

---

TITLE	<b>ISR Application for a Type A Water Licence</b>
SECTION	3: Overview of Activities in the ISR
SUBJECT	2: Project Setting

---

## **SETTING FOR PROJECT ACTIVITIES IN THE ISR**

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

### **Biophysical Setting**

The biophysical information in this topic incorporates information from desktop studies and field investigations in 2002, 2003, and 2004. The desktop studies included a review and analysis of available literature, government data, aerial photos, and satellite imagery. The field surveys were conducted along the gathering pipeline routes, at the proposed Storm Hills pigging facility site, and at the Swimming Point infrastructure site. Air quality monitoring and sound level surveys were also undertaken at certain locations (see [Section 8](#) for regional data and sections 4, 5, 6 and 7 for site-specific information).

### **Climate**

The gathering pipeline corridors through the ISR are located within a 150 by 200 km area designated as the northern air shed.

Average annual temperatures range from  $-10.5^{\circ}\text{C}$  in Tuktoyaktuk to  $-9.1^{\circ}\text{C}$  in Aklavik. Temperature extremes have ranged from  $-52.2^{\circ}\text{C}$  in the winter to  $33.9^{\circ}\text{C}$  in summer. Total normal annual precipitation ranges from 142.1 mm in Tuktoyaktuk to 207.8 mm in Aklavik.

### **Noise**

The acoustic environment around the proposed development in the ISR is dominated by the sounds of nature. Surveys near the proposed Niglintgak production facility site indicate sound levels were typically between 20 and 30 dBA when winds were less than 10 km/h. There is no industrial presence within audible distance of any project site.

### **Soils, Landforms and Permafrost**

The area covered by this application is within the Tundra ecological zone. Surficial deposits in the Parsons Lake area and along most of the gathering pipeline are composed primarily of hummocky moraine with minor amounts of glaciofluvial material.

Moraine is found in upland areas and is predominantly clay and silt-rich tills. Lowland areas commonly develop low-centred polygons and, more rarely, pingos. Active geomorphic processes include thermokarst and retrogressive thaw-flow slides.

Recent reclassifications (Heginbottom 2000) describe the outer delta area and portions of Richards Island as featuring intermediate discontinuous permafrost with about 35 to 65% permafrost beneath the area. In the Mackenzie Delta, permafrost thickness is generally less than 90 m thick, where present, and contains deep unfrozen zones (taliks), which in some cases extend to the base of the permafrost (through taliks). The depth of the active layer generally ranges from 30 to 100 cm.

Low ice content is expected in well-drained, coarse-grained sediments above the local groundwater table, such as glaciofluvial sand and gravels. Massive ice might be contained in granular deposits at depths below about seven metres, in some localized areas. Ice-rich permafrost is more commonly associated with fine-textured moraine, lacustrine sediments, organic soils, and fluvial deltaic sand deposits. The ice content might be very high if the deposits are located in poorly drained areas. Ice veins, lenses and massive ground ice are common.

### **Vegetation**

The study area in the ISR falls within the Tundra ecological zone. Topography is fairly level, rising from sea level in the delta to 150 m in elevation near Parsons Lake. Vegetation grows on a veneer of nonfrozen organic or granular substrate overlying the permafrost boundary. In wetter areas, sedges, cotton-grasses and sphagnum moss dominate high- and low-centred polygons. Drier areas support ericaceous shrubs. Riparian communities include wet sedge communities and taller shrubs. Holmes Creek and Hans Creek support outliers of black spruce. The floodplain of the Mackenzie River is dominated by shrub communities and wet sedge – cotton-grass meadows.

Twelve vegetation types found in the Tundra ecological zone have been identified within the study area and include:

- dry saxifrage tundra
- dwarf shrub heath
- upland shrub
- cotton-grass tussock
- high-centred polygons
- low-centred polygons
- riparian shrub
- riparian sedge – cotton-grass
- delta shrub
- delta sedge – cotton-grass

- delta low-centred polygons
- riparian black spruce and shrub

Sites that might support uncommon vegetation communities in the ISR include:

- exposed beaches of various substrates
- edges of riparian areas
- small eroding slopes and slumps
- balsam poplar stands
- snowmelt patches
- exposed granular substrates
- littoral zones of shallow lakes
- fluvial communities

Within the ISR study area, six rare plant species were observed:

- alternate-flowered water milfoil (*Myriophyllum alterniflorum*)
- Arctic seashore willow (*Salix ovalifolia* var. *arctolitoralis*)
- Chamisso's willow (*Salix chamissonis*)
- weak sedge (*Carex laxa*)
- wedgeleaf willow (*Salix sphenophylla*)
- Yukon stitchwort (*Minuartia yukonensis*)

Arctic seashore willow, Chamisso's willow and weak sedge are ranked *critically imperilled* for the Northwest Territories because of their extreme rarity. Arctic seashore willow is a nationally rare species that is endemic to Canada. The other three species are *reported* in the Northwest Territories.

