Clean Up of Lady Franklin Point (PIN-3) DEW Line Site

Prepared for:
Defence Construction Canada

Prepared by:
UMA Engineering Ltd.

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Gladys Joudrey
Environment Assessment Officer
Nunavut Impact Review Board (NIRB)
Box 2379
Cambridge Bay, NT

Dear Ms. Joudrey:

RE: Clean Up of Lady Franklin Point (PIN-3) DEW Line Site
Project Description and Screening Report

On behalf of Defence Construction Canada (DCC), we are pleased to submit this report (two copies) on the clean up of Lady Franklin Point (PIN-3). This report is to encompass both the Project Description and the Environmental Screening components of the Project, and is in support of the federal Environmental Assessment and Review Process (EARP).

Clean up of this site is scheduled to commence in July 2002. Consistent with our approach used for similar submissions for the clean up of other DEW Line sites, we will be preparing and submitting our applications for Land Use Permits, Water Use Licence, etc. during the upcoming winter/spring.

If there are any questions or concerns regarding the information presented in this report, please contact us at (403) 270-9200.

Sincerely,

UMA ENGINEERING LTD.

Tracy Stricklland for
Eva Schulz, P.Ag.
Environmental Scientist

cc: DCC, Peter Quinn – 1 report
ESG, Wayne Ingham - 1 report

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1. INTRODUCTION

1.1 Proponent Identification Information

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Contact Regarding this Submission:

UMA Engineering Ltd.:

- Eva Schulz / Tracy Strickland, (403) 270-9200

Defence Construction Canada:

- DEW Line Clean Up Project Manager: Peter Quinn, (613) 998-9523
- DEW Line Clean Up Contract Manager: Shawn Helmerson, (613) 998-4511

1.2 Lead Authorizing Agencies

The lead agency for this project is the Department of National Defence, represented by the Director General Environment. The management of this project is being provided by Defence Construction Canada. These agencies will be responsible for obtaining permits except in those cases where the clean up contractor is required to do so by legislation.

1.3 Project Rationale

Canada and the United States signed a Memorandum of Understanding (MOU) in March 1985, agreeing to modernize the North American Air Defence System. The memorandum sets out the requirements for replacement of the Distant Earth Warning (DEW) Line with an upgraded system to be called the North Warning System (NWS). The DEW Line facilities in Canada include 21 radar stations located in the Arctic as listed in Table 1. The DEW Line stations are situated on lands that are located in two land claim regions, with six stations located in the Inuvialuit Settlement Region (ISR) and the remaining 15 stations located in the Nunavut Settlement Area (NSA). An agreement was reached between the Department of National Defence (DND) and Nunavut Tunngavik Incorporated (NTI) regarding the requirements for the physical restoration of sites located within the NSA (a copy has been provided in Appendix II).

Eight of the DEW Line sites have been downsized and operate as NWS Long Range Radar (LRR) sites. The site at Lady Franklin Point, NWT, known as PIN-3, operates as an LRR site. Only two LLR sites, CAM-M and FOX-M, continue to be staffed on a permanent basis. The DEW Line facilities not required for the operation of the NWS LRR sites will be dismantled and those portions of the site restored.

Closure of the remaining 13 DEW Line sites began in 1991 and was completed in 1993. North Warning System involvement continues at eight of these sites and Short Range Radar (SSR) stations, either at the former operations site or nearby. The SRR stations are remotely operated and personnel will be on-site for short periods for maintenance and inspection. The remaining five DEW Line sites have been decommissioned and are to be closed.

The cleanup and restoration activities associated with the partial or total closure of the 21 DND DEW Line sites are subject to environmental screening. As the initiating agency under the federal *Environmental Assessment and Review Process* (EARP), DND is required to conduct an initial assessment of work proposed for the cleanup and restoration of the sites. Screening is the first stage of initial

assessment, and consists of a systematic, documented assessment of the environmental implications of a proposal, including the determination of the significance of potential environmental effects. Screening identifies the need for mitigation or monitoring programs, or modification of the project as proposed to reduce potential environmental effects. Screening also determines whether further study is required to fully evaluate potential environmental effects.

Table 1: Locations and Present Status of the 21 DEW Line Sites

Location	Site	Coordinates	Territory/Region	Status
Komakuk Beach	BAR-1	69°35'N, 140°11'W	Yukon/Inuvialuit	Closed in 1993, SRR in vicinity
Shingle Point	BAR-2	68°55'N, 137°15'W	Yukon/Inuvialuit	LRR
Tuktoyaktuk	BAR-3	69°26'N, 133°00'W	NWT/Inuvialuit	Closed in 1993, SRR in vicinity
Nicholson Peninsula	BAR-4	69°55'N, 128°58'W	NWT/Inuvialuit	Closed in 1993, SRR in vicinity
Cape Parry	PIN-M	70°10'N, 124°43'W	NWT/Inuvialuit	LRR
Clinton Point	PIN-1	69°35'N, 120°47'W	NWT/Inuvialuit	Closed in 1993
Cape Young	PIN-2	68°56'N, 116°55'W	NWT/Nunavut	Closed in 1993
Lady Franklin Point	PIN-3	68°28'N, 113°13'W	NWT/Nunavut	LRR
Byron Bay	PIN-4	68°45'N, 109°04'W	NWT/Nunavut	Closed in 1993
Cambridge Bay	CAM-M	69°06'N, 105°07'W	NWT/Nunavut	LRR/LSS
Jenny Lind Island	CAM-1	68°40'N, 101°43'W	NWT/Nunavut	Closed in 1992
Gladman Point	CAM-2	68°40'N, 97°48'W	NWT/Nunavut	Closed in 1992, SRR in vicinity
Shepard Bay	CAM-3	68°48'N, 96°26'W	NWT/Nunavut	LRR
Pelly Bay	CAM-4	68°27'N, 89°45'W	NWT/Nunavut	Closed in 1992, SRR in vicinity
Mackar Inlet	CAM-5	68°17'N, 85°07'W	NWT/Nunavut	Closed in 1992
Hall Beach	FOX-M	68°45'N, 81°11'W	NWT/Nunavut	LRR/LSS
Longstaff Bluff	FOX-2	68°54'N, 75°10'W	NWT/Nunavut	Closed in 1992, SRR in vicinity
Dewar Lakes	FOX-3	68°45'N, 109°04'W	NWT/Nunavut	LRR
Cape Hoover	FOX-4	68°26'N, 66°44'W	NWT/Nunavut	Closed in 1991, SRR in vicinity
Broughton Island	FOX-5	67°33'N, 63°49'W	NWT/Nunavut	Closed in 1991, SRR in vicinity
Cape Dyer	DYE-M	66°39'N, 61°21'W	NWT/Nunavut	LRR

LRR = Long Range Rader – under the new North Warning System
SRR = Short Range Radar
LSS = Logistics Support Site

1.4 Previous Environmental Assessments

As a federal proponent, the Department of National Defence is required to conduct an environmental assessment for the clean up of each DEW Line site.

