Valued Ecosystem Components

Valued Ecosystem Components (VEC's) are detailed in the environmental screening report included with this submission and include:

Biological

- Tundra provides feeding and/or denning habitat for lemming, Arctic hare, fox and potentially caribou.
- Marine mammals off coast.

Social / Economic

- Traditional land use - fishing off coast
- Regional employment/business/training opportunities.
- Archaeological sites identified in site vicinity.
- Aesthetic value
- Human health and safety.

Physical

- Protection of permafrost soils
- Surface water quality.

DESCRIPTION OF THE PUBLIC CONSULTATION PROCESS

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

In 1998, during the pre-construction delineation investigations at Broughton Island (FOX-5) a community meeting was held to update the residents on the status of the clean up and to exchange information with technical personnel involved with the delineation investigations.

Initial Public Consultation

During the public consultation process, meetings were held in those communities in the vicinity of DEW Line sites. Briefings to government officials in Iqaluit, Cambridge Bay and Yellowknife were also held. Advertisements, information packages and translation services 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.

For the DEW Line Clean Up project, DND has sought to integrate the views of all interested stakeholders, including individuals or groups, into the decision making process undertaken by the Department of National Defence. For this project, the approach to public involvement in environmental assessments includes two major elements:

- adequate public notification; and
- appropriate public consultation.

For DEW Line Clean Up, public notification has been used as a secondary source of public consultation, using a one-way exchange of information with the public. The purpose of this particular process is to provide notification of report preparation, decisions that are made and actions that have been or are planned to be taken. For this project, this particular methodology has not been considered 'participation'. Public notification has been used mainly for notifying the public of the results of previous environmental assessments.

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.

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 main goals in 1992 were to present the base clean up protocol and plan as well as hear suggestions and ideas from the public. The objectives of the initial meetings included the following:

a. Provide general information to the community regarding the status and schedule for the project;
b. Provide information regarding the process for closure and cleanup of the DEW Line;
c. Present environmental information regarding the DEW Line Clean Up (DLCU) Protocol adopted for the project;
d. Provide general information regarding the demolition/disposal of facilities;
e. Obtain information regarding public concerns through discussions at the meetings and through questionnaires; and
f. 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 which arose during the meetings.

Many questions and concerns were raised regarding various aspects of the project and almost half of these dealt with two main areas: 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 second major 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 a concern. The proposed cleanup protocol was generally accepted to be the most practical. Some details related to performance of long term monitoring were yet to be worked out. This will be addressed with the site specific monitoring plan.

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 DLCU and the public provided valuable insights into the project. In some cases people have unrealistic expectations regarding the project and it was important to

correct these. In this region of high unemployment it is important to be truthful and not be too optimistic concerning the economic impact of a one time project such as this clean up.

1993 Program

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

a. Update the communities on the current status of the project;
b. Present information on the site investigations and the 80% Design Submission for ten DND DEW Line sites studied in 1992;
c. Provide clean up protocol information on the remaining 11 DND DEW Line sites surveyed in 1993;
d. Present information on the plans for the 21 DIAND DEW Line sites; and
e. Request suggestions and ideas regarding community concerns with the cleanup plans.

Questions and concerns were raised by the public regarding a variety of aspects of this project. While the majority of concerns were in regards to socio-economic effects and benefits (employment opportunities) there was also a concern over the environmental protection measures that were to be employed during the clean up. The residents of these communites have expressed a desire to obtain job training and to be involved with the clean up of these sites. With respect to environmental protection, concern was expressed as to how the clean up of these sites would impact the food chain over the short and long terms. There were a number of concerns over how previous disposal practices, particularly ocean dumping, was conducted and what the effects will be. Another aspect of environmental protection raised by the public was that of aesthetics. Questions were asked about how the sites would look like at the end of the clean up. No major concerns about the effect of the clean up operations were raised.

The issues outlined above were addressed through discussions during the meetings and concerns were alleviated through these consultation sessions. Refer to Annex E for excerpts related to the 1993 public consultation in Broughton Island.

1994 Program

In 1994, public consultation focused on involvement of both the territorial (GNWT) government and 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).

1996 Program

In 1996, the DEW Line Clean Up project resumed its public consultation program by holding public meetings at those communities that would be closest to those 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, located approximately 160 km northwest of Broughton Island.

1997 Program

The DEW Line Clean Up 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.

Pre-Construction Public Consultation

In August 1998, during the delineation investigations for Broughton Island (FOX-5) 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 and 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:

- interview of elders, conducted by the NTI technical representative;
- a community meeting on August 10th, 1998; and
- site visit by NTI technical representative with a local community representative.

