7. DESCRIPTION OF THE ENVIRONMENT

Environmental conditions at PIN-3 were documented by UMA (1991) and RRMC (2001). Those environmental components potentially impacted by, or influencing cleanup operations are summarized below. Detailed descriptions of the biophysical environment are given in UMA (1991).

7.1 General Geography and Geology

The PIN-3 site is 15m above sea level and is adjacent to the shores of Dolphin and Union Straits near the Coronation Gulf.

The landscape surrounding the PIN-3 station is generally subdued with numerous water-filled depressions throughout. Surface materials consist of sand-, gravel-, and cobble sized rubble derived largely from the underlying bedrock. A thin veneer of organic rich muds or silts typically overlie these materials within depressional areas. No bedrock is exposed in the region, however, the area is underlain by a 900 m thick succession of gently dipping to flat-lying succession of Early Palaeozoic dolostones which regionally, unconformably overly Precambrian basement rocks (UMA et al. 1991).

Surface drainage on PIN-3 is directed down from the DEW Line station in a quasi-radial pattern, north-northeast through west to south-southeast, towards the sea. The beach ridges tend to be perpendicular to the general slope of the peninsula and so have been breached by watercourses in many locations. Most of the beach ridges north of the station are aligned upon northeast-southwest axes, while those south of the station tend to follow northwest-southeast alignments. The water supply lake, the largest body of water on the peninsula, is located immediately east of the station.

7.2 Flora

Towards the north and west of the station vegetation is sparse but is more continuous in the sheltered or leeward areas. Willow (Salix arcticas), sedge (Carex spp.), mountain avens (Dryas octopetala), saxifrage (Saxifraga spp.), lousewort (Pedicularis spp.), and polar grass (Arctargrostis

latifolia) occur on drier, upland sites. Cotton grass (Eriophorum spp.), willow (Salix spp.), sedges, grasses and mosses are commonly associated with moist sites. Bistort (Senecio congestus) was found around the sewage outfall and at brackish sites near the beach area which is its typical habitat across the Arctic (UMA et al. 1991). Arctic poppy (Papaver radicatum) occurs sporadically in the area. On dry, upland sites that had previously been disturbed, such as landfills and roads, Oxytropus spp., willows, grasses, and occasionally Arctic poppy were found.

7.3 Fauna

7.3.1 Terrestrial Mammals

- Muskoxen (Ovibos moschatus) have been observed on an infrequent basis. These animals are hunted by residents of Holman and Cambridge Bay following an allotted quota.
- Peary Caribou (Rangifer tarandus pearyi) occur on Lady Franklin Point throughout the year (UMA et al. 1991). These animals have been observed feeding across the site.
- Polar bear (Ursus maritimus) records of encounters at this station were not available (UMA et al. 1991). Regardless, it appeared that such incidents were rare particularly when compared to the eastern DEW-line sites (UMA et al. 1991)
- Grizzly bear (U. arctos horribilis) and black bears (U. americanus) were not reported by station personnel.
- Arctic fox (Alopex lagopus) have been sighted in the immediate vicinity of the station. These animals are attracted to artificial food sources (landfill and litter). A careful search of the station (within 1 km) did not reveal any active den sites although suitable habitat exists (UMA et al. 1991).
- Arctic hare (Lepus arcticus andersoni) have been observed amongst the buildings and droppings in the vicinity of the station indicated that the species is common.

- Small mammals were not observed at this site although burrows indicated that collared lemming (Dicrostonyx torquatus kilangmiutak), brown lemming (Lemmus sibiricus), or sik-sik (Spermophilus parryii) may occur (UMA et al. 1991).

- Observations or reports of other furbearers at PIN-3 were not evident. Densities of wolves within the Territory of Nunavut are believed to be lowest on Victoria Island and the Queen Elizabeth Islands (UMA et al. 1991). The short tailed weasel (Mustela erminea) is known to occur throughout Canada (UMA et al. 1991) and probably in the area.

