REPORT TO

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
WESTERN REGION

ENVIRONMENTAL SCREENING OF THE PROPOSED DETAILED SITE ASSESSMENT AND PRELIMINARY WASTE CONSOLIDATION OF CAM-F DEW LINE SITE NUNAVUT

PROJECT NO. ABC50516

Prepared by:

Jacques Whitford Environment Limited
Suite 500, 708– 11th Avenue SW
Calgary, Alberta T2R 0E4
Tel: (403) 263-7113
Fax: (403) 263-7116

www.jacqueswhitford.com

March 31, 2004

EXECUTIVE SUMMARY

Public Works and Government Services Canada (PWGSC), on behalf of Indian and Northern Affairs Canada (INAC) is planning to complete the clean up and remediation of the former CAM-F Intermediate DEW Line Site on Melville Peninsula. Various stages of clean up of the site has been ongoing since 1985. The first phase of PWGSC's clean up and remediation consists of a detailed site assessment and preliminary consolidation of existing wastes at the site. As required under the *Nunavut Land Claim Agreement* (*NLCA*) and the *Canadian Environmental Assessment Act* (*CEAA*), the activities proposed for CAM-F must undergo an environmental screening.

The detailed site assessment and preliminary waste consolidation at CAM-F is proposed to occur during the summer of 2004. Activities will consist of the establishment of a work camp and the investigation of the condition of the site, specifically assessing and categorizing the wastes present. Existing wastes will be consolidated. The information collected during these activities will be used to design the clean up and remediation program for the site.

The detailed site assessment and preliminary waste consolidation activities at CAM-F DEW Line Site will interact with the environment through vehicle and machinery emissions, waste disposal, surface disturbance and the provision of employment to local inhabitants. There is also the potential for spills of fuel or hazardous materials. The activities will be carried out following standard good operating practices for northern Canada, with spill prevention practices and contingency plans in place. The objectives of the activities are to assess existing contamination at the site and make preparations for site clean up and remediation. The environmental effects of the activities are assessed as being of low magnitude and not significant. The activities will benefit the area through the short-term employment of local individuals and through the commencement of clean up of the site.

TABLE OF CONTENTS

List of Tables

Page No.

List of Figures

Page No.

1.0 INTRODUCTION

The former CAM-F Intermediate DEW Line Site has been undergoing various stages of clean up since 1985. Indian and Northern Affairs Canada (INAC) has requested Public Works and Government Services Canada (PWGSC) Western Region to complete the remediation of the site over the next several years. PWGSC plans to accomplish this task through a detailed site assessment and preliminary waste consolidation, followed by the implementation of a remediation plan. This Environmental Screening assesses the potential impacts of the proposed detailed site assessment and preliminary waste consolidation of the CAM-F Dew Line Site.

2.0 REGULATORY CONTEXT

2.1 Permits, Licences, and Authorizations - Current Regulatory Regime

Development of the Project (as it is presently conceived) will involve a number of distinct undertakings and activities, requiring authorizations from a variety of federal, territorial, Inuit, and resource co-management agencies. Table 2-1 provides a preliminary listing of permits, licences, and authorizations that may be required to develop the Project. The specific permits, licences, and authorizations that will be required will depend on the final configuration of the Project and all related activities, and may include others not listed here. Regulatory procedures that must be followed differ for each permitting, licencing, or authorizing agency. The application for a permit, licence, or authorization will usually initiate a review of the Project under one or more environmental assessment processes, unless the proposed activity has been explicitly exempted from assessment.

Within Nunavut, Indian and Northern Affairs Canada (INAC) regulates land use on Crown (of federal) lands, whereas Nunavut Tungavik Incorporated (NTI) and the regional Inuit associations regulate subsurface and surface land use on Inuit Owned Lands. The Nunavut Water Board regulates water use in Nunavut. Environmental screening and assessment is the responsibility of the Nunavut Impact Review Board (NIRB). The *Nunavut Land Claim Agreement* (*NLCA*) establishes these new boards and regulatory processes, with the *Nunavut Land Claim Settlement Act* and the *Nunavut Act* being the federal legislation enabling the implementation of the provisions of the *NLCA*. Depending on the activity, environmental screening and assessment may also have to accommodate the requirements of the federal *Canadian Environmental Assessment Act (CEAA)*, in addition to the requirements of NIRB.

Table 2-1: Permits, Licences, and Authorizations That May Be Required (* indicates permits triggering *CEAA*)			
Activity	**Permit/Approval**	**Legislation**	**Agency**
Planning, Design, and Environmental Assessment Phase			
Site clearing, location of camps, laydown areas, miscellaneous land use	Land Use Permit	*Nunavut Land Claims Settlement Act Territorial Lands Act**	Nunavut Tungavik Incorporated, Kivalliq Inuit Association, Lands Division INAC
Water use and waste water disposal at camps	Water Licence	*Nunavut Waters Act*	Nunavut Water Board
Sewage disposal, food premises, sanitation at camps	Permit	*Public Health Act* (*Nunavut*)	Nunavut Department of Health and Social Services
Archaeological research and investigations	Archaeological Research Permit	*Nunavut Archaeological Sites Regulations* *Nunavut Land Claims Agreement Heritage Canada*	Inuit Heritage Trust, Nunavut Tungavik Inc. Heritage Canada
Wildlife studies and research in support of environmental assessment	Wildlife Research Permit	*Nunavut Wildlife Act*	Nunavut Wildlife Management Board Nunavut Department of Sustainable Development, Wildlife and Fisheries
Conduct of research and other scientific studies in support of environmental assessment	Other Scientific Research Permit	*Nunavut Scientific Research Act*	Nunavut Research Institute
Route preparation, camps, laydown and staging areas, borrow sources	Land Use Permit / Quarry Permit	*Nunavut Land Claims Settlement Act Territorial Lands Act and Regulations** *Federal Real Property Act & Regulations**	Nunavut Tungavik Incorporated, Kivalliq Inuit Association, Lands Division INAC
Water use and waste water disposal at camps, bridge crossings	Water Licence	*Nunavut Waters Act*	Nunavut Water Board
Transportation, use of heavy equipment	Vehicle Registration or Permit	*Motor Vehicles Act* (*Nunavut*)	Nunavut Department of Community Government and Transportation
Transportation of dangerous goods	Certificate / Permit	*Transportation of Dangerous Goods Act*	Transport Canada Nunavut Department of Sustainable Development
Sewage disposal, food premises, sanitation at camps	Permit / Criteria	*Public Health Act*(*Nunavut*)	Nunavut Department of Health and Social Services

2.2 Existing Environmental Assessment and Review Process

This section provides a summary of the typical regulatory provisions for environmental assessment pursuant to the *NLCA* and the *CEAA*, as outlined in the agreement, enabling legislation, guidelines, and operational procedures, that may apply to any project within Nunavut.

Article 12 of the *NLCA* establishes processes for the screening and review of project proposals on land and marine areas within the Nunavut Settlement Area (including Inuit Owned Lands, Commissioners lands, and Crown lands) and to the Outer Land Fast Ice Zone. The NIRB was established in 1996, under Article 12.2.1 of the *NLCA*, as an institution of public government with responsibilities for environmental assessment. The NIRB's primary functions are to screen and review the ecosystemic and socio-economic effects of project proposals, and to make recommendations to the federal or territorial Minister(s) responsible for authorizing such projects to proceed. The NIRB also can issue recommendations for monitoring of project effects, but the responsibility for enforcement of such provisions lies with the agency issuing a permit, licence, or authorization. The NIRB's objectives are to protect the ecosystemic integrity of Nunavut, and to protect and promote the existing and future well-being of the residents and communities of Nunavut, and of Canada.

The CAM-F Dew Line Site is on federal lands that are regulated by INAC. As the Responsible Authority, INAC requires that an environmental screening be conducted in accordance with the *CEAA*. Where a proposed project in Nunavut involves a *CEAA* trigger, federal and territorial governments and the NIRB work together to harmonize the environmental screening process. This process is intended to provide information for the federal authorities to support the screening of the project pursuant to the requirements of *CEAA*. As such, the study has been conducted in a manner that is consistent with the *NLCA* and *CEAA* and the guidance documentation of the NIRB, the Canadian Environmental Assessment Agency and INAC.

The initial step in obtaining approval for a project proposal within the Nunavut Settlement Area is the submission of an application for a permit, licence, lease, or approval to an authorizing agency (*i.e.*, government department, Designated Inuit Organization, regulatory board). It is important to note that more than one authorization may be required for undertakings and activities on land or water.

The authorizing agency is responsible for initial processing of the application. Where regional land use plans are in place, the application is forwarded to the Nunavut Planning Commission (NPC) for review of conformity with the land use plan. Where a project proposal conforms to an approved land use plan, or if a variance has been approved, the NPC forwards the project proposal application to the NIRB for screening. If no approved land use plans exist, project proposal applications are referred directly by the authorizing agency to the NIRB for screening.

The initial steps of the screening involve notification of the proponent and authorizing agencies, establishment of a timeline for a screening determination (where not specified by regulation), and distribution of the project proposal application to appropriate stakeholders. Taking into account all comments received from stakeholders regarding the project proposal, existing scientific information, Inuit traditional knowledge, and the information provided by the proponent, the NIRB then reviews the potential effects of the project and the level of public concern about and/or support for the project proposal. Once the screening has been completed, the NIRB will produce a Screening Decision Report that documents its determination as to whether the project proposal should be approved without further review, abandoned or modified by the proponent, or subject to review under Part 5 or 6 of the NLCA.

If the NIRB determines that the project proposal should proceed without further review, the NIRB may include in its Screening Decision Report terms and conditions to be attached to the authorizations to be issued. The authorizing agency will include the NIRB terms and conditions in the final authorization. However, where the authorizing agency disagrees with the recommended terms and conditions, the agency must provide the NIRB with a rationale for omissions from the final authorization. Monitoring of adherence to terms and conditions is the responsibility of the authorizing agency. The NIRB will complete its screening and issue its Screening Decision Report to the authorizing agency (or agencies) within applicable legislated timelines to allow the agencies to meet their legislative requirements. However, should an agency have no legislated time limits regarding the issuance of permits, NIRB will provide its Screening Decision Report within "an acceptable time period" (NIRB 2003a).

When the Screening Decision Report indicates that a review is required, the Minister may:

- refer the proposal to the Minister of Environment for review by a federal environmental assessment panel;
- refer the proposal back to the NIRB for a review of ecosystemic and socio-economic impacts; or
- inform the proponent that the proposal should be abandoned or modified and resubmitted to NIRB.

The scope of the project has been determined pursuant to Section 15.1 of the *CEAA*. Discussions with PWGSC were undertaken to establish the scope of the project, the scope of the environmental screening and the establishment of Valued Ecosystem Components (VECs). Factors considered in the environmental screening include those prescribed in Section 16.1 (a) to (e) of *CEAA*, listed below:

(a) the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
(b) the significance of the effects referred to in paragraph (a);
(c) comments from the public that are received in accordance with this Act and the regulations;
(d) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project; and

(e) any other matter relevant to the screening, comprehensive study, mediation or assessment by a review panel, such as the need for the project and alternatives to project, that the responsible authority or, in the case of a screening, the Minister after consulting with the responsible authority may require to be considered.

Cumulative environmental effects have been considered pursuant to Section 16.1(a) of *CEAA* for likely future projects. No additional factors have been prescribed under Section 16.1(e) by INAC for inclusion in the potential cumulative environmental effects assessment analysis.

The existing conditions of the project area environment, with respect to the identified VECs, are characterized in this report. Potential interactions of specific project activities with the environment are identified and the environmental effects are evaluated in consideration of appropriate mitigation measures.

3.0 ENVIRONMENTAL ASSESSMENT CONTACTS

Responsible Authority Contact: Robert Martin Contaminated Sites, Project Officer Nunavut Regional Office Bldg. 969, P.O. Box 2200 Iqaluit, NU X0A 0H0 Phone: (867) 975-4583 Fax: (867) 975-4560	***CEAA Contact:*** Brian Torrie Project Assessment Group Canadian Environmental Assessment Agency 160 Elgin Street, 22nd Floor, Ottawa, ON K1A 0H3 Phone: (613) 957-0791
Proponent Contact: Robert Martin Contaminated Sites, Project Officer Nunavut Regional Office Bldg. 969, P.O. Box 2200 Iqaluit, NU X0A 0H0 Phone: (867) 975-4583 Fax: (867) 975-4560	***Nunavut Impact Review Board:*** Jorgen Komak Environmental Assessment Officer P.O. Box 2379 Cambridge Bay, NU X0B 0C0 Phone: (867) 983-2593 Fax: (867) 983-2594 e-mail: jkomak@nirb.nunavut.ca
Environmental Consultant Contact: James Howell Jacques Whitford Suite 500, 708-11 Avenue SW Calgary, Alberta, T2R 0E4 Phone: (403) 263-7113 Fax: (403) 263-7116 email: jhowell@jacqueswhitford.com	

4.0 PROJECT DESCRIPTION

The Department of INAC wishes to implement a remedial action plan at the abandoned intermediate DEW Line site CAM-F, located at Sarcpa Lake, Nunavut. In order to develop a detailed remedial action

plan, additional assessment activities are necessary to quantify the volume of contaminated soil and hazardous materials at the site and to conduct a waste audit on all non-hazardous materials. It has also been recognized as necessary to identify potential gravel and rock borrow sources and suitable locations for an engineered landfill.

The former DEW Line site was constructed in 1957 and subsequently closed and abandoned in 1963. The site was converted to a scientific research station in 1977 under the auspices of the Science Institute of the Northwest Territories and Indian and Northern Affairs (DIAND). In 1985, a hazardous materials removal program was implemented with the removal of hazmat found in equipment and surface contaminants. Assessments completed in 1987/88 and 1994 have confirmed the presence of various hazardous materials and contaminated soil. In 1989, a partial clean up of PCB contaminated walls and floors at the station was carried out to limit the exposure of workers to PCBs. An asbestos abatement program and clean up of Dump A was carried out in 1997.

