XIV. BROUGHTON ISLAND, FOX-5
ENVIRONMENTAL SCREENING REPORT

A. Project Description

1. Location and Site Use

FOX-5 Broughton Island is near the eastern edge of Broughton Island, a small island off the east coast of the Cumberland Peninsula area of northeastern Baffin Island at 67° 33' N latitude and 63° 49' W longitude. The site is located in the Baffin District of Nunavut. The station is situated on a high point overlooking Davis Strait and is connected by a 9 km road to the community of Broughton Island, which is on the western shore of the island.

FOX-5 was an auxiliary station within the original DEW Line Station system. It has been decommissioned but currently has a remotely operated NWS Short Range Radar Station in its vicinity. The boundaries of the FOX-5 site encompass an area of approximately 1320 hectares. No special conservation land status has been assigned to the site.

2. General

The purpose of the project is to demolish all facilities not required as part of the North Warning System Short Range Radar site, clean up debris and contaminated soil, and partially restore portions of the site. An overall site plan is presented on the map located at the end of Section A. The total area requiring restoration activity is approximately 12 hectares. The Department of National Defence (DND) Project Registration and Environmental Assessment and Review Process (EARP) Form is provided in Appendix XIV-A at the end of this chapter.

One new non-hazardous landfill will be developed at the Station area for the disposal of site debris, demolished buildings and Tier I contaminated soil. Tier II soils will be contained in a new Tier II Disposal Facility developed at the Lower site.

A landfill for the disposal of demolition materials painted with PCB amended paint in concentration exceeding 50 ppm has been proposed for this site. In 1996 during the clean up the Tuktoyaktuk, Northwest Territories (BAR-3) DEW Line site in the Inuvialuit Settlement Region, it was discovered that the buildings had been painted with PCB amended paint. The concentration of PCBs in the paint exceed 50 ppm, which is regulated under the *Canadian Environmental Protection Act*. Currently the landfilling of this material is prohibited. Studies conducted have shown that the PCB's do not leach out of the paint. Discussions are underway with the Canadian Council of Ministers of the Environment (CCME) to make amendments or changes to the existing policy to permit landfilling of debris coated with PCB amended materials. A decision from Environment Canada is anticipated winter 2000/2001. The option for the PCB landfill will be confirmed when the decision from Environment Canada is rendered.

In addition, two landfills must be properly closed and regraded. Cleanup and restoration activities are confined primarily to the Main Station Area, the Airstrip/Lower Site Area, the Beach Area and locally disturbed areas which were used historically for waste disposal and borrow extraction. Hazardous materials will be removed from the site. A temporary cleanup camp and equipment storage area will be established. All facilities associated with the clean will be demobilized once cleanup activities have been completed.

3. Site Visits/Community Consultations

a. Site Visits

- Environmental Sciences Group - August 2 to 8, 1990
- UMA Engineering Ltd. - August 11 to 14, 1990
- UMA Engineering - July 23 to 25, 1992
- Environemntal Sciences Group - August 1998
- UMA Engineering Ltd. - August 1998

b. Community Consultations/Public Meetings

The community of Qitiktarjuaq (formerly Broughton Island) was visited on August 4, 1992, and May 10, 1993 as part of the intial DEW Line Clean Up public consultation meetings. The objective of the meetings were to:

- inform the community
- provide information regardin the process for closure and clean up and maximizing northern benefits
- present environmental information
- provide general information on demolition/disposal facilities
- obtain information regarding public concerns through discussions and questionnaires
- obtain information regarding local labour and contracting capabilities

The community was generally pleased that the sites would be cleaned up, although there was concern that it would not be for many years. Other concerns includ burning of fuels, transportation of hazardous materials, impact on fishing areas, inadequate clean up at abandoned sites. Other comments included interest in local benefits and jobs, salvage of buildings and access to road.

As part of the pre-construction public consultation, public meetings were held in Qitiktarjuaq on August 10, 1998 during the delineation investigations. The purpose of this meeting was to ensure local knowledge was collected and incorporated in the final delineation investigations. Also included as part of the public consultation in 1998 were interviews with resident of Qitiktarjuaq by the NTI technical representative and a site visit by the NTI technical representative and a community representative.

4. Cleanup Activities

a. Landfill Development

- Non-hazardous Landfill – This landfill is to be located in the station area off the northwest corner of the exting module train. Demolition debris and scattered debris from the Station Area will be placed in this landfill. Following placement and compacting of the debris, a minimum of 1 metre of fill material will be placed over the landfill. Groundwater monitoring wells will be installed around the landfill to facilitate monitoring.~~groundwater monitoring wells will be installed around the landfill to facilitate monitoring.~~

- New Tier II Disposal Facility – This facility is to be located adjacent to the access road approximately halfway between the airstrip and station areas. The facility will consist of saturated berms around the perimeter of the landfill, a synthetic liner incorporated along the base and side slopes, and sufficient granular fill material, as determined through geothermal analyses, to cover the facility to ensure permafrost aggradation of the contents. Monitoring of the thermal regime and the quality of the active layer water will be accomplished through the use of thermistors and monitoring wells, as specified in the DND/NTI Agreement.

