Table 6-8: Vegetation species identified at Ekalugad Fjord		
Family	**Scientific Name**	**Common Name**
Cyperaceae (Sedge Family)	*Carex bigelowii* Torr.	
	Carex misandra R.Br.	
	Eriophorum scheuchzeri Hoppe	Cottongrass
	Eriophorum triste (Th.Fr.) Hadac & Love	Cottongrass
Juncaceae (Rush Family)	*Juncus castaneus* Sm.	
	Juncus biglumis L.	
	Luzula confusa Lindebl.	
Salicaceae (Willow Family)	*Salix arctica* Pall. *s.lat.*	Arctic Willow
	Salix herbacea L.	Least Willow
Polygonaceae (Buckwheat Family)	*Oxyria digyna* (L.) Hill	Mountain Sorrel
	Polygonum viviparum L.	Bistort
Caryophyllaceae (Pink Family)	*Cerastium alpinum* L. *s.lat.*	Mouse-ear Chickweed
	Cerastium sp.	
	Silene acaulis L. ssp. *acaulis*	Moss-campion
Ranunculaceae (Crowfoot Family)	*Ranunculus nivalis* L.	
	Ranunculus sabinii R.Br.	Buttercup
Papaveraceae (Poppy Family)	*Papaver radicatum* Rottb.	Arctic Poppy
Brassicaceae (Mustard Family)	*Draba alpina* L.	
	Draba fladnizensis Wulf.	
	Draba nivalis Lilj. var. *elongata* Wats.	
Saxifragaceae (Saxifrage Family)	*Saxifraga cernua* L.	
	Saxifraga nivalis L.	Alpine Saxifrage
	Saxifraga oppositifolia	Purple Saxifrage
Rosaceae (Rose Family)	*Dryas integrifolia* M. Vahl	Mountain Avens
	Potentilla hyparctica Malte var. *hyparctica*	Cinquefoil
	Potentilla pulchella R.Br.	Cinquefoil
	Potentilla vahliana	Cinquefoil
Ericaceae	*Arctostaphylos alpina* (L.) *Spreng.*	Alpine Bear Berry
	Cassiope tetragona (L.) D.Don ssp. *tetragona*	Arctic White Heather
	Vaccinium uliginosum L. spp. *pubescens* (Wormsk.) Young	Blueberry
Scrophulariaceae (Figwort Family)	*Pedicularis hirsuta* L.	Hairy Lousewort

6.6.2 Terrain Impact Assessment

6.6.2.1 Study Area Boundaries

The spatial boundary for the assessment of the effects of project activities on the terrain of the area include the area immediately surrounding the FOX-C Intermediate DEW Line Site facilities. The temporal boundary is the remediation field work period as well as the additional monitoring period following completion of the project.

The administrative boundaries for the assessment refer to the jurisdictions within which and for which the assessment is being prepared. In this case, the assessment is being prepared under CEAA and NIRB for review by other federal and territorial departments following the CEAA process with additions to meet the NIRB requirements. Technical boundaries of the terrain assessment are the lack of site-specific terrain data and the limited time frame associated with the environmental screening.

6.6.2.2 Identification of Issues, Interactions and Potential Effects

An alteration in the ability of the local terrain to support native plants may result from the remediation activities. The majority of the terrain in the immediate vicinity of the site facilities is already heavily disturbed. Efforts have been made to locate borrow sources and new landfills within or close to the footprint of the facility site. Clean up and remediation of the site will allow for revegetation to occur. The dwarf shrub-lichen association would likely recolonize in the area, however given the harsh growing conditions of the area this may not be noticed for a number of years.

Most of the waste appears to have been deposited directly on the ground and only minor quantities have been buried. The excavation required for the development and subsequent closure of the new landfills and the closure of existing landfills has the potential to degrade permafrost. Efforts will be made to minimize re-grading of the site. The removal of site debris has the potential to further disturb the existing terrain. However, terrain and drainage will be improved as a result of grading disturbed areas to blend in to the natural environment.

Local vegetation may be affected by fugitive dust during the clean up and remediation activities. Mitigation measures used to reduce the levels of fugitive dust should reduce impacts to local vegetation.

The extraction of granular material will alter the terrain of borrow areas, and the movement of contractor's equipment and personnel around the site has the potential to disturb the tundra. Additionally, the excavation and removal of contaminated soil has the potential to degrade the permafrost.

Table 6-9 is an environmental assessment matrix for the Terrain VEC.