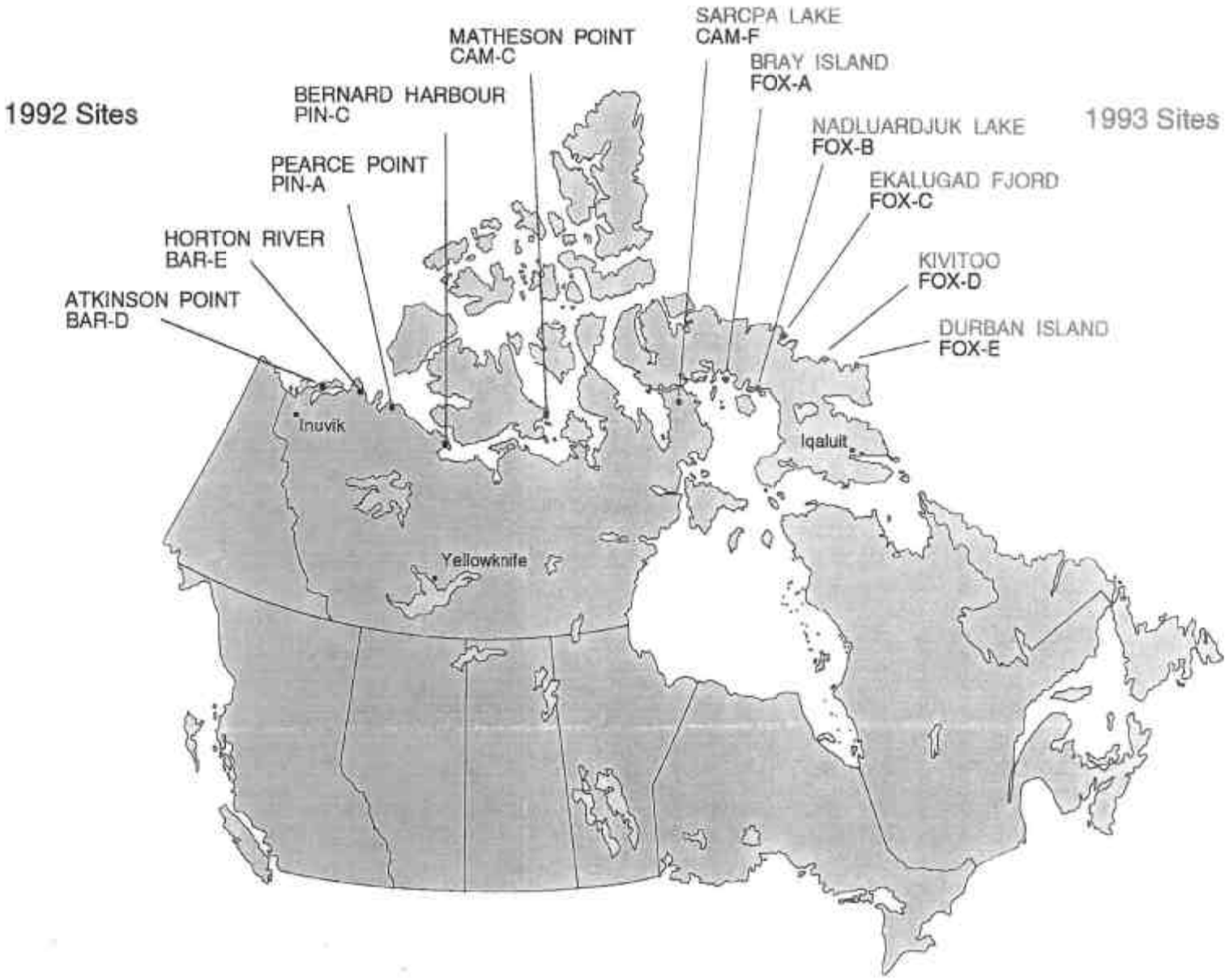
The Project consists of two components:

1. a detailed site assessment and preliminary waste consolidation at the CAM-F Dew Line Site (scheduled for 2004) and
2. the development and implementation of a remedial action plan for the site (scheduled to commence in 2005).

This environmental screening focuses on the first component, the detailed site assessment and preliminary waste consolidation. A separate environmental screening for the remediation component will be submitted for regulatory approval following completion of the detailed site assessment and design of the remediation program.

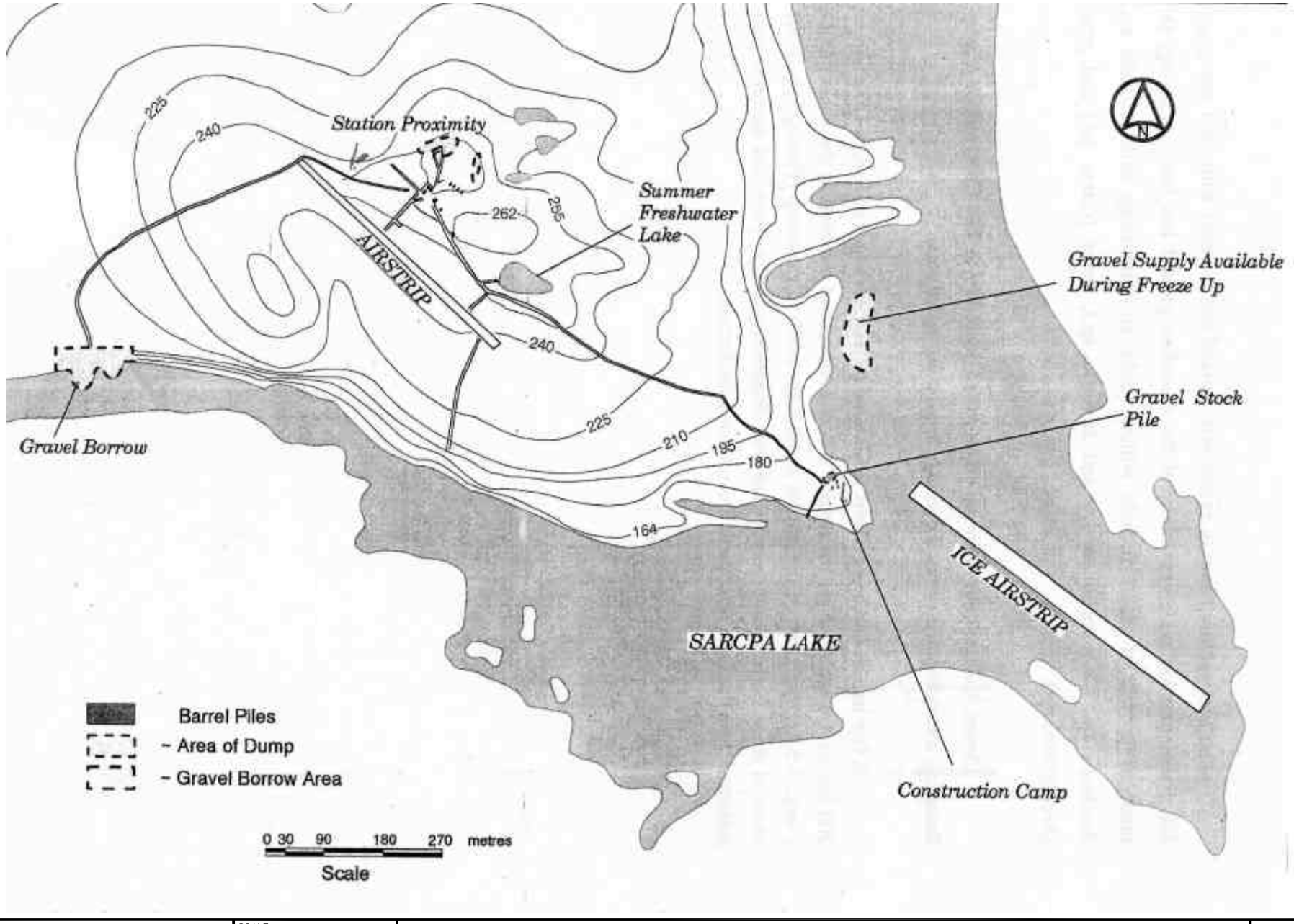
4.1 Project Location

CAM-F Dew Line Site (Figure 4-1) is located at 68°33' N, 83°19' W on Melville Peninsula, between Foxe Basin and Committee Bay in Nunavut Territory. The main station is situated at an elevation of 260 m above sea level on a hill approximately 2 km north of the west arm of Sarcpa Lake (Figure 4-2). Terrain around the site consists of rolling tundra highland with gravel deposits, several lakes and numerous rivers (Indian and Northern Affairs, 2003). The site, which is approximately 85 km west of Hall Beach and 100 km southwest of Igloolik, is landlocked and inaccessible by sea-lift. It can be reached by canoe or an overland winter route by way of Hall Lake and Kingora River (Royal Roads Military College 1994). As well, there is an airstrip accessible for most of the year and airplanes equipped with skis may land on Sarcpa Lake during the short summer.



Jacques Whitford	SCALE: N.T.S. DATE: 01/04/2004 DRAWN BY: SAR APPROVED BY:	TITLE : **CAM - F DEW LINE SITE GENERAL LOCATION MAP**	DRAWING NO. **4-1**

T:\Project_files\50000\50000\50516\ABC50516_4-1.dwg



jacques Whitford	SCALE: As Shown DATE: 01/04/2004 DRAWN BY: SAR APPROVED BY:	TITLE : **CAM - F DEW LINE SITE DETAILED LOCATION PLAN**	DRAWING NO. **4-2**

T:\Project_files\50000\50000\50516\ABC50516_4-2.dwg

Environmental assessment of the CAM-F DEW Line site was initiated in 1986 when DND and Environment Canada visited the site to remove contaminants such as PCBs and POLs and identify areas of buried materials that could pose environmental risks in the future. Their findings identified a number of drum caches with many of the drums still containing product. These were left in-place. Removal of PCB containing equipment was conducted and elevated PCB concentrations were noted in soil samples at several areas. Various sampling and clean up activities have been conducted at the site during the 1990s.

The site was revisited in 1994 by the Environmental Sciences Group of Royal Roads Military College at which time a detailed surface soil sampling program was completed. Their investigations identified soil contamination exceeding Tier I and Tier II DCC criteria near the module train, garage, warehouse, dumps, crashed aircraft and construction camp. However, these investigations did not include assessment of hydrocarbon contamination that has the potential to be a significant source of contamination at the site. Analysis of paint, barrel contents and asbestos has also been conducted.

4.2 Objectives of the Detailed Site Assessment and Preliminary Waste Consolidation

The objectives of the first phase of the Project include:

- A review of all previous information gathered for the site regarding on-site landfills, contaminated soils, and hazardous materials;
- The implementation of a detailed site assessment to:
  - Quantify the volume of contaminated soil at the site. This will include soil contaminated with heavy metals, PCBs, and petroleum hydrocarbons.
  - Quantify the volume of hazardous materials at the site, including asbestos-containing materials and paint containing PCBs and/or lead.
  - Quantify the volume of liquid waste that can be incinerated on-site (hydrocarbons) or requires southern disposal (PCB-containing oil, chlorinated or metal-containing hydrocarbons).
  - Identify potential locations for an engineered landfill for the disposal of non-hazardous waste.
  - Identify borrow sources to supply enough granular material for the construction of the landfill by way of a full geotechnical evaluation.
  - Complete a human health and ecological risk assessment at the site. This will likely include the collection of flora, fauna, and sediment samples.
  - Evaluate the condition of the runway.
- The initiation of a drum consolidation and crushing program at the site.
- The preparation of a detailed design for site remediation activities.

4.3 Scope of Work

The scope of work to be carried out at CAM-F Dew Line Site for the detailed site assessment and preliminary waste consolidation is described in this section.

4.3.1 Planning and Design

A detailed review of all previous site information was conducted in order to determine any information gaps and identify additional site information required for the preparation of a remediation specification. Applicable previous site information includes the assessments completed in 1985 and 1993.

Based on the review of the site information, community consultation has been initiated to introduce the objectives of the 2004 program to the communities in the surrounding area and to obtain a local perspective on the current use of the facilities at the site and the availability of heavy equipment and labourers from the community. The community consultation component will continue throughout the duration of the project to ensure that the community is informed about the activities, results, and plans regarding the site, and are active participants in the RAP development.

A preliminary site visit was conducted in mid-March 2004 to survey the terrain to the site along the Cat train route used in the past. Once the detailed scope of work has been finalized, permit applications will be prepared. The final component of the planning phase will be the preparation of a tender document for the supply of a camp, heavy machinery, and labourers for support services during all site activities in 2004. A quantitative human health and ecological risk assessment will be conducted and may be used to establish site-specific risk-based criteria that will be used to define the remedial program for CAM-F.

4.3.2 Field Program

4.3.2.1 Camp Construction

The field program will commence in mid-May and will include the mobilization of support equipment from Hall Beach to Sarcpa Lake. In early July, mobilization of any other necessary smaller pieces of equipment and supplies will be completed. This will be supported by fixed wing aircraft. The camp will be constructed in mid-July when the assessment activities are to commence. It is anticipated that camp size will be in the order of 15 to 20 people and will be staffed from July to mid-August.

4.3.2.2 Assessment Activities

Assessment of Existing Landfills

Two landfills have been identified at the site. Dump A is located east of the POL tanks and its depth has been previously estimated to be 6 m. In 1985, PCB capacitors were removed and activities from 1994 to 1997 included the removal and containerization of all CEPA and some Tier II contaminated soil. Waste

on the surface was separated into hazardous and nonhazardous materials. Following the 1997 excavation activities, it was estimated that 300 m^3 of Tier II soil and 130 m^3 of Tier I remains in the dump. Dump B is located north of the POL tanks and the depth of material rarely exceeds 1 m with minimal cover. This dump contains heavy equipment, wooden beams, barrels, electrical equipment, air ducts, beds, shelves, snowfencing, tanks, batteries, etc. Tier I impacted soils are present. One hundred-ten bags of asbestos containing materials were removed in 1997.

Assessment activities associated with the existing landfills will comprise:

- delineation of the landfill boundaries;
- identification and quantification, if necessary, of hazardous materials in the landfill including contaminated soil; and
- determination of whether the landfill is releasing deleterious substances into the surrounding environment.

Contaminated Soil Delineation

Areas of soils contaminated with heavy metals, PCBs, and/or petroleum hydrocarbons have been identified at the module train area, garage area, warehouse area, dumps, construction camp and crashed airplane site in previous reports. Further soil sampling is required to delineate the areal and vertical limits of the contamination on-site.

Hazardous Materials Inventory

A hazardous materials inventory will be completed at each of the structures remaining at the site. The inventory will identify and quantify materials that will require specialized disposal such as asbestos-containing materials, paint containing lead and/or PCBs, and PCB-containing equipment. Also included in this activity will be sampling of barrels containing liquid. Based on the barrel sampling program, estimates of the volume of liquid that can be incinerated on-site, shipped south for disposal, or disposed of on-site will be produced.

Assessment of New Landfill Location and Borrow Sources

The comprehensive remediation activities planned for this site will potentially generate a substantial volume of hazardous and non-hazardous waste. The construction of an engineered landfill at the site for the disposal of the waste is an option that may be implemented. Investigations are required to confirm if this is a viable option. Specifically, it needs to be determined if there is an appropriate location with adequate space for the volume of waste requiring disposal and if there is sufficient granular material from borrow sources to construct the landfill. A survey of the site will be conducted to tie in all site structures, borrow sources, landfill areas and assessed locations.

Site Specific Risk Assessment

A site-specific risk assessment will be completed at the site to quantify the risk to human and ecological receptors from the identified contamination. The results of the risk assessment may establish the level of effort required to reduce site environmental liability to an acceptable level.

