

responded that there are no recorded archaeological sites within a 15-km radius of the site (J. Ross pers. comm. 2005). The recent history of the site is as a DEW Line facility and scientific research facility.

6.10.2 Archaeological and Heritage Resources Impact Assessment

6.10.2.1 Study Area Boundaries

The spatial boundary for the assessment of the effects of project activities on archaeology and heritage resources is the facility and access route footprint. The temporal boundary is the remediation field-work period as well as the additional monitoring period following completion of the project.

The administrative boundaries for the assessment refer to the jurisdictions within which and for which the assessment is being prepared. In this case, the assessment is being prepared under CEAA and NIRB for review by other federal and territorial departments following the CEAA process with additions to meet the NIRB requirements. Technical boundaries of archaeological and heritage resources assessment are the lack of site-specific information and limited time frame associated with the environmental screening.

6.10.2.2 Identification of Issues, Interactions and Potential Effects

The presence and movement of people around the site has the potential to disturb unrecorded archaeological resources that may be present. Remediation activities also have the potential to expose new sites. Table 6-16 is an environmental assessment matrix for the archaeology and heritage resources VEC.

Table 6-16: Environmental Effects Assessment Matrix: Archaeology and Heritage Resources							
Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	Evaluation Criteria for Assessing Environmental Effects				
			Magnitude	Geographic Extent	Duration/Frequency	Reversibility	Ecological/Socio-Cultural and Economic Context
General Clean Up Activities	Excavation activities at the site have the potential to unearth new artefacts (P).	• N/A					
	Excavation activities at the site have the potential to unearth new artefacts (P).	• N/A					

Definition of Significance
A significant environmental effect of the project activities on archaeology and heritage resources would involve the destruction or disturbance of all or part of an archaeological, historic or palaeontological site considered to be of local, regional, national, or international value. This effect, if not

6.10.2.4 Residual Environmental Effects

No archaeological sites have been identified in the study area. If, during the course of the remediation program, archaeological resources are discovered, the Nunavut Department of Culture, Language, Elders and Youth will be contacted and work will be stopped at that location until an assessment of the find is made and permission to proceed is obtained from the Department.

6.10.2.3 Mitigation

Evaluation Criteria for Assessing Environmental Effects		Project Activity		Potential Positive (P) or Adverse (A)		Mitigation	
Magnitude	Geographic Extent	Duration/Frequency	Reversibility	Ecological/Socio-Cultural and Economic Context	Project Activity	Potential Positive (P) or Adverse (A)	Mitigation
1	1	1	1	N/A	The presence and movement of people around the site has the potential to disturb previously unrecorded archaeological and heritage resources (A).	The Nunavut Department of Culture, Language, Elders and Youth will be contacted if new artefacts or a site are discovered and work will be stopped until the site can be assessed and permission to proceed is obtained from the Department.	1 = Low: e.g., loss of a minor proportion of data at site, local or regional level; after low impact, interpretative capacity of the remains is virtually intact, limited only by loss of minor items and/or features. 2 = Medium: e.g., a proportion of the data at the site, local or regional level is lost but a significant proportion remains unimpacted, after medium impact, the interpretative capacity of the remains is hindered by loss of basic data about cultural descriptions and lifestyles. 3 = High: e.g., a significant proportion of the data at the site, local or regional level is lost; interpretative capacity of the remains following impact is minimal.
2	2	2	2	N/A			
3	3	3	3	N/A			
4	4	4	4	N/A			
5	5	5	5	N/A			
6	6	6	6	N/A			

controlled through mitigative investigation and documentation would result in the permanent loss of part of the non-renewable heritage resource base.

Residual Environmental Effects Summary

Table 6-17 summarizes the residual environmental effects of the project activities on archaeology and heritage resources. Residual effects are assessed as not significant or positive for the remediation activities.