Interviews were conducted with the local NTI representative who was a resident of Broughton Island and had worked on the DEW Line for approximately 15 years. He passed on information from his discussion of the clean up with other local people to the NTI technical representative and the DND investigation team. He also assisted with translation during an interview with an elder.

The community meeting was held on August 10th, 1998. Approximately 15 people attended. Concerns and comments were gathered and incorporated into the delineation investigation plans and the clean up plans. These included contaminated areas not previously assessed, information on past disposal practices, and current site and building use.

The NTI technical representative and the local representative were on site for 3 days 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.

Refer to Annex F for further details outlined in the *NTI technical representative report to NTI.*

Future Public Consultation

A community information briefing is planned for late fall or early winter (to be scheduled) in Qitiktarjuaq. The aim of this meeting will be to provide community residents with an overview

of the project in general and of the final details concerning the clean up of the Broughton Island (FOX-5) site.

The community will be invited to form a joint advisory committee with DND. The purpose of this committee, which is expected to typically include the two community representatives and the DND on-site representatives from the project, is to serve as a forum for addressing local concerns and questions about the clean up during the period when actual activity is taking place. It is expected that this committee will meet monthly during the summer periods.

DND/NTI Project Review Committee

As part of the Agreement between the Department of National Defence and Nunavut Tunngavik Incorporated (Annex B), there are to be regularly scheduled meetings between these two organisations. These meetings, which will involve senior management from both organisations, 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. This Review Committee can be accessed by the local community through NTI or the Regional Inuit Associations.

IDENTIFICATION OF ENVIRONMENTAL EFFECTS

An environmental assessment of the clean up of the Broughton Island (FOX-5) DEW Line site has been completed. As part of this assessment, potential interactions between the project components and the environment were identified. Particular concern was focussed on the location, sensitivity, seasonal presence and abundance of these components (i.e. bird nesting areas). Through this assessment Valued Ecosystem Components were identified. For the purposes of this environmental assessment, Valued Ecosystem Components can be physical, biological, socio-economic, historical or cultural in nature.

Environmental impacts were identified for the clean up of the Broughton Island (FOX-5) DND DEW Line site, as outlined in enclosed environmental screening report (Project Management Office DEW Line Clean Up, 2000).

Biophysical Environmental Effects

Value Ecosystem Components vs Project Components

The following summarize the interaction and potential impacts between Valued Ecosystem Components and the various activities associated with the clean up.

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 Landfill 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 would impact the local environment, including soil and 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, including soil quality.

VEC	*Activity*	*Description of Impact*
Water Quality	Landfill Development/ Landfill Closure	The migration of leachate from the new landfills and the Main Landfill 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 could 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.
	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.
	Contractor Support	Movement of contractor's equipment and personnel around the site has the potential to disturb the tundra.
Surface Water	Landfill Development/ Landfill Closure	The development and closure of the landfills has the potential to disrupt drainage at the site.

VEC	*Activity*	*Description of Impact*
Land Use	General Clean Up Activities	Clean up activities may disturb traditional land use, ie. 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	Although, the NTI/DND Co-operation Agreement (economic provisions) have not been finalized, it is likely there will be requirements for training and employment that will benefit the local community.

The Department of National Defence (DND) and Nunavut Tunngavik Incorporated (NTI) are currently in negotiation for the economic provisions of the DND/NTI Agreement for the Clean Up and Restoration of the DEW Line Sites within the Nunavut Settlement Area. It is anticipated that this agreement will include a Minimum Inuit Content (MIC) for the clean up contract and requirements for training, specifically related to the clean up activities. Generally, the contracts for the clean up of DEW Line site include clauses requiring the contractor to maximize Inuit involvement. Inuit involvement in the clean up will include both employment and business (contracting) opportunities.

Typically, labour required for the clean up includes heavy equipment operators and general labourers, as well as environmental and engineering specialists. Other opportunities include cleaning and cooking staff and transportation.

Effects from the clean up will be felt primarily by the community of Qitiktarjuak. During the clean up there will likely be increased employment and business opportunities for members of the community. As the contract for the clean up of FOX-5 has not been awarded, the requirements of the community are not confirmed.

It is likely that a self-sufficient temporary construction camp will be established at the site to accommodate contractor and other personnel.

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.

An analysis of cumulative environmental effects has been undertaken for this project. In doing so, four steps have been undertaken to date:

1. Scoping.

Scoping for cumulative impacts includes identifying issues of potential concern, Valued Ecosystem Components (VEC's) that could be affected and setting of boundaries.

