



# Shell Canada Energy

**Camp Farewell NT**

## *Closure and Reclamation Plan*



April 5, 2019

Inuvialuit Water Board  
P.O. Box 2531  
Inuvik NT  
XOE OT0

**Mr. Bijaya Adhikari**  
**Science and Regulatory Coordinator**

Dear Mr. Adhikari:

**Camp Farewell**  
**Closure and Reclamation Plan**

On behalf of Shell Canada Energy, IEG Consultants Ltd. (IEG) is pleased to provide the Closure and Reclamation Plan for the Camp Farewell Site (Site). The enclosed document is intended to meet the requirements for Shell to update the Closure and Reclamation Plan for the Site on a bi-annual basis.

Please contact Kyle Schepanow at (403) 648-4292 with any questions or comments.

Yours truly,  
**IEG CONSULTANTS LTD.**

A handwritten signature in black ink, appearing to read 'Kyle Schepanow', with a long, sweeping underline.

Kyle Schepanow, M.Sc., P.Geo.  
Senior Hydrogeologist

KS:sh

# Shell Canada Energy

## Camp Farewell, Northwest Territories

### *Closure and Reclamation Plan*

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## 1 PLAIN LANGUAGE SUMMARY

IEG Consultants Ltd. (IEG) was retained by Shell Canada Energy (Shell) to update the Closure and Reclamation Plan (CRP) for Shell's Camp Farewell Site (Site).

The Site is located approximately 125 km northwest of the town of Inuvik in the Northwest Territories (Figure 1) and can be accessed by barge, boat and helicopter.

Camp Farewell was constructed in the winter of 1970 and summer of 1971. The Site was operated as a staging and storage area in support of the Shell Mackenzie Delta Drilling Program. The Site consisted of a self-contained camp, providing electrical and heating services and facilities for accommodation, meals, fuel storage, equipment handling, water withdrawal and wastewater storage. Currently the Site is decommissioned, and all former infrastructure has either been disassembled or demolished apart from the emergency shelter and one storage building (Figure 2).

Camp Farewell is located on Crown land and is under lease to Shell (Lease No. 107-C/4-2-15). Activities at the Site are regulated by a Type B Water Licence (Water Licence N7L1-1834), issued by the Inuvialuit Water Board (IWB). The Site is also located within the Kendall Island Bird Sanctuary (KIBS), under jurisdiction of Environment Canada. A Canadian Wildlife Services (CWS) Migratory Birds Sanctuary Permit is required to enter and conduct work within the KIBS and is renewed each year.

The purpose of the CRP is to summarize the natural environment, historical infrastructure, and existing conditions at the Site, and describe the temporary and permanent closure activities that have been conducted to date. The CRP also includes details regarding future permanent closure and post-closure monitoring activities that are planned at the Site.

This version of the CRP has been updated to conform to the direction provided in the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB/AANDC 2013) (the Guideline), where applicable. Requirements of federal, territorial, and other regulations have been considered and applied throughout this plan. A glossary of terms and definitions is provided in Appendix I. A list of acronyms, abbreviations, units, and symbols used in this report is provided in Appendix II.

Temporary closure activities were conducted in 2009 and included dismantling and removal of camp support facilities that were either no longer required or no longer operational, removal of drilling materials and consumables, removal of fuel and fuel storage tanks that were no longer required, removal of construction materials, and removal of miscellaneous metals and piping. The temporary closure program also included the initiation of remedial activities on the gravel pad across the Site.

Permanent closure activities were initiated in 2013 with the remediation of the former sewage lagoon. Activities continued in 2014, 2015, 2016 and 2018 with the decommissioning and removal of site infrastructure, materials, equipment, and the remediation of the gravel pad.

Final permanent closure activities are scheduled for 2019, with post-closure monitoring beginning in 2020.

## 2 INTRODUCTION

### 2.1 Purpose and Scope of the Closure and Reclamation Plan

IEG was retained by Shell to update the CRP for the Site. The purpose of the CRP is to summarize the existing operational and environmental conditions at the Camp Farewell Site and summarize Shell's plans for closure and reclamation of the Site. The CRP sets out the closure objectives for each project component at the Site and outlines how these objectives will be achieved with the planned closure activities.

### 2.2 Goal of the Closure and Reclamation Plan

The closure and reclamation goal (or closure goal) is to return the Site and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities. The four closure principles of physical stability, chemical stability, no long-term active care requirements, and future use (including aesthetics and values) are the basis for determining whether the closure goal has been satisfied.

### 2.3 Closure and Reclamation Planning Team

This CRP has been prepared on behalf of Shell by IEG. The following individuals were involved in the preparation and submission of this Plan.

Company	Responsibility	Individual	Role
Shell Canada Energy	Owner	Grahame Bensted	Decommissioning, Abandonment & Reclamation Superintendent
IEG Consultants	Environmental Planning and Services	Kyle Schepanow	Senior Hydrogeologist

Ultimately Shell is responsible for the execution of the CRP and permanent closure of the Site. Shell will assign a project manager to implement and oversee the Shell approved program. Permanent closure activities will be supervised and designed by an environmental consulting company that is permitted to provide such services in the Northwest Territories and that is experienced in similar activities. Contractor services will be provided by a company that utilizes local resources (people and equipment).

Site activities since 2013 have been conducted under the direction of Tervita Corporation with environmental services provided by IEG. Tervita has retained a number of local companies to assist in the work completed at the Site.

### 2.4 Engagement

Shell has worked to develop positive community relations through the consideration of community values and feedback during the design of plans pertaining to Camp Farewell, as well as by involving local people and services during the operation and closure phases of the Site.



Consultation with local stakeholders is an important initiative pursued by Shell. Periodic consultation sessions are scheduled based on the level of Shell's activities in the region, Shell's plans and the communities desire to discuss issues. Historically, consultation programs have had participation from the Aklavik, Inuvik and Tuktoyaktuk communities, and have included Hunter and Trapper Committees (HTCs), community corporation members, elder committee members, and the general public.

In 2005 and 2006, a formal consultation process was initiated regarding the renewal of the Water Licence for the Site. It is understood that the community stakeholders were supportive of the temporary and permanent closure plans for the Site and of the following efforts initiated by Shell:

- improving the visual aesthetics of the Site;
- initiating treatment of hydrocarbon impacts on-site;
- minimizing disturbance of the tundra (provided the historical spill would not cause risk of adverse environmental effects); and
- protecting traditional land use in the area.

Shell continues to honor and remain in compliance with their agreement with the Inuvialuit Regional Corporation (IRC). As part of this agreement, Shell reports on its commitment to involve local people in its activities in the region on an annual basis. Shell continues to meet or exceed these commitments as defined in the agreement.

## 2.5 Regulatory Instruments for Closure and Reclamation

### 2.5.1 Applicable Regulatory Bodies

The following regulatory bodies maintain jurisdiction over the Site, as outlined below.

#### Inuvialuit Water Board (IWB)

The IWB enforces the Northwest Territories Waters Act within the Inuvialuit Settlement Region (ISR).

This Plan has been updated in fulfillment of the requirements outlined in Water Licence N7L1-1834 (Appendix III) as issued by the IWB. Part G of the Licence states:

*"1. The Licensee shall submit to the Board for approval within one (1) year of issuance of this Licence, an updated Interim Abandonment and Restoration Plan including plans for the abandonment and restoration of the Sewage lagoon and a complete Phase II Environmental Site Assessment of Camp Farewell. This assessment will include the full delineation of contamination (soil and water) associated with Camp Farewell operations, both on and off the gravel base pad.*

*2. The Licensee shall implement this Plan as and when approved by the Board.*

*3. Following approval of the Plan, the Licensee shall review the Abandonment and Restoration Plan every two (2) years and shall modify the Plan as necessary to reflect changes in operations and technology. All proposed Modifications to the Plan shall be submitted to the Board for approval."*

## Government of the Northwest Territories

Camp Farewell is located on Crown land and is under lease to Shell. The lease, No. 107-C/4-2-15 (Appendix IV), was re-issued in 2009 and is valid until 2028. The general requirements regarding reclamation of the Site are outlined in the lease. Part 14 (Restoration) states:

*“Where the lessee fails to restore the land as required and within the time allowed by the Regulations or by the Minister, the Minister may order the restoration of all or any part of such land and any expenses thus incurred by the Minister shall be recoverable from the lessee as a debt due to Her Majesty.”*

Shell holds a second lease for the adjacent airstrip.

On April 1, 2014, responsibility for public land, water and resource management in the Northwest Territories was transferred from the federal department of Aboriginal Affairs and Northern Development Canada (AANDC) to the Government of the Northwest Territories (GNWT) via the Northwest Territories Lands and Resources Devolution Agreement.

Regular lease inspections are carried out by Resource Management Officers in the GNWT Department of Lands to ensure that the general conditions of the lease are acceptable, improvements are made and maintained within the lease boundary and that proper methods of waste disposal and fuel storage are being implemented.

## Environment Canada – CWS

The Site lies within the KIBS, under jurisdiction of Environment Canada - CWS. A CWS Migratory Birds Sanctuary Permit is required to enter and conduct work within the KIBS and is renewed each year. The CWS permit issued for the most recent remediation program (NWT-MBS-18-03) was issued on June 28, 2018 and expired on December 31, 2018.

### 2.5.2 Applicable Regulatory Guidelines

Remediation guidelines utilized during the assessments of the Site have been based on the *Environmental Guideline for Contaminated Site Remediation* (GNWT 2003). The Northwest Territories *Environmental Protection Act (EPA)* gives the Minister of Environment and Natural Resources (ENR) the authority to develop, coordinate, and administer the guidelines. The specific guidelines that have been applied to assessments at the Site are discussed in more detail in Section 5.2.3.2.

The *Mine Site Reclamation Policy for the Northwest Territories* (INAC 2002) is the regulatory driver for reclamation of the Site. The policy lays out the guiding principles and objectives for mine closure and reclamation in the Northwest Territories. This policy and the complimenting Guideline are the most appropriate available guidance documents for the closure of the Site.

## 3 PROJECT ENVIRONMENT

### 3.1 Atmospheric Environment

The Site is located in a region classified as having a high subarctic ecoclimate, with very cold winters and cool summers. The mean annual daily temperature at the Inuvik A weather station (located approximately 120 km southeast of the Site) is -8.2°C, with daily average temperatures ranging from -26.9°C in January to 14.1°C in July (Environment Canada 2019). The mean annual precipitation is 240.6 mm, of which 114.5 mm falls as rain.

Winters in this area are long and there is a period of approximately two months when the sun does not rise above the horizon. During this period, very cold conditions prevail and may last for several weeks at a time. When temperatures reach such lows, the ability of the air to contain moisture is limited and very little precipitation falls. The average annual snowfall is 158.6 cm, with heaviest snowfalls occurring during October and November (Environment Canada 2019).

### 3.2 Physical (Terrestrial) Environment

#### 3.2.1 Physiography

The Site lies within the Tuktoyaktuk Coastal Plain Ecoregion of the Southern Arctic Ecozone. This Ecoregion covers the outer Mackenzie River Delta and Tuktoyaktuk Peninsula bordering the Beaufort Sea (ESWG 1996).

There are two main landscape types within the Tuktoyaktuk Coastal Plain Ecoregion. One is composed of distinctive delta landforms at the mouth of the Mackenzie River. These include wetlands, active alluvial channels, and estuarine deposits. Characteristic wetlands, which cover 25 to 50 percent of the area, are lowland polygon fens of both the low and high centre varieties. The second landscape type consists of broadly rolling uplands. Discontinuous moraine deposits mantle much of the area, except near the coast where fine textured marine sediments cover the surface. Outwash aprons of crudely-sorted sand and gravel and raised beach ridges along the shores of pre-glacial lakes, occur less frequently. The resulting undulating terrain is studded with many lakes and ponds (ESWG 1996).

#### 3.2.2 Surficial Geology

Surficial geology near the Site consists of silty sand overlying sand and interbedded sand and gravel deposits. These deposits are typically associated with the Toker Member, Melloch Till, or Buckland Glaciation deposits. These sediments are overlain by organic deposits. Outwash plains and valley trains identified in the Mackenzie Delta and Tuktoyaktuk Coastal lands are reported to be between 3 m and 30 m thick and include North Star Outwash, Garry Island Member, Cape Dalhousie Sands, and Turnabout Member. Geology observed at Camp Farewell indicates the outwash plain is approximately 15 m thick (WorleyParsons 2011).

The soil profile observed in boreholes advanced during the 2015 soil assessment was consistent with regional information and generally consisted of an upper organic layer underlain by coarse-grained sand with varying amounts of silt, and trace gravels to the maximum depth investigated (6 m below ground surface (bgs)). Permafrost was typically encountered at a depth of approximately 1.5 m bgs.

### 3.2.3 Hydrogeology

Groundwater flow at the Site occurs mainly in the coarse-grained sand portion of the active above the permafrost. Groundwater levels have been reported at depths ranging from 0.26 to 0.83 m bgs, with depths increasing toward the south. The depth to groundwater is dependent on the amount of gravel overburden and the groundwater is a light brown color as a result of the organic rich soils (WorleyParsons 2011).

### 3.2.4 Hydrology

The Mackenzie River Delta is a dynamic complex of lakes, islands, braided channels, and oxbows. The hydrological regime is the primary factor controlling vegetation and wildlife habitat in the area. It is an estuarine delta with poorly developed levees, formed largely from sediments transported by the Mackenzie River over the last 13,000 years. The southwest portion of the delta also receives sediment from the Peel River and Rat River. The major channels (East, Middle, and West) appear largely unchanged in the last century. The present delta is flat and dotted with numerous lakes, ponds, and river channels, but also contains land varying from stable forested areas to tidal flats (MRBC 1981).

Ice covers the waters of the delta for approximately eight months of the year and can be up to 2.5 m thick in the main stem of the Mackenzie River. Ice break-up usually begins in late April to early May, and ice movement occurs before peak spring water levels. Water levels recede during late summer and into the fall. The basic hydrology of the Mackenzie River Delta is a complex interaction of aggrading and degrading forces, with spring break-up being the major hydrological event each year (MRBC 1981).

## 3.3 Chemical Environment

Dominant soils of the Tuktoyaktuk Coastal Plain Ecoregion consist of Organic Turbic Cryosols developed on level to rolling organic, morainal, alluvial, fluvio-glacial, and marine deposits (ESWG 1996). Typically, these soils are underlain by a continuous layer of permafrost (greater than 90 percent permafrost). However, more recent data describes the outer Mackenzie River Delta and portions of Richards Island as being discontinuous permafrost with about 35 to 65 percent permafrost beneath the area. In the Mackenzie River Delta, the permafrost thickness is generally less than 90 m, and contains deep unfrozen zones (taliks), which may extend to the base of the permafrost. The depth of the active layer generally ranges from 0.3 to 1.0 m but is largely a function of ground surface insulation, vegetation cover, level of ground disturbance, and winter snow cover (Heginbottom 1998).

Background soil chemistry was evaluated by WorleyParsons (2006) and included an assessment of the effect of soil texture (i.e. organic vs. mineral soil) on soil chemistry, and the influence of organic matter content on laboratory-measured middle to heavy end hydrocarbon concentrations. Natural

soils in the area were found to contain organic matter and products of organic decay that interfered with laboratory analysis of petroleum hydrocarbon (PHC) compounds.

Groundwater in the vicinity of the Site is typically light brown in colour due to the organic rich soils in the active layer. Historical monitoring of existing piezometers at the Site have shown elevated concentrations of total dissolved solids (TDS), aluminum, cadmium, copper, iron, and selenium in one or more piezometers. In 2015, a groundwater sample collected from piezometer P06-3, located south of the historical burn pit (Figure 2), contained naphthalene at a concentration exceeding the applicable guidelines that are outlined in Section 5.2.3.2.