Table 6-17: Residual Environmental Effects Summary Matrix: Archaeology and Heritage Resources			
Phase	Residual Adverse Environmental Effect Rating	Likelihood (of significant adverse environmental effects)	
		Probability of Occurrence	Scientific Uncertainty
General Clean Up Activities	NS/P		
KEY Residual Environmental Effects Rating: S = Significant Adverse Environmental Effect NS = Not Significant Adverse Environmental Effect P = Positive Environmental Effect Probability of Occurrence: based on professional judgement: 1 = Low 2 = Medium 3 = High n/a = effect not predicted to be significant Scientific Uncertainty: based on scientific information, and statistical analysis or professional judgement: 1 = low level of confidence 2 = medium level of confidence 3 = high level of confidence n/a = effect not predicted to be significant			

6.10.2.5 Summary of Environmental Effects on Archaeology and Heritage Resources

The presence and movement of people around the site has the potential to disturb the archaeological and heritage resources that may be present. In the event that a new resource is discovered, the Nunavut Department of Culture, Language, Elders and Youth will be contacted. The effects of the Project on archaeology and heritage resources are assessed as not significant or as positive.

6.11 Land Use

6.11.1 Existing Environment

The CAM-F DEW Line Site facilities have been in place since 1957. Prior to this there were only traditional land use activities in the area. The site was used as an intermediate DEW line site until 1963. It was used as a research station in the 1970s and 1980s. Since the closure of the research station, the buildings on-site have been used by local residents.

Other land uses in the area are limited to trapping, hunting, and fishing. The main settlements are Igloolik and Hall Beach. The population of the ecoregion is approximately 1500 (Ecological Stratification Working Group 1995). Caribou hunting activities usually occur near the eastern coast of Melville Peninsula or on the Rae Isthmus, to the extreme south of the Melville Peninsula (Ferguson and Vincent 1992, Rippen and Bowden 1972). Residents of both communities in the region fish at Hall Lake and Hall River.

6.11.2.1 Study Area Boundaries

The administrative boundaries for the assessment refer to the jurisdictions within which and for which the assessment is being prepared. In this case, the assessment is being prepared under CEAA and NIRB for review by other federal and territorial departments following the CEAA process with additions to meet the NIRB requirements. No technical boundaries have been recognized for the assessment of the project on land use.

6.11.2.2 Identification of Issues, Interactions and Potential Effects

Remediation activities may disturb traditional land use such as hunting and fishing that occur during the summer months. Table 6-18 is an environmental assessment matrix for the land use VEC.

Table 6-18: Environmental Effects Assessment Matrix: Land Use

Evaluation Criteria for Assessing Environmental Effects					Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	General Clean Up Activities	
Ecological/Socio-Cultural and Economic Context	Reversibility	Duration/Frequency	Geographic Extent	Magnitude					
				1					
				2					
				3/1					
				R					
				N/A					
									</

Table 6-18: Environmental Effects Assessment Matrix: Land Use

Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	Evaluation Criteria for Assessing Environmental Effects				
			Magnitude	Geographic Extent	Duration/Frequency	Reversibility	Ecological/Socio-Cultural and Economic Context

KEY:

Magnitude: 1 = Low: e.g., a few land or water use activities precluded. 2 = Medium: e.g., a moderate number of land or water uses precluded. 3 = High: e.g., a large number of land or water uses precluded.	Geographic Extent: 1 = <1 km ² 2 = 1-10 km ² 3 = 11-100 km ² 4 = 101-1000 km ² 5 = 1001-10,000 km ² 6 = >10,000 km ²	Frequency: 1 = <11 events/year 2 = 11-50 events/year 3 = 51-100 events/year 4 = 101-200 events/year 5 = >200 events/year 6 = continuous	Ecological/Socio-cultural and Economic Context: 1 = Relatively pristine area or area not adversely affected by human activity. 2 = Evidence of adverse effects. N/A = Not Applicable
	Duration: 1 = <1 month 2 = 1-7 months 3 = 8-36 months 4 = 37-72 months 5 = >72 months	Reversibility: R = Reversible I = Irreversible	

6.11.2.3 Mitigation

In order to minimize impacts to traditional land use such as hunting and trapping activities, local hunter and trapper organizations will be notified of the scheduling of remediation activities.

6.11.2.4 Residual Environmental Effects

Definition of Significance

A significant environmental effect of the project activities on land use occurs if traditional land use activities are not permitted to occur.

Residual Environmental Effects Summary

Table 6-19 summarizes the residual environmental effects of the project activities on land use. The effect of remediation are assessed as being not significant or as positive.

