Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

CAM-D (Simpson Lake) Monitoring Plan

February 22, 2010

Table of Contents

Appendices

1.0 Introduction

1.1 Site Location

The CAM-D (Simpson Lake) site is located approximately 100 km east of Gjoa Haven, 80 km west of Kugaaruk and 120km southeast of Taloyoak (68° 35'N, 91° 57' W) in the middle of the Boothia Peninsula (see Figure 1 and Appendix A).

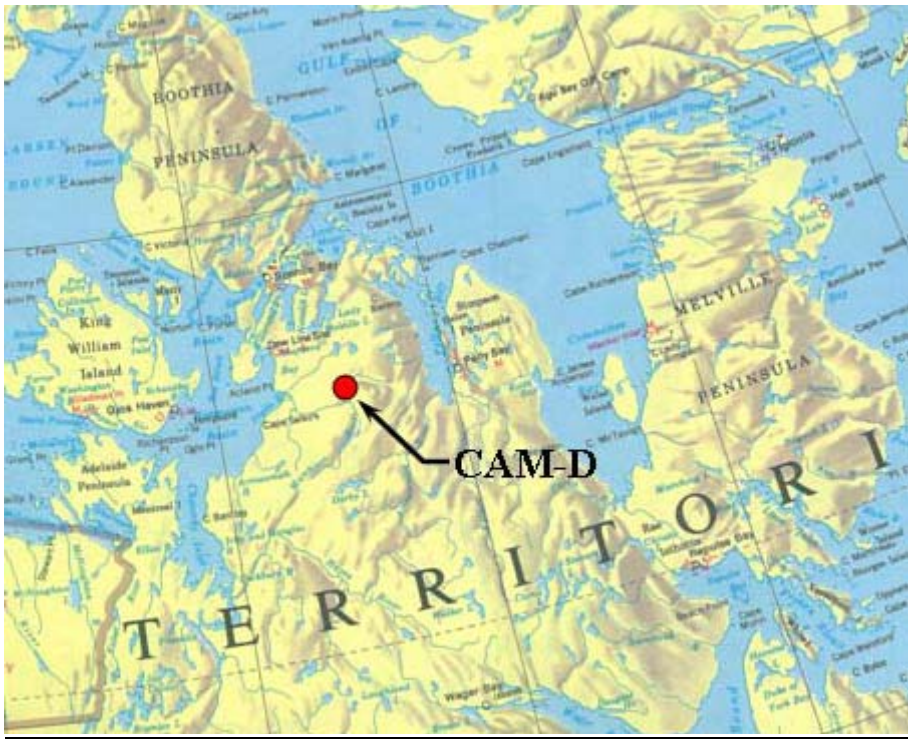


Figure 1: CAM-D (Simpson Lake) site location

1.2 Background

CAM-D (Simpson Lake) was constructed as an intermediate Distant Early Warning (DEW) Line site in 1957 by the Department of National Defence (DND). The station was taken out of service in 1963, and in 1965 responsibility for the site was assumed by INAC. The CAM-D (Simpson Lake) site consisted of a module train, warehouse, garage, Inuit house, POL tanks, Quonset huts, storage pads, a radar tower and a 750 m airstrip. The main station buildings are located on Ross Hills at an elevation of 370 m. The terrain is composed of rolling grassy hills cut by rock outcrops. At the time of the 1994 site assessment, only the garage and the POL pump house were standing with all other buildings removed, demolished or collapsed. One POL tank had been removed along with the concrete foundation and berm. The Doppler antenna was downed. Several electrical cabinets (most components removed) were near the garage area. Along the road to the airstrip there were several collapsed shacks. At the edge of the airstrip there remains a grader, truck, crane and some small shacks. The airstrip was reported to be in

good condition in 1994. Southeast of the garage were abandoned vehicles and a stack of approximately 5000 barrels (northeast of the garage there is a stack of an additional 1000 barrels). One very large main dump was identified with heavy equipment, barrels (over 2000) and debris.

Between 1992 and 1995 the Department of National Defence (DND) constructed an unmanned Short Range Radar (SRR) facility approximately 1 km east of the former the CAM-D site. Facilities associated with the SRR facility include a technical services building with an emergency shelter, diesel tanks, helipad, communication domes, an old shack and the construction camp accommodation module.

A total of approximately 371 m^3 of soils with concentrations of metals, Polychlorinated Biphenyl's (PCB), Petroleum Hydrocarbons (PHC) and Poly-Aromatic Hydrocarbons (PAH), which exceed the Abandoned Military Site Remediation Protocol[1], were identified at the site. The Tier I contaminated soil will be placed as intermediate fill in the non-hazardous landfill and the Tier II contaminated soil will be shipped off site for disposal. Co-contamination of soils is evident in most impacted areas. Approximately 3,074 m^3 of hydrocarbon impacted soil will be treated on site, with the method of treatment proposed by the successful Contractor.

A total of 58 m^3 of hazardous materials have been identified at the site. Hazardous materials identified at the site include batteries, lead, asbestos and PCB amended paint. Approximately 40 m^3 of the hazardous materials was observed to be painted with PCB/lead amended paint. All hazardous materials will be shipped off site for disposal.

