

OPI Project File #:  
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## **Department of National Defence**

### **Environmental Effects Determination (EED)**

#### **Project:**

**DRDC (DND) Land Use in Eureka, Nunavut**

Prepared by: Golder Associates Ltd.

Date: September 27, 2018

Version: 1

**OPI Project File #:**

**Base file #:**

**DG IE GPS #:**

## **Executive Summary**

An environmental assessment was conducted by Golder Associates Ltd. (Golder) for Defence Research and Development Canada (DRDC) for a proposed Project involving DRDC land use in Eureka, Nunavut, on Environment and Climate Change Canada (ECCC) property. This Environmental Effects Determination (EED) report summarizes the results of the environmental assessment.

The Project as discussed for the purpose of this report consists of the following components:

- Installation of 20-foot International Organization for Standardization (ISO) equipment shelter(s), a diesel generator, and an antenna array;
- Operation of the Project site as a research facility; and,
- Decommissioning of the Project site.

Potential significant adverse effects of the Project were assessed, and mitigation measures have been identified to minimize effects on the Valued Ecosystem Components (VEC) for physical, biological, and social and cultural effects. The VECs for which effects and mitigation have been identified include:

- Atmosphere
- Soils and Geology
- Ambient Noise
- Terrestrial Animals and Habitat
- Vegetation
- Species at Risk and Migratory Birds
- Land Use

To date, no significant concerns have been raised by the public or Indigenous communities in relation to the Project.

On the basis of this EED report, it has been determined that the Project is not likely to cause significant adverse environmental effects. Therefore, the Project can proceed with the mitigation measures in Table 5: Potential Effects of the Project on each Valued Ecosystem Component with Mitigation Measures of this report.

**OPI Project File #:**

**Base file #:**

**DG IE GPS #:**

### **1.1 Title of Proposed Project**

Defence Research and Development Canada (DRDC) Land Use in Eureka, Nunavut.

### **1.2 Originating Directorate, Base, or Unit**

DRDC, an agency of the Department of National Defence (DND), is the proponent responsible for the overall coordination of this Project.

### **1.3 Location of Proposed Project**

The proposed Project is located in Eureka, Ellesmere Island, Nunavut, at approximately N79°59'42.67, W 85°46'40.25. Eureka is a remote arctic weather station on ECCC land, comprising a modern research facility with a number of buildings and a landing strip. The proposed facilities for this Project will be situated approximate 3 kilometers (km) northeast of the ECCC weather station on the northern side of the airport runway. Figure 1 provides a satellite view of the location of the approximate proposed Project site (identified as the 'antenna array') in relation to the Eureka airport (landing strip).

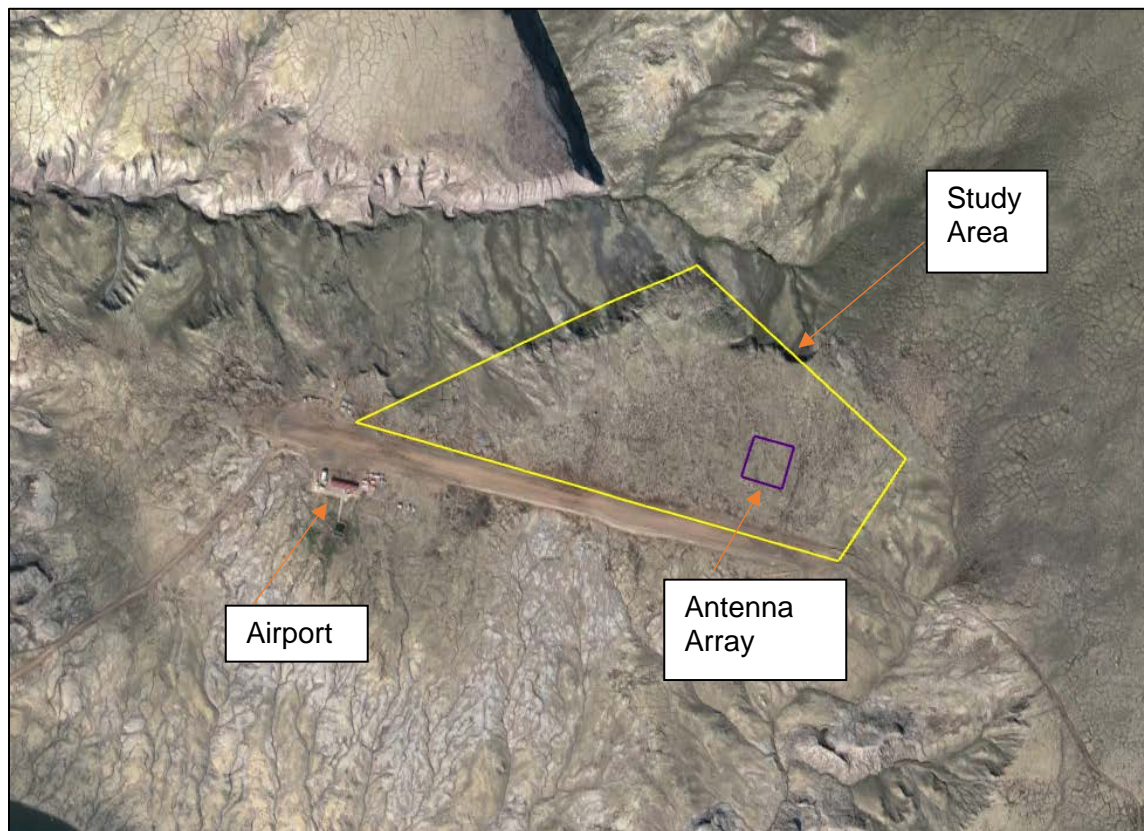
The antenna array will cover an area of 120 meters (m) by 120 m. To allow for maximum flexibility in the placement of the antenna array, a relatively flat Study Area of approximately 3.9 km<sup>2</sup> (refer to Figure 1) was surveyed. To the south of the Study Area is the Eureka weather station airport runway. The northeast and northwest edges of the Study Area are bound by steep declines. The average elevation of the Study Area is 256 m above sea level and is approximately 1.4 km from the coast.

OPI Project File #:

Base file #:

DG IE GPS #:

Figure 1: Project Study Area



Source: Google Earth, accessed September 4, 2018

## 1.4 Project Summary

The Project will consist of one or more 20-foot ISO equipment shelter(s) and an antenna array. The area of the antenna farm will be approximately 120 m by 120 m in area and consist of 256 aluminum pole antennas, each approximately 10 m high and held in place by stakes and guy ropes. There will be ground-level wire radials extending from each pole to improve the electrical ground. The Project will also involve the installation of a diesel generator to supply electricity to the Project. The purpose of the Project is to conduct experiments as to how radio transmissions are reflected by the changing ionosphere (due to sun-earth interactions), and specifically to gather data sets from actual observed propagation and backscatter in the polar region for future research work.

After the period of data collection, the site will be decommissioned.

Details about the Project are provided in section 2.1 of this report.

## 1.5 Environmental Effects Determination (EED) Trigger

- a) to be carried out on federal lands and is in relation to a physical work [ x ]
- b) to be carried out outside Canada and is in relation to a physical work [ ]
- c) not captured by CEAA 2012 but according to DND Policy, a due diligence environmental effects determination is required [ ]

**OPI Project File #:**

**Base file #:**

**DG IE GPS #:**

This activity meets the definition of a Project under section 66 of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) as it is a physical activity to be carried out on federal lands. Therefore, and EED is required for approval under section 67 before it can proceed.

## **1.6 EED Start Date**

Golder was retained on July 3, 2018 to conduct an EED for land use in Eureka Nunavut.

## **1.7 DG IE GPS EED number**

Tracking number provided by DG IE GPS \_\_\_\_\_.

## **1.8 Territorial Government Involvement**

The Government of Canada has a settled land claim with the Inuit of Nunavut, called the Nunavut Land Claim Agreement (NLCA), under which the Nunavut Impact Review Board (NIRB) and Nunavut Planning Commission (NPC) were established.