6.6.2.3 Mitigation

Excavation required for the development and subsequent closure of the new landfills and closure of existing landfills has the potential to degrade permafrost, however, project activities will be conducted to ensure that the time that the permafrost is exposed is minimized. Additionally, the surface area of exposed permafrost or active zone will be minimized.

The removal of site debris has the potential to further disturb the existing terrain however, the disturbed areas will be re-graded and reshaped to match existing terrain and drainage paths. Unless required for drainage purposes (i.e., landfill cap), smoothing and contouring of the surface will be minimized in order to create microsites that will encourage vegetation growth. During the remediation activities, vehicles and workers will use existing tracks for travel, whenever possible. Terrain and drainage will be improved on previously disturbed areas as a result of grading to blend into the natural environment.

The extraction of granular material will alter the terrain of borrow areas, however these will be re-graded and reshaped to match existing terrain and drainage paths. The excavation and removal of contaminated soil has the potential to degrade the permafrost, however project activities will be carried out to ensure that the time the permafrost is exposed is minimized, and to minimize the exposed surface are of permafrost or the active zone.

Mitigation measures to reduce to levels of fugitive dust will also benefit local terrestrial vegetation.

Table 6-9: Environmental Effects Assessment Matrix: Terrain

Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	Evaluation Criteria for Assessing Environmental Effects				
			Magnitude	Geographic Extent	Duration/Frequency	Reversibility	Ecological/Socio-Cultural and Economic Context
Landfill Development / Closure	Excavation required for the development and subsequent closure of the new landfills and closure of existing landfills has the potential to degrade permafrost (A).	• The duration of permafrost exposure will be minimized. • The surface area of exposed permafrost or active zone will be minimized. • Unless required for drainage purposes, smoothing and contouring of the surface will be minimized in order to create microsites that will encourage vegetation growth.	1	2	3/1	R	2
Site Debris Disposal	The removal of site debris has the potential to further disturb the existing terrain (A).	• Disturbed area will be regraded and reshaped to match existing terrain and drainage paths. • Existing tracks will be used for movement around the site.	1	2	3/1	R	2
Site regrading	Drainage will be improved as a result of grading disturbed areas. Previously disturbed areas will blend into the natural environment (P).	• N/A					
Borrow Source Development	The extraction of granular material will alter the terrain of the borrow area (A).	• Disturbed area will be regraded and reshaped to match existing terrain and drainage paths.	1	2	2/1	R	1
Contaminated Soil Excavation	The excavation and removal of contaminated soil has the potential to degrade permafrost (A).	• The duration of permafrost exposure will be minimized. • The surface area of exposed permafrost of active zone will be minimized.	1	2	3/1	R	2
Contractor Support	The establishment of the work camp may disturb or destroy landforms.	• The camp will be located on previously disturbed land	1	1	3/6	R	2
	Movement of contractor's equipment and personnel around the site has the potential to disturb the tundra (A).	• Existing roads will be used for movement around the site.	1	2	2/1	R	2

Table 6-9: Environmental Effects Assessment Matrix: Terrain								
Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	Evaluation Criteria for Assessing Environmental Effects				
			Magnitude	Geographic Extent	Duration/Frequency	Reversibility	Ecological/Socio-Cultural and Economic Context

KEY:

Magnitude:

1 = Low: Erosion, permafrost degradation and destruction of vegetation is minor and limited in extent.

2 = Medium: Erosion, permafrost degradation and destruction of vegetation is more intense and widespread.

3 = High: Extensive erosion, permafrost degradation and destruction of vegetation.

Geographic Extent:

1 = <1 km²
2 = 1-10 km²
3 = 11-100 km²
4 = 101-1000 km²
5 = 1001-10,000 km²
6 = >10,000 km²

Duration:

1 = <1 month
2 = 1-7 months
3 = 8-36 months
4 = 37-72 months
5 = >72 months

Frequency:

1 = <11 events/year
2 = 11-50 events/year
3 = 51-100 events/year
4 = 101-200 events/year
5 = >200 events/year
6 = continuous

Reversibility:

R = Reversible
I = Irreversible

Ecological/Socio-cultural and Economic Context:

1 = Relatively pristine area or area not adversely affected by human activity.

2 = Evidence of adverse effects.

N/A = Not Applicable

6.6.2.4 Residual Environmental Effects

Definition of Significance

A significant environmental effect on the terrain VEC is one that results in permafrost degradation, surface erosion, sliding or slumping such that a significant effect results upon one of the water quality, biological, heritage resource, or socio-economic VECs or when the population of a vegetation species is sufficiently affected to cause a decline in abundance and/or change in distribution beyond which natural recruitment would not return the population to its former level within several growing seasons.