A total of 745 m^3 of non-hazardous waste have been identified at the site. There are approximately 9,000 empty barrels located throughout the site. The crushed volume of these barrels has been included in the calculation of the volume of non-hazardous debris. In addition 15 full or partially full barrels containing various types of products were identified. These drums will be sampled as part of the remediation activities. All non-hazardous waste will be placed in the newly constructed non-hazardous waste landfill.

Five dumps or debris areas were identified at the CAM-D site as follows:

1. The Main Dump is located north of the station within a shallow depression in the bedrock. Debris within this dump consists of heavy equipment, domestic waste and approximately 2500 barrels.
2. The POL Area Dump is located north of the station and consists of two distinct piles of barrels. Approximately 245 barrels were identified in this area.
3. The Vehicle Dump is located southeast of the station and includes various pieces of heavy equipment and vehicles as well as empty barrels (8), assorted metal debris, and a battery.
4. The Large Barrel Dump is located east of the station and consists of approximately 5100 empty barrels.
5. The Pallet Line Area is located northeast of the station and consists of approximately 688 barrels and other miscellaneous waste.

[1] Indian and Northern Affairs Canada, Abandoned Military Sites Remediation Protocol - March, 2005

Water samples were taken from Simpson Lake and the old Water Lake and no elevated contaminants of concern were found. Sediment samples within Simpson Lake were also taken and no elevated contaminants were found.

The Human Health and Ecological Risk Assessment, completed by Jacques Whitford in 2006, did not identify any health risks associated with on-site exposure to the various chemicals of potential concern. However, an increased risk to ecological receptors was identified and a Remedial Action Plan has been developed to address these concerns.

The overall objectives for the CAM-D (Simpson Lake) remediation project are:

- To minimize environmental impacts to humans and wildlife at the site;
- To ensure the project is completed complying with all legal obligations;
- To ensure the project is undertaken in accordance with all Federal and/or Departmental policies;
- To increase public perception and attitude toward remediation activities;
- To promote the social and economic benefits of the project for Inuit; and
- To reduce liabilities to the Crown.

2.0 Monitoring Plan

As dictated by the Nunavut Water Board Licence 1BR-SIM0813, the following monitoring activities will take place:

Monitoring Station ID	Description	Parameters	Frequency	Plan
SIM-1	Water Usage	Volume	Daily	Water will be tracked daily, as specified in the remediation Contract
SIM-2	Sewage Discharge	Volume and Water Quality	Daily	Samples will be taken prior to discharge
SIM-3	Waste Handling Facility	Water Quality	As Necessary	Samples will be taken prior to discharge
SIM-4	Non-hazardous Waste Facility	Water Quality	As Necessary	Samples will be taken prior to discharge

In addition, the monitoring of the natural environment and post-closure condition of the site will be undertaken, as described in the following sections.

2.1 Natural Environment Monitoring

Natural environment data has been collected during the environmental assessment and as well as during community meetings. In addition, the information will also be collected during the remediation of the site, expected to occur in 2010 and 2011, and during monitoring of the Non-Hazardous Waste Landfill. This data includes local and

traditional knowledge of the site and will serve as a reference for post construction monitoring. The purpose of collecting this new data is not to find correlations with the landfill monitoring data but rather to provide anecdotal data related to the presence of wildlife and changes over time. The information to be gathered is included in the Visual Monitoring Checklist (see Appendix C).

The data to be collected during the site visit will include:
-Wildlife sightings (species, number, gender, juveniles);
-Other evidence of recent presence of wildlife (droppings, tracks, feathers/fur, carcass remains, etc.)
-Wildlife activity (summering/nesting/denning, migratory/passing through);
-Qualitative assessment of relative numbers versus previous years (more, same, less); and
-Revegetation of disturbed areas versus previous years (more, same, less).

Information regarding visits made to the site by local people may also be collected through consultations with local community members and/or local Hunter and Trapper Associations (HTOs) and/or the Kitikmeot Inuit Association (KIA). The type of information that may be collected includes:
-Wildlife sightings;
-Use by people for traditional activities;
-Season(s);
-Activities (hunting, fishing, trapping, camping, other harvesting);
-Relative frequency versus previous years (more, same, less);
-Wildlife species present (sightings or evidence);
-Wildlife presence versus previous years (more, same, less);
-Health of wildlife observed or harvested (good, average, poor); and
-Relative health of wildlife versus previous years (better, same, worse).

2.2 Post Construction Monitoring

Construction of the Non-Hazardous Waste Landfill at CAM-D (Simpson Lake) will commence in the spring of 2010 and be closed in the fall of 2011 (see Appendix B for the location of the Non-Hazardous Waste Landfill). The Non-Hazardous Waste Landfill was designed to contain non-hazardous materials only. It will be constructed on native ground, with all organic matter removed, and consists of four perimeter berms constructed of granular material. The non-hazardous waste will be placed in the landfill in layers consisting of 0.5 metre lifts of waste covered by 0.15 metres of granular fill. Once all the waste has been placed a final cover consisting of a minimum of 1.0 metres of granular fill will be used to cap the Non-Hazardous Waste Landfill (see Appendix B for detailed design drawings).

