

Department of Indian Affairs and Northern Development
Northern Affairs Program

Resolution Island Monitoring Program

NWB App. #NWB5RES0308
(December 31, 2003)



Table of Contents

EXECUTIVE SUMMARY	1
1.0 MONITORING AREAS	
1.1 New Landfills	2
1.2 Old Dumps	2
1.3 Interceptor Barriers	3
1.4 GPS Locations	3
1.5 Monitoring Schedule	4
1.6 Sampling and Analysis	5
1.7 Quality Assurance/Quality Control (QA/QC) Plan	5
Table 1: Estimated PCB Mass on Resolution Island	1
Table 2: General Monitoring Requirements	3
Table 3: Specific Monitoring Requirements	4
Table 4: Proposed Monitoring Schedule	4
Figure 1: Overall Site Plan	6
Figure 2: Airstrip Dump Plan	7
Figure 3: Tier II Landfill, Maintenance Dump and Interceptor Barrier Plan	8

EXECUTIVE SUMMARY

Resolution Island BAF-5 is located at the southeastern tip of Baffin Island, approximately 310km southeast of Iqaluit and just outside Frobisher Bay. It was part of the Pole Vault Line, used to transmit intercepted northern signals to southern military stations. This site was operated from 1953 to 1972 when the site was vacated by the U.S. Air Force. The site occupies an area of approximately 3 square km, and while in operation, over 200 people were stationed there. Over 20 buildings, eight dump sites, over 4000 barrels, and large amounts of visible debris were left on site. A series of environmental assessments conducted from 1985-1997 identified and delineated contamination on the site. The site is highly contaminated with PCBs from electrical equipment in the communications complex buildings, many buildings contain asbestos, and soils contaminated with hydrocarbons, lead, cobalt, mercury, and copper were also found.

Since 1997 the site has been under active remediation which is scheduled to continue for two more years. Following the clean up and remediation of the BAF-5 Resolution Island former military site a long-term monitoring program will be implemented. The 2003 field season witnessed the largest effort and volume of remediation work completed to-date with over 2000 m³ of contaminated soil containerized, shipped offsite and thermally treated. Identified below are the estimated masses and progress to date for all PCB contaminated material on Resolution Island.

Area	Estimated mass of PCB (kg)	Status
PCB oil from transformers and barrels	4000	Completed
PCB contaminated building material	100	Stored on site for shipment in 2004
S1/S4 Valley	3498	3396 kg remediated
S1/S4 Beach	1285	To begin in 2004
Furniture Dump	181	Completed
Airstrip Dump	23	Completed
PCL Dump	6	50% Complete
DND Helipad	3	33% Complete
Total	9096	84.6% Complete

Table 1: Estimated PCB mass on Resolution Island

1.0 MONITORING AREAS

The monitoring plan will be concerned with the landfills, dumps and the permanent interceptor barriers. The remediation plan proposed below is based largely on the agreement between Nunavut Tunngavik Incorporated (NTI) and the Department of National Defence (DND) for the clean-up and restoration of DEW line sites within the Nunavut settlement area (environmental provisions 1998).

1.1 New Landfills

Non Hazardous Landfills

Three (3) new landfills for non-hazardous (NH) wastes will be present at the end of the project:

- 1) the East Camp NH Landfill,
- 2) the West Camp NH Landfill, and
- 3) the Beach NH Landfill.

These landfills will be inspected visually for stability only. This visibility inspection will look for any settling, ponding, erosion or frost action that may have occurred. If there are signs of instability at these landfills such that buried material becomes exposed, then remedial action will be required. Table 2 summarizes the monitoring requirements for the three (3) non-hazardous landfills.

Tier II Landfill

For the Tier II landfill, visual inspection, water and soil monitoring as well as the recording of thermal measurements are proposed. The location of the Tier II landfill is presented in Figure 1.

The landfill will be inspected visually for stability. If there are any signs of instability (*i.e.*, settling, ponding, erosion or frost action) such that the geomembrane liners or buried material become exposed, then remedial action will be required.