CAM-F Dew Line Site Assessment

A sampling program will be implemented to assess the condition of lake-bottom sediments in Sarcpa Lake. Sediment samples will be collected and analyzed for PCBs, hydrocarbons and total metals. An electromagnetic survey and an underwater video camera will be utilized to determine if debris has been dumped into the lake in previous years.

Airstrip Evaluation

Previous assessment reports from the site have identified that the 1,100-m runway is in fair condition, however quite soft during the summer months. The condition of this airstrip needs to be confirmed and the investigations completed at the site this year should address what measures are necessary to bring the runway to a working condition. The status of the runway will have a major impact on the design of the remediation plan for 2005.

4.3.2.3 Waste Consolidation

Approximately 7,000 drums have been identified at various locations within the site; many of these are reported to be empty. Using local Inuit labourers, the dry empty barrels strewn around the site will be collected and returned to a central location for crushing. Barrels that contain product or are adjacent to a waterway will be left in place and included in the comprehensive remediation program to be implemented in 2005.

The benefit of initiating this activity in 2004 relates primarily to the effect it will have on the surrounding communities. The specific benefits of this task include:

- generation of local employment opportunities for Inuit;
- allowing Inuit labourers to job-shadow during the assessment activities and provide them with a better understanding of assessment activities; and
- allowing the local communities to take an active role in cleaning up the site which will facilitate cooperation between DIAND and the community groups.

4.3.2.4 Detailed Design for Site Remediation

Based on the results and reports generated from the assessment activities, a comprehensive site remediation plan and specification will be developed for the site. It is anticipated that this will be completed in early January 2005 to allow sufficient time to let and award the contract and provide adequate time for the successful contractor to coordinate the mobilization of supplies to the site in 2005.

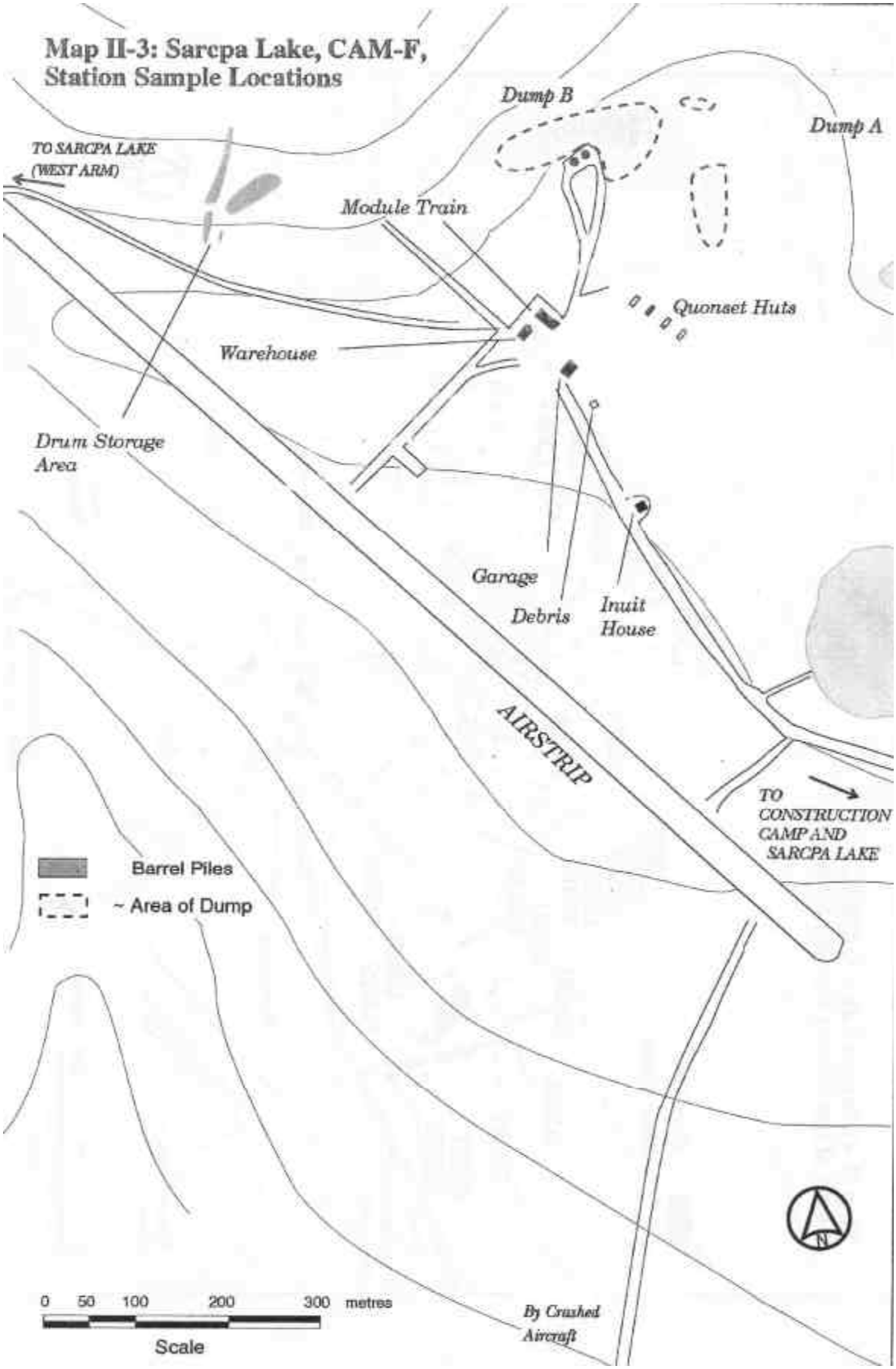
4.4 Existing Infrastructure

Figure 4-3 is a site layout of CAM-F Dew Line Site. Site infrastructure consists of the following:

- main building train;
- warehouse and garage;
- Inuit house (dormitory);
- POL (Petroleum, Oil, Lubricants) and drum storage pads;
- quonset hut;
- two dump sites;
- a vehicle dump;
- a radar tower;
- a land airstrip;
- a lake airstrip; and
- an 85-km winter route from Hall Beach to the site.

The winter route (Figure 4-4) will require no clearing and will use only existing points of land as references. The route passes from Hall Beach to Sarcpa Lake. Hall Beach is located on the east side of Melville Peninsula near the coast. There are three major sections of the route from Hall Beach to the site. The first (east) section, is approximately 30 km long, basically heading due west-to-northwest from the Hamlet. The middle section crosses Hall Lake, the largest lake on Melville Peninsula, heading west – southwest along the lake until reaching the west shore of the lake where it follows the lakeshore south for approximately 4 km. The third, most westerly section of the route, leaves the lake and twists up through higher elevations along the Kingora River route, before leaving the river ravine near the site and following high points of land the remainder of the way to Sarcpa Lake. The route enters the DEW Line site from the south.

As the route will be only be crossed during winter when both the lake and river are frozen, no Fisheries and Oceans Canada approvals will likely be required to access the site.



Jacques Whitford	SCALE: As Shown DATE: 01/04/04 DRAWN BY: SAR APPROVED BY:	CLIENT : TITLE : **CAM - F DEW LINE SITE SITE LAYOUT MAP**	DRAWING NO. **4-3**

T:\Project_files\50000\50000\50516\ABC50516_4-3.dwg

Figure 4-4: Winter Route from Hall Beach to CAM-F Dew Line Site

4.5 Waste Inventory

Wastes identified at the CAM-F Dew Line Site are identified in the following subsections.

4.5.1 Buildings and Infrastructure

Environmental issues associated with the buildings and infrastructure include PCB contaminated paint, which was identified in the building train in 1987 and 1988. In 1989, the identified areas were washed with a solvent and repainted with alkyd semi-gloss enamel. The generator and utility room and the water storage room were not cleaned, they were sealed off. In 1996, bulk PCB concentrations of the paint in the building train identified PCB concentrations of 330 – 28,000 ppm. PCB concentrations in the warehouse were 38,000 – 74,000 ppm. PCB concentrations in the garage were 710 ppm. PCB concentrations in the Inuit house were 1,200 ppm. The renovated parts of the building train contain pipe that is insulated with asbestos.

There are two dumps (Dump A and Dump B) northeast of the station. Dump A is the larger of the two dumps and was located east of the POL tanks. It contained electrical equipment from the building train, and was removed in 1996, and the soils were excavated to remove PCB contaminated soils. PCB contaminated soils above CEPA and DEW Line Clean Up Criteria (DCC) levels, and metals contaminated soil above the DCC levels still remain at the Dump A location.

Dump B is also located east of the POL tanks and extends along a bedrock ridge for about 100 m eastward. The depth of waste is less than one metre, and no cover is present. Waste consists of metal sheeting, metal pipes covered with asbestos insulation, heavy equipment, barrels, wooden beams, electrical equipment, air ducts, beds, batteries, and tanks.

A vehicle dump is located south of the warehouse. The dump includes trailers, snow ploughs, barrels, automobile batteries, tires, vehicle parts, glass, insulation coils, and cable.

There is a land airstrip that runs in an east-west direction and is about 1,100 m in length. It is not maintained and is very soft. There is also a lake ice strip that runs in and east-west direction and is about 1,800 m in length.

4.5.2 Hazardous Waste

Hazardous waste and debris from around the site includes (Indian and Northern Affairs 2003):

- From the warehouse
  - compressed gas cylinders
  - thirteen fuel drums (diesel fuel, naptha, gasoline)
  - generators

- ATVs and boats
- 285 m^3 of soil with metal concentrations greater than DCC
- 164 plastic barrels containing CEPA level PCB soils

- Paint from debris in Dump B had PCB concentrations of 1,700 ppm.

- From the land airstrip
  - six hydrogen cylinders
  - ten barrels of Jet B fuel

- From the old construction camp area
  - 5 barrels containing 230 L of product, likely PHCs and rust
  - 1 barrel containing product with high lead
  - 1 barrel containing product with high chlorine

- From along the road
  - 800 barrels that mostly contain domestic waste (these will be assessed to determine if they are hazardous)

- From the main barrel cache area
  - 7 barrels containing a total of 48 L of lubricating oil

Total volumes of hazardous material include 410 L of waste oil with PCB >50 ppm found in two drums, and an additional 5,995 L of other waste oil.

4.5.3 Non-hazardous Waste

Non-hazardous waste and debris at the site includes (Indian and Northern Affairs 2003):

- From around the station:
  - scrap metal and wood
  - barrels
  - toppled radar antenna (this may contain PCBs and if so will be handled as hazardous waste)

- From the land airstrip area:
  - metal debris (corrugated drain pipes, antenna, metal grates)
  - airstrip lighting
  - cables
  - crashed, burned-out aircraft
  - fourty-five empty barrels

- From the old Construction Camp (near the shore of Sarcpa Lake):
  - abandoned vehicles (trucks, crane)
  - snow fencing
  - tires
  - vehicle parts
  - wooden pallets
  - cables
  - batteries
  - wood
  - fire extinguisher
  - 1,500 empty barrels

- From the main barrel cache area:
  - 3,250 empty barrels

- North of the western arm of Sarcpa Lake:
  - 90 barrels (assumed to be empty or non-hazardous)

- From Dump A:
  - 34 barrels (assumed to be empty or non-hazardous)

4.6 Proposed Activities

The proposed activities at the CAM-F Dew Line Site include a preliminary site inspection, a detailed site assessment and preliminary waste consolidation, and site remediation activities. Although this environmental screening focuses on the detailed site assessment and preliminary waste consolidation, for completeness sake, information on all activities are summarized in Table 4-1.

Table 4-1: Task Description and Tentative Schedule – CAM-F Dew Line Site Detailed Site Assessment and Preliminary Waste Consolidation

Activity	Status	Comment
Background Review	**February 2/04 - March 26/04**	
Review Previous Reports	February – March 2004	Review to determine information gaps for the preparation of a remediation specification.
Program Options Review & Selection	February – March 2004	
Community Consultation	**January 8/04 – November 18/04**	
Establish Working Groups	April 1 – 14/04	Consultation will be done to introduce the objectives of the site activities and to obtain perspectives on the current use of the facilities, availability of heavy equipment and local labourers.
Meeting #1 – Project Introduction to Communities	April 8/04	

Table 4-1: Task Description and Tentative Schedule – CAM-F Dew Line Site Detailed Site Assessment and Preliminary Waste Consolidation		
Activity	**Status**	**Comment**
Meeting #2 – QIA and H&TO	March 16 – 17/04	
Meeting #3 – Project details & Org Structure	April 12 – 16/04	
Meeting #4 – Assessment Results	October 12 – 13/04	
Meeting #5 – Final Work Plan Delivery	November 17 – 18/04	
Regulatory Approvals – Assessment Activities	**January 23/04 – May 17/04**	
Preparation (Investigation)	January 23/04 – March 26/04	
Finalize Project Description	March 16 – 31/04	
Prepare and Submit Land Use and Water Use Applications	March 24/04 – April 5/04	
Project Review by NIWB/CEAA/DFO/DOE/Land Use Board	April 5, 2005 – May 17/04	
Preliminary Site Inspection	**March 14 to 17/04**	
Site familiarization trip	March 14 – 17/04	Non-intrusive task to be completed prior to irrevocable (funding) decisions Essential to determine tasks that can be completed in 2004, the necessary equipment, and logistical issues for stocking and supporting the camp.
Erect warming sign regarding site access/dangers	March 14 – 17/04	
Evaluate potential cat train routes	March 14 – 17/04	
Equipment Supply Contract	**March 9/04 – May 28/04**	
Prepare Equipment & Camp Supply Spec #1 for July Site Assessment	March 9 – 26/04	
French Translation for Spec #1	March 29/04 – April 6/04	
Tender Period Spec #1	April 9 – 29/04	
Award Contract #1	May 3 – 7/04	
Mobilize Equipment and Camp from Hall Beach to Sarcpa Lake	May 24 – 28/04	Principally by barged sea-lift.
Camp Construction	Mid July/04	The camp will be constructed in mid-July when the assessment activities are to commence.
Detailed Site Assessment and Preliminary Waste Consolidation	**May 31/04 – November 26/04**	
Obtain Assessment and HazMat Removal contracts	May 31/04 – July 7/04	
Assessment of Existing Landfills	Summer 2004	Including delineation of landfill boundaries; identification and quantification of hazardous materials in landfills, including contaminated soil; and determining if the landfill is releasing deleterious substances into the surrounding environment. Will include a geotechnical evaluation.
Contaminated Soil Delineation	Summer 2004	Areas of soils contaminated with heavy metals, PCBs, and/or petroleum hydrocarbons have been identified at the