Residual Environmental Effects Summary

Table 6-10 summarises the residual environmental effects of the project activities on terrain. Activities during the remediation phase are not expected to affect terrain significantly.

Table 6-10: Residual Environmental Effects Summary Matrix: Terrain			
Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
Landfill Development / Closure	NS		
Site Debris Disposal	NS		
Site Regrading	P		
Borrow Source Development	NS		

Table 6-10: Residual Environmental Effects Summary Matrix: Terrain			
Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
Contractor Support	NS		
Contaminated Soil Excavation	NS		

KEY:

Residual Environmental Effects Rating:

S =Significant Adverse Environmental Effect
NS =Not Significant Adverse Environmental Effect
P =Positive Environmental Effect

Probability of Occurrence: based on professional judgement:

1 = Low
2 = Medium
3 = High
n/a = effect not predicted to be significant

Scientific Uncertainty: based on scientific information, and statistical analysis or professional judgement:

1 = low level of confidence
2 = medium level of confidence
3 = high level of confidence
n/a = effect not predicted to be significant

6.6.2.5 Summary of Environmental Effects on Terrain

The removal of site debris has the potential to further disturb the existing terrain. Vehicles and workers will use existing tracks for movement around the site, as much as possible, to minimize disturbance to the tundra. Movement off the existing tracks will be required to access some barrels blown away from the disturbed areas, but this will be minimized.

Remediation activities are assessed as not having significant effects on the terrain of the FOX-C Intermediate DEW Line Site area.

6.7 Terrestrial Animals and Habitat

6.7.1 Existing Environment

Wildlife in the region is dependent on suitable habitat for survival and given the sparse presence of vegetation in the region low densities and diversity of wildlife in the area are expected. There is however several species that may utilize the area for certain life stages such as breeding or migrating. Based on existing information the keystone wildlife species expected in the area are highlighted below. It should be noted that all existing information for the area has been collected after the FOX-C facilities were already in place.

6.7.1.1 Mammals

Large terrestrial mammals include polar bear, arctic wolf and caribou. Smaller resident mammals include arctic hare, arctic fox, ermine, and collared lemmings. Walrus, ringed and bearded seal, narwhal, and bowhead whale typifies the marine environment (Ecological Stratification Working Group 1995).

Polar Bear

The polar bear is considered a sensitive species in Nunavut (Department of Sustainable Development, 2001) and in 2002 it was listed as a species of Special Concern (COSEWIC 2003). Movements of polar bears are normally dictated by sea ice characteristics, climate and the presence of prey species, especially ringed seals (Taylor et al. 2001). In Nunavut, polar bears are common in the coastal areas, especially in the summer. They move inland to find denning sites, where females will spend the winter with their new-born young.

FOX-C Intermediate DEW Line Site is located within the Baffin Bay polar bear population which is estimated to be 2,200 animals. This population is shared with Greenland (IUCN 2004). Within this population, polar bears exhibit site fidelity to these regions because of discontinuities in movement influenced by land-mass and open-water impediments. Most individuals within this population will spend the open water season on Baffin Island (Taylor et al. 2001). While occurrences of polar bears in the FOX-C Intermediate DEW Line Site region are likely to be low, they could be met there occasionally at any time throughout the year.

Caribou

Caribou on Baffin Island are usually seen in smaller groups compared to the migratory barren-ground caribou that winter below the treeline on the mainland. Ekalugad Fjord lies within the range of the Northeast Baffin Caribou Herd. The population of this herd is estimated to be over 10,000 individuals. Caribou adapt their migrations according to snow conditions and forage availability. They can deplete the food supply in an area, and change their migration routes to utilize new browsing areas. They are particularly sensitive to disturbances during calving and post-calving periods. During May, caribou migrate into the fjord valleys where the bulls will remain through the summer. The cows continue across the mountains to give birth at higher elevations. After calving they move to summer feeding areas in valleys. Calving areas on central Baffin Island have been recorded at a barren plateau east of Dewar Lakes (Elliott 1971), which are approximately 125 km west of Ekalugad Fjord.

Caribou are known to utilize the area around Ekalugad Fjord as tracks and droppings have been recorded on previous visits to the site (Reimer et al. 1994). However, little information exists on the distribution and movement of caribou in the vicinity of the site. Given the habitat features of the site, the area is not expected to be suitable for calving or a major migratory route.

Caribou protection measures are likely to be attached to land use permits in the region. These measures will likely be based on proposed measures outlined in the North Baffin Regional Land Use Plan that states, in general, development activities shall be prohibited within all caribou calving areas during calving season or if activities block or cause substantial diversion to caribou migration. At this time there is little information regarding traditional use of the area for hunting although there is evidence of past camps on the lakeshore near the lower site.

