughout summer and fall and into winter, as ground temperatures decline and freezeup begins. From January to March, discharge is low, because precipitation occurs as snow, and baseflow is limited by the deeply frozen land surface.

From the anchor fields in the Mackenzie Delta region to the Northwest Territories–Alberta boundary, the pipeline route crosses more than 500 watercourses. These watercourses vary from small, intermittent streams to large rivers.

Fish and Fish Habitat

The Mackenzie Delta includes a network of channels and is dominated by shallow floodplain lakes, some of which are recharged through spring flooding of the Mackenzie River.

A variety of fish species occur in the production area, including freshwater and marine species. Fish use of waterbodies ranges from no use or extremely limited use, to all-year use by most species. Some habitats are only used by certain life stages whereas others are used by all life stages.

The marine and brackish water species in Kugmallit Bay and nearshore areas of the Beaufort Sea include saffron cod, starry flounder, Arctic flounder, Pacific herring and fourhorn sculpin.

The Mackenzie River tributaries that cross the pipeline corridor vary in size, and range from small intermittent drainages to large rivers. More than 75% of the smaller streams along the corridor are intermittent and flow only during snowmelt or rain. These ephemeral drainages have poorly defined flow paths and are unlikely to provide suitable habitat for fish. Groundwater can form the baseflow for streams and maintain under-ice flow, providing winter habitat for fish.

Smaller watercourses exhibit a variety of channel features, e.g., riffles, runs and pools, which can provide seasonal rearing and feeding habitats, and potential spring spawning habitat. Larger streams can provide all-year habitat for fish species, including spring and fall spawning habitats and overwintering habitat in deep pools or runs.

The Mackenzie River system, including the delta channels and lakes, supports 41 species of fish of 14 families. Of these, 20 species are harvested for food, commercially or for local consumption, or used for recreation.

The number of species present in the Mackenzie River is low compared with other river systems of similar size, but high for rivers in northern latitudes. This diversity is likely because of the south to north flow of the Mackenzie River that brings warmer water northward and accelerates spring ice breakup along its length and in the Mackenzie Delta. Most species are distributed throughout the Mackenzie River and its tributaries. Arctic grayling and northern pike are the most widely distributed, along with longnose sucker, slimy sculpin and lake chub.

Northern pike, longnose sucker and Arctic grayling dominate the fish populations in the southern parts of the Mackenzie River. Occasionally, lake whitefish and round whitefish are also present.

Vegetation

Niglintgak, Taglu and Parsons Lake are located in the Tundra Ecological Zone. Abundant low shrubs, sedges and mosses characterize this area. Vegetation communities in the production area grow on a thin veneer of unfrozen organic or granular substrate overlying the permafrost boundary. Vegetation types include dwarf shrub heath on both granular and organic substrates. Wetter areas support high-centred and low-centred polygons on patterned ground, whereas drier areas support ericaceous shrubs. Wetter areas in the patterned ground support sedges, cotton-grasses and sphagnum moss. Riparian communities support wet sedge communities and taller shrubs. Holmes Creek and Hans Creek support outliers of black spruce communities. Vegetation types on the Mackenzie River floodplain include shrub communities and wet sedge–cotton-grass meadows.

The pipeline corridor is located in the North and South Taiga Plains ecological zones. Examples of the seven ecoregions crossed by the pipeline include the Great Bear Lake Plain Ecoregion, characterized by open stands of stunted black spruce and tamarack, with secondary quantities of white spruce. Ground cover includes dwarf birch, willow, ericaceous shrubs, cotton-grass, lichen and moss.

The Mackenzie River Plain Ecoregion is characterized by closed stands of tall to medium black spruce with a ground cover of feathermoss, bog cranberry, blueberry, Labrador tea and lichens. Jack pine stands occur south of Tulita. Drier sites have more open stands of black spruce and Jack pine. White spruce, balsam poplar and aspen can occur in warmer, moister sites in the southern section of the ecoregion. Poorly drained, peat-filled depressions are dominated by low stands of black spruce, ericaceous shrubs and sphagnum mosses. Wetlands cover 25 to 50% of the ecoregion and are characterized by peat plateau bogs or fens.

The Franklin Mountains Ecoregion is characterized by open stands of black spruce with a ground cover of dwarf birch, Labrador tea, lichen and moss. Drier sites tend to have more white spruce, white birch and aspen. Wet sites have bog-fen vegetation such as dwarf black spruce, Labrador tea, ericaceous shrubs and mosses.

The Hay River Lowlands Ecoregion is characterized on drier sites by closed mixed stands of trembling aspen, balsam poplar, white spruce, balsam fir and black spruce. Poorly drained fens and bogs, covered with tamarack and black spruce, occupy about 30% of this ecoregion.

Rare plants and a variety of uncommon vegetation communities occur throughout the study area, often associated with site-specific features such as exposed granular substrates, lakeshores, marshes, springs, snowmelt patches or stands of tall, dense trees. Many plants are rare as a result of being at the northern limit of their geographic range.

Traditionally used cultural plants include those used for food, medicine, ceremonies or material purposes. Berry picking, especially blueberry, cranberry and cloudberry, is an important part of the traditional culture throughout the study area. A variety of species and their multiple uses are indicated on species lists from each of the settlement regions.

Wildlife

The Northwest Territories, including the project area, is characterized by diverse wildlife habitat supporting over 66 species of terrestrial mammals, 235 species of birds, seven species of amphibians and two species of reptiles. Of these, 51 species of mammals, 117 species of birds and two species of amphibians have been observed in the study area, identifying the importance of this region to wildlife.

Characteristic mammal species that occur in the Tundra Ecological Zone include barren-ground caribou, muskox, grizzly bear, wolverine, gray wolf, muskrat, snowshoe hare, Arctic ground squirrel and northern red-backed vole.

Caribou use the production area in the winter, particularly around Caribou Hills and Parsons Lake. The riparian black spruce habitat and other woody vegetation in the rolling terrain provide visual and thermal cover and forage for caribou.

Important areas for grizzly bear include the southern part of the Tuktoyaktuk Peninsula to Holmes Creek. The area south of Richards Island to Parsons Lake is also important, particularly where denning habitat can be found.

Bird species include loons, grebes, waterfowl, hawks and eagles, owls, shorebirds, gulls, terns, cranes and songbirds. The majority of bird species are migratory and only occur in the study area during spring, summer and fall. The outer Mackenzie Delta is considered an important area for nesting, moulting and staging waterfowl, especially geese and tundra swans. These species provide an important subsistence food source for local hunters.

The northern boundary of the Transition Forest Ecological Zone represents the treeline. Twenty-eight species of mammals and one amphibian are known or are expected to occur in this zone. Moose and furbearers make use of the forested areas, particularly in river valleys that are more sheltered from wind. Grizzly bear find den sites and barren-ground caribou can also winter in this area. Seventy bird species occur in this ecological zone. The shorelines of lakes and rivers provide habitat for lesser yellowlegs and red-necked phalarope. Canada goose, northern pintail, white-winged scoter and black tern are characteristic waterfowl.

The North Taiga Plains Ecological Zone is predominantly a forested region containing closed-to-open forests of black and white spruce and white birch that are typical of the uplands and rocky ridges. Thirty-six mammal and one

amphibian species find suitable habitat in this zone. Winter mammal use is concentrated in tree and shrub communities that offer thermal and escape cover, as well as foraging opportunities. During the summer period, mammal use tends to be dispersed over a wider variety of vegetation types.

In the South Taiga Plains Ecological Zone, the main upland cover types consist of open-to-closed forests of aspen, white spruce, white birch and jack pine. Forty-five mammal and two amphibian species are known or expected to occur in this zone. As in the North Taiga Plains Ecological Zone, furbearers and large mammals concentrate in the winter in tree and shrub communities where thermal and escape cover is better than in open vegetation areas. In the summer, wildlife are more dispersed in other vegetation types. The birds of this zone are similar to those in the North Taiga Plains Ecological Zone.

Socio-Economic Environment

Study Area

The socio-economic study area comprises communities in the Northwest Territories whose permanent residents might be directly or indirectly affected by gas production and pipeline construction. This includes communities in the:

- Inuvialuit Settlement Region
- Gwich'in Settlement Area
- Sahtu Settlement Area
- Deh Cho Region
- Yellowknife, Hay River and Enterprise, together referred to as the industrial and commercial centres of the Northwest Territories

The study area also includes northwestern Alberta, where NGTL is proposing to construct the Northwest Mainline (Dickins Lake Section) and the NGTL interconnect facility.

This part of the study area includes the:

- relevant reserves of Dene Tha' First Nation
- High Level, Rainbow Lake and Zama City industrial and commercial centres

The nontraditional land and resource use, and heritage resources portions of the socio-economic impact assessment identify specific local study areas and regional study areas relative to project component locations and activities.

Approach

This socio-economic impact assessment focuses on project effects on the wellness of potentially affected communities. Community wellness refers to physical, emotional, social, cultural and economic well-being and is often the most highly valued aspect of community life. The state of community wellness depends on the well-being of all aspects of a community – individuals, families and the community as a whole. It could be substantially enhanced by project benefits and vulnerable to adverse effects.

This approach to assessing the effects of the project is community-focused, addressing community concerns. These concerns were identified through an extensive public participation process that included a series of community meetings and regional workshops. The aim is to design and implement the project using procedures that optimize effects that residents see as beneficial to their communities, and reduce effects they believe undesirable.

Communities and People

Up to 32 communities could be affected by the project, including 26 in the Northwest Territories and six in northwestern Alberta. According to the Government of the Northwest Territories Bureau of Statistics and Statistics Canada, the study area as of 2003 had a population of about 42,000, including 35,000 residents in the 26 territorial communities and 7,000 in the six northwestern Alberta communities.

Although the Northwest Territories population size fluctuated during the 1990s, the population is currently increasing because of a high birth rate and a declining death rate.

In 2003, there were:

- 6,956 people living in the Inuvialuit Settlement Region and Gwich'in Settlement Area combined, about 49% of them in Inuvik
- 2,504 people living in the Sahtu Settlement Area
- 3,248 people living in the Deh Cho Region

Among the essentially Aboriginal communities, only two have populations of about 1,000: Tuktoyaktuk with 990 and Fort Simpson with 1,237. Seven territorial study area communities have populations of 500 to 1,000 and of the remaining 14 communities, three have populations of less than 100. Populations of communities in northwestern Alberta in the study area range from 145 in Zama City to 3,445 in High Level.

The Northwest Territories population has a larger number of males than females with a ratio of 51:49. The population is disproportionately young. People aged 24 and younger form 42% of the total population.

About 50% of the total Northwest Territories population and 45% of the study area population were of Aboriginal origin in 2001. About 38% of the population in northwestern Alberta were of Aboriginal origin.

Economic Activity

The economic history of the study area has been marked by a series of economic cycles of high and low activity and relative prosperity. Since the 1970s, oil and gas has been an occasional major driver of the economy. However, employment in the public sector is the most important and stable economic influence.

By summer 2004, expansion of hydrocarbon exploration and mining had substantially increased employment in the Northwest Territories, through:

- natural gas discoveries in the Fort Liard area of the Deh Cho Region
- renewed natural gas exploration activity in the Beaufort Delta Region
- substantial diamond mine development activity in the North Slave Region

In addition, the Government of the Northwest Territories annually makes considerable commitments to expenditures on capital projects resulting in construction employment in many communities.

In northwestern Alberta, employment and business concerns are heavily influenced by the oil and gas industry.

Labour Force

Diamond mining projects and greater hydrocarbon exploration had substantially increased employment in the monetary economy by summer 2004. Participation and employment rates for the Northwest Territories, including the urban communities and the mostly Aboriginal communities, were well above those for Canada as a whole. The annual average rate of unemployment in the Northwest Territories was 5.8%, compared with 7.7% in the rest of Canada.

A sizeable potential labour force exists in the Aboriginal communities in the study area. The potential size reflects the relatively low participation and high unemployment rates in many smaller communities. These rates are partly explained by lower education and training levels of some people and by the importance to them of the traditional economy, i.e., harvesting.

Courses providing upgrading and training skills relevant to industrial employment have been and continue to be delivered in Aboriginal communities throughout the study area.

In the northwestern Alberta portion of the study area, the Dene Tha' First Nation communities have lower participation and employment rates and higher unemployment rates than the non-Aboriginal population.

Income Sources and Amounts

A large proportion of the Northwest Territories population has a low cash income. In 2000, 30% of all Aboriginal income groups in the Northwest Territories aged 15 and older, had annual incomes of less than \$15,000, whereas only 19% of the Northwest Territories non-Aboriginal income groups were in this low-income category. The average employment income in the Aboriginal communities of the Inuvialuit Settlement Region, Gwich'in Settlement Area, Sahtu Settlement Area and Deh Cho Region was \$26,135 in 2000, well below the Canadian average of \$31,757 and even lower than the average \$44,116 for Northwest Territories non-Aboriginal earners. The large amounts of wildlife harvested and country food consumed clearly indicate the importance of income-in-kind to many Aboriginal people.

Cost of Living

The cost of living in northern communities is a function of distance and ease of access from southern sources of supply, and thus is generally highest in the most northern communities. The Government of Canada conducts retail price surveys to determine cost-of-living differentials for residents of the Northwest Territories. The figure is based on a cost comparison of a basket of goods and services in Edmonton and a community in the Northwest Territories. According to the 2000 survey, the cost of living was 25 to 115% higher in the study area than in Edmonton.

Northwest Territories food price surveys use the cost of a standard food basket in Yellowknife as a base for comparison. In 2001, the cost of food in the study area was 10 to 113% higher than in Yellowknife. These costs were highest in the Sahtu Settlement Area and lowest in the Deh Cho Region. In High Level, the cost of living in 2003 was only 1% higher than in Edmonton.

Transportation Infrastructure

Northwest Territories communities are well served by transportation facilities and services. There is a substantial surplus capacity with respect to air, barge and highway transport access. All communities, except Kakisa, Hay River Reserve and Enterprise, have airstrips and are equipped with some form of navigational aid. Remaining communities, except for Fort Providence, have some scheduled air service.

The dominant transportation mode is the Mackenzie River, from which barge or sealift access is provided to 17 of the 26 study area communities in the Northwest

Territories. All 17 communities have adequate loading and unloading facilities. Thirteen of the 26 communities have road access via Highways 1, 2, 3 or 7, except during breakup or freezeup. Four communities in the study area have rail access, i.e., Hay River, Hay River Reserve, Enterprise and High Level.

Utilities, Energy and Communications

All communities have:

- electric power supply
- some facilities for storing heating and other fuel
- provisions for potable water and sanitary disposal of liquid and solid waste
- telephone connections
- radio and television broadcasts
- Internet access
- mail service

Housing and Recreation

Housing is difficult to find in Inuvik, Tuktoyaktuk and Fort Good Hope, and affordable housing is scarce in Yellowknife. Housing conditions have been evaluated in terms of the need for regular maintenance, minor repairs and major repairs. The proportion of houses needing major repair in most study communities is close to the territorial average of 16%. Some Aboriginal communities, however, have much higher percentages.

Most communities have recreational facilities that would be considered adequate for equivalent-size southern communities.

Governance

All existing governance relationships between the federal and territorial governments and the Aboriginal people, their organizations and communities in the Northwest Territories are in the process of change through ongoing negotiations. These negotiations are directed toward addressing devolution of authority and the conferring of self-government responsibilities on Aboriginal people.

The devolution negotiations between the Government of Canada, the Government of the Northwest Territories and the Aboriginal Summit will transfer control over land, water and resources to northern governments. The Aboriginal Summit is a negotiating body composed of virtually all the organized Aboriginal groups in the Northwest Territories except the Deh Cho First Nation, which is not participating at this time, but has observation status.

The Inuvialuit and the Gwich'in are jointly negotiating with the Government of the Northwest Territories an innovative system of regional government for the Beaufort Delta Region that recognizes the cultural uniqueness of the area as well as practical administrative realities.

Family and Community Wellness

There are no readily available comprehensive measures of family or community wellness, but some data can be used as indicators of wellness. The rate of children taken into care, where a child is ill-cared for and at risk, is an indicator of reduced family wellness. The rate of children in care is higher in the Northwest Territories than in the rest of Canada.