Three (3) monitoring wells (MW) will be installed down-gradient from the landfill and one (1) up-gradient. The three (3) down-gradient wells were installed in 2003, the remaining well (up-gradient) will be installed in 2004. The location of the installed and proposed MW is presented in Figure 3. Monitoring of these locations will begin in 2004. Water from the wells will be tested for As, Cd, Cr, Co, Cu, Pb, Ni, and Zn, PCBs, and TPH. Furthermore, the following parameters will be measured on site: pH, conductivity, and temperature.

Soil collected from four (4) locations adjacent to the monitoring wells will be analysed for the same set of parameters. Remediation steps will be required if the analytical results show a significant increase in contamination over a period of three (3) or more years.

Three (3) thermister strings will be placed within the landfill so as to record temperature at 0.5 m intervals. Temperatures will be recorded during the annual site visit. This landfill is designed to ensure that all the buried Tier II material should remain frozen. This steady state should be reached within 3 to 4 years. Remedial action could be required if all the buried material is not frozen permanently. The location of the proposed thermisters is presented in Figure 3. Table 2 summarizes the monitoring requirements for the Tier II Landfill and Table 3 summarizes the specific location and monitoring criteria of each monitoring well.

1.2 Old Dumps

The Airstrip and Maintenance dumps will be visually monitored for stability and have a water and soil sampling program. The location of these dumps is presented in Figure 1. Water and soil monitoring points will be established down-gradient from each dump with one reference location up-gradient. Table 2 summarizes the general monitoring requirements for these dumps while Table 3 shows the specific monitoring criteria.

In the case of the Maintenance dump three (3) points will be established at 10m and 30m down-gradient and one up-gradient from the dump and monitored for cobalt (Co) only. The location of the monitoring wells is presented in Figure 3.

For the Airstrip dump, four (4) monitoring wells will be established at 5 m, 25 m and 50 m down-gradient and one up-gradient from the dump. The up-gradient well and one down-gradient (25 m) well were installed in 2003. Figure 2 shows the location of the monitoring wells with respect to the dump.

1.3 Interceptor Barriers

The two (2) permanent interceptor barriers (*i.e.*, S1/S4 Valley barrier and S1/S4 Beach barrier) will be inspected and repaired, if necessary at each monitoring visit. The location of these barriers is presented in Figure 3.

Any silt collected by the barriers will be excavated and/or any used filters that need to be replaced will be removed and placed into plastic drums and sub-samples collected for PCB analysis. These drums will be temporarily stored in building B2 at the beach area. The drum contents will be managed according to the PCB level in the soil. In addition soil samples will be collected from the clean cells which will be established beyond the barriers. Table 2 summarizes the monitoring requirements for the interceptor barriers and Table 3 summarizes the specific monitoring criteria for the soil samples.

1.4 GPS Locations

The GPS coordinates of all sampling points will be measured during the 2004 season and subsequent seasons and will be reported starting in 2004.

Location	Visual	Water	Soil	Thermal
East Camp NH Landfill	X			
West Camp NH Landfill	X			
Beach NH Landfill	X			
Tier II Landfill	X	X	X	X
Maintenance Dump	X	X	X	
Airstrip Dump	X	X	X	
S1/S4 Valley Barrier	X		X	
S1/S4 Beach Barrier	X		X	

Table 2: General Monitoring Requirements

	Water & Soil				Thermal		
Location	ID	Notes	Distance	Install Date	ID	Depth	Install Date
Tier II Landfill	MW -1	Up-gradient	n/a	2004	TH-1	Various*	2005
	MW -2	Down-gradient	5 m (E)	2003	TH-2	Various*	2005
	MW -3	Down-gradient	5 m (S)	2003	TH-3	Various*	2005
	MW -4	Down-gradient	5 m (W)	2003			
Maintenance Dump	MW -11	Down-gradient	10 m	2004	* dependent on soil depth		
	MW -12	Down-gradient	30 m	2004			
Airstrip Dump	MW -20	Up-gradient	n/a	2003			
	MW -21	Down-gradient	5 m	2004			
	MW -22	Down-gradient	25 m	2003			
	MW -23	Down-gradient	50 m	2004			
S1/S4 Valley barrier	STV	Up-gradient	n/a	2003			
	CCV	Clean cell soil	n/a	2003			
	BWV	Down-gradient	n/a	2003			
S1/S4 Beach Barrier	STB	Up-gradient	n/a	2005			
	CCB	Clean cell soil	n/a	2005			
	BVB	Down-gradient	n/a	2005			