Wolves

Little information exists on the status of wolves in Nunavut but they are expected to occur in low densities (COSEWIC 2003). Wolves are considered a sensitive species in Nunavut and are considered rare on Baffin Island (Department of Sustainable Development 2001). They are usually found in association with caribou herds and have been reported in association with caribou around Dewar Lakes (Elliott 1971). One of the biggest threats to the long-term persistence of wolves are humans and their associated activities that cause habitat alteration and exploitation (Cluff et al. 2002).

Wolverines

The wolverine is listed as a species of Special Concern by COSEWIC and is considered sensitive in Nunavut (COSEWIC 2003; Department of Sustainable Development 2001). There are limited data available on the distribution, abundance, and ecology of wolverines in Nunavut (Mulders 2000). Based on reports from Inuit, the wolverine is likely rare on this part of Baffin Island (Mallory et al. 2001) and are expected to be at low densities compared to other regions in Nunavut. Like wolves, they are usually found in association with caribou herds however odours and waste from human developments have acted as an attraction for these animals.

Fox

The Red Fox and the Arctic Fox occur on Baffin Island, both of which are considered secure in Nunavut (Department of Sustainable Development 2001). Red foxes have adapted well to arctic tundra habitats and compete with arctic foxes. In the arctic, foxes primarily prey upon lemmings and nests of waterfowl species. The cyclic nature of lemming populations influences the populations and behaviour of foxes.

Foxes prefer vegetated soft ground for denning so the potential for dens exists in the FOX-C Intermediate DEW Line Site region. Foxes are territorial and rarely den less than a mile apart. If foxes are present in the FOX-C Intermediate DEW Line Site region they would likely have only one or two dens.

The curious nature of foxes often brings them in contact with human developments (Anand-Wheeler 2002). Potential interactions with the Project exist if proper waste and odour management strategies for the facilities are not developed. These strategies must identify and describe details of design features, operational measures, employee/contractor staff awareness and training, for handling of food, food waste and other wastes throughout the site and specifically for the kitchen and personnel quarters.

Arctic Hare

The arctic hare occurs on Baffin Island and is known to inhabit the area around Ekalugad Fjord (Qikiqtaaluk Corporation 2001), however population numbers and density are unknown. They are considered secure in Nunavut (Department of Sustainable Development 2001). They have small home ranges that allow them to build up a series of runways and escape routes from predators (Anand-Wheeler 2002). They are a main prey species for carnivores and are important for maintaining predator-prey relationships in this harsh environment. The presence of arctic hare in a region can act as an indicator to the presence of predator species, such as foxes, in the region.

6.7.1.2 Birds

In the Arctic, the presence of birds is for the most part a seasonal phenomenon. Nunavut contains the northern limits of breeding ranges for numerous species of migratory birds, colonial seabirds, shorebirds and waterfowl. Besides being important for subsistence harvesting, birds are also valuable components of the landscape. There have been no bird surveys conducted at the site, however incidental observations have been documented and are discussed below.

Waterfowl and Seabirds

The east coast of Baffin Island has topography that is steep and rugged that makes suitable nesting colonies for many seabirds. Species include Arctic Terns, Common Eiders, Northern Fulmar, Common Murre, and Black Guillemot. There are two small islands in Home Bay, at the mouth of Ekalugad Fjord, that are the only reported breeding sites for Dovekies in Canada (Alexander et al. 1991), although these islands are several kilometres from the site. Thayer's Gulls have been observed at the site, in addition to Snow Goose droppings (Reimer et al. 1994) suggesting that Ekalugad Fjord may act as a migratory stopover for snow geese migrating to northern Baffin Island.

Raptors

The east coast of Baffin Island offers suitable cliffs for nesting raptors along with seabirds. Seabirds may form an important part of raptors' diet here. The peregrine falcon is classified as "May be at Risk" in Nunavut (Department of Sustainable Development 2001) and is listed as a species of Special Concern by COSEWIC (COSEWIC 2003). The major cause of decline of peregrine falcon populations was the presence of agricultural pesticides in the environment. These compounds cause eggshell thinning, egg breakage, and reduced hatching success, brood-size and breeding success. Current threats include the small population size and the diminishing quality of habitat. Human intrusion and disturbance near nest sites may affect peregrine falcons. The species is protected from hunting in Nunavut, except by native people, who hunt the peregrine only rarely for ceremonial purposes. Nunavut also legally protects the falcon from live possession and trade (Environment Canada 2003). It is likely that peregrine falcons nest sparingly throughout the Baffin Region. However result from previous surveys suggest that peregrine falcon populations on Baffin Island have remained stable or increased over the past century (Mallory et al. 2001).