Table 6-19: Residual Environmental Effects Summary Matrix: Land Use			
Phase	Residual Adverse Environmental Effect Rating		Clean Up Activities
	NS/P		
	KEY		
Residual Environmental Effects Rating:			
S = Significant Adverse Environmental			
Effect			
NS = Not Significant			
Adverse			
Environmental Effect			
P = Positive Environmental Effect			
Professional judgement:			
Probability of Occurrence: based on			
Scientific Uncertainty: based on scientific information,			
and statistical analysis or professional judgement:			
Likelihood (of significant adverse environmental effects)			
Probability of Occurrence		Scientific Uncertainty	

6.11.2.5 Summary of Environmental Effects on Land Use

Clean up activities may disturb traditional land use such as hunting and fishing activities that occur during the summer months. In order to minimize these effects, local hunter and trapper organizations will be notified of the scheduling of clean-up activities. The effects of the Project on land use is assessed as not significant or as positive.

6.12 Aesthetics

6.12.1 Existing Environment

The CAM-F site is located on arctic tundra adjacent to a lake. The facilities interrupt a natural arctic landscape view with one of a former military operation.

6.12.2 Aesthetic Impact Assessment

6.12.2.1 Study Area Boundaries

The spatial boundary for the assessment of the effects of project activities on aesthetics is the CAM-F DEW Line Site facility. The temporal boundary is the remediation field-work period as well as the additional monitoring period following completion of the project.

The administrative boundaries for the assessment refer to the jurisdictions within which and for which NIRB for review by other federal and territorial departments following the CEAA process with additions to meet the NIRB requirements. No technical boundaries have been recognized for the assessment of the project on aesthetics.

6.12.2.2 Identification of Issues, Interactions and Potential Effects

Ultimately, the clean up activities will improve the aesthetics of the site by removing unsightly debris and restoring the site to a more natural state. Table 6-20 is an environmental assessment matrix for the aesthetics VEC.

Table 6-20: Environmental Effects Assessment Matrix: Aesthetics

Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	Evaluation Criteria for Assessing Environmental Effects				
			Magnitude	Geographic Extent	Duration/Frequency	Reversibility	Ecological/Socio-cultural and Economic Context
General Clean Up Activities	The clean up will improve the aesthetics of the site by removing unsightly debris and restoring the site to a more natural state (P).	• N/A					
KEY: Magnitude: 1 = Low: Little change to the visual landscape. 2 = Medium: Some views/capes are partially obscured or degraded. 3 = High: Most views/capes obscured or degraded. Geographic Extent: 1 = <1 km ² 2 = 1-10 km ² 3 = 11-100 km ² 4 = 101-1000 km ² 5 = 1001-10,000 km ² 6 = >10,000 km ² Duration: 1 = <1 month 2 = 1-7 months 3 = 8-36 months 4 = 37-72 months 5 = >72 months Frequency: 1 = <11 events/year 2 = 11-50 events/year 3 = 51-100 events/year 4 = 101-200 events/year 5 = >200 events/year 6 = continuous Reversibility: R = Reversible I = Irreversible Ecological/Socio-cultural and Economic Context: 1 = Relatively pristine area or area not adversely affected by human activity. 2 = Evidence of adverse effects. N/A = Not Applicable							

6.12.2.3 Mitigation

No mitigation is required since there are no project-aesthetic interactions identified.

6.12.2.4 Residual Environmental Effects

Definition of Significance

A definition of significance for residual effects on aesthetics is not required since no interactions have been identified.

Residual Environmental Effects Summary

Table 6-21 summarizes the residual environmental effects of the project activities on aesthetics.

Table 6-21: Residual Environmental Effects Summary Matrix: Aesthetics				
Phase	Residual Adverse Environmental Effect Rating	Probability of Occurrence	Scientific Uncertainty	Likelihood (of significant adverse environmental effects)
General Clean Up Activities				
P				
KEY				
Residual Environmental Effects				
Probability of Occurrence: based on				
Professional judgement:				
statistical analysis or professional judgement:				
S = N/A				
NS = N/A				
P =Positive Environmental Effect				
1 = Low				
2 = Medium				
3 = High				
n/a = effect not predicted to be significant				
n/a = effect not predicted to be significant				
= low level of confidence				
= medium level of confidence				
3 = high level of confidence				
n/a = effect not predicted to be significant				

6.12.2.5 Summary of Environmental Effects on Land Use

Generally, the clean up activities will improve the aesthetics of the site by removing unsightly debris and restoring the site to a more natural state.