Table 4-1: Task Description and Tentative Schedule – CAM-F Dew Line Site Detailed Site Assessment and Preliminary Waste Consolidation		
Activity	**Status**	**Comment**
		module train area, garage area, warehouse area, dumps, construction camp and crashed airplane site. Further soil sampling required to delineate the aerial and vertical limits on contamination.
Hazardous Materials Inventory	Summer 2004	Will identify and quantify materials requiring special disposal such as asbestos-containing materials, paint containing lead and/or PCBs, and PCB-containing equipment. Will also include sampling of barrels, estimating volume of liquid that can be incinerated on-site, shipped south for disposal or disposed of on-site.
Assessment of New Landfill Location and Borrow Sources	Summer 2004	Investigation required to confirm if this is viable. A survey will be conducted to tie in all site structures, borrow sources, landfill areas and assessed locations.
Site Specific Risk Assessment	Summer 2004	Will be completed to quantify the risk to human and ecological receptors at the site from contamination. The results may establish the level of effort required to reduce site environmental liability to an acceptable level.
CAM-F Dew Line Site Assessment	Summer 2004	Will be completed to assess the condition of the lake bottom sediments in Sarcpa Lake. Sediment samples will be analyzed for PCBs, hydrocarbons and total metals. An electromagnetic survey and underwater video camera ill be used to determine if debris has been dumped into the lake.
Airstrip Evaluation	Summer 2004	Will be completed to confirm the condition of the airstrip and to address what measures are necessary to bring the runway to a working condition. May have a major impact on the design of the remediation plan for 2005.
Waste Consolidation	Summer 2004	About 7,000 drums have been identified at various locations within the site; many are reported to be empty. Using local Inuit labourers, the dry empty barrels will be collected and returned to a central location for crushing. Barrels containing liquid or adjacent to a waterway will be left in-place and included in the comprehensive remediation program in 2005. Some consideration may be given to flying out some drums from the warehouse, or shipping them to Montreal via barge.
Laboratory Analyses	August 2 – 16/04	
Obtain all Reporting	September 27/04 – October 1/04	
Submit Draft Work Plan for Entire Site Clean Up to DIAND	October 25 – 29/04	
Finalize Work Plan and Project Description	November 15 – 26/04	

4.7 Work Camp

A work camp will be established at the CAM-F Dew Line Site to carry out the detailed site assessment and preliminary waste consolidation. The camp will be owned by the primary contractor who will be responsible for:

- food services;
- heating;

- lighting;
- fuel;
- potable and domestic water systems;
- sewage collection, treatment and disposal system;
- waste, refuse and garbage collection and disposal;
- camp fire prevention, alarm and fire fighting system;
- camp safety and security service;
- meals and catering service;
- sleeping and washroom facilities;
- bedding and bedding laundry service;
- janitorial service;
- personnel laundry facilities;
- recreational facilities; and
- snow removal.

The work camp, including its facilities, utilities, services, location and operation will be operated in accordance with applicable Federal, Territorial, and local codes, regulations and requirements governing camps, including environmental regulatory requirements, Land Use Permit and Water Use Licence.

Prior to the installation of camp facilities, all necessary work will be completed to ensure the protection of the environment. Additionally, consideration will be given to possible wildlife encounters when determining the camp layout. Bear and other wildlife safety literature will be considered when selecting the location of the kitchen, food storage, washroom and sleeping facilities. A working wildlife deterrent system will be put in place and there will be a replacement made available within 24 hours, should the primary system fail.

All camp wastes will be disposed of in accordance with the Land Use Permit. Sewage will be disposed of in pits. All sewage pits will be located a minimum of 100 m away from any drainage courses, water bodies and main camp buildings in accordance with the Land Use Permit. All potable water required for the camp, including dish washing and cooking water, will be brought to the site.

A fire extinguisher will be provided for each camp facility. A carbon monoxide detector will be provided for each facility that is equipped with an oil-burning heater. All flammable liquids will be handled and stored according to the current National Fire Code of Canada.

Basic camp rules will be established for the benefit of all occupants. The rules will cover subjects such as property damage, smoking, use of alcoholic beverages, drugs, firearms, security, nuisance, and any other matter related to the management of the camp operation. A copy of the camp rules will be provided to all occupants upon arrival to camp. Camp rules will prohibit the consumption of alcoholic beverages on site.

4.8 Personnel

Personnel involved with the project in the summer of 2004 will include, but are not limited to:

- 2 PWGSC employees;
- 2 INAC employees;
- 2 site and risk assessment specialists;
- 2 geotechnical evaluation specialists;
- 1 surveyor;
- 1 excavator operator;
- 1 truck driver;
- 1 site supervisor/mechanic;
- 5 labourers;
- 1 cook; and
- 1 cook's helper.

4.9 Equipment

Equipment required for the 2004 project activities will include, but is not limited to:

- 1 320B excavator;
- 1 flat bed cherry picker truck;
- 5 quads;
- 1 water pump;
- 1 portable generator;
- 1 boat and motor;
- 1 barrel crusher;
- cutting torches;
- adequate fuel and tanks, oil, grease, antifreeze, etc.;
- safety supplies (*e.g.,* tyvek suits, nitrile gloves, hard hats, respirators);
- survey rod and level;
- survey wheel;
- portable radios, satellite phone, GPS;
- spill kit and absorbent material;
- over pack drums; and
- paddles.

5.0 ENVIRONMENTAL ASSESSMENT METHODOLOGY

5.1 Overview and Approach

The assessment of the potential environmental effects of the proposed project has been carried out using a rigorous methodological framework developed on the basis of current, accepted practice and professional experience of the study team. The potential environmental effects of activities associated with the project on each VEC selected for consideration has been evaluated. Mitigation measures to address and minimize any potential environmental effects are also identified and discussed. The potential environmental effects resulting from malfunctions and accidents associated with the work plan have been evaluated. As well, the cumulative environmental effects of past, present and planned future activities have been assessed.

The assessment of project impacts is determined through the following procedure:

- VEC definition;
- determination of boundaries;
- potential interactions, assessment of impacts and mitigation analysis;
- summary of residual environmental impacts; and
- summary of mitigation and monitoring.

Each of these steps is described in further detail below.

5.2 VEC Definition and Selection

Standard environmental assessment practice encourages scoping to focus assessments on those environmental issues of greatest importance, referred to as Valued Environmental Components or VECs. The identification of key issues through stakeholder consultation, documents review process and site assessment process is critical to ensuring that the assessment focuses on those matters of primary concern to regulatory authorities, stakeholders and the assessor.

VECs are selected as components of the environment that are valued by society, and upon which the environmental assessment is focused. Potential environmental issues of concern that may be associated with the proposed project have been identified through consultation with Indian and Northern Affairs Canada (INAC), the Government of Nunavut, the professional judgement of the study team.

Based on the existing environmental conditions, the scope of the screening includes environmental effects on physical, biological, social and environmental components of value. The scope excludes the effects of accidental events on worker safety and the effects of burning fossil fuels by machinery used during the site remediation on the atmospheric environment (including greenhouse gases levels and

climate change). The scope of the socio-economic assessment is limited to the basic requirements of the *CEAA* Screening process whereby the assessment of socio-economic effects is limited to "*any change that the project may cause in the environment, including any such change on health and socio-economic conditions"*. The VECs identified for the project take in to consideration the nature, and temporal and spatial scope of the project and anticipated potential-environmental interactions. VECs selected and the rational for their selection is provided in Table 5-1. Table 3 summarizes the interaction and potential impacts between VECs and the various activities associated with the clean up.

Table 5-1: VEC Selection Rational

VEC	Rationale For Selection		
	Public/Stakeholder Concerns	Regulatory Considerations(*)	Professional Judgement
Air Quality	✓	✓	✓
Soil Quality	✓	✓	✓
Water Quality	✓	✓	✓
Terrain		✓	✓
Terrestrial Animals and Habitat	✓	✓	✓
Aquatic Animals and Habitat	✓	✓	✓
Health and Safety	✓	✓	✓
Archaeological and Heritage Resources	✓	✓	✓
Land Use	✓	✓	✓
Aesthetics	✓	✓	✓
Socio-economic Issues	✓	✓	✓

(*) Includes federal and territorial regulations.

5.3 Identification of Cumulative Environmental Affects

Cumulative effects have been defined as changes to the biophysical, social, cultural or economic environments caused by a project component in combination with any ongoing, past or future activities. Cumulative effects can occur as interactions between project components (either from the same or more than one site) and/or between environmental components. Effects can occur in one of four ways:

- physical or chemical transport mechanisms;
- "nibbling loss" (i.e., gradual disturbance);
- spatial or temporal crowding; and,
- growth induction initiated by a project.

5.3.1 Analysis of Cumulative Environmental Effects

Four steps in the analysis of the cumulative environmental effects of this project include scoping, analysis of effects, mitigation measures, and significance.

Scoping: Scoping includes the identification of issues of potential concern, VECs that could be affected and boundary setting. The activities considered include the investigation and remediation of the CAM-F Dew Line Site. Temporal and spatial boundaries encompass those periods during, and areas within which, the VECs are likely to interact with, or be influenced by project activities. The spatial boundaries include impacts over a larger (regional) area including the crossing of jurisdictional boundaries. As the landfills will remain on site, temporal boundaries extend beyond the time frame required to complete the clean up. Other boundaries to be considered as appropriate include administrative and technical boundaries imposed by factors such as finite resources of data, time, cost, and labour, as well as technical, political, or administrative and jurisdictional considerations.

Analysis of Effects: This section identifies the specific nature and extent of the interactions between the project and the VECs. Where appropriate, the assessment includes a summary of major concerns or hypotheses of relevance regarding the effect of each activity on the VECs being considered. Where existing knowledge or the application of standard mitigation indicates that an interaction is not likely to result in an impact, certain issues may warrant only limited analysis.

Mitigation Measures: For each interaction, options available for mitigation are considered in the impact analysis.

Significance: The environmental assessment considers activities associated with project activities that could result in adverse environmental effects in consideration of their likelihood of occurring, and taking into account appropriate mitigation measures. In determining whether there are adverse environmental effects, the following factors are considered:

- negative effects on the health of biota;
- loss of rare or endangered species;
- reductions in biological diversity;
- loss of critical/productive habitat;
- fragmentation of habitat or interruption of movement corridors and migration routes;
- transformation of natural landscapes;
- discharge or presence of persistent and/or toxic chemicals;
- toxicity effects on human health; and
- effects on cultural issues.

5.3.2 Identification of Mitigation Measures, Residual Impacts and Monitoring

Mitigation measures are identified that will result in a reduction or elimination of likely environmental impacts associated with the clean up. Section 6 discusses each VEC, the associated potential adverse environmental effects, the mitigation, and residual environmental effects. Taking into account the mitigation measures, the significance or anticipated residual impacts are identified for all potential impacts. The significance of the residual environmental impacts of project activities on a VEC is evaluated based on review of relevant literature, consultation with experts, and professional judgement.

Monitoring will be required in the future for a number of reasons including compliance, agreement commitments and impact management. This methodology also allows INAC to be able to establish baseline conditions for the project at the time of initiation. The implementation of recommended mitigation and monitoring will allow future activities to be compared to the current conditions identified by this assessment.

6.0 ENVIRONMENTAL ASSESSMENT

This section describes the potential interactions of specific project activities with the existing environmental conditions. Planned appropriate mitigation activities are identified and an assessment of the potential residual environmental effects (after mitigation is applied), including cumulative environmental effects. Potential interactions between the project and the identified VECs are described in the sub-sections below.

6.1 Regional Setting

CAM-F Dew Line Site is located on the eastern portion of Melville Peninsula, about 85 km west of Hall Beach and 100 km south of Igloolik. The site is located on the west side of Sarcpa Lake. Most of the Melville Peninsula is a polar semi-desert, being a high plateau of granitic Canadian Shield and holding only a small amount of soil, which is usually acidic. Coastal areas have basic soils on a limestone base and support a low shrub tundra complex. Vegetation is discontinuous and bedrock outcroppings are common (Ecological Stratification Working Group, 1995).

6.2 Public Consultation

Community presentations were carried out in Hall Beach and Igloolik in January 2004 to obtain input into the development of plans to remediate the site. The Hamlet Councils, Hunters & Trapper Organizations and Qikiqtani Inuit Association were in attendance. Presentations were generic in scope and focused on the clean up of CAM-F within the near future although specific dates were not defined. The same presentation was made to representative(s) of Fisheries and Oceans Canada Habitat Assessment, Environment Canada Environmental Protection Branch, Department of Indian Affairs and

Northern Development Land Use and the Nunavut Impact Review Board. The project has also been discussed with the Nunavut Water Board and the Nunavut Planning Commission.

Following a March 16, 2004 visit to CAM-F, there was an opportunity for a second meeting in Hall Beach on March 17th. Community members in attendance were representatives of the same groups as at the previous meeting in Hall Beach. Again, the presentation was generic in scope. The probability that the project scope would be reduced to a year of investigation with some waste management activities was introduced. Community ideas were sought and received on the overall site remediation plan and the site investigation project.

Meetings to present the site investigation plan to the public of both communities are being planned. As well, meetings to update the Federal and Territorial regulatory bodies are being planned. Resources for on-going communications, as requested by the communities, have been budgeted for.

6.3 Air Quality

6.3.1 Existing Environment

The climate on the Melville Peninsula is a typical polar climate characteristic of other high arctic sites. The snow begins to disappear in late May (Montgomerie *et al.,* 1982). The mean annual temperature is approximately -11°C with a summer mean of 2°C and a winter mean of -23°C. The mean annual precipitation ranges from 100 mm to 300 mm. Drainage tend to flow south-eastward towards Foxe Basin (Ecological Stratification Working Group, 1995).

6.3.2 Air Quality Impact Assessment

6.3.2.1 Study Area Boundaries

The spatial boundary for the assessment of project effects on air quality is the airshed on the Melville Peninsula. The temporal boundary is the detailed site assessment and preliminary waste consolidation field work period.

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 for review by NIRB and other federal departments through the normal CEAA process. Technical boundaries of the air quality assessment are the lack of site-specific meteorological data and the limited time frame associated with the environmental screening.

6.3.2.2 Identification of Issues, Interactions and Potential Effects

During the detailed site assessment and preliminary waste consolidation activities, there will be minor emissions of greenhouse gases, nitrogen oxides (NO_x), sulphur dioxide (SO_2) particulate matter (PM) and carbon monoxide (CO) due to combustion of diesel fuel or gasoline in vehicles. There is also the potential for generation of dust during vehicle movement. These emissions will be of short-term duration and will be restricted to the local area around the site. Table 6-1 is an environmental assessment matrix for the Air Quality VEC.