7.3.2 Marine Mammals

- Any sightings of beluga whales (Delphinapterus leucas), narwhals (Monodon monoceros), bowhead whales (Balaena mysticetus), harp seals (Phoca groenlandica) and the walrus (Odobenus rosmarus) are unlikely in the Lady Franklin Point area due to migration routes.

- Distributions of bearded and ringed seals (Phoca hispida & Erignathus barbatus) have been observed at Lady Franklin Point. In general, on south Victoria Island, 99 percent of seal sightings comprise ringed seals (UMA et al. 1991) and they are hunted regularly during spring and summer (UMA et al. 1991).

7.3.3 Birds

- Snowy Owls (Nyctea scandiaca), Peregrine falcon (Falco peregrinus), Gyrfalcon (Falco rusticolus) and Rough-legged Hawk (Buteo lagopus) have been known to occur on Victoria Island (UMA et al. 1991). It is noteworthy that the density of gyrfalcons breeding on the mainland immediately south of Cambridge Bay (southeast of PIN-3) has been reported as one pair per 125 km2 which approaches the highest in the world (UMA et al. 1991). These areas support high nesting densities of these raptors as well as Golden Eagle (Aquila chrysaetos).

- The sewage lagoon contained Semipalmated Sandpiper (Calidris pusillo), Baird's Sandpiper (C. bairdii), and Northern Phalarope (Lobipes lobatus).
- Lapland Longspur (Calcarius lapponicus) and Horned Lark (Eremoplila alpestris) were observed on drier sites as were Snow Bunting (Plectrophenax nivalis).
- Upland sites were being used by nesting Black-bellied Plover (Charadrius semipalmatus), Lesser Golden Plover (P. dominica) and Semipalmated plover (Charadrius semipalmatus).
- Arctic Tern (Sterna paradisaea) were found nesting approximately 3 km from the station but not in the immediate vicinity.
- No Ptarmigan (Lagopus sp.) were observed at this site but droppings and snow roosts were found throughout the area.
- Sabine's Gull (Xema sabini) are known to nest along the south coast of Victoria Island (UMA et al. 1991) but were not observed during the site visit.
- Glaucous gull (Larus hyperboreus) and Norther Raven (Corvus corax) were common and tended to roost on the facilities or at the landfill areas.
- There were infrequent sightings of Parasitic Jaeger (Stercorarius parasiticus) during the site visit.

7.3.4 Fish

- Stewart and Bernier (1983) have reviewed the aquatic resources of Victoria Island and reported finding the following species: anadromous Arctic char (Salvelinus aplinus), lake trout (Salvelinus namaycush), least cisco (Coregonus sardinella), Arctic cisco (C. autumnalis), lake whitefish (C. clupeaformis), fourhorn sculpin (Myoxocephalus quadricornis), and the

ninespine stickleback (Pungitius) (UMA et al. 1991). Both communities on Victoria Island fish arctic char commercially.

7.4 Heritage Resources

Nine historical resource sites were identified during the site visits. One of these sites is a Thule village with associated midden and burials. Three of the other sites contain tent rings and caches. One site is represented solely by caches and another contains caches and graves. The remaining site consists of house remains and caches, potentially Thule in affiliation.

7.5 Socio-Economic Setting

Kugluktuk (formerly Coppermine) and Cambridge Bay are the closest communities to the site. Kugluktuk is 115 km to the southwest and Cambridge Bay is 325 km to the southeast. The closest community with an aircraft charter base and a full range of commercial and public services is Cambridge Bay. Access to PIN-3 is limited to aircraft charter which typically originate in Cambridge Bay. The station is supplied by barge annually. Ice conditions limit access by water to the period from the beginning of August to the middle of September.

It is expected that, for the short term in particular communities and the longer term (i.e. approximately 20 years), a significant number of person-years of employment will be generated as a result of this project. Additionally, further enhancement of the area's economy is expected resulting from increased local purchases and use of local businesses. Optimization of Inuit involvement in the clean up is the subject of on-going negotiations between NTI and DND, and will include minimum levels in the contract for Inuit labour and business participation. This agreement, which will meet the requirements under the Nunavut Land Claims Agreement, is expected to be completed in the fall on 2001.