It is anticipated that ECCC will include the proposed Project in its yearly Land Use Permit approval application and that a decision will be required to determine whether the Project conforms to the requirements of any approved land use plans, and if so, whether the Project type is exempt from the requirement for screening by the NIRB. In accordance with the NLCA and the *Nunavut Planning and Project Assessment Act* (NuPPAA), the NIRB is responsible for the environmental assessment of proposed developments in the Nunavut Settlement Area prior to approval of the required Project authorizations. If the NIRB does not consider this a low-impact Project that would be exempt from the requirement for screening, the NIRB may determine that it needs to assess the potential biophysical and socio-economic impact of the Project and make recommendations and decisions about whether the Project may proceed. In such a case, it is understood that the NIRB may seek comments and distribute the application to stakeholders including federal departments and departments within the Government of Nunavut.

## **1.9 Other Federal Departments**

It is anticipated that ECCC will have a requirement under section 67 of CEAA 2012 to allow the use of federal lands for the purpose of the Project. In addition, ECCC is expected to include this Project in its yearly Land Use Permit approval extension application submission to the NIRB.

If the NIRB distributes the Land Use Permit application to stakeholders including federal departments, Crown- Indigenous Relation and Northern Affairs Canada (CIRNAC) may have a role reviewing the application to provide comments for NIRB's determination regarding whether a Land Use Permit can be granted for the Project.

## **1.10 Contacts**

Listed below is the main point of contact for this environmental assessment.

### **1.10.1 EED Point of Contact and Project OPI**

- a) Name, Rank, and Title: Ryan Riddolls, Project Defence Scientist
- b) Establishment: Defence Research and Development Canada
- c) Telephone Number: 613-991-2056
- d) Email Address: Ryan.Riddolls@forces.gc.ca

OPI Project File #:

Base file #:

DG IE GPS #:

## **Part 2. Environmental Effects Discussion**

### **2.1 Description of Project Construction, Operations and Decommissioning of the Project Site**

During the construction, operation and decommissioning of the Project, the environmental conditions and mitigation measures detailed under Land Use Permit N2012N0012, issued by Indian and Northern Affairs Canada must be adhered to.

#### **Construction:**

The Project will consist of one or more 20-foot ISO equipment shelter(s) to house radio equipment, and an antenna array. The ISO equipment shelter(s) will be prefabricated. The construction will not involve any excavations.

The area of the antenna array will be approximately 120 m by 120 m, and will consist of 256 aluminum pole antennas, each approximately 9 m high and held in place by stakes and guy ropes. The construction of the antenna array will be completed manually, involving the placement of 256 base plates affixed to the ground with 12-inch nails, the erection of the aluminum poles over the base plates, and the installation of radial wires. There will be ground-level wire radials extending from each pole to improve the electrical ground. No grading or excavations will be required for the antenna construction. To provide power to the Project, a diesel generator will be installed during the construction of the Project.

It is anticipated that the materials will be transported to Eureka via plane and/or ship and research staff brought in via a fixed wing aircraft from Resolute. A light truck will be used to transport the materials from the ECCC weather station (located approximately 2 km to the southwest) to the Study Area. No new roads will be required for Project construction.

#### **Operation:**

The operation phase and data collection are expected to start in late summer and will continue on a quarterly basis for two-week intervals over the span of two to three years for the first phase of the Project. The second phase of the Project will start the following year and will continue on a quarterly basis as well spanning two to three years. During the operation of the Project, experiments will be conducted as to how radio transmission are reflected by the changing ionosphere (due to sun-earth interactions), and specifically to gather data sets from actual observed propagation and backscatter in the polar region for future research work.

Research staff will be housed at the existing facilities at the weather station and no temporary camps, facilities or other services beyond those currently present would be required.

The weather station's electrical needs are supplied by a powerhouse with three generators. It is possible to run two units in parallel to share the loads when the need arises (EC 2010). As the proposed location for the antenna array is approximately 3.2 km from the weather station, a diesel fueled generator will provide electricity to the Project. The fuel for the generator will be contained in a double-walled tank inside the generator, with a capacity of 1000 L. The fuel will be brought to generator by a tanker truck and hosed into a fuel port inside the generator.

#### **Decommissioning:**

The antennae array site will be decommissioned once the data collection has occurred for four to five years. During the decommissioning phase, Project components, including antennas, base plates, ground wire, ISO shelter(s), diesel generator and all associated hardware (e.g., wires, nails, etc.) will be removed from the area and likely transported offsite by ship.

OPI Project File #:  
Base file #:  
DG IE GPS #:

## 2.2 Identification of Valued Environmental Components

The Environmental Effects Matrix is used to identify potential interactions between Project components and identified VECs. Table 1 below lists the VECs and the components of the Project identified in section 2.1 that were considered.

**Table 1: Environmental Effects Matrix**

PROJECT COMPONENTS	VALUED ENVIRONMENTAL COMPONENTS (VEC)													
	PHYSICAL					BIOLOGICAL				SOCIAL AND CULTURAL				
	Atmosphere	Surface Water	Groundwater	Soils and Geology	Ambient Noise	Terrestrial Animals and Habitat	Aquatic Animals And Habitat	Vegetation	Species at Risk and Migratory Birds	Land Use	Parks and Recreational Areas	Population	Cultural Resources	Aboriginal / Traditional Activities
<b>Construction</b>														
Antenna installation	X			X	X	X		X	X	X				
Equipment shelter(s) construction	X			X	X	X		X	X	X				
Diesel generator installation	X			X	X	X		X	X	X				
<b>Operations</b>														
Experimental research				X		X		X	X	X				
Diesel generator use	X			X	X									
<b>Decommissioning</b>														
Removal of materials	X			X	X	X		X	X	X				

Legend: [BLANK] = No Effect | [X] = Potential Significant Adverse Effect

**OPI Project File #:**

**Base file #:**

**DG IE GPS #:**

## **2.3 Description of Environmental Components**

### ***General Description***

The Project Study Area is located on Ellesmere Island, near the Fosheim Peninsula on the north shore of Slidre Fjord near the Eureka Weather Station, which is owned and operated by ECCC. The area is protected by hills, surrounded by low rolling country, and is in the vicinity of two rivers: Station Creek and Blacktop Creek (EC 2010).

The weather station, once used as a defense site during the cold war era, now houses researchers from a variety of disciplines that are completing experiments in the area. Research activity represents the most prevalent land use in the area.

The main operations building is a 16,000 square foot building built in 2004-2005. It includes offices, recreation area, TV room, laundry room, kitchen, pantry and dining room on the first floor and accommodations on the second floor. There are 19 rooms for accommodations in the complex. Normally the staff occupy between eight and nine rooms. Visitors are then housed in the remaining rooms (EC 2010).

Vehicles used onsite include 3/4-ton pickup trucks, tanker truck, passenger vans, snowmobiles, ATVs, and a Track Truck.

Detailed below is a description of the VECs as they pertain to the Study Area. Please note that a description of effects is included in Table 5 in Section 2.4 and is not discussed in this section.

### **2.3.1 Physical Components**

#### ***i) Atmosphere***

Due to its northern location, Eureka experiences periods of full daylight and full darkness. 24 hour daylight begins around April 13 and is typically present until August 28. The dark season typically runs from approximately October 21 to February 20. Transitional periods occur in spring when days draw longer and in fall when daylight hours decrease (EC 2010).

The temperature remains below zero for most of the year. July is the warmest month with a daily mean of 4 degrees Celsius. The record high is 20.7 degrees Celsius. The coldest month is February with a daily mean of -37 degrees Celsius. The record low is -55.3 degrees Celsius (EC 2010). Based on weather data from 1985-2015, the average annual high temperature is 10°C, and the average annual low temperature is -41°C, with a mean temp of -19°C. On July 3<sup>rd</sup>, 2018 the first day of the field assessment, the weather in Eureka had a high of 9.0°C and a low of 2.6°C. On July 5, 2018 the second day of the field assessment the high was 9.9 °C with a low of 2.3 °C (GC 2018).

The area around Eureka is classified as a desert and most of the precipitation is in the form of snow.