The Non-Hazardous Waste Landfill at CAM-D (Simpson Lake) will contain the following material:
-F3 and F4 fraction hydrocarbon contaminated soil;
-Non-hazardous demolition debris, such as timbers, plywood, and sheet metal;
-Non-hazardous site debris, such as scrap metal and wood;

-Non-hazardous debris/soil excavated from landfills;
-Creosote timbers;
-Double-bagged asbestos; and
-Tier I contaminated soil (Lead concentration between 200 and 500ppm and PCB concentrations between 1 and 5 ppm).

Water

Samples will be taken from the four (4) monitoring wells installed around the Non-Hazardous Waste Landfill. These samples will be analysed and the results will be compared to those collected from background samples. The parameters that will be analyzed include:
-Petroleum Hydrocarbons;
-Total and Dissolved Metals;
-Major Ions, Hardness, Total Dissolved Solids, Total Suspended Solids;
-pH, Conductivity; and
-Polychlorinated biphenyls (PCBs).

Visual

This activity will check the physical integrity of the Non-Hazardous Waste Landfill and look for evidence of erosion, ponding, frost action, settlement and lateral movement through the use of a Visual Monitoring Checlist (see Appendix C). Photographs will be taken to document the condition of the Non-Hazardous Waste Landfill and substantiate the recorded observations.

Soil (as necessary)

Soil sampling will be limited to locations where seepage or staining has been identified as part of the visual inspection. When required, soil samples will be collected over the interval of 0 to 0.15 metres and 0.35 to 0.50 metres depth. The parameters that will be analysed include:
-Polychlorinated biphenyls (PCBs);
-Petroleum Hydrocarbons; and
-Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, and Zinc.

2.3 Monitoring Schedule

The post construction monitoring frequency will follow the schedule identified in the INAC Abandoned Military Sites Remediation Protocol[2]. The three phases recommended by the protocol are:
• Phase I: years 1, 3 and 5;
• Phase II: years 7, 10, 15 and 25 (if required); and
• Phase III: beyond year 25 (if required).

Monitoring at the CAM-D (Simpson Lake) site is anticipated to begin in 2012. Phase I monitoring will take place in years 2012, 2014 and 2016. Each of the four monitoring

[2] Indian and Northern Affairs Canada, Abandoned Military Sites Remediation Protocol - March, 2009

events discussed above (i.e. natural environment, water, visual and soil) will be conducted during each of the three site visits. The visits will be carried out during the summer months of June, July, August or September. An evaluation of Phase I monitoring data would be carried out at the end of the 2016 program to confirm whether or not additional monitoring is required. If additional monitoring (Phase II) is required, it will be carried out during the years 2018, 2021, 2026 and 2036. At the completion of the 25 year monitoring program a review will take place and the need for continued monitoring will be assessed.

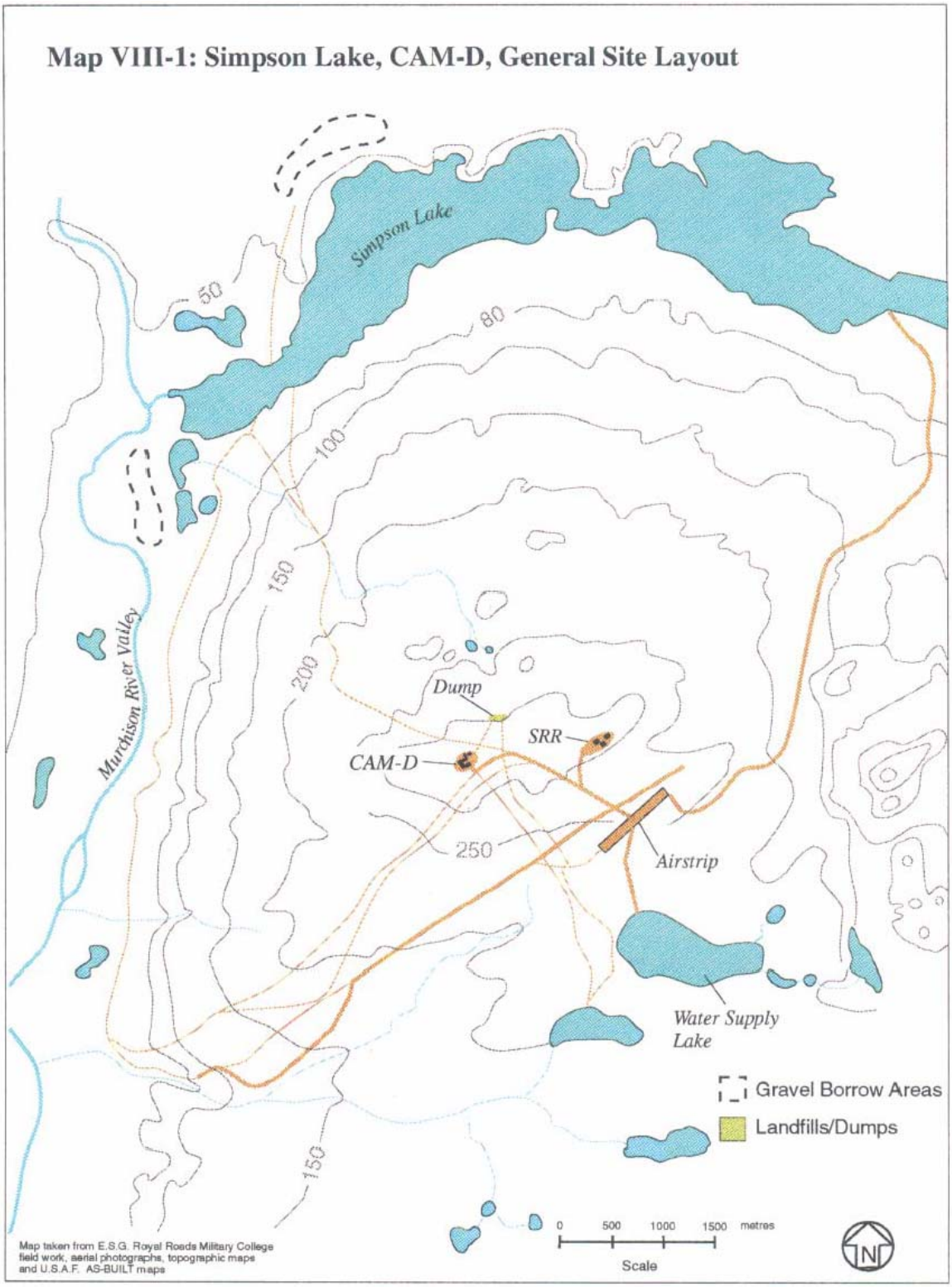
3.0 Quality Assurance / Quality Control Measures