The effectiveness of community social controls is another relevant index of community wellness. Accordingly, crime rate is an indicator of community wellness, and young offender crime rates indicate how well communities raise and engage young people.

Alcohol abuse is the source of many problems in the Northwest Territories. The Royal Canadian Mounted Police (RCMP) in several communities in 2002 and 2003 reported that 90% of their policing problems were alcohol related. Among both Aboriginal and non-Aboriginal residents, the alcohol consumption rates among males were about twice as high as those among females. The highest consumption rates were among young people aged 19 to 29 for both groups.

All Northwest Territories communities with more than 400 residents have RCMP detachments. Smaller communities are policed by the nearest detachments. Detachments in a number of communities report very heavy workloads.

Social services are delivered to Northwest Territories study area communities by:

- Inuvik Region Health and Social Services Authority
- Deh Cho Region Health and Social Services Authority
- Yellowknife Health and Social Services Authority
- Hay River Health and Social Services Authority

Health Conditions

Many health concerns in the Northwest Territories today relate to people's health-threatening behaviours. Such threats include:

- smoking
- alcohol abuse and related risks, including fetal alcohol syndrome/fetal alcohol effects (FAS/FAE)

- increased rates of diabetes
- sexually transmitted infections (STIs)

The incidence of smoking is substantially higher throughout the Northwest Territories than the rest of Canada, and almost twice as many Aboriginal, compared with non-Aboriginal, people smoke.

Alcohol abuse creates health problems that can harm the drinker, and perhaps the spouses, children, and associates of drinkers who become violent. As well, at a time when most adults have access to motorized transportation, impaired drivers place themselves and others at risk. There are no statistics that document the occurrence of FAS/FAE births.

The risk of diabetes in the Northwest Territories is about three to five times higher than for the rest of Canada.

High STI rates indicate high-risk sexual behaviour. Most of these infections occur among persons 15 to 35 years old. STI rates are highest in the regional Aboriginal communities and are substantially lower in the regional centres.

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 many are teenage suicides. The tragedy a suicide inflicts on the victim's family is broadly felt in small Aboriginal communities because these communities are so closely related, with many residents being relatives of the victim.

Health Care Facilities and Services

Health care facilities, family and community services are provided to residents of the Inuvialuit Settlement Region, Gwich'in Settlement Area and Sahtu Settlement Area by the Inuvik Region Health and Social Services Authority based in Inuvik, and to Deh Cho Region residents by the Deh Cho Health and Social Services Authority headquartered in Fort Simpson.

There are three hospitals in the study area:

- Inuvik Regional Hospital, which serves the Inuvialuit, Gwich'in and Sahtu communities
- Stanton Hospital in Yellowknife, which serves the Deh Cho communities and others outside the study area and is governed by the Stanton Territorial Hospital Authority
- H.H. Williams Memorial Hospital in Hay River

Other communities in the study area, generally with 200 or more residents, are served by health care centres staffed by several registered nurses. Health stations staffed by a single community health worker serve the smallest communities. These personnel can contact a registered nurse at any time for consultation and treatment advice.

Patients with special needs that Northwest Territories facilities are not equipped to handle are sent to provincial centres.

Education and Training

In 2001, about half the adults in the four Northwest Territories settlement areas were high school graduates, as were almost two thirds of adults in the whole Northwest Territories study area. A large portion of the Northwest Territories' adult population has taken trade or other non-university courses. The percentage with some postsecondary education in the Northwest Territories increased from 47% to 56% between 1996 and 2001.

The Government of the Northwest Territories Education Culture and Employment is responsible for providing kindergarten to Grade 12 education services. In each community with a primary or secondary school or both, a locally elected district education authority oversees the delivery of education services.

Northwest Territories adults can pursue further education or acquire skills training in their home community, in a regional centre in the Northwest Territories or in southern Canada. Aurora College has campuses in Inuvik and Yellowknife, and community learning centres in many other communities. Generally, Northwest Territories schools have found that enrolment in elementary and junior high school has remained stable, whereas enrolment in senior high has increased.

In the Northwest Territories, almost all the study area communities have satisfactory school facilities, suitably equipped and staffed with qualified teachers to a ratio of no more than 19 students per teacher, as required by the Northwest Territories *Education Act*.

Aurora College delivers a wide variety of academic upgrading and skills training courses to Aboriginal communities, when there is local demand.

Traditional Culture

The focus of the traditional culture of the Dene and the Inuvialuit has always been on survival in the difficult environment that is their home. Spiritual values, and implementing the lore, skills and disciplines essential to survival on the land, are the core of traditional culture.

Although the aspects of Inuvialuit and Dene culture essential to successful harvesting and surviving emergencies could be transmitted in English, all aspects of Aboriginal culture are more precisely expressed in the Aboriginal languages.

Traditional culture thus involves two aspects:

- knowledge, skills and disciplines required for traditional harvesting and trapping
- communication of cultural values and concepts through Aboriginal languages

Trapping incomes have fallen sharply since about 1988, and the number of trappers has seen a parallel decline. The result has been expansion of a dual economy, i.e., participation in both traditional harvesting and trapping and in the monetary economy. Harvesting and consuming traditional foods is important symbolically, economically and nutritionally, and continues at generally high levels in Aboriginal communities.

Language retention is an indicator of cultural preservation because spirituality, pre-eminent values and traditional knowledge can best be comprehended in traditional language terms. However, retention of Aboriginal language is declining throughout the study area because Euro-Canadian cultural influences are so pervasive in:

- educational settings
- most television programming
- work settings
- dealings with government officials and service providers

As a result, Aboriginal language facility is declining throughout the Northwest Territories and northwestern Alberta study area communities, with retention rates for these languages in 1999 ranging between 28% and 65% in different regions.

Currently, it appears that there has been considerable reduction in trapping and language retention among Aboriginal people. But considering the strength of Canadian cultural and economic influences that challenge their traditional values, skills and practices, Dene and Inuvialuit retention of traditional harvesting and related practices continues at relatively high levels.

Nontraditional Land and Resource Use

Most of the lands traversed by the project are federal Crown lands or settlement area private lands. In Alberta, the lands traversed by the pipeline corridor are all provincial Crown lands. Some project components are also located in municipal lands in Inuvik, Fort Good Hope, Norman Wells, Tulita, Fort Simpson and Hay River.

Granular resources identified in the study area range from construction-quality aggregate to materials unsuitable for use as fill. About 110 preferred and secondary locations have been identified for potential borrow sites between

Inuvik and northwestern Alberta. Because of their remote locations, many of the borrow sites have not been developed.

Timber resources in the study area are limited as the anchor fields and gathering pipelines are north of the treeline and the more southern parts of the project are located in the transition zone from tundra to forest.

There are no existing mines in the study area.

Over the last two decades, oil and gas activities in the Northwest Territories have focused on the Norman Wells and Fort Liard areas. There is extensive oil and gas development in the northwestern Alberta portion of the study area.

Nontraditional resource harvesting includes fishing and hunting by residents categorized as domestic, sport or commercial activity. Hunting activities are primarily regulated by Government of the Northwest Territories, Resources Wildlife and Economic Development, but are also subject to terms and conditions set out in the land claims agreements. Fishing licences are issued through Fisheries and Oceans Canada, and are subject to approval of the local hunters' and trappers' committee or renewable resource council.

Heritage Resources

Heritage resources are nonrenewable resources that might be located at or near the ground surface and are therefore vulnerable to any activities disturbing the ground. They are defined and managed under Northwest Territories and Alberta legislation and include archaeological or historic sites, burial sites, cairns and artifacts.

The study area for heritage resources consists of the general region that will be directly or indirectly affected by the project. Little information exists on the Prehistoric Period for this region, however the regional Historic Period is much better understood. Results of the project heritage resources research to date are summarized at the end of the Key Findings of the Environmental Impact Statement.

KEY FINDINGS OF THE ENVIRONMENTAL IMPACT STATEMENT

The following key findings of the EIS are summaries only. For more information, see Volume 5, Biophysical Impact Assessment, Volume 6, Socio-Economic Impact Assessment and Volume 7, Environmental Management.

Biophysical Environment

Air Quality

Potential effects of the project on air quality are related primarily to emissions from compressor stations and heater facilities during project operations. Air quality effects during construction are related to dust generated from disturbed areas, vehicle traffic and construction camps.

Mitigation strategies, such as dust control and use of appropriate equipment, are expected to effectively manage construction and operations effects. Strategies to reduce emissions include:

- using equipment that meets relevant standards including Northwest Territories regulations, Canadian Council of Ministers of the Environment (CCME) standards and Alberta standards (where regulations do not exist in the Northwest Territories)
- ensuring flare stack design and performance are consistent with applicable industry regulations
- applying best management practices to reduce fuel use
- avoiding idling vehicles, where practical

For all air quality key indicators, at all project locations, effects are predicted to be adverse, local and long term. The effect magnitude ranges from low to moderate. No significant effects on air quality are predicted.

Noise

Potential effects of the project on noise are related primarily to construction activities, compressor station operations and transportation during construction and operations.

Mitigation strategies to reduce effects of noise emissions include:

- designing facilities to meet Alberta EUB Guide 38 noise guidelines for remote sites, i.e., 40 dB at 1.5 km
- implementing engineering noise controls, as necessary, which might include silencers, insulation and upgraded building shells
- scheduling discretionary activities in sensitive areas to avoid effects from noise, where practical

No significant noise effects are predicted.

Groundwater

Potential effects of the project on groundwater can be related to changes in groundwater recharge and discharge patterns resulting from removal of granular material at borrow sites, flow obstruction, changes in permafrost patterns or subsidence.

Mitigation strategies to limit effects on groundwater include:

- installing drainage controls in areas of substantive groundwater flow encountered during pipeline trenching before the trench is backfilled
- monitoring, by aerial inspection, visual changes in locations or extent of groundwater discharge areas
- monitoring environmental effects of frost bulbs along the pipeline corridor
- adopting hydrology and water quality mitigation measures (see following sections)

Effects on groundwater from project-related activities are expected to be low magnitude and local in extent, except for moderate- to high-magnitude effects that might result from flow obstruction along pipelines. Moderate- to high-magnitude effects could occur at a few pipeline crossings or slopes where frost bulb formation could restrict groundwater movement. Most effects will be initiated by construction activities. Some effects could persist after decommissioning. Effects are expected to cause a low-magnitude, adverse change in groundwater, i.e., a change that is within the normal range of variation. On this basis, project activities will not have a significant effect on groundwater in the region.

Hydrology

Potential effects of the project on hydrology can be related to site disturbance during construction, water withdrawal, land settlement, flow obstruction or land subsidence from gas extraction.

Mitigation strategies to limit effects on hydrology include:

- grading and ditching to direct runoff through silt fences, sediment traps, vegetation, berms or isolation areas for controlled release to the watershed
- providing a minimum setback from watercourses to reduce effects on local drainage patterns and streamflow
- designing structures for thaw settlement

- monitoring, by visual inspection, drainage conditions and sediment control devices in the pipeline right-of-way
- monitoring streambed conditions and bank stability at watercourse crossings

The effects of the project on runoff amounts, drainage patterns, water levels and flow velocities are expected to be low magnitude and local in extent. Moderate-magnitude effects could occur at a few pipeline crossings where frost bulb formation could restrict flow over the winter and where mitigation measures are not applied because of the absence of fish habitat. No significant effects on hydrology are predicted.

Moderate-magnitude effects on sediment concentrations might result from potential dredging at Niglintgak and pipeline and gathering system construction. Based on preliminary information and known mitigation measures, construction and decommissioning of the barge-based gas conditioning facility at Niglintgak are not expected to result in any significant effects. Effects on channel morphology are expected to be low magnitude, except at Taglu during operations, when effects might be moderate magnitude in the local area.

Water Quality

Potential effects of the project on water quality can be related to leaks and spills, and suspended sediment inputs from land disturbance, dredging, barge traffic and watercourse crossings.

Mitigation strategies to limit effects on water quality include:

- disposing of wastewater or drilling waste by deep-well injection, remote sump or transport off site when waste cannot be treated for release to the watershed
- implementing drainage, erosion and sediment controls such as grading and ditching to direct runoff through silt fences, sediment traps, vegetation, berms, or isolation areas, as needed for the location
- reclaiming bed, banks and approach slopes of the watercourse to stable conditions, grade and contours
- implementing management practices, contingency plans, mitigation and emergency response plans to prevent and address leaks and spills
- recording the volume of water withdrawal and ensuring volumes do not exceed regulatory limits stated in water use permits
- monitoring waterbodies affected by domestic wastewater release and testing water releases

Effects on water quality range from low to moderate magnitude, and are local in extent during construction, operations and decommissioning. No significant effects on water quality are predicted.

Fish and Fish Habitat

Potential effects of the project on fish can be related to direct effects on fish habitat from activities such as watercourse crossing construction. Changes in water levels and water flow from water withdrawal, formation of frost bulbs around pipelines, or increases in suspended sediment could also affect fish and fish habitat.

Mitigation strategies to reduce effects on fish and fish habitat include:

- implementing drainage, erosion and sediment controls such as grading and ditching to direct runoff through silt fences, sediment traps, vegetation, berms, or isolation areas, as needed for the location
- conducting most pipeline construction activities in the winter
- implementing management practices, contingency plans, mitigation and emergency response plans to prevent and address leaks and spills
- avoiding spawning, rearing and overwintering fish habitats, unless authorized
- monitoring water quality at selected waterbodies
- prohibiting fishing by construction personnel while on the jobsite
- monitoring subsistence and recreational fish harvesting at selected waterbodies

Effects on fish and fish habitat range in magnitude from no effect to low magnitude, and local to regional in extent, with most effects not extending beyond long term.

No significant effects on fish habitat, fish health or fish abundance and distribution are predicted.

Soils, Landforms and Permafrost

Potential effects of the project on soils, landforms and permafrost are related to surface disturbance during construction or a change in thermal regime that can cause settlement or frost heave along the pipeline right-of-way or at facility locations.

Mitigation strategies to reduce effects on soils and landforms include:

- reducing surface disturbance through design, e.g., reduce route length, reduce facility footprints
- reducing grading and levelling to that required to prepare a safe and efficient working surface
- reclaim, stabilize and armour slopes and banks, as necessary
- monitoring effects of thaw settlement and frost heave, soil erosion, slope movement and drainage conditions at selected project sites
- identifying and marking uncommon plant communities before construction

All project effects on soils and landforms are limited to the directly disturbed and nearby area. Some moderate-magnitude effects are predicted for ground stability, particularly with respect to settlement along the pipeline right-of-way, and erosion and frost heave in sensitive aeolian deposits. Low-magnitude, far-future effects are related to effects on uncommon landforms and changes in ground stability in some locations. These effects will not be significant.

Vegetation

Potential effects of the project on vegetation are related to clearing and grading for project construction, dust and air emissions, and changes in landforms and soils from project activities. Project construction will adversely affect vegetation types through loss and alteration of vegetation, changes in physical site conditions, presence of reclamation species and possible introduction of non-native or invasive plant species.

Mitigation strategies to reduce effects on vegetation include:

- reducing surface disturbance through design, e.g., reduce route length, reduce facility footprints
- controlling weeds to prevent weedy species invasion
- reclaiming sites at completion of their use
- monitoring vegetation composition and cover, vegetation health and vigour, and presence of weeds at selected sites

All effects on the abundance, distribution and health of vegetation types, vegetation communities of concern and rare plants are predicted to be low. Some effects will be far future because of the length of time required for some

vegetation types to recover. Effects on rare plants are predicted to be beyond regional in extent. No significant effects on vegetation are predicted.

Wildlife

Potential effects of the project on wildlife are related to:

- reduced habitat availability because of direct habitat loss from construction
- sensory disturbance that causes wildlife to avoid areas
- barriers that the project might present to wildlife movement, such as trenches or pipelines that animals cannot cross

Increased mortality is possible because human–wildlife conflicts can result in the destruction of wildlife, and because hunters and predators can access wildlife more readily along roads or pipeline rights-of-way.