Table 3: Specific Monitoring Requirements

1.5 Monitoring Schedule

Initially, a baseline study will be conducted in 2006 during demobilization of equipment and infrastructure. Monitoring will then be conducted, according to the requirements on Table 2, once a year in approximately mid-August. Based on the agreement between NTI and DND, the frequency of the program will be on a yearly basis for the first 5 years, then year 7, 10, 15 and 25 if no problems are encountered. A full review of all data will be undertaken in the fifth year. The proposed monitoring schedule is presented in Table 4.

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Baseline Study																										
Monitoring Plan																										
Full Review																										

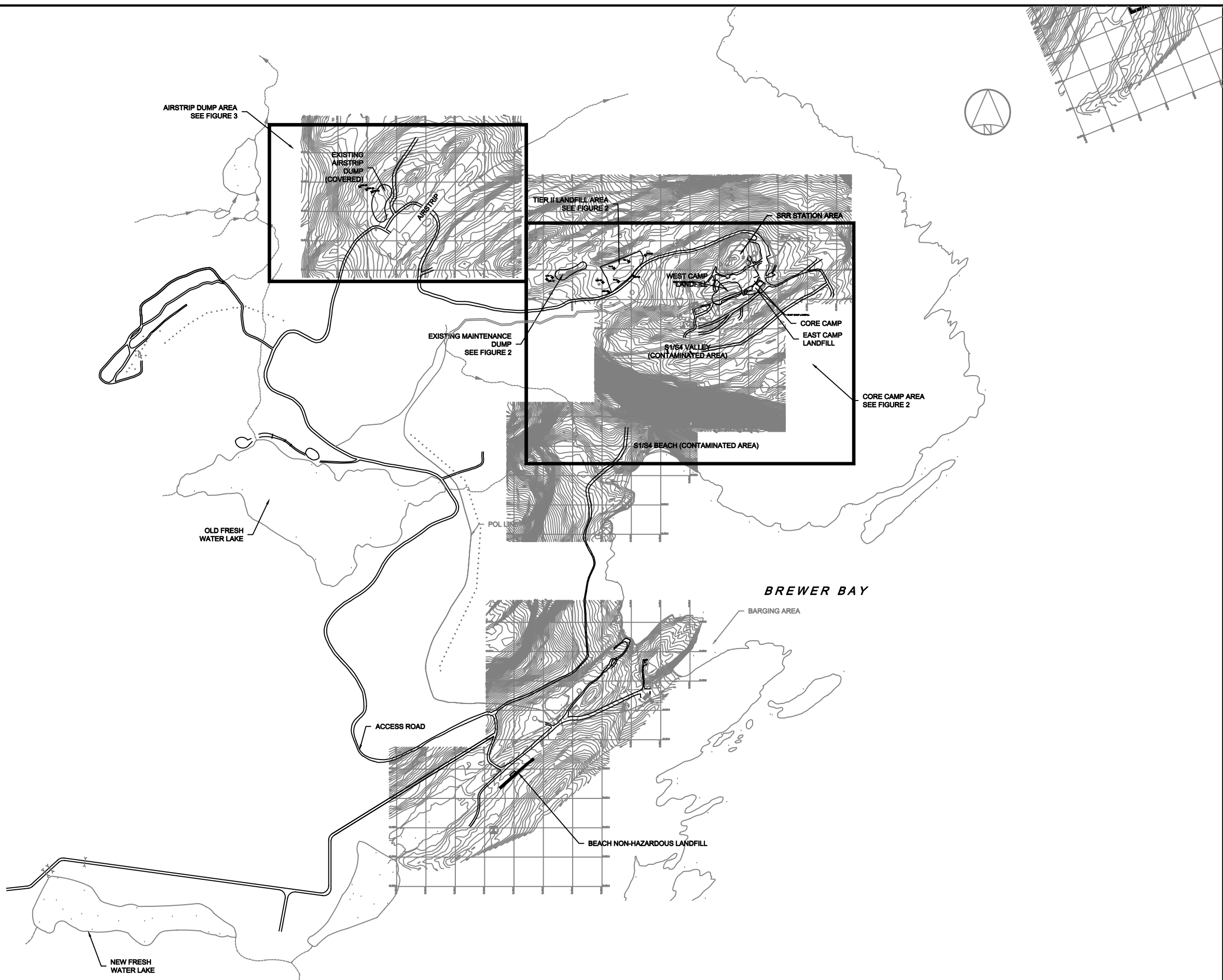
Table 4: Proposed Monitoring Schedule


1.6 Sampling and Analysis

All sampling, sample preservation and analyses will be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater". All analysis will be performed in a Canadian Association of Environmental Analytical Laboratories (CAEAL) Accredited Laboratory.