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.

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

APPENDIX A:
CAM-D (Simpson Lake) Site Layout

Map VIII-1: Simpson Lake, CAM-D, General Site Layout



APPENDIX B:
Non-Hazardous Waste Landfill Location and Design Drawings

CONTAMINATED AND IMPACTED SOIL						
AREA NAME	APPROX. AREA (m2)	ESTIMATED DEPTH OF CONTAMINATION (m)	ESTIMATED VOLUME OF EXCAVATION (m3)	COMMENTS	REFERENCE POINTS N	REFERENCE POINTS E
HYDROCARBON CONTAMINATED / IMPACTED						
3-PHC-1	190	0.4	76	CONTAINERIZE AND SHIP OFF SITE.	5 071	5 005
3-PHC-I-1	922	1.5	1383	USE AS INTERMEDIATE FILL AT NON-HAZARDOUS LANDFILL.	5 064	5 009
3-PHC-I-2	62	0.7	43	USE AS INTERMEDIATE FILL AT NON-HAZARDOUS LANDFILL.	5 034	5 049
3-PHC-I-3	669	1.1	736	USE AS INTERMEDIATE FILL AT NON-HAZARDOUS LANDFILL.	4 947	5 061
METALS CONTAMINATED SOIL						
3-MET-1	56	0.3	17	CONTAINERIZE AND SHIP OFF SITE.	5 003	5 087
BURIED DEBRIS EXCAVATION						
3-BD-1	523	2.0	1046	EXCAVATE AND SORT THE BURIED DEBRIS INTO DIFFERENT CATEGORIES AND DISPOSE OF ACCORDING TO REMEDIATION OPTIONS.	5 085	5 035
3-BD-2	171	2.0	342		5 015	5 013
3-BD-3	327	1.9	621		4 978	5 004
METALS / PCB CONTAMINATED SOIL						
3-METPCB-1	18	0.2	4	CONTAINERIZE AND SHIP OFF SITE.	5 035	4 910

AREA 3-PHC-1 COORDINATE POINTS
HYDROCARBON CONTAMINATED SOIL EXCAVATION

NO.	COORDINATES NORTHING	COORDINATES EASTING
A1	5 078.1	4 997.1
A2	5 079.9	4 999.7
A3	5 080.2	5 002.5
A4	5 078.9	5 006.1
A5	5 075.6	5 009.5
A6	5 072.8	5 015.2
A7	5 070.6	5 013.7
A8	5 069.2	5 009.8
A9	5 066.0	5 008.6
A10	5 062.3	5 005.8
A11	5 062.9	5 001.4
A12	5 064.4	4 999.9
A13	5 068.6	4 999.8
A14	5 075.7	4 996.7