7.6 Native Land Use

It is recognized that hunting and the relationship to the land are of profound cultural and spiritual importance to the Inuit. Hunting itself provides a means for linking modern day lifestyles and culture with the past. Hunting is valued by the Inuit as it contributes to both independence and community well-being.

No special conservation land status has been designated at this site. However, ringed seals are hunted regularly during spring and summer and Arctic char is fished commercially by both communities on Victoria Island.

7.7 Valued Ecosystem Components

The Valued Ecosystem Components (VEC's) identified for this Project include:

7.7.1 Physical

- Protection of Permafrost soils; and
- Surface water, particularly related to the drinking water supply.

7.7.2 Biological

Tundra habitat including:

- Feeding and nesting areas for birds;
- Feeding areas for herbivores;
- Feeding and calving areas for caribou, bears and muskoxen;
- Local vegetation; and
- Local wildlife.

7.7.3 Socio-economic

- regional employment opportunities;
- regional business opportunities;
- regional training opportunities; and
- hunting and fishing in local area.

7.7.4 Archaeological, Historical and Cultural

- archaeological sites identified around the station.

8. PUBLIC CONSULTATION PROCESS

As part of the DEW Line Clean Up project, public consultations were 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 public consultation sessions to consult the local residents about the project and to obtain input regarding specific concerns about the work.

8.1 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 public notification is to 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.

8.1.1 1992 Program

Nine communities were visited in 1992:

- Broughton Island
- Clyde River
- Igloolik
- Hall Beach
- Taloyoak (Spence Bay)
- Pelly Bay
- Gjoa Haven
- Kugluktuk (Coppermine)
- Cambridge Bay

The following were the primary objectives of the initial meetings:

- 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.

There were 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 a concern raised during the meeting. 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.

8.1.2 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 1993;
- Present information on the plans for the 21 DIAND 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.

8.1.3 1994 Program

In 1994, public consultation focused on the involvement of both the territorial government and the recently formed Inuit organisations. 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).

8.1.4 1996 Program

In 1996, the DLCU project resumed its public consultation program by holding public meetings at those communities closest to the sites undergoing clean up in 1996. Within the Nunavut Settlement Area, the communities of Broughton Island and Clyde River were invited to participate in a public meeting discussing upcoming DEW Line Clean Up activities at the FOX-4 Cape Hooper DEW Line site (approximately 160 km west of Broughton Island).

8.1.5 1997 Program

The DLCU project office followed up on the 1996 community visits in cases where there was local interest to do so. Both Clyde River and Broughton Island hosted a public information session. These meetings focused on providing planning details as to the upcoming work at the FOX-4 site. Community interest continued to be high, especially in the area of employment opportunities, environmental protection and salvage opportunities.

8.1.6 Pre-Construction Public Consultation

In the summer of 2000 and 2001, during the delineation investigations for PIN-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
- site visit by 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.

A copy of the April 25, 2001, meeting minutes have been included in Appendix V.

The NTI technical representative and the local representative were on site during 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.

8.2 DND/NTI Project Review Committee

As part of the Agreement between the DND and Nunavut Tunngavik Incorporated, there are to be regularly scheduled meetings between these two organizations. These meetings, which will 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.

9. IDENTIFICATION OF ENVIRONMENTAL EFFECTS

As part of this environmental assessment for the PIN-3 DEW Line site clean up, potential interactions between the project components and the environment were identified. The focus of the assessment was on the location, sensitivity, seasonal presence and abundance of these components (i.e. bird nesting areas). Through this assessment Valued Ecosystem Components were identified, which can include physical, biological, socio-economic, historical or cultural components.

9.1 Environmental Effects

9.1.1 Value Ecosystem Components vs Project Components

Table 4 summarizes the interaction and potential impacts between Valued Ecosystem Components and the various activities associated with the clean up.