### 3.4 Biological Environment

#### 3.4.1 Vegetation

Permafrost detracts from soil productivity by chilling the soil and creating waterlogged conditions in the thawed active layer near the soil surface. Plant communities in this area are relatively simple and are dominated by a few species that are well adapted to poor soil (low nutrient) conditions and the harsh climate. Vegetation grows on a veneer of unfrozen organic or granular substrate overlying the permafrost boundary. Vegetation in the area includes the following: delta shrub communities on active river terraces, sedge (*Carex sp.*) and cotton grass (*Eriophorum angustifolium*) communities in wet inactive areas, and patterned ground comprised of low-centered polygon fens which typically develop in poorly drained conditions (ESWG 1996).

Polygon-shaped depressions formed by ice wedges have been identified in the area to the north and west of the Site. These depressions result in conditions favorable for the growth of willow (*Salix* species) and alder (*Alnus* species) woody vegetation. Dwarf shrubs, moss and lichen ground cover characterizes the remaining areas surrounding the Site (WorleyParsons 2011).

#### 3.4.2 Aquatic Life

A large number of fish species may occur in the Mackenzie Delta region (AICCP, IICCP and TCCP 2008). The Mackenzie Delta provides important feeding, spawning, and overwintering habitat for anadromous and freshwater fish species. The Delta also represents a major conduit for fish migration from spawning areas in the delta or upstream of the delta, to overwintering areas in the delta or the nearshore Beaufort Sea. Migration is important for many arctic fish species since areas of resource abundance are commonly unsuitable for overwintering, and vice versa. Common species that may be found and/or harvested within the vicinity of the Site are summarized in Table 3.1. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and Species at Risk Act (SARA) ratings are also provided in Table 3.1, where applicable.

**Table 3.1 Fish found within the vicinity of the Site**

Common Name	Scientific Name	COSEWIC Status <sup>1</sup>	SARA Status <sup>1</sup>
Arctic Cisco	<i>Coregonus autumnalis</i>	-	-
Arctic Grayling	<i>Thymallus arcticus</i>	-	-
Broad Whitefish	<i>Coregonus nasus</i>	-	-
Inconnu	<i>Stenodus leucichthys</i>	-	-
Dolly Varden	<i>Salvelinus malma</i>	Special Concern	Special Concern
Lake Trout	<i>Salvelinus namaycush</i>	-	-
Lake Whitefish	<i>Coregonus clupeaformis</i>	-	-
Least Cisco	<i>Coregonus sardinella</i>	-	-
Burbot	<i>Lota lota</i>	-	-
Northern Pike	<i>Esox lucius</i>	-	-
Pacific/Blue Herring	<i>Clupea pallasii</i>	-	-

**Notes:**

Species information obtained from the AICCP (2008), IICCP (2008) and TCCP (2008).

<sup>1</sup>Government of Canada, 2019. Species at Risk Public Registry – A to Z Species Index.

- Not Listed

### 3.4.3 Terrestrial Fauna

Terrestrial animals in the area include barren-ground grizzly bear, arctic and red fox, wolverine, ermine, least weasel, mink, muskrat, Arctic ground squirrel, and several species of small rodents (lemmings and voles). Caribou are not thought to occur on Richards Island, but a domesticated herd of reindeer is typically summered on the island.

Grizzly bears reside year-round in the area, although at low density. Most local grizzly denning occurs on south and west facing lake and/or channel banks between sea level and 100 m above sea level within the bear’s home range. Low-lying areas around lakes and channels also provide good spring foraging habitat. Grizzly bears forage on bird eggs and thus are attracted to KIBS during the spring waterfowl nesting season.

Polar bears are generally restricted to areas with sea ice and are thus unlikely in the Camp Farewell area. However, maternity dens and secondary winter habitat occur along the coastline of the Mackenzie River Delta and Richards Island.

A total of 36 species of mammals may be found in the Mackenzie Delta region (AICCP, IICCP, and TCCP 2008). Common species that may be found and/or harvested within the vicinity of the Site are summarized in Table 3.2. The COSEWIC and SARA ratings are also provided in Table 3.2, where applicable.

**Table 3.2 Mammals found within the vicinity of the Site**

Common Name	Scientific Name	COSEWIC Status <sup>1</sup>	SARA Status <sup>1</sup>
Beaver	<i>Castor canadensis</i>	-	-
<b>Bears</b>			
Black Bear	<i>Ursus americanus</i>	Not at Risk	-
Grizzly Bear	<i>Ursus arctos</i>	Special Concern	No Status
Polar Bear	<i>Ursus maritimus</i>	Special Concern	Special Concern
Caribou	<i>Rangifer tarandus</i>	Threatened	No Status
<b>Foxes</b>			
Red Fox	<i>Vulpes vulpes</i>	-	-
Arctic Fox	<i>Alopex lagopus</i>	-	-
Lynx	<i>Lynx canadensis</i>	Not at Risk	-
Mink	<i>Mustela vison</i>	-	-
Moose	<i>Alces alces</i>	-	-
Muskrat	<i>Ondatra zibethicus</i>	-	-
Snowshoe Hare	<i>Lepus americanus</i>	-	-
Wolverine	<i>Gulo gulo</i>	Special Concern	No Status

**Notes:**

Species information obtained from the AICCP (2008), IICCP (2008) and TCCP (2008).

<sup>1</sup>Government of Canada, 2019. Species at Risk Public Registry – A to Z Species Index.

- Not Listed

### 3.4.4 Avifauna

Camp Farewell is located within the KIBS. The KIBS was established in 1961 to protect valuable waterfowl breeding and staging grounds within the outer Mackenzie River Delta. This area has been classified as a key migratory bird site in the Northwest Territories. The 600 km<sup>2</sup> sanctuary provides habitat for over 80 species of migratory birds, including up to 7,500 nesting snow geese. Large numbers of tundra swans (*Cygnus columbianus*), greater white-fronted geese (*Anser albifrons frontalis*), sandhill cranes (*Grus canadensis*), brant (*Branta bernicla*), dabbling ducks (*Anas sp.*), and shorebirds also nest and mount within the sanctuary. Although the sanctuary is primarily known for waterbirds, several species of raptors, passerines, and ground-dwelling birds are also present in the area. Other common species include snowy owl (*Bubo scandiaca*), gyrfalcon (*Falco rusticolus*), peregrine falcon (*Falco peregrinus*), osprey (*Pandion haliaetus*), common redpoll (*Acanthis flammea*), gray jay (*Perisoreus Canadensis*), common raven (*Corvus corax*), red-throated loon (*Gavia stellata*), northern shrike (*Lanius excubitor*), ptarmigan (*Lagopus sp.*), and fox sparrow (*Passerella iliaca*).

Common species that may be found and/or harvested within the vicinity of the Site are summarized in Table 3.3. The COSEWIC and SARA ratings are also provided in Table 3.3, where applicable.

**Table 3.3 Birds found within the vicinity of the Site**

Common Name	Scientific Name	COSEWIC Status <sup>1</sup>	SARA Status <sup>1</sup>
<b>Ducks</b>			
King Eider	<i>Somateria spectabilis</i>	-	-
Common Eider	<i>Somateria mollissima</i>	-	-
Mallard	<i>Anas platyrhynchos</i>	-	-
Scoters	<i>Melanitta spp.</i>	-	-
Wigeon	<i>Anas americana</i>	-	-
Old Squaw	<i>Clangula hyemalis</i>	-	-
Pintail	<i>Anas acuta</i>	-	-
<b>Geese and Swans</b>			
Canada Goose	<i>Branta canadensis</i>	-	-
Snow Goose	<i>Chen caerulescens</i>	-	-
White-fronted Goose	<i>Anser albifrons frontalis</i>	-	-
Brant	<i>Branta bernicla</i>	-	-
Tundra Swan	<i>Cygnus columbianus</i>	-	-
<b>Loons</b>			
Common Loon	<i>Gavia immer</i>	Not at Risk	-
Yellow-billed Loon	<i>Gavia adamsii</i>	Not at Risk	-
Pacific Loon	<i>Gavia pacifica</i>	-	-
Red-throated Loon	<i>Gavia stellata</i>	-	-
<b>Ptarmigan</b>			
Rock Ptarmigan	<i>Lagopus mutus</i>	-	-
Willow Ptarmigan	<i>Lagopus</i>	-	-
Sandhill Crane	<i>Grus canadensis</i>	-	-
<b>Eagles</b>			
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Not at Risk	-
Golden Eagle	<i>Aquila chrysaetos</i>	Not at Risk	-
<b>Falcons and Hawks</b>			
Peregrine Falcon	<i>Falco peregrinus</i>	Non-active	Special Concern
Gyrfalcon	<i>Falco rusticolus</i>	Not at Risk	-
Rough-legged Hawk	<i>Buteo lagopus</i>	Not at Risk	-
Snowy Owl	<i>Bubo scandiaca</i>	Not at Risk	-

**Notes:**

Species information obtained from the AICCP (2008), IICCP (2008) and TCCP (2008).

<sup>1</sup>Government of Canada, 2019. Species at Risk Public Registry – A to Z Species Index.

- Not Listed



## 4 PROJECT DESCRIPTION

### 4.1 Location and Access

Camp Farewell is located on the Mackenzie River within the ISR on the northeast bank of Middle Channel in the KIBS, Northwest Territories (Figure 1). It is approximately 125 km northwest of Inuvik and approximately 135 km west of Tuktoyaktuk.

The geographic coordinates for the Site are:

- Latitude 69° 12' 30.0" N, and
- Longitude 135° 06' 04.4" W.

A combination of transportation methods can be used to access Camp Farewell. The transportation methods include barge, boat and helicopter.

Typically, the barge season is mid-June to late-September. During activities at the Site, the barge camp is docked in the existing barge landing area, with the barge anchored to existing bollards (Figure 2).

The existing gravel airstrip at Camp Farewell is approximately 610 m long by 30 m wide (Figure 2). It has not been maintained since 2009 and should be used in emergency circumstances only.

The use of aircraft in KIBS is restricted seasonally and is defined in the annual CWS permit. Minimum flight altitudes are followed when in transit to and from the Site to reduce possible effects on wildlife and traditional land users.

### 4.2 Site History

Camp Farewell was constructed in the winter of 1970 and summer of 1971. The Site was operated as a staging and storage site in support of the Shell Mackenzie Delta Drilling Program. The Site consisted of a self-contained camp, providing electrical and heating services and facilities for accommodation, meals, fuel storage, equipment handling, water withdrawal and wastewater storage. The camp operated as a 60- to 70-person camp full time until 1978, after which it was in operation periodically until 1994. In 1999, a temporary one-story modular accommodation building for 30 plus persons and an exterior transformer were placed to the east of the main accommodations building.

The Site was constructed on permafrost, and based on its history, the preservation of this layer was taken into account during construction. During construction, a layer of polyurethane (either 50 mm foam or pads) was installed, including 450 mm of compacted gravel, to act as a thermal barrier and prevent contamination of the underlying soils and groundwater.

#### 4.2.1 Spill History

Approximately 800,000 litres of water contaminated diesel fuel was unintentionally released from the tank farm in 1981 according to a search of the GNWT Hazardous Spills Database. Investigation suggests the spill was a result of vandalism/theft that occurred in the winter of 1980/1981, resulting in the spring release, which was reported to authorities on May 24, 1981. Released fluids overtopped

the berm, and due to Site topography, flowed towards the southwest, over the steep banks of the Site and onto the frozen Mackenzie River. Free fuel within the berm and camp area was collected and pumped into holding tanks, while residual fuel was collected using sorbent pads. Fuel that spilled onto the frozen river was also collected using the sorbent pads. These pads were incinerated in a Sacke Portable Burner over the 4 to 6-week clean-up period (WorleyParsons 2011).

### 4.3 Site Geology

Site geology is described in Section 3.2.2. Cross-section locations are included on Figure 2. Cross-sections showing the interpreted lithology of the Site are shown on Figures 3 and 4.

### 4.4 Project Summary

#### 4.4.1 Site Operations

The Site is currently inactive. The Site was previously utilized as a staging area for seismic and drilling operations. It has historically been used for camp facilities, and storage of equipment and fuel to support drilling operations.

Since 2009, Site activities have been limited to temporary and permanent closure activities, which included dismantling and removal of infrastructure, removal of stockpiled materials and consumables, assessment activities, decommissioning and remediation of the lagoon, and remediation of the gravel pad, and environmental monitoring.

#### 4.4.2 On-Site Facilities

In addition to the camp, the Site historically included the following facilities:

- a bermed tank farm with five tanks;
- a sewage lagoon;
- a fuel trailer;
- three storage sheds (Shed #1, Shed #2, and Shed #3);
- metal storage tanks;
- an emergency shelter; and
- a burn pit area containing an open top metal bin for incineration of construction debris.

The primary water related facilities at the Site included:

- water intake system;
- storage system – storage tank inside the crew accommodations;
- distribution system;
- water use facilities – toilets, sinks, shower and associated piping;
- gravity collection system;

- lift station tank and pump;
- primary treatment system;
- UV disinfection unit and chlorine dosing system;
- final transport tank, pump, and piping; and
- storage lagoon.

In 2009, some facilities at the Site were removed during temporary closure activities. This included dismantling and removal of camp support facilities that were either no longer required or no longer operational, removal of drilling materials and consumables, removal of fuel and fuel storage tanks that were no longer required, removal of construction materials, and removal of miscellaneous metals and piping. Materials that could be recycled, such as metals, were separated from debris and waste material for shipment to appropriate facilities. A more detailed account of temporary closure activities is provided in Section 7.

In 2013, the sewage lagoon was remediated, and water supply and sewage treatment facilities were demolished and removed. No water-related facilities remain at the Site.

In 2014, Site buildings including Shed #2, Shed #3, and the camp building (Figure 2) were disassembled and/or demolished. Materials stored on-site including scrap metal, cable wire, assorted hoses, assorted pieces of pipe, five gallon pails of nuts, bolts and screws, pieces of conduit, steel caps, pup joints, tarps, rolls of polyliner, absorbents, steel skis for sleighs, large drums of jet fuel and engine oil, and assorted chemicals in small quantities were packaged and removed from Site via barge.

In 2015, the tank farm consisting of five tanks was demolished and removed from Site via barge.

The following facilities currently exist at the Site:

- one storage shed (Shed #1); and
- an emergency shelter.

Shed #1 is scheduled to be dismantled and removed during the 2019 remediation program. Shell intends for the emergency shelter to remain at the Site following post-closure activities for use by local hunters and the community.

## 5 PERMANENT CLOSURE AND RECLAMATION

### 5.1 Definition

Permanent closure is defined in the Guideline as the final closure of a site with no foreseeable intent by the existing proponent to return to either active exploration or mining. Permanent closure indicates that the proponent intends to have no activity on the site aside from post-closure monitoring and potential contingency actions. Permanent closure does not, however, preclude the proponent or another party from pursuing opportunities at the existing site or in the area at a time beyond the foreseeable future.

### 5.2 Permanent Closure and Reclamation Requirements

Reclamation activities have been divided into the following components, based on the Guideline, and the specific purposes of this CRP:

- Water Management Systems – dismantling and reclamation of water related facilities.
- Infrastructure, Buildings, and Equipment – dismantling and removal of camp facilities, supplies, and equipment.
- Contaminated Soil (and Water) – remediation of soil and water impacts.
- Gravel Pad and Surrounding Land – reclamation of the lands associated with Camp Farewell.

#### 5.2.1 Water Management Systems

##### 5.2.1.1 Component Description

A summary of historical water related facilities at the Site is provided in Section 4.4.2. Water related facilities were decommissioned and removed during the 2013 remediation program. There are no water management systems remaining on-site.

##### 5.2.1.2 Closure Objectives and Criteria

The objective of permanent closure activities associated with water management systems was the dismantling and removal of water related facilities at the Site. Water related facilities include infrastructure related to water collection, distribution, use, treatment and disposal.

Efforts were made to re-use and recycle materials, however, due to the condition of the facilities the majority of materials were packaged and removed from the Site for disposal at an appropriate facility.

The criteria applied to the remediation of the sewage lagoon is described in Section 5.2.3.2.

##### 5.2.1.3 Consideration of Closure Options and Selection of Closure Activities

The selected option for this closure activity was dismantling and removal of facilities, excavation and remediation/disposal of impacted materials, backfilling of the excavation with clean fill material sourced from other areas on-site, and natural revegetation of the disturbed area.