AREA 3-PHC-I-1 COORDINATE POINTS
PHC AND PAH HYDROCARBON IMPACTED SOIL EXCAVATION

NO.	COORDINATES NORTHING	COORDINATES EASTING
B1	5 078.5	4 996.7
B2	5 081.1	5 000.4
B3	5 079.9	5 005.5
B4	5 075.8	5 010.3
B5	5 075.1	5 013.3
B6	5 077.6	5 025.2
B7	5 077.2	5 029.0
B8	5 069.2	5 031.6
B9	5 061.3	5 030.4
B10	5 055.1	5 025.0
B11	5 049.3	5 003.3
B12	5 053.2	4 984.1
B13	5 058.7	4 980.2
B14	5 064.4	4 981.4
B15	5 073.0	4 994.1
B16	5 075.9	4 996.1

AREA 3-BD-1 COORDINATE POINTS
BURIED DEBRIS EXCAVATION

NO.	COORDINATES NORTHING	COORDINATES EASTING
C1	5 077.2	5 022.9
C2	5 081.5	5 022.3
C3	5 089.4	5 026.1
C4	5 096.8	5 025.8
C5	5 099.5	5 031.0
C6	5 095.7	5 041.3
C7	5 084.2	5 047.3
C8	5 079.8	5 047.2
C9	5 069.5	5 036.4
C10	5 070.3	5 028.8

AREA 3-PHC-I-2 COORDINATE POINTS
PHC HYDROCARBON IMPACTED SOIL EXCAVATION

NO.	COORDINATES NORTHING	COORDINATES EASTING
D1	5 034.7	5 045.6
D2	5 038.5	5 046.0
D3	5 039.2	5 050.9
D4	5 037.7	5 053.9
D5	5 033.3	5 053.7
D6	5 030.3	5 051.3
D7	5 029.9	5 047.2

AREA 3-BD-2 COORDINATE POINTS
BURIED DEBRIS EXCAVATION

NO.	COORDINATES NORTHING	COORDINATES EASTING
E1	5 022.1	5 005.7
E2	5 024.7	5 009.4
E3	5 023.3	5 014.6
E4	5 014.2	5 017.1
E5	5 008.3	5 019.6
E6	5 003.2	5 018.1
E7	5 002.5	5 015.7
E8	5 018.1	5 005.3

AREA 3-MET-1 COORDINATE POINTS
METALS CONTAMINATED SOIL EXCAVATION

NO.	COORDINATES NORTHING	COORDINATES EASTING
F1	5 006.0	5 084.4
F2	5 006.1	5 089.0
F3	5 003.2	5 091.3
F4	4 999.7	5 090.9
F5	4 997.8	5 089.2
F6	4 997.7	5 085.1
F7	5 000.3	5 083.3
F8	5 003.5	5 083.2

AREA 3-BD-3 COORDINATE POINTS
BURIED DEBRIS EXCAVATION

NO.	COORDINATES NORTHING	COORDINATES EASTING
G1	4 986.3	4 995.9
G2	4 989.5	5 005.0
G3	4 989.0	5 011.7
G4	4 987.3	5 012.3
G5	4 982.6	5 010.0
G6	4 976.1	5 011.5
G7	4 966.9	5 007.8
G8	4 965.1	5 003.4
G9	4 966.9	4 997.6
G10	4 981.0	4 994.2