Mitigation strategies to reduce effects on wildlife include:

- developing and implementing operating guidelines to:
 - address potential effects on wildlife
 - reduce sensory disturbance on wildlife
- managing access in cooperation with communities and regulatory agencies
- controlling pipeline corridor-related vehicle use
- preventing harvest, harassment and feeding of wildlife on the job site
- reducing the pipeline footprint and related vegetation clearing
- scheduling work activities to avoid sensitive life-cycle stages, where feasible
- implementing design and work practices to reduce the barrier effects of the pipeline on wildlife movement
- implementing reclamation plans to re-establish wildlife habitat
- managing waste effectively to avoid attracting wildlife

Habitat availability for wildlife is influenced by several factors, including vegetation loss, sensory disturbance and increased access by humans and predators. The magnitude of most effects on habitat availability will be low, with sensory disturbance being an important contributing factor when magnitude is moderate. Some effects extend into the far future because of the length of time it

takes for vegetation, particularly lichen and old-growth forests, to recover and restore habitat values.

The project is predicted to have low-magnitude effects on wildlife movement except for moderate-magnitude, medium-term, local effects on barren-ground and woodland caribou.

Wildlife mortality can be affected by the project through several pathways, including change in special habitats, energetic stress, removal of individuals and exposure to chemicals. The most important source of mortality will be from increased access for hunters and predators, which could result in moderate-magnitude, long-term effects on wildlife.

No significant effects on wildlife are predicted.

Cumulative Effects

An assessment of cumulative effects concluded that:

- the project will not contribute to significant cumulative effects
- there are no significant overall cumulative effects

Socio-Economic Environment

This section summarizes the socio-economic effects of the project. The project has the potential to deliver significant economic benefits, such as jobs, labour income and increases in gross domestic product and government revenue, both in the study area and elsewhere in Canada. However, these benefits carry with them certain risks that existing social wellness conditions, particularly within the study area, might be adversely affected. The challenge is to manage the flow and distribution of economic benefits, and undertake additional mitigation as necessary, to reduce corresponding undesirable changes in wellness conditions.

Because socio-economic effects involve many aspects of everyday individual and community conditions and public services, the responsibility for managing these effects must be shared. The project will need the full and active cooperation of potentially affected communities and governments to effectively meet this challenge. The specific commitments of the proponents toward implementation of this shared responsibility are detailed in Volume 6, Socio-Economic Impact Assessment.

Procurement, Employment and Regional Economic Effects

Project effects on procurement and employment conditions will derive from interactions between project demand and supply. Where demand exceeds northern supply capacity, supply requirements will be met outside the Northwest Territories. Timely implementation of mitigation measures to improve education

and skills and make bidding procedures user-friendly will expand northern labour force participation and business capacity.

Over the proposed main construction period, 2006 to 2010, project capital investment is estimated at \$6.2 billion. The largest expenditure will be for the natural gas pipeline, which will account for \$2.95 billion, or almost half of all expenditures. It is estimated that about \$1 billion of the project capital investment will be retained in the Northwest Territories. Annual average operations, maintenance and ongoing drilling expenditures in the Northwest Territories are expected to range from \$141 to \$210 million and average \$169 million from 2009 to 2030.

During the four years of project construction, about 5,800 direct and spinoff jobs, or an annual average of 1,400 jobs, will be generated in the Northwest Territories. About 114,000 direct and spinoff jobs will be generated in Canada because of project construction, or about 28,400 jobs annually. More than half those jobs are expected to be in Alberta.

With respect to operations and ongoing drilling activity, an annual average of about 500 direct and spinoff jobs will be generated by the project in the Northwest Territories from 2009 to 2030. This represents close to 40% of the total average annual project-related employment generated during this period.

The project has committed to a variety of economic effect optimization measures described in Volume 6, Socio-Economic Impact Assessment.

Project economic effects are expected to be positive, and high magnitude during construction. During operations, economic effects are expected to be positive, and low magnitude in all regions except Gwich'in Settlement Area, where effects will be moderate. Procurement, employment and regional economic effects will be significant during construction in most regions, and during operations in the Gwich'in Settlement Area.

The large-scale nature of the project, in the context of the relatively small and still developing study area economy, means that all key economic indicators for the Northwest Territories will be positively affected to a high degree. Although the effects on the national economy will be proportionally smaller, the attributes of these effects on most key indicators are expected to be similar.

The effect on the Northwest Territories gross domestic product is expected to be positive and significant during both construction and operations. The Canadian gross domestic product will be significantly affected only during construction.

Government Revenue

The project will be a substantial revenue source to the various levels of government, through benefits and access agreements, direct taxation and royalty

payments. The size of these various project payments is expected to exceed the costs of sustaining adequate infrastructure and services to meet project-related demands.

Although the project will generate large tax revenue for the federal and Northwest Territories governments during construction and operations, the net effect on the Government of the Northwest Territories will be dampened because part of the tax revenue will reduce the Formula Financing Grant. As a result, these effects are not significant for the Northwest Territories but are significant for the federal government.

Demography

The possibility that population increases will overburden community infrastructure and services is a concern. All aspects of field development and project construction will create demands for labour, and thus tend to encourage migration to regional and other centres of project activity. Relevant mitigation measures, such as hiring Aboriginal and other northern residents in their home communities and southern residents only in southern locations, will be used to reduce the number of migrants to the North searching for project work.

Project effects on population movement in most regions are expected to be adverse, low to moderate magnitude, usually short term and therefore, not significant. In Inuvik and Norman Wells, the effects could be both adverse and positive, and high magnitude. In Fort Simpson they are expected to be adverse, and moderate magnitude. In all cases, however, they will be local and short term, and therefore, not significant. For details, see Volume 6, Socio Economic Impact Assessment.

During operations, the effect on population will be relatively small and will only marginally affect Inuvik, Norman Wells and the other industrial and commercial centres in the Northwest Territories. The initial transitional effect on the study area could be about 470 people during the 2009 to 2015 period and is assessed as not significant.

Transportation Infrastructure

Because of its size, the project will induce substantially increased demands on all transportation modes during construction but not during operations.

The project will ensure that project transportation requirements will have limited adverse effects on any region or community in the study area. A timely, cooperative planning effort by the project proponents, the relevant transportation logistics managers, Government of the Northwest Territories Transportation, local community leaders and, in some cases, Government of the Northwest Territories Municipal and Community Affairs is required to design measures for managing

the expected project effects on transportation. These efforts must focus on the steps to be taken, development of effective protocols and procedures, combined with the resources to implement them.

Agreements between the project and the Government of the Northwest Territories, and between the project and applicable municipalities will be negotiated and will include provisions for the project's use of permanent and seasonal roads. Other relevant measures will include continuing discussions with transport facility and service providers (and the development of necessary controls for project traffic) to ensure sufficient capacity to meet community requirements and project demands.

During construction, project effects on transportation infrastructure will be mostly adverse because of increased demands. However, all effects are expected to be low to moderate magnitude, short term and therefore, not significant. No adverse transportation effects are expected during operations.

Energy and Utilities Infrastructure

The communities in the study area have mostly satisfactory water sourcing and treatment facilities, waste disposal arrangements, power supplies and heating fuel supplies. All have telephone, television, Internet and radio access, receive newspapers and have mail delivered three to six times a week.

Project construction camps are designed to be self-sufficient in terms of water treatment, sewage and solid waste treatment and disposal, and communications capabilities. The project is not expected to adversely affect utilities, energy sources or communications facilities in any study area community during operations or construction.

Housing

Project effects on housing and accommodations will include direct and indirect demands for short- and long-term accommodation. Demands for short-term accommodation will be greatly reduced by providing project construction camps for most direct hires but might increase to meet the needs of in-migrants. Hiring procedures that discourage speculative in-migration, will help reduce construction accommodation pressures and the housing sector might adjust somewhat by anticipating demand.

The effects on housing during construction will be adverse in communities where there is an existing shortage. These effects are expected to be low or moderate magnitude, short term and not significant. During operations, the regional centres of Inuvik, Norman Wells and possibly Fort Simpson, will experience a positive, low-magnitude, long-term effect that is not significant.

Recreation Resources

Camp facilities will meet the recreation needs of most project employees. Some employees will be based in the regional centres, most for relatively short periods. There could also be speculative in-migration to the regional centres, in spite of planned mitigation measures. Inuvik, Norman Wells and Hay River are well equipped with large-capacity recreation complexes and other facilities. However, if Fort Simpson experiences any sizable increase in short-term residents, the local recreation facilities and programs will be challenged.

The project is expected to have a high-magnitude, short-term, adverse effect on Fort Simpson, but generally will have only low-magnitude, short-term, adverse effects elsewhere. In all cases, these effects are not expected to be significant. During operations, no noticeable effect on community recreation resources is expected.

Governance

Governance systems are changing in the Northwest Territories. With the signing of land claims agreements in all affected regions except Deh Cho, and the associated transfer of powers, Aboriginal groups have enhanced political control. However, their effective authority is often limited because they lack financial independence, and territorial and federal governments still have considerable influence.

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

The project will produce considerable tax and royalties revenue that should exceed project-related increased demand for government expenditures. However, revenue could occur too late to cover costs and could accrue to different levels of government.

Project effects on governance are expected to be moderate magnitude in the Northwest Territories, limited to construction and not significant.

Individual, Family and Community Wellness

Wellness is used as a generic term and includes physical, emotional and mental health, and relationship well-being.

Community Well-Being and Delivery of Social Services

There could be negative and positive project effects on wellness from:

- increased local earnings and disposable incomes, but spending of project earnings by some northern residents on increased consumption of alcohol and associated increases in problem conditions
- opportunities for association of project workers with local community residents

Large, 1,350-person, construction camps will be located very close to three communities. Fort Good Hope and Norman Wells will each have a camp located next to the community, and Inuvik will be within 20 km of one 1,350- and one 250-person camp. Arriving and departing workers at these camps will use the local airport or airstrip, providing opportunities for them to associate with residents of the communities.

The most frequent and persistent problems that community wellness centres must address are substance abuse, primarily alcohol, and derivative violence, often in families. Increased income from project employment is expected to add substantially to substance abuse-related problems, and to the burdens of the social service workers and the RCMP who deal with these problems.

During construction, the effects on well-being in most individual communities are expected to be both negative and positive, but the net residual effect is expected to be adverse, low to moderate magnitude, local and short term. In Inuvik, Tuktoyaktuk and Aklavik, communities of the region that will be the most influenced by construction activity, and in Fort Simpson, the effects on well-being are expected to be high magnitude, but short term. However, no well-being effects are expected to be significant.

Although the magnitude of effects on the delivery of social services is expected to range from low to high in a few activity centres, these effects will be short term, local and not significant. There are expected to be positive, low-magnitude, long-term effects on well-being conditions and social services during operations.

Health Conditions and Health Care Services

The health of individuals and groups can benefit from the project because of employment opportunities and increased income to spend on better diet, necessary clothing and improved housing arrangements or facilities. Project-influenced associations with new role models could also have health or safety benefits. However, health might be adversely affected by:

- project-influenced associations with others who engage in health-risking behaviours
- exposure to contagious diseases, e.g., sexually transmitted infections
- ill-health or injury resulting from alcohol abuse and associated dangerous behaviour

Net residual project effects on health conditions during construction are expected to be adverse, low or moderate magnitude, and short term and therefore, are not significant.

Camps will be designed to have their own medical services, however it is expected that construction effects on health care services will be adverse, range from low to high magnitude, and will be local to regional in extent in study area communities and regions. All effects on health care facilities will be short term and not significant.

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

Project construction camps will be self-contained, sourcing and treating water, and treating and disposing of liquid and solid waste according to government published standards. The project is not expected to induce health risk for humans, plants or animals during either construction or operations. Relevant mitigation measures will address buildup of exhaust air pollutants from parked diesel engines idling near communities.

Public Safety and Protection Services

Many RCMP detachments in some study area communities are currently overburdened. During construction, policing workloads will be affected by having to address increased problems in the communities served and occasional problems in camps. Enhanced control of alcohol abuse will be the most effective way to reduce policing problems.

Given the increased likelihood of substance abuse and derivative problems that increased community earnings from pipeline construction income will bring, construction effects on local policing will be adverse, ranging from low to high magnitude but will be short-term. Accordingly these effects will not be significant. Effects on public safety during operations are expected to be neutral or adverse, low magnitude and long term.

Education Attainment and Services

Education attainment and services in the study area might be affected by the project, especially during construction. Some adolescents might respond to employment opportunities by leaving school prematurely. Some former dropouts might return to qualify for more training however, and children of in-migrants could increase enrolment demands. Thus, there could be project-related effects in education and training programs.

With regard to education attainment, most communities are expected to experience both positive and adverse effects of low or moderate magnitude during construction. These effects are short term and therefore, not significant.

Effects on education services and facilities are not expected in most communities. Moderate-magnitude, adverse effects are expected in Tuktoyaktuk, and low-magnitude, positive effects could occur in a few other communities. None of these effects is significant because of the short-term nature of construction activities.

Traditional Culture

Harvesting and seasonal wage employment tend to support each other, because wage employment is necessary to pay for the expensive equipment now needed for efficient harvesting, and the project will provide employment to help support these equipment needs. But project employment could jeopardize transfer of harvester skills and knowledge if time working for the project pre-empts harvesting opportunities, and Aboriginal workers lose interest in traditional lifestyles. On the other hand, Aboriginal workers could find that contacts with southern residents make their traditional lifestyle increasingly attractive.

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

Construction personnel will not be allowed to partake in harvesting activities while on the job.

It is anticipated that there will be moderate or low magnitude adverse effects on traditional harvesting, traditional language and culture retention in communities in the study area with substantial Aboriginal populations. No effects are expected in Norman Wells and Yellowknife.

Nontraditional Land and Resource Use

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

- land ownership
- granular resources
- timber
- mining
- oil and gas activities
- nontraditional resource harvesting, e.g., hunting, fishing and trapping by non-Aboriginals
- other commercial activities, e.g., reindeer herding, agriculture
- tourism and recreation
- environmentally protected areas, e.g., bird sanctuaries
- visual and protected resources

Project effects were assessed for all project components and phases. None of the anticipated effects are expected to be significant.

Protected Areas

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

The project has taken a landscape-based approach to the environmental and socio-economic impact assessments (resulting in a 30-km corridor centred on the pipeline). This approach provides an information base for assessing potential effects of the project on any future areas in the corridor that might be identified under the protected areas strategy. The effects on protected areas are generally low to moderate magnitude, and short term. As a result, they are not significant.

Heritage Resources

The methods employed for the project-focused field reconnaissance and heritage resource impact assessment are standard for archaeological projects of this type in the region. The heritage resources program designed for the project recognizes the uncertainty associated with final site and route selection and has adopted a staged approach that will provide increasing levels of precision for assessment of project effects on heritage resources as sites and routes are finalized.

Field studies consisted of a reconnaissance-level study of the three anchor fields and segments of a 1-km-wide corridor along the pipeline route. As well, 67 potential infrastructure and 159 potential borrow sites were investigated. A total of 114 heritage resources sites were found: 28 in the Inuvialuit Settlement Region, 32 in the Gwich'in Settlement Area, 34 in the Sahtu Settlement Area and 20 in the Deh Cho Region. Site significance was rated as high at 32 sites, medium at 37 sites and low at 47 sites.

No archaeological field studies were done in Alberta during 2002 and 2003.

A Heritage Resources Management Plan has been developed to reduce potential effects.

1 INTRODUCTION

1.1 Project Overview and Purpose

1.1.1 Background

Developing a natural gas pipeline from the Mackenzie Delta through the Northwest Territories to southern markets has been contemplated for many years. Various pipeline projects have been proposed during the last 30 years, considering economics, regulatory requirements, socio-economic and environmental conditions, and engineering and geotechnical issues in the decision-making process.