- Propose PCB Amended Painted Material Landfill – This landfill would be used for the disposal of demolition debris pained with PCB amended paint (PAP materials). It

would be located at the Station Area, approximately 250m northwest of the existing module train. The landfill would involve excavation of the ground to a depth of 1m, construction of berms, a geomembrane cover and base and granular cover. Long term monitoring, designed to evaluate the performance of the landfill, includes visual monitoring, thermal monitoring and environmental sampling and analysis (soil and water). If a timely decision from CCME/Environment Canada regarding the disposal PAP materials is not received, these materials will be temporarily stored in accordance with the *Storage of PCB Regulations* under CEPA with the until a decision is reached as to their ultimate disposal.

b. Landfill Closure

Two landfills requiring closure were identified at FOX-5, Broughton Island.

Main Landfill:

- This landfill is located approximately one kilometre northwest of the Station Area, north of the access road from the Station to the airstrip. The landfill is in a broad valley and encompasses an area of approximately five hectares. Existing cover material - 0.6 metre depth of wet gravel and sand with some cobbles.
- Leachate has been detected in the area down gradient of the landfill. Surface water runoff was identified as a concern and the EWG recommended a leachate containment system.
- A geocomposite clay liner will be installed on the downslope side of the landfill. Drainage will be diverted away from the landfill and erosion protection will be provided on the landfill surface. Tier I contaminated soil would be excavated and placed in new Non-hazardous landfill.
- Prior to closure, scattered debris from the surrounding area and some of the demolition debris will be placed and compacted in the landfill.

- Monitoring of the performance of containment system for this landfill will be accomplished through the use of thermistors and monitoring wells, as specified in DND/NTI Agreement.

Airstrip Landfill:

- The existing Airstrip Landfill is located adjacent to the shoreline approximately 100 metres southwest of the south end of the airstrip, and covers an area of less than half a hectare. Continual erosion the landfill by wave action occurs and drainage is directly into Broughton Channel.
- Loose debris to be removed.
- The EWG recommendation was complete excavation of the landfill.
- During excavation of the landfill testing of soil and waste materials will be required to determine disposal requirements. The excavation will be in an appropriate sequence to allow classification testing to be carried out. The surface area will be regraded/reshaped as required.
- Confirmatory testing will be carried out to confirm all contaminated materials have been removed.
- No monitoring is required.

c. Disposal of Site Debris

- All site debris to be disposed of in accordance with the DND/NTI Agreement.
- All materials to be sorted into hazardous and non-hazardous debris - hazardous materials to be removed from the site; non-hazardous materials to be placed in the new Non-hazardous Landfill. Site debris containing PCB amended painted materials will be segragated and disposed of as per PCB painted material.
- Debris areas have been identified at the Station Area, along road to Water Supply Lake, Main Landfill, Airstrip Area and Beach Area. Debris consists of barrels, metal, wood, cable, cement bags, rebar, culverts, tin cans , etc.
- Total volume of loose debris has been estimated at 200 m^3.

d. Disposal of Contaminated Soils

- Delineation investigation conducted in 1998 identified contamianted soil in following locations:
  - Module Train
  - Dormitory Train
  - Sewage Outfall
  - Station POL area
  - Garage
  - MOGAS Area
  - Main Landfill
  - Beach POL
  - Heated Vehicle Storage Area
  - Airstrip Landfill

Disposal of contaminated soil is as follows:

Tier I	665 m^3	to be landfilled on site
Tier II	1850 m^3	to be placed in Tier II facility
Type A Hydrocarbons	235 m^3	to be landfilled on site
Type B Hydrocarbons	1800 m^3 (minimum)	on-site treatment (landfarm)
Tier I/Type A	1900 m^3	to be landfilled on site
Tier II/Type A	205 m^3	to be place in Tier II facility
Tier II/Type B	800 m^3	to be placed in Tier II facility

The location of contaminated soil are shown on drawings. The fuel oil contamination at the Beach POL appears to be extensive (Type B). It is appears the fuel oil is in contact with the ocean.

e. Removal of Hazardous Materials

All hazardous materials, as designated under territorial or federal legislation, are to be shipped off-site to a licensed hazardous material facility for disposal. The exceptions to this are asbestos and creosote treated wood. Asbestos will be double-bagged and disposed in the new Non-hazardous Landfill. The location of the asbestos within the landfill will be marked on "as-built" drawings. Creosote-treated wood wrapped in plastic and placed in the Non-hazardous Landfill.

The paint on many of the building materials contains PCBs in access of 50 ppm. These construction materials will be collected using suitable equipment for the task. The disposal requirements for this material is to be confirmed. The option include:

- Containerize and transport off-site for disposal; or
- Landfilled in the PAP Materials Landfill

Any temporary storage on-site will be in accordance with the *Storage of PCB Material Regulations* under CEPA.

f. Demolition of Facilities

- All DEW facilities not required for NWS SRR operations will be demolished to top of concrete foundations, sorted into non-hazardous and hazardous components and treated as described above in subsections c and e, and that portion of the site restored.
- Hazardous materials that may be encountered during demolition include: asbestos in insulated buildings, creosote-treated timbers , sludge from cleaning of fuel tanks and painted building materials containing lead and PCBs.
- Initial estimates of demolition volume are 5100 m^3. This number has not been confirmed with final design.

Station Area:

- Seven buildings, including module train, dormitory buildings, warehouse, garage,
- Antenna; five air ground antenna, one TV antenna and five additional unidentified antennae.
- Two communication dishes.
- Two communication billboards.
- Radome, antenna and support structures.
- POL line; from the beach to the upper site.
- Power cable; from the airstrip to the upper site.
- Sewer line.
- Two 65,000 gallon diesel tanks, two 6,000 gallon mogas tanks, one unidentified capacity diesel tank.
- Four water tanks, 14,600 gallon capacity.