Table 6-1: Environmental Effects Assessment Matrix: Air Quality

Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	Evaluation Criteria for Assessing Residual Environmental Effects				
			Magnitude	Geographic Extent	Duration/ Frequency	Reversibility	Ecological/Socio-Cultural and Economic Context
Detailed Site Assessment and Preliminary Waste Consolidation	Emissions of greenhouse gases, nitrous oxides, sulphur dioxide, particulate matter, and carbon monoxide from vehicles (A).	• None	1	1	2/5	R	1
	Vehicle movement will generate dust (A).	• Dust control measures will be implemented. Water will be used for dust suppression. Exposed soil piles will be covered.	1	1	2/5	R	1
Hazardous Materials Removal	The removal of the contaminated soil from the environment will reduce the risk of effects on air quality (P).	• N/A					

KEY

Magnitude:

1 = Low: emissions predicted to be within the CCME National Ambient Air Quality Objectives
3 = High: Emissions predicted to exceed the CCME National Ambient Air Quality Objectives

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 = 1-12 months
3 = 13-36 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

6.3.2.3 Mitigation

Mitigative measures for controlling fugitive dust emissions during the project activities will be detailed in procedures that the contractors will be required to follow (i.e., watering down roads and exposed portions of the project site, covering exposed soil piles). Windblown dust during project activities is expected to be minor.

6.3.2.4 Residual Environmental Effects

Definition of Significance

Significant Impacts to the atmospheric environment are defined to occur when ground-level concentrations associated with emissions from activities exceed ambient air quality standards that have been established by the government to protect human health and the environment. In this case, the National Ambient Air Quality Objectives from the Canadian Council of Ministers of the Environment (CCME 1999) are the standards used.

Residual Environmental Effects Summary

Table 6-2 summarizes the residual environmental effects of the project activities on air quality. The effects of vehicle and equipment emissions during the detailed site assessment and preliminary waste consolidation are not expected to exceed CCME ambient air quality objectives, although no monitoring of emissions has been carried out. Emissions will be short term and intermittent and will not be unlike those from low traffic volumes in a city such as Iqaluit. Dust generation is expected to also be low in volume and infrequent.

Table 6-2: Residual Environmental Effects Summary Matrix: Air Quality

Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
Detailed Site Assessment and Preliminary Waste Consolidation	NS		
Hazardous Materials Removal	P		

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

6.3.2.5 Summary of Environmental Effects on Air Quality

Detailed site assessment and preliminary waste consolidation at CAM-F Dew Line Site will not have a significant impact on the air quality. The CAM-F Dew Line Site investigation and remediation will have a positive impact on air quality in terms of removing contaminated soil from the environment, thereby reducing the risk of dust from this soil affecting air quality.

6.4 Soil Quality

6.4.1 Existing Environment

Soils in the CAM-F Dew Line Site area are typically Turbic and Static Cryosols with some Organic Cryosols in poorly drained areas. These soils are developed on stony, sandy till, fluvial and marine deposits. Information on soil quality is lacking.

6.4.2 Soil Quality Impact Assessment

6.4.2.1 Study Area Boundaries

The spatial boundary for the assessment of project effects on soil quality is the CAM-F Dew Line Site and the extent beyond the site in which soil contaminates may be expected to migrate. The temporal boundary is the detailed site assessment and preliminary waste consolidation field-work period.

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 for review by NIRB and other federal departments through the normal CEAA process. Technical boundaries of the soil quality assessment are the lack of site-specific soil data and the limited time frame associated with the environmental screening.

6.4.2.2 Identification of Issues, Interactions and Potential Effects

The detailed site assessment and preliminary waste consolidation phase of the Project has the potential to interact with soil quality through the exposure of hazardous materials and contaminated soil to leaching during investigations and through accidental events such as spills. The operation of the work camp will include treatment and disposal of waste, and could negatively affect soil quality if not carried out properly. Table 6-3 is an environmental assessment matrix for the Soil Quality VEC.

Table 6-3: Environmental Effects Assessment Matrix: Soil Quality								
Project Activity	**Potential Positive (P) or Adverse (A) Environmental Effect**	**Mitigation**	**Evaluation Criteria for Assessing Residual Environmental Effects**					
			Magnitude	**Geographic Extent**	**Duration/ Frequency**	**Reversibility**	**Ecological/Socio -Cultural and Economic Context**
Detailed Site Assessment and Preliminary Waste Consolidation	Hazardous materials or contaminated soils may be exposed to leaching during investigations (A).	• Investigators will have reviewed previous site assessments and activities near known areas of contamination will be carried out in a manner to minimize disturbance to the contaminated materials.	1	1	2/1	R	2
	Accidental spills may result in soil degradation (A).	• Proper handling, storage and transportation procedures for hazardous materials will be implemented. • All workers will be trained in proper handling procedures for all hazardous materials on site. • Hazardous materials or fuel will not be stored in the beach area. • Spill contingency plans have been developed and will be implemented as necessary. • Contingency plans related to all materials and equipment will be available on site. • All fuel will be handled in accordance with the Contingency Plan.	1	1	2/1	R	2
	The operation of the construction camp will include treatment and disposal of waste, which could degrade soil quality (A).	• Hazardous materials will not be disposed of in the camp waste system. • All hazardous materials will be removed from the site for disposal. • All sewage will be disposed of in accordance with applicable regulations and guidelines.	1	1	2/1	R	2
Removal and Transport of Previously Containerized PCB Wastes	The potential exists for accidental release of hazardous materials, contaminated soil and/or fuels that could impact soil quality (A).	• Proper handling, storage and transportation procedures for hazardous materials will be implemented. • All workers will be trained in proper handling procedures for all hazardous materials on site. • Hazardous materials or fuel will not be stored in the beach area. • Spill contingency plans have been developed and will be implemented as necessary. • Contingency plans related to all materials and equipment will be available on site. • All fuel will be handled in accordance with the Contingency Plan.	1	1	3/1	R	2

Table 6-3: Environmental Effects Assessment Matrix: Soil Quality

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

KEY

Magnitude:

1 = Low: Soil chemical composition is not altered to the extent that vegetation currently present is affected.
2 = Moderate: Soil chemical composition is altered such that a moderate percentage of the vegetation is affected.
3 = High: Soil chemical composition is altered such that all vegetation is degraded and/or contaminants leach to groundwater.

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 = 1-12 months
3 = 13-36 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

6.4.2.3 Mitigation

During the detailed site assessment and preliminary waste consolidation activities, Project personnel will be appraised of known locations of hazardous waste and disturbance of these sites will be kept to a minimum. Spill prevention and spill contingency plans will be in effect during all activities.

Proper handling procedures will be implemented for the storage and transportation of hazardous materials. All workers will be trained to properly handle all hazardous materials on site, and no hazardous materials or fuel will be stored on the beach area. Contingency plans for spills will be followed, and will be available on site, and all fuel will be handled in accordance with the contingency plan.

Hazardous materials will not be disposed of in the camp waste system. The disposal of all sewage will be in accordance with applicable regulations and guidelines.

6.4.2.4 Residual Environmental Effects

Definition of Significance

Significant Impacts are defined as those altering soil such that one or both of the following occurs:

- soil chemical composition is altered such that it will not support vegetation in areas where vegetation previously grew and the extent is greater than 1 km from the facility.
- soil chemical composition is altered such that it is a threat to groundwater and surface water.

Residual Environmental Effects Summary

Table 6-4 summarizes the residual environmental effects of the project activities on soil quality. Activities during the detailed site assessment and preliminary waste consolidation phase are not expected to affect soil quality significantly.

Table 6-4: Residual Environmental Effects Summary Matrix: Soil Quality

Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
Detailed Site Assessment and Preliminary Waste Consolidation	NS		
Removal and Transport of Hazardous Material and Fuel	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

6.4.2.5 Summary of Environmental Effects on Soil Quality

Activities associated with the detailed site assessment and preliminary waste consolidation at CAM-F Dew Line Site are assessed as not having a significant effect on the environment.

The potential exists for an accidental release of hazardous materials, contaminated soil and/or fuels that could impact soil quality. However, proper handling procedures for hazardous materials will be implemented for their storage and transportation. Also, all workers will be trained to properly handle hazardous materials on site, and no hazardous materials or fuel will be stored on the beach areas. Spill contingency plans will be followed, and will be available on site. All fuel will be handled in accordance with the contingency plan.

The operation of the work camp will include the treatment and disposal of waste, and has the potential to degrade soil quality. However, hazardous materials will not be disposed of in the camp waste system, and the disposal of all sewage will be in accordance with applicable regulations and guidelines.

6.5 Water Quality

6.5.1 Existing Environment

Waterbodies in the vicinity of the CAM-F Dew Line Site include Sarcpa Lake, the Kingora River, Hall Lake, and numerous smaller lakes and rivers.

6.5.2 Water Quality Impact Assessment

6.5.2.1 Study Area Boundaries

The spatial boundary for the assessment of the effects of project activities on the water quality of the area is the local watershed for Sarcpa Lake and the watersheds crossed by the winter access route from Hall Beach to the site. The temporal boundary is the detailed site assessment and preliminary waste consolidation field-work period.

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 for review by NIRB and other federal departments through the normal CEAA process. Technical boundaries of the water quality assessment are the lack of site-specific water quality data and the limited time frame associated with the environmental screening.

6.5.2.2 Identification of Issues, Interactions and Potential Effects

Interactions between the detailed site assessment and preliminary waste characterization phase and the water quality environment will be similar to those for the soil quality environment, i.e., the potential for leachates from exposed hazardous materials and contaminated soil, and the potential for spills of fuel and hazardous materials.

Table 6-5 is an environmental assessment matrix for the Water Quality VEC.

Table 6-5: Environmental Effects Assessment Matrix: Water Quality

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
Detailed Site Assessment and Preliminary Waste Consolidation	Hazardous materials or contaminated soils may be exposed to leaching during investigations; the leachate may degrade water quality (A).	• Investigators will have reviewed previous site assessments and activities near known areas of contamination will be carried out in a manner to minimize disturbance to the contaminated materials.	1	1	2/1	R	1

Table 6-5: Environmental Effects Assessment Matrix: Water Quality

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
	Accidental spills may result in water quality degradation (A).	• Proper handling, storage and transportation procedures for hazardous materials will be implemented. • All workers will be trained in proper handling procedures for all hazardous materials on site. • Hazardous materials or fuel will not be stored in the beach area. • Spill contingency plans have been developed and will be implemented as necessary. • Contingency plans related to all materials and equipment will be available on site. • All fuel will be handled in accordance with the Contingency Plan.	1	1	2/1	R	1
	The operation of the construction camp will include treatment and disposal of waste, and could degrade water quality (A).	• Hazardous materials will not be disposed of in the camp waste system. • All sewage will be disposed of in accordance with applicable regulations and guidelines.	1	1	2/1	R	1

KEY:

Magnitude:

1 = Low: *e.g.,* Minor changes to water quality but not to the extent that aquatic life is affected or water that was previously potable is now non-potable.

2 = Medium: *e.g.,* Moderate changes to water quality, affecting aquatic life at a local level or decreasing the quality of potable water (*e.g.*, odour problem).

3 = High: *e.g.,* Major changes to water quality, affecting aquatic life at a regional level or rendering previously potable water non-potable.

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

6.5.2.3 Mitigation

During the detailed site assessment and preliminary waste consolidation phase, disturbance to known areas of hazardous waste will be minimized. Material handling and spill contingency plans will be in place and the disposal of camp wastes will meet all regulatory standards.

Proper handling procedures will be implemented for the storage and transportation of hazardous materials. All workers will be trained to properly handle all hazardous materials on site, and no hazardous materials or fuel will be stored on the beach area. Contingency plans for spills will be followed, and will be available on site, and all fuel will be handled in accordance with the contingency plan.

Hazardous materials will not be disposed of in the camp waste system. The disposal of all sewage will be in accordance with applicable regulations and guidelines.

6.5.2.4 Residual Environmental Effects

Definition of Significance

A significant impact to water quality is defined as one of sufficient magnitude so as to alter the quantity or quality of water to a degree that will result in a significant impact on aquatic life as defined in the impact significance definitions for other related VECs.

Residual Environmental Effects Summary

Table 6-6 summarizes the residual environmental effects of the project activities on water quality. Activities during the detailed site assessment and preliminary waste consolidation phase are not expected to affect water quality significantly.

Table 6-6: Residual Environmental Effects Summary Matrix: Water Quality

Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
Detailed Site Assessment and Preliminary Waste Consolidation	NS		

KEY

Residual Environmental Effects Rating:	Probability of Occurrence: based on professional judgement:	Scientific Uncertainty: based on scientific information, and statistical analysis or professional judgement:
S = Significant Adverse Environmental Effect	1 = Low	1 = low level of confidence
NS = Not Significant Adverse Environmental Effect	2 = Medium	2 = medium level of confidence
P = Positive Environmental Effect	3 = High	3 = high level of confidence
	n/a = effect not predicted to be significant	n/a = effect not predicted to be significant

6.5.2.5 Summary of Environmental Effects on Water Quality

The effects of the CAM-F Dew Line Site detailed site assessment and preliminary waste consolidation on water quality will not be significant.

6.6 Terrain

The terrain VEC includes surficial geology, soils and vegetation. The soils component refers to the physical characteristics of the surficial material; soil quality is addresses as a separate VEC in Section 6.3.

6.6.1 Existing Environment

6.6.1.1 Geology and Soils

Surficial Geology

The geology in the CAM-F Dew Line Site area is comprised largely of a plateau of Proterozoic granites rising from 50 to 450 m above sea level (asl). It is characterized by a rolling topography with elevational changes of 200 m or more within a few kilometres. The land is well drained, with numerous large lakes and rivers. CAM-F Dew Line Site is bordered by large hills (approximately 80 m) rising to the north and west. The hills are mainly rugged granite fell fields with large boulders and glacial eratics. The area is dotted with many tundra ponds, marshy areas, vegetated meadows and drier upland ridges (Montgomerie *et al.,* 1982).

Soils

The Melville Peninsula is composed of the flat-lying, Palaeozoic strata that form a very shallow basinlike area on the old surface of the Precambrian Shield. Turbic and Static Cryosols with some Organic Cryosols developed on marine, discontinuous glacial drift and organic deposits are the dominant soils. Permafrost is continuous with medium ice content (Ecological Stratification Working Group 1995). The surface active layer varies from 8-10 cm in depth to over 90 cm, depending on slope, aspect, parent material type and texture and the type of vegetation cover (Jaques 1982).

6.6.1.2 Vegetation

The mid-arctic climate limits the vegetation to herbaceous species only. The region is characterized by discontinuous tundra vegetation such as purple saxifrage, *Dryas spp.*, and arctic willow, along with alpine foxtail, wood rush, and saxifrage. Wet areas have a continuous cover of sedge, cottongrass, saxifrage, and moss (Ecological Stratification Working Group 1995). No trees are found in the area.

Extensive well-vegetated areas are not common in this region but can be found around Sarcpa Lake (Montgomerie *et al.* 1982). Scattered drier upland ridges and tundra ponds are present are present. Montgomerie *et al.* (1982) classified the habitats around Sarcpa Lake as ponds and small lakes (<5%), wet sedge meadows (10%), solifluction zones (30%), *Dryas*-lichen ridges (20%), boulder fields and exposed rock (25%), and disturbed area (10%). These classifications were for their 13 km^2 study around the CAM-F site.