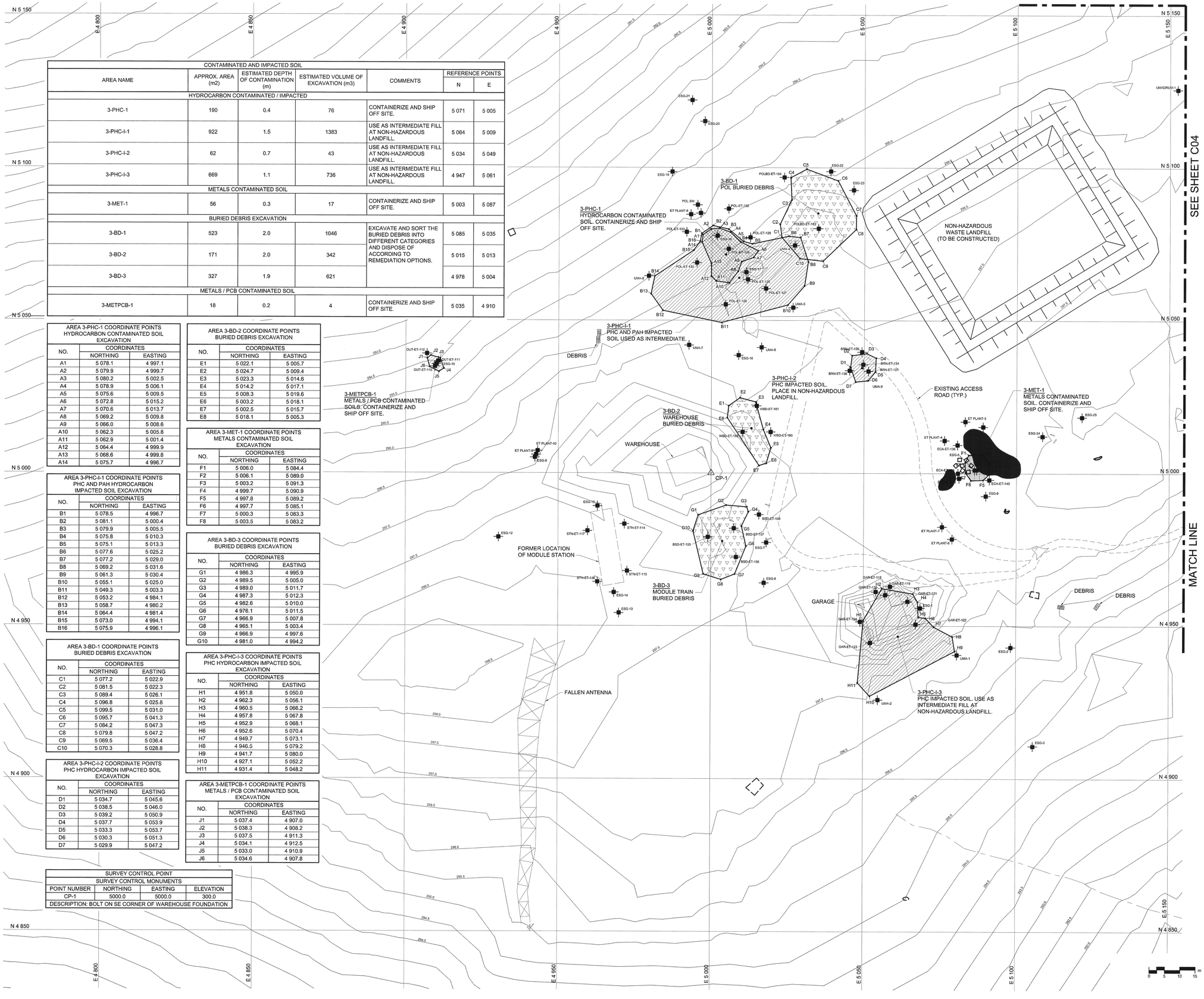
AREA 3-PHC-I-3 COORDINATE POINTS
PHC HYDROCARBON IMPACTED SOIL EXCAVATION

NO.	COORDINATES NORTHING	COORDINATES EASTING
H1	4 951.8	5 050.0
H2	4 962.3	5 056.1
H3	4 960.5	5 066.2
H4	4 957.8	5 067.8
H5	4 952.9	5 068.1
H6	4 952.6	5 070.4
H7	4 949.7	5 073.1
H8	4 946.5	5 079.2
H9	4 941.7	5 080.0
H10	4 927.1	5 052.2
H11	4 931.4	5 048.2

AREA 3-METPCB-1 COORDINATE POINTS
METALS / PCB CONTAMINATED SOIL EXCAVATION

NO.	COORDINATES NORTHING	COORDINATES EASTING
J1	5 037.4	4 907.0
J2	5 038.3	4 908.2
J3	5 037.5	4 911.3
J4	5 034.1	4 912.5
J5	5 033.0	4 910.9
J6	5 034.6	4 907.8

SURVEY CONTROL POINT			
SURVEY CONTROL MONUMENTS			
POINT NUMBER	NORTHING	EASTING	ELEVATION
CP-1	5000.0	5000.0	300.0
DESCRIPTION: BOLT ON SE CORNER OF WAREHOUSE FOUNDATION			



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Western Region

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GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. SITE PLANS AND TOPOGRAPHIC INFORMATION ARE BASED ON AIR PHOTOS AND SURVEY PROVIDED BY EARTH TECH AND INAC. CURRENT CONDITIONS MAY NOT BE EXACTLY AS SHOWN.
3. ALL COORDINATES ARE SITE COORDINATES AND ALL ELEVATIONS ARE BASED ON SITE DATUM.

LEGEND:

- PHC — PETROLEUM HYDROCARBONS
- PAH — POLYCYCLIC AROMATIC HYDROCARBONS
- BODY OF WATER
- DRAINAGE
- SURVEY CONTROL MONUMENT
- EXISTING DEBRIS
- TEST PIT LOCATION
- A1 — COORDINATE POINT
- METALS / PCB CONTAMINATED SOIL
- METALS CONTAMINATED SOIL
- BURIED DEBRIS
- HYDROCARBON IMPACTED SOIL
- HYDROCARBON CONTAMINATED SOIL

REGISTERED PROFESSIONAL ENGINEER R.H. SCHMIDTKE LICENSEE P639 NWT/NU

PERMIT TO PRACTICE
AECOM Canada Ltd.
Signature
Date 3/10/09
PERMIT NUMBER: P639
NWT/NU Association of Professional Engineers and Geoscientists

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REVISIONS	DESCRIPTION	DATE
0	Issued For Construction	09/03/11

