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DEW LINE CLEAN UP PROJECT
PIN-3 LADY FRANKLIN POINT
BASELINE LANDFILL MONITORING

Prepared for:
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Table of Contents

List of Appendices

List of Tables

List of Figures

1.0 PIN-3 Lady Franklin Point

1.1 Introduction

The PIN-3 Lady Franklin Point DEW Line site is located on the west side of Victoria Island at 68° 28' north latitude and 113° 13' west longitude. The community of Cambridge Bay is located approximately 325 kilometres southeast, and the community of Kugluktuk, 115 kilometres to the southwest.

PIN-3 was converted to a Long Range Radar (LRR) site in the early 1990s. The module train facility for the LRR burned down in a fire during the winter of 2000, but is scheduled for re-building. The environmental cleanup and demolition of facilities not required for the operation of the LRR site commenced in 2002 and was completed during the summer of 2004. The cleanup included the closure and remediation of four existing landfills as well as the construction of a landfill for the disposal of non-hazardous wastes generated from demolition, and collection of site debris. A DCC Tier II soil disposal facility for the disposal of Tier II contaminated soil was also constructed at this site. The landfills, as shown on the overall site plan, Figure PIN-3.1, include:

- Main Landfill
- NWS Landfill
- South Landfill
- North Landfill
- DCC Tier II Soil Disposal Facility
- Non-Hazardous Waste Landfill

Assessment of the PIN-3 site was carried out in 1989, 1990, 1993, 2000 and 2001. The engineering component of the assessment was completed by UMA Engineering Ltd. (UMA) and the environmental component by the Environmental Sciences Group (ESG). Input on traditional land use was provided by Vista Engineering on behalf of Nunavut Tunngavik Incorporated (NTI). Design requirements for landfill closure were based up the geophysical and geotechnical investigations performed by UMA and EBA Engineering Consultants Ltd. (EBA), and the environmental data provided by ESG.

In accordance with the NTI-DND Cooperation Agreement, landfill monitoring will be carried out following cleanup of the site. The monitoring schedule for the PIN-3 Lady Franklin Point site is provided in Table 1.1. Shaded rows indicate the monitoring events conducted internally by the DEW Line Clean Up project team.

This report has been prepared as a summary of the baseline monitoring carried out at PIN-3 Lady Franklin Point. Soil and groundwater sampling was done by ESG, with analytical work performed by Queen's University and the Royal Military College laboratories in Kingston, Ontario. The final construction inspection of the landfills was carried out by EBA and UMA.

The following sections provide an overview of the site biophysical environment and traditional land use activities, site background conditions, the general monitoring program, and the basis for evaluation of monitoring results.

Table 1.1: Monitoring Schedule – PIN-3 Lady Franklin Point

No. of Years After Construction	Monitoring Event Number	Year
Prior to and during	Baseline	1989, 1990, 2000-2001, 2003-2004
1	1	2005
2	2	2006
3	3	2007
4	4	2008
5	5	2009
7	6	2011
10	7	2014
15	8	2019
25	9	2029

1.2 Background

1.2.1 Biophysical Environment

The PIN-3 Lady Franklin Point site is located on the west side of Victoria Island at 68° 28' north latitude and 113° 13' west longitude. The community of Cambridge Bay is located approximately 325 kilometres southeast, and the community of Kugluktuk, 115 kilometres to the southwest.

The region displays typical tundra topography with numerous, unconnected shallow, depressions and thaw lakes in flat areas adjacent to ridges. Elongated, unconnected ponds may occupy the swales between the ridges. Flat topography and exposure have limited the vegetation growth in the area. Towards the north and west of the station, vegetation is sparse, but is more continuous in sheltered or leeward areas. Vegetation typically consists of willow, sedge, mountain avens, saxifrage, lousewart, mosses, and grasses.

Annual precipitation is in the order of 109 mm, with approximately 64 mm as rain and the remainder as snowfall.

During operation of the DEW site, and during DEW Line Clean Up site investigations, personnel indicated that muskoxen were observed on a frequent basis in the vicinity of the station. Peary caribou, the smallest of several kinds of caribou, may be observed year round at Lady Franklin Point. Other terrestrial mammals in the area include arctic fox, arctic hare, arctic ground squirrels and lemmings.

The marine environment off shore of the PIN-3 site is not a significant migratory route for the larger marine species. Due to annual ice conditions in the central Arctic, most marine mammals do not penetrate into or migrate from Lancaster Sound prior to freeze-up; however, ringed seals may occur year round.

Raptors, included Peregrine Falcon, snowy owl, golden eagle, rough-legged hawk and gyrfalcon are known to occur in the area. Shorebirds are neither as common nor as diverse as at Cambridge Bay.

Canada Geese, eider duck and loons were seen in the site vicinity. Other birds that have been observed include sandpipers, Phalarope, plover, terns, longspur, ravens and snow buntings.

1.2.2 Traditional Land Use

Residents of Kugluktuk travel over the sea ice in winter and spring and commonly stop over at the Lady Franklin Point beach area, although the ultimate hunting destination is usually Reid Island. Hunting at Lady Franklin Point is more common with Cambridge Bay residents, who harvest waterfowl and muskoxen. Caribou are more likely to be hunted closer to the community during their migration, but are occasionally harvested in the site area as well. Local people do not harvest sedentary aquatic organisms or plants from the area.

Within the Coronation Gulf and Dolphin and Union Straits, local residents harvest char, cod, and seal. Whale sightings were noted to be rare.

During freeze-up, sea ice is used for drinking water, while during the summer months, water is obtained from inland freshwater ponds. Water is not obtained from the PIN-3 site drinking water lake.

1.2.3 Geology and Site Background Conditions

The landscape at Lady Franklin Point is relatively flat with limited relief. Bedrock consists of Paleaozoic flat-lying, jointed, carbonate rocks. Surficial deposits are of marine origin, occurring as ridges and blankets on coastal platforms. Surficial material varies from poorly graded, stratified to massive gravel, through to sand, silt and clay. Bedrock is generally one to three metres below ground surface.

