

Site decommissioning activities will involve the demobilisation of all contractor equipment, camp infrastructure (if used) and materials no longer required at the site. The requirement for the contractor to undertake these decommissioning activities will be a contractual obligation written into the project specifications.

Timetable of Activities

The expected timetable for effecting the clean up, is provided for in the DND/NTI Agreement (Appendix A of Annex D).

It is expected that the clean up of this site will occur during the summer construction period (June - October) each year. Decommissioning of the clean up camp/crew/etc., is expected to occur in the second half of the last construction season.

Off site activities

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

- Air transport - most transportation by air is expected to utilise existing commercial and charter services in and out of each 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 sea lift support to transport bulk materials and equipment (vehicles, heavy equipment, etc) to the sealift beach. 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.

Number of personnel on-site

The total anticipated number of personnel on-site will vary with the size and scope of the clean up. The estimated average number of personnel on-site is 40 personnel. At times these numbers may be increased owing to existing North Warning System requirements.

New technology and methods to be utilised

Development of Tier II Soil Disposal Facilities

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 (estimated at 30,000 m³) would require segregation in a manner which precludes their continued contact with (and thereby

protecting) the Arctic ecosystem. A number of disposal options/technologies were considered by the DEW Line Cleanup Project team; of these, the most environmentally and economically viable was determined to be the development of engineered Tier II soil disposal facilities at specific sites. These facilities utilise a double containment system, consisting of permafrost and synthetic liners which limit leachate generation and prevent contaminant migration.

The Tier II soil disposal facilities are designed to provide a contained facility for the disposal of Tier II contaminated soil. One of the major concerns with respect to the facilities is the possible leakage of contaminants from soils placed in the facility and the potential impact on the surrounding ecosystem and nearby communities. The double containment system developed for the Tier II soil disposal facilities is designed to prevent contents from leaking and migrating into the surrounding environment. The design has been based on the characterisation of the contaminants in the soils and the geothermal properties of the permafrost. Permafrost will provide 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 base as well as the time required to provide adequate permafrost encapsulation. Synthetic liners provide secondary containment. A PVC (polyvinyl chloride) liner will be placed at the base and side slopes of the facility; this liner is chemically compatible with the contaminated soils (i.e. not adversely affected by exposure to hydrocarbons), and will prevent the potential movement of moisture during the period required for permafrost aggradation. The second liner, a geocomposite clay liner (GCL), is to be installed in the cover of the facility, which will prevent drainage from percolating down through the cover fill which might otherwise impact the time required for permafrost freeze-back. The geocomposite clay liner provides the required flexibility for accommodating settlement or disturbance. The GCL consists of a sandwiched composite of geotextiles and bentonite clay.

Careful consideration has also been given to the characterization of waste soils being placed in the Tier II soil disposal facilities. 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 occurred as a result of waste oil and/or fuel spills. These hydrocarbons will be contained within the soil matrix and will not exist as free liquids which could potentially leach. Leachate testing has also been conducted on most of the more highly contaminated soil samples as set forth in *Ontario Regulation 347*.

Another environmental concern during the development of these facilities is the possible requirement of explosives for use 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 authorised personnel in accordance with all required permits, licenses and applicable laws and regulations, and as dictated by regulatory authorities.

Selection of the areas for Tier II soil disposal facility development is based on a number of technical factors including:

- Topography, drainage and geology;
- Minimisation 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.

Future activities

As an environmental clean up project, there are no future uses/activities associated with this project, outside of the ongoing environmental monitoring program agreed to in the DND/NTI Agreement (Appendix H and I of Annex D).

Emergency Response Plan

Contingency plans associated with the clean up of each site are to be outlined in site- specific Environmental Protection Plans (see Annex E for Cambridge Bay). One section of these plans outline generic 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. These plans will enable persons that encounter a particular contingency situation to maximise 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.

Contingency Plan for Alternative Transportation

Given the geographical location of these sites (i.e. no regional road access but, in some cases (Hall Beach, Pelly Bay, Cambridge Bay, Broughton Island) still accessible to a community and airport), the number of technically and economically feasible transportation alternatives becomes limited. The two primary access alternatives, namely sealift and air, are already being utilised.