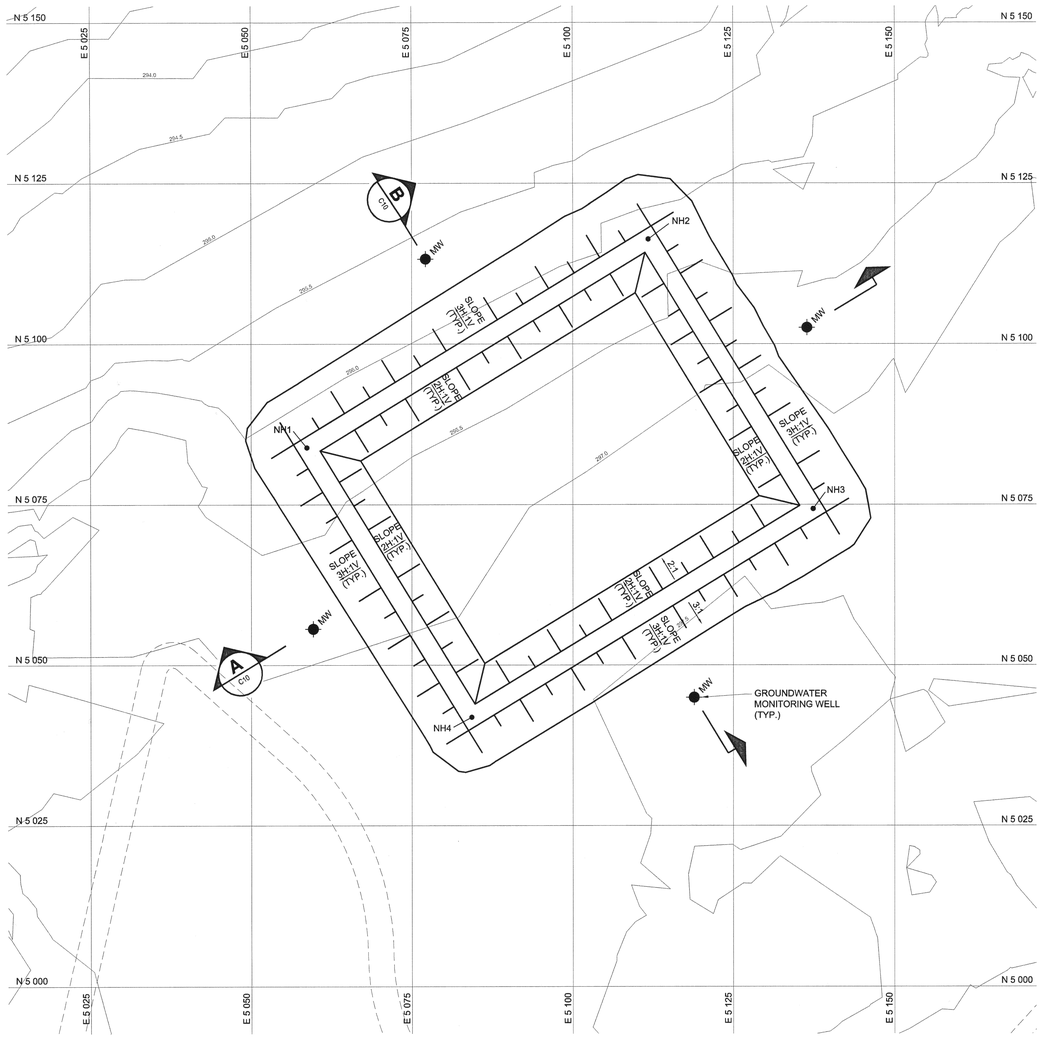
A detail number / number du detail
B source drawing no. / de dessin no.
C detail on drawing no. / detail sur dessin no.

project title / titre du projet
CAM-D REMEDIATION PROJECT

drawing title / titre du dessin
AREA 3 MAIN STATION AREA WEST

designed by / conçu par	K. FAISAL
drawn by / dessiné par	B. HASSLER
approved by / approuvé par	R. SCHMIDTKE
PWGSC Project Manager / Administrateur de Projets TPSGC	M. McELWAINE
scale / echelle	1:500
project no. / projet no.	416837
date / date	MARCH, 2009
sheet / feuille	C05
	OF 11