## Wildlife

The ISR is home to about 33 species of mammals, including ungulates, large carnivores, furbearers and small mammals. Characteristic species in the study region include barren-ground caribou, grizzly bear, gray wolf, Arctic fox, wolverine and Arctic ground squirrel. Some species have special status in the ISR. Special status refers to various levels of endangerment as identified by territorial and national institutions. Special status species include the grizzly bear (northwestern population), wolverine, river otter and polar bear.

The flat, low-lying outer delta floods annually and supports only a few mammal species. Inland, the landscape is characterized by rolling topography with numerous small lakes and watercourse channels. Dwarf shrubs and cotton-grass tussocks dominate the landscape; however, outlying pockets of taiga (open black spruce forest) occur in river valleys such as at Holmes Creek. This valley provides important winter habitat, including food, cover and thermal protection, for a number of wildlife species. The valley also supports several species, such as Canada lynx and red squirrel, which do not occur in other tundra habitats.

About 120 species of birds, including waterfowl, raptors, shorebirds and passerines, nest in the ISR study area. The majority of these species are migrants, but about 15 species occur as year-round residents. Species at risk include the peregrine falcon, short-eared owl and golden eagle.

The ISR contains several important areas for birds. The Mackenzie Delta is recognized as a key migratory bird breeding and staging site in the Northwest Territories. The abundant mudflats, shallow bays, sedge meadows, shrub and cotton grass-tussock habitats within the delta are used annually by thousands of staging, nesting, breeding and moulting waterfowl and waterbirds, including ducks, swans, geese, loons, cranes, shorebirds, seabirds and gulls. There are notable concentrations of moulting and brood-rearing lesser snow geese, Canada geese, greater white-fronted geese and tundra swans near Kendall Island and elsewhere along the coast of the outer delta. The outer Mackenzie Delta also provides nesting habitat for shorebirds. Many of the waterfowl species and some waterbirds are important food sources for local residents.

Within the Mackenzie Delta, the Kendall Island Bird Sanctuary (KIBS) was established in 1961 to protect waterfowl breeding and staging grounds. This 600 km<sup>2</sup> sanctuary provides habitat for over 80 species of migratory birds, including up to 7,500 nesting snow geese. Tundra swans, greater white-fronted geese, sandhill cranes, brant, dabbling ducks, and shorebirds also nest and moult within the sanctuary. In addition, several species of raptor, passerine and ground-dwelling birds are present in the area.

### **Hydrology**

The Mackenzie River basin contains the longest drainage system in Canada.

There are four large channel and nine Active I watercourses that will be crossed by gathering pipelines in the ISR. The largest watercourses in the area are the Kanguk Channel, Kuluarpak Channel, East Channel, Harry Channel and Aklak Channel. Very small Arctic drainages are crossed by the gathering pipeline laterals in the ISR. Flow in these watercourses is usually restricted over the winter period by freeze-to-bottom conditions.

Most watercourses (about 82%) crossed by the gathering pipeline laterals within the ISR are vegetated waterways with either an undefined drainage path or dispersed flow through small shrubs or trees.

### **Groundwater**

In an area of continuous permafrost, which typifies most of the study area within the ISR, ground water contributions to streamflow are limited and seasonal, with no or negligible contributions made in winter.

No evidence of perennial springs was found in the ISR study area, nor was any evidence found of groundwater inflow that would maintain winter stream flow. Open water and icings observed near the outlet from Noell Lake and along an associated stream are attributed to lake storage rather than groundwater inflow.

Seasonal springs and seepages occur at retrogressive thaw flow slides throughout the area. The water outflow at these locations is fed by ice melt-out from the active layer and melting of permafrost exposed at the slides. Flow is expected to cease shortly after winter freeze up. A small lake located close to Parsons Lake is reported to remain open in the winter. This lake might be fed by a talik through subpermafrost groundwater. Gas bubbling up through the lake water might be derived from an underlying natural gas reservoir.