#### 5.2.1.4 Engineering Work Associated with Selected Closure Activity

##### Summary of Work Completed to Date

The removal of on-site water management facilities was conducted in 2013 and included decommissioning (dismantling and removal) of the water related facilities and excavation of lagoon sediments following the decommissioning (dewatering and remediation) of the lagoon.

The dismantling and decommissioning activities included the following:

- Facilities related to the collection, transfer, and treatment of water were packaged and removed for disposal.
- The sewage lagoon was remediated and backfilled with clean soil material.
- Metal and piping materials were segregated and transported south for recycling or disposal.

Remedial activities conducted during the 2013 program are summarized in Section 5.2.3.4.

##### Future Work

Work associated with the closure of on-site water management systems has been completed and no future work is required.

#### 5.2.2 Infrastructure, Buildings and Equipment

##### 5.2.2.1 Component Description

A summary of historical and existing infrastructure at the Site is described in Section 4.4.2, and select former infrastructure is shown on Figure 2.

##### 5.2.2.2 Closure Objectives and Criteria

The objective of permanent closure activities associated with on-site infrastructure, buildings, and equipment is the removal of facilities, consumable materials, and equipment existing at the Site.

##### 5.2.2.3 Consideration of Closure Options and Selection of Closure Activities

During consultation sessions for previous programs, HTC and community members expressed a desire for Shell to leave the emergency shelter intact, so that it would remain available for use by locals (e.g. as emergency shelter during a hunting expedition). Shell has agreed to leave the emergency shelter in place, pending regulator approval. To this end, Shell performed maintenance on the emergency shelter in 2018. Maintenance activities included repairs to the roof and exhaust for the wood burning stove.

#### 5.2.2.4 Engineering Work Associated with Selected Closure Activity

##### Summary of Work Completed to Date

The removal of infrastructure was initiated in 2013 with the demolition and removal of the water treatment facilities, as described in Section 5.2.1.4. Further removal of infrastructure was conducted

in 2014 with the demolition of the camp building and the dismantling and removal of the Shed #2 and Shed #3 buildings. This also included the removal of various materials that were stored on-site. In 2015, the tank farm was demolished and also removed from Site. Currently the emergency shelter and Shed #1 building are the only remaining infrastructure at the Site. The dismantling and decommissioning of Site infrastructure included the following:

- Drilling materials (pipes, rig mats, etc.) that were still in sufficient condition were sold for re-use and/or transported south. Drilling materials that were no longer salvageable were transferred to appropriate facilities for recycling or disposal.
- Fuel storage was minimized to what was required for future remedial operations. Usable fuel was transferred to Inuvik for reuse and the excess storage tanks were transported vis barge for recycling or disposal.
- Miscellaneous materials (construction materials) were salvaged for resale and re-use where possible. Unsalvageable materials were transported via barge for recycling or disposal.
- The camp facilities were built in 1985, resulting in a low risk of mercury switches, asbestos and lead paint; however, a comprehensive survey for the potential of these hazardous materials was conducted. No hazardous materials were identified. Due to the age and condition of the facilities, there was little salvage value. The facilities were removed from the Site and recycled or disposed of at an appropriate facility.
- Metal and piping materials were segregated. Materials in good condition were sold for re-use, while the remaining material was shipped south for recycling.
- Scrap metal from the tank farm was shipped south for recycling.

Efforts have been made to re-use and recycle materials where practical and possible.

## Future Work

As stated in Section 4.4.2, Shed #1 is scheduled to be dismantled and removed during the 2019 remediation program. Shell intends for the emergency shelter to remain at the Site following post-closure activities for use by local hunters and the community.

### 5.2.3 Contaminated Soil and Water

#### 5.2.3.1 Component Description

Environmental Site Assessments (ESAs) conducted at the Site included a Baseline Environmental Assessment conducted in 2000, Phase I and II ESAs conducted in 2001, a second Phase II ESA conducted in 2006, and a soil assessment conducted in 2015. These assessments have identified multiple areas of environmental concern at the Site. Impacted soils and groundwater have been identified in association with the historical fuel spill, various storage areas across the Site, the burn pit, and the sewage lagoon. The 2015 soil assessment horizontally and vertically delineated the remaining PHC-affected soils on-site and was the basis for formulating the final remediation plan for the Site (IEG 2016).

### 5.2.3.2 Closure Objectives and Criteria

The objective for this closure activity is to remediate the impacted soil at the Site and confirm that the soil and groundwater at the Site meet the applicable guidelines detailed below.

The guidelines for organic and inorganic parameters in soil, sediment and water are provided by the Canadian Council of Ministers of the Environment (CCME), *Canadian Environmental Quality Guidelines* (CEQG), 1999 (with updates). The CCME CEQG provides guidelines for four primary land uses; “Agricultural”, “Residential/Parkland”, “Commercial”, and “Industrial”, and two soil types; “Fine” and “Coarse” grained soil, defined as having a median grain size of <75 µm or >75 µm, respectively (CCME 2006).

Guidelines for salinity, trace metals, PHC, and polycyclic aromatic hydrocarbon (PAH) parameters in soil are provided by the *Canada-Wide Standards for Petroleum Hydrocarbons (PHC CWS) in Soil* (CCME 2008), as well as by the *Environmental Guideline for Contaminated Site Remediation* (GNWT 2003). The GNWT Contaminated Site Remediation (CSR) guideline defines the same land uses and soil textures as CCME CEQG (GNWT 2003). The GNWT CSR further identifies guidelines for surface soil (0 m to 1.5 m depth) and subsoil (>1.5 m depth), as well as site-specific pathways that apply to PHCs F1 to F4 in soil, including “soil ingestion”, “nutrient cycling”, and “ecological soil contact”, among others.

#### Site-Specific Risk Assessment

Risk assessment is a remediation strategy implemented at appropriate sites as an alternative to physical remediation. Risk assessment directly evaluates whether impacted materials in situ pose a risk to existing receptors in a given environment.

A Screening Level Risk Assessment for the soils at Site was conducted by GatePost Risk Analysis (GPRA) in January 2017 (GPRA 2017). Subsequent to that assessment, GPRA was retained by Shell to conduct a Site-Specific Risk Assessment (SSRA) for the Site to provide further quantitative support for a risk-based approach to the planned remediation activities at the Site.

The SSRA calculated the hazard quotients and incremental lifetime cancer risk for relevant ecological receptors that may use the Site. Additionally, the SSRA calculated risk-based concentrations for the identified contaminants of potential concern (COPC), which included benzene, toluene, ethylbenzene, and xylenes (BTEX) and PHC fractions F1 to F3. The SSRA then established the maximum threshold concentrations of the COPCs that can be considered safe for each of the ecological receptors that could have either direct or dietary exposure to invertebrates and plants on the Site, or to soil ingested incidentally during foraging (GPRA 2018).

The SSRA concluded that human and wildlife receptors using the Site are at very low or no risk of adverse effects. The SSRA also concluded that removal of material below 0.6 m bgs is not required to reduce risks below acceptable levels but recommended that maximum concentration “hotspots” of PHC fractions in the subsurface soil should be removed to avoid future condensation to liquid phase. The SSRA concluded that a 5000 mg/kg management limit for PHC fractions F1 to F3 in subsurface soil (≥0.6 m bgs) is considered to be adequate to achieve this goal (GPRA 2018).

## Soil Quality Criteria

Based on the land use of the Site and the surrounding properties, the analytical results for BTEX in surface soil are compared to the “Residential/Parkland” soil guidelines found in the GNWT *Environmental Guideline for Affected Site Remediation* (GNWT 2003).

The analytical results for PHC fractions F1 (C<sub>6</sub>-C<sub>10</sub>), F2 (C<sub>10</sub>-C<sub>16</sub>), F3 (C<sub>16</sub>-C<sub>34</sub>) and F4 (C<sub>34</sub>-C<sub>50</sub>) in surface soil are compared to the GNWT guidelines for coarse-textured surface soil (0 m to 1.5 m). The limiting exposure pathways are “protection of groundwater for aquatic life” and “ecological soil contact”. Although the Mackenzie River is generally at a distance greater than 10 m from the delineated excavation zones at the Site, the “protection of groundwater for aquatic life” pathway was not eliminated in order to apply a more conservative remediation approach that would be consistent with previous remediation activities conducted at the Site. However, GPRA (2018) does present the elimination of this exposure pathway as part of the SSRA, and this will be considered in future remediation activities. The “protection of potable groundwater” pathway is excluded based on the depth of permafrost in the region.

Based on the recommendations of the SSRA, a criteria of 5000 mg/kg PHC F1 to F3 total is applied for subsurface soil (<0.6 m bgs).

A summary of the applicable guidelines and limiting pathways for surface and subsurface soils at the Site are provided in Table 5.1.

**Table 5.1 Applicable Assessment Guidelines and Exposure Pathways for Soil at the Site**

Parameter	Guideline (mg/kg)	Land Use/Grain Size/Limiting Pathway
<b>Surface Soil (&lt;0.6 m bgs)</b>		
Benzene	0.5	Residential/Parkland
Toluene	0.8	Residential/Parkland
Ethylbenzene	1.2	Residential/Parkland
Xylenes	1	Residential/Parkland
F1	130	Residential, Coarse-Grained, Ecological Soil Contact
F2	150	Residential, Coarse-Grained, Protection of Groundwater for Aquatic Life
F3	400	Residential, Coarse-Grained, Ecological Soil Contact
F4	280	Residential, Coarse-Grained, Ecological Soil Contact
<b>Subsurface Soil (≥0.6 m bgs)</b>		
F1-F3 total	5000	Proposed SSRA Criteria

## Groundwater Quality Criteria

Based on the soil assessment program completed by IEG in 2015, groundwater analytical results are compared to the CEQG (CCME 2007) for freshwater aquatic life. Groundwater results will continue to be compared to the CEQG as part of the CRP.

### 5.2.3.3 Consideration of Closure Options and Selection of Closure Activities

Due to the remote site location, there are limited options for remediation at the Site. The closure options and selected activities for the remediation of the gravel pad, surrounding lands, and groundwater are described below.



## Gravel Pad

Impacted gravel and soils may be treated in one of two ways:

- on-site treatment of hydrocarbon impacted material and reuse as backfill; or
- excavation, transportation, and disposal of materials at an appropriate off-site landfill facility.

The selection of these options is dependent on the type of impact (e.g. chloride contamination reduces treatability); however, the preferred option is to treat and reuse impacted soils/gravels for similar purposes at the Site, as gravel and backfill material is a limited resource in the Mackenzie Delta region.

## Surrounding Lands

As part of the implementation of the 2009 Interim Abandonment and Restoration Program outlined by WorleyParsons, an assessment of the soil quality, soil invertebrates and vegetation health of the tundra surrounding and including the historical spill area was conducted. Differences were not identified between the surrounding tundra and the fuel spill site related to vegetation health, or invertebrate population or relative abundance (WorleyParsons 2011).

WorleyParsons (2011) has also indicated that natural attenuation of PHCs is occurring in impacted soils associated with the historical fuel spill. Due to these findings, Shell does not plan to actively remediate off-site impacts associated with the historical fuel spill. The disturbance required for active remediation would be damaging to the land and is not warranted considering the lack of adverse effect on environmental receptors. Continued monitoring of the natural attenuation of PHCs in off-site soils is recommended.

## Groundwater

As stated in Section 3.3, the most recent groundwater monitoring programs at the Site have shown elevated concentrations of total dissolved solids (TDS) and several dissolved metals in one or more piezometers, as well as a naphthalene concentration exceeding the applicable guideline in the piezometer located south of the historical burn pit. Active groundwater remediation has not been deemed necessary for the Site.

As part of the post-closure monitoring program, the groundwater monitoring network will be updated by decommissioning, repairing, or replacing existing piezometers, as required. Piezometers will be monitored and sampled to assess the effectiveness of remediation activities and monitor groundwater quality at the Site. Groundwater monitoring as part of post-closure maintenance is further described in Section 5.5.1.

### 5.2.3.4 Engineering Work Associated with Selected Closure Activity

Remediation work associated with permanent closure began in 2013 with the remediation of the sewage lagoon. In 2015, IEG conducted a soil assessment in order to delineate the remaining PHC-affected soils on-site and formulate a remedial action plan for the Site (IEG 2016). The remedial activities were refined based on the new data and continued in 2016 and 2018. Details of the

remedial activities conducted to date are summarized below, along with plans for future remediation work.

## Summary of Work Completed to Date

### 2013 Remediation Program

The objective of the 2013 remediation program was to excavate and remove impacted material from the sewage lagoon. Remedial excavation activities were conducted from July 15, 2013 to August 18, 2013. The lagoon excavation was located on the west side of the camp building on the west side of the Site (Figure 2). The dimensions of the excavation were approximately 52 m by 34 m. The maximum depth of the excavation was approximately 7.5 m. Prior to remedial activities, the lagoon had a depth of approximately 2.5 m. Domestic waste debris was observed in the excavated material, including metal cans and fragments, and plastic debris.

PHC-affected soil resulting from previous operations was effectively removed from the lagoon area during the 2013 remediation program based on laboratory analytical data. Approximately 1,900 m<sup>3</sup> of excavated soil was barged to Hay River and hauled to and disposed of at the Tervita Rainbow Lake Landfill in Rainbow Lake, AB. Approximately 100 m<sup>3</sup> was stored on-site over winter in a secured metal shed and was barged to the landfill during the 2014 decommissioning activities.

Following remediation activities, the lagoon was backfilled with clean material from on-site sources, which was compacted and mounded to account for settling of the backfill material.

### 2015 Soil Assessment

In 2015, IEG conducted a soil assessment program at the Site to assess subsurface conditions in preparation for remedial activities in 2016. Assessment activities included advancement of 124 boreholes and collection of groundwater samples from the existing piezometers on-site. The Site was divided into areas of investigation based on the infrastructure previously and/or currently present.

Soil samples collected within each area were analyzed for some or all of the following parameters: detailed salinity parameters, trace metals, PHCs, and PAHs. Groundwater samples from piezometers were analyzed for one or more of the following parameters: routine potability parameters, dissolved metals, PHCs, and PAHs. Key findings of the 2015 program were as follows:

- Reported parameter concentrations for background soil samples were below the GNWT guideline for each parameter analyzed in 2015.
- pH values were reported below the guideline range in 56 soil samples collected from various locations across the extent of the Site.
- EC values above the GNWT guideline were observed in three soil samples collected from one borehole in the airstrip. True total barium soil concentrations were reported above the applicable guideline in three samples collected from one borehole in the burn pit area, one borehole inside shed #1, and one borehole in the laydown/storage area.
- Concentrations of BTEX and PHC fractions F1-F3 exceeded the GNWT guideline in soil samples collected from multiple boreholes across the Site.

- The concentration of PHC fraction F4 exceeded the GNWT guideline in one sample collected from the burn pit area.
- Reported PAH concentrations were less than the GNWT guidelines in all soil samples submitted for analysis.
- Groundwater samples collected from two piezometers showed TDS concentrations that exceeded the GNWT guideline. Groundwater samples collected from four piezometers contained concentrations of aluminum, cadmium, copper, iron, and selenium that exceeded the GNWT guidelines. One groundwater sample contained a concentration of naphthalene that exceeded the GNWT guideline.

### 2016 Remediation Program

Remedial activities continued in 2016 based on the results reported in the 2015 IEG soil assessment. The 2016 remediation program included the excavation, treatment, risk-based assessment, and backfilling of the impacted soil on-site. The main portion of the Site (excluding the airstrip) was divided into a grid consisting of 22 quadrants. A total of approximately 24,000 m<sup>3</sup> of soil was excavated from seven quadrants and windrowed on-site for treatment with an Allu bucket. Approximately 10,000 m<sup>3</sup> was successfully treated on-site and used as backfill. Approximately 14,000 m<sup>3</sup> of soil did not meet the GNWT guidelines following soil treatment activities. This material was used to fully or partially backfill five quadrants, with the intention of re-excavating the material and continuing treatment in subsequent remediation programs.