The gyrfalcon is the largest of all falcons, preying on mammals and birds up to the size of arctic hares and geese. They begin nesting in May and return to the same cliffs for many years, leaving a build-up of white guano that becomes encrusted with orange lichen. Average gyrfalcon densities on southern Baffin Island were one territory per 1,300 km^2 (Bromley and McLean 1986).

Rough-legged Hawks are at the limit of their natural range in south Baffin Island, so large numbers would not be expected near the site (Bromley and McLean 1986).

Other Birds

Other birds that have been recorded in the area include Snow Buntings, Redpolls, and Ptarmigan. These species are likely breeding in the area however exact breeding locations are unknown and may vary annually.

6.7.1.3 Species at Risk

The federal *Species at Risk Act* (*SARA*) was passed by Parliament on December 12, 2002. As of June 5, 2003, most of the Act has come into force. *SARA* applies to all aquatic species and migratory birds wherever they are found and to all species listed as endangered, threatened or extirpated species on federal lands (which includes territorial lands) by COSEWIC. In addition, *SARA* amends the definition of "environmental assessment" in the *Canadian Environmental Assessment Act* to include any change that the project may cause to a listed species, its critical habitat or the residences of individuals of that species. Subsequently, any project requiring an environmental assessment under federal law that is

likely to affect a listed species or its critical habitat needs to identify the adverse effects, and, if the project goes forward, steps must be taken to avoid or lessen those effects and to monitor them.

The polar bear, wolverine and peregrine falcon are three wildlife species that are listed by COSEWIC (2003) as species at risk. The status of these species has been highlighted in the subsections above. Activities at the site are not expected to impact these species at risk or their habitat in any substantial manner.

6.7.2 Terrestrial Animals and Habitat Impact Assessment

6.7.2.1 Study Area Boundaries

Given the wide ranging characteristics of most wildlife species, the spatial boundary for the assessment of the effects of project activities on the terrestrial animals includes the footprint of the FOX-C Intermediate DEW Line Site facilities plus the surrounding area. This boundary may extend to the nearest communities (Clyde River to the north and Qikiqtarjuag to the south) and to the western limits of Baffin Island, depending on the type of wildlife species. The temporal boundary is the remediation field-work period as well as the additional monitoring period following completion of the project.

The administrative boundaries for the assessment refer to the jurisdictions within which and for which the assessment is being prepared. In this case, the assessment is being prepared under CEAA and NIRB for review by other federal and territorial departments following the CEAA process with additions to meet the NIRB requirements. Technical boundaries of the terrestrial animals and habitat assessment are the limited time frame associated with the environmental screening.

6.7.2.2 Identification of Issues, Interactions and Potential Effects

Most wildlife species are likely to exhibit some degree of sensitivity to human disturbance and from noise associated with heavy equipment and aircraft during the remediation. This sensitivity varies based on aspects of their behaviour, including the degree to which they adapt and habituate to human disturbance. This disturbance could result in temporary displacement of certain species from preferred habitat; abandonment of nests, dens or breeding areas; destruction of nests or eggs; or stress-related reduction in reproductive success.

Potential interactions with wildlife, such as polar bear, wolves, wolverine and foxes, and the Project exist if proper waste and odour management strategies for the facilities are not developed. These strategies must identify and describe details of design features, operational measures, and employee/contractor staff awareness and training for handling of food, food waste and other wastes throughout the clean up site and specifically for the incinerator, landfill site, kitchens, camps and personnel quarters.

Major threats to polar bears are occurring at the global scale. Bio-accumulation of pollutants and climate change are affecting the overall survival of this species. Data suggest that the Baffin Bay population is being over-harvested; however, better data from Greenland is required to verify this assumption (IUCN 2004). Co-management discussions between Greenland and Canada are to continue to ensure this population remains stable. A strategy for dealing with polar bear interactions at the site should be implemented to ensure that no bears are unnecessarily destroyed as a result of the project.

Accidents, malfunctions and unplanned events such as collisions between wildlife and Project-related vehicles or hazardous material spills may interact with wildlife in a manner that results in the alteration of habitat, changes in wildlife movement patterns and/or the loss of individual animals. It should be noted that the removal of hazardous materials and contaminated soil from the environment reduces the risk of exposure to terrestrial animals. Table 6-11 is an environmental assessment matrix for the terrestrial animals VEC.