Table 4: Value Ecosystem Components vs Project Components

VEC	Activity	Description of Impact
Air Quality	Hazardous Materials Removal	The removal of the contaminated soil from the environment will reduce the risk of impacting air quality.
	Site Grading / Borrow Source Development	The extractions of granular materials and grading activities have the potential to create dust and impact air quality.
Soil Quality	Landfill Development/ Landfill Closure	The migration of leachate from the new landfills and the Main, NWS, North, South and South Beach landfills has the potential to degrade soil quality.
	Contaminated Soil Disposal / Hazardous Materials Removal	The removal of the contaminated soil from the environment will improve soil quality.
	Removal and Transport of Hazardous Material, Fuel and Contaminated Soil	The potential exists for accidental release of hazardous materials (including contaminated soil). An accidental release could impact the local environment, including soil and water quality.

Table 4: Value Ecosystem Components vs Project Components
(Continued)

VEC	Activity	Description of Impact
Soil Quality	Contractor Support	The operation of the construction camp will include treatment and disposal of waste. The potential exists for waste to impact the environment, including soil quality.
Water Quality	Landfill Development/ Landfill Closure	The migration of leachate from the new landfills and the Main, NWS, North, South and South Beach landfills has the potential to degrade water quality, both surface and ground water.
	Contaminated Soil Disposal / Hazardous Materials Removal	The removal of the contaminated soil and hazardous materials from the environment will reduce the risk of contamination of water (both surface and groundwater) quality.
	Removal and Transport of Hazardous Material, Fuel and Contaminated Soil	The potential exists for accidental release of hazardous materials (including contaminated soil). An accidental release would impact the local environment, including water quality.
	Site Grading/Borrow Source Development	Erosion and sedimentation of waterbodies during grading and gravel extraction activities has the potential to impact water quality.
	Contractor Support	The operation of the construction camp will include treatment and disposal of waste. The potential exists for waste to impact the environment, specifically soil and water quality.
Terrain	Landfill Development	Excavation required for the development or closure the landfills has the potential to degrade permafrost.
	Landfill Closure / Site Debris Disposal	The development of the landfills and removal of site debris has the potential to disturb the existing terrain at the landfill locations.

Table 4: Value Ecosystem Components vs Project Components (Continued)

VEC	Activity	Description of Impact
	Site Regrading	Terrain and drainage to be improved as a result of grading disturbed areas. Previously disturbed areas will blend into the natural environment
	Borrow Source Development	The extraction of granular material will alter the terrain of the borrow area.
	Contractor Support	Movement of contractor's equipment and personnel around the site has the potential to disturb the tundra.
	Contaminated Soil Disposal	The excavation of contaminated soil has the potential to degrade permafrost
Surface Water	Landfill Development/ Landfill Closure	The development and closure of the landfills has the potential to disrupt drainage at the site.
	Site Regrading	Terrain and drainage to be improved as a result of grading disturbed areas.
	Borrow Source Development	The extraction of granular material will alter the terrain of the borrow area and has the potential to disturb drainage.
Noise – Terrestrial Animals	General Clean Up Activities	The use of heavy equipment in various aspects of the clean up including, landfill development and closure, demolition, grading and transportation will increase noise levels, which has the potential to disturb wildlife. Marine transportation to and from the site has the potential to disturb marine mammals.
Terrestrial Animals	Contaminated Soil Disposal/Hazardous Materials Removal	The removal of hazardous materials and contaminated soil from the environment reduces the risk of exposure of terrestrial animals.
Terrestrial Habitat	Landfill Development	Loss of habitat, specifically vegetation as a result of the development of the new landfills in previously undisturbed areas.

