4. PUBLIC CONSULTATION PROCESS

As part of the DLCU project, public consultations have been carried out in communities across the north since August 1992. In 1992 and 1993, teams from the Department of National Defence and other federal departments conducted a broad range of public consultation sessions to consult the local residents about the project and to obtain input regarding specific concerns about the work.

4.1 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 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 establish a community DEW Line Clean Up 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 Hunters and Trappers Association and other relevant community organizations.

In the summer of 2000, during the delineation investigations for CAM-3, further consultation was conducted to ensure local knowledge was collected and incorporated into the final delineation investigations. Local knowledge is important for uncovering location(s) of contamination that had not been previously assessed, as well as information required for completing the Landfill Risk

Evaluation Matrix for each landfill site. Involvement of the local economy and Inuit representation (Nunavut Tunngavik Incorporated – NTI – technical representative) included discussions with long-time residents and community officials, including Hamlet Assistant Senior Administrative Officer and Chairman of Hunters and Trappers Association, and a site visit by NTI technical representative with a local community representative.

The local community was able to provide much information on past disposal practises. Concerns and comments were gathered and incorporated into the delineation investigation plans and the clean up plans.

The NTI technical representative and the local representative were on site during portions of the delineation work. During this time the NTI technical representative was able to observe the site and note any technical concerns that may have been overlooked by the DND investigation team.

4.2 Initial Public Consultation

DND has sought to integrate the views of all interested stakeholders, including individuals or groups, into the decision making process for the DLCU Project. The approach to public involvement in environmental assessments for this project includes two major elements: adequate public notification and appropriate public consultation.

Public consultation has been used to involve the public in the environmental assessment process through dialogue between northern residents and the project representatives. This dialogue has proved useful in identifying public concerns, needs and values before final decisions on courses of action were made.

The purpose of public notification is to provide information regarding report preparation, community meetings, environmental assessment results, site activities and upcoming decisions.

Public notification has been used mainly for notifying the public of the results of previous environmental assessments.

Public consultation meetings were held in those communities in the vicinity of DEW Line sites. Briefings to government officials were also held in Iqaluit, Cambridge Bay and Yellowknife. Advertisements and information packages were provided in English as well as Inuktitut. Minutes were recorded at each of the meetings and action items passed on to the responsible agencies.

4.2.1 1992 Program

Nine communities were visited in 1992 including: Qikiqtarjuaq; Clyde River; Igloolik; Hall Beach (Sanirajak); Taloyoak; Kugaruuk; Gjoa Haven (Ursuqtuq); Kugluktuk; and Cambridge Bay (Ikaluktutiak).

The primary objectives of the initial meetings were to:

- Provide general information to the community regarding the status and schedule for the project;
- Provide information regarding the process for closure and cleanup of the DEW Line;
- Present environmental information regarding the DEW Line Clean Up (DLCU) Protocol adopted for the project;
- Provide general information regarding the demolition/disposal of facilities;
- Obtain information regarding public concerns through discussions at the meetings and through questionnaires; and
- Obtain information regarding local labour and contracting capabilities to assist in developing implementation strategies.

A report prepared by the project management team outlined the information provided to the public and summarised questions/concerns that arose during the meetings.

A variety of questions and concerns were raised regarding all aspects of the project; however, almost half of the questions and concerns dealt with employment opportunities and environmental impact and protection. There is a serious desire among the people in the communities to obtain training and to be involved in the clean up of the sites. The issue of environmental impact and protection was expressed as concern about the short and long-term impact on the food chain. Perhaps the most serious concerns expressed centred on previous disposal practices, particularly ocean dumping.

The appearance of the sites, particularly those adjacent to communities, was also raised during the meetings. The proposed cleanup protocol was generally accepted to be the most practical.

In general, the meetings were well attended, the project team was well received and discussions were wide ranging and lively. People seemed to appreciate the initiative taken by DND to inform the communities regarding the DLCU project and the public provided valuable insights. In some cases the community expressed unrealistic expectations regarding the economic impact of a one-time project and it was important to correct these.