### 2018 Remediation Program

During the 2018 remediation program, portions of 19 of the 22 quadrants were excavated and windrowed on-site for treatment with an Allu bucket. Soil was excavated to a minimum depth of 0.6 m bgs or until permafrost was encountered. Soil samples were collected from the windrows of excavated soil to determine the concentrations of residual hydrocarbons and monitor the success of the on-site treatment. Soil samples were also collected from the base of the excavation to confirm that soils left in place below 0.6 m bgs were less than the proposed SSRA criteria of 5000 mg/kg F1-F3 total prior to backfilling. At the completion of the 2018 program there was one excavation base sample that exceeded the proposed SSRA criteria, and this area will be further addressed in 2019.

A total of approximately 30,000 m<sup>3</sup> of surface soil was excavated and treated during the 2018 Remediation Program. Analytical data collected during the remediation program have indicated that residual soil hydrocarbon concentrations have been reduced as a result of the Allu Bucket treatment. While there was an overall reduction in concentrations of PHCs, most of treated surface soil did not meet the GNWT guidelines at the end of the 2018 remediation program. Excavated and treated soil was backfilled into the excavated areas at the Site and contoured to avoid leaving an open excavation hazard. The excavation extents were recorded with a hand-held Trimble Geographic Positioning System (GPS).

### **Future Work**

Further treatment of soil containing residual hydrocarbons will be conducted during the 2019 remediation program.

## 5.2.4 Gravel Pad and Surrounding Lands

### 5.2.4.1 Component Description

Reclamation and revegetation plans are based on the entire Camp Farewell Site rather than individual components. A comprehensive understanding of natural northern conditions is required to restore the Site to a level compatible with the surrounding undisturbed land. The soils of the Mackenzie Delta are subject to extreme conditions, by way of thawing and freezing cycles. These cycles can result in reduced soil stability and depressions.

### 5.2.4.2 Closure Objectives and Criteria

The objective of permanent closure activities associated with the gravel pad and surrounding lands is the reclamation and revegetation of the Site. The goals of reclamation are to return the Site to a state comparable with original conditions and to prevent or minimize any adverse effects on the environment or threats to human health and safety.

The *Mine Site Reclamation Policy for the Northwest Territories* (INAC 2002) is the regulatory driver from which the reclamation plan was developed.

### 5.2.4.3 Consideration of Closure Options and Selection of Closure Activities

The current reclamation plan involves removing polyurethane foam and buried debris/waste from the Site, grading the Site to match surrounding topography, and revegetation of the Site.

As this plan is contingent on the availability of clean fill material, previous iterations of this CRP have included the option of a designed wetland/water body, in the event of there being insufficient clean soil on-Site post-remediation activities. As the current remediation plan is to treat the remaining impacted soil on Site (rather than removal and disposal), a contingency for a land use altering reclamation plan is no longer required and has been removed from this CRP.

### 5.2.4.4 Engineering Work Associated with Selected Closure Activity

#### Summary of Work Completed to Date

Removal and disposal of the polyurethane and buried debris/waste was conducted during each of the remediation programs conducted at the Site. One of the objectives of the 2018 remediation program was to excavate and remove all polyurethane foam and waste encountered within the planned excavation extents of the Site. To this end, excavation at the Site continued laterally until the extents of the polyurethane foam were determined and the encountered foam was removed. Waste materials uncovered during excavation activities (i.e. polyurethane foam and miscellaneous debris) were placed into 1 m<sup>3</sup> soil bags for appropriate offsite disposal. At the end of the program, soil bags were placed in Shed #1 for winter storage because due to weather conditions and barge availability it was not possible to remove the materials from the Site at the end of the program.

The polyurethane foam extending to the top of bank along the southern edge of the Site was not excavated in 2018 and will remain undisturbed by future remediation activities. During the 2018 remediation program, it was determined that the benefits of removing the foam were outweighed by

the potentially damaging effects of vegetation removal and increased risk of erosion along the river bank. This approach was approved on-site by a GNWT Department of Lands Inspector. Shell proposes to conduct shoreline monitoring and clean-up any foam that may be exposed by erosion along the bank during the post-closure monitoring programs for a period of five years.

### Future Work

The current reclamation plan includes:

- grading the area to match surrounding topography;
- reducing soil compaction and enhancing micro-topography via 'ripping and scarifying' activities; and
- assisting revegetation with appropriate species and amendments, as required.

If excess gravel is identified on-Site, it may be beneficial for re-use, as gravel is scarce in the area.

Revegetation is expected to occur by natural seeding and propagation of native species from the surrounding land, which will be promoted by scarification of the gravel pad. Voluntary natural revegetation has been successful on the adjacent airstrip.

While an active revegetation program is not planned, natural vegetation may be supplemented with application of amendments (fertilizer) and/or a native seed mixture, where appropriate. The final revegetation plan will be developed with assistance from the local Government Land Use Inspector. The goals of the revegetation plan would be to:

- help stabilize the soil on-Site;
- provide a habitat equivalent to the surrounding lands;
- allow the natural succession of native vegetation and therefore minimize additional maintenance; and
- provide consistent vegetation across the entire area by utilizing an appropriate seed mix, if required.

The polyurethane foam recovered during the 2018 remediation program will be removed from the Site and disposed of at an appropriate facility in 2019. The other waste was separated from the polyurethane foam and will also be removed from the Site and transferred to an appropriate facility in 2019.

### 5.3 Predicted Residual Effects

Following completion of permanent closure activities, site-specific conditions will be assessed to verify that the Site has been reclaimed to a state that meets the closure objectives outlined in the previous sections. It will be confirmed that the Site has been reclaimed in a manner that is consistent with current licenses and permits, and that is protective of human health and the environment. Though not expected, potential remaining risks will be identified and addressed as required.

## 5.4 Uncertainties

Previous environmental assessments have summarized the level of investigation completed to date and have established the current understanding of the Site conditions. Additional site assessments may be conducted as remediation and permanent closure activities occur. Following additional assessment activities, further remediation requirements may be identified resulting in uncertainties. Any discovered uncertainties regarding the permanent closure activities will be assessed and reasonable and practicable efforts will be made to mitigate or minimize their impacts on the permanent closure plan until final reclamation activities are completed.

## 5.5 Post-Closure Monitoring, Maintenance, and Reporting

### 5.5.1 Monitoring and Maintenance Program

Following permanent closure activities, Site inspections will be conducted on an annual basis for a minimum of five years or until vegetation is well established and permanent closure of the Site is accepted. Inspections will focus on the stability and health of the reclaimed area. The growth status of both desirable and non-desirable species will be documented. Unusual soil conditions (i.e. erosion, bare areas, etc.) will be identified and addressed.

Soil and vegetation quality will be assessed in areas that were previously identified as areas of concern, as well as areas surrounding the gravel pad. Soil samples may be submitted for laboratory analysis, and vegetation will be monitored for signs of stress or scarcity.

Site inspections will also include visual inspection for signs of:

- invasive species colonies;
- permafrost degradation;
- presence of polyurethane foam eroding from the river bank edge;
- development of depressions or subsidence;
- unfavorable run-off patterns or surface erosion; and
- river bank instability (e.g. slumping, channeling, erosion).

If deficiencies are identified during an annual inspection, mitigation measures may be developed to address the issues. A follow-up inspection will be conducted after the deficiencies have been corrected. The Site will be maintained, as required, until reclamation is considered complete and sustainable (i.e. the closure criteria for each project component has been satisfied and ongoing maintenance is no longer required).

Soil and groundwater monitoring should be included in the post-closure monitoring programs at the first, second, and fifth years following completion of permanent closure activities.

Each groundwater sample should be analyzed for the following parameters:

- BTEX, PHC F1-F4 hydrocarbon fractions;
- routine water chemistry parameters; and
- total nitrogen (in addition to nitrogen included in routine parameters).

Total nitrogen is included in the groundwater monitoring schedule in order to assess for potential effects of biodegradation of the polyurethane foam layer. As part of the Interim Abandonment and Restoration Plan submitted in 2011, WorleyParsons assessed the potential for biodegradation of the polyurethane that makes up the foam urethane layer installed at the Site. The assessment concluded that the foam is not susceptible to degradation and that if degradation does occur, the by-products are not particularly soluble. Nitrogen is a potential by-product of the degradation of the polyurethane foam (WorleyParsons 2011) and will be used as an indicator parameter for this process.

Parameters that should be analyzed for soil samples will be based on COPCs previously identified and may include some or all of the following:

- BTEX, PHC F1-F4 hydrocarbon fractions;
- detailed soil salinity; pH, electrical conductivity (EC), sodium adsorption ratio (SAR), soluble anions and cations;
- total metals (CCME metals); and
- PAHs.

### 5.5.2 Reporting Program

Post-Closure Monitoring Reports will be created and submitted to the applicable authorities as post-closure monitoring activities occur. Annual inspections and monitoring will be summarized and submitted in annual reports.

## 5.6 Contingencies

Should future assessments result in information that differs from that used in the development of this plan, additional planning will be conducted to address any issues that arise.

## **6 PROGRESSIVE RECLAMATION**

### **6.1 Definition**

Progressive reclamation takes place prior to permanent closure to reclaim components and/or decommission facilities that no longer serve a purpose. These activities can be completed during operations with the available resources to reduce future reclamation costs, minimize the duration of environmental exposure, and enhance environmental protection. Progressive reclamation may shorten the time required for achieving the closure objectives and may provide valuable experience on the effectiveness of certain measures that may be implemented during permanent closure.

### **6.2 Opportunities for Progressive Reclamation**

Progressive reclamation includes the activities undertaken during operation to assist in the subsequent reclamation activities upon closure. This does not apply to the Camp Farewell Site.



## **7 TEMPORARY CLOSURE**

### **7.1 Temporary Closure Goal and Closure Objectives**

A temporary closure program was conducted in 2009. Please see previous versions of this report and WorleyParsons (2010) for a detailed description of the goals and closure objectives of the temporary closure program.

### **7.2 Temporary Closure Activities**

Please see previous versions of this report and WorleyParsons (2010) for a detailed description of activities associated with the temporary closure program.

### **7.3 Temporary Closure Monitoring, Maintenance, and Reporting**

The results of the 2009 temporary closure program were reported in WorleyParsons (2010).

Additional monitoring, maintenance, and reporting related to temporary closure is not required at this time as the activities associated with the temporary closure of the Site have been completed.

### **7.4 Temporary Closure Contingency Program**

A contingency program is not required at this time as the activities associated with the temporary closure of the Site have been completed.

### **7.5 Temporary Closure Schedule**

The temporary closure schedule has been completed.

## 8 INTEGRATED SCHEDULE OF ACTIVITIES

Final Permanent Closure activities are scheduled for Summer 2019 and will include remediation of the gravel pad and the dismantling and removal of the Shed #1 building. Post-closure monitoring is scheduled to begin in 2020 and will follow the schedule proposed in Section 5.5.1.

## 9 POST-CLOSURE SITE ASSESSMENT

Post-closure monitoring will be conducted as described in Section 5.5.1. A final post-closure site assessment will be conducted to document the completion of permanent closure activities prior to requesting final closure of the Site.

## 10 FINANCIAL SECURITY

Shell has posted financial security for Camp Farewell, in the form of a letter of credit, totaling \$2 million as required by the IWB (renewal of Water Licence N7L1-1834). As there have been no changes to the planned closure activities and schedule, Shell does not propose any changes to the security estimate and deposit held by the regulator.

## 11 CLARIFICATIONS OF THIS REPORT

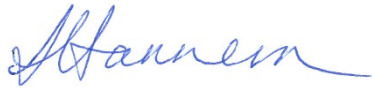
This report is an instrument of service of IEG Consultants Ltd. The report has been prepared for the exclusive use of Shell Canada Energy (Client) and the Inuvialuit Water Board for the specific application to the Camp Farewell site. The report's contents may not be relied upon by any other party without the express written permission of IEG Consultants Ltd. In this report, IEG Consultants Ltd. has endeavoured to comply with generally-accepted professional practice common to the local area. IEG Consultants Ltd. makes no warranty, express or implied.

The conclusions in this report are based on IEG Consultants Ltd.'s observations of existing site conditions and interpretations of site history and site usage information that were made available to IEG Consultants Ltd. IEG Consultants Ltd. assumes that information or data provided by the Client and by third parties are factual, complete and accurate. Conclusions about site conditions under no circumstances comprise a warranty that conditions in all areas within the site and beneath structures are of the same quality as those inferred from observable site conditions and readily available site history.

## 12 CLOSING

If you have any questions or comments regarding the above information, please contact Kyle Schepanow at (403) 648-4292.

### IEG CONSULTANTS LTD.



Stephanie Hannem, P.Ag.  
Environmental Scientist



Kyle Schepanow, M.Sc., P.Geo.  
Senior Hydrogeologist

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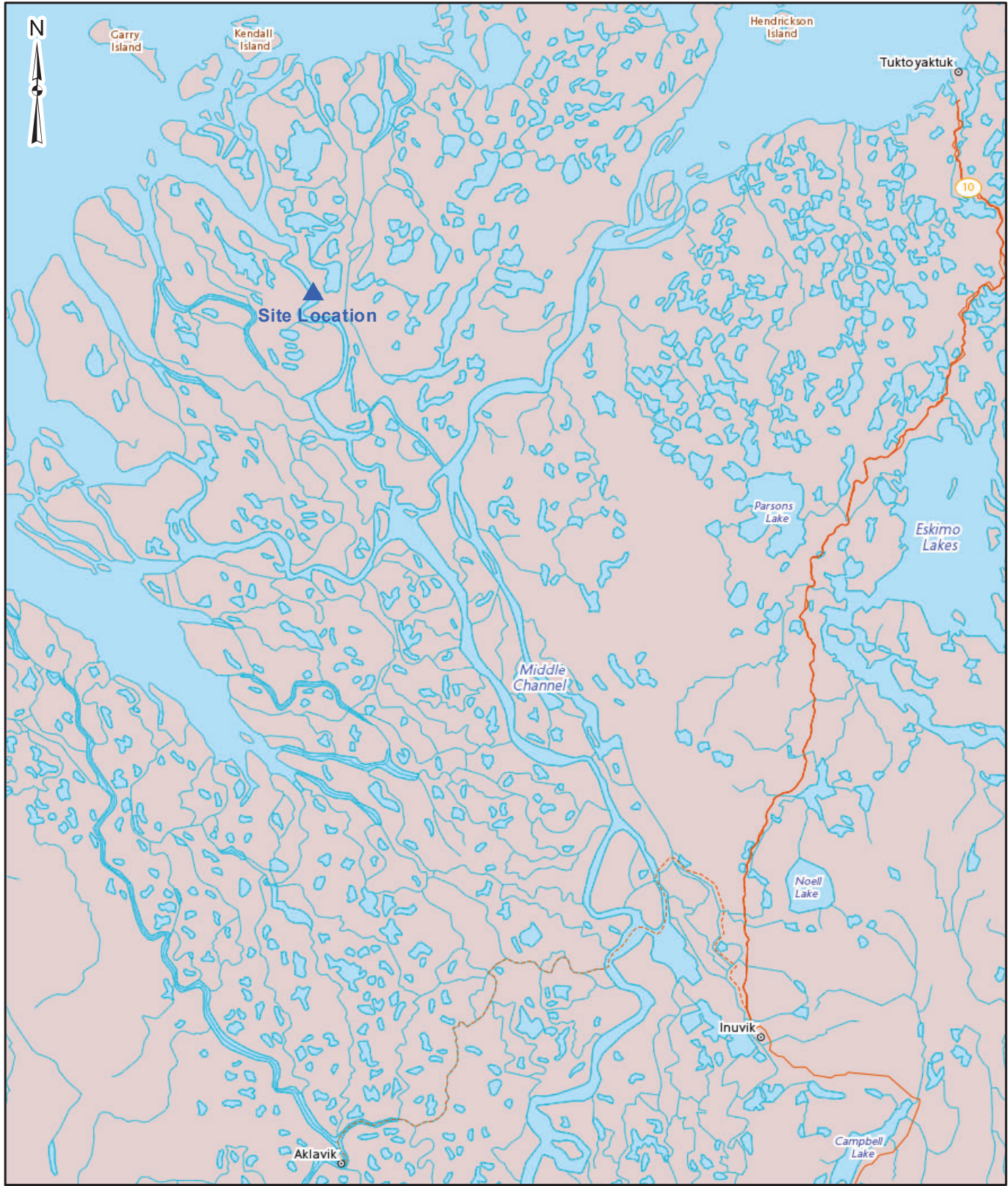
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## FIGURES