The Mackenzie Gas Project (the project) has been developed based on the experience of its proponents and the opportunities presented by current market conditions. The project proponents include:

- Imperial Oil Resources Ventures Limited, a subsidiary of Imperial Oil Limited
- Mackenzie Valley Aboriginal Pipeline Limited Partnership
- ConocoPhillips Canada (North) Limited (ConocoPhillips)
- ExxonMobil Canada Properties (ExxonMobil)
- Shell Canada Limited (Shell)

1.1.2 Purpose of Environmental Impact Statement

This Environmental Impact Statement (EIS) for the Mackenzie Gas Project has been developed over the last three years using a community, issue-focused approach that incorporates the input of those communities likely to be affected by the project. This is in keeping with the direction provided by the various regulatory agencies that are responsible for assessing and regulating energy developments in the Northwest Territories (see the Cooperation Plan, Northern Pipeline Environmental Impact Assessment and Regulatory Chairs' Committee [Chairs' Committee] 2002a). This EIS presents:

- an overview of the project, for the purpose of an environmental assessment
- a description of biophysical and socio-economic baseline conditions
- an assessment of potential impacts organized according to key questions and developed with community input

- a description of mitigation measures to reduce adverse biophysical and socio-economic impacts
- a summary of environmental management plans designed to reduce or manage adverse biophysical project effects, while enhancing beneficial effects to the communities of the Northwest Territories

The operator of each field will develop the anchor fields after individual approvals by the National Energy Board (NEB) have been received. The project proponents have agreed to participate in a common EIS submission and review process. As a result, the EIS submission has been prepared on behalf of the anchor field operators, the owners of the gathering system (including the natural gas liquid [NGL] pipeline), and the owners of the gas pipeline.

1.1.3 Project Purpose and Need

The purpose of the project is to develop three onshore natural gas fields (anchor fields) in the Mackenzie Delta and to transport natural gas and NGLs by pipeline to market (see Figure 1-1). The major project priorities are to:

- design, construct and operate the project safely
- meet quality, cost and schedule expectations
- demonstrate care for the environment
- create a wide range of business and employment opportunities for Aboriginal and other northern and Canadian residents

The pipeline system will be anchored by developing about 172 billion m³ of sweet natural gas from the three anchor fields in the production area. The Mackenzie Valley pipeline is needed to economically transport the natural gas from the production area to southern markets over the next 25 to 30 years.

1.1.4 Project Overview

Constructing, operating and decommissioning the project components will involve:

- drilling wells and installing production facilities at Niglintgak, Taglu and Parsons Lake, including:
 - flow lines
 - gas conditioning facilities

- installing infrastructure to support construction and operations activities, including:
 - barge landing sites
 - camps
 - fuel storage sites
 - stockpile sites
 - access roads
 - airstrips and helipads
 - borrow sites
- constructing and operating gas processing and separation facilities
- constructing and operating pipelines and associated facilities, including:
 - a natural gas pipeline
 - an NGL pipeline
 - compressor stations
 - a heater station
 - metering and pigging facilities
- connecting the NGL pipeline with the existing Enbridge pipeline near Norman Wells
- connecting the gas pipeline with the NOVA Gas Transmission Ltd. (NGTL) pipeline system at an interconnect facility in northwestern Alberta
- decommissioning and abandoning components at the end of their useful lives

The project has been designed to accommodate gas and NGLs from other potential sources in the Mackenzie Delta and Mackenzie Valley.

1.1.5 Project Alternatives

Various alternatives were considered in evaluating and selecting the preferred option to develop the project, including:

- alternatives to the project – functionally different ways to produce, process and transport Mackenzie Delta gas to southern markets
- alternative means – technically and economically feasible ways to implement and conduct the project within the context of the preferred option

Figure 1.1 has been removed for the purposes of reducing file size and can be viewed as a graphic separately. This document can be accessed through the link in the Table of Contents reference web page.

Alternatives to the project were considered at a broad, conceptual level, to explore the proposed options for developing anchor fields in the Mackenzie Delta and transporting the gas to southern markets (see Volume 2, Project Description for further details).

Transportation

Alternatives to gas transportation were considered, including:

- having liquefied natural gas plants in the production area, with the product being transported by ship or barge to North American or other international markets
- using barges on the Mackenzie River to transport gas liquids from the Inuvik area facility to Norman Wells
- constructing alternative pipeline corridors

Liquefied Natural Gas Plants

Liquefied natural gas plants and associated ship or rail transportation are often used in remote and unpopulated areas as an alternative to transporting natural gas by pipeline. This alternative was rejected because of the lack of all-season shipping routes from the Beaufort Sea to markets, and the requirements to develop deep-water ports in the shallow Mackenzie Delta or coastal area. In addition, railway lines and all-weather road access to the production area do not exist.

Barges for Natural Gas Liquids

Using barges to transport NGLs is only possible during the open-water season, not during the winter. Because the liquids need to be transported continually, to avoid extensive storage, this option was rejected.

Alternative Pipeline Corridors

Alternative pipeline corridors included:

- a polar gas route with various route options
- a Mackenzie riverbed route, i.e., pipe laydown within the river channel

These corridors were rejected as viable options because of combined technical, economic, social, environmental and regulatory considerations. The preferred corridor does, however, consider parts of the polar gas route, as discussed in the route selection process (see Volume 2, Project Description).

1.1.5.1 Alternative Means to Carry Out the Project

Alternative means that were considered to carry out the project included:

- alternative locations for facilities and infrastructure sites
- route alternatives within the preferred pipeline corridor
- alternative methods for construction and reclamation

Alternative means were considered according to technical, economic, social and environmental criteria (see Volume 2, Project Description, for details). Public input was incorporated in the decision-making process, specifically during the route and site selection process.

1.1.5.2 The Preferred Alternative

The proposed project is expected to meet regional and national interests and the interests of stakeholders, including:

- northern residents
- regulators
- governments
- consumers

To date, there are no viable alternatives to the development and transportation of Mackenzie Delta gas to southern markets that have advanced to the same level as the current project.

1.1.5.3 The No-Go Alternative

A no-go alternative to the project would forgo development benefits and opportunities, given that:

- recoverable resources exist in the three anchor fields
- market conditions are expected to be favourable to support project development
- many northern residents are now willing to consider project development

The no-go alternative would result in lost benefits and opportunities for both the proponents and northern residents.

In the context of the EIS, proven technology and management practices can be applied to the project today, to avoid or reduce adverse environmental and socio-economic effects.

1.2 Proponent Ownership

The Mackenzie Gas Project (the project) is being developed by:

- Imperial Oil Resources Ventures Limited, a subsidiary of Imperial Oil Limited, which will construct and operate the Mackenzie gathering system and the Mackenzie Valley pipeline on behalf of the gathering system and pipeline proponents. Imperial Oil Resources Limited currently holds the significant discovery licence for, and operates, the Taglu gas field.
- the Mackenzie Valley Aboriginal Pipeline Limited Partnership, which was formed by representatives of various aboriginal groups to represent the ownership interest of the Aboriginal people of the Northwest Territories in the Mackenzie Valley pipeline
- ConocoPhillips Canada (North) Limited (ConocoPhillips) and ExxonMobil Canada Properties (ExxonMobil), which jointly hold the Parsons Lake gas field. This field is 75% held by ConocoPhillips and 25% held by ExxonMobil, and is operated by ConocoPhillips.
- Shell Canada Limited (Shell), which holds and operates the Niglintgak gas field
- Imperial Oil Resources Ventures Limited, ConocoPhillips, ExxonMobil and Shell, which will develop the Mackenzie gathering system

1.2.1 Commercial Agreements

The Mackenzie Delta and other areas along or near the Mackenzie Valley have been, and continue to be, active areas of exploration. The proponents have had extensive discussion with companies interested in transporting their natural gas and NGLs via the project pipelines. Precedent agreements have been executed with some shippers.

1.3 Project Schedule

1.3.1 Regulatory Review and Approvals

Following submission of the EIS to the Joint Review Panel, as envisaged in the Cooperation Plan (see Section 1.6.1, Cooperation Plan), it is expected that the EIS will go through:

- an evaluation to ensure it conforms with the EIS Terms of Reference
- an information request phase
- a hearing phase

1.3.2 Project Phases

Developing the Mackenzie Delta natural gas reserves and constructing the gas and NGL pipelines requires a multi-year phased effort (see Figure 1-2).

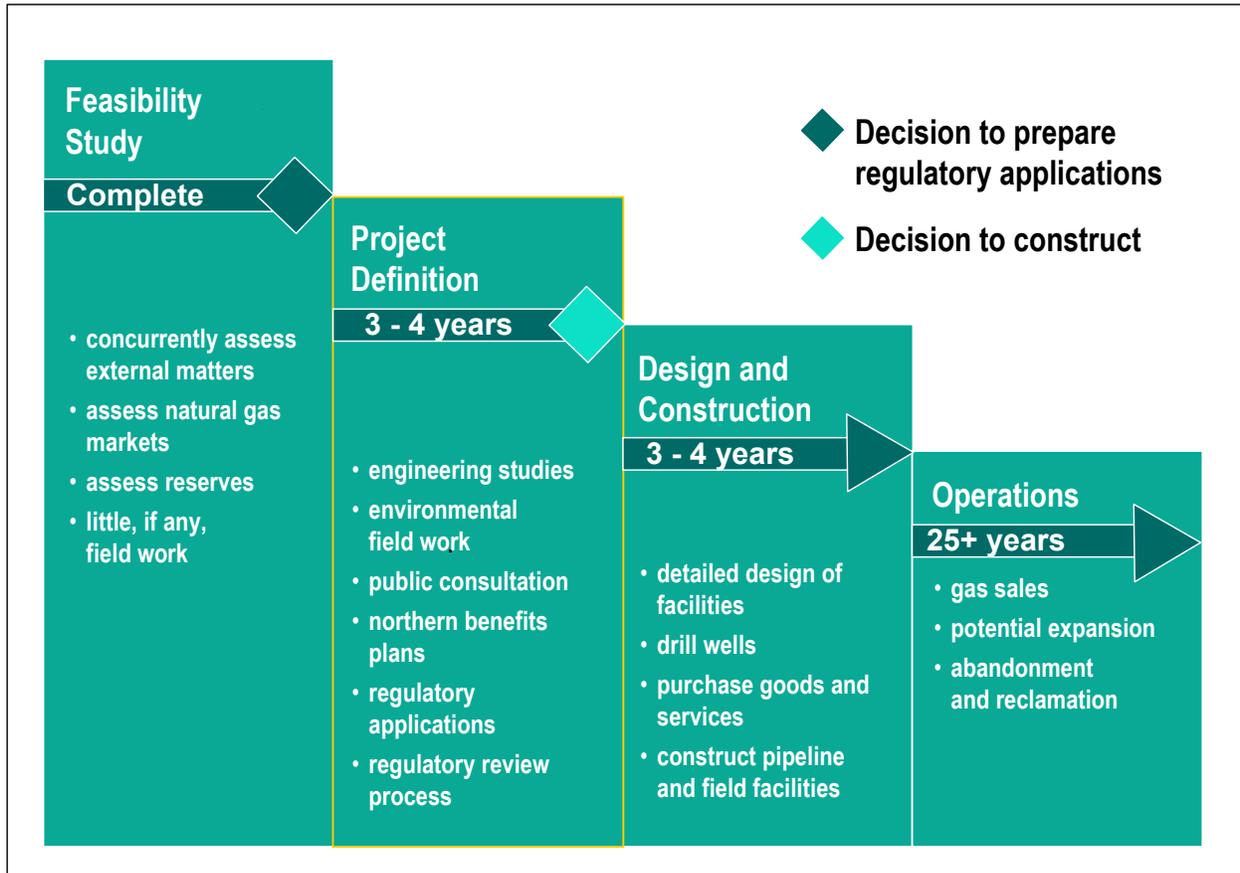


Figure 1-2: Project Phases

1.3.2.1 Project Definition

Following completion of the Feasibility Study in 2001, the project definition phase began in 2002. Activities in this phase include:

- completing conceptual and preliminary engineering design
- completing a preliminary construction execution plan
- conducting biophysical and socio-economic studies and assessments
- developing access agreements and benefits plans
- consulting with the public
- developing and submitting applications for regulatory approval
- participating in the environmental assessment and regulatory review process

Subject to regulatory approval, at the end of this phase, the proponents will decide whether to proceed with construction. This decision will be based on:

- the terms and conditions of the regulatory approvals
- results of detailed engineering
- final project cost estimates
- final commercial agreements
- fiscal terms
- the outlook for natural gas markets

1.3.2.2 Detailed Design and Construction

Following the regulatory application review process, detailed engineering design will begin. Final engineering and construction will begin when the required approvals and permits are received.

Detailed design, construction and initial well drilling are expected to take three to four years.

1.3.2.3 Operations

The EIS assumes that the operations phase will last for 25 to 30 years. During this phase, well drilling will continue. Expansion of the facilities and pipelines could occur in association with new or replacement gas coming on stream.

The EIS also presents a brief assessment of decommissioning and abandonment, which is part of operations. Regulatory requirements and society expectations and attitudes might change over the life of the project. Therefore, decommissioning and abandonment procedures will be reassessed when decommissioning begins.

1.4 Major Project Components

1.4.1 Anchor Fields

The three anchor gas fields that will provide product to the gas and NGL pipelines are:

- Niglintgak
- Taglu
- Parsons Lake

The fields are located in the Inuvialuit Settlement Region of the Northwest Territories (see Figure 1-3).

Figure 1.3 has been removed for the purposes of reducing file size and can be viewed as a graphic separately. This document can be accessed through the link in the Table of Contents reference web page.

1.4.1.1 Niglintgak

Niglintgak, operated by Shell, is located at the southern end of Niglintgak Island in the Mackenzie Delta, about 120 km northwest of Inuvik and about 85 km west of Tuktoyaktuk. Shell has been active in the Niglintgak area since the early 1970s. The Niglintgak field discovery well was drilled in 1973. During the following four years, four delineation wells were drilled. The information from these wells was analyzed and used to obtain a significant discovery licence in 1987.

1.4.1.2 Taglu

Taglu, operated by Imperial Oil Resources Limited, is located about 120 km northwest of Inuvik and about 70 km west of Tuktoyaktuk. Imperial Oil discovered Taglu in 1971. The discovery well was followed by six more wells drilled between 1972 and 1985. Of these seven wells, five encountered hydrocarbons and two were dry and abandoned. In 1987, Imperial Oil was granted a significant discovery licence for Taglu.

1.4.1.3 Parsons Lake

Parsons Lake, operated by ConocoPhillips, is located about 70 km north of Inuvik and about 55 km southwest of Tuktoyaktuk. The Parsons Lake field was discovered in 1972 and defined by two-dimensional (2-D) seismic and other study programs between 1959 and 2001. Between 1971 and 1986, 19 wells were drilled. The Parsons Lake significant discovery licences were granted in 1987.

1.4.1.4 Anchor Field Development Planning

The development of the three fields is in the project definition phase. Several options for production and facility design and pad locations are currently being evaluated to satisfy the requirements for environmental, operational and economic success. Field developments will be addressed through the development plan application process. The field operators have been conducting coordinated public consultation sessions to incorporate feedback and input, to address and reduce any potentially adverse effects and enhance positive effects.

The EIS provides the biophysical and socio-economic basis for the development plan applications. The results of the studies, environmental assessments and public consultation will be incorporated in each development plan application.

The facilities needed to recover the hydrocarbon resources from the three anchor fields will be developed while considering:

- the environment and current land uses
- technical, safety and integrity needs of facilities operating in an Arctic climate

1.4.2 Gathering System

The components of the gathering system include:

- gathering pipelines to collect the sweet natural gas and associated NGLs from three natural gas fields, Niglintgak, Taglu and Parsons Lake (the anchor fields), and transport them to a facility located near Inuvik
- a gas processing facility and supporting facilities near Inuvik to recover NGLs from the gas stream (the Inuvik area facility)
- a pipeline (the NGL pipeline) to transport NGLs south from the Inuvik area facility to Norman Wells, where it will be tied into the existing Enbridge Inc. pipeline
- associated facilities, including:
 - pigging facilities
 - metering stations
 - a slug catcher
- valve stations

1.4.3 Pipeline Corridor

The gas pipeline will be used to transport gas from the Inuvik area facility to the NGTL interconnect facility near the Northwest Territories–Alberta boundary. The NGL pipeline will transport NGLs along the same corridor as the gas pipeline from the Inuvik area facility to Norman Wells.

Figure 1-1, shown previously, shows the proposed pipeline corridor, resulting from technical studies and consultation with community residents. The detailed routes of the gas and NGL pipelines within the pipeline corridor are subject to further detailed technical and commercial studies and public consultation.