The activities considered included the operation of the FOX-5 North Warning System Short Range Radar site and existing Hamlet operations.

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.

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.

3. Mitigation Measures

Mitigation measures were identified for project-environment interactions.

4. Significance

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

According to discussions with the Hamlet SAO, there are no major projects planned or underway which need to be considered for cumulative effects. The only activity expected to contribute to the assessment of cumulative impacts is the on-going operations and maintenance of the FOX-5 Short Range Radar Site.

Operation of FOX-5 North Warning System Short Range Radar (SRR)

In general, impacts will be limited to upper site where the SRR is located. However, there are fuel storage tanks located at the beach area. Activities associated with the operation of the SRR include:

- handling and storage of POL and other hazardous materials
- aircraft transportation
- gravel extraction
- wastewater disposal

Air, Soil and Water Quality

The operation of the SRR requires the use and storage of POL and other hazardous materials. The potential exists for accidental release of hazardous substance to degrade air, soil and water quality. Mitigation measures related to accidental release have been identified by NWSO in a detailed Environmental Protection Plan. Significant impacts are not likely provided identified mitigation measures for DEW Line clean up and operation of NWS SRR are implemented.

Terrestrial Habitat and Aquatic Habitat

Extraction of granular material for maintenance of roads, helipads, etc. has the potential to disturb terrestrial habitat and degrade aquatic habitat (sedimentation). Mitigation measures related to gravel borrow have been identified by NWSO in a detailed Environmental Protection Plan. Significant impacts are not likely provided identified mitigation measures for DEW Line clean up and operation of NWS SRR are implemented.

Terrestrial Animals and Aquatic Animals

Operations at the site may disturb wildlife. Mitigation measures related with wildlife are addressed in the NWSO Environmental Protection Plan. Significant impacts not likely provided mitigation measures for DEW Line clean up and operation of NWS SRR are implemented.

IDENTIFICATION OF MITIGATION MEASURES AND RESIDUAL IMPACTS

Mitigation measures were identified that would result in a reduction or elimination of likely environmental effects associated with the clean up. All potential adverse effects were considered. Mitigation measures are outlined in the DEW Line clean up Environmental Protection Plan (EPP) for FOX-5 (Annex A). The EPP forms part of the contract documents and requires all on-site personnel to adhere to the mitigation measures outlined.

The following 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.

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.	Not significant.
The migration of leachate from the new landfills and the Main Landfill has the potential to degrade soil and water quality.	New facilities will not include hazardous materials. Main landfill, Tier II and PCB 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, landfill closure and monitoring.

Impact	*Mitigation Measure*	*Significance*
The potential exists for accidental release of hazardous materials (including contaminated 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. 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 Section 4.2.3.	Significant impacts are not likely provided mitigation measures are implemented.
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 Section 2.2.3.4 of the 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 in waterways. Disturbed areas adjacent to water to be re-stabilized and re-vegetated.	Significant effects not likely provided mitigation measures are implemented.
Excavation required for the development or closure of landfills has the potential to degrade permafrost.	Minimize time permafrost is exposed. Minimize surface area of exposed permafrost or active zone.	Not significant.

Impact	*Mitigation Measure*	*Significance*
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.
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.	Not significant due to rare occurrences of wildlife on site. 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 signiciant.
The existing facilities may be used by wildlife as habitat (ie. 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.

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 airstrip landfill, the extraction of granular material, 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 for 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.
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 Broughton Island has the potential to disturb archaeological resource in the area.	Clearly mark archaeological resources. Avoid resources. Contact authorities in the event new resources are discovered or a known resource is disturbed.	Not significant.

Impact	***Mitigation Measure***	***Significance***
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.

ABANDONMENT AND DECOMMISSIONING PLAN

The contract documents for the DEW Line Clean Up Project will require that the contractor 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, personnel, and the construction camp are to be removed from the site by the contractor. The construction specifications provide for a percentage of the payment for mobilisation/demobilisation to be withheld pending a satisfactory withdrawal from the site.

Demobilisation will coincide with the annual sealift. The contractor will be required to arrange for this sealift. All provisions of the Environmental Protection Plan will be strictly adhered to until the demobilisation is complete.

MONITORING AND MAINTENANCE PLANS

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. 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. Refer to Annex G for details of the DEW Line Clean Up Landfill Monitoring Plan. 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 recommendations to the Steering Committee. In those cases where remediation standards are not being maintained, an engineering and/or other solution will be implemented to rectify the situation.

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