#### ***ii) Surface Water***

The Study Area is located approximately 1.4 km from a strait that connects to the Arctic Ocean. In early July 2018, there were small ponds and damp grassy areas near the centre of the runway. Ephemeral pools near the runway dry up over the course of the summer. The site is also in the vicinity of two rivers: Station Creek and Blacktop Creek (EC 2010); however, there are no wetlands or watercourses within the Study Area.

To supply Eureka with fresh water, a small man-made lagoon has been built beside Station Creek. During the spring runoff, the water from the creek is pumped into the lagoon and then treated and used throughout the station for drinking water (EC 2010).



**OPI Project File #:**

**Base file #:**

**DG IE GPS #:**

**iii) Groundwater**

Currently there are no groundwater supply sources in the Study Area, including allocations and licenses for permits to take water. As the Project will not involve any water taking or excavations, groundwater will not be impacted.

**iv) Soils and Geology**

The Study Area is located in the tundra, and the ground remains frozen year round (permafrost) with only the top few feet thawing in the summer to allow vegetation to grow (EC 2010).

The surrounding area is comprised of gentle rolling hills; however, mountainous terrain is easily visible from the station. A few kilometres to the north, Blacktop Ridge has peaks of up to 825 m. The rock formations around Eureka are quite unique, and the area is known for its Rose rocks and calcite formations (EC 2010).

Geological features of the area include glaciers, low mountains, and the Arctic Ocean. Soils consist of marine clays, overlain with fine sands.

**v) Ambient Noise**

It is anticipated that the main existing source of ambient noise in the vicinity of the proposed Project is the gravel airstrip and associated use by aircraft, with minor contributions from terrestrial vehicles such as ATVs and snowmobiles. Airport facilities are minimal and no fuel sales are available. Flights to and from Eureka are usually charted from Resolute Bay or Yellowknife.

During the light season there is an increase in aircraft activity into and around Eureka. The dark season sees a marked decrease and for many months the only plane is the monthly produce flight (EC 2010); thus noise from aircraft is negligible during the dark season.

**2.3.2 Biological Components**

**i) Terrestrial Animals and Habitat**

According to the 'Visitor's Guide to Eureka' (EC 2010), the wildlife around Eureka is plentiful.

*"Hares, foxes, wolves and muskoxen are often seen in and around the station. Seals can often be spotted sunning themselves on the ice during light season. Peary Caribou, Polar Bears and lemmings are seen occasionally, while weasels are spotted only once in a while.*

*The Arctic is a bird watchers paradise as many species come to nest or stop here for a while before continuing further north. Bird species sighted in the Eureka area include jaegers, Arctic terns, snow buntings, gulls, ptarmigan, snowy owls, ruddy turnstones, snow geese, ducks, Brandt's, hawks and ravens."*

On July 3 and July 5, 2018 the Study Area was traversed by one Golder biologist to identify potential biological constraints associated with the development of the Project. Potential constraints include the presence of species at risk and their habitat that are protected under the federal *Species at Risk Act* and/or natural heritage features such as wildlife sanctuaries or special management areas. Wildlife and wildlife sign were recorded and a detailed plant inventory was collected. Photographs were taken throughout the Study Area and are attached as Appendix A.

During the field investigation, the Golder biologist identified evidence of Arctic hare, Arctic fox, muskox, and Arctic wolf in the Study Area. An Arctic hare leveret was observed and six muskox and numerous other Arctic hare were observed to the south of the Study Area.

**OPI Project File #:**

**Base file #:**

**DG IE GPS #:**

Tracks of unknown bird species were observed in the Study Area. The tracks are likely from a ruddy turnstone or red knot based on the size of the tracks. A red knot and long-tailed jaeger were observed in the Study Area. A photo of the red knot can be seen in Photo 6 of Appendix A.

Incidental observations outside of the Study Area include common raven, snow bunting, Lapland longspurs, ruddy turnstones, glaucous gulls and long-tailed jaegers.

Table 2 provides an inventory of the wildlife species observed in the Study Area. All species are considered secure federally and territorially with the exception of the red knot, which have three subspecies that breed in Canada; *rufa*, *islandica* and *rosealari*. Of these three, only the *islandica* subspecies is known to summer on Ellesmere Island (COSEWIC 2007b).

**Table 2: Study Area Species Observations, Based on Field Work Completed in July 2018**

Common Name	Scientific Name	Type of Observation
<b>Birds</b>		
Ruddy Turnstone	<i>Arenaria interpres</i>	Tracks
Long-tailed Jaeger	<i>Stercorarius longicaudus</i>	Visual
Red Knot	<i>Calidris canutus islandica</i>	Visual
<b>Mammals</b>		
Muskox	<i>Ovibos moschatus</i>	Tracks, Scat
Arctic Hare	<i>Lepus arcticus</i>	Visual, Tracks, Scat
Arctic Wolf	<i>Canis lupus arctos</i>	Tracks, Scat
Arctic Fox	<i>Vulpes lagopus</i>	Scat

**ii) Aquatic Animals and Habitat**

The Study Area is located on a plateau with no water features nearby, therefore aquatic animals and habitat are not found within the Study Area.

**iii) Vegetation**

According to the 'Visitor's Guide to Eureka' (EC 2010), Eureka is known as the garden spot of the Arctic. Even though the climate is very dry with little precipitation and a short summer season, many colourful flowers manage to grow. The vegetation reflects a harsh environment where the growing season is short and there is always a chance of frost. The plants remain close to the ground and have a shallow root system due to the permafrost (EC 2010).

According to the guide, the variety of plants that may be found include purple saxifrage, mountain avens, locoweed, arctic poppies, daisies, arctic willow and dandelion.

Since permafrost restricts drainage, the ground becomes water logged and marshes develop. Arctic cotton is only found in these very wet areas (EC 2010).

During the Golder site visit in July 2018, vegetation in the Study Area was sparse, covering approximately 10% of the site. The vegetative community was dominated by cotton-grass and Arctic willow. A photo of Arctic willow is included as Photo 3 of Appendix A. The complete list of plants observed in the Study Area is provided in Table 3.

OPI Project File #:

Base file #:

DG IE GPS #:

**Table 3: Plant Species Observed in the Study Area during the Field Investigation**

<b>Common Name</b>	<b>Scientific Name</b>
Arctic Willow	<i>Salix arctica</i>
Mountain Sorrel	<i>Oxyria digyna</i>
Holmen's Dandelion	<i>Taraxacum holmenianum</i>
Mountain Avens	<i>Dryas integrifolia</i>
Woolly Lousewort	<i>Pedicularis lanata</i>
Arctic Cinquefoil	<i>Potentilla hyparctica</i>
Arctic Chickweed	<i>Cerastium articum</i>
Arctic Cotton-grass	<i>Eriophorum scheuchzeri</i>
Smooth Whitlow-grass	<i>Draba glabella</i>
Yellow Marsh Saxifrage	<i>Saxifraga hirculus</i>
Arctic Poppy	<i>Papaver radicum</i>
Arctic Campion	<i>Silene involucreta</i>
Anderson's Alkali Grass	<i>Puccinellia andersonii</i>
Elegant Sunburst Lichen	<i>Xanthoria elegans</i>
Map Lichen	<i>Rhizocarpon geographicum</i>

#### **iv) Species at Risk and Migratory Birds**

Based on the desktop screening, the Study Area is located within the ranges of a number of species at risk. The list of species at risk with potential to occur in the area surrounding Eureka, as well the assessment of the potential for the species or their habitat to occur on the Study Area, is listed in Table 4. This table includes species listed in one of the schedules within the *Species at Risk Act* (SARA), which have been designated as at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Species not protected by SARA may otherwise be protected through territorial or provincial legislation. In Nunavut, territorial designations or species at risk are protected under the *Wildlife Act*. Species designated as threatened or endangered by the *Wildlife Act* are offered protection under the Act for the species and its critical habitat.

The July 3 and 5, 2018, field investigations confirmed that habitat for the species at risk identified during the desktop screening is not present in the Study Area for most species at risk. However, there is potential for migratory and non-migratory birds to find habitat in the area.