1.7 Quality Assurance/Quality Control (QA/QC) Plan

Quality Assurance/Quality Control (QA/QC) will be consistent with CAEAL regulations and guidelines. At least 20% of samples will be taken and analysed in duplicate and all appropriate laboratory QA/QC data will be generated and reported.








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General Notes:

1. LOCATIONS ARE APPROXIMATE AND NOT SURVEYED.

Legend:

No.	DATE	REVISION	REVISION	APPR.
  SCALE - ÉCHELLE 100 50 0 100 200 300 m				
PROJECT - PROJET BAF-5 RESOLUTION ISLAND				
© COPYRIGHT HER MAJESTY THE QUEEN IN THE RIGHT OF CANADA 2003, AS REPRESENTED BY INDIAN AND NORTHERN AFFAIRS CANADA				
TRADE - MÉTIER SITING		DATE 2003-12-11		
SUBJECT - SUJET FIGURE 1 GENERAL SITE LAYOUT AND DRAWING INDEX				
PRODUCTION		CONCURRENCE - ASSENTIMENT		
DESIGNED ÉTUDE		P.S.		
DRAWN DESSINE		G.J.		
CHECKED VÉRIFIÉ		K.C.		
COORDINATION		REVIEWED - REVU		
DWG. NO. - DESSIN NO. MP-2003-102-01				
				