Table 4: Value Ecosystem Components vs Project Components
(Continued)

VEC	Activity	Description of Impact
	Facility Demolition	The existing facilities may be used by wildlife as habitat (i.e. nests in structures). The demolition of these facilities has the potential to impact availability of habitat.
	Borrow Source Development	The extraction of granular material will require the disturbance of the ground has the potential to impact terrestrial habitat (including vegetation).
Aquatic habitat and animals	Landfill Closure	The proximity of the South and South Beach landfills to the marine environment has the potential to impact aquatic habitat due to sediment or hazardous materials entering the water. The potential would then exist for impacts on aquatic animals. Conversely, the excavation of landfills in close proximity to the ocean would reduce the potential for impact.
	Site Regrading/ Borrow Source Development	The extraction of granular material and grading adjacent to waterbodies (both fresh and marine) has the potential to impact aquatic habitat due to sediment entering the water. The potential would then exist for impacts on aquatic animals.
Aquatic habitat and animals	Contaminated Soil Disposal/Hazardous Materials Removal	The removal of contaminated soil and other hazardous materials from areas close to waterbodies, reduces the risk of exposure to aquatic animals.
	Removal and Transport of Hazardous Material, Fuel and Contaminated Soil	The excavation of contaminated soil from the beach area has the potential to degrade the aquatic environment in the event of an accidental release and impact aquatic animals due to close proximity to the marine environment.
	Contractor Support	The transportation to/from the site has the potential to disturb aquatic animals.

Table 4: Value Ecosystem Components vs Project Components
(Continued)

VEC	Activity	Description of Impact
Health and Safety	Landfill Closure/ Site Debris Disposal/ Facility Demolition/ Removal and Transport of Hazardous Material, Fuel and Contaminated Soil	The excavation of potential hazardous materials from the landfills, the collection and disposal of potential hazardous debris, the removal of hazardous materials from the facilities and the general handling of hazardous materials has the potential to impact health and safety of workers.
	Contaminated Soil Disposal/Hazardous Materials Removal	The removal of contaminated soil and other hazardous materials from the environment reduces the risk of exposure of people.
Archaeological	General Clean Up Activities	The presence and movement of people around the site has the potential to disturb the archaeological resources identified around the site.
Land Use	General Clean Up Activities	Clean up activities may disturb traditional land use, i.e. hunting and fishing activities that would occur during the summer months.
Aesthetics	General Clean Up Activities	Generally, the clean up, specifically landfill closure, collection of site debris, site grading and demolition of old facilities will improve the aesthetics of the site by removing unsightly debris and restoring the site to a more natural state.
Economy	Contractor Support	The contractor will be required to have a minimum Inuit content in the workforce and subcontractors for the clean up. This will provide employment benefits and related economic benefits.
	General Clean Up Activities	It is likely there will be requirements for training and employment that will benefit the local community.

9.1.2 Impact of the Environment on Project

The implementation of a clean up project, such as the clean up of PIN-3, in an Arctic environment brings with it unique logistical issues. The potential exists for delays in the clean up associated with bad weather. These delays may include work stoppage on-site or delays in the transportation to and from the site of personnel and supplies. Conditions related to the Arctic climate, such as ice and frozen ground may also delay clean up activities. Ice may delay marine transport to and from the site. Clean up activities which are best completed at maximum thaw may be delayed depending on seasonal climate changes.

10. IDENTIFICATION OF CUMULATIVE ENVIRONMENTAL EFFECTS

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

- Physical or chemical transport mechanisms;
- "Nibbling loss" (i.e. gradual disturbance);
- Spatial or temporal crowding;
- Growth induction initiated by the project.

10.1 Analysis of Cumulative Environmental Effects

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

10.1.1 Scoping

Scoping includes the identification of issues of potential concern, VEC's that could be affected and boundary setting. The activities considered included the operation of the PIN-3 North Warning System Short Range Radar site.

The spatial boundaries included impacts over a larger (regional) area including the crossing of jurisdictional boundaries. As the landfills will remain on site, temporal boundaries extended beyond the time frame required to complete the clean up work.

10.1.2 Analysis of Effects

The analysis included an evaluation of baseline data and possible effects on VEC's. The combined interactions between the clean up activities and future land use and those Valued Ecosystem Components (VECs) which are similar were identified.

10.1.3 Mitigation Measures

Mitigation measures were identified for project-environment interactions.

10.1.4 Significance

The interactions are defined as having a low (L), moderate (M) or high (H) probability of occurring. The next step is to determine the likelihood of significant adverse effects, taking into account appropriate mitigation measures.