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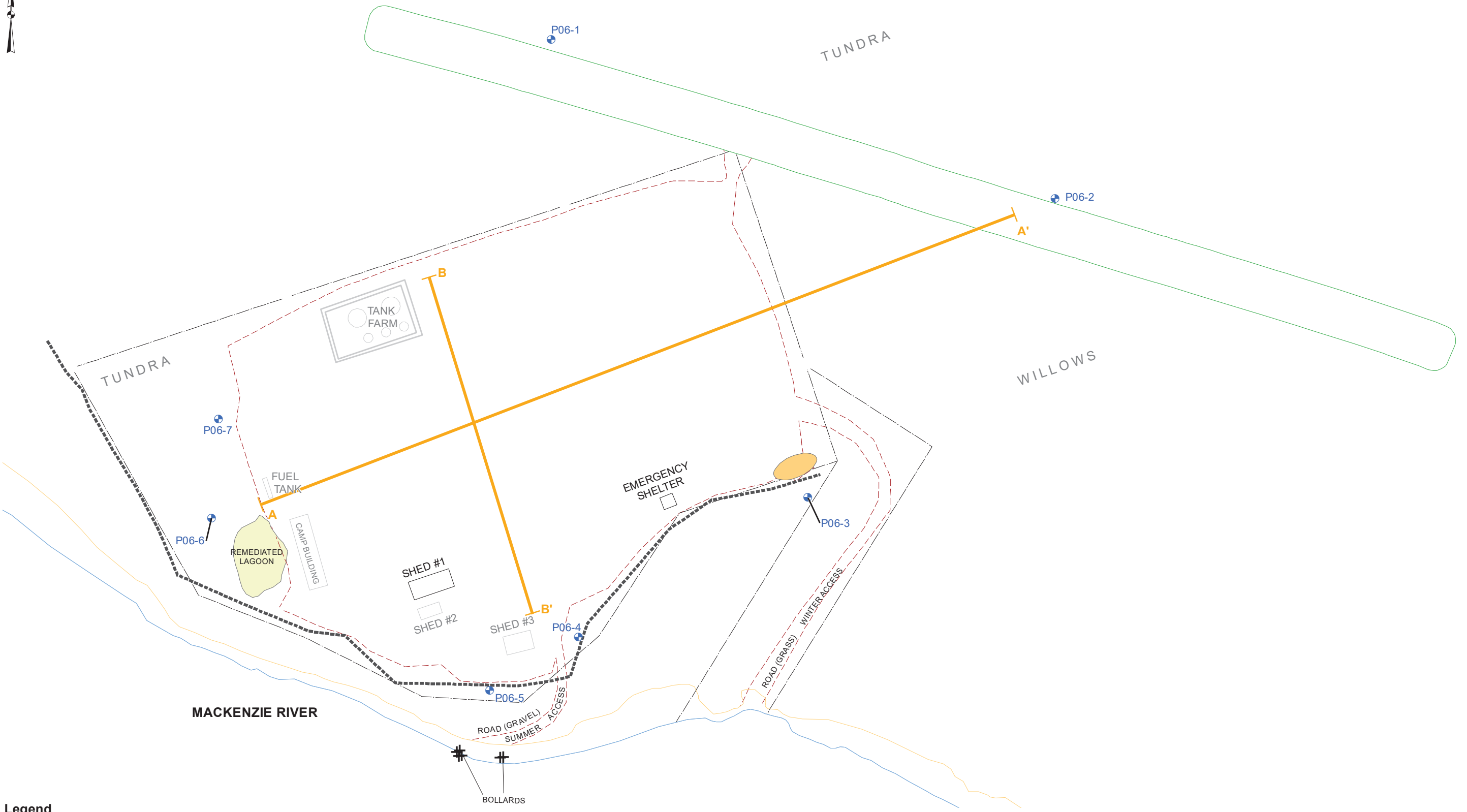
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<b>NOTES:</b> 1. HORIZONTAL DATUM: NAD83 2. GRID ZONE: UTM Zone 8N 3. IMAGE SOURCE: The Toporama Web Map Service, <a href="http://wms.ess-ws.nrcan.gc.ca/wms/toporama_en">http://wms.ess-ws.nrcan.gc.ca/wms/toporama_en</a> , Government of Canada, Natural Resources Canada, Earth Sciences Sector
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CLIENT  <b>Shell Canada Energy</b>


PROJECT Camp Farewell Closure and Reclamation Plan		
TITLE Site Location Map		
SCALE 1:700,000	PROJECT No. A04012A11	FIG No. 1

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**Legend**

- Piezometer
- Boundary
- Edge of Gravel
- River
- Sand
- Top of Bank
- Cross-section Locations
- Former Aboveground Storage Tank
- Airstrip
- Former Burn Pit
- Existing Infrastructure
- Removed infrastructure

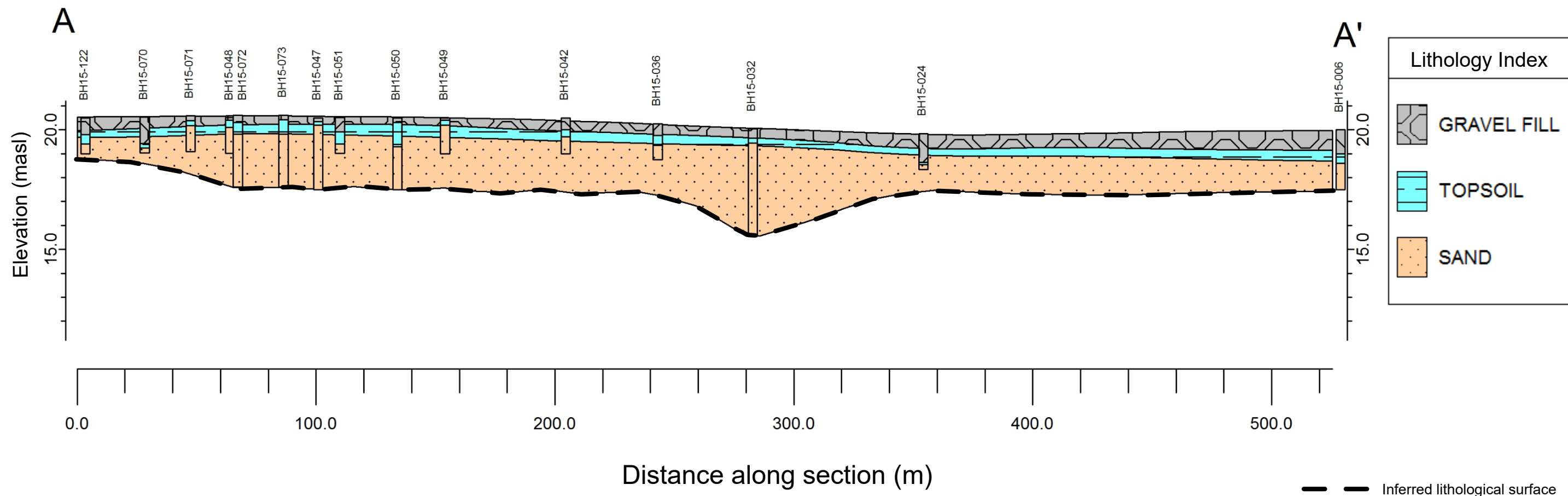


NOTES:  
 1. HORIZONTAL DATUM: NAD83  
 2. GRID ZONE: UTM Zone 8N  
 3. SOURCE: Site survey plan prepared for Shell Canada Limited by Inukshuk Geomatics Inc.; original scale 1:2,000.



PROJECT Camp Farewell Closure and Reclamation Plan		
TITLE Site Plan		
SCALE 1:2,500	PROJECT No. A04012A11	FIG No. 2

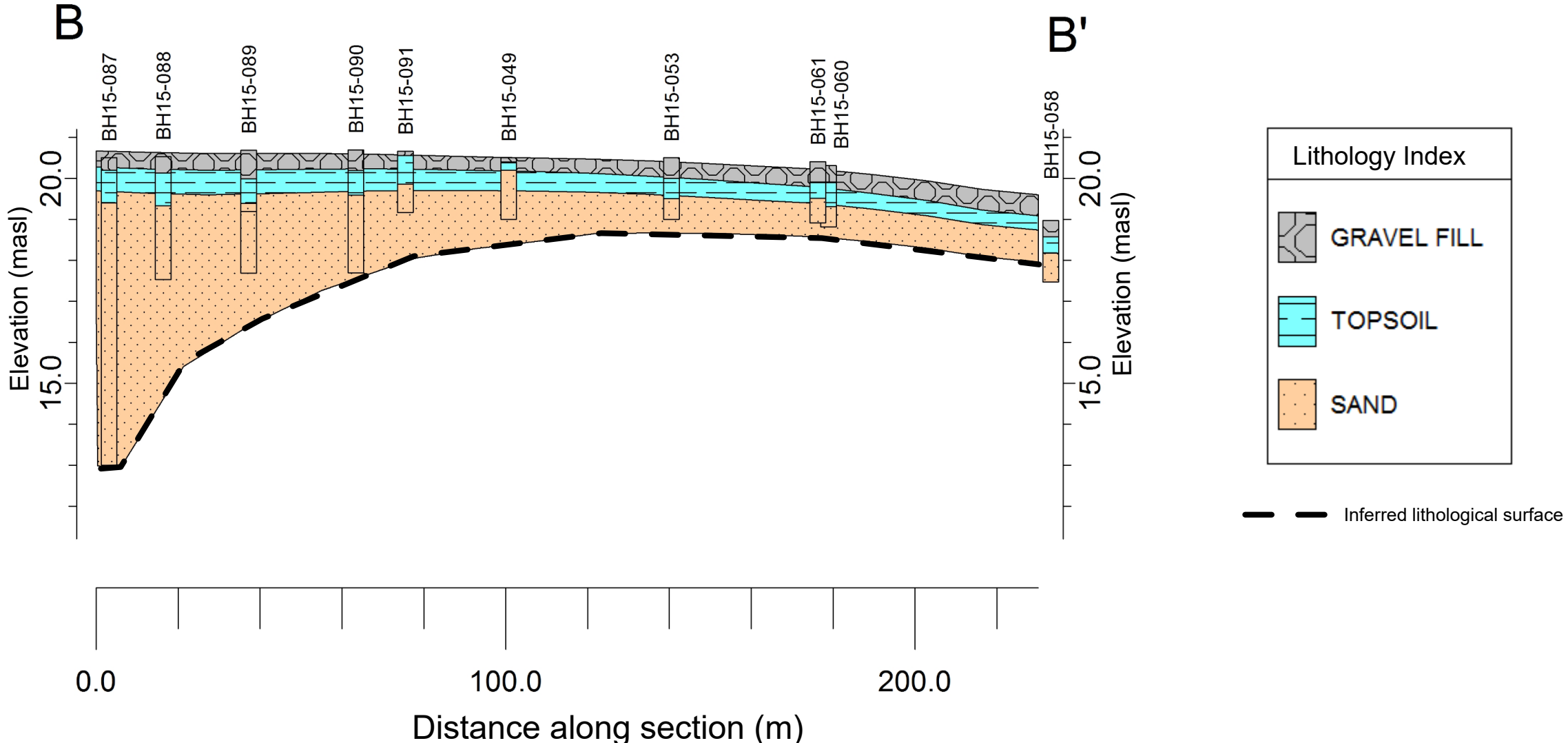
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<b>NOTES</b> 1. Vertical Exaggeration = 10x	<b>CLIENT</b> 	<b>PROJECT</b> Camp Farewell Closure and Reclamation Plan
		<b>TITLE</b> Cross Section A-A'
<b>SCALE</b> -	<b>PROJECT No.</b> A04012A11	<b>FIG. No.</b> 3

# Cross-Section B-B'



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<b>NOTES</b> 1. Vertical Exaggeration = 10x	<b>CLIENT</b> 	<b>PROJECT</b> Camp Farewell Closure and Reclamation Plan	
		<b>TITLE</b> Cross Section B-B'	
<b>SCALE</b> -	<b>PROJECT No.</b> A04012A11	<b>FIG. No.</b> 4	

# APPENDIX I

## Glossary of Terms and Definitions

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## Appendix I

### Glossary of Terms and Definitions

#### I-1 DEFINITION OF TERMS

The following list of terms are used throughout the Closure and Reclamation Plan:

**Abandonment:** The permanent dismantlement of a facility so it is incapable of its intended use. This includes the removal of associated equipment and structures.

**Active layer:** The layer of ground above the permafrost which thaws and freezes annually.

**Backfill:** Material excavated from a site and reused for filling the surface or underground void created by mining or excavating.

**Background:** An area near the site under evaluation not influenced by chemicals released from the site, or other impacts created by on-site activity.

**Berm:** A mound or wall, usually of earth, used to retain substances or to prevent substances from entering an area.

**Bioremediation:** The use of microorganisms or vegetation to reduce contaminant levels in soil or water.

**Closure Criteria:** Standards that measure the success of selected closure activities in meeting closure objectives.

**Closure Goal:** The guiding statement that provides the vision and purpose of reclamation. Attainment of the closure goal happens when all closure objectives have been satisfied.

**Closure Objectives:** Statements that describe what the selected closure activities are aiming to achieve; they are guided by the closure principles.

**Closure Principles:** The four core closure principles are 1) physical stability, 2) chemical stability, 3) no long-term active care requirements, and 4) future use (including aesthetics and values). The principles guide the selection of closure objectives.

**Contaminant:** Any physical, chemical, biological or radiological substance in the air, soil, or water that has an adverse effect. Any chemical substance with a concentration that exceeds background levels, or which is not naturally occurring in the environment.

**Contouring:** The process of shaping the land surface to fit the form of the surrounding land.

**Decommissioning:** The process of permanently closing a site; removing equipment, buildings and structures. Rehabilitation and plans for future maintenance of affected land and water are also included.

**Disposal:** The relocation and containment of unwanted materials in an approved facility.

**Erosion:** The wearing away of rock, soil or other surface material by water, rain, waves, wind, or ice; the process may be accelerated by human activities.

**Financial Security (Deposit):** Funds held by the Crown that can be used in the case of abandonment of an undertaking to reclaim the site or carry out any ongoing measures that may remain to be taken after the abandonment of the undertaking.

**Groundwater:** All sub-surface water that fills openings and pore spaces in soil and rock layers. The water table is the point below which the ground is completely saturated.

**Landfill:** An engineered waste management facility at which waste is disposed by placing it on or in land in a manner that minimizes adverse human health and environmental effects.

**Permafrost:** Ground that remains at or below zero degrees Celsius for a minimum of two consecutive years.

**Permanent Closure:** The final closure of a site with no foreseeable intent by the existing proponent to return to either active exploration or mining.

**Reclamation:** The process of returning a disturbed site to its natural state or one for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety.

**Remediation:** The removal, reduction, or neutralization of substances, wastes or hazardous material from a site in order to prevent or minimize any adverse effects on the environment and public safety now or in the future.

**Revegetation:** Replacing original ground cover following a disturbance to the land.

**Risk Assessment:** Analysis of potential threats and options for mitigation for a given site, component, or condition. Risk assessments consider factors such as risk acceptability, public perception of risk, socio-economic impacts, benefits, and technical feasibility. It forms the basis for risk management.

**Selected Closure Activity:** The closure and reclamation activity chosen from the closure options for each project component.

**Stakeholders:** industry, federal agencies, the territorial government, Aboriginal organizations/governments, land owners, affected communities, and other parties with an interest in a project.

**Temporary Closure:** When operations are ceased at a site with the intent to resume activities in the future. Temporary closures can last for a period of weeks, or for several years, based on economic, environmental, political, or social factors.