The initial investigations, which took place from 1989 to 1994 were used to provide a baseline study of the existing environment (both biological and physical) and ecological pathways and possible transport mechanisms that will exist during the clean up. Studies of socio-economic aspects, in particular a detailed archaeological survey of the sites, were also completed during this time.

As an early planning tool, environmental assessments were drafted in 1994 for each DEW Line site, by DND under the auspices of the Environmental Review Process Guidelines Order (ESG, 1994). These assessments have been preceded by extensive on-site environmental and engineering investigations completed by the Environmental Sciences Group (ESG) at Royal Military College and UMA Engineering Limited (UMA). The objectives of these studies were as follows:

- to identify the nature and extent of chemical contamination at the sites;
- to determine the possible impact of these contaminants on the Arctic ecosystem, particularly to the food chain; and
- to develop practical environmental clean up strategies appropriate for the Arctic.

The investigations included:

An initial environmental clean up study of the DEW Line sites in Canada carried out on behalf of the United States Air Force by a consortium of Canadian consultants: The objectives for this study included: identifying and investigating areas impacted by past waste disposal practices and spills; determining and evaluating remediation alternatives for the waste disposal and spill area and; developing disposal options for debris arising from the demolition of DEW Line

structures. This study provided information on the presence of hazardous materials, the biophysical environment, facility details, and the existing landfills.

An environmental study of ten of the 21 sites carried out in 1989/90 by the Environmental Sciences Group (ESG) at Royal Roads Military College for the Canadian Department of National Defence: This study provided a detailed physical and chemical inventory of the stations and considered the impact of chemical contaminants on the Arctic ecosystem. This study provided information on the debris found on site, contents of landfills, fuel spills and patterns of contaminant dispersal.

Two studies designed to assess the impact of the historically common practice of disposing debris into the ocean through the ice were carried out in 1994 and 1995 by a consortium of several Canadian government departments. These studies concluded that there were no significant chemical effects arising from the presence of debris on the ocean floor.

During the final site investigations conducted in 1996 at BAR-3, Tuktoyaktuk and PIN-M, Cape Parry, the DND investigation team discovered that the paint on many of the buildings contained PCBs in excess of 50 ppm (parts per million). Materials containing concentrations of PCBs at 50 ppm or greater are regulated under the Canadian Environmental Protection Act. Currently, this material cannot be placed in a landfill. DND is investigating disposal methods for PCB paints. Pending the results of these studies, PCB painted demolition waste is being temporarily stored at the sites in accordance with the Storage of PCB Materials Regulations.

Environmental Screening Report for 15 Dew Line Sites in the NSA

Subsequent changes to overall project planning have been assessed over time and the assessment document updated. An Environmental Screening Report for 14 of the 15 DEW Line sites in Nunavut (Project Management Office DEW Line Clean Up, 1998) was submitted with the Project

Description of the Fifteen DEW Line site in the Nunavut Settlement Area to the Nunavut Impact Review Board (NIRB) in June 1998 (Project Management Office DEW Line Clean Up, 1998b).

Emergency Investigation

In January 2000, a fire destroyed the module train at PIN-3. As a result, ESG was asked by the Director General Environment, Department of National Defence, to participate in an emergency investigation of the site. This investigation addressed issues resulting from the fire, as well as gathering additional data necessary to develop the detailed drawings and specifications required for the overall cleanup of the PIN-3 site.

In the summer of 2000, further investigations were conducted to delineate contaminated areas and obtain environmental and engineering information required to finalize the clean up plans. This information has been reviewed and the environmental screening was updated to include relevant new information (Project Management Office DEW Line Clean Up, 2000).

1.5 Report Objective

The objective of this report is to document the environmental screening of cleanup activities proposed for the PIN-3 DEW Line site. This report represents both the Screening Report and the Project Description. This report has been prepared in accordance with the Interim DND Environmental Assessment Manual (DND 1991), a document prepared by DND to facilitate compliance with the federal EARP Guidelines order and with EARP Implementation Guidelines.

1.6 List of Approvals, Permits and Licences Required

The following is a list of permits required for the clean up of the PIN-3 site:

Land Use Permit

As per the Territorial Land Use Act and Territorial Land Use Regulations, a Class A permit, issued by the Department of Indian and Northern Affairs, will be required for the activities associated with the clean up the PIN-3 DEW Line site. Contact: Department of Indian and Northern Affairs, Land Administration, Iqaluit, NU, (867) 975-4283.

Quarry Permit

As per the Territorial Land Use Act and Territorial Quarrying Regulations, a Quarry Permit(s), issued by the Department of Indian and Northern Affairs, will be required for the extraction of granular material required for the clean up. Contact: Department of Indian and Northern Affairs, Land Administration, Iqaluit, NU, (867) 975-4283.

Water Use License

As per the Nunavut Land Claims Agreement Act, a Water Use License, issued by the Nunavut Water Board, will be required for camp operations and construction activities associated with the clean up of the PIN-3 DEW Line site. Contact: Nunavut Water Board, Gjoa Haven, NU, (867) 360-6338.

In addition, the successful clean-up contractor may require a number of other permits or licences. These permits or licences pertain to the operation and maintenance of the contractor's camp or owing to his/her status as an employer. Examples of these permits include those related to the possession of firearms, day-to-day camp operation and federal/territorial labour codes.

There is no requirement anticipated for either the project management office or the contractor to obtain the following permits or licences:

- Quarry permits for existing DND gravel sources located within the existing DND reserves; and
- Research or archaeological permits, as scientific or archaeological research activities in support of the clean up requiring such permits have been completed.