1.5 Project Guiding Principles

1.5.1 Environment, Health and Safety

The project guiding principles for environment, health and safety are summarized as follows:

- project planning will take into account sustainable development, balancing economic growth with environmental stewardship, and social and cultural well-being

- all phases of the project will include environmental and health and safety management systems
- opportunities for reduction of greenhouse gases and other emissions will be pursued
- the proponents will incorporate the best practical technology and recognized industry standards to avoid and reduce effects on the environment and on the health and safety of the public and workforce
- physical footprints will be kept as small as practical, taking into account safety and regulatory codes and standards
- monitoring programs will be implemented to test predictions and assumptions and to provide feedback that will be used to modify construction and operational practices
- the project will undergo risk assessments and hazard evaluations where necessary to avoid or reduce effects on the environment and the health and safety of the public and workforce
- contingency plans will be in place for responding to nonroutine incidents and emergencies, although the possibility of such incidents occurring is remote

1.5.2 Public Participation and Consultation

The project's guiding principles for public participation and consultation are: inform and solicit comments from affected members of the public in a timely manner about proposed developments and activities affecting their community. Information will be provided throughout all project phases.

- be responsive to public input and concerns and take these into account during project design and planning
- record and respond to public concerns that are raised

1.5.3 Traditional Knowledge

The project guiding principle for incorporating traditional knowledge in the EIS and in the detailed design, construction and operations phases is to gather and take into account local traditional knowledge, in conjunction with scientific data, throughout the environmental assessment process.

1.5.4 Biophysical Effects

The project guiding principles for biophysical effects are summarized as follows:

- a biophysical impact assessment will identify potential positive and adverse effects of the project using the results from field studies, literature sources and traditional knowledge
- mitigation measures to reduce or eliminate adverse effects will be incorporated into project design, construction practices and operational procedures
- the significance of any adverse residual effect will be assessed in terms of the magnitude, geographic extent and duration of the effect
- environmental monitoring programs will be developed with community and regulatory input. Monitoring will encompass both compliance and effects monitoring.

1.5.5 Socio-Economic Effects

The project guiding principles for socio-economic effects are summarized as follows:

- the project proponents will provide the opportunity for northern residents to participate in, and benefit from, the project
- a socio-economic impact assessment will identify potential positive and adverse effects. The project will apply management measures to reduce or avoid adverse effects, and methods to enhance the positive effects and benefits of the project.
- management of socio-economic effects will require a shared responsibility between the project proponents and the applicable government agencies

1.5.6 Regulatory Compliance

The project guiding principles for regulatory compliance are as follows:

- the project proponents, contractors and subcontractors are committed to meeting all applicable regulatory requirements during all phases of the project
- a regulatory compliance management plan will be implemented before initial construction. It will include tracking, recording, inspecting and following up.

1.5.7 Environmental Management

A series of environmental management and protection plans will be in place before construction and will be updated as required throughout the detailed design, construction and operations phases (see Volume 7, Environmental Management).

1.6 Project Approval Process

1.6.1 Cooperation Plan

The Cooperation Plan (Chairs' Committee 2002a) provides the framework for:

- the regulatory approval process for the project
- preparing and submitting the EIS as an integral component of the regulatory filings

This EIS covers:

- the three anchor fields
- the gathering system, including the NGL pipeline
- the gas pipeline and associated facilities
- associated logistics
- infrastructure
- granular resource requirements

1.6.2 Consolidated Information Requirements

On September 30, 2002, the Chairs' Committee released the *Consolidated Information Requirements* (CIR) (Chairs' Committee 2002b) for the environmental impact assessment and regulatory review of a northern gas pipeline project through the Northwest Territories. The *Consolidated Information Requirements* are intended to guide potential proponents in collecting and analyzing baseline environmental and socio-economic data and technical information used for preparing the EIS and other regulatory applications.

1.6.3 Preliminary Information Package

The project proponents submitted the *Mackenzie Gas Project Preliminary Information Package* (PIP) to the Chairs' Committee and other interested parties on June 18, 2003. The PIP identified potential environmental and socio-economic issues at that time, and the assessment approach that would be taken and submitted in the EIS (Imperial Oil et al. 2003).

The Chairs' Committee evaluated and accepted the PIP as complete on June 30, 2003. The PIP was subsequently used to initiate the:

- review steps under the *Canadian Environmental Assessment Act*
- environmental screening process under the *Inuvialuit Final Agreement*
- review process under the *Mackenzie Valley Resource Management Act*

The EIS is consistent with, and expands on, the contents of the PIP.

1.6.4 Terms of Reference

A draft Terms of Reference was issued for public comment and feedback on June 3, 2004.

A final Terms of Reference was subsequently issued to the project proponents and it will serve as the basis for the Joint Review Panel to evaluate the EIS for acceptability and completeness and allow the review and hearing process to begin.

The project proponents believe the EIS meets the intent of the Terms of Reference. If areas require further clarification or data, the proponents will file supplementary reports or respond to formal information requests.

1.6.5 National Energy Board Regulatory Filings

Under the *Canada Oil and Gas Operations Act* (COGOA), Development Plan Applications (DPAs) are being filed separately with the NEB for anchor field development at:

- Niglintgak
- Taglu
- Parsons Lake

An authorization to construct the Mackenzie gathering system under COGOA is also being submitted.

An application under the *National Energy Board Act* is also being made for approval to construct and operate the Mackenzie Valley pipeline from the Inuvik area facility to the Northwest Territories–Alberta boundary.

Each NEB filing refers to this EIS submission for specific details on the environmental and socio-economic effects and mitigation measures.

The EIS also considers new NGTL facilities required to transport gas delivered by the Mackenzie Valley pipeline. NGTL will seek approval from the Alberta Energy and Utilities Board for these facilities, under a separate regulatory application.

1.6.6 Permit Applications

A series of site or activity-specific Project Permit Applications (PPAs) will be required before construction, including:

- land use permits
- land lease permits
- water licences
- navigable water licences
- fisheries authorizations

Land use permits are required for construction of all project facilities and infrastructure sites, including, for example:

- well pads
- flow lines
- winter roads
- construction camps
- barge landing sites

Land leases, with a term of up to 30 years and renewable for an additional 30 years, are required for facility, infrastructure and camp sites.

Water licences are required for:

- domestic water use
- constructing ice roads
- hydrostatic testing of the pipeline
- discharge of wastewater

Navigable water licences are required for navigable watercourse crossings and docking sites. Authorizations are required for water crossings, barge landing sites and any areas where fish habitat could be harmfully altered, disrupted or destroyed (Cott and Moore 2003).

Table 1-1 summarizes these permit applications. Figure 1-4 shows the linkage between the Environmental Impact Statement (EIS) and the PPAs. Data collected for the EIS can be used at a regional or overview level to support the PPAs. However, site-specific information will be part of the approval process for each project permit application.

Table 1-1: Permit Applications

No. of Sites	Project Component	Approval Date Required	Permit Name	Regulatory Agency	Legislation	Area
Filed by Imperial Oil Resources Ventures Limited for the Gas Pipeline and Gathering System						
1	Detailed pipeline route	mid-2006	Plan, Profile and Book of Reference	NEB	National Energy Board Act	NWT
1	Inuvialuit Settlement Region access to highways	mid-2006	Temporary Access to a Public Highway	GNWT, DoT	NWT Public Highways Act	ISR
1	Inuvialuit Settlement Region airstrip	mid-2006	Aerodrome Registration	TC	Canadian Aviation Regulations	ISR
1	Inuvialuit Settlement Region airstrip navigation	mid-2006	Navigation Permit	NavCanada	Civil Air Navigation Services Commercialization Act	ISR
1	Inuvialuit Settlement Region airstrip, effects on migratory birds	mid-2006	Migratory Bird Permit	CWS	Migratory Bird Convention Act	ISR
65	Inuvialuit Settlement Region electrical work	mid-2006	Electrical Permit	GNWT, PWS	Electrical Protection Act	ISR
17	Inuvialuit Settlement Region explosives storage	mid-2006	Explosives Storage Permit	DNR	Explosives Act	ISR
17	Inuvialuit Settlement Region explosives use	mid-2006	Explosives Use Permit	NWT, WCB	Explosives Use Act	ISR
58	Inuvialuit Settlement Region land tenure, Crown land	mid-2006	Lease and LoO	INAC	Territorial Lands Act, Federal Real Property Act	ISR
66	Inuvialuit Settlement Region land use, Crown land	mid-2006	Land Use Permit	INAC	Territorial Land Use Regulations	ISR
49	Inuvialuit Settlement Region land use, private land	mid-2006	Land Use Permit	ILA	Inuvialuit Land Management System	ISR
40	Inuvialuit Settlement Region private land tenure	mid-2006	Lease/right-of-way	ILA	Inuvialuit Land Management System	ISR
8	Inuvialuit Settlement Region quarries, Crown land	mid-2006	Quarry Permit/Lease	INAC	Territorial Quarrying Regulations	ISR
9	Inuvialuit Settlement Region quarrying, private land	mid-2006	Quarry Licence	ILA	Inuvialuit Land Management System	ISR
19	Inuvialuit Settlement Region radio apparatus	mid-2006	Radio Apparatus Permit	Dol	Radiocommunication Act	ISR
198	Inuvialuit Settlement Region water crossings	mid-2006	Authorization for HADD, if necessary	DFO	Fisheries Act	ISR

Table 1-1: Permit Applications (cont'd)

No. of Sites	Project Component	Approval Date Required	Permit Name	Regulatory Agency	Legislation	Area
Filed by Imperial Oil Resources Ventures Limited for the Gas Pipeline and Gathering System (cont'd)						
198	Inuvialuit Settlement Region work in navigable waters	mid-2006	Navigable Waters Approval	CCG	Navigable Waters Protection Act, NEB Act	ISR
115	Inuvialuit Settlement Region, burning timber	mid-2006	Fire permit to clear land	RWED	Forest Protection Act	ISR
1	Inuvialuit Settlement Region, timber cutting	mid-2006	Timber Cutting Permit	RWED	Forest Management Act	ISR
115	Inuvialuit Settlement Region, land use	mid-2006	Archaeologist Permit	PWNHC	Archaeological Sites Regulations	ISR
1	Inuvialuit Settlement Region, land use	mid-2006	Mackenzie Development Area Permission	MACA	Mackenzie Development Area regulations	ISR
115	Inuvialuit Settlement Region, wildlife disturbance	mid-2006	Wildlife Permit	RWED	NWT Wildlife Act	ISR
233	ISR water use, and water crossings	mid-2006	Water Licence	NWTWB	NWT Waters Act	ISR
1	Kendall Island Bird Sanctuary land use	mid-2006	Migratory Bird Permit	CWS	Migratory Bird Sanctuary Regulations	ISR
1	Gwich'in Settlement Area access to highways	mid-2006	Temporary Access to a Public Highway	GNWT, DoT	NWT Public Highways Act	GSA
2	Gwich'in Settlement Area airstrip	mid-2006	Aerodrome Registration	TC	Canadian Aviation Regulations	GSA
2	Gwich'in Settlement Area airstrip navigation	mid-2006	Navigation Permit	NavCanada	Civil Air Navigation Services Commercialization Act	GSA
2	Gwich'in Settlement Area airstrip, effects on migratory birds	mid-2006	Migratory Bird Permit	CWS	Migratory Bird Convention Act	GSA
1	Gwich'in Settlement Area compressor stations	mid-2006	Boiler and Pressure Vessel Permit	GNWT, PWS	Boiler and Pressure Vessel Act	GSA
78	Gwich'in Settlement Area electrical work	mid-2006	Electrical Permit	GNWT, PWS	Electrical Protection Act	GSA
21	Gwich'in Settlement Area explosives storage	mid-2006	Explosives Storage Permit	DNR	Explosives Act	GSA
21	Gwich'in Settlement Area explosives use	mid-2006	Explosives Use Permit	NWT, WCB	Explosives Use Act	GSA

Table 1-1: Permit Applications (cont'd)

No. of Sites	Project Component	Approval Date Required	Permit Name	Regulatory Agency	Legislation	Area
Filed by Imperial Oil Resources Ventures Limited for the Gas Pipeline and Gathering System (cont'd)						
45	Gwich'in Settlement Area land tenure, Crown land	mid-2006	Lease and LoO	INAC	<i>Territorial Lands Act, Federal Real Property Act</i>	GSA
1	Gwich'in Settlement Area land use	mid-2006	Gwich'in Land Use Plan Amendment	GLUPB	<i>Mackenzie Valley Resource Management Act</i>	GSA
128	Gwich'in Settlement Area land use	mid-2006	Land Use Permit	MVLWB	Mackenzie Valley Land Use Regulations	GSA
62	Gwich'in Settlement Area private land tenure	mid-2006	Industrial Lease/right-of-way	GLA	Gwich'in Land Management and Control Rules	GSA
9	Gwich'in Settlement Area quarries, Crown land	mid-2006	Quarry Permit/Lease	INAC	Territorial Quarrying Regulations	GSA
12	Gwich'in Settlement Area quarries, private land	mid-2006	Quarry Lease	GLA	Gwich'in Land Management and Control Rules	GSA
23	Gwich'in Settlement Area radio apparatus	mid-2006	Radio Apparatus Permit	DoI	<i>Radiocommunication Act</i>	GSA
209	Gwich'in Settlement Area water crossings	mid-2006	Authorization for HADD, if necessary	DFO	<i>Fisheries Act</i>	GSA
245	Gwich'in Settlement Area water use and water crossings	mid-2006	Water Licence	MVLWB	<i>NWT Waters Act</i>	GSA
209	Gwich'in Settlement Area work in navigable waters	mid-2006	Navigable Waters Approval	CCG	<i>Navigable Waters Protection Act, NEB Act</i>	GSA
128	Gwich'in Settlement Area, burning timber	mid-2006	Fire permit to clear land	RWED	<i>Forest Protection Act</i>	GSA
1	Gwich'in Settlement Area, timber cutting	mid-2006	Timber Cutting Permit	RWED	<i>Forest Management Act</i>	GSA
128	Gwich'in Settlement Area, land use	mid-2006	Archaeologist Permit	PWNHC	Archaeological Sites Regulations	GSA
1	Gwich'in Settlement Area, land use	mid-2006	Inuvik Watershed Development Area Approval	MACA	Inuvik Watershed Development Area Regulations	GSA
1	Gwich'in Settlement Area, land use	mid-2006	Mackenzie Development Area Permission	MACA	Mackenzie Development Area Regulations	GSA
128	Gwich'in Settlement Area, wildlife disturbance	mid-2006	Wildlife Permit	RWED	<i>NWT Wildlife Act</i>	GSA

Table 1-1: Permit Applications (cont'd)

No. of Sites	Project Component	Approval Date Required	Permit Name	Regulatory Agency	Legislation	Area
Filed by Imperial Oil Resources Ventures Limited for the Gas Pipeline and Gathering System (cont'd)						
1	Sahtu Settlement Area access to highways	mid-2006	Temporary Access to a Public Highway	GNWT, DoT	NWT Public Highways Act	SSA
3	Sahtu Settlement Area airstrip	mid-2006	Aerodrome Registration	TC	Canadian Aviation Regulations	SSA
3	Sahtu Settlement Area airstrip navigation	mid-2006	Navigation Permit	NavCanada	Civil Air Navigation Services Commercialization Act	SSA
3	Sahtu Settlement Area airstrip, effects on migratory birds	mid-2006	Migratory Bird Permit	CWS	Migratory Bird Convention Act	SSA
2	Sahtu Settlement Area compressor stations	mid-2006	Boiler and Pressure Vessel Permit	GNWT, PWS	Boiler and Pressure Vessel Act	SSA
151	Sahtu Settlement Area electrical work	mid-2006	Electrical Permit	GNWT, PWS	Electrical Protection Act	SSA
51	Sahtu Settlement Area explosives storage	mid-2006	Explosives Storage Permit	DNR	Explosives Act	SSA
51	Sahtu Settlement Area explosives use	mid-2006	Explosives Use Permit	NWT, WCB	Explosives Use Act	SSA
54	Sahtu Settlement Area land tenure, Crown land	mid-2006	Lease and LoO	INAC	Territorial Lands Act, Federal Real Property Act	SSA
195	Sahtu Settlement Area land use	mid-2006	Land Use Permit	MVLWB	Mackenzie Valley Land Use Regulations	SSA
17	Sahtu Settlement Area quarries, Crown land	mid-2006	Quarry Permit/Lease	INAC	Territorial Quarrying Regulations	SSA
56	Sahtu Settlement Area radio apparatus	mid-2006	Radio Apparatus Permit	DoI	Radiocommunication Act	SSA
368	Sahtu Settlement Area water crossings	mid-2006	Authorization for HADD, if necessary	DFO	Fisheries Act	SSA
418	Sahtu Settlement Area water use, and water crossings	mid-2006	Water Licence	MVLWB	NWT Waters Act	SSA
368	Sahtu Settlement Area work in navigable waters	mid-2006	Navigable Waters Approval	CCG	Navigable Waters Protection Act, NEB Act	SSA
223	Sahtu Settlement Area, burning timber	mid-2006	Fire permit to clear land	RWED	Forest Protection Act	SSA
10	Sahtu Settlement Area, Fort Good Hope land tenure	mid-2006	Lease/right-of-way	MACA	Commissioner's Land Act	SSA

