INTRODUCTION

This subject supports an application for the development of a temporary infrastructure site south of Fort Good Hope. It contains:

- an overview map with the site location (Figure 4-1)
- an estimate of the personnel requirements
- a summary of the operations
- a description of potential environmental and resource effects
- construction equipment estimates

The Fort Good Hope barge landing is the subject of a MACA land use permit application.

The location of the Fort Good Hope infrastructure site is shown in the site-specific map provided in Figure 4-2 and the photograph in Figure 4-3.

PERSONNEL (PART 3)

The construction of the infrastructure site at Fort Good Hope will require clearing, grading, camp construction and mechanical crews. These crews, of up to 60 people, will be obtained from the main pipeline clearing and grading crews or will be established specifically for infrastructure development. They will initially reside at a barge-based mobile camp and a subsequent 90-person camp at the stockpile site within the municipal boundary of Fort Good Hope. The main Fort Good Hope camp pad, on SSA Crown land, will be constructed during the winter of 2006-2007.

In the winter of 2006-2007, the 90-person construction camp will be relocated to the Fort Good Hope camp and expanded to a capacity of about 1,350 personnel. This camp will require a camp support staff of about 120 people. These people are included in the 1,350-person total.

Construction personnel will occupy the camp over three winter construction seasons (2007-2009 for right-of-way clearing, 2008-2009 for pipeline construction and 2009-2010 for commissioning and reclamation). Personnel will begin arriving in November. Numbers will peak in mid-winter and taper off toward spring. A minimal camp support staff will remain on the site between construction seasons.

SUMMARY OF OPERATION (PART 5)

The land use activities and operations associated with this site include:

- developing and operating:
  - a fuel storage site to support construction activities
  - an administration office
  - a stockpile site for storage of material, equipment, and pipe, and for construction equipment maintenance
  - sequentially, a 90-person camp expanding to a 1,350-person camp for worker accommodation during construction activities
  - a helipad within the site boundary
- developing a new 1.6 km all-weather road from the Fort Good Hope fuel depot and stockpile site, subject of the aforementioned MACA application, to the Fort Good Hope infrastructure site, and a 3.4 km winter road from the site to the right-of-way

Preconstruction Activities

Before site development begins:

- a preconstruction survey will be conducted to finalize the location and site-specific layout
- geotechnical evaluations will be conducted, as required, to support engineering of the infrastructure site components

Development Activities

Initial development activities will commence in 2006 and will include clearing and construction of the pad that will support the proposed infrastructure site. The pad material might be obtained from nearby borrow sites on either Sahtu private and Crown land or land within municipal boundaries. The borrow sites on private land will be included in the land use permit application for private lands within the SSA. The borrow sites on land within the municipal boundaries of Norman Wells and Fort Good Hope are the subject of a MACA land use permit application. Detailed discussion of development of borrow sites on Crown lands is included in Section 5.

Figure 4.1 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

The infrastructure site will be developed on the east side of the Mackenzie River. By placing all the related facilities together, operational efficiencies are realized and the overall footprint of construction activities is reduced. These facilities include:

- a module, pipe, material and equipment stockpile
- a fuel storage depot
- a camp
- an administration office
- a helipad

Figure 4-7 shows an artist's impression of a 1,350-person camp layout.

Infrastructure Site Access

Access to the Fort Good Hope infrastructure site will be from the barge landing along access roads KG-BL-A-341.9 and KG-PS-A-341.9, which are also described in the MACA land use permit application and the SSA private land use permit application.

Access from the infrastructure site to the pipeline right-of-way will be along winter access road KG-C-W-341.9, a portion of which is also included in the SSA private land use permit application. Table 4-1 provides details on the Fort Good Hope infrastructure access roads.

Estimated road lengths allow for an additional 30% for topography and routing uncertainty.

Table 4-1: Fort Good Hope Infrastructure Access

Access Road Name	Kilometre Post (KP)	Land Use			Estimated Length (km)
		Municipal Length (km)	Private Length (km)	Crown Length (km)	
KG-PS-A-341.9	341.9	2.3		1.6	3.9
KG-C-W-341.9	341.9		1.4	3.4	4.8
Total length of Fort Good Hope access on Crown lands:				5.0	

Fuel Storage Depot

The fuel storage depot will require the installation of pads of a sufficient depth to permit truck movement around the site and to safely support refuelling activities. The pads will be sufficient to stabilize the traffic areas of the site, to provide a suitable driving surface and to support the fuel tanks. The fuel depot will be

located within the overall infrastructure site footprint. Additional information on typical fuel storage depots is provided in Section 3.

Storage tanks will be used to supply the site requirements for electric power generation and pipeline and facility construction equipment. Tank storage for about 4.3 million L will be required at the Fort Good Hope site. These tanks are planned to contain diesel fuel.

The fuel storage depot at the Fort Good Hope site will be monitored by computerized systems and site security patrol. It will be equipped with management control systems for access, and authorization controls for fuel handling. An emergency shutdown system will also be provided.

Stockpile Site

The stockpile at the Fort Good Hope site will require the installation of pads to permit truck movement around the site and to safely support unloading and storing large loads of pipe, equipment, modules and materials. The pad will be of sufficient depth to stabilize the storage areas of the stockpile site and provide a suitable driving surface for heavy truck traffic. Pad material requirements, the stockpile layout, and size will be finalized after the preconstruction survey. Typical stockpile sites are discussed in Section 3.

Camp Site

Development of the temporary self-contained camp will require the installation of pads of sufficient depth to permit the transport and erection of about 300 modular camp structures. Pad material requirements, camp site layout and size will be finalized after the preconstruction survey. Typical camp layout and services are described in Section 3.

Start-up of camp activities will involve the mobilization of supplies and materials.

Water for the camp will likely be obtained from the Mackenzie River. The water will be transported by truck from the source to the camp site for use as camp and fire suppression water.

Helicopter Landing Area

A helicopter landing area may be developed within the footprint of the infrastructure and facility sites. Helipad dimensions will typically range from about 30 x 30m (0.1 ha) to about 36 x 135m (0.5 ha).

Operations Activities

The site will act as a staging area for the construction activities for a section of the project.

Fuel Depot Operations

Fuel will be delivered by barge to the Fort Good Hope barge landing. Fuel storage tanks will be filled using fuel trucks shuttling between the barge landing and the tanks. If the fuel storage site is close enough, a temporary surface pipeline might be installed to connect the barge landing area to the fuel storage site so that fuel can be pumped directly into fuel storage tanks.

Required fuel will be delivered from the depot to the construction sites. This will require daily truck traffic through the fuel depot during construction operations.

Stockpile Operations

The stockpile will be used to store material required for construction of the pipeline. The all-weather access road (KG-PS-A-341.9) will be used for transporting equipment and material from the fuel depot and stockpile site to the Fort Good Hope infrastructure stockpile site. This activity will take place once the all-weather access road has been constructed in summer/fall 2006.

A preliminary estimate of materials to be stockpiled at the infrastructure site includes about 48,500 tonnes of pipe and 7,320 tonnes of camp modules and supplies. A list of equipment that might be stored at the site is included in Section 6 of this application.