Soil samples were collected in locations removed from site activities to establish background geochemical conditions. Sample results are presented in Table 1.2.

Table 1.2: PIN-3 Lady Franklin Point - Summary of Site Background Soil Analytical Data

Sample #	Depth (cm)	Date	Copper [mg/kg]	Nickel [mg/kg]	Cobalt [mg/kg]	Cadmium [mg/kg]	Lead [mg/kg]	Zinc [mg/kg]	Chromium [mg/kg]	Arsenic [mg/kg]	Mercury [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]
BF503	0	1990										0.0056	
BM500	0	1989	5.8	<5.0	<5.0	<1.0	<10	6	<10	<0.3	<0.5	0.00049	
G527	0	1990	18.6	11.3	<5.0	<1.0	<10	11	<20	1.1	<0.5		
G528	0	1990	18.4	17.8	<5.0	<1.0	<10	10	<20	0.3	<0.5	<0.0025	
G529	0	1990	10.4	17.9	<5.0	<1.0	<10	60	<20	0.7	<0.5	<0.0011	
00-13890/91	0	2000	12	6.1	<5.0	<1.0	<10	18	<20	<1.0		<0.1	<40
00-14528	0	2000	35	5.7	<5.0	<1.0	<10	<15	<20	1.5		<0.1	<40
00-14529	0	2000	6.7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1	<40
00-14530/31	0	2000	6.6	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1	<40
00-14532	0	2000	6.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1	<40
01-17947	0	2001	18	5.0	<5.0	<1.0	<10	23	<20	<1.0	<0.1	<0.1	
01-17948	60	2001	6.7	<5.0	<5.0	<1.0	<10	15	<20	<1.0	<0.1	<0.1	
01-17949	0	2001	7.5	<5.0	<5.0	<1.0	<10	15	<20	1.2	<0.1	<0.1	
01-17950/51	40	2001	11	7.0	5.1	<1.0	<10	17	<20	1.2	<0.1	<0.1	
N Value			13	13	13	0	0	13	13	13	8	13	5
Average			12.5	6.6	<5.0	<1.0	<10	15.8	<20	<1.0		<0.1	<40
Standard Deviation			8.3	5.6				14.3					
Minimum			5.8	2.5				6	<10	<0.3	<0.1	<0.0011	
Maximum			35	17.9	5.1			60	<20	1.5	<0.5	<0.1	
95% Confidence Limit			4.5	3.1				7.8					

1.3 Landfill Monitoring Program

The general components of the landfill monitoring program at PIN-3 include:

- Visual inspection
- Surface and shallow depth soil sampling and analyses
- Groundwater sampling and analyses
- Ground temperature monitoring

The requirements for landfill monitoring, as laid out in Environmental Provisions of the NTI-DND Agreement, are summarized in Table 1.3. Detailed landfill monitoring requirements are described in the Landfill Monitoring Plan – Part B – Nunavut Settlement Region.

Table 1.3: General Landfill Monitoring Requirements

Landfill Classification	Visual Inspection	Groundwater Sampling	Soil Sampling	Thermal Monitoring
Existing Landfills, High Potential Environmental Risk (Class A)	Not required, as landfill to be excavated.			
Existing Landfills, Moderate Potential Environmental Risk (Class B)	√	√	√	√
Existing Landfill, Low Potential Environmental Risk (Class C)	√		√	
New Landfill, Non-Hazardous Waste Landfill	√	√	√	
New Landfill, DCC Tier II Disposal Facility	√	√	√	√

A summary of these requirements, as related to the specific landfills at PIN-3, is provided in Table 1.4. The rationale for the monitoring requirements is provided in the landfill-specific sections.

Table 1.4: PIN-3 Lady Franklin Point Landfill Monitoring Requirements

Landfill Designation	Visual Inspection	Groundwater Sampling	Soil Sampling	Thermal Monitoring
Main Landfill	√	√	√	√
NWS Landfill	√		√	
South Landfill – West	√		√	
South Landfill – East	√		√	
North Landfill	√		√	
DCC Tier II Soil Disposal Facility	√	√	√	√
Non-Hazardous Waste Landfill	√	√	√	

1.3.1 Visual Inspection

The physical condition of each landfill is inspected in accordance with the Visual Inspection Checklist provided in the Environmental Provisions of the NTI-DND Agreement. Documented observations include evidence of settlement, ponding, frost action, erosion, and lateral movement, as well as sloughing of berms, and thermal contraction cracks. Documentation of observations is supported using hand drawn sketches, as applicable. Photographic Records are provided to document the general condition of the landfill and to substantiate all recorded observations.

1.3.2 Soil Sampling

Background (naturally occurring) conditions refer to native soil geochemistry and represent soil quality from an area not impacted by site activities. Soil sampling to establish general site background conditions was conducted in 1989, 1990, 2000, and 2001 by the Environmental Sciences Group (ESG). Results are reported in Table 1.2 above.

Baseline conditions refer to existing soil chemistry at the landfill area prior to and during remediation. The baseline landfill monitoring program consists of two phases: samples collected as part of the landfill assessment program which determined whether the landfill posed a potential environmental risk, and samples collected during the construction/closure of the landfill. The results of subsequent landfill monitoring events are compared to baseline and background values to evaluate any potential changes in environmental conditions.

As part of the baseline sampling program, soil samples are collected in areas upgradient and downgradient of each landfill. Upgradient samples are targeted to areas near the landfill, but not influenced by migration of contaminants through the landfill. Upgradient samples are meant to be representative of contaminant input conditions to the landfill and serve as the primary basis upon which to compare the downgradient contaminant concentrations.

Downgradient soil samples are collected at surface/shallow depths from designated areas at the toe of each landfill and from areas of preferential drainage. These soil samples are collected and analyzed to document whether there has been migration of contaminants, either historically or recent, from the landfill area. Although contaminants are primarily transported in water (surface and groundwater), they have a tendency to absorb to soil particles the water is migrating through. The soil, thus, retains information regarding the historical input of contaminants.