2. ENVIRONMENTAL ASSESSMENT PROCESS OVERVIEW

2.1 Regulatory Overview and Environmental Guidelines

During the implementation of the DEW Line Clean Up Project, all applicable environmental laws, regulations and requirements of federal, territorial and other authorities, will be adhered to. The contractors affecting the work will acquire and comply with those permits, approval and authorizations as may be required. The Contractor will be subject to and must comply with those permits and approvals obtained on behalf of and by DND to conduct this work. The Contractor, through all project phases, will work in close cooperation with regulatory authorities and DND to ensure compliance.

Federal Regulatory Overview

- The Canadian Environmental Protection Act and Regulations
- The Transportation of Dangerous Goods Act and Regulations
- The Fisheries Act
- The Arctic Waters Pollution Prevention Act and Regulations
- The Migratory Birds Convention Act
- The Canada Wildlife Act
- The Canada Shipment Act
- The Constitution Act
- The Navigable Waters Protection Act
- The Territorial Lands Act
    - The Territorial Land Use Regulations
    - The Territorial Quarrying Regulation

- The Northwest Territories Waters Act and Regulations
- Atomic Energy Control Act and Regulations
- Explosives Act and Regulations
- National Fire Code (NFC)

Nunavut Regulatory Overview

The Territorial Government and DIAND jointly administer the Nunavut Territory that contains DEW Line sites. The DIAND regional office is in Yellowknife. DIAND district offices within the Nunavut Settlement Area and the Territorial seat of environment are located in Iqualuit.

In addition to the Federal and Territorial Acts and Regulations above , the clean up of the DEW Line sites in Nunavut are also governed by:

- The Explosives Use Act
- The Wildlife Act
- The Environmental Protection Act
- The Spill Contingency Planning and Reporting Regulation
- Safety Act and Regulations
- The Public Health Act and Regulations
- The Historical Resources Act

Environmental Guidelines

- National Guidelines for Decommissioning Industrial Sites
- Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments

- National Guidelines for the Landfilling of Hazardous Waste
- Guidelines for Preparation of Hazardous Material Spill Contingency
- Code of Good Practice on Dump Closing or Conversion to Sanitary Landfill (1977)
- Code of Practice for Used Oil Management in Canada
- Canadian Drinking Water Guidelines
- NWT Guidelines for the Removal of Materials Containing Friable Asbestos
- NWT Guidelines for Municipal Type Wastewater Discharges
- NWT Guidelines for Discharge of Treated Municipal Wastewater

2.2 Environmental Assessment Process

The environmental assessment undertaken under EARPGO, and updated in accordance with the requirements of CEAA, has used a process in which potential environmental impacts are assessed on Valued Ecosystem Components identified during the initial scoping exercise.

The following sections provide a summary of the activities that were undertaken in conducting this environmental assessment:

Scoping

As a self-directed environmental assessment, the initial step taken was to conduct a series of social and ecological scoping exercises designed to:

- Determine the temporal and spatial boundaries of the assessment; and
- Focus the analysis on the environmental issues directly related to the clean up project itself (i.e. identification of Valued Ecosystem Components).

In scoping the project, clean up activities to be assessed were identified. Possible additional activities were examined using the Canadian Environmental Assessment Agency's "Principal Project/Accessory" test, which is used to determine if other activities demonstrate an interdependence, linkage and/or geographical/ecological proximity with the primary clean up.

The assessment scope included a determination of the environmental effects to be assessed and the effects that are to be considered in making decisions regarding the project. The following chart outlines the scope of the project and of the assessment:

Scope of the Project: **Project:** Clean Up of the PIN-3 Lady Franklin Point DEW Line Site **EA Trigger:** Funding from Department of National Defence **Scope of the project:** Principal Project: physical clean up of the PIN-3 Lady Franklin Point DEW Line site. Accessory physical works: Demolition of facilities, removal of waste materials (including hazardous) and contaminated soil, debris disposal, mobilization and demobilization of contractor's equipment and personnel. **Other undertakings in relation to the physical work:** None.
Scope of the Assessment: **Project:** Clean Up of the PIN-3 Lady Franklin DEW Line Site **EA Trigger:** Funding from Department of National Defence **Scope of the assessment:** The environmental assessment is to consider the effects of all project related activities (i.e. those related to the clean up of the site) and associated physical works on both biophysical (terrestrial, aquatic) and socio-economic assessment factors.

As a result of the scoping, the following factors were identified for assessment:

- Evaluation of environmental effects of the project, including those relating to cumulative effects that are likely to result from carrying out this project.
- Project undertakings performed in conjunction with other off site projects/activities that have been or will be carried out.
- The relative levels of significance.
- Public comments.
- Mitigation measures deemed to be technically and economically feasible.

Interested parties were identified and consulted during the development of the project definition process including:

- 'Expert' federal departments (Environment Canada, GNWT Natural Resources, GNWT Health, DIAND);
- 'Other' federal departments (DND, Defence Construction Canada, Parks Canada);
- Aboriginal organizations (Nunavut Tunngavik Incorporated, Nunavut Planning Commission) and Kitikmeot Inuit Association); and
- Community leadership of the various eastern Arctic hamlets, including elders from Kugluktuk, and the general public.

2.3 Assessment of Environmental Effects

The initial step following the scoping exercise was to determine the possible environmental effects of the project. This assessment involves providing a detailed overview of the project, a description

of the existing environment (including inventories and ecological processes) and the identification of project-environment interactions.

The aim of describing the project was to clearly outline the constituent components and activities that were to occur on each of the DEW Line sites. Activities include mobilization, project layout and design, plans and scheduling, specifics related to each of the activities (i.e., how would contaminated soil be identified, excavated, transported and disposed of), operating procedures, control procedures and demobilization plans.

During the scientific studies described above, the site teams collected the relevant information concerning the existing environment components of the study area. This information included a description of the physical, biological and social characteristics of the study area.

Using the information that was obtained on the project and the existing environmental setting, the assessment study determined interactive links between these two components. Particular concern was focused on the location, sensitivity, seasonal presence and abundance of these components

Also included in the assessment of environmental effects were possible impacts relating to socio-economic factors (heritage, culture, archaeological, employment and business opportunities), land use and human health.

During the assessment stage, conclusions were made as to the type of impact (i.e. level of adversity) and its level of significance, based on scientific judgement and comments received during public consultation sessions.