During construction, the material required for constructing the project will be hauled from the stockpile site and set in place at the infrastructure site. When construction is underway, truck activity will occur along the proposed all-weather and winter access roads.

Camp Site Operations

The camp will be used to feed and house construction personnel. The largest element of the operations will be catering and housekeeping for the camp residents. Other activities will include the maintenance operations of the camp and restocking of fuel and supplies by truck.

Daily transport of personnel will be required during construction activities along the pipeline right-of-way, and to and from the Fort Good Hope infrastructure site. This will be accomplished primarily with buses and light trucks. Food and other supplies will be trucked in periodically. Daily water truck cycles will bring the necessary volume of water (about 227 L per person daily or 300 m^3 daily at full occupancy) to the camp.

The camp will have attendants and facilities to handle medical problems as they arise. All project camps will have a zero tolerance policy for alcohol and illegal drugs.

SUMMARY OF POTENTIAL ENVIRONMENTAL AND RESOURCE EFFECTS (PART 6)

ENVIRONMENT

The following topics provide specific biophysical and human environment setting, effects and mitigation information for Fort Good Hope infrastructure site. This information includes data collected during the 2004 field studies.

Biophysical Environment

Air Quality Setting

The air quality setting for this site is expected to be similar to the regional setting for the SSA described in Section 8.

Air Quality Potential Effects and Mitigation

Potential effects on air quality associated with the development of the infrastructure site, such as dust, vehicle and equipment emissions, are expected to be limited and localized. Site-specific effects and mitigation are expected to be similar to regional effects and mitigation for the SSA described in Section 8.

This infrastructure site might be a potential source of air emissions from space heating and from the incinerators used to manage certain types of combustible non-hazardous wastes. Air effects from these sources will be limited to the immediate vicinity of the site.

Noise and Light Setting

The noise setting for this site is expected to be similar to the regional setting for the SSA described in Section 8.

The site is currently undeveloped and therefore, no manmade sources of light occur.

Noise and Light Potential Effects and Mitigation

The potential effects of, and mitigation pertaining to, noise and lighting are discussed next. These items are combined because both affect sensory perception.

Potential effects on noise levels associated with the development of the infrastructure site are expected to be limited and localized. Site-specific effects and mitigation are expected to be similar to regional effects and mitigation for the SSA described in Section 8.

Industrial lighting can cause increases in ambient light. Sources of light include vehicles, flares and lighting around the site.

Lighting will be used during non-daylight hours, which, during the winter months, might mean periods where lighting is required on a 24 hour basis. Conversely, during the late spring and through summer months, lighting will not be required at all because of the extended daylight hours.

The potential visual effect of lighting can be partially reduced by proper placement and use of lighting only in areas where it is required.

Soils, Landforms and Permafrost Setting

There is one barge landing at Fort Good Hope. The site, which will be developed for the project, lies south of Fort Good Hope, west of the Fort Good Hope airstrip at the base of a colluvial slope. This barge landing will be developed on fluvial deposits of the Mackenzie River. The proposed access road that connects the site to the airstrip will climb the colluvial slope of the Mackenzie River to reach a glaciofluvial plain above. Fluvial floodplains adjacent to the Mackenzie River typically lack permafrost. Colluvial slopes adjacent to the Mackenzie might contain areas of permafrost, although the amount of permafrost might be lower than average, as the parent materials are likely coarse grained and well drained.

The Fort Good Hope stockpile site will be constructed to the east of the airstrip on a glaciofluvial plain. Glaciofluvial plains in the region are well to moderately well drained and have typically developed soils of the Brunisolic Order. The site lies within the zone of extensive discontinuous permafrost, although glaciofluvial deposits in this region generally lack permafrost.

The Fort Good Hope infrastructure site will be constructed on a gently sloping moraine plain to the southeast of the airstrip. The site is adjacent to a lowland area containing organic deposits and fens. The northwest corner of the infrastructure site is also underlain by this organic unit.

The access road to the infrastructure site will cross this organic unit. The infrastructure site will be connected to the pipeline right-of-way by a road crossing a gently sloping moraine plain. This plain displays a blanket slope drainage pattern that is perpendicular to the road alignment. The morainal plain is likely moderately well to poorly-drained and has probably developed soils of the Cryosolic Order. The possibility of encountering permafrost within moraine is 50 to 80%.

Soils, Landforms and Permafrost Potential Effects and Mitigation

Colluvial slope deposits along the banks of the Mackenzie River are subject to erosion following disturbance of the surface layer. The use of fine-grained materials to construct barge pads might increase the sediment load of the Mackenzie River during high water events. Construction of barge site will result in soil loss, although soil development on fluvial deposits of the Mackenzie River is likely minimal.

Landform-related environmental sensitivities are not predicted for the stockpile site. Construction of granular pads at the infrastructure site will result in a small amount of soil loss because of burial.

Organic units to the west of the infrastructure site might be subject to drainage disruption following disturbance of the surface layer. Gently sloping morainal plains might also be subject to drainage disruption where access roads are oriented at right angles to the slope.

General mitigation strategies to offset potential effects are outlined in Section 8.

Vegetation Setting

The barge landing and stockpile site are composed of upland white spruce – Alaska birch and black spruce – Labrador tea/mountain cranberry forest, while the camp site location is a mosaic of black spruce – tamarack and black spruce – Labrador tea/mountain cranberry forest. A small portion is also located in a ground birch/water sedge wetland. Vegetation surveys have been completed in the area of the stockpile site and camp. A rare plant survey was completed near the camp site. No rare plants were recorded at the site surveyed near the camp site.

The barge landing and stockpile site are dominated by upland white spruce – Alaska birch forest, which is characterized by an open to closed tree canopy of black spruce, white spruce and Alaska birch. Shrub cover is composed largely of green alder, willows and short black spruce and Alaska birch, with a moderate cover of moss and lichens. The black spruce dominated forest of the site is characterized by an open tree canopy of black spruce and abundant cover of low and dwarf shrubs. Lichens, in particular reindeer lichens, are a dominant component of the ground cover.

The black spruce – Labrador tea forest area of the camp site is similar to that of the barge landing and stockpile site. Areas of black spruce – tamarack forest are characterized by a dense tree layer with heights ranging from 1 to 10 m, an average of 5 m. Shrubs are also common and include ground birch, Labrador tea, bog bilberry, mountain cranberry and shrubby willow. The majority of the ground cover is composed of lichens, bryophytes and grasses. The west edge of the site contains an area of ground birch/water sedge wetland. A nearby area that was surveyed indicates this area is a mix of scattered to open short shrubs, including ground birch, Labrador tea, and leatherleaf and more grass dominated areas, consisting mainly of water sedge.

These sites will be accessed using an existing cutline for most of the route. This line appears to have been recently cut or is frequently used. In either case, trees and shrubs are absent except for occasional and very short individuals. The portion of the route from the barge site to the Fort Good Hope air strip is undisturbed and will cross a black spruce – Labrador tea forest and a small area of upland white spruce – Alaska birch forest along a north west facing slope.

Vegetation along this portion will be cleared. Trees on the slope are potentially mature and tall, and a community of concern.