Analytical results of soil samples collected downgradient of landfills are compared to contaminant concentrations of samples collected upgradient of landfills. Downgradient samples are also compared to overall site background contaminant levels because they help in establishing a more broad level of contaminant concentrations that can be found at the site, particularly where different soil or rock types are present. Contaminant concentrations in downgradient samples that are significantly higher than background or upgradient concentrations, particularly where there have been changes over time, provide evidence of contaminants having migrated to and, possibly beyond, the soil sampling location. These data, in conjunction with other site-specific information, were used in the assessment of the environmental status of the landfill and the determination of an appropriate remediation solution.

Soil sampling locations are indicated on the site-specific landfill drawings included in the annexes to this report. Samples collected during baseline and subsequent landfill monitoring are analyzed for the following parameters:

- Inorganic elements: arsenic, cadmium, chromium, cobalt, copper, lead, nickel and zinc.
- Mercury.

- PCBs (polychlorinated biphenyls – total Aroclor).
- TPH (Total Petroleum Hydrocarbons) – as represented by the sum of F1 (nC_6 to nC_{10}), F2 (nC_{10} to nC_{16}.), and F3 (nC_{16} to nC_{34}.), as defined by the CCME Tier I Method – Rev. 5, Analyses of Total Petroleum Hydrocarbons in soil.

The Method Detection Limit (MDL) for each parameter is specified in Table 1.7.

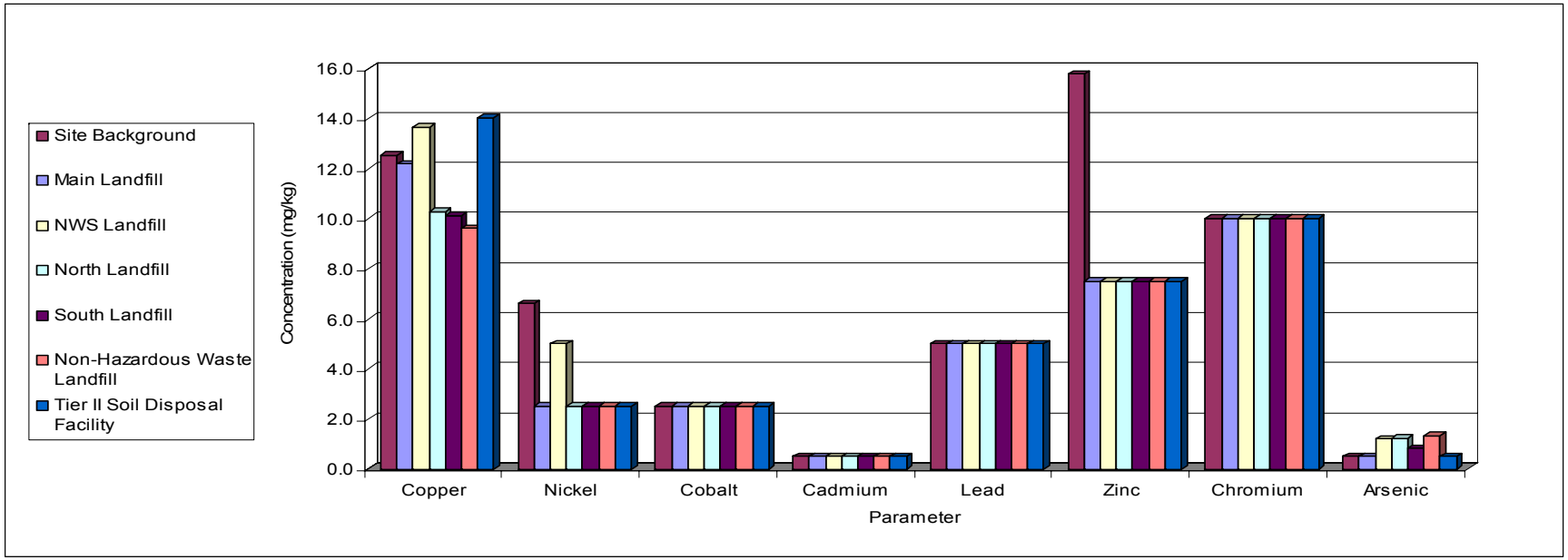
The requirement for the analyses of baseline samples is to provide record information on the environmental status of the landfill should potential problems be identified during the monitoring program. Analytical results are presented under the discussion for each landfill.

To provide a basis for evaluation with subsequent monitoring analytical results, simple statistical analyses were carried out to determine the arithmetic mean, standard deviation, and 95% confidence interval for each inorganic parameter analyzed. In general, for samples in which the concentration was less than the Method Detection Limit (MDL), one-half of the MDL was used in the statistical analyses. However, in cases where the majority of the analytical results fell below the MDL, the arithmetic mean is represented as less than the MDL. It should be noted that MDLs for analyses completed under previous years' landfill assessment programs may not be the same as those specified Table 1.5, particularly for PCBs. In cases where the contaminant was not detected, the chemical baseline is typically represented as a range over the different MDLs. Summaries of the arithmetic mean of the concentration of inorganic elements in soil are presented in Table 1.5 and Figure 1.1. Additional statistical data is presented under the discussion for each landfill.

Table 1.5: PIN-3 Lady Franklin Point - Summary of Arithmetic Mean - Soil Baseline Data

Area	Arithmetic Mean (in mg/kg)								Range
	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic	PCBs
Site Background	12.5	6.6	<5.0	<1.0	<10	15.8	<20	<1.0	
Main Landfill	12.2	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.001 - 0.2
NWS Landfill	13.7	5.0	<5.0	<1.0	<10	<15	<20	1.2	0.001 - <0.1
North Landfill	10.3	<5.0	<5.0	<1.0	<10	<15	<20	1.2	0.0011 - <0.1
South Landfill	10.1	<5.0	<5.0	<1.0	<10	<15	<20	0.8	0.0009 - <0.1
Non-Hazardous Waste Landfill	9.6	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.003 - <0.1
Tier II Soil Disposal Facility	14.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.003 - <0.1

Figure 1.1: PIN-3 Lady Franklin Point - Summary of Arithmetic Mean - Soil Baseline Data