Airstrip and Beaching Area:

- Heated vehicle storage building at the airstrip and storage shed at the beaching area.
- Two 65,000 gallon diesel tanks, two 6,000 gallon mogas tanks and two 18,300 gallon diesel tanks at the beaching area; and one 18,300 gallon diesel tank at the airstrip.

g. Transportation of Hazardous Materials Off-site

- Hazardous materials to be placed in environmental containers at an approved storage facility on-site and removed by air or sealift, in accordance with the *Transportation of Dangerous Goods Act*.

h. General Site Grading

Areas include:

- Two existing landfills to be closed.
- Two new landfills to be developed and properly closed.

- Tier II Disposal Facility.
- Locations in Station, Beach and Landfill Areas disturbed during demolition.
- Debris and contaminated soil excavation areas.
- Borrow areas for granular materials.
- Locations disturbed by contractor during establishment and operation of cleanup camp and equipment storage facilities.
- Hydrocarbon treatment area

i. Development of Borrow Sources

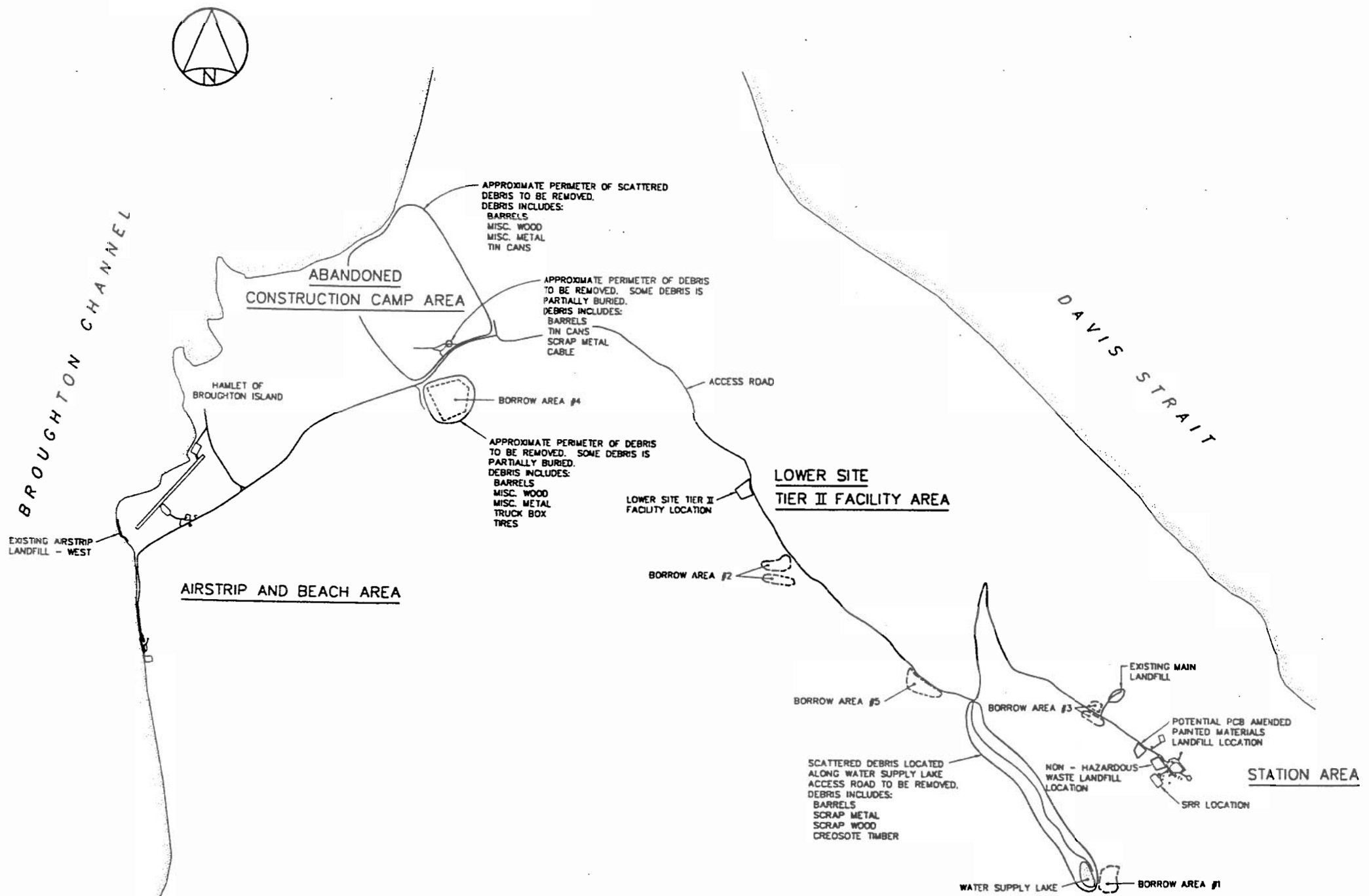
- Approximately 170,000 m^3 of granular material will be required for the clean up. Granular fill is required for closure of landfills, upgrading of the access road to the main site from the airstrip and general site grading purposes.
- Additional granular fill is required for the development of the new Tier II Disposal Facility and the Demolition Landfill. Amount to be quantified upon the completion of the site selection and final design.
- Five borrow areas have been identified at the site:
  #1 – located near the water supply lake
  #2 – located along access road (northwest of Station Area)
  #3 – located along access road (closest to and northwest of Station Area)
  #4 – located southwest from the abondoned cosntruction campo area.
  #5 – located along h access road between #3 and #2

j. Contractor Support Activities

- A potential Beach Landing Area, located at the POL Sealift Receiving Area on the shoreline approximately one kilometre south of the south end of the airstrip, is available to the Contractor. This area was used for beach landing support when the site was in operation, and is accessible from the Station.