Vegetation Potential Effects and Mitigation

Development of this infrastructure site and its associated access road will affect vegetation through clearing and mechanical damage to trees, shrubs, forbs and non-vascular species, the permanent loss of vegetation and underlying substrates through site expansion and potential changes in site drainage and along the access road.

The majority of effects on vegetation will occur because of project activities arising from site construction and operations. These effects might include the potential influence of dust deposition on the health and growth of nearby vegetation, as well as the potential accidental introduction of non-native plant species to the infrastructure site and along the access road. Effects on vegetation due to the infrastructure site and access road will persist into the far future (effect extends beyond 30 years past decommissioning and abandonment) given the slow rate of vegetation growth in the North. When the site and access road are decommissioned, introduction of non-native reclamation species might also occur. Vegetation on the infrastructure site and along the access road might develop into a different vegetation community than what was there before development.

Implementation of primary mitigation measures, as described in Section 8, will help reduce the magnitude of effects on vegetation at this site and its access road.

Wildlife Setting

Regional wildlife information is described in Section 8.

Wildlife habitat at the Fort Good Hope fuel depot and stockpile site is composed of closed mature black spruce – tamarack forest. Alder, willow, and lichen dominates the open shrub layer. These important wildlife features at the site provide foraging habitat for moose (winter) and woodland caribou (winter).

Wildlife habitat at the Fort Good Hope camp site is composed of patchy black spruce tamarack forest. Ground birch, berries and lichen dominate the shrub and ground layer. These important wildlife features at the site provide foraging habitat for moose (winter), woodland caribou (winter) and grizzly bear (spring).

In addition, the site has been disturbed by a cutline.

Based on habitat availability, a variety of species might inhabit the borrow site. These include several species that have special status designation at the international, national and territorial levels, as determined by the International Union for Conservation of Nature and Natural Resources (IUCN),

the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Department of Resources, Wildlife and Economic Development (RWED, now ENR), respectively. These species are summarized in Table 4-2.

Table 4-2: Special Status Species That Were Observed or That Might Occur at the Fort Good Hope Infrastructure Site

Species	Status[a]			
	RWED[b]	COSEWIC[c]	SARA[d]	IUCN[e]
Grizzly bear (northwestern population)	Sensitive	Special concern	Schedule 3 – special concern[f]	
Northern flying squirrel	Sensitive	-	-	Lower risk – least concern
Wolverine	Secure	Special concern	Schedule 3 – special concern[f]	Vulnerable
Woodland caribou (Boreal population)	Sensitive	Threatened	Schedule 1 – threatened	Lower risk – least concern
Golden eagle	Sensitive	Not at risk	-	-
Peregrine falcon (anatum)	At risk	Threatened	Schedule 1 – threatened	-
Peregrine falcon (tundra)	May be at risk	Special concern	Schedule 3 – special concern	-
Olive-sided flycatcher	Sensitive	-	-	-
Boreal chickadee	Sensitive	-	-	-
Blackpoll warbler	Sensitive	-	-	-
Gray-headed chickadee	May be at risk	-	-	-
Harris' sparrow	Sensitive	-	-	-
American tree sparrow	Sensitive	-	-	-
Northern flicker	Sensitive	-	-	-
Rusty blackbird	Sensitive	-	-	-
White-throated sparrow	Sensitive	-	-	-
Northern pintail	Sensitive	-	-	-
Common snipe	Sensitive	-	-	-

Table 4-2: Special Status Species That Were Observed or That Might Occur at the Fort Good Hope Infrastructure Site (cont'd)

Species	Status[a]			
	RWED[b]	COSEWIC[c]	SARA[d]	IUCN[e]
White-winged scoter	Sensitive	-	-	-
Lesser yellowlegs	Sensitive	-	-	-
Red–necked phalarope	Sensitive	-	-	-
Short-eared owl	Sensitive	Special concern	Schedule 3 – special concern	-
Boreal chorus frog	Sensitive	-	-	-

NOTES:
[a]A hyphen indicates no status has been assigned for that species.
[b]RWED – Resources, Wildlife and Economic Development (known as ENR since April 1, 2005)
[c]COSEWIC – Committee on the Status of Endangered Wildlife in Canada
[d]SARA – *Species at Risk Act*
[e]IUCN – The World Conservation Union
[f]SARA status is to be reassigned (i.e., potentially added to Schedule 1) pending results of public consultation, stakeholder consultation and final Ministerial approval.

Wildlife Potential Effects and Mitigation

This infrastructure site is composed of moderate to high quality habitat for wildlife. The barge landing site provides high quality winter foraging habitat for moose and woodland caribou, while the camp site provides high quality foraging for woodland caribou (winter), moose (winter), and grizzly bear (spring).

General potential effects resulting from development and operation of the infrastructure site include direct and indirect habitat loss, disruption of wildlife movements and wildlife mortality. The small footprint of disturbance relative to regional habitat availability, suggests that the magnitude of project effects on birds and most mammals, including those with special status designation, will be low. However, specific issues of concern at the infrastructure sites include:

- disturbance of browsing moose during winter
- disturbance of foraging woodland caribou during winter
- disturbance of foraging grizzly bears during spring

Implementation of general mitigation measures, as outlined in Section 8, will reduce effects on wildlife during infrastructure site development and operations. Specifically, the following mitigation measures are considered important for this site:

- use the waste management plan described in Section 11
- avoid active nesting and known denning sites (as determined during preconstruction surveys) to the extent practical
- reduce project activities during the grizzly bear active period to the extent practical
- prohibit the recreational use of access roads by project staff while on the job site
- establish and enforce regulations to prevent harassment of wildlife

Hydrology Setting

This infrastructure site includes one camp site location, a storage stockpile site and a barge landing site. The camp is located adjacent to a small unnamed lake to the west. The area encompassing this site that contributes runoff to the unnamed lake is about 1.6 km². The other camp, which is the preferred site, is located to the south of an unnamed watercourse connecting a string of lakes. The unnamed watercourse eventually drains to the Mackenzie River at about 3 km from the camp site. The area encompassing this site that contributes runoff to the unnamed watercourse and lakes is about 5 km². The storage stockpile site is located about 1 km upslope of the Mackenzie River and most of the runoff would potentially flow into the Mackenzie River. The area encompassing the storage stockpile site that contributes runoff to the Mackenzie River is about 1 km². A barge landing site is located on the Mackenzie River, downslope of the storage stockpile site.

Hydrology Potential Effects and Mitigation

An increase in mean annual runoff flow due to the higher runoff coefficient of the disturbed area and of any increase in mean sediment concentration from the sites are expected to be limited with the implementation of site drainage and sediment control measures. Effects on the Mackenzie River due to the barge landing site and runoff from the storage stockpile site are expected to range from limited to some localized effects because of the relatively large flows in the watercourse and the high dilution capacity.

Groundwater Setting

No groundwater features, such as springs, seeps, or extensive icings have been noted in association with this site. There was a reported spring at the base of an esker ridge about 2.3 km northeast of Fort Good Hope. This feature was investigated in 2002. While no spring was observed on the ground, the gravel exposed in a road cut across the esker exhibited considerable calcite ($CaCO_3$) coating, which indicates that groundwater discharge or seepage has occurred in the past, or might be occurring intermittently.