1.3.3 Groundwater Sampling

During the construction phase, groundwater monitoring wells are installed at all existing landfills classified as a moderate environmental risk (Class B landfills) and new landfills. The Main Landfill at PIN-3 was designated as Class B. Two new landfills were built during the construction phase; the Non-Hazardous Waste Landfill to accommodate non-hazardous waste and site debris, and the DCC Tier II Disposal Facility to accommodate Tier II-contaminated soil. Similar to the soil monitoring program, groundwater monitoring wells were installed hydraulically upgradient and downgradient of the landfills as indicated in Table 1-4 and Table 1-8. Surface and shallow depth soil samples are also collected adjacent to monitoring well locations. Analytical data from water samples collected from wells up- and downgradient are reviewed in conjunction with soil analytical data to evaluate potential impacts associated with the landfill. Baseline groundwater data exists only from the site clean-up period; no samples were collected in the relevant areas during the site investigation. A summary of mean baseline concentrations of contaminants in groundwater is provided in Table 1-6 and Figure 1-2.

For baseline and for future monitoring events, the following physical measurements are recorded prior to collection of groundwater samples from a monitoring well:

- Water elevation.
- Total water of depth.
- Height of well stick-up.
- Depth to bottom of well.
- Presence of hydrocarbons.
- Hydrocarbon thickness (if appropriate).

Prior to sampling, monitoring wells are purged until groundwater parameters such as pH, temperature and conductivity stabilize. In the event of low recharge volumes, standing water may be sampled and specifically documented. Water samples are not filtered.

Following withdrawal of a water sample, other physical measurements recorded include:

- Colour, odour.
- pH; conductivity, and temperature.

Groundwater samples are analyzed for the following parameters:

- Inorganic elements (total concentrations): arsenic, cadmium, chromium, cobalt, copper, lead, nickel and zinc.
- Mercury.
- PCBs (polychlorinated biphenyls – total Aroclor).
- TPH (Total Petroleum Hydrocarbons) – C_6 to C_{32}.

Minimum Method Detection Limits are specified in Table 1-7. A summary of the landfill monitoring installations/sampling locations is provided in Table 1-8.

Table 1.6: PIN-3 Lady Franklin Point - Summary of Arithmetic Mean - Groundwater Baseline Data

Area	Arithmetic Mean (in mg/L)							
	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic
Site Background	0.004	<0.003	<0.001	<0.010	0.008	0.008	<0.003	<0.0005
Main Landfill	0.009	0.020	<0.003	<0.001	<0.01	0.017	0.032	<0.003
Non-Hazardous Waste Landfill	0.012	0.021	<0.003	<0.001	<0.01	0.019	0.041	<0.003
Tier II Soil Disposal Facility	0.308	0.065	0.021	<0.001	0.528	0.527	0.111	0.015

Figure 1.2: PIN-3 Lady Franklin Point - Summary of Arithmetic Mean - Groundwater Baseline Data