- Potential equipment storage areas include the area adjacent to the Beach Landing Area described above, a granular area in the vehicle storage area, and a granular pad east of the module train at the Station Area.
- Potential cleanup camp areas are located in the granular areas at the Vehicle Storage Area and Station Area.
- Sewage from the camp will be handled with, at minimum, primary treatment (settling tank) and discharged to ground surface. Sewage treatment and disposal will be in accordance with the Land Use Permit.
- Domestic waste to be disposed (as is, or incinerated as specified by the Land Use Permit) in a landfill on-site.
- Vehicle traffic to work areas is to be supported by the existing access roads that traverse the site.
- Labour and equipment requirements are anticipated to include 35- 45 personnel, 20 pieces of heavy construction equipment and 6 support vehicles.
- Duration of work is anticipated to be approximately 4 months, not including winter shutdown period, over a period of two years.

Broughton Island FOX-5, Overall Site Plan



National Defence / Défense nationale

Headquarters
Quartier général

General Notes:

Legend:

BODY OF WATER

No.	DATE	REVISION	REVISION	APPR.

SCALE - ECHELLE 400 200 0 400 800 1200m

PROJECT - PROJET
FOX-5 BROUGHTON ISLAND

DEW LINE CLEAN UP

TRADE - METIER	DATE
SITING	2000-09-01

SUBJECT - SUJET

OVERALL SITE PLAN

PRODUCTION	CONCURRENCE - ASSENTIMENT	
DESIGNED ETUDE SMS/FMS		DES OFF AGENT CONCEPT
DRAWN DESSINE DM		SECT HD CHEF SECT
CHECKED VERIFIE FJ/BLK		DES MGR GEST CONCEPT
COORDINATION	REVIEWED - REVU	

DWG. NO. - DESSIN NO.
H-B233/1-9101-101

B. Environment

1. General Description

Environmental conditions at FOX-5 were documented by UMA (1991) and RRMC (1991). Those environmental components potentially impacted by or influencing cleanup operations are described below.

a. Physiography

- Variable landscape consisting of raised marine sediments which form bench-like terrain that slopes gently toward the sea along the east and west coasts; glacial U-shaped valleys and broad, gently sub-rounded hills in the interior; and boulder covered uplands bound, partly, by sheer cliff walls along the southeast coast.
- Extensive patterned ground, evident particularly within the valley; till sheets and frost shattered bedrock common at high elevation.
- Surface materials include till, bedrock, weathered bedrock, and raised marine deposits.

b. Flora

- More sparse than that normally found in the region: disturbed areas are almost entirely devoid of vegetation; surrounding terrain - vegetation cover from 5 to 15 percent.
- Species present include saxifrage (*Saxifraga* sp.), mountain avens (*Dryas* sp.), willow (*Salix* sp.), kobresia (*Kobresia* sp.), sedges (*Carex* spp.), grass (*Phippsia* sp., *Trisetum* sp.), wood rush (*Luzula* sp.) and Arctic poppy (*Papaver radicatum*).
- Vegetation slightly more abundant at Beaching Area; dominant species include sedges (*Carex* spp.) and cotton grass (*Eriophorum* sp.).

c. Fauna

Terrestrial Mammals:

Generally, terrestrial wildlife biodiversity is considered low to moderate. The proximity of the lower site to a commercial airstrip and corresponding disturbance limits use of area by wildlife. Wildlife is more likely at upper site. Wildlife in the area includes:

- Barren-ground caribou (*Rangifer tarandus greonlandicus*) are known to occur in the area, although none observed or reported during site visits.
- Polar bears (*Ursus maritimus*) - area of known or suspected denning and wintering areas; an important summering area is located approximately 150 km to the north.
- Arctic fox (*Alopex lagopus*), wolf (*Canis lupus*), lemmings (*Dicrostonyx torquatus kilangmiutak*) and Arctic hare (*Lepus arcticus andersoni*) probably present.

Marine Mammals:

The local community has indicated that seals, narwhal and walrus populations occur year round in Davis Strait and Broughton Channel. The receiving waters of Davis Strait are a known harvest area supporting diverse marine life.

- Beluga whales (*Delphinapterus leucas*) – One of the populations occurs in Cumberland Sound region and belugas frequent coastal areas during the summer period of July to late August.
- Narwhal (*Monodon monoceros*) – During the fall they migrate along the east coast of Baffin Island to overwintering grounds in Davis Strait and west Greenland.
- Bowhead whale (*Balaena mysticetus*) – They migrate south along the east coast of Baffin Island to Cumberland Sound region. A major summering area is located approximately 200 km north of the station.
- Killer whale (*Orcinus orca*) – May be found in Davis Strait in late summer.
- Harp seal (*Phoca groenlandica*) – Migrate along the east coast of Baffin Island, north in the summer and south in September/October.
- Harbour seal (*Phoca vitulina*) – They occur in small numbers in the summer along the east coast of Baffin Island.

- Bearded seal (*Cystophora cristata*) – Are year round residents of the eastern Arctic.
- Ringed seal (*Phoca hispida*) – Are abundant throughout the arctic and are resident year round.
- Hooded seals *(Cystophora cristata)* - Davis Strait is an important breeding and migration area.