At site locations where continuous permafrost exists, groundwater flow is expected to be limited, seasonal and restricted to the active layer.

Groundwater Potential Effects and Mitigation

General mitigation measures, such as the installation of ditches or culverts to restore surface water drainage patterns, will be used as required.

There do not appear to be any groundwater related issues associated with either the camp or the barge landing infrastructure sites at Fort Good Hope. Other than the generally accepted need to prevent groundwater contamination as a result of the designated land use, no mitigation measures are proposed at present.

Water Quality Setting

Water quality data for this site is expected to be similar to regional data described in Section 8.

Water Quality Potential Effects and Mitigation

Site-specific water quality effects and mitigation are expected to be the same as the regional biophysical effects and mitigation, presented in Section 8.

Fish and Fish Habitat Setting

The proposed Fort Good Hope barge landing site is located on the Mackenzie River, about 1 km upstream of the settlement and about 0.5 km from the airport.

Fish

Fish captured or reported to have been captured from the Mackenzie River included at least 16 species: 10 large-bodied, major species and six small-bodied, minnow species. Longnose sucker was the dominant species, with other major species including Arctic grayling, northern pike, walleye, goldeye, burbot, inconnu, mountain whitefish, broad whitefish and Arctic lamprey.

The Mackenzie River in this area provides a corridor for movement of diadromous fish species between the Beaufort Sea and upstream areas of the Mackenzie River. Species that have been found include chum salmon, Arctic cisco and least cisco.

Fish Habitat

The Mackenzie River at the barge landing site is comprised entirely of deep run (R1) habitat.

Channel bed material was primarily sand and gravel, with some cobble, boulders and woody debris. Water depth and turbulence, with occasional boulders, provide most of the instream cover near the barge landing site.

Habitat Use

Cover provided by depth, and seasonally by turbidity, makes the run habitats of near-shore right downstream bank potentially suitable for rearing, and adult feeding and holding by species such as northern pike, longnose sucker, whitefish species and burbot. Shallow shore margin flats, during summer, will provide rearing habitat for species such as inconnu, longnose sucker, other whitefish species, and small forage and minnow species. Mainstem spawning potential at the site is limited, but some woody debris might be used in side channels by northern pike. Spring spawning species likely move up the Hare Indian (Rabbitskin) River and smaller tributaries to spawn. Spawning by inconnu and other whitefish species might occur in fall, farther upstream at The Ramparts. Shallow shore margin habitats in the area and downstream might be used for transitory rearing by fry of these species. Based on a watercourse depth maximum deeper than 16 m, and bathymetric profiles, it is likely that some parts of the mainstem channel and the Hare Indian (Rabbitskin) River confluence, near the barge site, are suitable for overwintering.

Fish and Fish Habitat Potential Effects and Mitigation

Development of the Fort Good Hope infrastructure site might affect fish and fish habitat directly through activities associated with improvement to the existing barge landing site and indirectly through introduction of sediment carried by surface run from the site.

Maintaining a vegetated buffer zone between the site and local waterbodies, if required, and implementation of site-specific erosion and sediment control plans will prevent sediment from the infrastructure site reaching surface waters.

Human Environment

This topic contains a description of the protected areas and heritage resource setting and potential effects and mitigation for the Fort Good Hope infrastructure site. Other human environment information is described in Section 8.

Protected Areas Setting

The Fort Good Hope infrastructure site is located within the proposed Mackenzie River Special Management Area. This area is described in the SPDLUP as a very important regional and territorial travel and transportation corridor, heritage place and traditional use location.

Protected Areas Potential Effects and Mitigation

The development of this site in the proposed Mackenzie River Special Management Area will result in a decrease in the land base available for other land uses within this area. The presence of development within this area will be a permanent change to the landscape.

Heritage Resources Setting

Fort Good Hope infrastructure site was considered to have low potential for the discovery of heritage resources. A heritage resource site has been previously recorded within a 5 km range of the development area. No heritage sites were recorded as a result of the aerial reconnaissance.

The nature of the heritage resource potential and results of preliminary investigations at these locations were provided to the Prince of Wales Northern Heritage Centre in a report under permit 2004–956 in March 2005.

Heritage Resources Potential Effects and Mitigation

Before the development of this site, a Heritage Resource Impact Assessment will be conducted and provided to the Prince of Wales Northern Heritage Centre. If it is determined that the development will affect any heritage resources, mitigation plans will be prepared. Regulations in the Northwest Territories prevent the publication or distribution of this information to the public. This information can only be obtained, with explicit approval, from the Prince of Wales Northern Heritage Centre.

PUBLIC INVOLVEMENT

Community feedback indicated that the construction camp should be moved farther away from the community to reduce potential impacts. An alternative location south of the Fort Good Hope airport, outside municipal boundaries, was selected.

This application is for the alternative site outside the Fort Good Hope municipal boundary.

The public involvement activities are documented in Section 10.

EQUIPMENT (PART 10)

The following tables show an estimate of the equipment that might be required for the Fort Good Hope infrastructure site. An exact list and numbers will not be known until immediately before construction. Table 4-3 lists the site construction equipment. Table 4-4 lists site operations equipment.

Table 4-3: Estimate of Site Construction Equipment

Type and Approximate Number per Site	Size, Model or Equivalent	Proposed Use
4x4 crew cab pick up – 2	4x4	Transporting crews
Bulldozers with GP buckets, U blades and brush rakes – 2	Large sized bulldozer (405 HP)	Site grading, pad and access road development, spreading granular material, snow removal
Dump trucks (double axle) – 2	Truck with trailer (12 m^3)	Hauling granular material
Front end loader with GP bucket – 1	Large sized loader (5.5 m^3 bucket loader)	Site preparation work
Road grader – 1	Large sized grader (4.9 m blade)	Site preparation work, grading ramps and access roads
Tracked mechanical ditcher – 1	Medium sized excavator (1.45 m^3 bucket)	Excavating and removing organic material
Tree feller-buncher and skidder – 1	Tracked 35,490 kg feller-buncher with a high speed saw head	Site clearing and timber hauling
Compactor – 1	Medium sized compactor (20,879 kg sheepsfoot packer)	Compaction of camp site pad fill materials and access road construction
Cranes (tracked) – 1	Medium sized crane (100 t)	Unloading and placement of camp modules
Mechanics truck with welder -1	4x4	Equipment repair
Water truck – 1	Tandem axle, 16-24 m^3	Site and road work
Sea containers – 2	6 m	Storage
Mobile camp – 1	35 person	Site development
Fuel truck – 1	3785 L	Fuel for equipment
Skid steer loaders – 2	Large sized skid steer (80 HP)	Site work

Table 4-3: Estimate of Site Construction Equipment (cont'd)

Type and Approximate Number per Site	Size, Model or Equivalent	Proposed Use
Sea containers – 4	6 m	Storage
Tractor trailers – 4	Dry van 14.6 m or 16.2 m	Parts and supplies
Road graders – 2	Large sized grader (4.9 m blade)	Earthwork, road maintenance and snow removal
Front end loader with GP bucket - 1	Large sized loader (5.5 m^3 bucket loader)	Movement of camp supplies and snow removal
Snow machines – 6	Small sized snow machine (400 cc)	Personnel transport
4x4 crew cab pick up – 4	4x4	Transporting crews
Crane (tracked) – 1	Medium sized crane (100 t)	Loading and unloading pipe, equipment and materials
Flatbed trucks with pickers – 2	10 ton truck	Transporting materials and maintenance
Truck and water tank trailers – 5	Tandem axle, 16-24 m^3	Bringing water to the camp for domestic use and fire protection
Skid steer loaders – 2	Large sized skid steer (80 HP)	Site work

FUELS (PART 11)

Table 4-5 itemizes fuel storage. This represents an estimate of fuel requirements.