2.4 Identification of Mitigation Options

The third stage of the assessment process was to undertake the identification of mitigation measures that would result in a reduction or elimination of likely environmental effects associated with the

clean up of each of the sites. In the case of this project, all potential adverse effects were addressed and not simply those deemed to be significantly adverse, the minimum required by assessment legislation. Mitigative actions now form part of the overall project design and planning documentation, which resulted in the Environmental Protection Plan (Appendix III). The requirement for on-site personnel to adhere to these mitigative measures is contractual in nature as the Environmental Protection Plan forms part of the clean up contract.

3. PROJECT DESCRIPTION

The environmental clean up of the former PIN-3 Lady Franklin Point DEW Line Site.

3.1 Project Location

PIN-3 Lady Franklin Point is one of the 21 DND DEW Line sites to be cleaned up under the DLCU Project. PIN-3 (68° 28' N, 113° 13' W) is located on the south coast of Victoria Island in the Kitikmeot Region of the Territory of Nunavut as depicted in Figure 1, Appendix I. The station is adjacent the shores of Dolphin and Union Strait near the Coronation Gulf. The closest communities are Kugluktuk (formerly Coppermine), approximately 115 km to the southwest, and Cambridge Bay, 325 km to the southeast. Access to PIN-3 is limited to charter aircraft and sealift. Ice conditions limit access by water to the site from the beginning of August to the middle of September.

The PIN-3 station is approximately 15 m above sea level. The topography at the site is generally low-lying with shallow ponds and lakes.

The former PIN-3 DEW Line site is located on a DND reserve on federal Crown lands under the administrative control of Indian and Northern Affairs.

3.2 Project Goals

The aim of the DLCU Project is to decommission those facilities used by the former DEW Line, which have been declared surplus to the requirements of the new NWS, and to restore the sites to an environmentally safe condition. Environmental restoration includes the setting of remediation objectives that are designed to preclude the continued migration of contamination (and hence biomagnification) into the Arctic ecosystem/food chain. To accomplish this, remediation will include:

- The excavation of soils in cases where parameters exceed those that have been set for the project (i.e. believed to cause significant input into the lower levels of the food chain, for example, higher plants and detritus); and

- The remediation of landfills, which may serve as a source of water contamination and may enter the lower levels of the marine food chain (i.e. algae).

3.3 Evaluation of Alternatives to the Project

The DEW Line facilities at these locations are no longer required by DND. Therefore, they pose both a safety hazard and a potential long-term source of contaminant input to the sensitive Arctic environment. Therefore, a clean up process that will preclude further input into the environment in general, and specifically, the food chain, must be completed.

As a project strictly dedicated to the clean up of these military establishments, the range of alternatives to this project are limited in nature. Two alternatives to the clean up of these sites that can be identified have been rejected or implemented in a limited fashion based on either military operational requirements and/or environmental reasons. The two alternatives are as follows:

Commercial or other Government use of the facilities: This alternative involves the sale of those facilities no longer required by the DND to commercial interests. Two possibilities are present, namely on-site commercial development or sale of the capital assets themselves and movement off-site. The federal government's continuing operational requirements of these sites (i.e. most sites remain part of the NWS) preclude the on-site option from being followed.

No clean up action (Null alternative): The second alternative involved examining the environmental impact of maintaining the status quo at the sites. It was quickly realized that failure to address the environmental problems identified during the site investigations could lead to the following:

- Placing the Arctic environment/food chain at risk;
- Possible future legal liabilities for the federal government; and
- Greater clean up costs in the future.

3.4 Schedule

PIN-3 was to undergo a detailed site investigation in 2003, and was scheduled for clean up in 2005 as part of the DLCU Project. The January 2000 fire destroyed the module train structure at PIN-3 and left the site non-operational. Because of the fire, the clean up of the PIN-3 site has been advanced and is currently scheduled to begin in 2002, with completion in 2004. A summary of the clean-up/construction schedule is as follows:

- The contractor will mobilize to the site in August 2002, by barge or sealift and set up a temporary construction camp.
- Clean up activities are expected to continue through to 2004, depending on the contractor's approach and weather conditions.
- The expected duration of annual clean up activities on site will be from July to October. During the winter months, work will cease and equipment and facilities on site will be winterized. It is expected that the contractor's workforce and accessory personnel will mobilize to and from the site via chartered aircraft from Cambridge Bay, Nu.
- Completion of the clean up and demobilization of the contractor's facilities and equipment is anticipated for September 2004.
- Long term monitoring of the landfills will begin upon completion of clean up (2004) and will continue for a 25-year period. After 25 years, the monitoring requirements will be re-evaluated.

4. PROJECT PLANNING

4.1 DEW Line Clean Up Protocol

The purpose of the DEW Line Clean Up project is to:

- Demolish and remove existing facilities that are not required for the operation of the North Warning System;
- Remove contaminated soils from the Arctic food chain;
- Stabilize existing landfills;
- Clean up surface debris; and
- Physically restore the unused portion of the site to as natural a state as possible.

4.1.1 Protocol Development

In cooperation with several federal departments (Environment Canada, Fisheries and Oceans, Indian and Northern Affairs) and the Government of the Northwest Territories (Renewable Resources and Health departments), DND initially drafted the General Protocol for the DLCU Project in 1991. This protocol served as the basis for the DND/NTI Agreement on environmental provisions for the clean up of these sites (a copy has been included in Appendix II). At the time of implementation there were no established environmental standards for the Arctic. As a result, existing federal guidelines, such as the Interim Canadian Environmental Quality Criteria for Contaminated Sites (1991), were modified to reflect both the sensitivity of the Arctic food chain to ecological processes such as biomagnification and the close dependence of the Inuit on the land for food. In addition, a barrel specific protocol was prepared to outline the process for dealing with barrels and barrel contents found on the DEW Line sites.