### **Water Quality**

Waterbodies along the proposed gathering pipeline routes through the ISR fall within the Mackenzie Delta. The waters of the delta typically are moderately coloured and have high total suspended solids (TSS) levels in delta channels and low TSS levels in lakes near Niglintgak, Parsons Lake and Taglu. These parameters are influenced by the discharge regime. For example, turbidity and colour tend to be low over the winter, highly variable in spring, and peak over the summer. Conversely, conductivity and TSS concentrations are highest in the winter and decline in the open water period.

### **Fish and Fish Habitat**

The Mackenzie River and its tributaries throughout the ISR support both diadromous and resident fish species. About 31 species of fish are potentially present in ISR watercourses. Of these species, nine spawn in the fall. These include the salmonid species, except arctic grayling. Fall spawning generally occurs in larger watercourses with perennial flow. Spring spawning is typically in smaller tributaries and can occur in intermittent or ephemeral drainages.

## **HUMAN ENVIRONMENT SETTING**

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

### **People and the Economy**

The ISR is made up of the largely Aboriginal communities of Aklavik in the Beaufort Delta, Tuktoyaktuk and Paulatuk on the Beaufort Sea Coast, Holman on Victoria Island and Sachs Harbour on Banks Island. Aklavik is also considered to be a Gwich'in community as indicated by the Gwich'in Comprehensive Land

Claim Agreement signed in 1992. Information on Inuvik is included in the project applications for development activities in the GSA. However, Inuvik infrastructure and services are available to ISR residents. Therefore, Inuvik is included in the discussion below.

The 2003 estimated population of the ISR communities was 2,506, including 990 in Tuktoyaktuk. More than 90% of the population in the ISR communities was Aboriginal in 2001, except for Paulatuk, where about 20% of the residents were non-Aboriginal. The Aboriginal population is 95% or more Inuvialuit, except in Aklavik where 24% are Dene and 7% are Metis.

Employment rates in Tuktoyaktuk, Aklavik and Holman generally increased from 1991 to 2001, and unemployment rates also decreased. In 2001, average employment income was about \$30,000 per year in Tuktoyaktuk, \$24,000 in Aklavik and Holman and \$23,000 in Paulatuk. Data is not available for Sachs Harbour.

### **Community Services**

Community wellness, measured in terms of the physical, emotional, social and economic well being of individuals and families in ISR communities, is challenged by a number of issues. These longstanding issues include alcohol abuse, and related violence and illness, smoking, sexually transmitted infections (STIs) and suicides. This places additional burdens on health care, public safety and protection services in the communities.

Inuvialuit communities are served by the Inuvik Regional Health and Social Services Authority (IRHSSA). IRHSSA runs the Inuvik Regional Hospital, a new facility that opened in 2003, and a public health unit. An air ambulance is stationed in Inuvik to ensure rapid response to medical emergencies in the other communities. Community health centers staffed by registered nurses are found in all the ISR communities except Sachs Harbour, which has a health station staffed by a single registered nurse or a community health worker. Services that are not available from the IRHSSA are sought in Yellowknife or outside the Northwest Territories, upon referral of IRHSSA staff.

There are RCMP detachments in Tuktoyaktuk, Aklavik, Paulatuk and Holman. The Inuvik RCMP detachment consists of 12 officers and is responsible for policing Sachs Harbour.

Economic growth in the Mackenzie Delta has created a housing shortage in Tuktoyaktuk. Similar problems have not been recorded in Holman, Paulatuk or Sachs Harbour.

The five ISR communities have kindergarten to grade 12 schools with substantial excess capacity. A range of diploma and certificate courses and programs is offered through Aurora College.

The proportion of the adult population with high school diplomas fell slightly in the ISR between 1994 and 2001 because of graduation rate declines in Tuktoyaktuk and Sachs Harbour. In 2001, 39% of the adults in the five ISR communities were high school graduates.

### **Physical Infrastructure**

Inuvik serves as the transportation hub for communities in the ISR and elsewhere in the Beaufort Delta. Inuvik has scheduled flights, the all-weather but seasonally restricted Dempster Highway, and barge-based re-supply in the summer. Aklavik and Tuktoyaktuk have winter road connections with Inuvik.

All of the Inuvialuit communities have scheduled air service and marine resupply. From mid-July to late September, Northern Transportation Company Limited (NTCL) resupplies the Arctic communities via its staging site at Tuktoyaktuk, using tugs and barges. There is no rail access in any of the Inuvialuit communities.