Table 4-4: Estimate of Fuel Storage at the Fort Good Hope Infrastructure Site

Fuels	Number of Containers	Capacity of Containers	Location
Diesel	7	500,000 L	Fuel Depot
Diesel	4	200,000 L	Fuel Depot

PERIOD OF OPERATIONS (PART 14)

Site operations will be continuous from 2006 through the summer of 2010, with the potential for limited activities after 2010. See Section 3 for a schedule of development activities in the SSA.

LOCATION OF ACTIVITIES BY MAP COORDINATES (PART 16)

Map coordinates of the centroid of the site are shown in Table 4-6. A map showing the location of the site is provided in Figure 4-2.

A photograph of the Fort Good Hope infrastructure site appears in Figure 4-3.

A photograph of the Fort Good Hope infrastructure site appears in Figure 4-3.

Table 4-5: Map Coordinates for the Fort Good Hope Infrastructure Site

Activity	Latitude (DD)	Longitude (DD)	UTM Easting (m)	UTM Northing (m)	UTM Zone
Fort Good Hope infrastructure site	66.2240	-128.5779	518990	7344941	9

FEES (PART 18)

The total land area required for activities contained in this subject is 33.8 ha.

The land requirements are shown in Appendix A.

Figure 4.2 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

Figure 4.3 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

INTRODUCTION

This subject supports an application for the development of a temporary infrastructure site east of Tulita. It contains:

- an overview map with the site location (Figure 4-4)
- an estimate of the personnel requirements
- a summary of the operations
- a description of potential environmental and resource effects
- construction equipment estimates

The location of the 12 Mile Point infrastructure site is shown in the site-specific map provided in Figure 4-5. An infrastructure site photograph is shown in Figure 4-6, and a barge site photograph is shown in Figure 4-7.

PERSONNEL (PART 3)

The construction of the 12 Mile Point infrastructure site will require clearing, grading, pad construction crews. Crews of up to 60 people will reside on a barge based pioneer camp. These crews will be obtained from the main pipeline clearing and grading crews will be established specifically for infrastructure development. The 12 Mile Point pad will be completed during the winter of 2006-2007.

SUMMARY OF OPERATION (PART 5)

The land use activities and operations associated with this site include:

- developing and operating:
    - a fuel storage site to support construction activities
    - an administration office
    - a stockpile site for storage of material, equipment, and pipe, and for construction equipment maintenance
    - a redeveloped seasonal barge landing
    - a day trailer for living accommodation to support construction activities
    - a helipad within the site boundary

- developing a new 0.7 km all-weather road from the barge landing site to the 12 Mile Point infrastructure site, and a 4.8 km winter road from the site to the right-of-way

Preconstruction Activities

Before site development begins:

- a preconstruction survey will be conducted to finalize the location and site-specific layout
- geotechnical evaluations will be conducted, as required, to support engineering of the infrastructure site components

Development Activities

Initial development activities will commence in 2006 and will include clearing and construction of the pad that will support the proposed infrastructure site. The pad material might be obtained from nearby borrow sites on both Sahtu private and Crown land. The borrow sites on private land will be included in the land use permit application for private lands within the SSA. Detailed discussion of development of borrow sites on Crown lands is included in Section 5.

The infrastructure site will be developed on the east shore of the Mackenzie River. By placing all the related facilities together, operational efficiencies are realized and the overall footprint of construction activities is reduced. These facilities include:

- a module, pipe, material and equipment stockpile
- a fuel storage depot a camp
- an administration office
- a helipad

A conceptual stockpile layout is provided in Section 3.

Infrastructure Site Access

Access to the 12 Mile Point infrastructure site from the Mackenzie River will be from the barge landing along access road TD-BL-A-569.9.

Access from the infrastructure site to the pipeline right-of-way will be along access road TD-PS-W-569.9 (see Table 4-7).

Estimated road lengths allow for an additional 30% for topography and routing uncertainty.

Figure 4.4 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

Table 4-6: 12 Mile Point Infrastructure Access

Access Road Name	Kilometre Post (KP)	Land Use			Estimated Length (km)
		Municipal Length (km)	Private Length (km)	Crown Length (km)	
TD-BL-A-569.9	569.9			0.7	0.7
TD-PS-W-569.9	569.9			4.8	4.8
Total length of 12 Mile Point access on Crown lands:				5.5	

Fuel Storage Depot

The fuel storage depot will require the installation of pads of a sufficient depth to permit truck movement around the site and to safely support refuelling activities. The pads will be sufficient to stabilize the traffic areas of the site, to provide a suitable driving surface and to support the fuel tanks. The fuel depot will be located within the overall infrastructure site footprint. Additional information on typical fuel storage depots is provided in Section 3.

Storage tanks will be used to supply the site requirements for electric power generation and pipeline and facility construction equipment. Tank storage for about 200,000 L will be required at the 12 Mile Point site. This tank is planned to contain diesel fuel.

The fuel storage depot at the 12 Mile Point site will be monitored. It will be equipped with management control systems for access, and authorization controls for fuel handling. An emergency shutdown system will also be provided.

Stockpile Site

The stockpile at the 12 Mile Point site will require the installation of pads to permit truck movement around the site and to safely support unloading and storing large loads of pipe, equipment, modules and materials. The pad will be of sufficient depth to stabilize the storage areas of the stockpile site and provide a suitable driving surface for heavy truck traffic. Pad material requirements, the stockpile layout, and size will be finalized after the preconstruction survey. Typical stockpile sites are discussed in Section 3.

Barge Landing Site

The new seasonal barge landing site will be is situated on the east shore of the Mackenzie River about 12.0 km east of the Town of Tulita. The barge landing site will be redeveloped primarily on the beach area of the Mackenzie River (see Figure 4-5). The developed area will be used for unloading material and equipment from the barges onto trucks for subsequent transport to the stockpile site.

The selected location of the barge landing site:

- reduces the impacts on commercial river traffic
- is close to existing infrastructure to reduce physical impacts

In-stream activities will be restricted to the excavating required to prepare a smooth flat base for beaching a 600 Series spud barge. Work on the river bank will involve installing temporary mooring points, consisting of anchor blocks or screw-in anchors, and constructing the barge access ramp adjacent to the spud barge for transferring material and equipment to trucks. No pier piles are required at this site. The material excavated from the river edge will either be used, if suitable, as fill to create the barge access ramp, or to level and fill low-lying areas at the barge landing site. The barge access ramps will be constructed by building up granular materials to the level of the spud barge's deck. Fill material will be obtained from local granular sites and granular resource suppliers. The need for rig mats or geotextiles to stabilize the fill material and improve the weight-bearing capacity of the ramps will be determined in the field during construction.