4.2.2 1993 Program

The same nine communities in the Nunavut Settlement Area visited in 1992 were revisited in May and June 1993. The objectives for this second round of meetings were as follows:

- Update the communities on the current status of the project;
- Present information on the site investigations and the 80% Design Submission for ten DND DEW Line sites studied in 1992;

- Provide clean up protocol information on the remaining 11 DND DEW Line sites surveyed in 1992;
- Present information on the plans for the 21 DEW Line sites; and
- Request suggestions and ideas regarding community concerns with the cleanup plans.

The questions and concerns raised by the public were similar in nature to those expressed during the 1992 meetings. Community members were predominantly concerned about employment, business and training opportunities as well as environmental protection and impact to the food chain.

Generally public concern on the aforementioned issues was alleviated through these consultation sessions.

4.2.3 1994 Program

In 1994, public consultation focused on the involvement of both the territorial government and the recently formed Inuit organizations. Two meetings were held in late 1994 with Nunavut officials in Cambridge Bay (Kitikmeot Inuit Association/Nunavut Tunngavik Incorporated joint meeting and Nunavut Planning Commission).

4.2.4 2000 Site Investigation Consultation

In the summer of 2000, during the delineation investigations for CAM-3 further consultation was conducted to ensure local knowledge was collected and incorporated into the final delineation investigations. Local knowledge is important for uncovering location(s) of contamination that had not been previously assessed, as well as information required for completing the Landfill Risk Evaluation Matrix for each landfill site. Involvement of the local community and Inuit representation (Nunavut Tunngavik Incorporated (NTI) technical representative) included discussions with long time residents and community officials, including Hamlet Assistant Senior

Administrative Officer and Chairman of Hunters and Trappers Association; and a site visit by an NTI technical representative with a local community representative.

The local community was able to provide much information on past disposal practices. Concerns and comments were gathered and incorporated into the delineation investigation plans and the clean up plans.

The NTI technical representative and the local representative were on site during portions of the delineation work. During this time the NTI technical representative was able to observe the site and note any technical concerns that may have been overlooked by the DND investigation team. A report detailing the observations of the NTI while on-site at CAM-3 is provided in Appendix IV.

4.2.5 2004 Pre-construction Consultation

A meeting was held on April 27, 2004 in Taloyoak to review the program with the local people and was well-attended. All components of the work program were reviewed, as were details of the training program for local people. Questions asked at the meeting related to the training program, how much work is going to be available, the status of the buildings on-site and the landfarm operation. A copy of the presentations and questions/answers is in Appendix IV.

4.3 DND/NTI Project Review Committee

As part of the Agreement between the Department of National Defence and Nunavut Tunngavik Incorporated (Appendix III), there are regularly scheduled meetings between these two organizations. These meetings, which involve senior management from both organizations, are designed to provide a regular forum to discuss the clean up program within the Nunavut Settlement Area and to resolve concerns relating to environmental and/or socio-economic issues.

5. IMPLEMENTATION AND DESIGN/ENGINEERING

The clean up plans and procedures are outlined in the following sections. Selected photographs of the clean up areas at CAM-3 are in Appendix II.

5.1 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.

- **Sealift transport** - it is anticipated that contractors will utilise sealift to transport bulk materials and equipment (vehicles, heavy equipment, etc) to/from CAM-3. This would potentially result in the increase in sealift traffic by one or two sailings per year (one early and one late summer). Otherwise, no additional vessel traffic is anticipated.

- **Land Transport** – it is anticipated that overland transport will be required between the beach landing area and the Station Area via existing roads for mobilization/demobilization of materials and equipment.

5.2 Development of Borrow Areas

Approximately 150,000 cubic metres of granular material is required for the clean up. Granular material 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 Soil Disposal Facility. Table 5-1 outlines the borrow areas and potential gravel volumes to be extracted from each area.