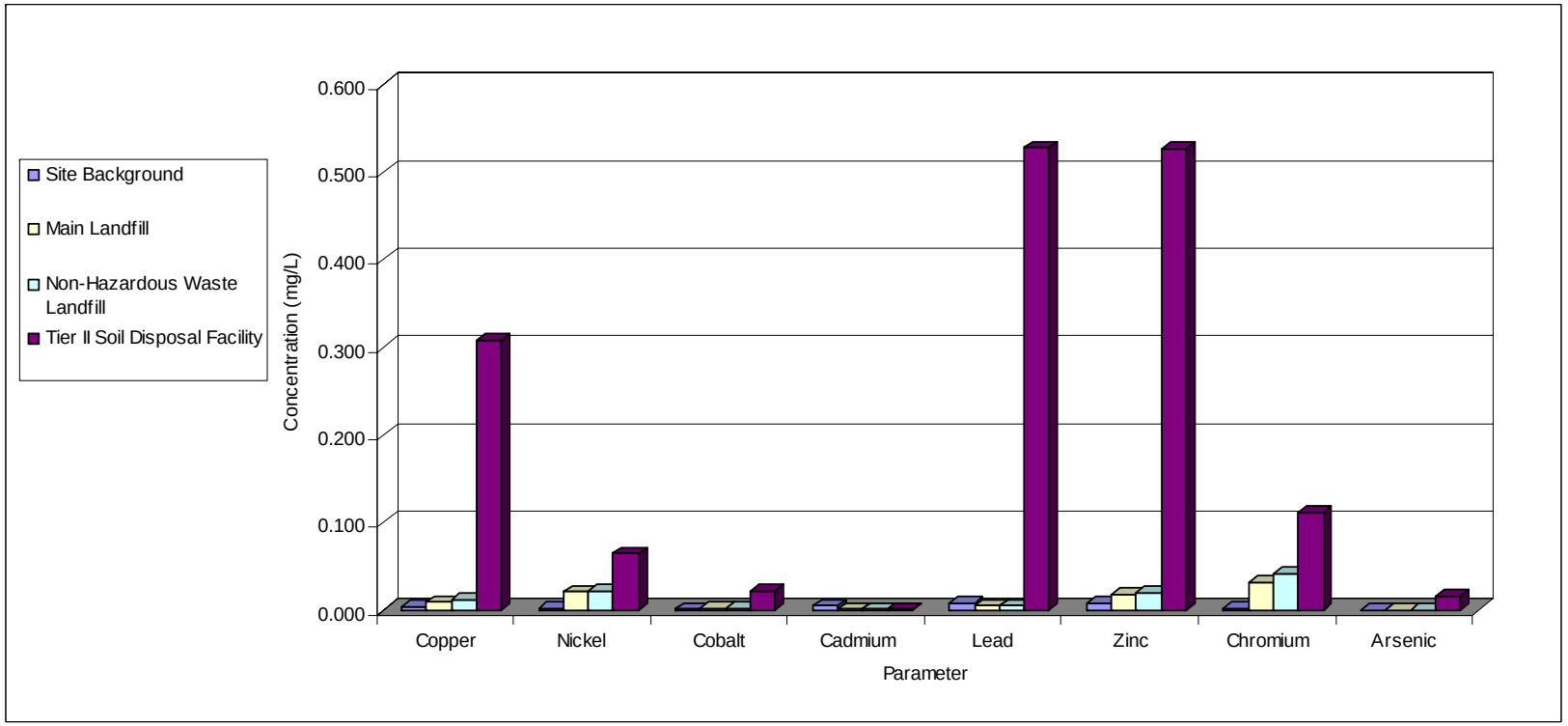


Table 1.7: Detection Limits for Analytical Requirements

Parameter	Soil Samples Minimum Analytical Detection Limit (mg/kg = ppm)	Water Samples Minimum Analytical Detection Limit (mg/L = ppm)
Copper	<3.0	<0.005
Nickel	<5.0	<0.010
Cobalt	<5.0	<0.005
Cadmium	<1.0	<0.001
Lead	<10	<0.01
Zinc	<15	<0.005
Chromium (total)	<20	<0.005
Arsenic	<0.2	<0.05
Mercury	<0.1	<0.001
PCBs	<0.003	<0.003
TPH	<40	<1

1.3.4 Thermal Monitoring

For Class B landfills where a component of the remediation design includes the placement of additional fill to promote aggradation of permafrost through the landfill contents, geothermal modelling is conducted to determine the maximum depth of active layer at the landfill, and the amount of fill required on the landfill surface to ensure that the active layer does not penetrate into the landfill contents following freeze-back. Modelling also determines the length of time required for the landfill contents to freeze-back following the placement of additional surface fill. Geothermal modelling considers soil type, soil thermal properties, presence or absence of insulating cover (vegetation or snow drift), measured ground temperatures at the site or at nearby sites, measured air temperature and climatic data (from 1959-1999 from Environment Canada), an estimated 1 in 100 warm year air temperature, and an estimate of the effect of global warming (based on estimates of temperature change reported by the Panel on Energy Research and Development for Environment Canada – PERD - in 1998) At PIN-3, a typical active layer depth based on ten years of mean climatic data is 2.2 m for the Main Landfill and 2.1 m for the Tier II Soil Disposal Facility. The predicted active layer depths for a 1 in 100 warm year are 2.8 m and 2.7 m respectively. The predicted active layer depth for both landfills after 100 years of global warming (using the best estimate approximation method as opposed to more conservative approaches) is 2.6 m. The active layer depth used for design at PIN-3 is the resultant active layer depth from modelling 10 consecutive 1 in 100 warm years – a depth of 3.0 m (for both landfills). It is expected to take one year for the landfill contents to freeze back with this depth of cover fill.

During landfill remediation, vertical thermistors are installed within the landfill and along the key toe to record ground temperatures. Measured ground temperatures will be compared to the active layer depth and freeze-back time modelled during design. It is anticipated that all landfills where freeze-back is an integral part of the design will reach thermal equilibrium within approximately five years following closure.

If thermal equilibrium is not achieved within five years, it may be necessary to increase the term of the thermal monitoring.

1.4 Scope of Report

The following sections of the report are organized according to landfill designation. For each landfill included in the monitoring program, the following information is provided:

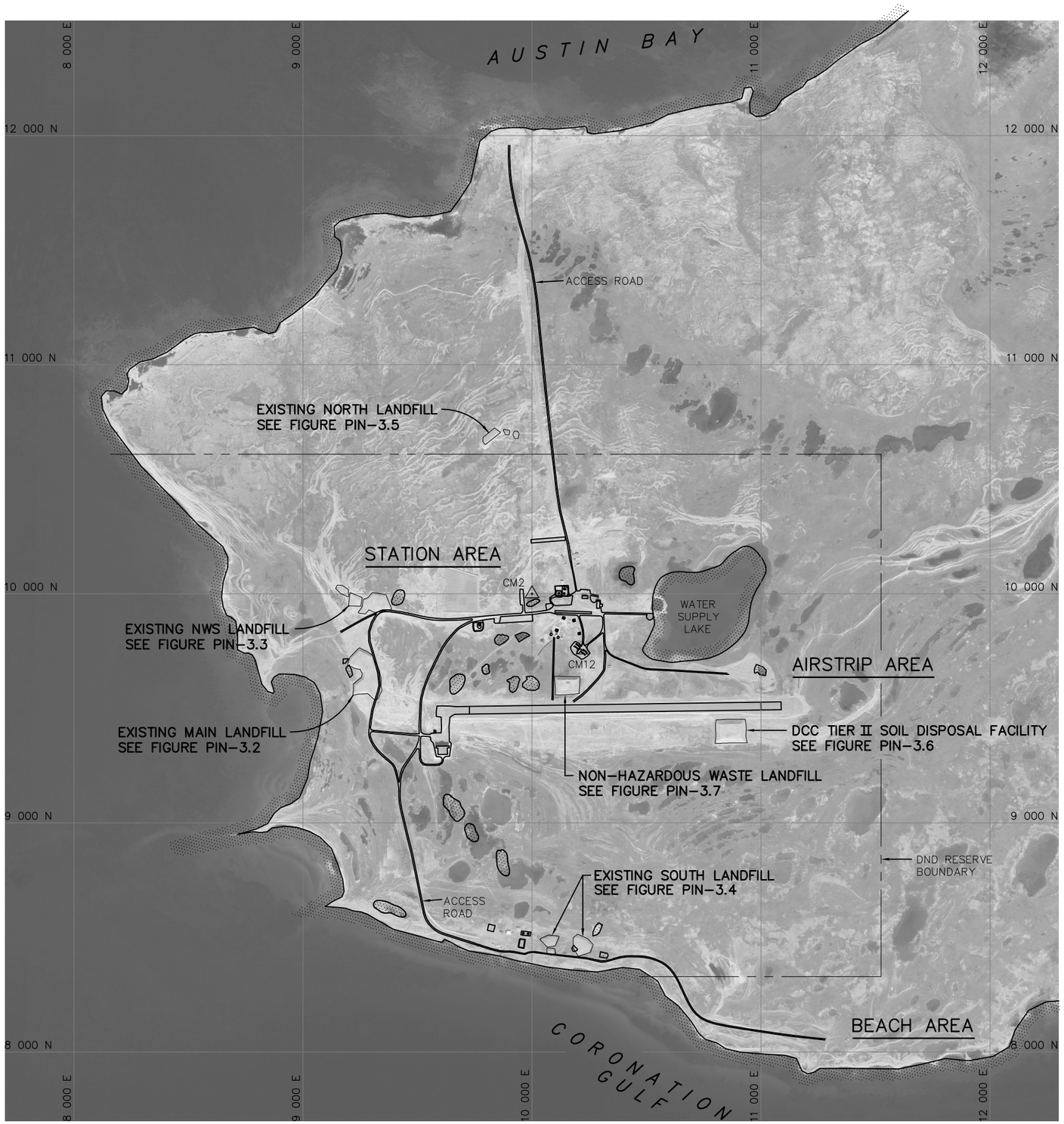
- A brief description of the landfill.
- Qualitative assessment of the potential environmental risk associated with the specific landfill.
- Summary of the remediation design.
- Baseline conditions (as applicable).