The multi-year use of the barge landing site might require the barge ramp to be replaced each season because of the wash-out effects caused by the spring ice flows on the Mackenzie River. This might require maintaining a small stockpile (about 1,000 m^3) of till and granular resources for annually reconstructing the barge landing site. The need for and size of this stockpile will be determined at the site after the quality of the excavated material and local beach material has been assessed.

Operations Activities

The site will act as a staging area for the construction activities for a section of the project.

Fuel Depot Operations

Fuel will be delivered by barge to the 12 Mile Point barge landing. Fuel storage tanks will be filled using fuel trucks shuttling between the barge landing and the tanks. If the fuel storage site is close enough, a temporary surface pipeline might be installed to connect the barge landing area to the fuel storage site so that fuel can be pumped directly into fuel storage tanks.

Required fuel will be delivered from the depot to the construction sites. This will require daily truck traffic through the fuel depot during construction operations.

Stockpile Operations

The stockpile will be used to store material required for construction of the pipeline. The all-weather access road (TD-BL-A-569.9) will be used for transporting equipment and material from the barge landing site to the 12 Mile

Point stockpile site. This activity will primarily take place in the summer during the open-water barging season.

During the barge-unloading period (about seven weeks each year), trucks will operate continuously until all the required material has been stockpiled. A preliminary estimate of materials to be stockpiled at the infrastructure site includes about 15,300 tonnes of pipe and 250 tonnes of modules and supplies. A list of equipment that might be stored at the site is included in Section 6 of this application.

During construction, the material required for constructing the project will be hauled from the stockpile site to various locations along the pipeline right-of-way. When construction is underway, truck activity will occur along the DOT winter road and the winter access roads.

Barge Site Operations

The 600 Series spud barge will be used for unloading cargo barges of pipeline materials, pipeline construction equipment and construction consumables for the construction activities. The spud barge will be berthed at the barge landing site for about three weeks each season, to unload that season's materials.

About six 1500 series cargo barges could be moored simultaneously near the barge landing site while waiting to be unloaded. They will be moored where they will not interfere with other river traffic or result in potential safety concerns. The mooring distance from the shore will depend on the water depth and the draft of the barges. Tie lines to temporary mooring points on shore, such as mooring screw anchors or anchor blocks, will be required to secure the barges to the shore while they wait to be unloaded. The temporary mooring points will be re-established each construction season if they are destroyed or removed by ice activity.

SUMMARY OF POTENTIAL ENVIRONMENTAL AND RESOURCE EFFECTS (PART 6)

ENVIRONMENT

The following section provides specific biophysical and human environment setting, effects and mitigation information for 12 Mile Point infrastructure site. This information includes data collected during the 2004 field programs.

Biophysical Environment

Air Quality Setting

The air quality setting for this site is expected to be similar to the regional setting for the SSA described in Section 8.

Air Quality Potential Effects and Mitigation

Potential effects on air quality associated with the development of the infrastructure site, such as dust, vehicle and equipment emissions, are expected to be limited and localized. Site-specific effects and mitigation are expected to be similar to regional effects and mitigation for the SSA described in Section 8.

Noise and Light Setting

The noise setting for this site is expected to be similar to the regional setting for the SSA described in Section 8.

The site is currently undeveloped and therefore, no manmade sources of light occur.

Noise and Light Potential Effects and Mitigation

The potential effects of, and mitigation pertaining to, noise and lighting are discussed next. These items are combined because both affect sensory perception.

The potential effects and mitigation pertaining to noise and lighting are discussed next. These items are combined because both affect sensory perception. Potential effects on noise levels associated with the development of the infrastructure site are expected to be limited and localized. Site-specific effects and mitigation are expected to be similar to regional effects and mitigation for the SSA described in Section 8.

Industrial lighting can cause increases in ambient light. Sources of light include vehicles, flares and lighting around the site.

Lighting will be used during non-daylight hours, which, during the winter months, might mean periods where lighting is required on a 24 hour basis. Conversely, during the late spring and through summer months, lighting will not be required at all because of the extended daylight hours.

The potential visual effect of lighting can be partially reduced by proper placement and use of lighting only in areas where it is required.

Soils, Landforms and Permafrost Setting

The infrastructure site lies within an area of discontinuous permafrost and was mapped as a silt-clay plain, made up of lacustrine clay and silt, commonly mantled by sand and silty sand, and discontinuous organic cover. These areas typically border rivers and coastal areas. Where this material has been eroded by stream action, the resultant slopes are generally highly unstable. Analysis of the aerial photographs indicates the silt-clay plain is relatively flat, sloping gently either toward the Mackenzie River or to the Great Bear River to the north of the

infrastructure site. Many small lakes dot the surface of the silt-clay plain and this may indicate that the entire region between the Norman Range to the north, the Franklin Mountains to the east, and the Mackenzie River is a groundwater discharge zone.

The bedrock underlying the infrastructure site has been mapped as a small window of resistant, competent limestone belonging to the Devonian Hume Formation in an area otherwise characterized by soft, easily eroded Cretaceous shale, or Devonian Imperial Shale.

Soils, Landforms and Permafrost Potential Effects and Mitigation

General mitigation strategies to offset potential effects are outlined in Section 8.

Vegetation Setting

The barge landing and stockpile site are composed of burned upland white spruce – Alaska birch and black spruce – Labrador tea/mountain cranberry forests with areas of riparian willow – grey alder vegetation near the Mackenzie River. Rare plant surveys have been completed in the vicinity of the proposed barge landing site.

Air photo interpretation indicates that the regenerating forest areas are characterized by short regenerating Alaska birch with some spruce, and standing fire-killed snags. Shrubs are a dominant component of these areas with the shrub layer characterized by dense and tall long beaked willow and green alder with shorter prickly rose.

The riparian willow – grey alder vegetation is characterized by scattered balsam poplars (averaging 3 m in height) with dense cover of sandbar willows and prickly rose with traces of long beaked willow and soapberry. The ground layer is dominated by Canada goldenrod but includes a diversity of species including wild blue flax, common silverweed, licorice root, field horsetail and northern bedstraw. A weedy species, white sweetclover was also present in the area surveyed.

Access to this infrastructure site will use an existing winter road from which shrubs and regenerating trees will need to be cleared. Surrounding vegetation is burned upland white spruce – Alaska birch and black spruce – Labrador tea/mountain cranberry forest similar in composition to that described above for the site. The existing access follows the top edge of the 12 Mile Creek ravine down to the river, avoiding riparian willow vegetation, a community of concern, surrounding the creek. No rare plants were recorded near the infrastructure site and access road.

Vegetation Potential Effects and Mitigation

Development of this infrastructure site and its associated access road will affect vegetation through clearing and mechanical damage to trees, shrubs, forbs and non-vascular species, the permanent loss of vegetation and underlying substrates through infrastructure site expansion and potential changes in site drainage and along the access road.