Jaques (1982) further classified the vegetation communities in the nearby Roche Bay area. These classifications were based on bedrock and surficial materials. West of Roche Bay, where Sarcpa Lake is located, is comprised of Precambrian granites and gneisses. There are five major plant associations in this upland region: 1) Dwarf shrub-lichen; 2) Dwarf shrub; 3) Dwarf shrub-heath-moss; 4) Sedge meadows; and 5) Snow beds.

The dwarf shrub-lichen association is found where snow cover is light to non-existent. Total vegetation cover is low ranging from 15 to 30 percent. Bare rock and bedrock fragments form most of the ground cover. Dominant vascular plant species include Mountain Avens (*Dryas integrifolia*). Alpine Sweetgrass (*Hierochloe alpina*) is abundant on the most exposed sites. Dwarf shrub associations occur where the snow is somewhat deeper. Total vegetation cover is 50 to 80 percent. The dwarf shrub-heath-moss association develops where snow cover is light to moderate but persistent until June in most years. Total vegetation cover ranges from 50 to 75 percent. Mountain Avens, Arctic Heather (*Cassiope tetragona*) and the mosses *Rhacomitrium lanuginosum* and *Tomenthypnum nitens* dominate this association. The sedge meadow association develops on nearly level or gentle slops where drainage is imperfect. Total vegetation cover ranges from 80 to 100 percent. Dominant plant species are water sedge *(Carex aquatilis)* and *Bryum* spp. The snow bed association develops in topographic depressions or lee slopes where snow accumulations are heavy and snow cover remains until late in the growing season. Vegetation species vary depending on the longevity of the snow cover (Jaques 1982).

There are over 1000 species of vascular plants in Nunavut. Of these only 18 species have been reviewed as to their general status in the territory. To date no rare or endangered vegetation species have been identified (Department of Sustainable Development 2001).

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 CAM-F Dew Line Site facilities. The temporal boundary is the detailed site assessment and preliminary waste consolidation field-work period.

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 for review by NIRB and other federal departments through the normal CEAA process. 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

During the detailed site assessment and preliminary waste consolidation activities, interactions with the terrain will be restricted to minor disruption by vehicle movement. Movement will be restricted to existing tracks and already-disturbed areas as much as possible.

Most of the waste appears to have been deposited directly on the ground and only minor quantities have been buried.

The majority of the terrain in the immediate vicinity of the site facilities is already heavily disturbed. 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.

Local vegetation may be effected 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.

Table 6-7 is an environmental assessment matrix for the Terrain VEC.

Table 6-7: 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
Detailed Site Assessment and Preliminary Waste Consolidation	Vehicle movements could disturb the ground surface (A).	• Movement will be restricted to existing tracks and already-disturbed areas as much as possible.	1	1	2/1	R	2
Contractor Support	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	3	1/1	R	2

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

6.6.2.3 Mitigation

During the detailed site assessment and preliminary waste consolidation activities, vehicles and workers will use existing tracks for travel, whenever possible. The removal of site debris has the potential to disturb the existing terrain.

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

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 6-8 summarizes the residual environmental effects of the project activities on terrain. Activities during the detailed site assessment and preliminary waste consolidation phase are not expected to affect terrain significantly.

Table 6-8: Residual Environmental Effects Summary Matrix: Terrain

Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
Detailed Site Assessment and Preliminary Waste Consolidation	NS		
Contractor Support	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

Detailed site assessment and preliminary waste consolidation are assessed as not having significant effects on the terrain of the CAM-F Dew Line Site area.

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 to minimize disturbance to the tundra.

6.7 Terrestrial Animals and Habitat

6.7.1 Existing Environment

6.7.1.1 Wildlife

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 are however several species that may ulitize 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 CAM-F facilities were already in place.

Mammals

Terrestrial mammals include polar bear, common in coastal areas, as well as arctic hare, arctic fox, lemming, and caribou (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.

CAM-F Dew Line Site in within the Foxe Basin polar bear population that is estimated to be 2300 animals (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 and poor habitat. During the ice-free season, polar bears tend to concentrate on Southampton Island, where denning has occurred (Borealis Exploration Limited 1981), and along the Wager Bay coast. However, some bears may be encountered on the islands and coastal regions throughout the Foxe Basin area (IUCN 2004). The number of polar bears occurring on or near Melville Peninsula is believed to be small. Local wind and drift ice conditions likely make the area unsuitable for polar bears (Borealis Exploration Limited 1981). While occurrences of polar bears in the CAM-F Dew Line Site region are likely to be low, they could be met there occasionally at any time throughout the year. Preferred hunting areas for polar bears are north of Melville Peninsula than along its eastern coast. Polar bears have been observed in the Garry Bay (Ferguson and Vincent 1992).

Caribou

Population estimates for caribou on Melville Peninsula have varied. Calef and Helmer (1981) provided an estimate of 52,000 animals in 1976 for the southern portion of Melville Peninsula (below 68^{o}N).

Heard *et al.* (1986) estimated 2500 animals and Ferguson and Vincent (1992) estimated a similar population of 2900 for northern Melville Peninsula (above 68°N). Others have indicated that about 4000 to 4500 adult females have been observed on the calving grounds and a total population for Melville Peninsula is about 10,000 animals (Borealis Exploration Limited 1981).

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. Little information on caribou movements on Melville Peninsula is available. Evidence from researchers and locals suggest that there is an east-west movement of caribou in late winter (Ferguson and Vincent 1992). Caribou surveys for the Melville Peninsula have shown that animals are principally distributed along the western coast.

Surveys (Calef and Helmer 1981; Rippen and Bowden 1972) have shown that calving grounds on Melville Peninsula are located in the area central region of the peninsula between Parry Bay and Lyon Inlet. Calving occurs from late May to mid June. Calves have been observed south of Sarcpa Lake (Ferguson and Vincent 1992). After the calving period bulls and non-breeding females have been found to the south of the calving grounds (Calef and Helmer 1981). Caribou tend to move to higher country inland during the summer and move to coastal areas in the fall.

Hunters from Igloolik and Hall Beach usually harvest caribou from northern Melville Peninsula and northern Baffin Island (Ferguson and Vincent 1992). During the winter, hunters have harvested caribou in the area east and south of Hall Lake. Some have also been harvested along the eastern coast, south of Parry Bay during the summer. Significant numbers of annual harvest have been taken on the Rae Isthmus, to the extreme south of the Melville Peninsula. Hunters have indicated that caribou move eastward through the isthmus in April and May and westward during September and October (Rippen and Bowden 1972).

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 that is considered rare on Melville Peninsula (Department of Sustainable Development 2001) and usually hunted whenever they are seen (Borealis Exploration Limited 1981). They are usually found in association with caribou herds and have been reported by residents of Igloolik and Hall Beach (Ferguson and Vincent 1992). 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 (*Gulo gulo*) 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). On the Melville Peninsula, wolverine populations 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. Residents of Igloolik and Hall Beach have reported wolverines whenever caribou are around (Ferguson and Vincent 1992).

Fox

The Red Fox and the Arctic Fox occur on Melville Peninsula, 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. They are typically trapped in winter when they are common (Borealis Exploration Limited 1981). Arctic foxes will also trail behind polar bears to scavenge food.

Arctic foxes prefer vegetated soft ground for denning so the potential for dens exists in the CAM-F Dew Line Site region. Arctic foxes are territorial and rarely den less than a mile apart. Density of dens in the Keewatin was one per twenty-seven square miles. If foxes are present in the CAM-F Dew Line Site region they would likely only be one or two dens (Borealis Exploration Limited 1981).

Arctic Hare

The arctic hare occurs on the Melville Peninsula, 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 prey species, such as foxes, in the region.

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.

Approximately 40 species of birds are typically present in the CAM-F Dew Line Site region, of which approximately 22 are breeding in the area. The breeding bird community is more similar to those of Arctic Island sites than to other mainland sites (Montgomerie *et al.* 1982). Table 6-9 provides a summary of the birds for the CAM-F Dew Line Site region and provides and indication of their status and abundance as described by Montgomerie *et al.* (1982).

Table 6-9: Birds of the CAM-F Dew Line Site region			
Common Name	**Scientific Name**	**Status / Abundance (CAM-F Dew Line Site)**	**Status (Nunavut)**
Red-throated Loon	Gavia stellata	Uncommon Breeder	Secure
Arctic Loon	Gavia arctica	Rare Breeder	Secure
Yellow-billed Loon	Gavia adamsii	Rare Visitor	Secure
Snow Goose	Chen caerulescens	Abundant Transient	Secure
Canada Goose	Branta canadensis	Uncommon Transient	Secure
King Eider	Somateria spectabilis	Abundant Transient	Sensitive
Oldsquaw	Clangula hyemalis	Common Breeder	Secure
Red-breasted Merganser	Mergus serrator	Uncommon Visitor	Secure
Rough-legged Hawk	Buteo lagopus	Rare Breeder	Secure
Peregrine Falcon	Falco peregrinus	Rare Transient	May be at Risk
Gyrfalcon	Falco rusticolus	Rare Transient	Secure
Rock Ptarmigan	Lagopus mutus	Abundant Breeder	Sensitive
Black-bellied Plover	Pluvialis squatarola	Uncommon Transient	Secure
Lesser Golden Plover	Pluvialis dominica	Abundant Breeder	Secure
Semipalmated Plover	Charadrius semipalmatus	Uncommon Breeder	Undetermined
Ruddy Turnstone	Arenaria interpres	Rare Transient	Secure
Red Knot	Calidris canutus	Rare Transient	Undetermined
Sanderling	Calidris alba	Rare Transient	Secure
Semipalmated Sandpiper	Calidris pusilla	Uncommon Breeder	Sensitive
White-rumped Sandpiper	Calidris fuscicollis	Common Breeder	Secure
Baird's Sandpiper	Calidris bairdii	Abundant Breeder	Secure
Pectoral Sandpiper	Calidris melanotos	Uncommon Breeder	Secure
Purple Sandpiper	Calidris maritima	Rare Visitor	Sensitive
Dunlin	Calidris alpina	Rare Breeder	Secure
Red Phalarope	Phalaropus fulicaria	Uncommon Breeder	Sensitive
Pomarine Jaeger	Stercorarius pomarinus	Rare Visitor	Secure
Parasitic Jaeger	Stercorarius parasiticus	Rare Transient	Secure
Long-tailed Jaeger	Stercorarius longicaudus	Uncommon Breeder	Secure
Herring Gull	Larus argentatus	Rare Breeder	Secure
Thayer's Gull	Larus thayeri	Uncommon Visitor	Not Assessed
Glaucous Gull	Larus hyperboreaus	Uncommon Breeder	Secure
Sabine's Gull	Xema sabini	Rare Visitor	Secure
Arctic Tern	Sterna paradisaea	Uncommon Breeder	Secure
Snowy Owl	Nyctea scandiaca	Rare Visitor	Secure
Horned Lark	Eremophila alpestris	Abundant Breeder	Sensitive
Common Raven	Corvus corax	Uncommon Visitor	Secure
Water Pipet	Anthus spinoletta	Uncommon Breeder	Sensitive
White-crowned Sparrow	Zonotrichia leucophrys	Rare Visitor	Sensitive
Lapland Longspur	Calcarius lapponicus	Abundant Breeder	Secure
Snow Bunting	Plectrophenax nivalis	Abundant Breeder	Sensitive

Waterfowl and Water Birds

Waterfowl observed in the CAM-F Dew Line Site region include Snow Geese, Canada Geese, King Eider, Oldsquaw, and Red-breasted Merganser. There is a colony of snow geese nesting in the Roche Bay area (Borealis Exploration Limited 1981; Montgomerie *et al.* 1982) and most birds seen in the CAM-F Dew Line Site area are associated with this colony. Roche Bay is also a spring staging area for other geese and eiders. The area is not used for staging in the fall (Borealis Exploration Limited 1981).

The only common waterfowl breeder in the CAM-F Dew Line Site area is the Oldsquaw who nest in the small ponds near the site. Oldsquaw will move their broods to larger lakes, like Sarcpa Lake, and remain there until August or September (Montgomerie *et al.* 1982).

Three species of loons are rare to uncommon in the CAM-F Dew Line Site region. Red-throated Loons and Arctic Loons have been observed on and flying over Sarcpa Lake. Evidence of breeding by both species has also been observed. One Yellow-billed Loon has been observed on the lake (Montgomerie *et al.* 1982).

Four species of gulls are rare to uncommon for the area. The Herring Gull and Glaucous Gull have bred in the area and Thayer's Gull and Sabine's Gull have been observed in the area. Records from Igloolik have shown that these species are more common along the coastal regions (Montgomerie *et al.* 1982).

Raptors

Peregrine falcons are relatively common on the Melville Peninsula. Surveys on the Melville Peninsula (Calef and Heard 1981) indicate their preferred nesting sites are on cliffs and outcrops near lakes, ponds and streams. Peregrine falcons have been observed nesting on southern Melville Peninsula (Calef and Heard 1981) but have not been observed nesting in the vicinity of Sarcpa Lake (Montgomerie *et al.* 1982).

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. While the gyrfalcon has been observed nesting on southern Melville peninsula (Calef and Heard 1981), it is considered a rare transient in the CAM-F Dew Line Site region (Montgomerie *et al.* 1982).

Rough-legged Hawks have been observed nesting in the Sarcpa Lake region (Montgomerie *et al.* 1982; Smith 1987) as well as on the southern portion of Melville Peninsula (Calef and Heard 1981). However, they are considered a rare breeder in area (Montgomerie *et al.,* 1982). The snowy owl is considered a rare visitor to the area (Montgomerie *et al.* 1982).

Shorebirds

Thirteen species of shorebirds have been recorded for the Sarcpa Lake area (see Table 6-9). Of this group five are considered rare to uncommon breeders, one is considered a common breeder and two are considered abundant breeders. The latter two are the lesser golden plover and Baird's sandpiper. Both of these species prefer dry Dryas-lichen areas for nesting. The common breeder (white-rumped sandpiper) prefers wet sedge meadows for nesting as do the majority of the uncommon breeders (Montgomerie *et al.* 1982).

Other Birds

Of the remaining birds in the area, three are considered abundant breeders. These are the horned lark, lapland longspur and the snow bunting. The horned lark and lapland longspur nest mainly on dry Dryas-lichen areas. In the Sarcpa Lake area snow buntings have been found nesting on disturbed habitats, in crevices on rock ridges and boulder fields (Montgomerie *et al.* 1982).