## **APPENDIX II**

### **List of Acronyms, Abbreviations, Units, and Symbols**

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## Appendix II

### List of Acronyms, Abbreviations, Units, and Symbols

#### II-1 ACRONYMS

The following acronyms are used throughout the Closure and Reclamation Plan:

<b>AANDC</b>	Aboriginal Affairs and Northern Development Canada
<b>AICCP</b>	Aklavik Inuvialuit Community Conservation Plan
<b>BTEX</b>	benzene, toluene, ethylbenzene, and xylenes
<b>CCME</b>	Canadian Council or Ministers of the Environment
<b>CEQG</b>	Canadian Environmental Quality Guidelines
<b>COPC</b>	Contaminant of Potential Concern
<b>COSEWIC</b>	Committee on the Status of Endangered Wildlife in Canada
<b>CRP</b>	Closure and Reclamation Plan
<b>CSR</b>	Contaminated Site Remediation
<b>CWS</b>	Canadian Wildlife Service
<b>EC</b>	electrical conductivity
<b>ENR</b>	(GNWT) Department of Environment and Natural Resources
<b>EPA</b>	(Northwest Territories) Environmental Protection Act
<b>ESA</b>	environmental site assessment
<b>GNWT:</b>	Government of the Northwest Territories
<b>GPRA</b>	Gatepost Risk Analysis
<b>GPS</b>	Geographic Positioning System
<b>HTC</b>	Hunter and Trapper Committee
<b>IICCP</b>	Inuvik Inuvialuit Community Conservation Plan
<b>INAC</b>	Indian and Northern Affairs Canada
<b>IRC</b>	Inuvialuit Regional Corporation
<b>ISR</b>	Inuvialuit Settlement Region

<b>IWB</b>	Inuvialuit Water Board
<b>KIBS</b>	Kendall Island Bird Sanctuary
<b>PAH</b>	polycyclic aromatic hydrocarbon
<b>PHC</b>	petroleum hydrocarbon
<b>SAR</b>	sodium adsorption ratio
<b>SARA</b>	Species at Risk Act
<b>SSRA</b>	Site-Specific Risk Assessment
<b>TCC:</b>	Tuktoyaktuk Community Conservation Plan
<b>TDS</b>	total dissolved solids

## II-2 ABBREVIATIONS

The following abbreviations are used throughout the Closure and Reclamation Plan:

<b>bgs</b>	below ground surface
<b>e.g.</b>	for example
<b>etc.</b>	et cetera (and so on)
<b>IEG</b>	IEG Consultants Ltd.
<b>N</b>	north
<b>Shell</b>	Shell Canada Energy
<b>Site</b>	Camp Farewell Site
<b>Tervita</b>	Tervita Corporation
<b>W</b>	west

## II-3 UNITS

The following units are used throughout the Closure and Reclamation Plan:

<b>°C</b>	degree Celsius
<b>kg</b>	kilogram
<b>km</b>	kilometer
<b>km<sup>2</sup></b>	square kilometer

<b>m</b>	meter
<b>m<sup>3</sup></b>	cubic meter
<b>mg</b>	milligram
<b>mm</b>	millimeter
<b>µm</b>	micrometer

## **II-4 SYMBOLS**

The following symbols are used throughout the Closure and Reclamation Plan:

<	less than
>	greater than
°	degree
®	registered trademark

## **APPENDIX III**

### **Water Licence N7L1 1834**

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July 13, 2017

David A. Brown  
Staff Environmental Engineer  
Shell Canada Energy  
150 N. Dairy Ashford Road  
Houston, Texas 77079

Dear Mr. Brown:

**Re: N7L1-1834 – Shell Canada Energy, Camp Farewell – Term Amendment of Type “B” Water Licence**

The Inuvialuit Water Board (IWB) is pleased to approve a term amendment of Water Licence N7L1-1834 for closure and remediation and post monitoring activities. In this regard, all terms and conditions for N7L1-1834 will remain as originally issued with the exception of:

1. the extension of the expiry date to July 17, 2029;
2. Part B: General Conditions, Item 12; and
3. Part D: Conditions Applying to Waste Disposal, Item 16.

Each of these are detailed in the attached licence amendment.

A copy of the amended Terms and Conditions and all documentation associated with the term amendment of the licence has been filed in the Public Register. Copies are available at the IWB office and on the IWB Electronic Register located on the IWB website: [www.inuvwb.ca](http://www.inuvwb.ca).

The IWB appreciates the cooperation of Shell Canada Energy in complying with the Terms and Conditions of the Water Licence. Should you have any questions or concerns, please contact Mardy Semmler, Executive Director, at (867) 678-2942.

Sincerely,

A handwritten signature in black ink, appearing to read 'Roger Connolly', written over a circular stamp or seal.

Roger Connolly  
Chairperson

Attachments

Copied to: Lloyd Gruben, ENR Water Resources Officer - Inuvik Region



## INUVIALUIT WATER BOARD LICENCE AMENDMENT

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Licensee	Shell Canada Energy
Licence Number	N7L1-1834
Effective Date of Amendment	July 18, 2017

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Pursuant to the *Waters Act* and Waters Regulations the Inuvialuit Water Board hereby grants the following Licence Amendment.

### Term of Water Licence

The current expiry date has been extended to July 17, 2029 to ensure consistency with the Closure and Reclamation Plan that includes an eight (8) year monitoring, maintenance, and reporting program following the completion of the permanent closure activities.

### Part B: General Conditions

12. Consultation records, including a summary, with the Hunters and Trappers Committee (HTC) of Tuktoyaktuk must be submitted to the IWB at least thirty (30) days prior to conducting any activities at the site.

### Part D: Conditions Applying to Waste Disposal

16. A barge waste management and disposal plan must be submitted to the IWB at least thirty (30) days prior to mobilization of the barge to the site.

This Licence is amended and recorded at Inuvik, Northwest Territories.

INUVIALUIT WATER BOARD

A handwritten signature in black ink, appearing to be a stylized name, written over a horizontal line.

Chairperson

A handwritten date in black ink, written over a horizontal line.

Date July 13, 2017

**PART A: SCOPE AND DEFINITIONS**

**1. Scope**

- a) This Licence entitles Shell Canada Energy to use water and dispose of Waste as an industrial undertaking associated with oil and gas exploration and development in the Mackenzie Delta at Farewell Camp and Stockpile Site (Camp Farewell) located at Latitude 69°12'30" North, and Longitude 135°06'04" West, Northwest Territories;
- b) This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of Waste of any type in any Waters or in any place under any conditions where such Waste or any other Waste that results from the deposits of such Waste may enter any Waters. Whenever new Regulations are made or existing Regulations are amended by the Governor in Council under the *Northwest Territories Waters Act*, or other statutes imposing more stringent conditions relating to the quantity or type of Waste that may be so deposited or under which any such Waste may be so deposited, this Licence shall be deemed, upon promulgation of such Regulations, to be automatically amended to conforming to such Regulations; and
- c) Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.
- d) This Licence is issued subject to the conditions contained herein with respect to the use of Waters as prescribed in Section 8 of the *Act* and the deposit of Waste to any Waters as prescribed in Section 9 of the *Act*.

**2. Definitions**

In this Licence: **N7L1-1834**

**"Act"** means the *Northwest Territories Waters Act*;

**"Analyst"** means an Analyst designated by the Minister under Section 35(1) of the *Northwest Territories Waters Act*;



**“Average Concentration”** means the discrete average of up to four (4) consecutive analytical results submitted to the Board in accordance with the sampling and analysis requirements specified in the “Surveillance Network Program”;

**“Board”** means the Northwest Territories Water Board established under Section 10 of the *Northwest Territories Waters Act*;

**“Freeboard”** means the vertical distance between water line and the lowest elevation of the effective water containment crest on a dam or dyke’s upstream slope;

**“Geotechnical Engineer”** means a professional engineer registered with the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists whose principal field of specialization is the design and construction of earthworks in a permafrost environment;

**“Greywater”** means all liquid Wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet Waste;

**“Inspector”** means an Inspector designated by the Minister under Section 35(1) of the *Northwest Territories Waters Act*;

**“Licensee”** means the holder of this Licence;

**“Minister”** means the Minister of Aboriginal Affairs and Northern Development Canada (AANDC);

**“Modification”** means an alteration to a physical work that introduces a new structure or replaces an existing structure and does not alter the purpose or function of the work, but does not include an expansion;

**“Regulations”** mean Regulations proclaimed pursuant to Section 33 of the *Northwest Territories Waters Act*;

**“Sewage”** means all toilet Wastes and Greywater;

**“Sewage Treatment Facilities”** comprises the area and engineered structures designed to contain Sewage as identified in the project description and also include a Sump constructed of impervious material and/or with an impervious liner;

**“Sump”** means an excavation for the purpose of catching or storing water and/or Waste;

**“Waste”** means Waste as defined by Section 2 of the *Northwest Territories Waters Act*;

**“Waste Disposal Facilities”** mean all facilities designated for the disposal of Waste and include the Sewage disposal facilities, solid Waste disposal facilities, and bagged toilet Wastes disposal facilities;

**“Water Supply Facilities”** mean all facilities designed to collect, treat and supply water for industrial purposes; and

**“Waters”** mean Waters as defined by Section 2 of the *Northwest Territories Waters Act*;

**PART B: GENERAL CONDITIONS**

1. The Licensee shall file an Annual Report with the Board not later than March 31<sup>st</sup> of the year following the calendar year reported which shall contain the following information:
  - a) the monthly and annual quantities in cubic metres of fresh water obtained from all sources;
  - b) the monthly and annual quantities in cubic metres of each and all Waste discharged;
  - c) the location and direction of flow of all Waste discharged to the water or the land;
  - d) a summary of the monthly and annual quantities of Waste stored on site and transported off site;
  - e) the results of sampling carried out under the “Surveillance Network Program”;
  - f) a summary of any Modifications carried out on the Water Supply Facilities and Sewage Treatment Facilities, including all associated structures;
  - g) a list of any spills and unauthorized discharges;
  - h) details on the restoration of any Sumps;
  - i) a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;

- j) a summary of any studies requested by the Board that relate to Waste disposal, water use, or reclamation, and a brief description of any future studies planned;
  - k) notation of updates and/or revisions to the approved Spill Contingency Plan, Waste Disposal Facilities operations and maintenance plan, and sewage treatment plan;
  - l) an outline of any spill training and communications exercises carried out; and
  - m) any other details on water use or Waste disposal requested by the Board within forty-five (45) days before the annual report is due.
2. The Licensee shall comply with the "Surveillance Network Program" annexed to this Licence, and any amendment to the said "Surveillance Network Program" as may be made from time to time, pursuant to the conditions of this Licence.
  3. The "Surveillance Network Program" and compliance dates specified in the Licence may be modified at the discretion of the Board.
  4. The Licensee shall, within thirty (30) days of the issuance of this Licence, submit to the Board for approval a map or drawing indicating the location of all Surveillance Network Program sampling stations.
  5. The Licensee shall, within thirty (30) days of the issuance of this Licence, post the necessary signs to identify the stations of the "Surveillance Network Program". All postings shall be located and maintained to the satisfaction of an Inspector.
  6. Any meters, devices or other such methods used for measuring the volumes of water used or Waste disposed and discharged shall be installed, operated and maintained by the Licensee to the satisfaction of an Inspector.
  7. The Licensee shall immediately report to the 24 Hour Spill Report Line (867-920-8130) any spills which are reported to, or observed by, the Licensee within the project boundaries.
  8. All monitoring data shall be submitted in printed form and electronically in spreadsheet format on a diskette or other electronic forms acceptable to the Board.
  9. All reports shall be submitted to the Board in printed format accompanied by an electronic copy in a common word processing format on diskette or other electronic forms acceptable to the Board.

10. Within thirty (30) days of issuance of this Licence, the Licensee shall have posted and shall maintain a security deposit in the amount of Two Million (\$2,000,000.00) Dollars pursuant to Section 17 of the Act and Section 12 of the Regulations, in a form suitable to the Minister. The security deposit shall be maintained until such time as it is fully or in part refunded by the Minister pursuant to Section 17 of the Act.
11. The Licensee shall ensure a copy of this Licence is maintained at the site of operation at all times.

**PART C: CONDITIONS APPLYING TO WATER USE**

1. The Licensee shall obtain water from the Middle Channel of the Mackenzie River in winter or the unnamed lake north of the camp in summer as described in the project description, or as otherwise approved by an Inspector.
2. The daily quantity of water used for all purposes shall not exceed 150 cubic metres.

**PART D: CONDITIONS APPLYING TO WASTE DISPOSAL**

1. The Licensee shall within thirty (30) days of the issuance of this Licence, submit to the Board for approval an updated operation and maintenance plan for the Waste Disposal Facilities. This plan shall include but not necessarily be limited to details on the design, operational capacity, management and maintenance, and disposal of sludges.
2. All Sewage shall be directed to the onsite Sewage Treatment Facilities as approved by an Inspector.
3. The Sewage Treatment Facilities shall be maintained and operated in such a manner as to prevent structural failure to the satisfaction of the Inspector.
4. All Waste discharged from the onsite Sewage lagoon shall be directed to the channel of the Mackenzie River at a location approved by an Inspector.
5. There should be no discharge of floating solids, garbage, grease, free oil or foam.

6. All effluent discharged by the Licensee from the Sewage lagoon at "Surveillance Network Program" Station Number 1834-1 shall meet the following effluent quality requirements:

Sample Parameter	Average Concentration
BOD <sub>5</sub>	70.0 mg/L
Total Suspended Solids	70.0 mg/L
Faecal Coliforms	1 X 10 <sup>4</sup> CFU/dL
Oil and Grease	5.0 mg/L
Total Residual Chlorine (TRC)	0.1 mg/L

7. The effluent discharged shall have a pH between six (6) and nine (9) and no visible sheen of oil and grease.
8. Introduction of water to Waste for the purpose of achieving effluent quality requirements in Part D, Item 7 is prohibited.
9. A Freeboard limit of 1.0 metre shall be maintained at all times in the Sewage lagoon, or as recommended by a qualified Geotechnical Engineer and/or as approved by the Board.
10. The Licensee shall advise an Inspector at least five (5) days prior to initiating and decant of the Sewage lagoon.
11. All analyses shall be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of water and Wastewater" or by such other methods as may be approved by an Analyst.
12. The Licensee shall contain all contaminated soil or contaminated snow in such a manner as to minimize the potential for migration of contaminants into any Waters, to the satisfaction of an Inspector.
13. The Licensee shall store, segregate and dispose of all solid and hazardous Wastes in a manner acceptable to the Inspector.
14. Unless authorized by this Licence, the Licensee shall ensure that any Wastes associated with this undertaking do not enter any water body.
15. The Licensee shall submit to the Board a copy of each agreement(s) between third parties to store, transport or dispose of Wastes. The copy submitted to the Board shall include, at a minimum, the following:

- a. type of Waste;
- b. quantities of Waste;
- c. disposal location(s), and
- d. proof of acceptance from third parties.

**PART E: CONDITIONS APPLYING TO MODIFICATIONS**

1. The Licensee may, without written approval from the Board, carry out Modifications to the planned undertakings provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:
  - a) the Licensee has notified an Inspector in writing of such proposed Modifications at least five (5) days prior to beginning the Modifications;
  - b) such Modifications do not place the Licensee in contravention of either the Licence or the Act;
  - c) an Inspector has not, during the five (5) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than five (5) days; and
  - d) an Inspector has not rejected the proposed Modifications.
2. Modifications for which all of the conditions referred to in Part F, Item 1 have not been met may be carried out only with written approval from an Inspector.
3. The Licensee shall provide to the Board as-built plans and drawings of the Modifications referred to in this Licence within ninety (90) days of completion of the Modifications.

**PART F: CONDITIONS APPLYING TO CONTINGENCY PLANNING**

1. The Licensee shall submit to the Board for approval within thirty (30) days of issuance of this Licence an updated Emergency Response & Spill Contingency Plan in accordance, for example, with the *Guidelines for Spill Contingency Planning, April 2007*, developed by AANDC-Water Resources Division.