Table 1-1: Permit Applications (cont'd)

No. of Sites	Project Component	Approval Date Required	Permit Name	Regulatory Agency	Legislation	Area
Filed by Imperial Oil Resources Ventures Limited for the Gas Pipeline and Gathering System (cont'd)						
12	Sahtu Settlement Area, Fort Good Hope land use	mid-2006	Land Use Permit	MACA	Commissioner's Land Act	SSA
2	Sahtu Settlement Area, Fort Good Hope quarrying	mid-2006	Quarry Permit	MACA	Commissioner's Land Regulations	SSA
61	Sahtu Settlement Area, K'ahsho Got'ine, land tenure	mid-2006	Lease/right-of-way	KGDLC	Sahtu Comprehensive Land Claim Agreement	SSA
12	Sahtu Settlement Area, K'ahsho Got'ine, quarries	mid-2006	Quarry Permit	KGDLC	Sahtu Comprehensive Land Claim Agreement	SSA
11	Sahtu Settlement Area, Norman Wells land tenure	mid-2006	Lease/right-of-way	MACA	Commissioner's Land Act	SSA
13	Sahtu Settlement Area, Norman Wells land use	mid-2006	Land Use Permit	MACA	Commissioner's Land Act	SSA
2	Sahtu Settlement Area, Norman Wells quarrying	mid-2006	Quarry Permit	MACA	Commissioner's Land Regulations	SSA
2	Sahtu Settlement Area, timber cutting	mid-2006	Timber Cutting Permit	RWED	Forest Management Act	SSA
34	Sahtu Settlement Area, Tulita District, land tenure	mid-2006	Lease/right-of-way	TDLC	Sahtu Comprehensive Land Claim Agreement	SSA
17	Sahtu Settlement Area, Tulita District, quarries	mid-2006	Quarry Permit	TDLC	Sahtu Comprehensive Land Claim Agreement	SSA
3	Sahtu Settlement Area, Tulita land tenure	mid-2006	Lease/right-of-way	MACA	Commissioner's Land Act	SSA
3	Sahtu Settlement Area, Tulita land use	mid-2006	Land Use Permit	MACA	Commissioner's Land Act	SSA
223	Sahtu Settlement Area, land use	mid-2006	Archaeologist Permit	PWNHC	Archaeological Sites Regulations	SSA
1	Sahtu Settlement Area, land use	mid-2006	Mackenzie Development Area Permission	MACA	Mackenzie Development Area Regulations	SSA
1	Sahtu Settlement Area, land use	mid-2006	Norman Wells Development Regulations Approval	MACA	Norman Wells Development Regulations	SSA
223	Sahtu Settlement Area, wildlife disturbance	mid-2006	Wildlife Permit	RWED	NWT Wildlife Act	SSA

Table 1-1: Permit Applications (cont'd)

No. of Sites	Project Component	Approval Date Required	Permit Name	Regulatory Agency	Legislation	Area
Filed by Imperial Oil Resources Ventures Limited for the Gas Pipeline and Gathering System (cont'd)						
2	Camsell Bend, barge landing	mid-2006	Land Use Permit	MVLWB	Mackenzie Valley Land Use Regulations	DCR
2	Camsell Bend, barge landing	mid-2006	Water Licence	MVLWB	NWT Waters Act	DCR
1	Deh Cho Region access to highways	mid-2006	Temporary Access to a Public Highway	GNWT, DoT	NWT Public Highways Act	DCR
5	Deh Cho Region airstrip	mid-2006	Aerodrome Registration	TC	Canadian Aviation Regulations	DCR
5	Deh Cho Region airstrip navigation	mid-2006	Navigation Permit	NavCanada	Civil Air Navigation Services Commercialization Act	DCR
5	Deh Cho Region airstrip, effects on migratory birds	mid-2006	Migratory Bird Permit	CWS	Migratory Bird Convention Act	DCR
2	Deh Cho Region compressor stations	mid-2006	Boiler and Pressure Vessel Permit	GNWT, PWS	Boiler and Pressure Vessel Act	DCR
102	Deh Cho Region electrical work	mid-2006	Electrical Permit	GNWT, PWS	Electrical Protection Act	DCR
43	Deh Cho Region explosive storage	mid-2006	Explosives Storage Permit	DNR	Explosives Act	DCR
43	Deh Cho Region explosives use	mid-2006	Explosives Use Permit	NWT, WCB	Explosives Use Act	DCR
89	Deh Cho Region land tenure, Crown land	mid-2006	Lease and LoO	INAC	Territorial Lands Act, Federal Real Property Act	DCR
132	Deh Cho Region land use	mid-2006	Land Use Permit	MVLWB	Mackenzie Valley Land Use Regulations	DCR
43	Deh Cho Region quarries	mid-2006	Quarry Permit/Lease	INAC	Territorial Quarrying Regulations	DCR
50	Deh Cho Region radio apparatus	mid-2006	Radio Apparatus Permit	DoI	Radiocommunication Act	DCR
196	Deh Cho Region water crossings	mid-2006	Authorization for HADD, if necessary	DFO	Fisheries Act	DCR
214	Deh Cho Region water use, and water crossings	mid-2006	Water Licence	MVLWB	NWT Waters Act	DCR
196	Deh Cho Region work in navigable waters	mid-2006	Navigable Waters Approval	CCG	Navigable Waters Protection Act, NEB Act	DCR
132	Deh Cho Region, burning timber	mid-2006	Fire permit to clear land	RWED	Forest Protection Act	DCR
1	Deh Cho Region, timber cutting	mid-2006	Timber Cutting Permit	RWED	Forest Management Act	DCR

Table 1-1: Permit Applications (cont'd)

No. of Sites	Project Component	Approval Date Required	Permit Name	Regulatory Agency	Legislation	Area
Filed by Imperial Oil Resources Ventures Limited for the Gas Pipeline and Gathering System (cont'd)						
132	Deh Cho Region, land use	mid-2006	Archaeologist Permit	PWNHC	Archaeological Sites Regulations	DCR
1	Deh Cho Region, land use	mid-2006	Mackenzie Development Area Permission	MACA	Mackenzie Development Area Regulations	DCR
132	Deh Cho Region, wildlife disturbance	mid-2006	Wildlife Permit	RWED	NWT Wildlife Act	DCR
1	Alberta land use	mid-2006	Pipeline Agreement	ASRD	Public Lands Act	AB
1	Alberta land use	mid-2006	Pipeline Installation Lease	ASRD	Public Lands Act	AB
1	Alberta land use	mid-2006	Timber clearing and burning permits	ASRD	Public Lands Act	AB
Filed by Operators of Production Fields (Imperial Oil Resources Limited, ConocoPhillips and Shell)						
1	Niglintgak access to highways	mid-2006	Temporary Access to a Public Highway	GNWT, DoT	NWT Public Highways Act	ISR
1	Niglintgak airstrip	mid-2006	Aerodrome Registration	TC	Canadian Aviation Regulations	ISR
1	Niglintgak airstrip navigation	mid-2006	Navigation Permit	NavCanada	Civil Air Navigation Services Commercialization Act	ISR
1	Niglintgak compressor	mid-2006	Boiler and Pressure Vessel Permit	GNWT, PWS	Boiler and Pressure Vessel Act	ISR
7-9	Niglintgak construction in a watercourse	mid-2006	Authorization for HADD, if necessary	DFO	Fisheries Act	ISR
16	Niglintgak electrical work	mid-2006	Electrical Permit	GNWT, PWS	Electrical Protection Act	ISR
1	Niglintgak KIBS land use	mid-2006	Migratory Bird Permit	CWS	Migratory Bird Sanctuary Regulations	ISR
7	Niglintgak land tenure	mid-2006	Lease (4) and LoO (3)	INAC	Territorial Lands Act, Federal Real Property Act	ISR
8	Niglintgak land use	mid-2006	Land Use Permit	INAC	Territorial Land Use Regulations	ISR
1	Niglintgak radio apparatus	mid-2006	Radio Apparatus Permit	Dol	Radiocommunication Act	ISR
1	Niglintgak water use	mid-2006	Water Licence (Type A)	NWTTWB	NWT Waters Act	ISR
7	Niglintgak work in navigable waters	mid-2006	Navigable Waters Approval	CCG	Navigable Waters Protection Act, NEB Act	ISR

Table 1-1: Permit Applications (cont'd)

No. of Sites	Project Component	Approval Date Required	Permit Name	Regulatory Agency	Legislation	Area
Filed by Operators of Production Fields (Imperial Oil Resources Limited, ConocoPhillips and Shell) (cont'd)						
1	Niglingak, disposal of dredged material	mid-2006	Disposal at Sea Permit	EC	<i>Canadian Environmental Protection Act</i>	ISR
1	Taglu access to highways	mid-2006	Temporary Access to a Public Highway	GNWT, DoT	<i>NWT Public Highways Act</i>	ISR
2	Taglu airstrip	mid-2006	Aerodrome Registration	TC	Canadian Aviation Regulations	ISR
2	Taglu airstrip navigation	mid-2006	Navigation Permit	NavCanada	<i>Civil Air Navigation Services Commercialization Act</i>	ISR
1	Taglu pressure vessels	mid-2006	Boiler and Pressure Vessel Permit	GNWT, PWS	<i>Boiler and Pressure Vessel Act</i>	ISR
1	Taglu construction in a watercourse	mid-2006	Authorization for HADD, if necessary	DFO	<i>Fisheries Act</i>	ISR
4	Taglu electrical work	mid-2006	Electrical Permit	GNWT, PWS	<i>Electrical Protection Act</i>	ISR
1	Taglu KIBS land use	mid-2006	Migratory Bird Permit	CWS	Migratory Bird Sanctuary Regulations	ISR
4	Taglu land tenure	mid-2006	Lease and LoO	INAC	<i>Territorial Lands Act, Federal Real Property Act</i>	ISR
6	Taglu land use	mid-2006	Land Use Permit	INAC	Territorial Land Use Regulations	ISR
1	Taglu radio apparatus	mid-2006	Radio Apparatus Permit	Dol	<i>Radiocommunication Act</i>	ISR
1	Taglu water use	mid-2006	Water Licence	NWTWB	<i>NWT Waters Act</i>	ISR
1	Taglu work in navigable waters	mid-2006	Navigable Waters Approval	CCG	<i>Navigable Waters Protection Act, NEB Act</i>	ISR
6	Taglu, land use	mid-2006	Archaeologist Permit	PWNHC	Archaeological Sites Regulations	ISR
6	Taglu, wildlife disturbance	mid-2006	Wildlife Permit	RWED	<i>NWT Wildlife Act</i>	ISR
1	Parsons Lake access to highways	mid-2006	Temporary Access to a Public Highway	GNWT, DoT	<i>NWT Public Highways Act</i>	ISR
1	Parsons Lake airstrip	mid-2006	Aerodrome Registration	TC	Canadian Aviation Regulations	ISR
1	Parsons Lake airstrip navigation	mid-2006	Navigation Permit	NavCanada	<i>Civil Air Navigation Services Commercialization Act</i>	ISR

Table 1-1: Permit Applications (cont'd)

No. of Sites	Project Component	Approval Date Required	Permit Name	Regulatory Agency	Legislation	Area
Filed by Operators of Production Fields (Imperial Oil Resources Limited, ConocoPhillips and Shell) (cont'd)						
1	Parsons Lake compressor	mid-2006	Boiler and Pressure Vessel Permit	GNWT, PWS	Boiler and Pressure Vessel Act	ISR
15	Parsons Lake electrical work	mid-2006	Electrical Permit	GNWT, PWS	Electrical Protection Act	ISR
2	Parsons Lake land tenure	mid-2006	Lease and LoO	INAC	Territorial Lands Act, Federal Real Property Act	ISR
1	Parsons Lake land tenure, private land	mid-2006	Lease/right-of-way	ILA	Inuvialuit Land Management System	ISR
4	Parsons Lake land use, Crown land	mid-2006	Land Use Permit	INAC	Territorial Land Use Regulations	ISR
1	Parsons Lake land use, private land	mid-2006	Land Use Permit	ILA	Inuvialuit Land Management System	ISR
1	Parsons Lake radio apparatus	mid-2006	Radio Apparatus Permit	Dol	Radiocommunication Act	ISR
1	Parsons Lake water use	mid-2006	Water Licence	NWTWB	NWT Waters Act	ISR
1	Parsons Lake, burning timber	mid-2006	Fire permit to clear land	RWED	Forest Protection Act	ISR
Filed by NOVA Gas Transmission Ltd. for the Northwest Mainline (Dickins Lake Section)²						
TBD ¹	Alberta land use	mid-2006	PLA	ASRD	Public Lands Act	AB
TBD ¹	Alberta land use	mid-2006	Pipeline Installation Lease	ASRD	Public Lands Act	AB
TBD ¹	Alberta land use	mid-2006	Timber clearing and burning permits	ASRD	Public Lands Act	AB
TBD ¹	Construction	mid-2006	Permit to construct	EUB	Pipeline Act	AB
TBD ¹	Traditional land use	mid-2004	Archaeological Investigation Permit	ACD	Historical Resources Act	AB
TBD ¹	Water crossings	14 days before activities begin	Notice under the Code of Practice for Pipelines and Telecommunications Lines Crossing a Water Body	AE	Water Act	AB
TBD ¹	Water crossings	14 days before activities begin	Notice under the Code of Practice for Watercourse Crossings	AE	Water Act	AB

Table 1-1: Permit Applications (cont'd)

No. of Sites	Project Component	Approval Date Required	Permit Name	Regulatory Agency	Legislation	Area
Filed by NOVA Gas Transmission Ltd. for the Northwest Mainline (Dickins Lake Section)² (cont'd)						
TBD ¹	Hydrostatic testing	7 days before activities begin	Notice under the Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing of Pipelines	AE	Water Act	AB
TBD ¹	Hydrostatic testing	7 days before start of temporary diversion for hydrostatic testing	Notice under the Code of Practice for the Release of Hydrostatic Test Water from Petroleum Liquid and Gas Pipelines	AE	Environmental Protection and Enhancement Act	AB
TBD ¹	Road crossings	30 days before construction starts	Road Crossing Agreement	N/A (Agreement with landowner)	N/A	AB
TBD ¹	Road use agreements		Road Crossing Agreement	N/A (Agreement with landowner)	N/A	AB
TBD ¹	Survey clearance	Survey can take place at any time after survey permission is granted	Survey certificate	ASRD	Surface Rights Act	AB
TBD ¹	Timber removal and salvage	Will file for a waiver for exemption	Included under the EFR part of the PLA	ASRD	Public Lands Act	AB
TBD ¹	Pipeline crossings		Pipeline crossing agreement	N/A (Agreement with pipeline owner)	N/A	AB

Table 1-1: Permit Applications (cont'd)

NOTES:

- 1 The number of sites is not yet available and will depend on the completion of a survey and final project design.
- 2 The prime construction contractor will obtain all other incidental permits before and during construction.