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. Peregrine Falcons are relatively common on Melville Peninsula with the major nesting areas on the southwestern coast (Borealis Exploration Limited 1981), but as mentioned there has been no documented evidence of peregrines nesting near Sarcpa Lake. Both the polar bear and wolverine are only expected to occur near Sarcpa Lake on an occasional basis. Both the horned lark and snow bunting are sensitive species and are expected to be two of the more common species in the Sarcpa Lake area. Given the current level of disturbance in the area effects to these two species are likely to be not significant.

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 should include the footprint of the CAM-F Dew Line Site facilities plus the surrounding area which may extend to the limit of the Melville Peninsula depending on the type of wildlife species. The temporal boundary is the detailed site assessment and preliminary waste consolidation field-work period.

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 for review by NIRB and other federal departments through the normal CEAA process. 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

Major threats to polar bears are occurring at the global scale. Bio-accumulation of pollutants and climate change are effecting the overall survival of this species. For the Foxe Basin population global

climate change, as it is effecting sea ice patterns is the major threat (IUCN 2004). Hunting regulations and sustainable harvesting practices are being implemented to protect the bears.

The CAM-F Dew Line Site project is not within a major core area for polar bears. Consequently, interaction between the remediation activities and polar bears are expected to be minimal. A strategy for dealing with polar bear interactions should be implemented to ensure that no bears are unnecessary destroyed as a result of the project.

Local inhabitants have identified the CAM-F project area as a good place to hunt caribou (C. Doupe, pers. comm. 2004). However, the major movements of caribou are nearer the coast, away from Sarcpa Lake. The nearest caribou activity to Sarcpa Lake would be the wintering areas that extend up the east coast from Hall Lake south along Parry Bay, generally from the coast to 15 km inland (Borealis Exploration Limited 1981). The northern boundary of the calving area on Melville Peninsula is about 100 km south of Sarcpa Lake (Borealis Exploration Limited 1981), thus avoiding any disturbance during the calving and post calving period.

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, 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.

Most wildlife species are likely to exhibit some degree of sensitivity to human disturbance and from heavy equipment during the detailed site investigation and preliminary waste consolidation. 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 and stress-related reduction in reproductive success.

Accidents, malfunctions and unplanned events such as collisions between wildlife and Project-related vehicles or hazardous materials spill 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 6-10 is an environmental assessment matrix for the terrestrial animals VEC.

Table 6-10: 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
Detailed Site Assessment and Preliminary Waste Consolidation	The movement of humans and vehicles around the site has the potential to disturb wildlife (A).	• Workers will be instructed to avoid encounters with animals. • Vehicle movement will be restricted to existing tracks wherever possible.	1	1	2/1	R	1
General Clean Up Activities	The use of heavy equipment during the clean up has the potential to disturb wildlife (A).	• Remediation activities will commence prior to breeding season • 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

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

During detailed site assessment and preliminary waste consolidation, workers will receive wildlife awareness training and will instructed to avoid wildlife encounters.

To reduce disturbance to breeding birds, a small amount of activities will begin prior to the breeding season, with most of the detailed site assessment and preliminary waste consolidation occurring after breeding season. Birds will likely move to different areas to begin breeding.

During the 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. Also, the appropriate wildlife officer will be contacted for guidance to ensure that the disturbance of wildlife is minimized.

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 block or cause substantial diversion to caribou migration. Since CAM-F Dew Line Site is outside of these areas these measures should not effect the project schedule.

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 should 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 6-11 summarizes the residual environmental effects of the project activities on terrestrial animals and habitat. Effects of the Project on terrestrial animals and habitat, for both the detailed site assessment and preliminary waste consolidation activities are assessed as not significant. The removal and disposal of hazardous materials will have a positive effect on terrestrial animals.

Table 6-11: 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
Detailed Site Assessment and Preliminary Waste Consolidation	NS		
General Clean Up Activities	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

6.7.2.5 Summary of Environmental Effects on Terrestrial Animals and Habitat

During the 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 the existing terrain to facilitate the recovery of the 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 the 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 the detailed site assessment and preliminary waste consolidation on the terrestrial animals and habitat are assessed as not significant.

6.8 Aquatic Animals and Habitat

6.8.1 Existing Environment

The most important fish species to the people of the Melville peninsula is the Arctic char *(Salvelinus alpinus*). 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. Populations of arctic char occur in Hall Lake and Hall River. These populations are the largest in the region and are important to the residents of Hall beach and Igloolik (Borealis Exploration Limited. 1981).

Lake trout have been sampled from Sarcpa Lake (Wilson and Hebert, 1998), however their population numbers are unknown. Little information exists for other fish species in the Sarcpa Lake region.

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 Sarcpa Lake and its outlets, primarily Kingora River that leads into Hall Lake. The temporal boundary is the detailed site assessment and preliminary waste consolidation field-work period.

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 for review by NIRB and other federal departments through the normal CEAA process. 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

Sarcpa Lake drains into Hall Lake and Hall River via Kingora River, then into Roche Bay (Parry Bay) so it will be critical that deleterious substances (pollution and sedimentation) are kept out of Sarcpa Lake.

The potential exists for an accidental release of hazardous materials, contaminated soil and/or fuels, which could affect aquatic habitat. Table 6-12 is an environmental assessment matrix for the aquatic animals and habitat VEC.

Table 6-12: 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
Detailed Site Assessment and Preliminary Waste Consolidation	Accidental spills of fuel may enter the aquatic environment (A).	• Spill prevention and spill contingency plans will be in effect during the project activities.	1	2	1/1	R	1
Hazardous Materials Removal	The removal of hazardous materials from areas close to waterbodies, reduces the risk of exposure to aquatic animals (P).	• N/A	N/A	N/A	N/A	N/A	N/A
Removal and Transport of Hazardous Material and Fuel	Accidental releases of hazardous materials and/or fuels may enter the aquatic environment (A).	A spill prevention and contingency plan will be in effect during activities.	2	2	2/1	R	1

Table 6-12: 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

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

Effects of the Project on aquatic animals and habitat during the detailed site assessment and preliminary waste consolidation will be mitigated by spill prevention and contingency plans.

6.8.2.4 Residual Environmental Effects

Definition of Significance

A significant environmental effect of the project activities on aquatic animals occurs if a population or portion thereof is affected in such a way as to cause a decline or change in abundance or distribution of the population over one or more generations; natural recruitment may not re-establish the population to its original level. A significant effect on aquatic habitat may alter the valued habitat, physically, chemically or biologically, in quality or extent, to such a degree that there is a decline in the diversity of the habitat. This effect would be reflected by a decline in abundance and/or change in distribution of the benthic community within the bridge area, beyond which natural recruitment would not return that population to its former level within several generations.

Residual Environmental Effects Summary

Table 6-13 summarizes the residual environmental effects of the project activities on aquatic animals and habitat. The implementation of the mitigative measures proposed to protect the aquatic animals and habitat will result in the residual effects being not significant or, in the case of the removal of existing hazardous materials, positive.

Table 6-13: Residual Environmental Effects Summary Matrix: Aquatic Animals and Habitat			
Phase	**Residual Adverse Environmental Effect Rating**	**Likelihood (of significant adverse environmental effects)**	
		Probability of Occurrence	**Scientific Uncertainty**
Detailed Site Assessment and Preliminary Waste Consolidation	NS		
Hazardous Materials Removal	P		
Removal and Transport of Hazardous Material and Fuel	NS		
Contractor Support	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

6.8.2.5 Summary of Environmental Effects on Aquatic Animals and Habitat

Effects of the Project on aquatic animals and habitat are associated with the potential deposition of eroded material from borrow excavations and water quality affects from landfill leachates and fuel and chemical spills. The implementation of mitigation measures such as berms, silt fences and/or silt booms will prevent deleterious substances from entering the aquatic environment. Spill prevention and contingency plans will mitigate the effects of accidental spills.

6.9 Health and Safety

6.9.1 Health and Safety Impact Assessment

6.9.1.1 Study Area Boundaries

The spatial boundary for the assessment of the effects of project activities on health and safety is the CAM-F Dew Line Site vicinity (immediate area) and the homes of the workers performing the site investigations and remediation. The temporal boundary is the detailed site assessment and preliminary waste consolidation field-work period and the remediation period.

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 for review by NIRB and other federal departments through the normal CEAA process. Technical boundaries of the health and safety assessment are the lack of site-specific information and limited time frame associated with the environmental screening.

6.9.1.2 Identification of Issues, Interactions and Potential Effects

The exposure of potentially hazardous materials during assessment of the landfills, the collection and disposal of potentially hazardous debris, the removal of hazardous materials from facilities and the general handling of hazardous materials has the potential to impact health and the safety of workers. Ultimately, the removal of contaminated soil and other hazardous materials from the environment reduces the risk of exposure to people. Table 6-14 is an environmental assessment matrix for the Health and Safety VEC.

Table 6-14: Environmental Effects Assessment Matrix: Health and Safety

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
Detailed Site Assessment and Preliminary Waste Consolidation	Investigations and disturbance to existing hazardous waste storage areas has the potential to expose workers to hazardous substances (A).	• Workers will be provided with safety training for the handling of the materials expected to be encountered. • Personel Protective Equipment will be provided to all workers. • A comprehensive health and safety plan will be developed and implemented.	1	N/A	1/1	R	N/A
General Clean Up Activities	The excavation of potentially hazardous materials from the landfills, the collection and disposal of potentially hazardous debris, the removal of hazardous materials from facilities and the general handling of hazardous materials has the potential to impact health and the safety of workers (A).	• Transportation of any hazardous materials will be in accordance with Transportation of Dangerous Goods Regulations. • A comprehensive health and safety plan will be developed and implemented. • Workers will be required to wear and use appropriate personal protective equipment. • Workers will be trained in the use of personal protective equipment and proper handling procedures for hazardous materials.	1	N/A	1/1	R	N/A
Contaminated Soil Disposal/Hazardous Materials Removal	The removal of contaminated soil and other hazardous materials from the environment reduces the risk of exposure to people. (P)	• N/A					

Table 6-14: Environmental Effects Assessment Matrix: Health and Safety

KEY:

Magnitude:

1 = Low: No more than a few individuals are affected with minor, short-term health problems.

2 = Medium: A small portion of the local community are affected with minor, short-term health problems.

3 = High: An individual is affected with a chronic health problem or a large portion of the local community is affected with minor, short-term health problems.

Geographic Extent:

N/A

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

6.9.1.3 Mitigation

The transportation of any hazardous materials will be in accordance with the Transportation of Dangerous Goods Regulations. A comprehensive health and safety plan will be developed and implemented with requirements for workers to wear and use appropriate personal protective equipment. Workers will also be trained in the use of personal protective equipment and proper handling procedures for hazardous materials.

6.9.1.4 Residual Environmental Effects

Definition of Significance

A significant environmental effect of the project activities on health and safety occurs if an individual develops a chronic health problem as a result of working on the Project.

Residual Environmental Effects Summary

Table 6-15 summarizes the residual environmental effects of the project activities on health and safety.

Table 6-15: Residual Environmental Effects Summary Matrix: Health and Safety

Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
Detailed Site Assessment and Preliminary Waste Consolidation	NS		
General Clean Up Activities	NS		
Contaminated Soil Disposal/Hazardous Materials Removal	P		

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

6.9.1.5 Summary of Environmental Effects on Health and Safety

The collection and disposal of potentially hazardous debris, the removal of hazardous materials from facilities and the general handling of hazardous materials has the potential to affect the health and the safety of workers. To help mitigate this risk, the transportation of any hazardous materials will be in accordance with Transportation of Dangerous Goods Regulations. Additionally, a comprehensive health and safety plant will be developed and implemented, which will require workers to wear and use appropriate personal protective equipment. Workers will also be trained in the use of personal protective equipment and proper handling procedures for hazardous materials. The effects of the detailed site assessment and preliminary waste consolidation are assessed as not significant.

6.10 Archaeological and Heritage Resources

6.10.1 Existing Environment

Information on the archaeological and heritage resources of the CAM-F Dew Line Site has not been examined. The recent history of the site is as a DEW Line facility and scientific research facility.

6.10.2 Archaeological and Heritage Resources Impact Assessment

6.10.2.1 Study Area Boundaries

The spatial boundary for the assessment of the effects of project activities on archaeology and heritage resources is the facility and access route footprint. The temporal boundary is the detailed site assessment and preliminary waste consolidation field-work period.
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 for review by NIRB and other federal departments through the normal CEAA process. Technical boundaries of archaeological and heritage resources assessment are the lack of site-specific information and limited time frame associated with the environmental screening.

6.10.2.2 Identification of Issues, Interactions and Potential Effects

The presence and movement of people around the site has the potential to disturb the archaeological resources identified around the site. Table 6-16 is an environmental assessment matrix for the archaeology and heritage resources VEC.

Table 6-16: Environmental Effects Assessment Matrix: Archaeology and Heritage Resources

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
Detailed Site Assessment and Preliminary Waste Consolidation	Any excavations associated with activities may disturb heritage resources present (A).	• Known archaeological and heritage resource sites will be marked prior to assessment and consolidation activities. • Authorities will be contacted if new artifacts or a site are discovered and work will be stopped until the site can be assessed.	1	1	1/1	I	N/A

KEY:

Magnitude:

1 = Low: *e.g.*, loss of a minor proportion of data at site, local or regional level; after low impact, interpretative capacity of the remains is virtually intact, limited only by loss of minor items and/or features.

2 = Medium: *e.g.,* a proportion of the data at the site, local or regional level is lost but a significant proportion remains unimpaired; after medium impact, the interpretative capacity of the remains is hindered by loss of basic data about cultural descriptions and lifestyles.

3 = High: *e.g.*, a significant proportion of data at the site, local or regional level is lost; interpretative capacity of the remains following impact is minimal.

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

6.10.2.3 Mitigation

In order to minimize impacts to archaeology and heritage resources, all known archaeological and heritage resources will be clearly marked so that they can be avoided. Additionally, in the event that a new resource is discovered or a known resource is disturbed, the relevant authorities will be contacted.

6.10.2.4 Residual Environmental Effects

Definition of Significance

A significant environmental effect of the project activities on archaeology and heritage resources would involve the destruction or disturbance of all or part of an archaeological, historic or palaeontological site considered to be of local, regional territorial, national, or international value. This effect, if not controlled through mitigative investigation and documentation would result in the permanent loss of part of the non-renewable heritage resource base.

Residual Environmental Effects Summary

Table 6-17 summarizes the residual environmental effects of the project activities on archaeology and heritage resources. Residual effects are assessed as not significant or positive for the detailed site assessment and preliminary waste consolidation, and the remediation activities.

Table 6-17: Residual Environmental Effects Summary Matrix: Archaeology and Heritage Resources

Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
Detailed Site Assessment and Preliminary Waste Consolidation	NS/P		

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

6.10.2.5 Summary of Environmental Effects on Archaeology and Heritage Resources

The presence and movement of people around the site has the potential to disturb the archaeological and heritage resources identified around the site. In order to minimize impacts to archaeology and heritage resources, all known archaeological and heritage resources will be clearly marked so that they can be avoided. Additionally, in the event that a new resource is discovered or a known resource is disturbed, the relevant authorities will be contacted. The effects of the Project on archaeology and heritage resources are assessed as not significant.