Birds:

- Potentially Snowy Owl (*Nyctea scandiaca*); Peregrine Falcon (*Falco peregrinus*), Gyrfalcon (*Falco rusticolus*), and Rough-legged Hawk (*Buteo lagopus*) are known to occur in the region.
- Fulmar (*Fulmarus glacialis*) colonies throughout the region.
- Unidentified gulls (*Larus hyperboreus or L. argentatus or L. thayeri or Xema sabini*) observed at site.

Fish:

- Anadromous Arctic char (*Salvelinus alpinus*) is known to occur throughout southeastern Baffin Island. Fishing for Arctic Char occurs off the coast.
- Large populations of both land-locked and sea-run Arctic char constitute a significant food source for domestic and commercial use.
- Limited numbers of Atlantic salmon (*Salmo salar*) occur in late summer.

d. Heritage Resources

- One site was recorded on the west side of Broughton Island southeast of the summit station in 1990; it is Inuit and, possibly, late Thule in affiliation.
- The archaeological site is well removed from the station and is not expected to be impacted by cleanup activities.
- Several other historical sites have previously been recorded on Broughton Channel; there remains some potential for the presence of new sites in the area of the village, the lower part of the station and the coastline north from the village.

e. Socio-Economic Setting

- The residents of the village of Qitiktarjuaq (formerly Broughton Island) hunt and fish throughout the general area as well as returning to their former communities periodically. The many fiords, inlets and bays from Broughton Island, south to Cape Dyer are used by the residents of the community for hunting marine mammals. Across Broughton Channel, on Baffin Island, residents of Qitiktarjuaq will hunt for caribou.
- The Broughton Island airstrip provides regular scheduled air links to the south, west and north, with Iqaluit being the main hub of the area; a wide range of other commercial and public services are available in the village.
- Concerns over local hiring practices raised at the public meeting were responded to by the assurance that local hiring preference will be a contract requirement and training programs will be available to upgrade skills.

2. Valued Ecosystem Components (VECs)

- Physical
  - Surface water quality.
- Biological
  - Tundra provides feeding and/or denning habitat for lemming, Arctic hare, fox and potentially caribou.
  - Marine mammals and fish off coast.
- Social / Economic
  - Fishing off coast.
  - Archaeological sites identified in site vicinity.
  - Aesthetic value.
  - Human health and safety

C. Potential Impacts and Mitigation/Monitoring

The following tables identify and summarize the potential impacts and recommended mitigation and montoring measures.

IMPACT MATRIX – PROJECT COMPONENTS VS ENVIRONMENT

PROJECT COMPONENTS	VALUED ECOSYSTEM COMPONENTS														
	Physical						Biological				Socio-Ecnomic				
	Air Quality	Soil Quality	Water Quality (ground and surface)	Terrain	Surface Water (drainage)	Noise Levels	Terrestrial Habitat	Terrestrial Animals	Aquatic Habitat	Aquatic Animals (mammals/fish)	Archaeological/Heritage	Human Health and Safety	Land Use	Recreation/Aesthetics	Economy
Landfill Development		E	E	E	E	E	E	E							
Landfill Closure		E	E	E	E	E		E	E	E		E		E	
Site Debris Disposal				E								E		E	
Facility Demolition						E	E	E				E		E	
Contaminated Soil Disposal		E	E					E	E	E		E			
Hazardous Waste Removal	E	E	E					E	E	E		E			
Site Regrading	E		E	E	E	E		E	E	E				E	
Borrow Source Development	E		E	E	E	E	E	E	E	E					
Removal and Transport of Hazardous Materials, Fuel and Contaminated Soil		E	E	E	E	E	E		E	E		E			
Contractor Support		E	E	E	E			E		E					E
General Clean Up Activities											E		E		E

Terrain = refers to permafrost as well as topographic
Surface Water = refers to drainage
Terrestrial habitat = includes vegetation/tundra habitat
Aquatic habitat = include freshwater and marine habitats
Economy = refers to social benefits (employment/training)

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Landfill Development			
Soil Quality The migration of leachate from the new landfills has the potential to degrade soil quality.	Facility will not contain hazardous materials. Tier II and PCB facilities will incorporate a leachate containment, which includes synthetic liner and freezeback of permafrost.	Not significant due to the design criteria.	Long term monitoring as per the Landfill Monitoring Program.
Water Quality The migration of leachate from the new landfills has the potential to degrade water quality, both surface and ground water.	Facility will not contain hazardous materials. Tier II and PCB facilities will incorporate a leachate containment, which includes a synthetic liner and freezeback of permafrost. Site facilities away from natural drainage. Grade cover to promote surface run-off	Not significant due to the design criteria.	Long term monitoring as per the Landfill Monitoring Program.
Terrain The development of the landfills will require excavation that has the potential to degrade permafrost. The development of the landfills has the potential to disturb the existing terrain at the landfill locations.	Minimize time permafrost is exposed. Regrade and reshape to match existing terrain to facilitate recovery of ecosystem components in the area.	Not significant provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented.
Surface Water The development of the landfills has the potential to disrupt drainage at the site.	Areas to be regraded and reshaped to match surrounding terrain and existing drainage paths.	Not significant provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented.