416837-C05



BERM PLAN

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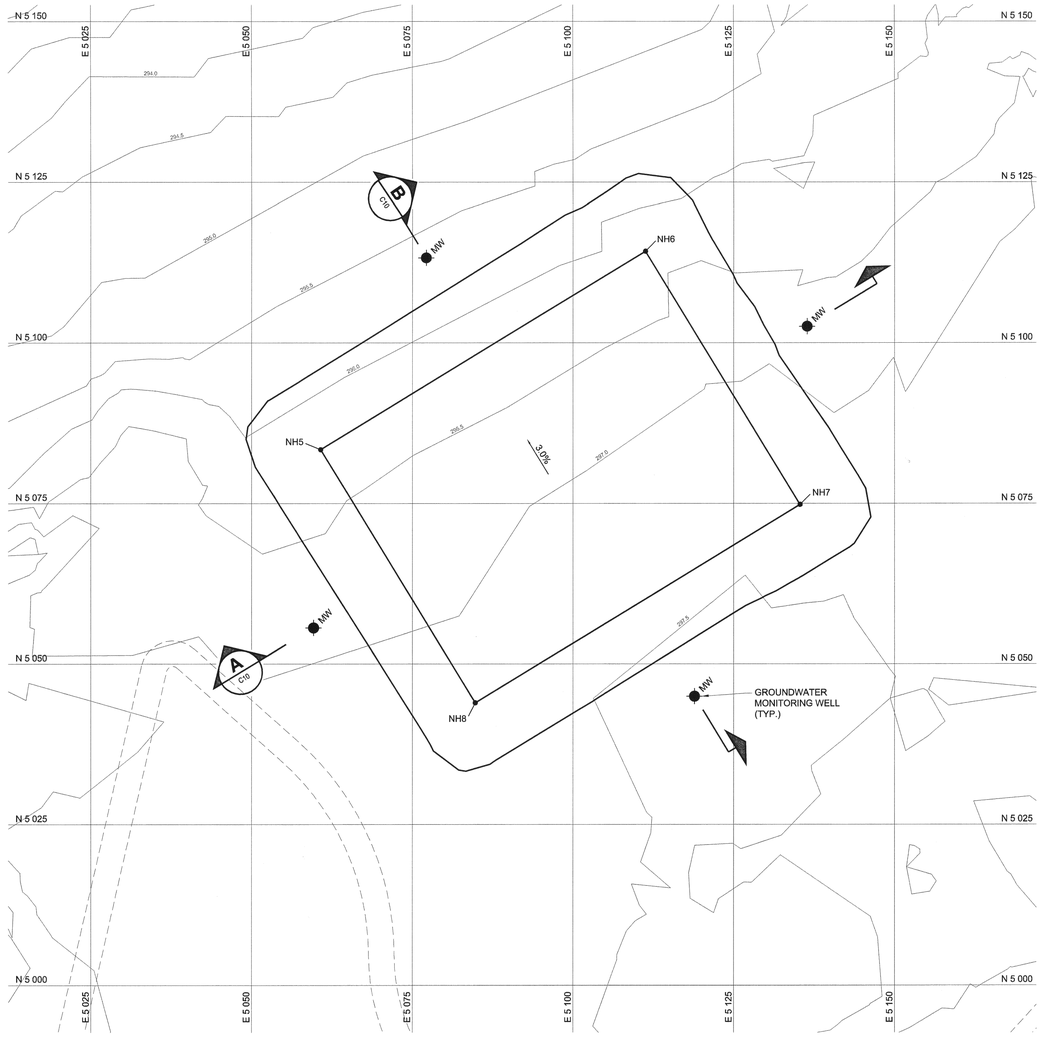

FINAL COVER PLAN

0 4 8 12 m SCALE 1:400

COORDINATE LISTING			
No.	NORTHING	EASTING	ELEVATION
NH1	5 083.86	5 058.66	298.50
NH2	5 116.30	5 111.73	298.50
NH3	5 074.32	5 137.39	299.61
NH4	5 041.88	5 084.32	299.61
NH5	5 083.36	5 060.72	299.50
NH6	5 114.24	5 111.23	299.50
NH7	5 074.82	5 135.33	300.61
NH8	5 043.94	5 084.81	300.61

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LEGEND:

NH1 — COORDINATE POINT

MW — PROPOSED MONITORING WELL LOCATION

REGISTERED PROFESSIONAL ENGINEER R.H. SCHMIDTKE LICENSEE NUNAVUT

PERMIT TO PRACTICE
AECOM Canada Ltd.
Signature
Date
PERMIT NUMBER: P639
NWT/NU Association of Professional Engineers and Geoscientists

UMA | AECOM

REVISIONS	DESCRIPTION	DATE
0	ISSUED FOR CONSTRUCTION	09/03/11

A detail number / number du detail
B source drawing no. / de dessin no.
C detail on drawing no. / detail sur dessin no.

project title / titre du projet
CAM-D REMEDIATION PROJECT

drawing title / titre du dessin
NON-HAZARDOUS WASTE LANDFILL PLAN

designed by / conçu par	T. ESHPETER
drawn by / dessiné par	B. HASSLER
approved by / approuvé par	R. SCHMIDTKE
PWGSC Project Manager / Administrateur de Projets TPSGC	M. McELWAINE
scale / échelle	1:200
project no. / projet no.	416837
date / date	MARCH, 2009
sheet / feuille	C09 OF 11

416837-C09

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Saved by: Hassler, Brad
UMA FILE NO.: 2977-351-00_01-B-0009_R0.DWG
B1 1000 x 707

APPENDIX C:
Visual Monitoring Checklist

Date:			
Site:			
Note	**Response**	**Extent**	**Description**
	Yes/No	*Provide information as applicable (i.e. length/width/depth/type)*	*Features of note, photographic reference with scale, point of view anddirection*
Natural Environmental Monitoring			
Wildlife Sightings			
Evidence of Wildlife			
Wildlife Activity			
Relative Number			
Evidence of Revegetation			
Landfill Location:			
Post-Closure Landfill Monitoring			
Evidence of Settlement			
Evidence of Erosion			
Evidence of Frost Action			
Animal Burrows			
Vegetation Present			
Vegetation Stresses			
Staining Present			
Seepage Points			
Exposed Debris			
Condition of Instruments			
Other Features			