The majority of effects on vegetation will occur because of project activities arising from site construction and operations. These effects might include the potential influence of dust deposition on the health and growth of nearby vegetation, as well as the potential accidental introduction of non-native plant species. Effects on vegetation due to the infrastructure site and access road will persist into the far future (effect extends beyond 30 years past decommissioning and abandonment) given the slow rate of vegetation growth in the North. When the infrastructure site and access road are decommissioned, introduction of non-native reclamation species might also occur. Vegetation on the infrastructure site and along the access road might develop into a different vegetation community than what was there before development.

White sweet clover is present at the barge landing site and might need to be controlled during or following activities at this site to prevent its spread.

Implementation of primary mitigation measures, as described in Section 8, will help reduce the magnitude of effects on vegetation at this infrastructure site and its access road.

Wildlife Setting

Regional biophysical information is addressed in Section 8.

Wildlife Potential Effects and Mitigation

Regional biophysical effects and mitigation are addressed in Section 8.

General potential effects resulting from development and operation of the borrow site and access road on wildlife include direct and indirect habitat loss, disruption of wildlife movements and wildlife mortality. The timing of project activities, as well as the small footprint of disturbances relative to regional habitat availability, suggests that the magnitude of project effects on birds and most mammals, including those with special status designation, will be low. However, specific issues of concern at the borrow site and along the access road include:

- attraction of grizzly bears to the borrow site and potential mortality of problem bears
- displacement of grizzly bears from high quality foraging habitat during the spring
- disturbance of nesting birds near the borrow site during summer (if site is active) and potential abandonment of nest sites
- displacement of caribou from high quality foraging habitat during winter
- disturbance of caribou and disruption of movements
- increased hunting/poaching of wildlife such as marten resulting from increased access

Implementation of general mitigation measures, as outlined in Section 8, will reduce effects on wildlife during borrow site and access road development and operations. Specifically, the following mitigation measures are considered important for this site:

- use the waste management plan described in Section 11
- avoid active nesting sites (as determined during preconstruction surveys) to the extent practical
- reduce project activities during the nesting period to the extent practical
- prohibit the recreational use of associated access roads by project staff while on the job site
- establish and enforce regulations to prevent harassment of wildlife

Hydrology Setting

The 12 Mile Creek infrastructure site is located about 0.5 km upslope of the Mackenzie River and 200 metres south of 12 Mile Creek. Most of the runoff would potentially flow into the Mackenzie River as distributed flow. The area encompassing this infrastructure site that contributes runoff to the Mackenzie River is about 3 km^2.

Hydrology Potential Effects and Mitigation

Effects of any potential increase in mean annual runoff due to the higher runoff coefficient of the disturbed area and in mean sediment concentration on the Mackenzie River are expected to be limited locally because of the relatively large flows in the Mackenzie River and the high dilution capacity of the river.

Groundwater Setting

No groundwater features have been noted previously in the vicinity of the infrastructure site.

Groundwater Potential Effects and Mitigation

Groundwater effects relating to the development of the site are not expected, therefore, no mitigation measures are proposed at this time.

General mitigation measures, such as the installation of ditches or culverts to restore surface water drainage patterns, will be used as required.

Water Quality Setting

Water quality data for this site is expected to be similar to regional data described in Section 8.

Water Quality Potential Effects and Mitigation

The 12 Mile Point infrastructure site might affect water quality through leaks and spills, sediment releases from disturbed land, and changes in surface water flow and level associated with changes in surface runoff.

Effects of small-scale leaks will be reduced through management practices, contingency plans, mitigation and emergency response plans.

The effects of land disturbance on surface runoff and suspended sediment concentrations were assessed on a site-specific basis. Limited effects are expected on surface water flow and water level in the Mackenzie River due to changes in runoff. These effects represent a change of less than 2% of the natural range in flows and water levels. Consequently, no effects on water quality are expected.

The hydrology component predicted the effect on mean annual total suspended sediment (TSS) concentrations to be limited, i.e., less than 10 mg/L, in the Mackenzie River. Limited effects are expected on the water quality parameters associated with sediment inputs, i.e., nutrients and metals.

Fish and Fish Habitat Setting

The infrastructure site is located on the east bank of the Mackenzie River about 10 km upstream of the community of Tulita, and about 200 metres upstream of 12 Mile Creek. 12 Mile Creek is classified as an Active II Channel and is crossed by the pipeline about 3 km upstream. Active II Channels have defined beds and banks and intermittent flows. They are typically dry or frozen to the bed in winter. However, they can be used by fish during periods of flow. The unnamed stream is

likely able to provide spawning and rearing habitat for spring spawning species such as Arctic grayling and northern pike.

Fish captured or reported to have been captured from the Mackenzie River included at least 16 species: 10 large-bodied, major species and six small-bodied, minnow species. The major species include Arctic grayling, northern pike, walleye, goldeye, burbot, inconnu, mountain whitefish, broad whitefish and Arctic lamprey. The Mackenzie River in this area also provides a corridor for movement of diadromous fish species between the Beaufort Sea and upstream areas of the Mackenzie River. Species that have been found include chum salmon, Arctic cisco and least cisco. Twelve lake chub ranging in size from 45 to 94 mm fork length. were captured by electrofishing beach seining and bait minnow traps during 2004 fish and fish habitat surveys. The most abundant large-bodied fish captured during the previous studies were broad whitefish, lake whitefish and least cisco.

The Mackenzie River at the barge landing site is composed entirely of deep run habitat. The wetted channel width at the barge landing site is about 1,500 m. Water depth ranged from 0.06 to 12.5 m with a mean cross sectional channel depth of 6.1 m with a maximum depth of 10.4 m. Channel bed material consisted predominantly of clay, with small amounts of sand, gravel, cobble and boulder. Water depth and turbulence, with occasional boulders, provide most of the instream cover near the barge landing site. Riparian areas adjacent to both banks were bare soil with patches of small shrubs and grasses. Further back the vegetation was comprised mostly of grass, forbs and small deciduous shrubs.

Due to the predominance of deep river habitat and abundant instream cover provided by depth, the habitat appeared suitable for rearing and adult feeding and holding use by northern pike, suckers, whitefish species and burbot. This was confirmed by members of the community of Tulita, who indicated that inconnu and whitefish were netted immediately upstream, near 12 Mile Point during the fall (Peter Horassie 2004).

The lack of coarse substrates made use of the area as rearing and adult feeding and holding habitat not suitable for Arctic grayling. Similarly, the predominantly clay and sand substrate and absence of riffle run made the area unsuitable as spawning habitat for Arctic grayling, suckers and whitefish. The lack of submerged vegetation along the shoreline indicated unsuitable spring-spawning habitat for northern pike. However, the infrastructure site does provide potential burbot spawning habitat, as this species is known to spawn over fine substrates in the area (Lombard North Group 1976). Based on the deep nature of this channel and high flows, the habitat is suitable for overwintering by all species potentially present in the area.