10.2 Identification of Mitigation Measures and Residual Impacts

Mitigation measures were identified that would result in a reduction or elimination of likely environmental effects, including potential adverse effects, associated with the clean up. Mitigation measures are outlined in the DLCU Environmental Protection Plan (EPP) for PIN-3 (Appendix II). The EPP forms part of the contract documents and requires all on-site personnel to adhere to the mitigation measures outlined.

Table 5 summarizes the mitigation measures identified for the potential adverse environmental impacts detailed above. Taking into account the mitigation measures, the significance or anticipated residual impacts were identified for all potential adverse impacts.

Table 5: Mitigation Measures & Residual Impacts

Impact	Mitigation Measure	Significance
The extractions of granular materials and grading activities have the potential to create dust and impact air quality.	Implement dust control measures. Used oil will not be used for dust suppression.	Not significant.
The migration of leachate from the existing and new landfills has the potential to degrade soil and water quality.	New facilities will not include hazardous materials. Main landfill and Tier II facilities will incorporate leachate containment, which includes synthetic liner and freezeback of permafrost. Grade cover to promote surface run-off. Site facilities away from natural drainages.	Not significant due to design criteria for landfill development and closure.
The potential exists for accidental release of hazardous materials (including cont-aminated soil). An accidental release would impact the local environment, including soil and water quality.	Implement proper handling, storage and transportation procedures for hazardous materials. All workers to be trained in proper handling procedures for all hazardous materials on site. Do not store hazardous materials, including fuel, on beach. Prepare spill contingency plans. Ensure all materials and equipment to implement contingency plans are available on-site. Handle all fuel in accordance with EPP.	Significant impacts are not likely provided mitigation measures are implemented.

Table 5: Mitigation Measures & Residual Impacts
(Continued)

Impact	Mitigation Measure	Significance
The operation of the construction camp will include treatment and disposal of waste. The potential exists for waste to impact the environment, including soil and water quality.	Do not dispose of hazardous materials in camp waste system. Disposal of all sewage to be in accordance with applicable regulations and guidelines. Dispose of domestic waste as per EPP.	Not significant.
Erosion and sedimentation of waterbodies during grading and gravel extraction activities has the potential to impact water quality.	Prevent siltation by use of berms or silt fences. Do not operate equipment within the wetted perimeter. Disturbed areas adjacent to water to be re-stabilized and re-vegetated if required.	Significant effects not likely provided mitigation measures are implemented.
Excavation required for the development or closure of the landfills and contaminated soil excavation has the potential to degrade permafrost.	Minimize time permafrost is exposed. Minimize surface area of exposed permafrost or active zone.	Not significant.
Disturbance of the terrain and drainage due to extraction of granular material, the development and closure of the landfills, movement of contractor's equipment and personnel around the site and removal of site debris.	Regrade and reshape disturbed areas to match existing terrain and drainage paths. Use existing roads for movement around the site.	Not significant provided mitigation measures are implemented.

Table 5: Mitigation Measures & Residual Impacts (Continued)

Impact	Mitigation Measure	Significance
The use of heavy equipment in various aspects of the clean up including, landfill development and closure, demolition, grading and transportation, will increase noise levels, which has the potential to disturb wildlife. Marine transportation to and from the site has the potential to disturb marine mammals.	Survey for wildlife concentrations. Avoid known wildlife colonies or bird nesting areas. Employ minimum distance/ height restrictions for transportation activities.	Mitigation measures to be implemented to minimize noise impacts in event of wildlife on site.
Loss of habitat, specifically vegetation as a result of the development of the new landfills and the extraction of granular material in previously undisturbed areas.	Regrade and reshape the disturbed areas to match existing terrain to facilitate recovery of ecosystem components. Re-vegetate where required.	Not significant.
The existing facilities may be used by wildlife as habitat (i.e. nests in structures). The demolition of these facilities has the potential to impact availability of habitat.	Inspect facilities prior to demolition for use by wildlife. Do not demolish while birds are nesting. Contact appropriate wildlife officer for additional guidance to ensure disturbance of wildlife is minimized.	Not significant.