AB = Alberta	
ACD = Alberta Community Development	
AE = Alberta Environment	
ASRD = Alberta Sustainable Resource Development	
CCG = Canadian Coast Guard	
CWS = Canadian Wildlife Service	
DCR = Deh Cho Region	
DFO = Department of Fisheries and Oceans	
DNR = Department of Natural Resources, Canada	
DoI = Department of Industry, Canada	
EC = Environment Canada	
EFR = Environmental Field Report	
EUB = Energy and Utilities Board	
GLA = Gwich'in Land Administration	
GLUPB = Gwich'in Land Use Planning Board	
GNWT, DoT = Government of the Northwest Territories, Department of Transportation	
GSA = Gwich'in Settlement Area	
HADD = Harmful Alteration, Disruption or Destruction of Fish Habitat	
ILA = Inuvialuit Land Administration	
INAC = Indian and Northern Affairs Canada	
ISR = Inuvialuit Settlement Region	
KGDLG = K'ahsho Got'ine District Land Corporation	
KIBS = Kendall Island Bird Sanctuary	
LoO = Licence of Occupation (right-of-way from INAC)	
MACA = Municipal and Community Affairs	
MVLWB = Mackenzie Valley Land and Water Board	
N/A = not applicable	
NEB = National Energy Board	
NWTTWB = Northwest Territories Water Board	
PLA = Pipeline Agreement	
PWNHC = Prince of Wales Northern Heritage Centre	
PWS = Public Works and Services, GNWT	
RWED = Resources, Wildlife, and Economic Development, GNWT	
SSA = Sahtu Settlement Area	
TBD = to be determined	
TC = Transport Canada	
TDLC = Tuiita District Land Corporation	
WCB = Workers' Compensation Board	

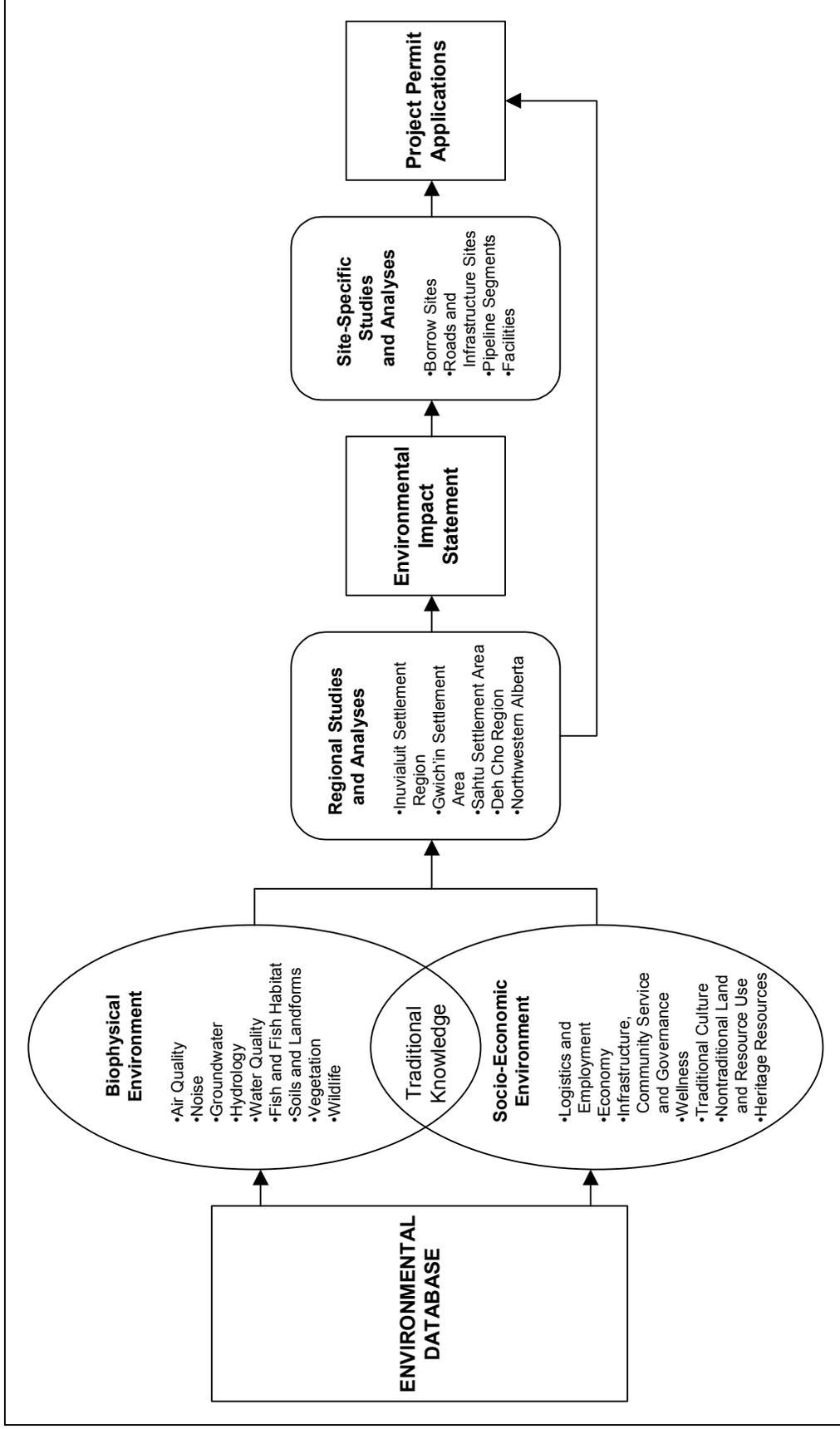


Figure 1-4: Linkage Between the Environmental Impact Statement and the Project Permit Applications

1.7 Developing the Environmental Impact Statement

1.7.1 Community-Based Focus

The EIS addresses the issues and concerns identified during public consultation and EIS workshops, as summarized in Section 4, Public Participation. It also incorporates the traditional knowledge available during EIS preparation.

1.7.2 Consultants Group

The project proponents retained a group of companies with broad and extensive experience in environmental and socio-economic impact assessment and mitigation planning. The group includes AMEC Earth and Environmental Limited (AMEC), IMG Golder Corporation, KAVIK-AXYS Inc. and TERA Environmental Consultants.

The consultants group provided about 300 team members to complete:

- the environmental field studies
- the biophysical impact assessment
- the socio-economic evaluations and assessments
- the EIS documents

This includes developing this EIS document, and providing support during the regulatory review process.

The consultants are actively involved in the project design, providing input to the engineers, planners and management. The team used the extensive skills and experience of its assessment members to design and complete the required biophysical and socio-economic studies and consultations to evaluate the probable effects of the proposed development and operation of the project. The team included individuals with extensive experience in northern development projects, who will also provide expertise during the regulatory review process.

1.7.3 Document Structure

The EIS includes the following volumes:

- Volume 1, Overview and Impact Summary – provides an introduction to the project and overview of assessment results for a general audience
- Volume 2, Project Description – describes the scope of the project on which the EIS is based

- Volume 3, Biophysical Baseline – summarizes the environmental setting of the project based on historical information, published and anecdotal information, traditional knowledge and baseline studies
- Volume 4, Socio-Economic Baseline – summarizes the socio-economic setting of the project based on historical information, published and anecdotal information, traditional knowledge and baseline studies
- Volume 5, Biophysical Impact Assessment – identifies possible residual biophysical effects after mitigation measures
- Volume 6, Socio-Economic Impact Assessment – identifies possible residual socio-economic effects after mitigation measures
- Volume 7, Environmental Management – describes environmental management systems and plans that the project proponents will implement, to ensure adverse effects are avoided or reduced to the extent practical, and positive effects are enhanced
- Volume 8, Environmental Alignment Sheets – contains all relevant pipeline environmental alignment sheets

At the end of each volume, a list of references and a glossary are provided.

1.8 Concordance with the Terms of Reference

Table 1-2 provides a concordance table between the Terms of Reference (TOR) and the EIS. Sections of the TOR that relate directly to the EIS begin at Section 5.0 regarding the principles used to develop the EIS. These are addressed in Volumes 1, 4 and 6 of the EIS (section numbers indicate where in each volume the material is presented).

The concordance table identifies the title of each subject area to be addressed, provides a brief descriptive summary of that subject and gives the corresponding EIS volume and section where it can be located.

Table 1-2: Concordance with the Terms of Reference

Section of TOR	Title	Description Summary	Volume of EIS	Section of EIS Volume
5.0	Principles			
5.1	Contribution to Sustainability	<ul style="list-style-type: none"> Sustainable development in impact assessment process 	1	2
5.2	Use and Respect for Traditional Knowledge	<ul style="list-style-type: none"> Use of traditional knowledge in project planning and impact assessment process 	1 4	2, 3 5
5.3	Recognition of Land Claim Agreements and Treaties	<ul style="list-style-type: none"> Impact assessment process developed in context of existing land claim agreements and treaties 	4 6	1 1
5.4	Recognition of Diversity	<ul style="list-style-type: none"> Take into account perspectives of the people in the project area 	1	3, 4
5.5	The Precautionary Approach	<ul style="list-style-type: none"> Use of precautionary approach in impact assessment 	1	2
6.0	Guidance on the Preparation of the EIS	<ul style="list-style-type: none"> Traditional knowledge in EIS; concordance table; reason for any TOR omission in the EIS; a key subject index; clear language; use diagrams to clarify text 	1	1, 2
7.0	Executive Summary	<ul style="list-style-type: none"> Background on the proponents; project overview; project setting: geographic, physical, biological and human environments; key findings 	1	Executive Summary
8.0	Introduction			
8.1	The Proponent	<ul style="list-style-type: none"> Ownership arrangements; ownership of rights; personnel responsible for preparing the EIS; record of environmental performance in conducting similar projects in northern environments 	1	1
8.2	Project Overview and Purpose	<ul style="list-style-type: none"> Purpose, location, components and phases, workforce and equipment, associated activities, schedule and cost 	1	1
8.3	The Project Setting	<ul style="list-style-type: none"> General overview of the geographic, ecological, social, economic and cultural setting; communities in project area 	3 4	1 1
8.4	The Environmental Impact Assessment Process and Approvals	<ul style="list-style-type: none"> Steps in the impact assessment process and main approvals required; government permits and authorizations required (as an appendix) 	1	1, 2
8.5	Study Strategy and Methodology	<ul style="list-style-type: none"> Describe approach, strategy and methodology. 	1	2
9.0	Project Description			
9.1	General Requirements	<ul style="list-style-type: none"> Project components (permanent or temporary facilities) and related undertakings and physical activities by location and project phase 	2	3, 4, 5
9.2	Proposed Facilities	<ul style="list-style-type: none"> Permanent structures and infrastructure; properties and volumes of transported or disposed product during facility operations 	2	3, 5, 6

Table 1-2: Concordance with the Terms of Reference (cont'd)

Section of TOR	Title	Description Summary	Volume of EIS	Section of EIS Volume
9.3	Land Requirements and Right-of-Way (ROW) Dimensions	<ul style="list-style-type: none"> • Dimensions and location of facility sites and right-of-way; size and location of temporary work room; ownership of lands; zoning and planning designations 	2	3-7
9.4	Schedule and Boundaries	<ul style="list-style-type: none"> • For each project phase: schedule and boundaries 	2 6	1 2
9.5	Cost and Workforce	<ul style="list-style-type: none"> • For each project phase; cost and workforce 	2 6	9 2, 3
9.6	Construction Phase	<ul style="list-style-type: none"> • Activity; transportation of materials, equipment and workers; equipment requirements; temporary facilities and physical works; work camps; major activities; field development; dredging; watercourse crossings; testing of the pipeline; cleanup and restoration 	2	1-8
9.7	Operation and Maintenance Phase	<ul style="list-style-type: none"> • Operation of facilities; maintenance and repair; inspection, monitoring and surveillance; modification 	2 7	1-8 3, 5
9.8	Decommissioning and Abandonment Phase	<ul style="list-style-type: none"> • Ownership, transfer and control of project components maintaining integrity of decommissioned and abandoned facilities 	2 7	3, 4, 5 3
9.9	Need For, Purpose Of and Alternatives to the Project	<ul style="list-style-type: none"> • Need for and purpose of project; alternatives to project; criteria used to identify costs and benefits of alternatives considered 	1	1
9.10	Alternative Means of Carrying Out the Project	<ul style="list-style-type: none"> • Technically and economically feasible ways that the project can be carried out; consideration of alternative means 	2	2
10.0	Public Participation	<ul style="list-style-type: none"> • Methods used to identify, inform and solicit input to the EIS; evaluation of effectiveness of methods used to secure public participation in EIA process; outline of support provided to communities, organizations and individuals involved in public participation process; documentation of those who provided comments; outcomes of public engagement; how public engagement was used in identification of issues, impact prediction and mitigation, and project design; principles and methods to provide information and obtain input 	1	4
11.0	Existing Environment			
11.1	Introduction	<ul style="list-style-type: none"> • Characterization of existing physical, biological and human environments; description of trends and changes in the environment unrelated to the project 	3 5 4 6	1 11 1 9
11.2	Ecoregions and Ecozones	<ul style="list-style-type: none"> • Description of ecoregions and ecozones in which the project is located 	3	9

Table 1-2: Concordance with the Terms of Reference (cont'd)

Section of TOR	Title	Description Summary	Volume of EIS	Section of EIS Volume
11.3	Physical Environment			
11.3.1	Terrain, Geology, Permafrost and Soils	<ul style="list-style-type: none"> Regional and area setting, topography; bedrock, surficial materials and soils; granular materials; permafrost; areas of geotechnical and geological instability 	3	8
11.3.2	Marine Sediment Quality and Quantity	<ul style="list-style-type: none"> Description of marine sediments 	3	6
11.3.3	Climate	<ul style="list-style-type: none"> Location of recording stations and length of record; prevailing climatic conditions, seasonal variations, predominant winds, temperature and precipitation; spatial and temporal boundaries; current climate-related extreme events 	3	2
11.3.4	Air Quality	<ul style="list-style-type: none"> Airshed spatial boundaries; current sources of emissions, seasonal variations, conditions affecting quality and assimilation capacity; existing air quality; visibility; recording stations and length of record 	3	2
11.3.5	Noise	<ul style="list-style-type: none"> Existing noise sources; sources and types of variation; relevant noise level standards; noise spatial boundaries; recording stations and length of record 	3	3
11.3.6	Water Quality and Quantity	<ul style="list-style-type: none"> Waterbodies, watercourses, drainage areas; watercourses with flow all year; connectivity of adjacent watercourses; hydrologic characteristics; flood regimes and ice-jamming; water use characteristics 	3	6
11.4	Biological Environment			
11.4.1	Fish and Fish Habitat	<ul style="list-style-type: none"> Fish species present and description; habitat requirements; local and regional abundance; species of concern; species important to subsistence harvesters; species subject to exclusive or preferential rights under land claims; species important to guides and outfitters; known sensitive areas; areas subject to exclusive harvesting rights; harvest pressures 	3	7
11.4.2	Birds and Bird Habitat	<ul style="list-style-type: none"> Bird species present; abundance and distribution; movements and habitat requirements; species of concern; species subject to exclusive or preferential rights under land claims; species important to guides and outfitters; areas subject to exclusive harvesting rights; species important to subsistence harvesters; sensitive habitats; harvest pressures 	3	10
11.4.2.1	Kendall Island Bird Sanctuary	<ul style="list-style-type: none"> Migratory bird habitat, abundance and distribution of migratory species; habitat use 	3	10

Table 1-2: Concordance with the Terms of Reference (cont'd)