6.13 Socio-Economics

6.13.1 Existing Environment

CAM-F, located on the Melville Peninsula, is in the Qikiqtaaluk region of Nunavut. Communities on the Peninsula include Hall Beach (85 km east) and Igloolik (100 km northeast). Population of the communities, according to the 1996 census was 867 in Hall Beach and 1,174 in Igloolik. The economy of the region is based on hunting and fishing and on the tourist industry. Diamond exploration is currently ongoing on Melville Peninsula.

6.13.2 Socio-Economic Impact Assessment

6.13.2.1 Study Area Boundaries

The spatial boundary for the assessment of the effects of project activities on socio-economics is Nunavut as labour and equipment may be required from Igloolik or Cambridge Bay, although most of the effects of the Project will be felt in Igloolik and Hall Beach. The temporal boundary is the remediation field-work period as well as the additional monitoring period following completion of the project.

The administrative boundaries for the assessment refer to the jurisdictions within which and for which the assessment is being prepared. In this case, the assessment is being prepared under CEAA and NIRB for review by other federal and territorial departments following the CEAA process with additions

to meet the NIRB requirements. No technical boundaries have been recognized for the assessment of the project on socio-economics.

6.13.2.2 Identification of Issues, Interactions and Potential Effects

The Department of National Defence (DND) and Nunavut Tunngavik Incorporated (NTI) have signed a *DND/NTI Agreement for the Clean Up and Restoration of the DEW Line Sites within the Nunavut Settlement Area* outlining the economic provisions. The agreement includes 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 sites include clauses requiring the contractor to maximize Inuit Involvement. Inuit involvement in the remediation activities will include both employment and business (contracting) opportunities, and local purchases.

Table 6-22 is an environmental assessment matrix for the socio-economic VEC.

Table 6-22: Environmental Effects Assessment Matrix: Socio-Economics						
Project Activity	Potential Positive (P) or Adverse (A) Environmental Effect	Mitigation	Evaluation Criteria for Assessing Environmental Effects			
			Magnitude	Geographic Extent	Duration/Frequency	Reversibility
Contractor Support	The contractor will be required to have a minimum Inuit content in the workforce for the clean up. This will provide employment benefits and related economic benefits (P).	• N/A				

KEY:			
Magnitude:	Geographic Extent:	Frequency:	Ecological/Socio-cultural and Economic Context:
1 = Low: e.g., Few individuals affected.	1 = <1 km ²	1 = <11 events/year	1 = Relatively pristine area or area not adversely affected by human activity.
2 = Medium: e.g., A moderate number of individuals affected.	2 = 1-10 km ²	2 = 11-50 events/year	2 = Evidence of adverse effects.
3 = High: e.g., A large number of individuals affected.	3 = 11-100 km ²	3 = 51-100 events/year	N/A = Not Applicable
	4 = 101-1000 km ²	4 = 101-200 events/year	
	5 = 1001-10,000 km ²	5 = >200 events/year	
	6 = >10,000 km ²	6 = continuous	
	Duration:	Reversibility:	
	1 = <1 month	R = Reversible	
	2 = 1-7 months	I = Irreversible	
	3 = 8-36 months		
	4 = 37-72 months		
	5 = >72 months		

6.13.2.3 Mitigation

During any remediation project, whenever possible, DIAND strives to support and enhance the development of healthy, sustainable communities by leveraging local skills and knowledge into their approach to addressing environmental issues associated with contaminated sites. By these means core competencies are maximized and deployed. Whenever possible, the project will also adopt solutions tailored to the northern environment and its inhabitants. This includes leveraging local knowledge and the incorporation of provisions accounting for the unique needs of northerners and the needs of the environment in which they live into the development and implementation of policies and procedures.

6.13.2.4 Residual Environmental Effects

Definition of Significance

A definition of significance for residual effects on socio-economics is not required since effects are positive.

Residual Environmental Effects Summary

Table 6-23 summarizes the residual environmental effects of the project activities on socio-economics.