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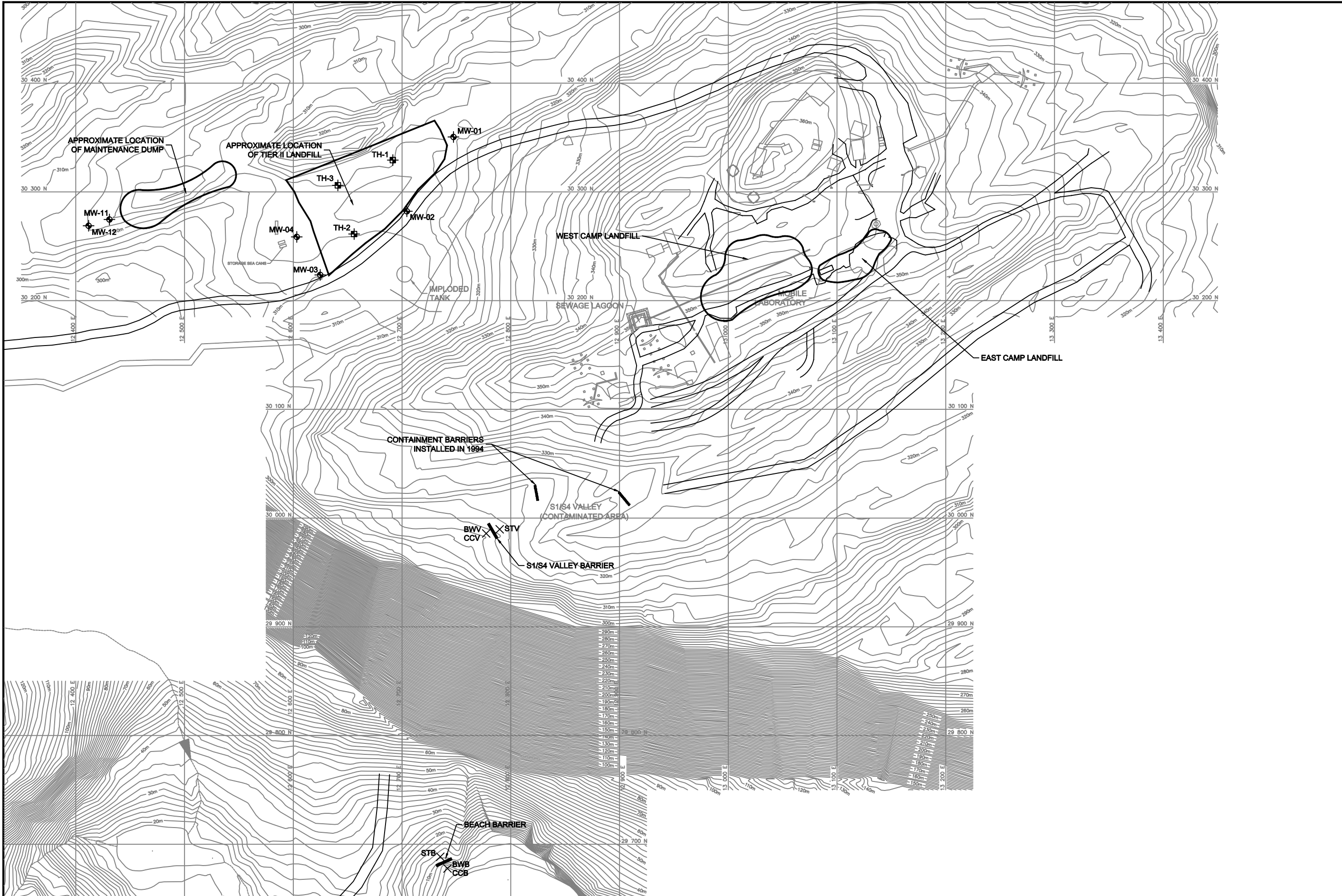
NUNAVUT REGIONAL OFFICE


General Notes:

1. LOCATIONS ARE APPROXIMATE AND NOT
SURVEYED.

Legend:

No.	DATE	REVISION	REVISION	APPR.
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PROJECT - PROJET				
BAF-5 RESOLUTION ISLAND				
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TRADE - MÉTIER		SITING		DATE 2003-12-11
SUBJECT - SUJET				
FIGURE 3 AIRSTRIP DUMP				
PRODUCTION		CONCURRENCE - ASSENTIMENT		
DESIGNED ÉTUDE		P.S.		
DRAWN DESSINE		G.J.		
CHECKED VÉRIFIÉ		K.C.		
COORDINATION		REVIEWED - REVU		
DWG. NO. - DESSIN NO. MP-2003-102-03				
Canada ¹⁰⁰				




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NUNAVUT REGIONAL OFFICE

GENERAL NOTES:
1. LOCATIONS ARE APPROXIMATE AND NOT SURVEYED.

LEGEND:

No.	DATE	REVISION	REVISION	APPR.



SCALE - ÉCHELLE
0 25 50 100 m

PROJECT - PROJET
BAF-5 RESOLUTION ISLAND

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NORTHERN AFFAIRS CANADA

TRADE - MÉTIER	SITING	DATE
		2003-12-11

SUBJECT - SUJET
**FIGURE 2
LOCATION OF EAST AND WEST CAMP
NON-HAZARDOUS LANDFILLS, THE S1/S4
VALLEY AND BEACH BARRIERS, TIER II
LANDFILL, AND MAINTENANCE DUMP**

PRODUCTION	CONCURRENCE - ASSENTIMENT
DESIGNED ÉTUDE	P.S.
DRAWN DESSINE	G.J.
CHECKED VÉRIFIÉ	K.C.
COORDINATION	REVIEWED - REVU

DWG. NO. - DESSIN NO.
MP-2003-102-02