IMPACT SUMMARY			
Description of Impact	*Mitigation Measures*	*Significance*	*Monitoring*
Terrestrial Habitat Loss of habitat as a result of the development of the new landfills.	Regrade and reshape to match existing terrain to facilitate recovery of ecosystem components in the area.	Not significant as previously disturbed areas to be used and provided mitigation measures are implemented.	None required.
Noise – Terrestrial Animals The use of heavy equipment in the development of the landfill has the potential to disturb wildlife.	Employ dedicated bear monitor at all times. Avoid use of heavy equipment during nesting and migratory periods. Avoid known wildlife colonies. Avoid transportation during periods of wildlife concentrations. Employ minimum distance/height restrictions for transportation activities	Significant impacts are not likely to due to limited occurrence of wildlife within the station area.	Regular inspection for wildlife.
Landfill Closure			
Soil Quality The migration of leachate from the existing, Main Landfill has the potential to degrade soil quality.	No hazardous materials to be place into landfills. Closure design to include leachate containment.	Not significant due to design criteria for closure of the landfills.	Long term monitoring as per the Landfill Monitoring Program.
Water Quality Leachate migration from the existing landfills has the potential to degrade water quality, both surface and ground water.	No hazardous materials to be place into landfills. Closure design to include leachate containment.	Not significant due to design criteria for closure of the landfills.	Long term monitoring as per the Landfill Monitoring Program.

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Terrain The closure of the existing landfill has the potential to disturb the existing terrain at the landfill locations.	Regrade and reshape to match existing terrain to facilitate recovery of ecosystem components in the area.	Significant impacts are not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented.
Surface Water Disturbance of the terrain associated with the closure of the landfills has the potential to disturb drainage.	Areas to be regraded and reshaped to match surrounding terrain and existing drainage paths.	Significant impacts are not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented.
Noise- terrestrial animals The use of heavy equipment has the potential to disturb wildlife.	Employ dedicated bear monitor at all times. Avoid use of heavy equipment during nesting and migratory periods. Avoid known wildlife colonies. Avoid transportation during periods of wildlife concentrations. Employ minimum distance/height restrictions for transportation activities	Significant impacts are not likely to due to limited occurrence of wildlife within the station area.	Regular inspection for wildlife.
Aquatic habitat and animals The close of the airstrip landfill has the potential to impact aquatic habitat and animals due to the close proximity of the landfill to the the marine environment	Prevent siltation by use of berms of silt fences as required. Do no operate equipment in water. Do not use bed material as borrow. Survey aquatic habitat for fish and mammal concentrations prior to begin work. Disturbed areas adjacent to water should be re-stabilized and re-vegetated as required.	Not significant provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented. Regular inspection for wildlife.

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Health and Safety The excavation of potential hazardous materials from the landfills has the potential to impact health and safety of workers	Workers are to wear and use of appropriate personnel protective equipment during excavation of landfill. Workers are to be trained in used of personnel protective equipment and associated hazards of landfill excavation. Follow proper procedures for dealing with hazardous materials, working around heavy equipment, etc.	Significant impacts are not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented. Regular health and safety meetings to refresh workers on proper procedures.
Aesthetics Closure of the landfills will remove/cover the exposed debris improving the aesthetics of the area.	Ensure regrading and reshaping matches existing terrain. Ensure any debris removed in disposed of properly.	Positive	None.
Site Debris Disposal			
Terrain The removal of debris has the potential to alter terrain in the immediate vicinity of the debris.	Regrade and reshape to match existing terrain to facilitate recovery of ecosystem components in the area.	Positive.	None.

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Health and Safety The collection and disposal of potential hazardous debris has the potential to impact health and safety of workers.	Workers are to wear and use of appropriate personnel protective equipment during collection of site debris. Workers are to be trained in used of personnel protective equipment and associated hazards of handling hazardous materials. Follow proper procedures for dealing with hazardous materials, working around heavy equipment, etc.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented. Regular health and safety meetings to refresh workers on proper procedures.
Aesthetics The removal of site debris will improve the aesthetics of the site debris areas.	Ensure regrading and reshaping matches existing terrain. Ensure any debris removed in disposed of properly.	Positive.	None.
Facility Demolition			
Noise -- Terrestrial Animals The use of heavy equipment and demolition of the buildings will result in increased noise levels that has the potential to impact terrestrial animals.	Employ dedicated bear monitor at all times. Avoid use of heavy equipment during nesting and migratory periods. Avoid known wildlife colonies. Avoid transportation during periods of wildlife concentrations. Employ minimum distance/height restrictions for transportation activities	Significant impacts are not likely to due to limited occurrence of wildlife within the station area.	Regular inspection for wildlife.

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Terrestrial habitat The existing facilities may be used by wildlife as habitat (ie. birds in billboards). The demolition of these facilities has the potential to impact availability of habitat.	Inspect facilities prior to demolition for use by wildlife. Do not demolish while birds are still nesting. Contact wildlife officer for additional guidance to ensure disturbance of wildlife is minimized.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented. Regular inspection for wildlife.
Health and Safety The potential exists for workers to be exposed to hazardous materials as they are removed from the facilities.	Workers are to wear and use of appropriate personnel protective equipment during collection of site debris. Workers are to be trained in used of personnel protective equipment and associated hazards of handling hazardous materials. Follow proper procedures for dealing with hazardous materials, working around heavy equipment, etc.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented. Regular health and safety meetings to refresh workers on proper procedures.
Aesthetics The aesthetics of the site will be improved with the removal of the buildings.	None required.	Positive.	None.
Contaminated Soil Disposal			
Soil Quality The removal of the contaminated soil from the environment will improve soil quality.	None required.	Positive.	None.