Water, sewage and solid waste disposal services meeting Government of the Northwest Territories (GNWT) standards are available in the five Inuvialuit communities (GNWT Water Board 1992). Because of the extreme cold temperatures and permafrost, most Inuvialuit communities do not have piped water and sewage disposal to individual homes. Water is delivered to households by truck, and liquid waste disposal is by pumpout from a holding tank or by “honey bags” for which there is scheduled pickup.

Diesel-fuelled generators provide power in the ISR communities. The main heating fuel is P-50 fuel oil.

### **Traditional Culture**

Traditional culture includes the knowledge, skill and discipline required to harvest and survive on the land. Traditional or country foods, the traditional economy, and Aboriginal language use and retention, are important aspects. Within the ISR, survey findings indicate:

- about 54% of the adult population in the Beaufort Delta communities hunted or fished in 2002
- country food represented at least half of the food consumed in 1998 by 72% of the households in the ISR
- Inuvialuit trapping declined between 1987 and 2002. The percentage of men aged 25 to 59 years who trapped fell from 56 to 10%

- fluency in the Aboriginal languages, including Inuvialuktun, declined between 1989 and 1999, with only about 34% of Aboriginal adults in ISR communities excluding Aklavik, and 19% in Aklavik, speaking Aboriginal languages in 1999

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

Non-traditional land and resource use within the ISR includes extracting borrow material, and oil and gas exploration activities.

There are no mines or ore deposits of consequence within the development area.

Commercial, domestic and sport hunting activities occur within the ISR, but there is limited information available for harvest numbers and harvest locations in the study area. There is only sporadic use of the study area by resident sport hunters.

Licensed Inuvialuit guides and outfitters lead most land- and water-based tours within the ISR, and charter companies operate air tours. About 16 tour operator companies are based in the Mackenzie Delta area, offering a range of services.

About 12 commercial fishing licences are issued annually within the Inuvik area. Four domestic fishing licences are issued in the ISR for large geographic areas around Inuvik. A domestic fishing licence allows non-Aboriginal people to fish with a net for non-commercial purposes. Common areas for sport fishing include Sitidgi, Noell, Husky, Jimmy and Yaya lakes, and the Yaya River.

### **Protected Areas**

A number of Community Conservation Plans (CCPs) have been prepared within the ISR. Of these, the project study area is within those plans prepared by the communities of Tuktoyaktuk, Aklavik and Inuvik. The CCPs offer guidelines for development activities that reflect the views of hunters, trappers and fishermen in the communities. These guidelines are designed to ensure conservation of renewable resources (Community of Inuvik et al. 2000; Community of Aklavik et al. 2000; Community of Tuktoyaktuk et al. 2000). However, development activities are permitted on the lands covered by the CCPs.

The land use categories identified in the CCP areas range from Category A (lands with no known significant and sensitive cultural or renewable resources) to Category E (lands where cultural or renewable resources are of extreme significance and sensitivity). Land uses within the study area include lands where cultural or renewable resources are of some significance (Category B), of particular significance during specific times of year (Category C) or of particular significance throughout the year (Category D). There are no Category A or E lands within the project study area.

The KIBS (CCP Area 706D) encompasses 606 km<sup>2</sup> of the Mackenzie River delta, including many flat islands and part of Kendall Island that borders on the Beaufort Sea (Environment Canada 2000). The KIBS provides important habitat for waterfowl and shorebirds. This site is managed by the Canadian Wildlife Service in cooperation with local communities and regional Aboriginal organizations, under the *Migratory Birds Act* (Northwest Territories Protected Areas Strategy Advisory Committee 1999). As stipulated in the Inuvialuit Final Agreement, Inuvialuit beneficiaries can access the sanctuary, and hunt and trap wildlife within it (Environment Canada 2000). Other types of land use in the KIBS are subject to approval, require a Sanctuary Permit and are only permitted if they are of limited effect. KIBS is the only ISR protected area with additional permitting requirements. There are flight and activity restrictions in the KIBS during June and July.

### **Heritage Resources**

In addition to the previously recorded heritage resources that are in close proximity to the proposed development areas, the 2002 and 2003 heritage resource field programs resulted in the identification of 42 heritage resources in the ISR. These included prehistoric archaeological, historic archaeological and a wide array of cultural sites, including recent campsites, trails, cabins and burials. Palaeontological resources were also identified.