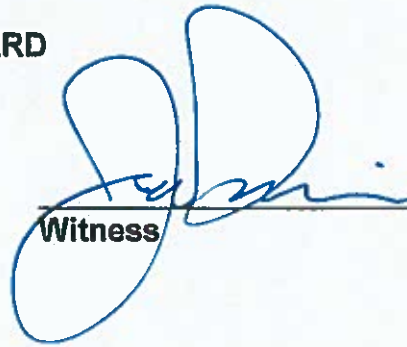
2. The Licensee will maintain a copy of the approved Emergency Response & Spill Contingency Plan onsite in a readily available location, to the satisfaction of an Inspector.
3. The Licensee shall ensure that petroleum products, hazardous material and other Wastes associated with the project do not enter any Waters.
4. The Licensee shall ensure that all containment berms are constructed of an impermeable material, to the satisfaction of an Inspector.
5. The Licensee shall ensure that fuel stored in each tank within the tank farm be no greater than 85% of the tank's capacity to allow for expansion and avoid overflows.
6. If, during the period of this Licence, an unauthorised discharge of Waste occurs, or if such a discharge is foreseeable, the Licensee shall:
  - a) report the incident immediately via the 24 Hour Spill Reporting Line (867) 920-8130; and
  - b) submit to an Inspector a detailed report on each occurrence not later than thirty (30) days after initially reporting the event.

**PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION**

1. The Licensee shall submit to the Board for approval within one (1) year of issuance of this Licence, an updated Interim Abandonment and Restoration Plan including plans for the abandonment and restoration of the Sewage lagoon and a complete Phase II environmental site assessment of Camp Farewell. This assessment will include the full delineation of contamination (soil and water) associated with Camp Farewell operations, located both on and off the gravel base pad.
2. The Licensee shall implement this Plan as and when approved by the Board.
3. Following approval of the Plan, the Licensee shall review the Abandonment and Restoration Plan every two (2) years and shall modify the Plan as necessary to reflect changes in operations and technology. All proposed Modifications to the Plan shall be submitted to the Board for approval.

**NORTHWEST TERRITORIES WATER BOARD**

  
Chairman

  
Witness



## **APPENDIX IV**

### **Lease 107 C/4-2-15**

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N.W.T. Lease No.: 107 C/4-2-15

File No.: 107 C/4-2

THIS LEASE made this 7 day of April 2009.

BETWEEN: Her Majesty the Queen in right of Canada,

Hereinafter called "Her Majesty"

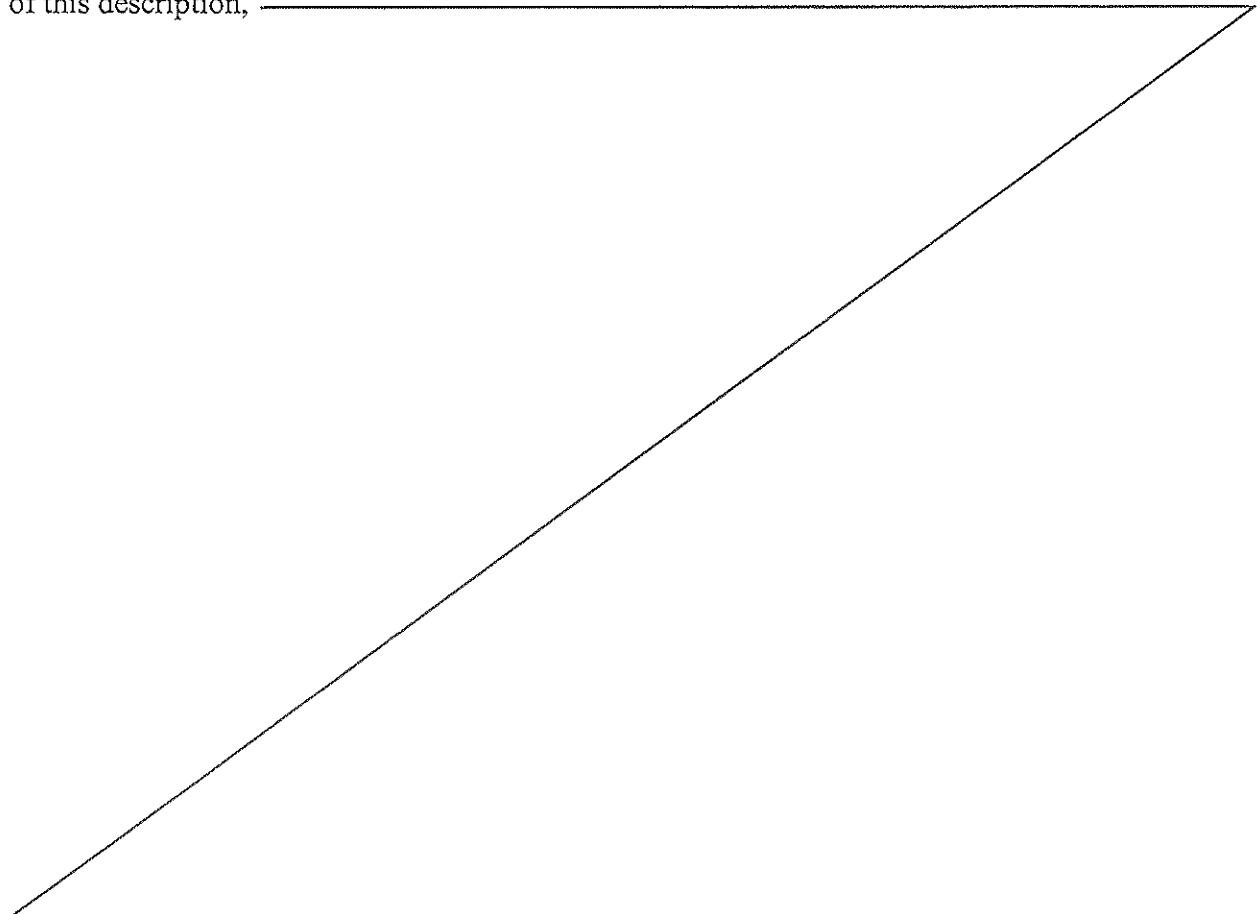
OF THE FIRST PART

AND: **SHELL CANADA LIMITED** a body corporate, incorporated under the Laws of Canada, having a registered office in the City of Calgary in the Province of Alberta,

Hereinafter called "the lessee"

OF THE SECOND PART

WITNESSETH that in consideration of the rents, covenants and agreements herein reserved and contained on the part of the lessee to be paid, observed and performed, and subject to the Territorial Lands Act and the Territorial Lands Regulations, Her Majesty demises and leases unto the lessee all that certain parcel or tract of land situate, lying and being composed of all those parcels of land at Farewell designated as Parcels A, B and C, in QUAD 107 C/4, in the Northwest Territories, as said parcels are shown outlined in red on the sketch annexed hereto and forming part of this description,



hereinafter called "the land", SUBJECT to the following reservations:

Initial(s) SC **Canada**

SHELL'S COPY

- (a) all mines and of all minerals whether solid, liquid or gaseous which may be found to exist within, upon, or under such lands together with the full powers to work the same and for that purpose to enter upon, use and occupy the lands or so much thereof and to such an extent as may be necessary for the effectual working and extracting of the said minerals;
- (b) the rights of the recorded holders of mineral claims and any other claims or permits affecting the land;
- (c) all timber that may be on the land;
- (d) the right to enter upon, work and remove any rock outcrop required for public purposes;
- (e) such right or rights-of-way and of entry as may be required under regulations in force in connection with the construction, maintenance and use of works for the conveyance of water for use in mining operations; and
- (f) the right to enter upon the land for the purpose of installing and maintaining any public utility;

THE PARTIES COVENANT AND AGREE AS FOLLOWS:

**DEFINITIONS:**

1. In this lease:
  - (a) "Minister" means the Minister of Indian Affairs and Northern Development and any person authorized by him in writing to act on his behalf;
  - (b) "facilities" means all physical structures or appurtenances placed in or upon the land;
  - (c) "construction" means all manner of disturbance of the natural state of the surface of the land, including the sub-surface and sub-strata;
  - (d) "Surveyor General" means the Surveyor General as defined in the Canada Lands Surveys Act;
  - (e) "body of water" means any lake, river, stream, swamp, marsh, channel, gully, coulee or draw that continuously or intermittently contains water;

**TERM:**

2. The term of this lease shall be for a period of **twenty (20) years** commencing on the **1<sup>st</sup> day of January A.D. 2009 AD.** and terminating on the **31<sup>st</sup> day of December A.D. 2028 AD.**

**RENT AND TAXES:**

3. Subject to Clause 4 the lessee shall pay to the lessor yearly and every year in advance the rental of **six hundred and twenty (\$620.00) dollars.**

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4. The Minister may, not less than three (3) months before the expiration of the first five (5) year period of the said term, or of any succeeding five (5) year period during the term, notify the lessee in writing of an amended rental payable for the following five (5) year period and, failing further notification, for the remainder of the term, the said amended rental to be based upon the fair appraised value of the land at the time of such notification but without taking into account the value of any improvements placed thereon by and at the expense of the lessee.
5. The lessee shall during the term of this lease, pay all taxes, rates and assessments charged upon the land or upon the lessee in respect thereof.

**USE:**

6. The lessee shall use the land for **STAGING AREA, FUEL STORAGE, EQUIPMENT AND MATERIAL STORAGE AND BASE CAMP** purposes only.

**SUBLETTING OR ASSIGNMENTS:**

7. The lessee shall not sublet the land or assign or transfer this lease without the consent of the Minister in writing, which consent shall not be unreasonably withheld. Such consent shall not be required in the event of the lessee mortgaging or pledging the rights and privileges granted herein to secure the payment of any bonds or other indebtedness of the lessee, or to any assignment made to or by any securing holder as a result of default by the lessee under any mortgage or pledge; however, copies of such instruments must be forwarded to the Minister.
8. No Sublease, assignment or transfer of this lease to any party will receive the consent of the Minister unless Lease number 107 C/4-1-8 is sublet, assigned or transferred to the same party.

**BREACH:**

9. Where any portion of the rental herein reserved is unpaid for more than thirty (30) days after it becomes due, whether formally demanded or not, the Minister may by notice in writing terminate this lease and on the day following the mailing of such notice, this lease is cancelled.
10. Where the lessee breaches or fails to perform or observe any of the covenants, terms, conditions or agreements herein contained, other than the covenant to pay rent, the Minister may so advise the lessee by written notice and if the lessee fails to remedy the breach or non-performance within a reasonable time thereafter or within the time granted in the said notice, the Minister may, by notice in writing, terminate this lease and on the day following the mailing of such notice, this lease is cancelled.
11. Unless a waiver is given in writing by the Minister, Her Majesty will not be deemed to have waived any breach or non-performance by the lessee of any of the covenants, terms, conditions or agreements herein contained and a waiver affects only the specific breach to which it refers.

**TERMINATION:**

12. Upon the termination or expiration of this lease, the lessee shall deliver up possession of the land in a restored condition and, where there are no arrears of rent or taxes, the lessee may, within three (3) months after the termination or expiration, remove any buildings or other structures owned by him that may be on the land.

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13. Termination or expiration of this lease will not prejudice Her Majesty's right to unpaid rental or any other right with respect to a breach or non-performance of any covenant, term, condition or agreement herein contained nor will the lessee be relieved of any obligation contained herein.

**RESTORATION:**

14. Where the lessee fails to restore the land as required and within the time allowed by the Regulations or by the Minister, the Minister may order the restoration of all or any part of such land and any expenses thus incurred by the Minister shall be recoverable from the lessee as a debt due to Her Majesty.

**WASTE DISPOSAL:**

15. The lessee shall dispose of all combustible garbage and debris by burning in an incinerator approved by the Land Agent and remove all noncombustible garbage and debris to an authorized dumping site.
16. The lessee shall dispose of human waste in a manner satisfactory to the Minister.
17. The lessee shall not discharge or deposit any refuse substances or other waste materials in any body of water, or the banks thereof, which will, in the opinion of the Minister, impair the quality of the waters or the natural environment and any areas designated for waste disposal shall not be located within thirty-one (31) metres of the ordinary high water mark of any body of water, unless otherwise authorized by the Minister.

**ENVIRONMENTAL:**

18. The lessee shall at all times keep the land in a condition satisfactory to the Minister.
19. The lessee shall not do anything which will cause erosion of the banks of any body of water on or adjacent to the land, and shall provide necessary controls to prevent such erosion.
20. The lessee shall not unduly interfere with the natural drainage pattern of the land, except with the permission of the Minister.

**FUEL AND HAZARDOUS CHEMICALS:**

21. The lessee shall take all reasonable precautions to prevent the possibility of migration of spilled petroleum fuel over the ground surface or through seepage in the ground by:
- (i) constructing a dyke around any stationary petroleum fuel container where the container has a capacity exceeding four thousand (4,000) litres; and
  - (ii) ensuring that the dyke(s) and the area enclosed by the dyke(s) is impermeable to petroleum products at all times; and
  - (iii) ensuring that the volumetric capacity of the dyked area shall, at all times, be equal to the capacity of the largest petroleum fuel container plus ten (10) percent of the total displacement of all other petroleum fuel containers placed therein; or

Such other alternative specifications submitted by the lessee that may be approved, in writing, by the Minister.

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22. The lessee shall ensure that fuel storage containers are not located within thirty-one (31) metres of the ordinary high water mark of any body of water unless otherwise authorized by the Minister.
23. The lessee shall mark with flags, posts or similar devices all petroleum fuel storage facilities, including fill and distribution lines, such that they are clearly visible at all times.
24. The lessee shall immediately report all spills of petroleum and hazardous chemicals in accordance with the Government of the Northwest Territories Spill Contingency Planning and Reporting Regulations and any amendments thereto, or in a manner satisfactory to the Minister.
25. The lessee shall prevent the possibility of migration of spilled fuel over the ground surface or through seepage in the ground.
26. The lessee shall take all reasonable precautions to prevent the migration of petroleum products into bodies of water.
27. The lessee shall, within six (6) months of the execution of this lease deliver to the Minister, for his approval, an Oil Spill Contingency Plan and shall maintain the provisions of the said Plan, and any modifications approved by the Minister, throughout the term of this lease.
28. The lessee shall handle, store, dispose and keep records of all hazardous and toxic chemicals in a manner satisfactory to the Minister.
29. The fuel storage facilities of the lessee, including all tanks, bladders, hoses, pumps, fuel transfer lines and associated mechanical connections and valves shall be installed and maintained to the satisfaction of the Minister and the lessee agrees to make such reasonable modifications and improvements as are deemed necessary by the Minister.

**BOUNDARIES AND SURVEYS:**

30. Her Majesty is not responsible for the establishment on the ground of the boundaries of the land.
31. The boundaries of the land are subject to such adjustment and alteration as may be shown to be necessary by survey.
32. The Minister may, during the term herein granted, by notice in writing, order the lessee to survey the boundaries of the land and the lessee shall, at its own expense, within one (1) year from the date of said notice, make or cause to be made a survey of the land, such survey to be made in accordance with the instructions of the Surveyor General, and upon completion of the survey and the production of survey plans suitable for recording in the Canada Lands Surveys Records and filing in the Land Titles Office for the Northwest Territories Land Registration District, Her Majesty will execute an Indenture in amendment of this lease for the purpose of incorporating herein descriptions of the land based on the said plans.

**IMPROVEMENTS:**

33. The lessee is responsible for ensuring that all improvements to the land are made within the boundaries of the land.
34. The lessee shall not erect any building or structure nearer than a distance of three (3) metres from any boundary of the land.
35. The lessee shall not construct any facilities within thirty-one (31) metres of the ordinary high water mark of any body of water without the written approval of the Minister.

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36. The lessee shall maintain the existing improvements now situated on the land on the effective date of this lease, or any similar improvements which may be constructed, in a manner and condition satisfactory to the Minister.

**ACCESS:**

37. Her Majesty assumes no responsibility, express or implied, to provide access to the land.
38. It shall be lawful for Her Majesty or any person duly authorized at all reasonable times to enter upon the land for the purpose of examining the condition thereof.
39. The Minister may grant to such persons as he may consider fit, rights-of-way or access across, through, under or over all or any portion of the land for any purpose whatsoever, but such rights-of-way or access will not unreasonably interfere with the rights granted to the lessee hereunder, or with any improvements made by the lessee on the land.