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Water quality The removal of the contaminated soil from the environment will reduce the risk of contaminated soil impact water quality.	None required.	Positive.	None.
Terrestrial Animals, Aquatic Habitat and Animals, Human Health and Safety The removal of contaminated soil from the environment reduces the risk of exposure.	None required.	Positive.	None.
Hazardous Materials Removal			
Air Quality, Soil Quality, Water Quality The removal of the contaminated soil from the environment will reduce the risk of impacting air, soil and/or water quality.	None required.	Positive.	None.
Terrestrial Animals, Aquatic Habitat and Animals, Human Health and Safety The removal of contaminated soil from the environment reduces the risk of exposure.	None required.	Positive.	None.
Site Regrading			
Air Quality Regarding of disturbed areas has to the potential to create dust.	Implement dust control measures. Do not use fuel as a dust suppressant. Use only water.	Not significant.	On-going visual monitoring of dust levels.

IMPACT SUMMARY			
Description of Impact	*Mitigation Measures*	*Significance*	*Monitoring*
Water Quality, Aquatic Habitat Erosion and sedimentation of waterbodies during regarding activities has the potential to impact water quality, aquatic habitat.	Prevent siltation by use of berms of silt fences as required. Do no operate equipment in water. Survey aquatic habitat for fish and mammal concentrations prior to begin work. Disturbed areas adjacent to water should be re-stabilized and re-vegetated as required.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented. Regular inspection for aquatic animals.
Terrain and Surface Water Terrain and drainage to be improved as a result of grading disturbed areas.	Ensure regraded areas match existing terrain.	Positive.	None.
Noise and Terrestrial Animals The use of heavy equipment will result in increased noise levels that has the potential to disturb wildlife.	Avoid use of heavy equipment during nesting and migratory periods. Avoid known wildlife colonies. Avoid transportation during periods of wildlife concentrations. Employ minimum distance/height restrictions for transportation activities	Significant impacts are not likely to due to limited occurrence of wildlife within the station area.	Regular inspections for wildlife.
Aesthetics Regrading of disturbed areas will improve aesthetics of site.	Ensure regraded areas match existing terrain	Positive.	None.
Borrow Source Development			

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Air Quality The extraction of granular material has the potential to create dust and impact air quality	Implement dust control measures. Do not use fuel as a dust suppressant. Use only water.	Not significant.	On-going visual monitoring of dust levels.
Water Quality, Aquatic Habitat and Animals Erosion during the extraction of granular materials has the potential to degrade surface water and impact aquatic habitat and aquatic animals.	Prevent siltation by use of berms of silt fences as required. Do no operate equipment in water. Survey aquatic habitat for fish and mammal concentrations prior to begin work. Disturbed areas adjacent to water should be re-stabilized and re-vegetated as required.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented. Regular inspections for aquatic animals.
Terrain and Drainage The extraction of granular material will alter the terrain of the borrow area and has the potential to disturb drainage.	Regrade and reshape the borrow areas to match existing terrain and drainage paths.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented.
Noise The use of heavy equipment will result in increased noise levels that has the potential to disturb wildlife.	Avoid use of heavy equipment during nesting and migratory periods. Avoid known wildlife colonies. Avoid transportation during periods of wildlife concentrations. Employ minimum distance/height restrictions for transportation activities	Significant impacts are not likely to due to limited occurrence of wildlife within the station area.	Regular inspection for wildlife.

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Terrestrial Habitat The extraction of granular material will require the disturbance of the ground will has the potential to impact terrestrial habitat (including vegetation).	Regrade, reshape and revegetate to match existing terrain to facilitate recovery of ecosystem components in the area.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented.
Removal and Transport of Hazardous Material, Fuel and Contaminated Soil			
Soil and Water Quality The potential exist for accidental release of hazardous materials (including contaminated soil). An accidental release would impact the local environment, including soil and water quality.	Proper handling procedures for hazardous materials to be followed. Prepare contingency plans in the event of an accidental release. Ensure all materials and equipment required for contingency plans are readily available. Ensure all workers are properly trained in handling procedures and contingency plans.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented.
Terrain The excavation of contaminated has the potential to degrade the permafrost while exposed.	Minimize time permafrost is exposed.	Not significant.	Inspect area to ensure proper reshaping.
Surface Water (drainage) The disturbance of the terrain has the potential to disturb drainage in the contaminated soil areas.	Regrade and reshape to match existing drainage paths.	Not significant.	Inspect area to ensure proper reshaping.

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Noise – Terrestrial Animals The use of heavy equipment results in increase noise levels that has the potential to impact terrestrial animals.	Avoid use of heavy equipment during nesting and migratory periods. Avoid known wildlife colonies. Avoid transportation during periods of wildlife concentrations. Employ minimum distance/height restrictions for transportation activities	Significant impacts are not likely to due to limited occurrence of wildlife within the station area.	Regular inspection for wildlife.
Aquatic Habitat and Animals The excavation of contaminated from the airstrip and beach area has the potential to degrade the aquatic environment and impact aquatic animals due to close proximity to the marine environment.	Do no operate equipment in water. Survey aquatic habitat for fish and mammal concentrations prior to begin work. Cease transportation activities during periods of wildlife concentration. Disturbed areas adjacent to water should be re-stabilized and re-vegetated as required. Transportation of any materials to be in accordance with TDGA. Follow designated routes for shipping activities	Significant impacts not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented. Regular inspection for aquatic animals.