Table 1.8: Summary of Landfill Monitoring Installations/ Sampling Locations
PIN-3 Lady Franklin Point

Landfill Designation/Monitoring Locations	Coordinates[1]		Elevation
	North (m)	East (m)	(masl)
Main Landfill			
MW-5 (soil and groundwater)	9664	9378	9.57
MW-6 (soil and groundwater)	9693	9185	4.07
MW-7 (soil and groundwater)	9651	9247	4.66
MW-8 (soil and groundwater)	9571	9206	3.08
VT1 (temperature)	9681	9292	10.70
VT2 (temperature)	9699	9210	7.92
VT3 (temperature)	9603	9298	10.01
VT4 (temperature)	9590	9233	7.82
NWS Landfill			
P3-1 (soil)	10010	9330	-
P3-2 (soil)	9922	9232	-
P3-3 (soil)	9968	9189	-
P3-4 (soil)	10003	9145	-
South Landfill – East and West			
P3-5 (soil)	8515	10072	-
P3-6 (soil)	8454	10105	-
P3-7 (soil)	8413	10083	-
P3-8 (soil)	8456	10054	-
P3-9 (soil)	8510	10230	-
P3-10 (soil)	8421	10234	-
P3-11 (soil)	8449	10170	-
North Landfill			
P3-12 (soil)	10691	9871	-
P3-13(soil)	10699	9789	-
P3-14 (soil)	10729	9825	-
P3-15 (soil)	10727	9891	-
P3-16 (soil)	10721	9937	-

Landfill Designation/Monitoring Locations	Coordinates[1]		Elevation
	North (m)	East (m)	(masl)
Tier II Soil Disposal Facility			
MW-9 (soil and groundwater)	9470	10860	15.26
MW-10 (soil and groundwater)	9336	10795	10.88
MW-11 (soil and groundwater)	9329	10867	10.65
MW-12 (soil and groundwater)	9336	10939	10.96
VT5(temperature)	9431	10848	18.62
VT6 (temperature)	9432	10888	18.59
VT7 (temperature)	9374	10850	17.50
VT8 (temperature)	9375	10890	17.52
Non-Hazardous Waste Landfill			
MW-13 (soil and groundwater)	9598	10217	15.12
MW-14 (soil and groundwater)	9652	10145	14.28
MW-15 (soil and groundwater)	9587	10095	14.49
MW-16 (soil and groundwater)	9549	10138	14.42

Note 1: Coordinates are referenced to the site grid and are only approximate for soil sampling locations. Monitoring well and thermistor coordinates as provided by the cleanup contractor



LEGEND:

CM2 △ SURVEY CONTROL MONUMENT

SURVEY CONTROL MONUMENTS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
CM2	10 000.000	10 000.000	15.115	PIN–3 BASELINE STA. 8+00.0
CM12	9 754.519	10 222.290	15.511	DMA RM–1 11809

RECORD DRAWING
NOT FOR CONSTRUCTION

0 200 400 600m
200 100 1:20000

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3 - LADY FRANKLIN POINT

OVERALL SITE PLAN

FIGURE PIN-3.1

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DOS NAME: P3-RD01.DWG DJ - 05/11/08

2.0 Main Landfill

The Main Landfill is located approximately 800 metres west of the main station facilities. The landfill is bounded to the north and east by existing access roads. Based on the results of the geophysical survey, the area of buried debris is irregularly shaped, but fairly continuous over the landfill area, with a total area of 14,200 m^2. Landfill depth was estimated to vary between 0.5 and 2.0 m depth. At the time of investigation, scattered surface and partially buried debris, consisting of metal, barrels, and domestic wastes, covered approximately 30 percent of the surface area. Several areas of Tier II contamination were present on the surface of the landfill: there were several areas with copper and/or lead and PCB contamination, one of which also contained Tier II zinc. There were also two areas of Tier I PCB contamination. Downgradient of the landfill, there were localized areas where inorganic element concentrations were elevated compared to site background or upgradient concentrations. In particular, copper was noted to be elevated in several areas, especially in the north section of the landfill. However, elevated (compared to background) copper levels were detected in two upgradient soil samples as well.

The surface of the landfill generally slopes to the west with grade varying between 2% and 4%. Cover materials consist of sand and gravel. Prior to remediation, depth of existing cover materials was estimated as 0.5 m or less. Surface water run-off potential was considered low due to the slight slopes. The direction of flow from the landfill is west, towards the Coronation Gulf, approximately 150 metres downgradient. Vegetative cover was low to moderate, with increased vegetation along the toe and downgradient of the landfill. The habitat usage of the area is considered moderate, with sightings of muskox, caribou, fox, hare and birds. There was no evidence of birds nesting in the landfill area. The nearest potential freshwater drinking water sources is over 1 kilometre away.

Based on the available information, the Main Landfill was classified as moderate to high potential environmental risk. The remediation for this landfill included partial excavation (the north section), and for the remaining part of the landfill, the installation of a liner system anchored into the permafrost or bedrock along the toe of the landfill and regrading with the placement of additional granular fill sufficient to cause permafrost aggradation through the landfill contents. A cross-section showing illustrated remedial design is shown in Figure 3.2a. Groundwater monitoring wells were installed around the landfill perimeter.