The *Migratory Birds Convention Act 1994* (MBCA) provides protection for most species of birds found in Canada at the federal level. The MBCA was passed in 1917 and updated in 1994 and 2005 (Government of Canada 2018a). ECCC is responsible for providing protection for birds through the MBCA by implementing the Migratory Birds Regulations and the Migratory Bird Sanctuary Regulations (Gc2018b). Section 12 of the MBCA outlines the requirements for the protection of bird species from disturbance and destruction. As outlined in this section, capturing, killing, injuring, taking or disturbing migratory birds is a violation of the MBCA as is damaging, destroying, removing or disturbing the nests of migratory birds defined in the MBCA. Furthermore, Section 5 of the MBCA provides protection to aquatic habitats and other areas used by migratory birds. The release of substances into aquatic habitats or areas frequented by migratory birds or which flow into habitats frequented by migratory birds, which may cause harm to migratory birds, is a violation of the MBCA.

OPI Project File #:  
Base file #:  
DG IE GPS #:

**Table 4: Species at Risk in Nunavut**

Terrestrial Species at Risk <sup>(1)</sup>	COSEWIC Designation <sup>(2)</sup>	Schedule of SARA <sup>(2)</sup>	Government Organization with Primary Management Responsibility <sup>(3)</sup>	Habitat	Probability of Occurring in Study Area	Rational
Eskimo Curlew	Endangered	Schedule 1	ECCC	The breeding habitat consisted of treeless upland tundra with dwarf shrubs and grassy tundra meadows. During fall migration, these birds used a variety of coastal and terrestrial habitats. They fed in areas of crowberry, salt marsh, meadows, pastures, old fields, intertidal flats and sand dunes. In spring, curlews were found in tallgrass and eastern mixed-grass prairies, often in areas disturbed by recent fires, areas near water disturbed by grazing bison, and in cultivated fields (Environment Canada 2007). Present day habitat use is unknown.	Low	Last species observation occurred over 50 years ago.
Ivory Gull	Endangered	Schedule 1	ECCC	Associated with Arctic ice pack and drift ice (AOU 1983). Nests on steep cliffs of low rocky islets near ice or snow (AOU 1983); also in icefields or glaciers, on flat rocky areas, and on gravel-strewn floating ice islands (Johnson and Herter 1989).	Low	There is no suitable habitat within the Study Area to support this species.
Ross's Gull	Threatened	Schedule 1	ECCC	Nesting occurs in marshy wetlands along coastal lowlands or in wooded valleys, on islands in lakes, and on gravel reefs, often with arctic terns (Terres 1980, Johnson and Herter 1989, AOU 1998, Mallory et al. 2006). During the nonbreeding season, this gull is mostly pelagic.	Low	There is no suitable habitat within the Study Area to support this species.

OPI Project File #:  
Base file #:  
DG IE GPS #:

Terrestrial Species at Risk <sup>(1)</sup>	COSEWIC Designation <sup>(2)</sup>	Schedule of SARA <sup>(2)</sup>	Government Organization with Primary Management Responsibility <sup>(3)</sup>	Habitat	Probability of Occurring in Study Area	Rational
Harlequin Duck (eastern population)	Special Concern	Schedule 1	ECCC	Winters in rough coastal waters, especially along rocky shores or reefs; summering nonbreeders and immatures also occur in this habitat (Cassirer et al. 1993). Nests along fast-moving rivers and mountain streams on rocky islands or banks. Streams are braided to reticulate with many riffles and rapids (Cassirer et al. 1993). Requires relatively undisturbed, low gradient, meandering mountain streams with dense shrubby riparian areas (greater than 50% streamside shrub cover), and woody debris for nesting and brood rearing; also needs mid-stream boulders or log jams and overhanging vegetation for cover and loafing; indicator of high water quality (Spahr et al. 1991). Sometimes nests beside mountain lakes and lake outlets. Nests in a hollow, usually under the cover of bushes within about 30 m of water; also in rock crevice among boulders, in rock cavity in cliff face, in a tree cavity (Cassirer et al. 1993), in a puffin burrow, or similar hidden site; occasionally on open tundra (Ehrlich et al. 1992). Tends to breed in the same area in successive years.	Low	There is no aquatic habitat within the Study Area to support this species.
Rusty Blackbird	Special concern	Schedule 1	GN	Rusty blackbird breeds in swamps, fens, bogs and beaver ponds of boreal or mixed forests. It may also breed in dense vegetation along creeks, and on the edges of riparian forests or pasture edges (COSEWIC 2006). Edge habitat associated with disturbances such as clear cut or burn regeneration zones may be favoured. Rusty blackbirds nest in small trees or shrubs, close to, or over water. Nests may be in living or dead trees and stumps, but have also been found on the ground (Avery 2013).	Low	There is no suitable habitat within the Study Area to support this species.

OPI Project File #:  
Base file #:  
DG IE GPS #:

Terrestrial Species at Risk <sup>(1)</sup>	COSEWIC Designation <sup>(2)</sup>	Schedule of SARA <sup>(2)</sup>	Government Organization with Primary Management Responsibility <sup>(3)</sup>	Habitat	Probability of Occurring in Study Area	Rational
Felt-leaf Willow	Special concern	Schedule 1	GN	In the Athabasca Sand Dunes, this willow occurs on large, open, active sand dunes, primarily on the crests, leeward slope ridges, moister hollows, advancing edges, and in dune slacks. It also occurs as scattered individuals or small patches on the shallow shifting sands of gravel flats throughout the dune fields and sometimes on the broad sandy beaches and beach terraces of Lake Athabasca. Nothing is known about the location or the habitat of the Felt-leaf Willow at Pelly Lake, NT.	Low	No felt leaf willow were observed in the Study Area during the site investigation.
Peregrine Falcon	Special Concern (anatum-tundrius complex)	Schedule 1 – Threatened (anatum) Schedule 3 – Special Concern (tundrius)	GN	Peregrine falcon breeds in areas containing suitable nesting locations and sufficient prey resources. Such habitat includes both natural locations containing cliff faces (heights of 50 - 200 m preferred) and also anthropogenic landscapes including urban centers containing tall buildings, open pit mines and quarries, and road cuts. Peregrine falcons nest on cliff ledges and crevices and building ledges. Nests consist of a simple scrape in the substrate (COSEWIC 2007a).	Low	No cliffs are present in the Study Area
Short-eared Owl	Special Concern	Schedule 1	GN	Short-eared owl breeds in a variety of open habitats including grasslands, tundra, bogs, marshes, clearcuts, burns, pastures and occasionally agricultural fields. The primary factor in determining breeding habitat is proximity to small mammal prey resources (COSEWIC 2008). Nests are built on the ground at a dry site and usually adjacent to a clump of tall vegetation used for cover and concealment (Gahbauer 2007).	Low	Tall vegetation suitable for nesting sites was absent from the Study Area during the site investigation.
Peary Caribou	Threatened	Schedule 1	GN	During the summer, Peary caribou are found in areas where the vegetation is most dense, such as the slopes of river valleys and upland plains. During the winter, they inhabit areas where the snow cover is not as deep, such as beach ridges and rock outcrops. Peary caribou migrate between summer and winter ranges, sometimes moving between islands.	Low	No evidence of this species was observed during the site investigation. Anecdotal evidence collected from long-time weather station staff indicate that the presence of caribou is uncommon in the area.