Section of TOR	Title	Description Summary	Volume of EIS	Section of EIS Volume
11.4.3	Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Wildlife species present and description; species of concern; species subject to exclusive or preferential rights under land claims; species important to guides and outfitters; habitat types; species important to subsistence harvesters; habitat or sites of special value or sensitivity; areas subject to exclusive harvesting rights; migratory patterns, routes and timing relative to project facilities and activities; harvest pressures; levels of habitat fragmentation 	3	10
11.4.4	Marine Mammals	<ul style="list-style-type: none"> Species present; abundance and distribution and seasonal movements; known sensitive areas; species of concern; species subject to exclusive or preferential rights granted by land claims; areas subject to exclusive harvesting; rights granted to land claim beneficiaries; harvest pressures 	3	10
11.4.5	Vegetation	<ul style="list-style-type: none"> Vegetation and vegetation assemblages; classification system; species or assemblages that are rare, valued, protected or designated; description of species of concern; historical and current human use of vegetation; merchantable timber; non-native species present; frequency of forest and tundra fire; post-fire vegetation succession 	3	9
11.5	Human Environment		4	2, 3, 4, 5
11.5.1	General	<ul style="list-style-type: none"> Conditions at the community, regional (e.g., Mackenzie Delta), territorial, provincial and national levels using relevant social and economic indicators; indicators and measures of personal and community health 	4	2 - 6
11.5.2	Demographics	<ul style="list-style-type: none"> Population and population trends; number of persons per household and number of households; age and gender; ethnicity; births, deaths and migration 	4	2
11.5.3	National, Regional and Community Economies	<ul style="list-style-type: none"> National, provincial and territorial gross domestic product; employment rate; employment by industry and occupation; job vacancy and unfilled positions; labour force growth; labour force participation and labour force balance; income and income balance; annual level of social assistance recipients; poverty levels; local households consuming harvested meat and fish; local consumer prices and cost of living; current status of the renewable resource sector; local and regional economic development goals; land-based enterprises and economic activities; number of licensed businesses; number of licensed businesses by Aboriginal ownership 	4	2, 4, 5

Table 1-2: Concordance with the Terms of Reference (cont'd)

Section of TOR	Title	Description Summary	Volume of EIS	Section of EIS Volume
11.5.4	Education, Training and Skills	<ul style="list-style-type: none"> Graduation and achievement rates; trade certification levels; education, training and skill levels; training and certification programs; adult basic education and literacy programs; timing and duration of education and skills development programs 	4	2, 4
11.5.5	Harvesting	<ul style="list-style-type: none"> Harvesting activities by Aboriginal people; relationship between harvesting and household and community economies; current resource accessibility; harvest levels; reliance on harvesting for household food supply; participation level in harvesting activities; location of harvest areas; restrictions of harvesting activities; recreational hunting and fishing and other harvesting activities by other residents; outfitting and trapping activities 	4	5, 6
11.5.6	Land Use	<ul style="list-style-type: none"> Designated or planned land uses; seasonal and permanent camp areas; traditional trails; land use categories; land use areas as per Gwich'in and Sahtu Regional Land Use Plans; valued aesthetic locations; heritage sites and resources; lands and features of special interest or value 	4	6
11.5.7	Heritage Resources	<ul style="list-style-type: none"> Archaeological, paleontological and historic sites and resources; culturally important sites; burial sites; heritage resource potential 	4	7
11.5.8	Human Health and Community Wellness	<ul style="list-style-type: none"> Physical, mental and social health of residents; nutrition; diseases; substance abuse; available support systems; homelessness and poverty 	4	4
11.5.9	Socio-Cultural Patterns	<ul style="list-style-type: none"> Cultural and spiritual life of communities; patterns of family and community life; participation in traditional activities; social relations; available support systems 	4	4, 5
11.5.10	Infrastructure and Institutional Capacity	<ul style="list-style-type: none"> Role of different orders of government; fiscal relationships between governments; status of community and local government institutions; use of existing services and infrastructure and capacity of these to meet additional and new needs 	4	3
12.0	Impact Assessment Methodology			
12.1	Selection of Valued Environmental Components (VECs)	<ul style="list-style-type: none"> Methods by which VECs were identified; basis, or justification, for their selection 	1	2
12.2	Impact Analysis Methodology	<ul style="list-style-type: none"> Methods used to predict potential impacts of the project on VCs, on component interactions and on broader relationships with physical, biological and human environments 	1	2
12.3	Assessment Boundaries	<ul style="list-style-type: none"> Spatial and temporal boundaries used; study area and project boundaries; ecological boundaries, social and economic boundaries, and administrative boundaries for each VEC selected 	1	2

Table 1-2: Concordance with the Terms of Reference (cont'd)

Section of TOR	Title	Description Summary	Volume of EIS	Section of EIS Volume
12.4	Mitigation Measures	<ul style="list-style-type: none"> Measures to mitigate adverse impacts or to create or enhance beneficial impacts; proven versus experimental mitigation measures; applicable codes of practice; mitigation measures contained in benefit, socio-economic and environmental agreements 	1	2
12.5	Residual Impacts	<ul style="list-style-type: none"> Direction; magnitude; geographic extent; timing and duration; frequency; reversibility 	1	2
12.6	Significance	<ul style="list-style-type: none"> Process used to determine significance; basis for determining significance; contribution of project to sustainable social and economic development 	1	2
12.7	Likelihood	<ul style="list-style-type: none"> Likelihood of occurrence for any significant residual adverse impacts 	1	2
12.8	Confidence in Prediction	<ul style="list-style-type: none"> Degree of certainty in the impact predictions and determination of significance 	1	2
12.9	Application of a Precautionary Approach	<ul style="list-style-type: none"> Circumstances under which a precautionary approach is warranted 	1	2
13.0	Physical Environment Impact Analysis			
13.1	Terrain, Geology, Permafrost and Soils	<ul style="list-style-type: none"> Slope and soil stability; erosion; subsidence from resource extraction; granular resources extraction; sumps; subsurface injection of waste fluids; permafrost thermal conditions, ice-rich soils, frost heave and thaw settlement; effects of Project and forest and tundra fires 	5	8
13.2	Marine Sediment Quality and Quantity	<ul style="list-style-type: none"> Marine sediments 	5	6
13.3	Air Quality	<ul style="list-style-type: none"> Project activities that are sources of air emissions; emissions of concern by source for each project phase; air quality parameters affected by emissions; acid deposition; how changes in air quality affect humans, wildlife and vegetation; ice fog; relevant government air quality standards; potential health impacts related to project emissions; how the environment affects air quality; regulatory regime related to project emissions; participation in national or territorial air emissions and reporting programs 	5	2
13.4	Noise	<ul style="list-style-type: none"> Components or activities that produce noise levels of concern, effects of terrain and weather; disturbance to wildlife and birds, disturbance of harvest and recreational activities, impacts on communities; relevant government noise standards; potential health impacts related to changes in noise levels 	5	3

Table 1-2: Concordance with the Terms of Reference (cont'd)

Section of TOR	Title	Description Summary	Volume of EIS	Section of EIS Volume
13.5	Water Quality and Quantity	<ul style="list-style-type: none"> Alteration of surface drainage patterns and surface water hydrology, hydrogeological resources, changes in availability of water to users, or quality, discharge of wastewater effluent, erosion, subsidence, slope stability, flow or water levels, water withdrawal and volume of withdrawal, possibility of inter-basin transfer of water, gravel extraction 	5	4, 5, 6
14.0 Biological Environment Impact Analysis				
14.1	Species of Concern	<ul style="list-style-type: none"> Change project might cause to a listed species at risk, its critical habitat or residences of individuals of that species; species of concern listed or tracked by Northwest Territories or Alberta; potential impacts on species of concern relative to applicable legislation 	5	10
14.2	Fish and Fish Habitat	<ul style="list-style-type: none"> Watercourse crossing and temporary vehicle crossing methods; applicable watercourse crossing standards; relevant policies to protect or enhance fish and fish habitat; disruption of sensitive life stages or habitat; disruption of habitat; distribution or abundance; sensitive habitats; blockages to movement; blasting; how project-related changes in harvest pressures affect resource; condition to which the right-of-way and temporary work areas will be reclaimed or restored, and maintained; criteria for evaluating the success of mitigation and reclamation measures 	5	7
14.3	Marine Mammals	<ul style="list-style-type: none"> Disruption of life stages, habitat and feeding activities; distribution and abundance; sensitive habitats; migratory patterns; how changes in harvest pressures affect the resource; relevant policies and management plans to protect marine mammals and habitat 	5	10
14.4	Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Alteration of habitat, visual or auditory disturbance; disruption of sensitive life stages or habitat; wildlife movement patterns, distribution or abundance; sensitive habitats; population cycles; predator-prey relationships; how project-related changes in harvest pressures affect resource 	5	10
14.5	Birds and Bird Habitat	<ul style="list-style-type: none"> Disruption of sensitive life stages or habitat; alteration of habitat; sensitive habitat; visual or auditory disturbance; distribution or abundance; how project-related changes in harvest pressures affect resource; ROW maintenance and access 	5	10
14.5.1	Kendall Island Bird Sanctuary	<ul style="list-style-type: none"> Spatial and temporal zones of influence on migratory birds 	5	10

Table 1-2: Concordance with the Terms of Reference (cont'd)

Section of TOR	Title	Description Summary	Volume of EIS	Section of EIS Volume
14.6	Vegetation	<ul style="list-style-type: none"> Alteration or loss of species or vegetation assemblages; sensitive areas; introduction of non-native species; changes in soil, hydrologic or permafrost regimes; re-establishment of vegetation; how project-related changes in harvest pressures affect vegetation resources; vegetation control 	5	9
14.7	Biodiversity	<ul style="list-style-type: none"> Changes to biodiversity resulting from ecosystem or habitat loss, habitat fragmentation, response to edge effects, species distribution, invasive and non-native species, water and air emissions, species of concern; Project-related changes in harvest levels; changes in habitat use 	5	13
15.0	Human Environment Impact Analysis	<ul style="list-style-type: none"> Needs and interests of various segments of local populations; how project will enhance or impair both current social, cultural and economic ways of life in communities, and community aspirations for the future; possible reactions to project-related effects and capacity of people, communities and institutions to respond to the project 	6 1	1, 3, 4, 5, 6 4
15.1	Regional and Community Demographics and Mobility	<ul style="list-style-type: none"> In and out migration by community and region and residence patterns 	6	3
15.2	Local, Regional, Provincial and Territorial and National Economies	<ul style="list-style-type: none"> Contribution to gross domestic product; tax considerations; employment and income; effect of unionized labour; competition for labour; community income and household economics; local consumer prices and cost of living; how project-related impacts on harvested resources of harvest activities affect community income and household economics, and sustainability of traditional economies; activities that are lost or deferred because of the project; spinoff economic activity; opportunities for businesses to supply goods and services; distribution of costs and benefits of project activities; competition between land users; opportunities to diversify economic base; consistency and compliance with local and regional land use plans; consistency with goals and objectives identified in territorial, regional and community economic development plans and strategies 	6	2, 3, 6, 7
15.3	Education, Training and Skills	<ul style="list-style-type: none"> Participation in education and training; educational achievement and attainment; local and regional training opportunities available; application of project-related skill levels in workforce to other projects 	6	3, 5

Table 1-2: Concordance with the Terms of Reference (cont'd)

Section of TOR	Title	Description Summary	Volume of EIS	Section of EIS Volume
15.4	Subsistence, Sport and Commercial Harvesting	<ul style="list-style-type: none"> Travel pattern changes; changes in access, disturbance of harvest patterns; changes in harvest levels; changes in the abundance and distribution of harvested resources, changes in harvesting costs; changes in harvest effort as perceived by harvesters; competition between harvesters; changes in quality of harvested species; measures to avoid or reduce changes in abundance, distribution or quality of harvested species, or mitigate the consequences of such changes; control of hunting, fishing or harassment of animals by on-site personnel 	5 6 7	10 5, 6, 7 2, 3, 4
15.5	Human Health and Community Wellness	<ul style="list-style-type: none"> Perceptions of physical and mental health and changes in quality of life; local and regional differences; measures of mortality and morbidity; presence or absence of support systems; poverty and homelessness; literacy skills and education levels; changes in diet and use of country food; how project-related impacts on harvested resources or harvest activities affect health and wellness; effects of changes in water and air quality 	6	5, 6
15.6	Social and Cultural Patterns and Cohesion	<ul style="list-style-type: none"> Cultural and spiritual life of communities; traditional lifestyles, values and culture; patterns of social organization; family dynamics or structure; social relations; how transient workers could impact communities; how project-related impacts on harvested resources or harvest activities affect social and cultural patterns and cohesion; programs that could support cultural patterns and cohesion 	6	4, 5, 6
15.7	Land Use	<ul style="list-style-type: none"> Conformity to designated land use management areas and plans 	6	7
15.7.1	Protected Areas and Special Management Areas	<ul style="list-style-type: none"> Existing protected areas; community conservation plans; regional land use plans; special management areas; proposed special management areas; effect on functioning of the proposed network of protected areas 	6	7
15.8	Cultural and Heritage Resources	<ul style="list-style-type: none"> Historical, archaeological, paleontological, cultural and heritage resource sites; resource potential; encountering of resources during project activities; valued visual and aesthetic locations 	6	8
15.9	Infrastructure and Institutional Capacity	<ul style="list-style-type: none"> Housing in communities; infrastructure and services and capacity of institutions and organizations to deliver services; measures to reduce financial burden caused by the project on infrastructure and institutional capacity 	6	3, 4
16.0	Changes to the Project Caused by the Environment	<ul style="list-style-type: none"> Climate change, extreme weather events, flooding, subsidence, ice scour, seismicity, unstable slopes, permafrost, ecologically and culturally important flora and fauna; human use and value 	5	11, 14

Table 1-2: Concordance with the Terms of Reference (cont'd)

Section of TOR	Title	Description Summary	Volume of EIS	Section of EIS Volume
16.1	Climate Change	<ul style="list-style-type: none"> How changes to climate in the project area affects the project over its lifespan in terms of future conditions, changes to the project caused by climate change, and mitigation and monitoring 	5	11
17.0	Cumulative Impacts	<ul style="list-style-type: none"> Scoping; analysis; mitigation; significance; follow-up 	5 6	12 9, 10
18.0	Capacity of Renewable Resources	<ul style="list-style-type: none"> Consider the capacity of those renewable resources likely to be significantly affected, to meet present and future needs 	1	2
19.0	Accidents and Malfunctions	<ul style="list-style-type: none"> Spills of hazardous material; fire; use of explosives; transportation accidents; rupture or failure of a pipeline; failure of components at a compression or processing facility; harvesting; social and cultural elements, or systems 	7	5
20.0	Obligations Under the Inuvialuit Final Agreement			
20.1	Worst-Case Scenario	<ul style="list-style-type: none"> Worst-case scenario for the project (paragraph 13(11)(b) of the IFA); potential impacts of the worst-case scenario on the environment 	7	3
20.2	Wildlife Compensation	<ul style="list-style-type: none"> Measures necessary to reduce any negative impact on wildlife harvesting (paragraph 13(11)(a) and (b) of the IFA) 	6 7	6 3
21.0	Compensation	<ul style="list-style-type: none"> Plans for compensation as part of proposed mitigation 	6	3, 4, 5, 6
22.0	Greenhouse Gas Emissions	<ul style="list-style-type: none"> Sources, quantities and frequency of project-related emissions of GHG; ways to reduce GHG emissions; required permits with respect to GHG emissions from operation of project facilities; relevant, current government actions to identify, track, report or manage GHG; means by which GHG emissions would be managed 	5	2, 11
23.0	Emergency Response and Environmental Management	<ul style="list-style-type: none"> Company programs regarding facility monitoring, emergency preparedness and environmental management 	7	5, 6
23.1	Facility Monitoring	<ul style="list-style-type: none"> Safety and detection measures incorporated at project facilities 	2 7	3, 4, 5 6
23.2	Emergency Preparedness	<ul style="list-style-type: none"> Proponents' emergency response procedures; applicable regulatory requirements; consistency with municipal requirements 	7	5, 6
23.3	Environmental Management and Protection Programs	<ul style="list-style-type: none"> Plans relevant to design and implementation of standard mitigation practices to be followed during the lifespan of the project; regulatory requirements relevant to monitoring; communities, agencies, boards and regulators involved during preparation of programs 	7	6
24.0	Socio-Economic and Cultural Policies and Commitments	<ul style="list-style-type: none"> Commitments, policies and arrangements directed at promoting beneficial, or mitigating adverse, effects on social or economic conditions 	6	3, 4, 5, 6

Table 1-2: Concordance with the Terms of Reference (cont'd)

Section of TOR	Title	Description Summary	Volume of EIS	Section of EIS Volume
25.0	Compliance Inspection, Monitoring and Follow-up	<ul style="list-style-type: none">Environmental and socio-economic monitoring programs in terms of compliance inspection; monitoring; follow-up	7 6	6 10