Table 5-1: Summary of Granular Material Requirements from CAM-3 Borrow Areas

Borrow Area	Estimated Quantity of Granular Material (m^3)
1	30
2	12,000
3	33,000
4	22,000
5	12,000
6	6000
7	10,000
8	50,000
9	13,500
10	2000
11	2000
12	4500

5.3 Contaminated Soil Disposal Requirements

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

The locations of the contaminated soil areas are shown on the Drawings in Appendix I.

5.3.1 Contaminated Soil Types

There are a variety of contaminated soil types that require disposal at CAM-3. Table 5-3 at the end of this section provides a matrix outlining the disposal requirements for each type of contaminated soil. Definitions of the types of contaminated soils potentially found at the CAM-3 site are as follows:

DCC Tier I Contaminated Soil: soils containing concentrations of any or all contaminants listed as follows: Lead – 200 to 500 ppm; PCBs - 1 to <5 ppm.

DCC Tier II Contaminated Soils: Soils containing concentrations equal to or in excess of any or all of the contaminants listed as follows:

Table 5-2: DCC Tier II Contaminant Criteria

Arsenic	30 ppm
Cadmium	5 ppm
Chromium	250 ppm
Cobalt	50 ppm
Copper	100 ppm
Lead	500 ppm
Mercury	2 ppm
Nickel	100 ppm
Zinc	500 ppm
PCBs	>5ppm to <50 ppm

Hazardous Contaminated Soil: Contaminated soil is classified as hazardous in accordance with the Transportation of Dangerous Goods Act and Regulations (including CEPA and leachable soil).

CEPA Contaminated Soil: Soil containing concentrations of PCBs equal to or in excess of 50 parts per million. Materials contaminated with PCBs at concentration levels equal to or in excess of 50 ppm (mg/kg) are legislated as hazardous materials. Storage, handling and disposal of PCBs are regulated under the Canadian Environmental Protection Act and the Federal Transportation of Dangerous Goods Act. All applicable regulations must be adhered to.

Leachable Soil: Soil containing contaminants that when subject to the leachate test prescribed in the TDGA and Regulations, leaches contaminants in excess of the concentrations listed in Part V of the regulations. Handling and disposal are regulated under Federal, Territorial, and Provincial Regulations. All applicable regulations must be adhered to.

Petroleum Hydrocarbons: Hydrocarbon products include those described by laboratory analyses as lubricating oil and grease, fuel oil, diesel and/or gasoline.

Hydrocarbon Contaminated Soil: Soil containing concentration of Total Petroleum Hydrocarbons (TPH) in concentrations considered to create a risk to the environment.

Type A Contaminated Soil: Hydrocarbon contaminated soil in which the primary petroleum hydrocarbon product present in the soil as determined by laboratory analysis consists of lubricating oil and grease. For remedial purposes, Type A contaminated soil shall be treated as Tier I contaminated soil containing hydrocarbon contamination.

Type B Contaminated Soil: Hydrocarbon contaminated soil in which the primary petroleum hydrocarbon product present in the soil as determined by laboratory analysis consists of fuel oil, and/or diesel, and/or gasoline.

Type B – Tier I Contaminated Soil: Type B contaminated soil containing concentrations of lead between 200 and 500 ppm and PCBs between 1 and <5 ppm. Type B and combinations of DCC Tier I and Type B contaminated soil shall be excavated and treated on site in a landfarm.

Type B – Tier II Contaminated Soil: Type B contaminated soil containing contaminants in excess of DCC Tier II criteria shall be treated as DCC Tier II contaminated soil containing hydrocarbon contamination

Clean Soil: Soil that has been sampled, analysed, and determined to have contaminant concentrations below DCC Tier I contaminant levels, TPH less than 2500 ppm, and lead and PCBs at concentrations of less than 200 ppm and 1 ppm, respectively.