4.1.2 Criteria

The protocol outlined in the DND/NTI Agreement was developed from the results of the biophysical, socio-economic, and engineering site assessments (mediated through the DND/NTI Environmental Working Group - EWG). The DEW Line Clean Up Protocol documents contains clean up criteria and specific physical actions that are to be undertaken, specific to the DEW Line sites. These criteria have been developed based on existing federal and provincial criteria in conjunction with studies that show the functional relationships and/or pathways for biological uptake from soil. The resulting protocol defines two concentration tiers of soil contamination (Annex E of Appendix II). Soil substrates containing Tier I concentrations may be placed in an appropriate on-site landfill while those soils in excess of the Tier II standard are to be disposed of in a manner that provides additional measures to permanently segregate these contaminants from the Arctic ecosystem. Soils exceeding federal legislative limits (i.e., Canadian Environmental Protection Act and Chlorobiphenyl Regulations) will be disposed of off-site at a licensed disposal or destruction facility.

4.2 Disposal Requirements

4.2.1 Tier II Contaminated Soil Disposal Requirements

Based on engineering field surveys conducted at the sites in 1992 and 1993, it became apparent that a potentially large volume of Tier II contaminated soil at the 21 DEW Line sites would require segregation in a manner which precludes their continued contact with the Arctic ecosystem. The DEW Line Cleanup Project team considered a number of disposal options/technologies. Of the options, the most environmentally and economically viable was determined to be the development of engineered Tier II soil disposal facilities at specific sites. These facilities utilize a double containment system consisting of permafrost to limit leachate generation and synthetic liners to prevent migration of contaminant into the surrounding environment.

The design of the landfill was based on the characterization of the contaminants in the soils and the geothermal properties of the permafrost. Permafrost provides the primary containment barrier in which the frozen substrate will advance (freeze-back) and encapsulate the contents in the facility. Extensive geothermal analysis on the time required for freeze-back, thermal regime in the ground surrounding the facilities and the depth of the active layer in the cover material has been used to determine the thickness of both the cover and the base. A high density polyethylene (HDPE) liner will be placed at the base and side slopes of the facility to provide secondary containment. The liner is chemically compatible with the contaminated soils and will prevent the potential movement of moisture during the period required for permafrost aggradation. A second liner, a geocomposite clay liner (GCL), is to be installed in the cover of the facility and will prevent drainage from percolating down through the cover fill which might otherwise impact the time required for permafrost freeze-back. The GCL consists of bentonite clay sandwiched between geotextiles.

4.2.2 CEPA Contaminated Soil

Contaminated soils, which contain levels of contaminants in violation of the Canadian Environmental Protection Act (CEPA) and associated regulations, are considered hazardous material and will not be placed in the Tier II soil disposal facilities. These materials are to be removed from the site to a licensed disposal facility along with other hazardous wastes. Some of the soils may also contain petroleum hydrocarbons (often where lead and PCB contamination have also occurred as a result of waste oil and/or fuel spills). Leachate testing has also been conducted on most of the more highly contaminated soil samples as set forth in Ontario Regulation 347. Wastes determined to be "leachate toxic" under this test are not placed in the Tier II disposal facility, but are instead removed from the site to a licensed disposal facility.

4.2.3 Tier I Contaminated Soil

Soils exceeding Tier I contamination criteria but not classified as Tier II contaminated soil are not considered a high leachate risk and may be disposed of in an on-site, non-hazardous waste (NHW)

landfill. NHW landfills are also used to dispose of non-hazardous site debris and demolition materials. Typical construction of a NHW landfill consists of gravel perimeter berms surrounding layers of interbedded waste and intermediate cover soil. A layer of granular material, minimum one metre thick, is placed as final cover for the landfill and graded to promote positive drainage.

4.2.4 Hydrocarbon Contaminated Soils

In 1998 the DLCU Protocol was revised to address hydrocarbon contaminated soils at the Nunavut sites under the environmental provisions of the DND/NTI Agreement. Under the amended protocol, hydrocarbon contamination is divided into two types based on common sources at the DEW Line sites. In Type A hydrocarbon contaminated soil, the primary petroleum product present is lubricating oil and grease. Due to the low leachability of this type of hydrocarbon, these soils are generally deemed safe for disposal in a NHW landfill. Soils where the primary petroleum hydrocarbon contaminant was fuel oil are classified as Type B hydrocarbon contaminated soils. Several options for disposing of Type B contaminants have been employed based on location and site specific factors. The most feasible and environmentally sound disposal options are placement in a secure, Tier II style landfill; passive land-treatment (landfarming); and containerization and transport off site to a disposal facility in the south.

Selection of the areas for contaminated soil disposal facilities development is based on a number of technical factors including:

- Topography, drainage and geology;
- Availability of construction materials (gravel borrow);
- Minimization of disturbance to natural drainage patterns;
- Appropriate distances from marine and freshwater systems and communities, as well as other biologically-sensitive areas;

- Ensure drainage away from ocean and domestic water supplies, distances from beaching areas and locations of contaminated soil, and
- Accessibility.

Another environmental concern during the development of these facilities is the possible requirement for use of explosives in some excavation activities. In addition to the obvious danger to human health, other possible impacts could include damage to surrounding areas (including waterbodies, environmentally sensitive areas and hazardous material storage facilities) from shock waves and blasting scatter, and the disturbance of nearby wildlife by sudden peak noise levels. Blasting, where required, will be conducted by authorized personnel in accordance with all required permits, licenses and applicable laws and regulations, and as dictated by regulatory authorities.

4.3 Investigations and Delineation

4.3.1 Assessment of Landfills and Hydrocarbon Contaminated Areas by the EWG

The Environmental Working Group (EWG) is comprised of scientific and technical experts representing both the Inuit (NTI) and DND. The purpose of the EWG is to examine environmental issues related to the DLCU Project and to provide recommendations to a joint DND/NTI core group consisting of senior management from both organizations. Specific tasks that have been assigned to the EWG include:

- Development of a landfill risk evaluation matrix;
- Evaluation of, and recommendations for, a post-construction/remediation landfill monitoring program;
- Identification of hydrocarbon clean up requirements;
- Establishment of confirmatory testing protocols; and

- Preparation of a list of items suitable for landfilling at the DEW Line sites.

The EWG completed their work in June 2001. Their findings included the following:

- Regrade the north and south landfills; excavate the south landfill; and remove localized areas of Tier II soil and regrade the NWS Landfill;

- A total of ten distinct areas of hydrocarbon contaminated soils were evaluated. A summary of this evaluation is provided in Table 2. The evaluation considered the likelihood of exposure and receptor sensitivity for three major pathways: atmosphere, soil and water. Only the primary pathway, which determines the recommended risk mitigation measure, is identified in the summary table.