Table 6-11: Environmental Effects Assessment Matrix: Terrestrial Animals and Habitat

Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	Evaluation Criteria for Assessing Environmental Effects				
			Magnitude	Geographic Extent	Duration/Frequency	Reversibility	Ecological/Socio-Cultural and Economic Context
General Clean Up Activities	The use of heavy equipment during the clean up has the potential to disturb wildlife (A).	• Known wildlife colonies or bird nesting areas will be avoided, if possible. • Minimum distance/height restrictions for transportation activities will be applied. • An Environmental Protection Plan will be prepared.	1	2	4/1	R	1
Contaminated Soil Disposal / Hazardous Materials Removal	The removal of hazardous materials and contaminated soil from the environment reduces the risk of exposure to terrestrial animals (P).	• N/A					
Landfill Developments	Loss of habitat may occur as a result of the development of the new landfills in previously undisturbed areas (A).	• New landfills will be located within the existing facility footprint or adjacent to it wherever possible. • New landfill areas will be graded and reshaped to match existing terrain to facilitate the recovery of ecosystem components.	1	2	3/1	R	1

Table 6-11: Environmental Effects Assessment Matrix: Terrestrial Animals and Habitat

Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	Evaluation Criteria for Assessing Environmental Effects				
			Magnitude	Geographic Extent	Duration/Frequency	Reversibility	Ecological/Socio-Cultural and Economic Context
Facility Demolition	The existing facilities may be used by wildlife as habitat. The demolition of these facilities has the potential to impact availability of habitat (A).	• Facilities will be inspected for use by wildlife prior to demolition. • Facilities will not be demolished in the immediate vicinity of nests while birds are nesting. • Appropriate wildlife officer will be contacted for additional guidance to ensure disturbance of wildlife is minimized.	1	2	3/1	R	1
Borrow Source Development	The extraction of granular material will require the disturbance of the ground and has the potential to impact terrestrial habitat (A).	• Disturbed areas will be graded and reshaped to match existing terrain to facilitate the recovery of ecosystem components.	1	2	3/1	R	1

KEY:

Magnitude:

1 = Low: *e.g.*, a few individuals. Species and or habitats affected occasionally.

2 = Medium: *e.g.*, a moderate percentage/number of individuals, species and or habitats affected within the LSA for a period of more than one month.

3 = High: *e.g.*, a large percentage/ number of individuals, species and or habitats within LSA affected for a period of more than one month.

4 = Very High *e.g.*, long-term regional effects on wildlife abundance distribution and biodiversity (*e.g.*, impact to an endangered species).

Geographic Extent:

1 = <1 km²
2 = 1-10 km²
3 = 11-100 km²
4 = 101-1000 km²
5 = 1001-10,000 km²
6 = >10,000 km²

Duration:

1 = <1 month
2 = 1-7 months
3 = 8-36 months
4 = 37-72 months
5 = >72 months

Frequency:

1 = <11 events/year
2 = 11-50 events/year
3 = 51-100 events/year
4 = 101-200 events/year
5 = >200 events/year
6 = continuous

Reversibility:

R = Reversible
I = Irreversible

Ecological/Socio-cultural and Economic Context:

1 = Relatively pristine area or area not adversely affected by human activity.

2 = Evidence of adverse effects.

N/A = Not Applicable

6.7.2.3 Mitigation

Prior to commencement of remediation work, workers will receive wildlife awareness training and will be instructed to avoid wildlife encounters.

The Migratory Birds Regulations, Section 6(a), states that: "*no person shall (a) disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird…*"

During the remediation activities, efforts will be made to avoid known wildlife colonies and bird nesting areas. Where applicable, minimum distance and height restrictions will be employed for transportation activities. Also, the appropriate wildlife officer will be contacted for guidance to ensure that the disturbance of wildlife is minimized and the *Migratory Birds Regulations* are met.

Caribou protection measures are likely to be attached to land use permits. These measures will likely state that project activities shall be prohibited within all caribou calving areas during calving season or if activities block or cause substantial diversion to caribou migration. Since FOX-C Intermediate DEW Line Site is outside of these areas such measures should not affect the project schedule. Helicopter movement during the Project may disturb caribou present in the area. Helicopter pilots will be instructed to avoid caribou when travelling around the site.

There is the potential for accidental events to adversely affect wildlife and wildlife habitat. To minimize the possibility of an accidental event, including collisions, spills, or fires, an environmental protection plan will be implemented that contains a number of sections that will minimize and mitigate potential effects of such an event on wildlife and wildlife habitat. These include Wildlife Protection Measures and Hazardous Materials and Spill Contingency Procedures.