Table 5-3: Contaminated Soil Disposal Requirements

Designation / Co-Designation	Tier I	Tier II	Type A	Type B	Hazardous
None (No Co-contaminants)	Non-Hazardous Landfill	Tier II Disposal Facility	Non-Hazardous Landfill	Landfarm	Containerize for off-site transport and disposal by others.
Type A	Non-Hazardous Landfill	Tier II Disposal Facility			Containerize for off-site transport and disposal by others.
Type B	Landfarm	Tier II Disposal Facility			Containerize for off-site transport and disposal by others with hydrocarbon resistant liners.

5.3.2 Tier I Contaminated Soil Disposal Requirements

Soils exceeding Tier I contaminated criteria but not classified as Tier II contaminated soil do not pose a leachate risk and therefore 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 constructions 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. A more detailed description of a NHW Landfill is provided in Section 5.4.1.

5.3.3 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. A number of disposal options/technologies were considered by the DLCU Project team. Of the

options, the most environmentally and economically viable was determined to be the development of engineered Tier II soil disposal facilities. These facilities utilize a double containment system consisting of permafrost to limit leachate generation and synthetic liners to prevent migration of contaminants into the surrounding environment. A detailed description of a Tier II Soil Disposal Facility is in Section 5.4.2.

5.3.4 CEPA Contaminated Soil Disposal Requirements

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 facility. These materials are to be excavated, removed from the site and transported to a licensed disposal facility. Some of the soils may also contain petroleum hydrocarbons – often where lead and PCB contaminants have also occurred as a result of waste oil and/or fuel spills. These hydrocarbons are contained within the soil matrix and do not exist as free liquids which could potentially leach. Leachate testing has also been conducted on 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.

5.3.5 Hydrocarbon Contaminated Soil Disposal Requirements

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. Due to the concern of leachate generation and migration from Type B contaminants, these soils are not

placed in the NHW landfill or Tier II Soil Disposal Facility. 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.

5.3.6 Selection of Contaminated Soil Disposal Facility Locations

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);
- 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 requirements for use of explosives in some extraction activities. In addition to the obvious danger to human health, other possible impacts could include damage to surrounding areas (including water bodies, 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.

5.4 Proposed Construction

Several specialized facilities are to be constructed to dispose of waste generated on site due to the demolition of existing structures, removal of contaminated soil and site debris, and landfill excavation. Only materials exceeding CEPA standards will be disposed of off site.

The new facilities are sited following the completion of the detailed engineering investigation. As new roads will have to be constructed to access these areas, the contractor may be required to make special provisions to protect tundra vegetation. It is also assumed that the contractor will have to provide adequate drainage for all excavations.

5.4.1 Non-Hazardous Waste (NHW) Landfill

The Non-Hazardous Waste (NHW) Landfill is designed on the premise that they will contain non-hazardous materials only and will not generate leachate. Therefore, it is not necessary to eliminate all moisture migration into and out of the landfill. The NHW Landfill is also not designed to maintain the contents in a perennially frozen state.

The following materials are proposed for disposal in the Non-Hazardous Landfill at CAM-3:

- 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
- Double-bagged asbestos.

The NHW Landfill at CAM-3 will consist of a perimeter containment berm and granular cover to minimize erosion and infiltration in order to provide long-term stability. The NHW Landfill will be established on native ground (stripped of any organic matter). No base cover or liner is required for this landfill. Development and closure of the NHW Landfill includes the following work:

- Construction of exterior berms;
- Placement of Tier I contaminated soil and non-hazardous demolition waste and site debris in the landfill;
- Compaction of landfill debris;
- Placement and compaction of intermediate granular cover in the landfill;
- Placement and compaction of final granular cover over the landfill;
- Grading to promote drainage away from the landfill;
- Placement and compaction of intermediate granular cover in the landfill;
- Placement and compaction of final granular cover over the landfill;
- Grading to promote drainage away from the landfill;
- Supply and installation of groundwater monitoring wells in and around the landfill as indicated on the drawings.
- Survey of the locations of the asbestos and creosote-treated timbers.