Table 5: Mitigation Measures & Residual Impacts
(Continued)

Impact	Mitigation Measure	Significance
Impact on aquatic habitat due to sediment and/or hazardous materials entering an aquatic environment from activities such as closure of South Beach landfill, the extraction of granular materials, grading and handling of contaminated soil and other hazardous materials The potential would then exist for impacts on aquatic animals.	Visually inspect aquatic habitat for fish and marine mammals prior to work beginning. Avoid work during periods of wildlife concentrations. Implement mitigation measures to prevent deleterious substances from entering the aquatic environment.	Significant effects not likely provided mitigation measures are implemented.
The transportation to/from the site has the potential to disturb aquatic animals.	Obtain information regarding wildlife concentrations in work areas. Cease transportation activities during periods of wildlife concentrations. Transportation of any hazardous materials to be in accordance with Transportation of Dangerous Goods Regulations. Follow designated routes for shipping activities.	Significant effects not likely provided mitigation measures are implemented.

Table 5: Mitigation Measures & Residual Impacts (Continued)

Impact	Mitigation Measure	Significance
The excavation of hazardous materials from the landfills, the collection and disposal of hazardous debris and the removal of hazardous materials from the facilities and general handling of hazardous materials has the potential to impact health and safety of workers.	Develop and implement a comprehensive health and safety plan. Workers are to wear and use appropriate personal protective equipment. Workers to be trained in use of personal protective equipment and proper handling procedure for hazardous materials. Proper procedures for working around heavy equipment to be implemented.	Significant effects not likely provided mitigation measures are implemented.
The presence and movement of people around the site and Victoria Island has the potential to disturb archaeological resources in the area.	Clearly mark archaeological resources. Avoid resources. Contact authorities in the event a new resources is discovered or a known resource is disturbed.	Not significant.
Clean up activities may disturb traditional land use, hunting and fishing activities that would occur during the summer months	Contact local hunters and trapper organization to coordinate clean up activities and traditional land use.	Not significant.

11. ABANDONMENT AND DECOMMISSIONING PLAN

The contract documents for the DLCU Project will require the contractor to clean up and remediate the area in which their activities took place. Following the completion of clean up activities, all vehicles and equipment, remaining fuel, supplies, and construction camp are to be removed from the site by the contractor. The construction specifications provide for a percentage of the payment for mobilization/demobilization to be withheld pending a satisfactory withdrawal from the site.

The contractor will be required to arrange for demobilization, which usually coincides with the annual sealift. All provisions of the EPP will be strictly adhered to until the demobilization is complete.

12. MONITORING AND MAINTENANCE PLANS

12.1 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 prepared.

12.2 Monitoring in Relation to Environmental Objectives

As part of the overall DLCU 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. The purpose of this program will be to ensure that environmental objectives, particularly those related to landfill remediation, continue to be met. The specific tasks related to the monitoring of each landfill are based on the associated risk. A site specific monitoring plan will be developed upon completion of the clean up.

The Environmental Working Group will review the results of each monitoring event and provide recommendation to the Steering Committee. In those cases where to remediation standards are not being maintained, an engineering and/or other solution will be implemented to rectify the situation.

13. CONCLUSIONS AND RATIONALE

The overall impact of cleanup activities at PIN-3 will be the physical restoration of the site to its quasi-natural state (including drainage), the mitigation of the potential effects contaminants and hazardous materials on human and ecosystem health, and the northern economic benefits gained from the employment of workers and contractors from nearby communities during cleanup operations.

Some of the proposed cleanup activities have the potential to impact adversely on the environment – particularly, breeding and foraging habitat for a number or Arctic birds and mammals, and human and ecosystem health. Nevertheless, the integration of proper mitigation procedures that will be established in the environmental protection plan and the positive impacts indicated above will more than outweigh the potential negative effects in the long term, in addition to facilitating the restoration of ecosystem components lost during cleanup and previous site activities.