**INDEMNIFICATION:**

40. The Lessee shall at all times hereafter indemnify and keep Her Majesty indemnified against all claims, demands, actions or other legal proceedings by whomsoever made or brought against Her Majesty by reason of anything done or omitted to be done by the lessee, his officers, servants, agents or employees arising out of or connected with the granting of this lease.
41. The lessee will not be entitled to compensation from Her Majesty by reason of the land or any portion thereof being submerged, damaged by erosion, or otherwise affected by flooding.
42. Her Majesty will not be liable for damages caused by vandalism or interference by others with the lessee's facilities and equipment.

**REVIEW:**

43. At the request of the lessee, any decision of the Minister will be reviewable by the Trial Division of the Federal Court of Canada; costs of such review are the responsibility of the lessee unless otherwise ordered by the Court.

**NOTICES:**

44. All written notices respecting the land or the covenants, terms, conditions or agreements contained in this lease shall, unless otherwise stipulated herein, be deemed to have been received by the lessee ten (10) days after the mailing thereof or, if hand delivered, on the day of delivery.
45. Any notice affecting this lease which Her Majesty may desire to serve upon the lessee, or any notice which the lessee may desire to serve upon Her Majesty shall, unless otherwise stipulated herein, be sufficiently served if posted by registered mail to the last known address of the opposite party as follows:

To Her Majesty:      Director of Operations,  
                                  Northwest Territories Region,  
                                  Department of Indian Affairs and Northern Development  
                                  P. O. Box 1500  
                                  Yellowknife, N.T.  
                                  X1A 2R3

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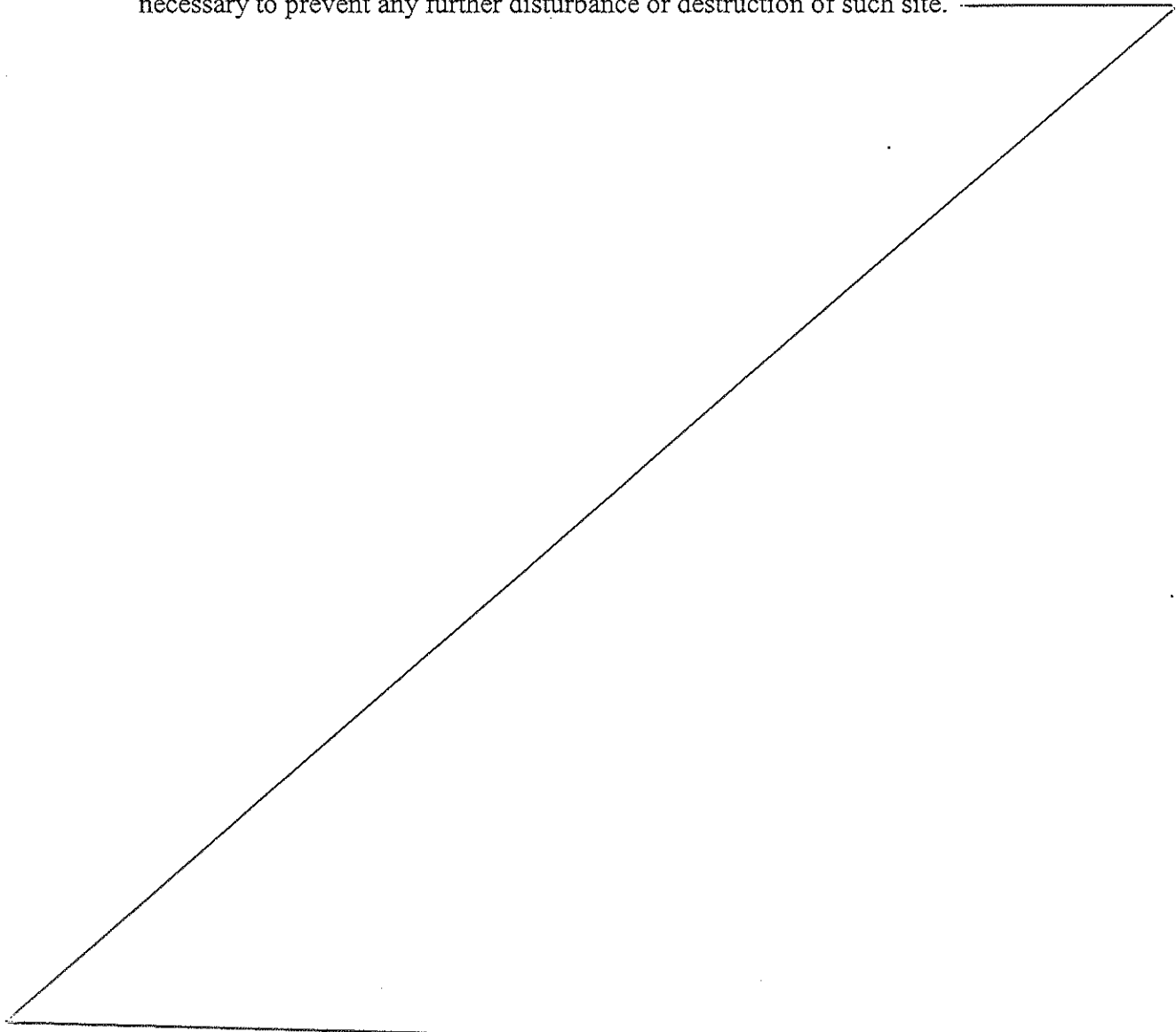
To the Lessee: SHELL CANADA LIMITED  
P.O. Box 100 Station Main  
Calgary, AB T2P 2H5

Either party may change its address for service during the term of this lease by notifying the other party in writing.

- 46. No notice of breach or default given herein by Her Majesty shall be valid or of any effect unless it is also given to any mortgagee of the lessee, in respect of the leased lands, of which Her Majesty shall have received written notice.

**GENERAL:**

- 47. The Lessee shall abide by and comply with all applicable lawful rules, acts, regulations and by-laws of the Federal Government, Territorial Government, Municipal Government or any other governing body whatsoever that have been or may be enacted or amended from time to time and in any manner affect the said land.
- 48. This lease enures to the benefit of and is binding upon Her Majesty, Her Heirs and Successors and the lessee, its successors and assigns.
- 49. No implied covenant or implied liability on the part of Her Majesty is created by the use of the words "demises and leases" herein.
- 50. If an archaeological site is discovered within the land, the lessee shall immediately advise the Minister in writing of such a discovery and shall take all reasonable precautions necessary to prevent any further disturbance or destruction of such site.



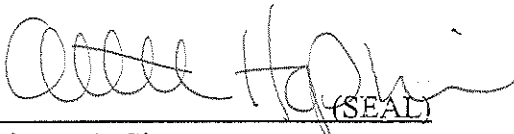
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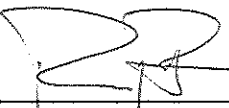
IN WITNESS WHEREOF the Director of Operations, Northwest Territories Region, Department of Indian Affairs and Northern Development, has hereunto set his hand and seal on behalf of Her Majesty the Queen in right of Canada; and SHELL CANADA LIMITED has hereunto affixed its corporate seal attested to by its duly authorized officers.

SIGNED, SEALED AND DELIVERED )  
on behalf of Her Majesty by the )  
Director of Operations, Northwest )  
Territories Region, Department of )  
Indian Affairs and Northern )  
Development in the presence of )

  
Director's Witness )

 (SEAL)  
Director's Signature )

SIGNED SEALED AND DELIVERED )  
on behalf of SHELL CANADA LIMITED )

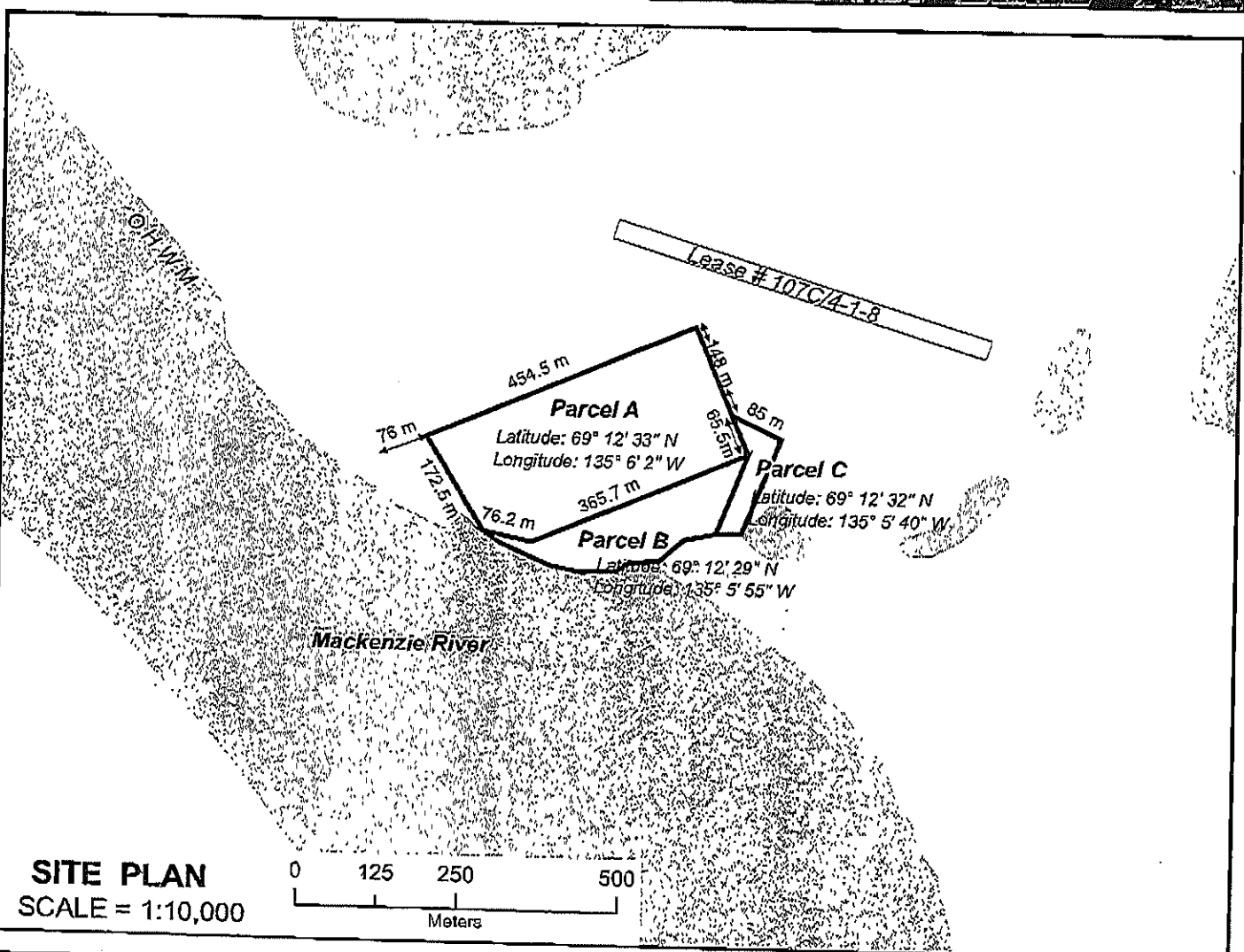
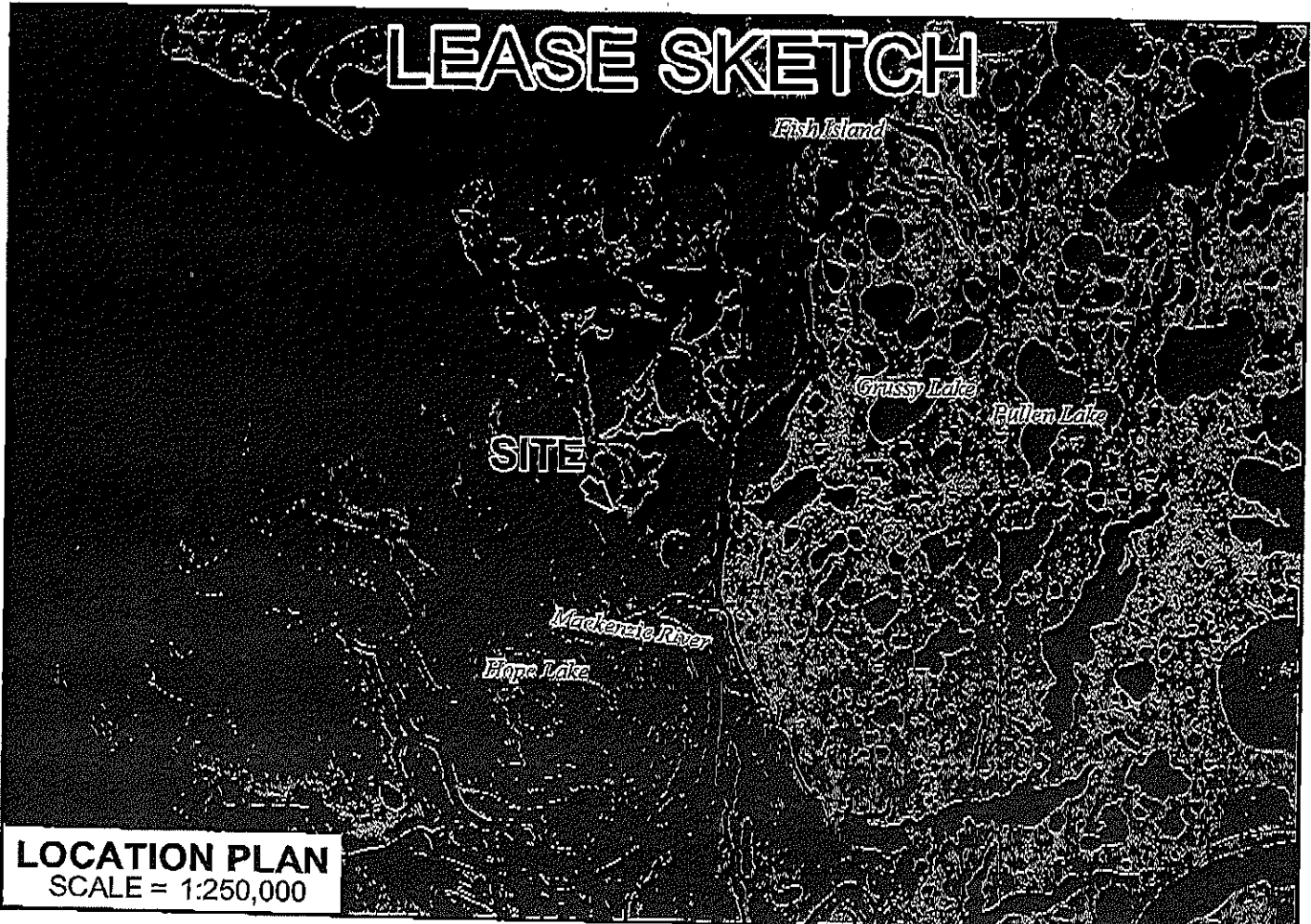
 (C/S)  
Signature **Richard W. Riegert**  
**Assistant Secretary**

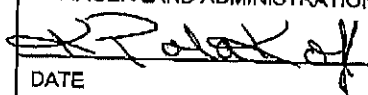


\_\_\_\_\_  
Name and title of Director or Officer )

APPROVALS  
LAND Rgm  
J.V. \_\_\_\_\_  
LEGAL 20  
FORWARD FOR EXECUTION  
Rgm

\_\_\_\_\_  
Signature ) (C/S)

\_\_\_\_\_  
Name and title of Director or Officer )



<b>ANNEXED HERETO AND FORMING PART OF N.W.T. LEASE No. 107C/4-2-15</b>			
LATITUDE: LONGITUDE: PROJECTION : UTM, zone 8 DATUM: NAD 83 SKETCH AREA = 12.4 ha± <small>Area obtained by ArcInfo calculation using XTools</small>	DRAWN BY: E.M., IMAG DATE: February 6, 2008 REVISED: DATE:	MANAGER LAND ADMINISTRATION  DATE Dec. 4, 2008	
	 Indian and Northern Affairs Canada	Affaires indiennes et du Nord Canada	