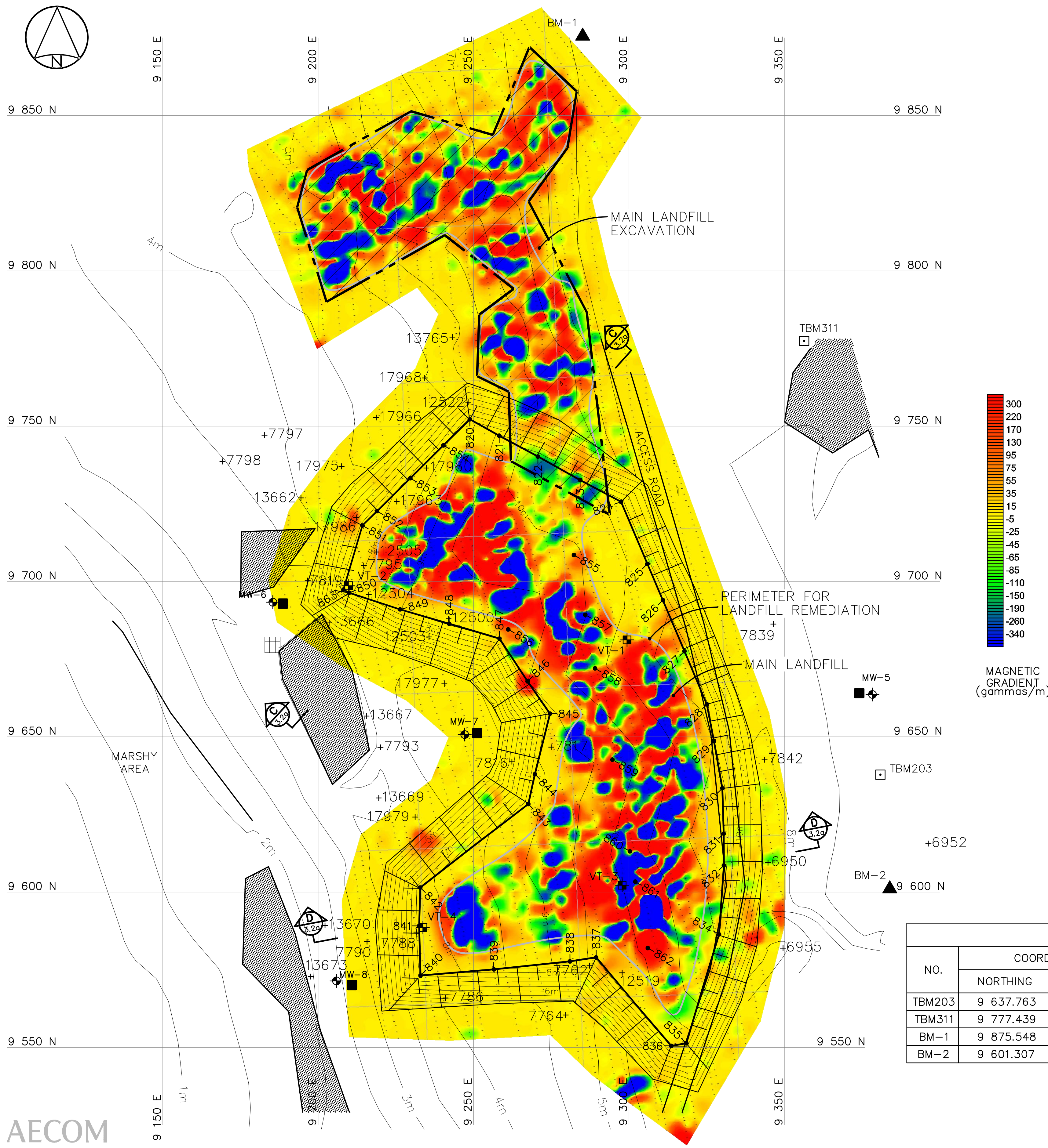
The long term monitoring plan consists of visual inspection for evidence of settlement or erosion, collection of soil and groundwater samples to evaluate the effectiveness of the leachate containment system, and monitoring of subsurface ground temperatures along the toe and in the main body of the landfill. Approximate locations for the collection of soil and groundwater samples, and thermistor installation locations are identified on Figure PIN-3.2.

2.1 Baseline Data

Locations for baseline soil samples are shown in Figure PIN-3.2. A summary of baseline soil analytical data is provided in Table 2.1. Baseline data is comprised of landfill assessment data for soil samples collected up- and downgradient of the landfill during site investigation events, and data from soil and groundwater samples collected at the permanent monitoring locations during site cleanup in 2003-2004. Data for soil samples collected in surface contaminated areas have not been included because these areas are now effectively contained within the landfill. Soil baseline concentrations of inorganic elements at the Main Landfill are consistent with site background levels. It is worth noting, however, that copper was the predominant contaminant noted to be elevated downgradient of the landfill during assessment, and levels above site background were also noted at two upgradient locations. However, this data was from samples collected primarily from the north section of the landfill that was excavated; this data has not, therefore, been included in the baseline data set, and the average copper concentration calculated is

close to the average background level. Low-level PCBs and total petroleum hydrocarbons (TPH) were detected in soil from localized locations downgradient.

Groundwater baseline analytical data is provided in Table 2.2. No PCBs or TPH were detected in groundwater. Site background levels for groundwater are based on only one sample. Nonetheless, groundwater baseline concentrations at the Main Landfill are significantly higher than site background levels for copper, nickel, zinc, and chromium.