OPI Project File #:  
Base file #:  
DG IE GPS #:

Terrestrial Species at Risk <sup>(1)</sup>	COSEWIC Designation <sup>(2)</sup>	Schedule of SARA <sup>(2)</sup>	Government Organization with Primary Management Responsibility <sup>(3)</sup>	Habitat	Probability of Occurring in Study Area	Rational
Barren Ground Caribou	Threatened	No Schedule	GN	Most barren ground caribou populations migrate seasonally from the tundra to more forested areas of the boreal forest. The remaining non-migratory barren ground caribou populations live and breed in the tundra year-round. With the exception of the Dolphin and Union population which migrates within the tundra.	Low	No evidence of this species was observed during the site investigation. Anecdotal evidence collected from long-time weather station staff indicate that the presence of caribou is uncommon in the area.
Polar Bear	Special Concern	Schedule 1	GN	The polar bear frequents the southern edge of the multi-year pack ice of the Arctic Ocean (the ice-covered waters surrounding the North Pole). It is commonly found in coastal areas and in the channels between the islands and archipelagos of the Arctic. The type and extent of the sea ice are the main factors that determine the quality of polar bear habitat. Because the sea ice provides access to the bears' main prey species, the distribution of the bears in most areas follows the seasonal extent of the sea ice. The species' habitat is closely associated with that of its preferred prey, the ringed seal, which lives exclusively in association with sea ice for at least part of the year.	Low	The Study Area is located relatively far from the coast and polar bear are unlikely to travel that far inland during summer months when ice is broken up. No evidence of polar bear was observed during the site investigation and anecdotal evidence collected from long-time weather station staff indicate that polar bears are very uncommon in the area.

OPI Project File #:  
Base file #:  
DG IE GPS #:

Terrestrial Species at Risk <sup>(1)</sup>	COSEWIC Designation <sup>(2)</sup>	Schedule of SARA <sup>(2)</sup>	Government Organization with Primary Management Responsibility <sup>(3)</sup>	Habitat	Probability of Occurring in Study Area	Rational
Red Knot (rufa subspecies)	Endangered	Pending Schedule 1	ECCC	Knots nest on barren habitats such as windswept ridges, plateaus or slopes that are usually dry south-facing locations that may be located near wetlands or lake edges (COSEWIC 2007b). An analysis of breeding ground characteristics of central arctic breeding knots found that knots generally were observed at elevations of less than 150 m above sea level, less than 50 m from the coast and in areas of less than 5% vegetation (COSEWIC 2007b). According to COSEWIC (2007b) the Red Knot rufa subspecies breeds on islands of the central Arctic exclusively. The majority of red knots overwinter in Tierra del Fuego, Argentina and migrate to the Canadian Arctic each spring for a short breeding season, before heading south again in the fall. During migration, they stop at several staging sites to rest and re-fuel before continuing their journey. Knots use different habitats and food sources on breeding, wintering and staging grounds. On their wintering and migration stopover sites, they inhabit intertidal areas, salt marshes, and brackish lagoons, wherever they can find molluscs and other invertebrates that form the main part of their diet (COSEWIC 2007b).	Low	The Study Area does not provide much habitat for foraging as the pools are ephemeral and dry up by mid-summer. No evidence of bird nesting was observed present on the site during the site investigation.



OPI Project File #:  
Base file #:  
DG IE GPS #:

Terrestrial Species at Risk <sup>(1)</sup>	COSEWIC Designation <sup>(2)</sup>	Schedule of SARA <sup>(2)</sup>	Government Organization with Primary Management Responsibility <sup>(3)</sup>	Habitat	Probability of Occurring in Study Area	Rational
Red Knot (islandica subspecies)	Special Concern	Schedule 1	ECCC	Knots nest on barren habitats such as windswept ridges, plateaus or slopes that are usually dry south-facing locations that may be located near wetlands or lake edges (COSEWIC 2007b). An analysis of breeding ground characteristics of central arctic breeding knots found that knots generally were observed at elevations of less than 150 m above sea level, less than 50 m from the coast and in areas of less than 5% vegetation (COSEWIC 2007b). (COSEWIC 2007b).	High	The Study Area does not provide suitable breeding habitat for this species. The average elevation of the Study Area is 256 m above sea level and the Study Area is 2.8 km from the coast.  Though an individual was observed foraging, no evidence of bird nesting was observed during the site investigation. COSEWIC (2007b) maintains that foraging habitats can be up to 10 km from the nest and in damp or barren areas.
Porsild's Bryum	Threatened	Schedule 1	GN	Porsild's Bryum appears to have very specific, narrow microsite requirements. In all sites where it is found, the species occurs in microsites that remain damp or wet from either seepage or splash (Brassard & Hedderson 1983). Cleavitt (2002) also noted that, at the Whitehorse Creek and Mountain Park study sites, the microsites became dry with the onset of winter freezing. A similar observation was noted by Flowers (1973) for populations in Utah. This suggests that the species may be physiologically adapted to, and even require, a period of winter desiccation.	Low	Habitat in the Study Area is described as polar desert. Moist microclimatic conditions required by this species are absent from the Study Area.

OPI Project File #:  
Base file #:  
DG IE GPS #:

Terrestrial Species at Risk <sup>(1)</sup>	COSEWIC Designation <sup>(2)</sup>	Schedule of SARA <sup>(2)</sup>	Government Organization with Primary Management Responsibility <sup>(3)</sup>	Habitat	Probability of Occurring in Study Area	Rational
Horned Grebe (Western population)	Special Concern	Schedule 1	ECCC	Horned grebe breeds in small freshwater ponds, marshes or lake inlets, which includes man-made ponds. Preferred habitat has a mixture of open water and emergent vegetation and is usually less than 10 ha in size. The horned grebe builds a cryptic floating nest in the shallows not far from open water (Hoar 2007).	Low	No aquatic or wetland habitat was present in the Study Area. Ephemeral pools are present in the Study Area but not suitable for nesting.
Grizzly Bear	Special Concern	Schedule 1	GN	Now found mostly in arctic tundra, alpine tundra, and subalpine mountain forests. Once found in a wide variety of habitats including: open prairie, brushlands, riparian woodlands, and semidesert scrub. Ranges widely at the landscape level. Most populations require huge areas of suitable habitat. Common only where food is abundant and concentrated (e.g., salmon runs, caribou calving grounds). Typically digs own hibernation den, usually on steep northern slope where snow accumulates. See LeFranc et al. (1987).	Low	No evidence of this species was observed during the site investigation. The Study Area lacks suitable denning habitat.
Wolverine (Western population)	Special Concern	Schedule 1	GN	Wolverine inhabit alpine and arctic tundra, boreal and mountain forests (primarily coniferous). Habitat is limited to mountains in the south, especially large wilderness areas. They usually occur in areas with snow on the ground in winter. Riparian areas may be important winter habitat. They may disperse through atypical habitat. When inactive, the wolverine occupies den in cave, rock crevice, under fallen tree, in thicket, or similar site. Young are born in a den among rocks or tree roots, in hollow log, under fallen tree, or in dense vegetation, including sites under snow.	Low	No evidence of this species was observed during the site investigation. The Study Area lacks suitable denning habitat.
Atlantic Cod, Arctic Lakes	Special Concern	No schedule	DFO	Requires marine habitat	Low	No aquatic habitat is present within the Study Area.
Atlantic Walrus	Special Concern	No Schedule	DFO	Requires marine habitat	Low	No aquatic habitat is present within the Study Area.

**OPI Project File #:**  
**Base file #:**  
**DG IE GPS #:**

Terrestrial Species at Risk <sup>(1)</sup>	COSEWIC Designation <sup>(2)</sup>	Schedule of SARA <sup>(2)</sup>	Government Organization with Primary Management Responsibility <sup>(3)</sup>	Habitat	Probability of Occurring in Study Area	Rational
Beluga Whale (Cumberland Sound population)	Threatened	Schedule 1	DFO	Requires marine habitat	Low	No aquatic habitat is present within the Study Area.
Beluga Whale (Eastern Hudson Bay population)	Endangered	No Schedule	DFO	Requires marine habitat	Low	No aquatic habitat is present within the Study Area.
Beluga Whale (Eastern High Arctic – Baffin Bay population)	Special Concern	No Schedule	DFO	Requires marine habitat	Low	No aquatic habitat was present within the Study Area.
Bowhead Whale (eastern Canada – West Greenland population)	Special Concern	No Schedule	DFO	Requires marine habitat	Low	No aquatic habitat is present within the Study Area.
Killer Whale (Northwest Atlantic / Eastern Arctic populations)	Special Concern	No Schedule	DFO	Requires marine habitat	Low	No aquatic habitat is present within the Study Area.
Narwhal	Special Concern	No Schedule	DFO	Requires marine habitat	Low	No aquatic habitat is present within the Study Area.