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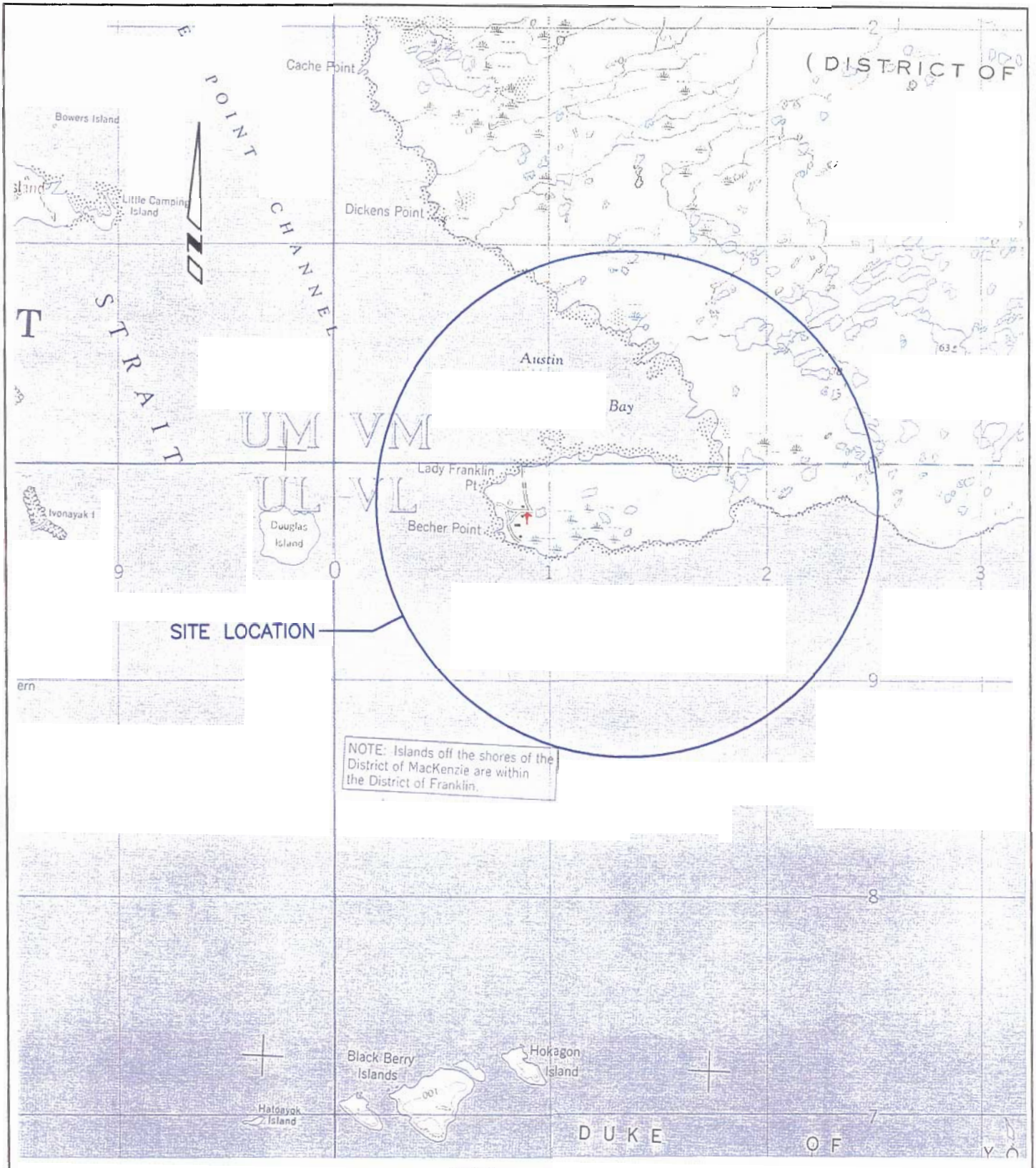
APPENDIX I

Figures



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SCALE

REFERENCE FROM 1957 MAP, CAPE KRUSENSTERN, EDITION 1
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METRIC

NUNAVUT TERRITORY

PIN-3
LADY FRANKLIN POINT
SITE LOCATION PLAN

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