6.11 Land Use

6.11.1 Existing Environment

The CAM-F Dew Line Site facilities have been in place since 1957. Prior to this there were only traditional land use activities in the area. The site was used as an intermediate DEW line site until 1963. It was used as a research station in the 1970s and 1980s. Since the closure of the research station, the buildings on site have been used by local residents.

Other land uses in the area are limited to trapping, hunting, and fishing. The main settlements are Igloolik and Hall Beach. The population of the ecoregion is approximately 1500 (Ecological Stratification Working Group, 1995). Caribou hunting activities are usually occur near the eastern coast of Melville Peninsula or on the Rae Isthmus, to the extreme south of the Melville Peninsula (Ferguson and Vincent, 1992; Rippen and Bowden, 1972). Residents of both communities in the region fish at Hall Lake and Hall River.

6.11.2 Land Use Impact Assessment

6.11.2.1 Study Area Boundaries

The spatial boundary for the assessment of the effects of project activities on land use is the Melville Peninsula. The temporal boundary is the detailed site assessment and preliminary waste consolidation field-work period.

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 for review by NIRB and other federal departments through the normal CEAA process. No technical boundaries have been recognized for the assessment of the project on land use.

6.11.2.2 Identification of Issues, Interactions and Potential Effects

Detailed site assessment and preliminary waste consolidation may disturb traditional land use such as hunting and fishing activities that occur during the summer months. Table 6-18 is an environmental assessment matrix for the land use VEC.

Table 6-18: Environmental Effects Assessment Matrix: Land Use

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
Detailed Site Assessment and Preliminary Waste Consolidation	Clean up activities may disturb traditional land use such as hunting and fishing activities that occur during the summer months (A).	• The local hunter and trapper organization will be notified of the scheduling of clean-up activities.	1	2	2/1	R	N/A
General Clean Up Activities	Clean up activities may disturb traditional land use such as hunting and fishing activities that occur during the summer months (A).	• The local hunter and trapper organization will be notified of the scheduling of clean-up activities.	1	2	3/1	R	N/A

Table 6-18: Environmental Effects Assessment Matrix: Land Use

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: *e.g.,* a few land or water use activities precluded.

2 = Medium: *e.g.,* a moderate number of land or water uses precluded.

3 = High: *e.g.,* a large number of land or water uses precluded.

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

6.11.2.3 Mitigation

In order to minimize impacts to traditional land use such as hunting and trapping activities, local hunter and trapper organizations will be notified of the scheduling of clean up activities.

6.11.2.4 Residual Environmental Effects

Definition of Significance

A significant environmental effect of the project activities on land use occurs if traditional land use activities are not permitted to occur.

Residual Environmental Effects Summary

Table 6-19 summarizes the residual environmental effects of the project activities on land use. The effect of detailed site assessment and preliminary waste consolidation are assessed as being not significant.

Table 6-19: Residual Environmental Effects Summary Matrix: Land Use			
Phase	**Residual Adverse Environmental Effect Rating**	**Likelihood (of significant adverse environmental effects)**	
		Probability of Occurrence	**Scientific Uncertainty**
Detailed Site Assessment and Preliminary Waste Consolidation	NS		
General Clean Up Activities	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

6.11.2.5 Summary of Environmental Effects on Land Use

Clean up activities may disturb traditional land use such as hunting and fishing activities that occur during the summer months. In order to minimize these effects, local hunter and trapper organizations will be notified of the scheduling of clean-up activities. The effects of the Project on land use is assessed as not significant.

6.12 Aesthetics

6.12.1 Existing Environment

The CAM-F site is located on arctic tundra adjacent to a lake. The facilities interrupt a natural arctic landscape view with one of a former military operation.

6.12.2 Aesthetic Impact Assessment

6.12.2.1 Study Area Boundaries

The spatial boundary for the assessment of the effects of project activities on aesthetics is the CAM-F Dew Line Site facility. The temporal boundary is the detailed site assessment and preliminary waste consolidation field-work period and the remediation period.

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 for review by NIRB and other federal departments through the normal CEAA process. No technical boundaries have been recognized for the assessment of the project on aesthetics.

6.12.2.2 Identification of Issues, Interactions and Potential Effects

Ultimately, the clean up activities will improve the aesthetics of the site by removing unsightly debris and restoring the site to a more natural state. However, the detailed site assessment and preliminary waste consolidation is not expected to have any interaction with the aesthetics of the area. Table 6-20 is an environmental assessment matrix for the aesthetics VEC.

Table 6-20: Environmental Effects Assessment Matrix: Aesthetics

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
Detailed Site Assessment and Preliminary Waste Consolidation	No interaction expected	• N/A					

KEY:

Magnitude:

1 = Low: *e.g.,* MEPA water quality standards met and/or little drawdown of the UER aquifer.

2 = Medium: *e.g.,* MEPA water quality guidelines met and/or moderate drawndown of the UER aquifer.

3 = High: *e.g.,* MEPA water quality guidelines not met and/or significant drawndown of the UER aquifer.

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

6.12.2.3 Mitigation

No mitigation is required since there are no project-aesthetic interactions identified.

6.12.2.4 Residual Environmental Effects

Definition of Significance

A definition of significance for residual effects on aesthetics is not required since no interactions have been identified.

Residual Environmental Effects Summary

Table 6-21 summarizes the residual environmental effects of the project activities on aesthetics.

Table 6-21: Residual Environmental Effects Summary Matrix: Aesthetics

Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
Detailed Site Assessment and Preliminary Waste Consolidation	No interaction		

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

6.12.2.5 Summary of Environmental Effects on Land Use

The detailed site assessment and preliminary waste consolidation activities are not expected to interact with the aesthetic environment.

6.13 Socio-Economics

6.13.1 Existing Environment

CAM-F, located on the Melville Peninsula, is in the Qikiqtaaluk region of Nunavut. Communities on the Peninsula include Hall Beach and Igloolik. Population of the communities, according to the 1996 census was 867 in Hall Beach and 1,174 in Igloolik. The economy of the region is based on hunting and fishing and on the tourist industry. Diamond exploration is currently ongoing on Melville Peninsula.

6.13.2 Socio-Economic Impact Assessment

6.13.2.1 Study Area Boundaries

The spatial boundary for the assessment of the effects of project activities on socio-economics is Nunavut as labour and equipment may be required from Iqaluit or Cambridge Bay, although most of the effects of the Project will be felt in Igloolik and Hall Beach. The temporal boundary is the detailed site assessment and preliminary waste consolidation field-work period.

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 for review by NIRB and other federal departments through the normal CEAA process. No technical boundaries have been recognized for the assessment of the project on socio-economics.

6.13.2.2 Identification of Issues, Interactions and Potential Effects

The Department of National Defence (DND) and Nunavut Tunngavik Incorporated (NTI) have signed a *DND/NTI Agreement for the Clean Up and Restoration of the DEW Line Sites within the Nunavut Settlement Area* outlining the economic provisions. The agreement includes a Minimum Inuit Content (MIC) for the clean up contract and requirements for training, specifically related to the clean up activities. Generally, the contracts for the clean up of DEW Line sites include clauses requiring the contractor to maximize Inuit Involvement. Inuit involvement in the detailed site assessment and preliminary waste consolidation activities will include both employment and business (contracting) opportunities, and local purchases.

Table 6-22 is an environmental assessment matrix for the socio-economic VEC.

Table 6-22: Environmental Effects Assessment Matrix: Socio-Economics

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
Detailed Site Assessment and Preliminary Waste Consolidation	Nunavut residents will have employment opportunities during the field work (P).	• N/A					

KEY:

Magnitude:

1 = Low: *e.g.,* Few individuals affected.

2 = Medium: *e.g.,* A moderate number of individuals affected.

3 = High: *e.g.,* A large number of individuals affected.

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

6.13.2.3 Mitigation

During any remediation project, whenever possible, DIAND strives to support and enhance the development of healthy, sustainable communities by leveraging local skills and knowledge into their approach to addressing environmental issues associated with contaminated sites. By these means core competencies are maximized and deployed. Whenever possible, the project will also adopt solutions tailored to the northern environment and its inhabitants. This includes leveraging local knowledge and the incorporation of provisions accounting for the unique needs of northerners and the needs of the environment in which they live into the development and implementation of policies and procedures.

6.13.2.4 Residual Environmental Effects

Definition of Significance

A definition of significance for residual effects on socio-economics is not required since effects are positive.

Residual Environmental Effects Summary

Table 6-23 summarizes the residual environmental effects of the project activities on socio-economics.

Table 6-23: Residual Environmental Effects Summary Matrix: Socio-Economics

Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
Detailed Site Assessment and Preliminary Waste Consolidation	P		

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

6.13.2.5 Summary of Environmental Effects on Socio-Economics

The contractor will be required to have a minimum Inuit content in the workforce for the detailed site assessment and preliminary waste consolidation work. This will provide employment benefits and related economic benefits.

6.14 Impact of the Environment on the Project

The implementation of a clean up project in an Arctic environment has unique logistical issues. The winter route must be completely frozen to bring equipment to the site and to transport waste from the

site. The potential exists for delays in the clean up associated with bad weather. These delays may include work stoppage on-site or delays in the transportation to and from the site of personnel and supplies. Conditions related to the Arctic climate, such as ice and frozen ground may also delay clean up activities. Ice may delay marine transport to and from the site. Clean up activities which are best completed at maximum thaw may be delayed depending on seasonal climate changes.

7.0 ASSESSMENT SUMMARY

The detailed site assessment and preliminary waste consolidation activities at CAM-F DEW Line Site will interact with the environment through vehicle and machinery emissions, waste disposal, surface disturbance and the provision of employment to local inhabitants. There is also the potential for spills of fuel or hazardous materials. The activities will be carried out following standard good operating practices for northern Canada, with spill prevention practices and contingency plans in place. The objectives of the activities are to assess existing contamination at the site and make preparations for site clean up and remediation. The environmental effects of the activities are assessed as being of low magnitude and not significant. The activities will benefit the area through the short-term employment of local individuals and through the commencement of clean up of the site.

8.0 REFERENCES

Anand-Wheeler, I. 2002. Terrestrial mammals of Nunavut. Department of Sustainable Development, Iqaluit, NT.

Borealis Exploration Limited. 1981. Initial Environmental Evaluation for the Borealis Exploration Limited Melville Peninsula iron ore development: Discussion draft. Borealis Exploration Limited,

Calef, G.W. and A. Helmer. 1981. Population estimate for the Melville peninsula caribou herd in 1976. Department of Renewable Resources, Yellowknife, NWT. File Report No. 15. 16 pp.

Calef, G.W., and D.C. Heard. 1981. Reproductive success in peregrine falcons and other raptors at Wager Bay and Melville Peninsula, NWT Indian and Northern Affairs Canada, Ottawa, ON. 26 pp.

Canadian Council of Ministers of the Environment (CCME). 1999. Canadian Environmental Quality Guidelines. Chapter 1: Canadian National Ambient Air Quality Objectives: Process and Status.

Cluff, H.D., L.R. Walton, and P.C. Paquet. 2002. Movements and habitat use of wolves denning in the central Arctic, Northwest Territories and Nunavut, Canada. Final report to the West Kitikmeot/Slave Study Society, Yellowknife, NT Canada.

COSEWIC, 2003. Canadian Species at Risk, May 2003. Committee on the Status of Endangered Wildlife in Canada. 43 pp.

Department of Sustainable Development. 2001. Nunavut wild species 2000: general status of wild species in Nunavut. Department of Sustainable Development, Government of Nunavut, Iqaluit, NU.

Doupe, Chris. 2004. Senior Environmental Biologist, Environmental Services, Western Region, Public Works and Government Services Canada. personal communication.

Ecological Stratification Working Group. 1995. A National Ecological Framework for Canada. Agriculture and Agri-Food Canada, Research Branch, Centre for Land and Biological Resources Research and Environment Canada, State of the Environment Directorate, Ecozone Analysis Branch, Ottawa/Hull. Report and national map at 1:7 500 000 scale.

Ferguson, M.A.D., and D.S. Vincent. 1992. Status of caribou on northern Melville Peninsula in June 1982. File Report No. 107, Department of Renewable Resources, Yellowknife, NT. 19 pp.

Heard, D.C., T.M. Williams, and K. Jinfors. 1986. Precalving distribution and abundance of barren-ground caribou on northeast mainland of the Northwest Territories. Arctic 39(1): 24-28.

Indian and Northern Affairs Canada. 2003. Project Name: Sarcpa Lake, Site Number: EK005, NAP Contaminated Sites Management Program, Nunavut Region, PPA Number: NU2003_16, Annual Project Planning and Approval Document 2003-2004.

IUCN. 2004. IUCN/SCC Polar bear specialist group Web Site. URL: http://pbsg.npolar.no/. Accessed February 20, 2004.

Jaques, D. 1982. Flora and vegetation of the Roche Bay area, Melville Peninsula, Northwest Territories, Canada: Accompanies by a LANDSAT computer map of vegetation cover. Ecosat Geobotantical Surveys Inc., North Vancouver, BC. 26 pp.

Montgomerie RD, Cartar RV, McLaughlin RL, Lyon BE. 1982. Birds of Sarcpa Lake Melville Peninsula Northwest Territories: breeding phenologies, densities and biogeography. Arctic 36:65-75

Mulders, R. 2000. Wolverine Ecology, Distribution, and Productivity in the Slave Geological Province. Final report to the West Kitikmeot/Slave Study Society, Yellowknife, NT Canada.

Rippen and Bowden. 1972. Melville Peninsula caribou study. Game Management Division, Government of the Northwest Territories, Yellowknife, NT.

Royal Roads Military College. 1994. Environmental Study of Abandoned DEW Line Sites: II. Six Intermediate Sites in the Eastern Arctic.

Smith, CJ. 1987. Parental roles and nestling foods in the rough-legged hawk, *Buteo lagopus*. Ontario Field Naturalist, 101(1): 101-103.

Taylor, M.K., S. Akeeagok, D. Andriashek, W. Barbour, E.W. Born, W. Calvert, H.D. Cluff, S. Ferguson, J. Laake, A. Rsoing-Asvid, I. Stirling and F. Messier. 2001. Delineating Canadian and Greenland polar bear (*Ursus maritimus*) populations by cluster analysis of movements. Canadian Journal of Zoology, 79:690-709.

Wilson, C.C., and P.D.N. Hebert. 1998. Phylogeography and postglacial dispersal of lake trout (*Salvelinus namaycush*) in North America. Canadian Journal of Fisheries and Aquatic Science, 55: 1010-1024.