For further design details of the NHW landfills, please refer to Drawings 104 and 113 in Appendix I.

5.4.2 Tier II Soil Disposal Facility

The design of this facility is based on the characteristics of the contaminants in the soils, the geothermal properties of the area and the local permafrost regime. The design utilizes permafrost as the primary containment barrier – both the Tier II contaminated soil and the Type 4 (wet, silty gravel) perimeter berms are designed to be continuously frozen. Geothermal analysis was conducted to determine the time required for freeze-back of the facility and the long-term thermal regime of the facility. The thickness of the cover material was calculated to prevent thaw of the contaminated soil even after 10 consecutive 1 in 100 warm years.

A high-density polyethylene (HDPE) liner is 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 contaminants during the period required for permafrost aggradation. A second HDPE liner is to be placed over the contaminated soils and seamed to the base liner to prevent precipitation from percolating down through the cover fill and into the Tier II contaminated soils.

A Tier II Soil Disposal Facility is designed to contain contaminated soil exceeding the DCC Tier II Criteria. The development and closure of the Tier II facility at CAM-3 will include the following work:

- Construction of exterior berms with saturated silty gravel;
- Supply and installation of HDPE liners, as indicated on the Drawings;
- Placement of Tier II contaminated soils in the landfill;

- Placement and compaction of intermediate granular cover over the soil;
- Installation of the top HDPE liner;
- Placement and compaction of final granular cover on the landfill;
- Grading to promote drainage away from the landfill; and
- Supply and installation of thermister strings and groundwater monitoring wells in and around the landfill, as indicated on the Drawings.

During construction of this facility, the gradation and the moisture content and the compaction are monitored to ensure the compliance with the design.

Further details on the design of the Tier II Soil Disposal Facility, including the height of the perimeter berms, thickness of cover material and location of monitoring wells can be found in Appendix I on Drawings 104, 109, 114 and 115

5.4.3 Hydrocarbon Soil Treatment Facility

The hydrocarbon contaminated soil treatment facility at CAM-3 consists of a landfarm. The landfarm will be located at least 100 metres away from any water body, and in an area free of ponded water; to provide for the convenient access of equipment; at least 300 metres from the construction camp, offices, and laboratory; and in an area that is relatively free of boulders and that is generally level. Development, operation and closure of the landfarm will involve the following work:

- Ground preparation, such as removal of boulders and placement of granular bedding material, to facilitate treatment options, as required;
- Construction and maintenance of roadways required to support treatment operations;

- Construction of exterior berms and drainage ditches;
- Placement of Type B contaminated soil in the landfarm;
- Placement of Type B contaminated soils co-contaminated with Tier I contaminants in a separate area of the landfarm;
- Specific activities for landfarming operations, including nutrient application, tilling, and moisture conditioning;
- Final grading to promote drainage away from the site and to match the surrounding terrain.
- Supply and installation of groundwater monitoring wells around the perimeter of the landfarm, as shown on the Drawings.
- Closure and removal of all equipment and materials following confirmation that treatment has remediated the contaminated soil.

Excavation of hydrocarbon-contaminated soils is not permitted within 2 m of any watercourse or within 2 m of the high water mark of the intertidal zone.

During the landfarm operation, granular nutrients are to be distributed evenly over the surface of the contaminated soil, at rates that will provide the minimum nitrogen loading. Moisture conditioning of the landfarm will be conducted as required by application of water spray to maintain optimum water content within the soil.

After application of nutrients, the full thickness of the soil is to be tilled. The contaminated soil will be tilled every 10 days. During periods of prolonged warm, dry weather, the tilling frequency will be increased to every 5 days. During periods of precipitation, tilling of the soil will be delayed until the soil is considered damp to a depth of 100 mm.