For two sites (Mackar Inlet and Dewar Lakes, sealift will likely be replaced by Cat trains as these sites are land-locked.

Pollution Control Systems and Environmental Management Procedures

The main focus of the project environmental management program during the clean up is based upon-site specific Environmental Protection Plans (sample in Annex E) and the associated North Warning System spill response plan (Annex F). The requirements outlined in these plans have been the end result of the environmental assessment process and includes those mitigative measures designed to reduce or eliminate potential effects. Disposal methods for solid, liquid or gaseous wastes are shown in this plan.

For the purposes of this project, monitoring is being conducted for two reasons:

Monitoring in relation to the environmental assessment. This monitoring involves a continual on-site review of impact predictions made during the environmental assessment process. The purpose of this monitoring is two fold:

- to confirm the accuracy of impact predictions made if, and when, they occur on-site and to ensure that mitigative action taken is appropriate; and

- to be able to identify impacts that occur on-site that may not have been identified during the assessment process but, none the less, require an appropriate mitigative response.

The results of on-site this assessment of will be reviewed on an annual basis as part of the project quality assurance program. Assessment areas and impact predictions requiring adjustment or re-evaluation are identified at this point and an action plan promulgated.

Monitoring in relation to environmental objectives. As part of the overall DEW Line Clean Up program, DND will undertake an extensive multiple year post clean up monitoring program at each site. This monitoring program is contained in the DND/NTI Agreement (Appendix H and I of Annex D). The purpose of this program will be to ensure that environmental objectives, particularly those related to landfill remediation, continue to be met. The results of this program will be provided to stakeholder organisations. In those cases where agreed to remediation standards are not being maintained, an engineering and/or other solution will be implemented to rectifying the situation.

Project Financing

The clean up of the DEW Line sites in the Nunavut Settlement Area is being financed by the Department of National Defence.

PART 3 - DESCRIPTION OF THE EXISTING ENVIRONMENT SURROUNDING DEW LINE SITES IN THE NUNAVUT SETTLEMENT AREA

As discussed in the section entitled 'Project Components and Alternatives' above, much of the existing environmental conditions along the DEW Line has been based on the studies undertaken by the Environmental Sciences Group (Royal Roads Military College) and the United States Air Force. The purpose of these studies was to provide an overview of the baseline condition of each of the 21 DND DEW Line sites.

This section of the submission will provide an overview of the existing biophysical and socio-economic/cultural environments of the regions surrounding these sites. This section is supplemental to the specific information provided in the environmental assessment reports that accompany this submission.

Description of the Biophysical Environment

Area Ecology

Arctic Archipelago Ecozone

The 15 DEW Line sites in the Nunavut Settlement Area are located within the Arctic Archipelago ecozone. This ecozone, which covers the northern mainland coast of Nunavut (including Boothia Peninsula) as well as the islands to the north of the mainland (i.e., Victoria Island, Jenny Lind Island, King William Island). Biologically, this ecozone is further subdivided into two ecoprovinces, five ecoregions and 21 ecodistricts.

Terrestrial Environment

Flora

Most sites are characterised by undulating hills which are typically well drained and sustain 100 percent vegetation cover. The sloped areas are dominated by *Dryas* spp., grasses, *Salix* spp., and *Cassiope* spp., with lesser amounts of sedges, *Saxifrage* spp., *Empetrum nigrum* and lichens. Low lying organic terrain between hilly areas are dominated by sedges and *Equisetum* spp., with lesser amounts of grasses, *Dryas* spp., and *Salix* spp.

Flat areas are often characterized by organic terrain with numerous small pools of water. The vegetative cover in this area is typically 100 percent and comprised of grasses, sedges, *Salix* spp., *Vaccinium vitis-idaea*, *Ledum palustre*, *Dryas* spp., and *Betula* spp.

Disturbed areas at these sites have variable degrees of vegetative cover consisting of grasses, *Dryas* spp., and *Salix* spp. Areas down-gradient from the sewage outfall areas are dominated by sedges with incidental occurrences of *Dryas* spp., *Salix* spp. and *Senecio congestus*.