**Notes:**

- <sup>1)</sup> The Department of Fisheries and Oceans (DFO) has responsibility for aquatic species.
- <sup>2)</sup> GC 2018c – Accessed August 2018
- <sup>3)</sup> ECCC has a national role to play in the conservation and recovery of species at risk in Canada, as well as responsibility for management of birds described in the *Migratory Birds Convention Act, 1994* (MBCA). Day-to-day management of terrestrial species is not covered in the MBCA and is the responsibility of the Government of Nunavut (GN). Populations that exist in Nunavut National Parks are also managed under the authority of the Parks Canada Agency.

**OPI Project File #:**

**Base file #:**

**DG IE GPS #:**

### **2.3.3 Social and Cultural Components**

#### **i) Land Use**

The Project Study Area assessed is federally owned and will be used as to accommodate equipment shelter(s), a diesel generator, and an antenna array to conduct experiments and gather data regarding how radio transmissions are reflected by the changing ionosphere. There are currently no other known land uses in the immediate area of the proposed the antenna array. The wider Study Area (Figure 1) includes the following existing structures:

- Center-west of the Study Area contains two very high frequency (VHF) radars. One radar is a meteor tracking radar and the other is a wind profiler radar.
- East part of Study Area contains a scaffold tower with sensors to measure ground reflectivity.

To the west of the Study Area is an area used for fuel storage and aircraft operations. The southern edge of the Study Area is bound by the Eureka weather station runway.

During the July 2018 field survey, discarded barrels and tangles of heavy gauge wire were observed in three locations approximately 50 m from the runway.

#### **ii) Parks and Recreational Areas**

Eureka's proximity to Axel Heiberg Island and Ellesmere Island National Park Reserve (named Quttinirpaaq National Park in 2001) makes it a major starting point for the many scientific and tourist expeditions in the area during the summer months. Encompassing Canada's northernmost lands, Quttinirpaaq National Park, north of the Study Area, covers 37,775 km<sup>2</sup> on northern Ellesmere Island (EC 2010). In addition, Eureka is the farthest north permanent civilian site; therefore, Eureka facilities are used for many expeditions to the North Pole. The re-supply planes for the expeditions must refuel at Eureka (EC 2010).

According to the Visitor's Guide to Eureka, the vicinity of Eureka offers beautiful scenery for the hiker and photographer, and fossils, rocks and Arctic flowers can be collected.

Eureka itself however, is not intended to be used for recreational purposes and before being permitted to visit Eureka, all visitors must first obtain permission from ECCC (EC 2010).

Hunting of animals or birds is not permitted without a license from the territorial government or a local Hunter's and Trapper's Association. Likewise, a fishing license must be purchased from the Wildlife Officer in Resolute. (EC 2010).

#### **iii) Population**

The proposed Project is proposed in Eureka, which is approximately 420 kilometres from Grise Fiord, the nearest community.

The population of Eureka, which is located approximately 2 km southwest from the Study Area, comprises approximately 11 people, which includes staff from the weather station (Meteorological Service of Canada [MSC]) and the Canadian Network for the Detection of Atmospheric Change (CANDAC).

In addition, DND occupies a facility at the air strip during the short summer season to do maintenance on the communication system and other infrastructure. This can increase the population by 25 to 40 personnel at certain times of the season (EC 2010).

In addition, researchers and visitors are periodically housed in the main complex (EC 2010).

**OPI Project File #:**

**Base file #:**

**DG IE GPS #:**

***iv) Cultural Resources***

Archaeological evidence has placed inhabitants in the High Arctic and Northwest Greenland since 2000 BCE. Traditionally, the indigenous peoples of Nunavut relied on trapping, hunting, and fishing for clothing and food, and lived in igloos, semi-subterranean houses or animal skin tents (Rea 2017).

There are not any known sites of Indigenous archaeological or cultural significance present in the vicinity of the Study Area.

The Project does not fall under the prohibition requirements for Class A or Class B Archeology and Palaeontology permits as no fuel storage, or leveling or grading of the site will be conducted (Stenton 2003). As these permits are not required, an archeological assessment was not undertaken.

From a Euro-Canadian history, Eureka was the first JAWS (Joint Arctic Weather Station) site, established on April 7, 1947. Many of the permanent buildings and the airstrip date back to that origin of the site. The buildings and infrastructure that were once used during the cold war era have since been transformed to the weather and research station.

OPI Project File #:  
Base file #:  
DG IE GPS #:

## 2.4 Project Effects and Associated Mitigation Measures

**Table 5: Potential Effects of the Project on each Valued Ecosystem Component with Mitigation Measures**

VEC(s) Affected	Project Component(s)	Description of Effects	Mitigation Measures	Are residual significant adverse effects likely?
Atmosphere	<ul style="list-style-type: none"> <li>Construction (installation of antennas, diesel generator and equipment shelter(s))</li> <li>Operations (research, diesel generator)</li> <li>Decommissioning (removal of materials)</li> </ul>	<ul style="list-style-type: none"> <li>There is potential for adverse impacts to air quality from dust generation and dispersion during construction, operations and decommissioning, as well as emissions from engine idling, and exhaust from aircraft, diesel generator, or other terrestrial vehicles (e.g., trucks and snowmobiles) going to and from the site (2 km round trip) during all phases.</li> </ul>	<ul style="list-style-type: none"> <li>Engine idling is to be minimized.</li> <li>A forced-air fuel fired incinerator will be used to incinerate combustible garbage and debris.</li> <li>Combustible garbage and debris (except petroleum products) will be burned in a container acceptable to a Land Use Inspector.</li> <li>Dispose of all combustible waste petroleum products by removal.</li> </ul>	No. Effects would be limited to a small geographical area within the Project Study Area and with a low probability of extending beyond the Project area. The potential adverse impacts are considered to be of low magnitude, short-term, and reversible, though the impact of greenhouse gas (GHG) emissions are considered irreversible.
Ambient Noise	<ul style="list-style-type: none"> <li>Construction (installation of antennas, diesel generator and equipment shelter(s))</li> <li>Operations (research, diesel generator)</li> <li>Decommissioning (removal of materials)</li> </ul>	<ul style="list-style-type: none"> <li>Aircrafts, terrestrial vehicles and the diesel generator may cause auditory and visual disturbances to wildlife; however, the Project is not anticipated to result in a measurable increase above the current baseline.</li> </ul>	<ul style="list-style-type: none"> <li>All vehicles must be fitted with standard and well-maintained noise suppression devices</li> </ul>	No. Effects would be limited to a small geographical area within the Project Study Area and with a low probability of extending beyond the Project area. The potential adverse impacts are considered to be of low magnitude, short-term, and reversible.

OPI Project File #:  
Base file #:  
DG IE GPS #:

VEC(s) Affected	Project Component(s)	Description of Effects	Mitigation Measures	Are residual significant adverse effects likely?
Soils and Geology	<ul style="list-style-type: none"> <li>Construction (installation of antennas, diesel generator and equipment shelter(s))</li> <li>Operations (research, diesel generator)</li> <li>Decommissioning (removal of materials)</li> </ul>	<ul style="list-style-type: none"> <li>There is potential for adverse effects to ground stability, vegetation health, soil quality, terrain, and permafrost from the establishment of the antenna array, construction activities, and overland transportation via the use of terrestrial vehicles. Specifically: <ul style="list-style-type: none"> <li>Even normal operation of an all-terrain vehicle on the tundra can damage the thin layer of organic material, rendering it incapable of sustaining vegetation.</li> <li>Tracks left by vehicles can persist on the tundra for decades.</li> <li>Damage to permafrost can cause long-term adverse effects such as differential settlement, terrain instability, and erosion.</li> <li>Use of vehicles on exposed soil may result in soil compaction or rutting, which could contribute to soil erosion during snow melt in late spring and early summer.</li> <li>Accidental spills during refuelling of the diesel generator may result in soil contamination.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Ensure that the temporary equipment shelter(s) is installed on wood blocks, a platform on the tundra or durable land (i.e., gravel).</li> <li>Operate vehicles in a responsible manner by avoiding the unspoiled tundra.</li> <li>Do not move any equipment or vehicles unless the ground surface is in a state capable of fully supporting the equipment or vehicles without rutting or gouging.</li> <li>Suspend overland travel of equipment or vehicles if rutting occurs.</li> <li>Upon completion of Project activities complete all cleanup and undertake restoration of any disturbed areas to a stable state (may include natural reclamation)</li> <li>Follow appropriate refueling procedures for vehicles.</li> <li>Have a spill response plan on site, which includes appropriate storage measures, spill response measures, equipment requirements, and overall handling procedures for the management of fuel and chemicals.</li> <li>Use drip pans or equivalent device when refueling equipment on-site, The Permittee shall ensure that an appropriate spill kit be readily available during transfer of any fuel.</li> </ul>	No. Effects would be limited to small geographic area, with potential adverse effects anticipated to be low in magnitude, infrequent in occurrence and reversible in nature.