6.7.2.4 Residual Environmental Effects

Definition of Significance

A significant environmental effect of the project activities on terrestrial animals occurs when the population of a species is sufficiently affected by the Project to cause a decline in abundance and/or change in distribution beyond which natural recruitment (reproduction and immigration from unaffected areas) would not return the population to its former level within several generations.

Residual Environmental Effects Summary

Table 6-12 summarises the residual environmental effects of the project activities on terrestrial animals and habitat. Effects of the Project on terrestrial animals and habitat, for the remediation activities are assessed as not significant. The removal and disposal of hazardous materials will have a positive effect on terrestrial animals.

Table 6-12: Residual Environmental Effects Summary Matrix: Terrestrial Animals and Habitat

Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
General Clean Up Activities	NS		
Contaminated Soil Disposal / Hazardous Materials Removal	P		
Landfill Development	NS		
Facility Demolition	NS		
Borrow Source Development	NS		

Table 6-12: Residual Environmental Effects Summary Matrix: Terrestrial Animals and Habitat

Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty

KEY:

Residual Environmental Effects Rating:

S = Significant Adverse Environmental Effect
NS = Not Significant Adverse Environmental Effect
P = Positive Environmental Effect

Probability of Occurrence: based on professional judgement:

1 = Low
2 = Medium
3 = High
n/a = effect not predicted to be significant

Scientific Uncertainty: based on scientific information, and statistical analysis or professional judgement:

1 = low level of confidence
2 = medium level of confidence
3 = high level of confidence
n/a = effect not predicted to be significant

6.7.2.5 Summary of Environmental Effects on Terrestrial Animals and Habitat

During project activities, efforts will be made to avoid known wildlife colonies or bird nesting areas. Where applicable, minimum distance and height restrictions will be employed for transportation activities. All disturbed areas will be re-graded and reshaped to match existing terrain to facilitate recovery of ecosystem components. Prior to demolition, facilities will be inspected for use by wildlife (*i.e.,* nests in structures). Should any active nests be discovered, waste consolidation will be postponed until nesting is complete. Also, the appropriate wildlife officer will be contacted for guidance to ensure that the disturbance of wildlife is minimized.

Wildlife protection measures that include provisions to reduce attractants through proper waste disposal, education and awareness of potential wildlife interactions and hazardous materials and spill contingency procedures will be adhered to.

The effects of remediation on the terrestrial animals and habitat are assessed as not significant.

6.8 Aquatic Animals and Habitat

6.8.1 Existing Environment

Little information exists about fish species near the project site. Fish have been observed in the unnamed freshwater lake adjacent the site but have not been identified (Reimer et al. 1994). The previous environmental screening for the site has identified Arctic Char *(Salvelinus alpinus*) as a species known to inhabit the area (Qikiqtaaluk Corporation 2001). Studies by Jacques Whitford (2005a) found Arctic Char are present in the freshwater lake in the lower project area and that the river joining the lake to Ekalugad Fiord. The gravel substrates in the lake provide good spawning habitat for adult Arctic Char. Discussions with several Inuit persons confirmed the presence of Arctic Char in the lake. Arctic Char is the most important fish species to the people of Baffin Island. Char are fished during their spring run out of the rivers and during the fall run back into the rivers. Char are usually caught in estuaries as the fish wait there to acclimatise to a change in water salinity. During winter

months, Inuit are known to come to the lake to ice fish when char are spawning (Jacques Whitford 2005a).

Approximately 30 marine fish species have been reported from Davis Strait and Baffin Bay. Arctic cod are by far the most abundant and ecologically important. It is the major food source for many species of seabirds and marine mammals, especially the narwhal, beluga and harp seal.

Several species of marine mammals are expected to be in Ekalugad Fjord. Species include walrus, harbour seal, ringed seal, harp seal, hooded seal, beluga whale, narwhal, bowhead whale and killer whale. Ekalugad Fjord has not been identified as a critical area for any species of marine mammals.

6.8.2 Aquatic Animals and Habitat Impact Assessment

6.8.2.1 Study Area Boundaries

The spatial boundary for the assessment of the effects of project activities on the aquatic animals is the freshwater lake adjacent to the site and the river flowing into Ekalugad Fjord. The fjord itself is also considered within the spatial boundary for this screening. The temporal boundary is the remediation field-work period as well as the additional monitoring period following completion of the project.