Table 2: Summary of Hydrocarbon Contaminated Areas at PIN-3 Lady Franklin Point

Area ID	Hydrocarbon Evaluation			Recommended Risk Mitigation Measures	Comments
	Primary Pathway	Likelihood of Exposure	Receptor Sensitivity		
Garage Area – Type A	Water & Soil	Moderate	Low	No action required. See comments.	Four distinct stained areas, two of which are co-contaminated with inorganic elements and PCBs. The two remaining areas will be scarified to a minimum of 30 cm depth.
Diesel Refueling Area – Type B	Soil	Moderate	Low	*Provisional Recommendation:* Excavate to 30 cm depth, and backfill with clean fill	Additional delineation will be carried out in 2001 to confirm volume estimates.
Hanger Interior – Type A	All	Low	Low	No action required.	Co-contaminated areas to be excavated in accordance with DLCU protocol.
Hanger Exterior - Fuel	Soil & Water	High	Low	Additional information required to assess area.	Delineation of contamination and identification of source will be carried out in 2001.
Beach Pallet Line – Type A	All	Low	Low	No action required.	Scarify area to 30 cm depth.
Pallet Line – Type A	All	Low	Low	No action required.	Scarify area to 30 cm depth.
Former Hazmat Storage Area – Type A	All	Low	Low	No action required.	Scarify area to 30 cm depth.
North Beach Stain – Type A	Water	Low	Moderate	No action required.	Scarify area to 30 cm or bedrock, whichever is encountered first.
Main Landfill	Water	High	Moderate	Excavate contaminated soil to a depth of 50 cm or 2500 ppm TPH, whichever is encountered first.	Remediation solution for landfill may include encapsulation, review and revise as appropriate.
NWS Landfill Area – Type A	Soil	Low	High	No action required	The area is co-contaminated with Tier I and will be excavated accordingly.
Module Train Area					Insufficient information to complete evaluation.

4.3.2 Final Assessment by DND

Prior to the clean up of each site, DND undertakes a final site assessment. The aim of the site visits is several-fold, including:

- To fully delineate the extent of contaminated areas in order to prepare accurate construction drawings;
- To confirm the structural and environmental status for buildings and other facilities that are to be demolished;
- To re-confirm the baseline environmental conditions at of the site prior to implementation; and
- To examine landfills, where required, to confirm details pertaining the required remediation strategy.

Final delineation investigations at PIN-3 were conducted in 2000 and 2001.

4.4 Inclusion of Traditional Knowledge

One of the guiding principles of the DLCU Project is to ensure the meaningful participation of local residents in both the planning and execution phases. One way of ensuring this is to incorporate traditional knowledge into the site clean up plans. An Inuit representative who is familiar with both the DEW Line site and traditional use of the area is chosen by the relevant Regional Inuit Association to be on-site during the site investigation phase prior to the clean up. The Inuit representative works closely with the EWG to identify Inuit use of the area, wildlife patterns and related past activities, and occurrences that may have had an impact on landfills (i.e., dumping, hazardous waste storage, natural occurrences). This traditional and local knowledge is used to refine clean up activities by including unknown issues or adjusting environmental protection plans.

Additionally, DND and the NTI established a community DLCU Project committee to facilitate the flow of local knowledge to the EWG prior to and during each site visit. To accomplish this goal, the EWG visit local communities most affected by each DEW Line site and conduct one on one interviews with a number of residents, the Hamlet Administrative Officer and/or Mayor, the local HTA and other relevant community organizations.

5. PROJECT DESIGN - ENGINEERING

The project layout and the work to be conducted at the site as been outlined in the drawings included in Appendix IV.

5.1 Proposed Construction

To dispose of waste generated on site due to the demolition of existing structures, removal of contaminated soil and site debris and landfill excavation, several specialized facilities will be constructed on site. For the purpose of this report, only materials exceeding CEPA standards will be disposed of off site.

The new facilities will be sited following the completion of a detailed geotechnical investigation. It is possible that the landfills will be located in areas with saturated ground or that may not currently have road access. The construction of new access roads is not anticipated to be difficult due to the presence of flat, shallow bedrock over most of the site and abundant aggregates. However, the contractor may be required to make special provisions to protect tundra vegetation. The contractor will provide adequate drainage for all excavations.

5.1.1 Non-Hazardous Waste (NHW) Disposal Facility

The following materials are proposed for disposal in a Non-Hazardous Waste Landfill at PIN-3:

- DCC Tier I and Type A Hydrocarbon Contaminated Soil;
- non-hazardous demolition debris;
- non-hazardous site debris;
- non-hazardous debris and Tier I soils excavated from landfills;

- creosote timbers wrapped in polyethylene sheeting; and
- bagged asbestos.

The Non-Hazardous Waste Landfill is to be established on native ground (stripped of any organic matter) and surrounded by a one metre high berm of Type 2 material. No base cover or liner is required for this landfill.

The footprint of the NHW Landfill is approximately 48 m^2.

5.1.2 Northern Disposal Facility (DCC Tier II)

The Northern Disposal Facility (NDF) is a lined structure used to landfill Tier II soils only. The shallow bedrock on this site limits the depth that the landfill may be excavated into the overburden. However, the fact that the site is no longer active means that rock excavation using explosives may be carried out without disturbing radar equipment. Special blasting techniques may still be required to minimize vibrations and control fly rock.

5.1.3 Landfarm

The landfarm is to be constructed to provide for on-site remediation of Type B hydrocarbon contaminated soil. The landfarm will be constructed so that there will be 1.1 metre high perimeter berms surrounding a 112 metre by 125 metre area. A 300 mm thick base of granular fill will be placed beneath a 0.5 metre thick layer of hydrocarbon contaminated soil. The landfarm will be capped with 0.5 metre of granular fill upon closure.

The facility is assumed to operate for a total of 24 weeks over a three-year period with intermittent applications of liquid nutrient and tilling events.

5.1.4 Instrumentation

The NDF and NHS landfills will require the installation of groundwater monitoring wells and temperature thermistors. Groundwater monitoring wells will also be placed around the landfarm. The required nominal depth of each monitoring well is assumed to be 8m. A follow-up program will require monitoring of the landfarm, NDF and NWS landfills annually for the first five years after construction and subsequently after seven, ten, fifteen and twenty-five years.