OPI Project File #:  
Base file #:  
DG IE GPS #:

VEC(s) Affected	Project Component(s)	Description of Effects	Mitigation Measures	Are residual significant adverse effects likely?
			<ul style="list-style-type: none"> <li>All spills will be reported immediately in accordance with instructions contained in "Spill Report" from NWT 1752(05/93). Twenty-four (24) hour spill report line 98670 920-8130.</li> <li>Construct a dyke around each stationary fuel container or group of fuel containers where any has a capacity exceeding 4,000 litres.</li> </ul>	
Terrestrial Animals and Habitat	<ul style="list-style-type: none"> <li>Construction (installation of antennas, diesel generator, and equipment shelter(s))</li> <li>Operations (research)</li> <li>Decommissioning (removal of materials)</li> </ul>	<ul style="list-style-type: none"> <li>The proposed activities may take place within habitats and seasonal ranges for wildlife species such as muskox, migratory birds and non-migratory birds, it is possible that wildlife avoidance may temporarily change the distribution of wildlife species in the area</li> <li>Potential adverse impacts to terrestrial wildlife, migratory birds, non-migratory birds, and their associated habitats due to increased noise generated from construction activities for the establishment of the antenna array, aircraft transportation, and overland transportation using pickup trucks and snowmobiles.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that all field personnel are made aware of the measures in place to protect wildlife and are provided training and/or advice on how to implement these measures.</li> <li>Cease activities that may interfere with the movement or calving of muskox, until the muskox have left the area.</li> <li>Keep all wastes inaccessible to wildlife at all times. Keep all garbage and debris in bags placed in a covered metal container and bring back to the station until disposed of at an approved facility.</li> <li>Do not feed or harass wildlife.</li> <li>Ensure that aircraft avoid flying directly over animals and do not, unless for emergency, touch-down in areas where wildlife are present.</li> <li>Prohibit hunting onsite by all personnel.</li> <li>Avoid walking through or near wetlands or damp muddy areas.</li> </ul>	No. Effects would be limited to small geographic area, with potential adverse effects anticipated to be low in magnitude, infrequent for the duration of the Project, or short to moderate duration, and reversible in nature.



OPI Project File #:  
Base file #:  
DG IE GPS #:

VEC(s) Affected	Project Component(s)	Description of Effects	Mitigation Measures	Are residual significant adverse effects likely?
			<ul style="list-style-type: none"> <li>Do not unnecessarily damage wildlife habitat in conducting this Project.</li> <li>During the period of May 15 to July 15, when caribou are observed within 1 km of project operations, the Permittee shall suspend all operations, including low-level over flights. Following July 15, if caribou cows or calves are observed within a 1 km of operations all operations in the vicinity will be suspended.</li> </ul>	
Vegetation	<ul style="list-style-type: none"> <li>Construction (installation of antennas, diesel generator, and equipment shelter(s))</li> <li>Operations (research)</li> <li>Decommissioning (removal of materials)</li> </ul>	<ul style="list-style-type: none"> <li>There is potential for adverse effects to vegetation health from direct damage or damage to soil quality from equipment and use of vehicles on site.</li> </ul>	<ul style="list-style-type: none"> <li>Facilities should be sited to minimize disturbance to vegetation.</li> <li>Refer to the mitigation measures for the Soils and Geology VEC.</li> </ul>	No. Effects would be limited to small geographic area, with potential adverse effects anticipated to be low in magnitude, infrequent in occurrence (due to the short duration of the Project) and reversible in nature.
Species at Risk and Migratory Birds	<ul style="list-style-type: none"> <li>Construction (installation of antennas, diesel generator, and equipment shelter(s))</li> <li>Operations (research)</li> <li>Decommissioning (removal of materials)</li> </ul>	<ul style="list-style-type: none"> <li>A red knot (a species at risk bird) was observed foraging in the Study Area during the field investigation. It is possible that the proposed activities may take place within habitats and seasonal ranges for other species at risk.</li> <li>While it is not predicted that there will be direct impacts to habitat, it is possible that wildlife avoidance may temporarily change the distribution of wildlife species in the area during Project activities.</li> </ul>	<ul style="list-style-type: none"> <li>Prior to construction, conduct an area search for evidence of nesting using non-intrusive search methods (i.e., a non-intrusive breeding bird survey).</li> <li>Comply with ECCC's <u>Avoidance Guidelines</u> to reduce the risk of incidental take of migratory birds, nests and eggs, and to help make proactive avoidance and mitigation</li> </ul>	No. Effects would be limited to small geographic area, with potential adverse effects anticipated to be low in magnitude, infrequent in occurrence (due to the short duration of the Project) and reversible in nature.

OPI Project File #:  
Base file #:  
DG IE GPS #:

VEC(s) Affected	Project Component(s)	Description of Effects	Mitigation Measures	Are residual significant adverse effects likely?
		<ul style="list-style-type: none"> <li>Refer to the adverse effects identified for the Terrestrial Animals and Habitat VEC.</li> </ul>	<p>decisions for any activities that might affect migratory birds. For example:</p> <ul style="list-style-type: none"> <li>Do not disturb or destroy the nests or eggs of any birds.</li> <li>Refer to ECCC's guidance on buffer zone and setback distances, and avoid areas where active nests of any birds are discovered (i.e., with eggs or young), until nesting is complete and the young have left the nest.</li> <li>Minimize activities during periods when birds are particularly sensitive to disturbance such as migration, nesting and moulting.</li> <li>Ensure aircraft avoid excessive hovering or circling over areas where bird presence is likely.</li> <li>Activities such as construction, operations, and decommissioning should not take place during the breeding season on structures where migratory birds are nesting, as there is a risk of disturbing or destroying eggs or nestlings.</li> <li>Also refer to the mitigation measures identified for the Terrestrial Animals and Habitat VEC.</li> </ul>	

OPI Project File #:  
Base file #:  
DG IE GPS #:

VEC(s) Affected	Project Component(s)	Description of Effects	Mitigation Measures	Are residual significant adverse effects likely?
Land Use	<ul style="list-style-type: none"> <li>Construction (installation of antennas, diesel generator, and equipment shelter(s))</li> <li>Operations (research)</li> <li>Decommissioning (removal of materials)</li> </ul>	<ul style="list-style-type: none"> <li>During the course of the Project, the land use of the Study Area will change from having no infrastructure to being developed into a temporary antenna array. After the Project's approximately five years of operation, the Study Area will return back to its original undeveloped state.</li> <li>Overall, the effects Project activities are compatible with the surrounding land uses primarily associated with research and the ECCC weather station.</li> <li>Due to the current land use, it is not anticipated that the Project activities will interfere with wildlife harvesting or traditional land use activities as they do not currently occur in the Study Area.</li> </ul>	<ul style="list-style-type: none"> <li>Inform any potentially interested parties about the Project proposal prior to its commencement</li> <li>Obtain all permits required prior to the commencement of the Project and comply with all conditions</li> <li>Operate the site in accordance with all applicable Acts, Regulations and Guidelines.</li> <li>Ensure that the land use is kept clean and tidy at all times.</li> <li>Remove obstructions to natural drainage caused by any part of this land use operation.</li> <li>Immediately cease any activity should a suspected archeological, palaeontological, or burial site be discovered during the course of a land use operation.</li> <li>Ensure all persons are aware of conditions pertaining to archaeological sites and artifacts as was as paleontological sites and fossils.</li> </ul>	No. Effects would be limited to small geographic area, with potential adverse effects anticipated to be low in magnitude, infrequent in occurrence and reversible in nature.