The administrative boundaries for the assessment refer to the jurisdictions within which and for which the assessment is being prepared. In this case, the assessment is being prepared under CEAA and NIRB for review by other federal and territorial departments following the CEAA process with additions to meet the NIRB requirements. Technical boundaries of the aquatic animals and habitat assessment are the lack of site-specific information and limited time frame associated with the environmental screening.

6.8.2.2 Identification of Issues, Interactions and Potential Effects

Water from the freshwater lake drains into Ekalugad Fjord so it will be critical that deleterious substances (pollution and sedimentation) are kept out of the lake. The potential exists for an accidental release of hazardous materials, contaminated soil and/or fuels, which could affect aquatic habitat. The removal of fuel drums in the watershed and the placement of culverts could result in sedimentation and the release of hazardous materials that could destroy aquatic habitat and kill fish. Table 6-13 is an environmental assessment matrix for the aquatic animals and habitat VEC.

Table 6-13: Environmental Effects Assessment Matrix: Aquatic Animals and Habitat								
Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	Evaluation Criteria for Assessing Environmental Effects					
			Magnitude	Geographic Extent	Duration/Frequency	Reversibility	Ecological/Socio-Cultural and Economic Context	
Landfill Closure	The proximity of landfills to water bodies has the potential to affect aquatic habitat, thereby affecting aquatic animals through sediment or hazardous materials entering the water (A).	• Mitigative measures such as berms, silt fences and/or silt booms will be implemented to prevent deleterious substances from entering the aquatic environment.	2	2	3/1	R	1	
	The remediation of the beach landfills will reduce the potential for impact (P).	• N/A						
Site Regrading. Borrow Source Development	The extraction of granular material and grading adjacent to waterbodies (fresh and marine) has the potential to affect aquatic habitat thereby affecting aquatic animals through sediment entering the water (A).	• Mitigative measures such as berms, silt fences and/or silt booms will be implemented to prevent deleterious substances from entering the aquatic environment.	2	2	3/1	R	1	
Contaminated Soil Disposal, Hazardous Materials Removal	The removal of contaminated soil and other hazardous materials from areas close to waterbodies reduces the risk of exposure to aquatic animals (P).	• N/A						
Removal of fuel drums within the watershed	Activities within the watershed could result in sedimentation and the release of hazardous materials, resulting in the destruction of aquatic habitat and fish mortality (A).	• An environmental protection plan for the removal of fuel drums in the watershed has been developed (Appendix B)	1	2	3/2	R	1	

Table 6-13: Environmental Effects Assessment Matrix: Aquatic Animals and Habitat

Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	Evaluation Criteria for Assessing Environmental Effects				
			Magnitude	Geographic Extent	Duration/Frequency	Reversibility	Ecological/Socio-Cultural and Economic Context
Placement of culverts	Soil erosion and resulting sedimentation of the stream may occur during placement, resulting in the destruction of aquatic habitat and fish mortality (A).	• An environmental protection plan for the installation of culverts has been developed (Appendix B)	1	2	3/2	R	1
Removal and Transport of Hazardous Material, Fuel and Contaminated Soil	Accidental releases of hazardous materials, contaminated soil and/or fuels may enter the aquatic environment (A).	• A spill prevention and contingency plan will be in effect during activities. • Mitigative measures such as berms, silt fences and/or silt booms will be implemented to prevent deleterious substances from entering the aquatic environment.	1	2	2/1	R	1

KEY:

Magnitude:

1 = Low: <1% loss of critical fish habitat or <1% change in fish population abundance.

2 = Medium: 1-20% loss of critical fish habitat or 1-20% change in fish population abundance.

3 = High: >20% loss of critical fish habitat or >20% change in fish population abundance.

Geographic Extent:

1 = <1 km²
2 = 1-10 km²
3 = 11-100 km²
4 = 101-1000 km²
5 = 1001-10,000 km²
6 = >10,000 km²

Duration:

1 = <1 month
2 = 1-7 months
3 = 8-36 months
4 = 37-72 months
5 = >72 months

Frequency:

1 = <11 events/year
2 = 11-50 events/year
3 = 51-100 events/year
4 = 101-200 events/year
5 = >200 events/year
6 = continuous

Reversibility

R = Reversible
I = Irreversible

Ecological/Socio-cultural and Economic Context:

1 = Relatively pristine area or area not adversely affected by human activity.

2 = Evidence of adverse effects.

N/A = Not Applicable

6.8.2.3 Mitigation

The implementation of the environmental protection plan for the removal of fuel drums within the watershed and the installation of culverts (Appendix B) and contingency plans for the clean up of FOX-C (Appendix C) will mitigate effects of the remediation on aquatic animals and habitat.