5.2 Landfill Closure

Four landfill areas require closure at the PIN-3 site as described in the following sections.

5.2.1 Main Landfill

The Main Landfill is located approximately 900 metres west of the destroyed module train. An estimated area of approximately 23,000 square metres was derived from the geophysical surveys. The landfill depth is estimated to vary between 0.5 and 2.0 metres. The landfill surface has a variable slope of 2% to 4%. The surface of the landfill is fairly well vegetated. The ocean is located approximately 300 metres west and down gradient of the landfill.

The environmental investigation conducted in 2000 indicates there may be some localized migration of contaminants. Additional sampling and assessment in this area is to be conducted during the 2001 investigation.

There are two options for the remediation of this landfill; one option is leachate containment and the other option is partial excavation of Tier II contaminated soils and regrading with a 1 metre depth of granular fill. Using Option 1, the Tier II contaminated soils remain in place because they will be contained within the leachate collection system. Under Option 2, the Tier II contaminated soils are excavated and disposed of on-site at the Tier II disposal facility. The volume of landfill excavation is small, and is conservatively estimated at 450 cubic metres.

North Warning System (NWS) Landfill

The NWS Landfill is located approximately 50 metres north from the north edge of the Main Landfill and consists of three separate lobes. An aerial extent of buried material of approximately 14,000 square metres was derived from the geophysical surveys. The landfill depth is estimated to be at least 1.5 metres. The landfill surface is relatively level, with the exception of a steep slope along the western edge of the landfill where one of the lobes is located. The ocean is located approximately 450 metres west and down gradient of the landfill. The NWS Landfill is well covered with crushed rock, with limited visible debris present. Battery and carburetor disposal areas are located to the north of the NWS Landfill.

The Tier II contaminated soil found on the east side of the landfill requires delineation in 2001, excavation and disposal in an appropriate on-site Tier II disposal facility. The landfill will be regraded with Type 2 granular fill to a depth of 1 metre.

5.2.2 South Landfill

The South Landfill is located at the south beach area adjacent to Coronation Gulf. It is approximately 1 kilometre south of the airstrip and it begins approximately 100 metres east of the beach POL pad. The South Landfill is divided into two separate areas. The South Landfill refers to three landfill lobes north of the road and the South Beach Landfill refers to the landfill south of the road.

The topography of the area is flat, with localized depressions that fill with water. The landfill is covered in sand and/or beach gravel and has some visible debris including rusted metal and partially exposed barrels.

Although both areas are considered to pose low potential environmental risk and can be regraded, portions of the South Beach Landfill are located approximately 10 metres from the shoreline. The

proximity of the shoreline poses a risk of erosion from sea ice push during the winter. The South Beach Landfill is to be excavated and the resulting excavation backfilled with Type 2 granular fill. Site reconnaissance indicated that the waste might be shallowly buried so an average 0.75 metre depth of excavation is assumed. The total waste excavation is estimated to be 1,300 cubic metres.

The South Landfill, consisting of three separate lobes on the north side of the road, is expected to be regraded with a 1 metre depth of Type 2 granular fill. Approximately 6,600 cubic metres of granular fill is required for the three areas of this landfill.

5.2.3 North Landfill

This buried debris area is founded on flat inland, shallow bedrock in a sparsely vegetated area. There is no evidence of Tier II contaminated soil or leachate from this landfill. It is proposed to regrade the North Landfill with gravel fill. Scattered surface debris outside the regraded area will be removed and disposed of on-site.

5.2.4 Asbestos Disposal Facility

The 1992 site investigation identified a small gravel pad, where asbestos had been buried. This area is not considered to contain leachable materials. Due to the low risk of cover erosion or environmental exposure from the material disposed of in this area, it is proposed to regrade the Asbestos Disposal Facility with granular fill.

5.2.5 Other Areas Requiring Site Regrading

There were numerous additional small areas identified during the field investigations as requiring minor regrading or cover. These areas generally consist of piles of buried or partially buried, non-hazardous debris and may be regarded with gravel.

5.3 Disposal of Site Debris

All site debris is to be disposed of in accordance with the DND/NTI Agreement. All debris will be sorted and classified as hazardous and non-hazardous debris. Hazardous materials will be shipped off-site for disposal, non-hazardous materials will be placed in the NHW landfill.

Creosote treated timbers and asbestos will be wrapped in plastic or bagged and disposed of in the NHW landfill. Building materials containing PCB amended paints, in excess of 50 ppm, will be collected, and containerized for future disposal. Temporary storage on-site will be in accordance with the Storage of PCB Waste Regulations under CEPA.

Where it is possible to remove scattered or embedded debris, the area will be reshaped if necessary, and any voids left by removal of debris will be backfilled with granular material.

5.4 Disposal of Contaminated Soils

All contaminated soil found at PIN-3 has been divided into one of five categories depending on the type and severity of the contamination. Generally, less hazardous surface contaminants, if less than 3 square metres in area, are regraded whereas more extensive or problematic contaminated soils are excavated. Excavations left by soil removal are backfilled with granular fill.

Approximate volumes of soils for disposal are presented in Table 3.

Table 3: Soil Disposal Volumes - PIN-3 Lady Franklin Point

Soil Type	Estimated Volume	Disposal
Tier I	1,100 m^3	Place in NHW landfill
Tier II	3,750 m^3	Tier II facility
Type A Hydrocarbons	270 m^3	NHW facility
Type B Hydrocarbons	3,300 m^3	On-site treatment
Contaminated Soil from Landfills	1,750 m^3	Tier II facility

The locations of contaminated soil are shown on the Design Drawings in Appendix IV.

5.5 Demolition of Facilities

Due to the January 2000 fire, the PIN-3 DEW Line site has been closed, and all remaining facilities are to be demolished. All buildings and facilities will be demolished to top of concrete foundations, sorted into non-hazardous and hazardous components and treated as described above, and that portion of the site restored. Hazardous materials that may be encountered during demolition include:

- asbestos in insulated buildings;
- creosote-treated timbers;
- sludge from cleaning of fuel tanks;
- painted building materials containing lead and PCBs; and
- other small amounts from various electronic equipment.