**OPI Project File #:**

**Base file #:**

**DG IE GPS #:**

## **2.5 Public Participation**

Due to the remoteness of the Study Area and the compatibility of the Project with the current use of the location for research purposes, no public participation on the Project has occurred to date. Based on past activities and reviews for previous Land Use Permits at Eureka, no public concerns are anticipated as a result of the Project.

## **2.6 Aboriginal Community Engagement**

Due to the remoteness of the Study Area and the compatibility of the Project with the current use of the location for research purposes, no Indigenous engagement regarding the Project has occurred to date.

Based on past Projects and reviews for previous Land Use Permits at Eureka, no comments are anticipated to be received with respect to Inuit Qaujimajatuqangit or traditional and community knowledge in relation to the proposed Project, and no comments or concerns are anticipated as a result of the Project.

## **2.7 References and Expertise from Other Federal Government Bodies**

DRDC personnel provided input to this EED with regard to the Project components and Project location, and specifically in facilitating the field investigation of the Study Area in July 2018. EEEEC staff at the weather station also provided anecdotal information during the field investigation.

## **2.8 Conclusion**

As the Project would involve temporary works at an existing research station, the nature of potential environmental effects is considered to be well-known. Potential adverse effects are likely to be localized, of low magnitude, and short-term. Based on past evidence of similar scope of activities, potential adverse effects will be reversed following Project closure and effects mitigated with the measures identified.

Thus, the construction, operation and decommissioning of the equipment shelter(s), diesel generator and antenna array may result in temporary environmental effects; however, taking into consideration the mitigation measures identified, it is predicted that no significant adverse residual effects will occur as a result of the Project. In addition, this Project is not likely to result in cumulative impacts.

OPI Project File #:

Base file #:

DG IE GPS #:

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### **Environmental Effects Determination**

**On the basis of this EED Report, it has been determined that the impact of this Project on the environment is as follows (indicate with an X):**

- EED terminated with no determination. Project **cannot** proceed. [    ]
- Project is not likely to cause significant adverse environmental effects. [ X ]  
The Project **can** proceed with application of the mitigation measures specified in the interaction tables in this report.
- The Project is likely to cause significant adverse environmental effects. [    ]  
The Project **cannot** proceed.
- Refer the Project, through the chain of command and **only on the recommendation of Environmental Command and DG IE GPS**, to Governor in Council for a decision on whether the Project is justified to proceed. [    ]

#### **EED Report Prepared by:**

**Name:** Leah Gold, Golder Associates Ltd.

**Title:** Environmental Assessment Specialist



Signature

27-09-2018

Date (dd-mm-yyyy)

#### **EED Report Reviewed by:**

**Name:** Tamara Skillen, Golder Associates Ltd.

**Title:** Sr. Environmental Assessment Specialist, Associate



Signature

27-09-2018

Date (dd-mm-yyyy)

#### **EED Report Accepted and Approved by:**

The undersigned accepts the determination and recommendations of this environmental effects determination report. The undersigned also accepts the responsibility to incorporate the recommendations of the report into the Project design and implementation.

**Name:**

**Title:**

Signature

Date (dd-mm-yyyy)

**OPI Project File #:**  
**Base file #:**  
**DG IE GPS #:**

## **Appendix A**

### Site Photos





Photo 1: Looking North West from Center of Study Area.



Photo 2: Looking to the East across Study area.





Photo 3: Arctic Willow



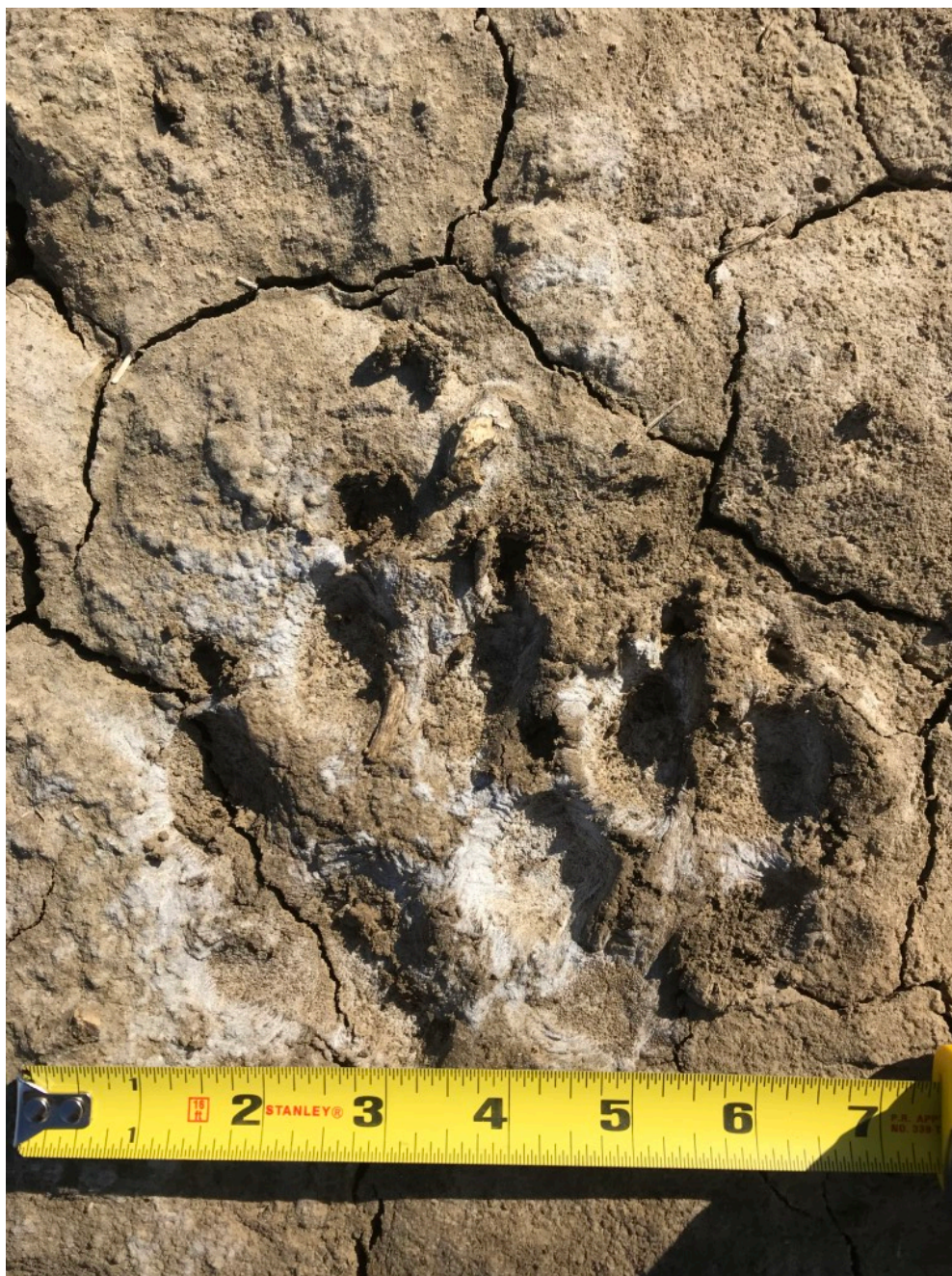


Photo 4: Arctic Wolf paw prints





Photo 5: Mountain Sorrel





Photo 6: Red knot



Photo 7: Looking North from Southern boundary of the Study Area. Muskox scat in Foreground.