Table 6-23: Residual Environmental Effects Summary Matrix: Socio-Economics			
Phase	Residual Adverse Environmental Effect Rating		Likelihood (of significant adverse environmental effects)
	Contractor Support		
KEY			
Residual Environmental Effects Rating:			
Probability of Occurrence: based on Scientific Uncertainty: based on scientific information, and statistical analysis or professional judgement:			
S = Significant Adverse Environmental Effect			
NS = Not Significant			
Adverse			
3 = High			
2 = Medium			
1 = Low			
n/a = effect not predicted to be significant			
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6.13.2.5 Summary of Environmental Effects on Socio-Economics

The contractor will be required to have a minimum Inuit content in the workforce for the remediation work. This will provide employment benefits and related economic benefits. The effects of the remediation of CAM-F on the socio-economic VEC are assessed as positive.

6.14 Summary of Environmental Effects

Table 6-24 is an interaction matrix between the Project and several environmental parameters, showing the effects of the Project on the environment. The parameters listed are those required by the NIRB and those that were not identified as specific VECs in the preceding sections, were included as part of the VECs discussed.

6.15 Cumulative Effects

The effects of the remediation of the former CAM-F DEW Line site will be cumulative with the effects of other activities in the area. The purpose of the remediation program is to repair the environmental effects of the DEW Line site. The only other activities identified at the site are traditional land use activities. The remediation program will interact with traditional land use during the time on-site activities are occurring but this period is of short duration (September 2005, Winter 2005/2006, and July-October 2006 and 2007) and traditional land users (hunters and trappers) will be notified of the periods when the remediation crews will be on site. The remediation of the site will have a positive effect on the environment through the removal of hazardous materials and the restoration of the habitat to one that is similar to what was present before site construction. There is a potential negative cumulative effect of the remediation on the socio-economic VEC. Ongoing remediation of other DEW Line sites in the region (e.g., Cape Hooper and Cape Dyer) will put pressure on the available labour pool and may make it difficult for contractors to meet their minimum Inuit labour content for their work. Overall, however, the contribution of the effects of the remediation to the cumulative effects of the area are assessed as being positive or not significant.

6.16 Impact of the Environment on the Project

The implementation of a clean up project in an Arctic environment has unique logistical issues. The winter route must be completely frozen to bring equipment to the site and to transport waste from the site. 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.

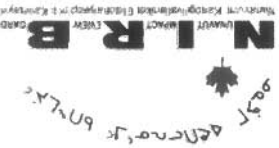
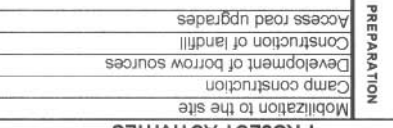
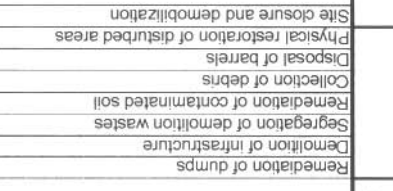
7.0 CONCLUSIONS

The remediation of the former CAM-F DEW Line site at Ekalugad Fjord involves the removal of hazardous waste, the burial of non-hazardous waste, and the removal of facilities. The remediation activities are part of DIAND's environmental management of the North. Remediation will be carried out following procedures that will protect the environment. For the more sensitive activities of removing fuel drums within the watershed and culvert installation, an environmental protection plan has been developed. Contingency plans have also been developed for the remediation activities. The effects of the remediation on the environment have been examined and assessed, as required under the *Canadian Environmental Assessment Act*. The effects of the project on the environment have been assessed as not significant or as positive.



NUNAVUT IMPACT REVIEW BOARD
CAM-F (SARCPA LAKE) REMEDIATION
ENVIRONMENTAL INTERACTION MATRIX

TABLE 6-24:

PROJECT ACTIVITIES	INTERACTION MATRIX											
												
ENVIRONMENTAL COMPONENTS												
												
SITE												
												
CLOSURE												

Notes: Please indicate in the matrix cells whether the interaction causes an impact and whether the impact is:

P Positive
N Negative and non-mitigatable
M Negative and mitigatable
U Unknown

If no impact is expected then please leave the cell blank

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