The following items are scheduled for demolition at PIN-3:

- POL Pumphouse
- Communication Dishes (4)
- POL Tanks, 65,000 Gal. (5)
- Creosote Coated Utility Poles
- POL lines
- Electrical Cable
- Culverts
- Sewage Outfall Line

- T.V. Satellite Dish
- Module Train Wreckage

Demolition debris is classified into several categories based upon their specific disposal and handling requirements as follows:

- Non-hazardous materials requires no special treatment and can be crushed and placed in a NHW landfill.
- Creosote treated timbers must be wrapped in polyethylene sheets before being placed in a NHW landfill. Creosote coated power poles or foundations are to be cut off 300 mm below ground level.
- Asbestos must be removed and disposed of in a method that eliminates the risk of exposure to friable asbestos. Proper personal protective equipment and specialized equipment is required when removing asbestos. Asbestos materials are bagged in polyethylene prior to placement in a NHW landfill.
- Tanks and pipes containing fuel must be pumped out or drained prior to cleaning and disposal.
- Hazardous waste is segregated and disposed of according to CEPA guidelines
- Demolition materials containing PCB amended paints with greater than 50 ppm PCB's are to be disposed of off site.

Demolition debris to be disposed of on site will be cut into shapes and sizes which will minimize void space when landfilled. Concrete foundations are largely left intact except where coated with PCB paints. Following the removal of site structures, demolition areas are reshaped or backfilled with granular fill to a height flush with the remaining foundations. All voids or holes that are left by foundation or structure removal are filled with gravel.

5.6 Transportation of Hazardous Materials Off-site

Hazardous materials to be placed in environmental containers at an approved containment facility on-site and removed by airlift in accordance with Transportation of Dangerous Goods Act.

5.7 General Site Grading

Areas likely to require regrading include:

- Four landfill areas to be closed.
- Tier II Disposal Facility.
- Hydrocarbon treatment areas (for on-site treatment)
- Non-hazardous waste landfill
- Locations disturbed during demolition.
- Debris and contaminated soil excavation areas.
- Borrow areas for granular material.
- Locations disturbed by contractor during establishment and operation of cleanup camp and equipment storage facilities.

5.8 Development of Borrow Sources

Approximately 225,000 m^3 of granular material is required for the clean up. The granular fill is required for closure of landfills, upgrading of the access roads during construction, backfilling contaminated soil areas and general site grading purposes. Additional granular fill is required for the development of the new Non-hazardous Waste Landfill and the Tier II Disposal Facility.

The five gravel sources which have been identified include:

- Borrow Area #1: North of the east end of the Airstrip
- Borrow Area #2: West of the west end of the Airstrip
- Borrow Area #3: At the Beach area
- Borrow Area #4: Northwest of the Station Area
- Borrow Area #5: Southwest of the west end of the Airstrip

5.9 Contractor Support Activities

Additional activities required to support the contractor's work include:

- Use of existing beach landing area, airstrip and roads at site for equipment transport, movement and access to work areas.
- Set-up of construction camp and equipment storage area.
- Sewage from the camp will be handled with, at minimum, primary treatment (settling tank and lagoon) and discharged to ground surface. Sewage treatment and disposal will be in accordance with the Land Use Permit and Water Use License.
- Domestic waste to be disposed (as is, or incinerated as specified by the Land Use Permit) in the new Non-hazardous Waste Landfill.
- Demobilization of cleanup camp following end of project.
- Vehicle traffic to work areas is to be supported by the existing access roads that traverse the site.

- Labour and equipment requirements are anticipated to include 35- 45 personnel, 20 pieces of heavy construction equipment and 6 support vehicles.
- Duration of work is anticipated to be approximately 4 months, not including winter shutdown period, over a period of two years.

5.10 Future Activities

There are no future uses/activities associated with this project, outside of the ongoing landfill monitoring program agreed to in the DND/NTI Agreement.

6. PROJECT IMPLEMENTATION

6.1 Site Access and Transportation Methods

Off site activities in support of this project will be in the form of transportation associated with the transport of materials, equipment and personnel to the site. These activities are described below:

- **Air transport** - most transportation by air is expected to utilise existing commercial and charter services in and out of the site. Depending on the contractor's schedule, minimal use of chartered aircraft will occur at remote sites (i.e., one flight per week using Twin Otter). No rotary wing flying activity directly to the site by the clean up contractor is anticipated.

- **Sealift transport** - it is anticipated that contractors will utilise sealift to transport bulk materials and equipment (vehicles, heavy equipment, etc) to/from Lady Franklin Point. This would potentially result in the increase in sealift traffic by one or two sailings per year (one early and one late summer), only if a specific, dedicated trip is made for DEW Line Clean Up purposes. Otherwise, no additional vessel traffic is anticipated.

- **Land Transport** – it is anticipated that overland transport will be required between the site and boat dock for mobilization/demobilization of materials and equipment

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

6.2 Environmental Protection and Contingency Plans

6.2.1 Environmental Protection Plan

The main focus of the project environmental management program during the clean up is based upon site specific Environmental Protection Plans and the associated North Warning System spill response plan. The requirements outlined in these plans are the end result of the EARPGO/CEAA

environmental assessment process, and include those mitigative measures designed to reduce or eliminate potential harmful effects. Disposal methods for solid, liquid or gaseous wastes are shown in this plan. The Environmental Protection Plan for PIN-3 is provided in Appendix III.

6.2.2 Contingency Plans

Contingency plans associated with the clean up of each site are outlined in site specific Environmental Protection Plans. For each site, contingency plans for the prescribed course of action to be followed in the event of fuel or chemical spills, potentially dangerous wildlife encounter and the discovery of heritage resources are described. These plans will enable persons that encounter a particular contingency situation to maximize the effectiveness of the environmental protection response and meet regulatory requirements for reporting to the appropriate agencies. Associated with this document is the detailed spill response plan for the North Warning System, which has operational control of the site. This spill response plan also forms part of the contractual obligations of the successful contractor.

6.3 Clean Up Contract

The following steps outline the contract award procedures:

- A tender package is produced which includes **ALL** of the work to be completed at the site. The tender package will include instructions for the Contractor to attain Minimum Inuit Content (MIC) in his/her workforce, as well as a Minimum Inuit Employment Content (MIEC), as specified in the DND/NTI Economic Agreement.

- The contract will be awarded to the most competitive bidder, who fulfills all of the requirements as stated in the tender package.

- Once the contract is awarded, the successful Contractor can begin plans to start the clean up work.