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Health and Safety The potential exists for workers to be exposed to contaminated soil during excavation	Workers are to wear and use of appropriate personnel protective equipment during collection of site debris. Workers are to be trained in used of personnel protective equipment and associated hazards of handling hazardous materials. Follow proper procedures for dealing with hazardous materials, working around heavy equipment, etc.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented. Regular health and safety meetings to refresh workers on proper procedures.
Contractor Support			
Soil and Water Quality The operation of the construction camp will include treatment and disposal of waste. The potential exists for waste to impact the environment, specifically soil and water quality.	Disposal of waste to be in accordance with applicable regulations and Specifications. Ensure discharge of sewage does not compromise public health or environment.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspection of discharge area for soil saturation and run-off. Regular testing of discharged wastewater to ensure it is in accordance with applicable standards.
Terrain and Drainage Movement of contractor's equipment and personnel around the site has the potential to disturb the tundra. This may impact drainage.	Establish camp is previously disturbed area. Use existing roads for movement around site.	Significant impacts not likely provided mitigation measures are implemented.	None.

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Terrestrial and Aquatic Animals The transportation to/from and around the site has the potential to disturb wildlife.	Do not harass or feed wildlife. Equipment and vehicles to yield to wildlife. Control refuse and store in secure containers to prevent access by wildlife. Domestic animals and pet should not be permitted on site.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspection for wildlife.
Economy The contractor will be required to use have a minimum Inuit content in the workforce for the clean up. This will provide employment benefits.	None required.	Positive.	None.
General Clean Up Activities			
Archaeological The presence and movement of people around the site and Broughton Island has the potential to disturb archaeological resource in the area.	Clearly mark any archaeological resources close to site. Site personnel to avoid resources. Contact authorities in the event a new resource is discovered or existing one disturbed.	Significant impacts not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented.
Land Use Clean up activities may disturb traditional land use, hunting and fishing activities that would occur during the summer months.	Consult local Hunter's and Trapper committee to minimize conflict between clean up activities and traditional land use.	Significant impacts are not likely provided mitigation measures are implemented.	Regular inspections to ensure mitigation measures are being implemented.

IMPACT SUMMARY			
Description of Impact	***Mitigation Measures***	***Significance***	***Monitoring***
Economy Although, the NTI/DND Co-operation Agreement (economic provisions) have not been finalized, it is likely there will be requirements for training and employment that will benefit the local community.	Maximize use of local labour and businesses for clean up.	Positive.	Monitor Inuit content of clean up activities/contract.

D. Environmental Summary Table for Broughton Island, FOX-5

The following table summarizes the environmental impacts for the clean up of FOX-5.

IMPACT MATRIX - SUMMARY															
PROJECT COMPONENTS	VALUED ECOSYSTEM COMPONENTS														
	Physical						Biological				Socio-Ecnomic				
	Air Quality	Soil Quality	Water Quality (ground and surface)	Terrain	Surface Water (drainage)	Noise Levels	Terrestrial Habitat	Terrestrial Animals	Aquatic Habitat	Aquatic Animals (mammals/fish)	Archaeological/Heritage	Human Health and Safety	Land Use	Recreation/Aesthetics	Economy
Landfill Development		NS	NS	M	M	NS	NS	NS							
Landfill Closure		NS	NS	M	M	NS		NS	M	M		M		PI	
Site Debris Disposal				PI								M		PI	
Facility Demolition						NS	M	NS				M		PI	
Contaminated Soil Disposal		PI	PI					PI	PI	PI		PI			
Hazardous Waste Removal	PI	PI	PI					PI	PI	PI		PI			
Site Regrading	NS		M	PI	PI	NS		NS	M	M				PI	
Borrow Source Development	NS		M	M	M	NS	M	NS	M	M					
Removal and Transport of Hazardous Materials, Fuel and Contaminated Soil		M	M	NS	NS	NS		NS	M	M		M			
Contractor Support		M	M	M	M			M		M					PI
General Clean Up Activities											M		M		PI

IMPACT MATRIX - SUMMARY	
Legend NI: No Impact PI: Potential Impact (Significance Unknown) NS: Not Significant +: Positive Impact SI: Significant Impact (Mitigation Unknown) IM: Impact Mitigable SN: Significant Non-mitigable (Impact) UI: Unacceptable Impact IP: Impact of (Significant) Public Concern Terrain = refers to permafrost as well as topographic Surface Water = refers to drainage Terrestrial habitat = includes vegetation/tundra habitat Aquatic habitat = include freshwater and marine habitats Economy = refers to social benefits (employment/training)	Summary of Potential Environmental Impacts: 1. Physical disturbance of heritage resources. 2. Physical disturbance of habitat, flora and fauna. 3. Human and ecosystem safety during handling/transport of hazardous and contaminated materials. 4. Overall improvement of physical condition and mitigation of chemical contamination at the site; facilitation of recovery of lost ecosystem components and ecosystem health. 5. Economic benefits.

E. Conclusions

The overall impact of decommissioning and cleanup activities at Broughton Island will be the physical restoration of the site to its quasi-natural state (including drainage), the mitigation of the potential effects of contaminants and hazardous materials on human and ecosystem health, and the northern economic benefits gained from the employment of workers and contractors from nearby communities during cleanup operations.

Some of the proposed cleanup activities have the potential to impact adversely on the environment - particularly heritage resources, Arctic habitat, flora and fauna, and human and ecosystem health. Nevertheless, the integration of proper mitigation procedures that will be established in the environmental protection plan and the positive impacts indicated above will more than outweigh the potential negative effects in the long term, in addition to facilitating the restoration of ecosystem components lost during cleanup and previous site activities.

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