There are no waterbodies within the boundaries of the stockpile site and no watercourses are crossed by the all-weather road leading from the barge landing to the stockpile site.

Fish and Fish Habitat Potential Effects and Mitigation

Effects on fish and fish habitat from development of the barge landing at the 12 Mile Point infrastructure site are primarily related to direct disturbance of fish habitat by activities associated with development and operation of the site and indirect effects resulting from increased sediment in runoff.

A temporary spud barge landing will be placed in the nearshore area. Although some in-water work may be required to prepare a stable birth for the spud barge, dredging is not planned. Disturbance to nearshore or riparian habitat that occurs through annual placement and removal of the spud barge will be limited and short term.

The all weather road from the barge landing to the stockpile site does not cross any watercourses. Consequently no direct effects on fish habitat are expected.

Maintaining a vegetated buffer zone between the site and local waterbodies, if required, and implementation of site-specific sediment and erosion control plans will prevent sediment from the borrow site reaching surface waters.

Human Environment

This topic contains a description of the protected areas and heritage resource setting and potential effects and mitigation for the 12 Mile Point infrastructure site. Other human environment information is described in Section 8.

Protected Areas Setting

According to the SPDLUP, this site is located within an area designated for multiple use. Multiple use areas have no restrictions to development as long as their effects on resource users and values are reduced.

Protected Areas Potential Effects and Mitigation

Because this site is located within a proposed multiple use area, no effects on protected areas are expected.

Heritage Resources Setting

The 12 Mile Point infrastructure site was inspected during the 2004 field program. The location was considered to have high potential for the discovery of heritage resources. Numerous heritage resource sites have been previously recorded within two kilometres of the proposed development area, indicating prior use of this

region. A number of contemporary cabins are also located directly across the Mackenzie River channel indicating continued use of the area. No sites were recorded as a result of the aerial overflights at this location.

The 2004 field program also included a ground reconnaissance of the barge landing site at the 12 Mile Point infrastructure site. This area is also considered to have high potential for heritage resources, although, no heritage resource sites were recorded as a result of the surface reconnaissance.

The nature of the heritage resource potential and results of preliminary investigations at this site will be provided to the Prince of Wales Northern Heritage Centre in a report under permit 2004-956.

Heritage Resources Potential Effects and Mitigation

Before the development of this site, a Heritage Resource Impact Assessment will be conducted and provided to the Prince of Wales Northern Heritage Centre. If it is determined that the development will affect any heritage resources, mitigation plans will be prepared.

PUBLIC INVOLVEMENT

Residents of the Hamlet of Tulita raised concerns regarding the originally proposed barge landing and stockpile site on land within the Tulita municipal boundary. This new location was identified south of Tulita at 12 Mile Point, with participation and agreement from community representatives.

The public involvement activities are documented in Section 10.

EQUIPMENT (PART 10)

The following tables show an estimate of the equipment that might be required for the 12 Mile Point infrastructure site. An exact list and numbers will not be known until immediately before construction. Table 4-8 lists the site construction equipment. Table 4-9 lists site operations equipment.

Table 4-7: Estimate of Site Construction Equipment

Type and Approximate Number per Site	Size, Model or Equivalent	Proposed Use
4x4 crew cab pick up – 2	4x4	Transporting crews
Bulldozers with GP buckets, U blades and brush rakes – 2	Large sized bulldozer (405 HP)	Site grading, pad and access road development, spreading granular material, snow removal

Table 4-7: Estimate of Site Construction Equipment (cont'd)

Type and Approximate Number per Site	Size, Model or Equivalent	Proposed Use
Dump trucks (double axle) – 2	Truck with trailer (12 m^3)	Hauling granular material
Front end loader with GP bucket – 1	Large sized loader (5.5 m^3 bucket loader)	Site preparation work
Road grader – 1	Large sized grader (4.9 m blade)	Site preparation work, grading ramps and access roads
Tracked mechanical ditcher – 1	Medium sized excavator (1.45 m^3 bucket)	Excavating and removing organic material
Tree feller-buncher and skidder – 1	Tracked 35,490 kg feller-buncher with a high speed saw head	Site clearing and timber hauling
Compactor –1	Medium sized compactor (20,879 kg sheepsfoot packer)	Compaction of camp site pad fill materials and access road construction
Cranes (tracked) – 1	Medium sized crane (100 t)	Unloading and placement of camp modules
Mechanics truck with welder –1	4x4	Equipment repair
Water truck – 1	Tandem axle, 16-24 m^3	Site and road work
Sea containers – 2	6 m	Storage
Mobile camp – 1	35 person	Site development
Fuel truck – 1	3785 L	Fuel for equipment

Table 4-8: Estimate of Equipment to Operate the Infrastructure Site

Type and Approximate Number per Site	Size, Model or Equivalent	Proposed Use
Sea containers – 4	6 m	Storage
Tractor trailers – 4	Dry van 14.6 m or 16.2 m	Parts and supplies

Table 4-8: Estimate of Equipment to Operate the Infrastructure Site (cont'd)

Type and Approximate Number per Site	Size, Model or Equivalent	Proposed Use
Road graders – 2	Large sized grader (4.9 m blade)	Earthwork, road maintenance and snow removal
Front end loader with GP bucket – 1	Large sized loader (5.5 m^3 bucket loader)	Movement of camp supplies and snow removal
Snow machines – 6	Small sized snow machine (400 cc)	Personnel transport
4x4 crew cab pick up – 4	4x4	Transporting crews
Crane (tracked) – 1	Medium sized crane (100 t)	Loading and unloading pipe, equipment and materials
Flatbed trucks with pickers – 2	10 ton truck	Transporting materials and maintenance
Truck and water tank trailers – 5	Tandem axle, 16-24 m^3	Bringing water to the camp for domestic use and fire protection
Skid steer loaders – 2	Large sized skid steer (80 HP)	Site work

FUELS (PART 11)

Table 4-10 itemizes fuel storage. This represents an estimate of fuel requirements.

Table 4-9: Estimate of Fuel Storage at 12 Mile Point

Fuels	Number of Containers	Capacity of Containers	Location
Diesel	1	200,000 L	Fuel Depot

PERIOD OF OPERATIONS (PART 14)

Site operations will be continuous from 2006 through the summer of 2010, with the potential for limited activities after 2010. See Section 3 for a schedule of development activities in the SSA.

LOCATION OF ACTIVITIES BY MAP COORDINATES (PART 16)

Map coordinates of the site centroid are shown in Table 4-11. A map showing the location of the site is provided in Figure 4-5.

A photograph of the 12 Mile Point infrastructure site appears in Figure 4-6. A photograph of the barge landing site appears in Figure 4-7.

Table 4-10: Map Coordinates for 12 Mile Point

Activity	Latitude (DD)	Longitude (DD)	UTM Easting (m)	UTM Northing (m)	UTM Zone
12 Mile Point barge landing site	64.8834	-125.2904	391540	7197428	10
12 Mile Point stockpile site	64.8892	-125.2853	391806	7198057	10

FEES (PART 18)

The total land area required for activities contained in this subject is 17.8 ha.

The land requirements are shown in Appendix A.

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Figure 4.6 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

Figure 4.7 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.