LEGEND:

- TBM203 ⊡ TEMPORARY BENCHMARK
- BM-2 ▲ PERMANENT BENCHMARK
- MW-5 MONITORING WELL LOCATION
- VT VERTICAL THERMISTOR
- 820 COORDINATE POINT
- ■ MONITORING SOIL SAMPLE LOCATION
- BEDROCK
- +6952 BASELINE SOIL SAMPLE LOCATION

COORDINATE POINTS (AS-BUILT) FINAL LANDFILL SURFACE			
NO.	NORTHING	EASTING	ELEV.
820	9 752.2	9 248.8	8.86
821	9 746.9	9 258.2	9.58
822	9 740.2	9 270.7	10.34
823	9 732.6	9 284.3	10.46
824	9 725.6	9 297.4	10.71
825	9 705.7	9 305.9	10.73
826	9 694.0	9 310.9	10.87
827	9 677.5	9 317.8	11.36
828	9 660.4	9 325.0	11.09
829	9 648.6	9 327.3	11.02
830	9 633.4	9 330.0	11.20
831	9 618.8	9 330.4	11.40
832	9 608.6	9 330.5	11.26
833			
834	9 586.4	9 329.0	11.05
835	9 551.3	9 318.4	9.75
836	9 550.5	9 313.6	9.56
837	9 579.0	9 289.4	9.64
838	9 577.7	9 281.0	9.20
839	9 575.1	9 256.5	8.36
840	9 573.1	9 232.9	7.53
841	9 589.1	9 232.4	7.82
842	9 601.5	9 232.8	7.86
843	9 628.3	9 267.6	8.84
844	9 637.9	9 269.7	8.87
845	9 657.4	9 274.6	9.43
846	9 667.8	9 267.4	9.50
847	9 681.6	9 258.3	9.02
848	9 686.4	9 242.1	9.12
849	9 691.0	9 226.3	8.99
850	9 696.3	9 210.0	7.93
851	9 718.0	9 214.2	7.68
852	9 722.6	9 218.9	7.83
853	9 733.2	9 229.6	8.17
854	9 743.8	9 240.3	8.42
855	9 708.5	9 282.3	9.91
856	9 684.6	9 261.1	9.04
857	9 689.3	9 285.9	9.98
858	9 672.0	9 289.1	10.39
859	9 642.6	9 294.6	9.64
860	9 613.1	9 300.2	10.28
861	9 603.3	9 302.0	10.12
862	9 582.0	9 306.0	10.08
863	9 697.4	9 208.1	7.80

MONITORING WELLS			
NO.	NORTHING	EASTING	ELEV.
MW-5	9 663.625	9 378.293	9.57
MW-6	9 693.324	9 185.410	4.07
MW-7	9 650.712	9 247.115	4.66
MW-8	9 571.398	9 205.859	3.08

THERMISTORS			
NO.	NORTHING	EASTING	ELEV.
VT-1	9 681.173	9 299.360	10.70
VT-2	9 698.633	9 209.688	7.92
VT-3	9 602.196	9 297.756	10.01
VT-4	9 588.565	9 233.678	7.82

BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
TBM203	9 637.763	9 380.841	8.869	SPIKE
TBM311	9 777.439	9 356.332	8.842	50mm X 50mm WOODEN HUB
BM-1	9 875.548	9 285.067	8.370	25mm DIA. STEEL PIPE
BM-2	9 601.307	9 384.159	9.277	25mm DIA. STEEL PIPE

RECORD DRAWING
NOT FOR CONSTRUCTION

15 7.5 0 15 30 45m
1:1500

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

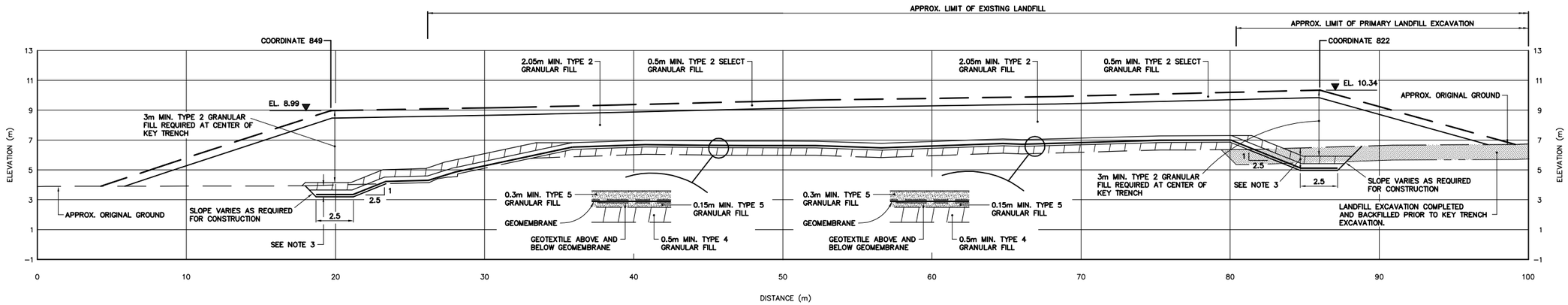
PIN-3 - LADY FRANKLIN POINT

EXISTING MAIN LANDFILL

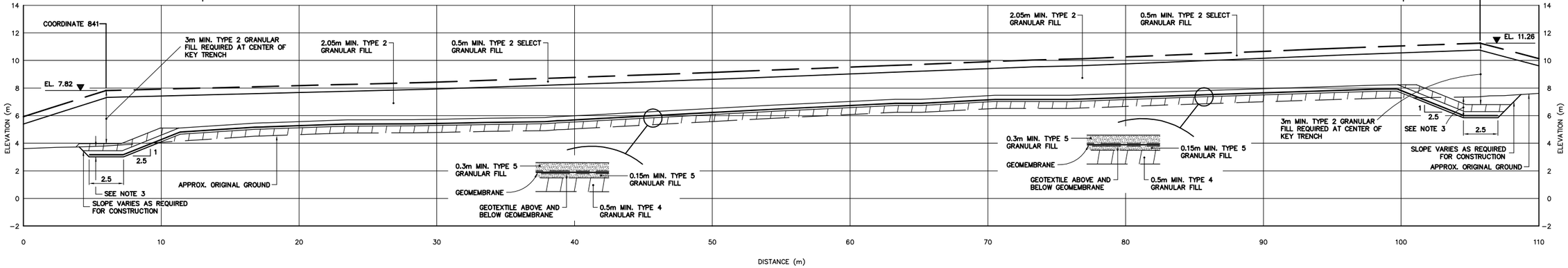
FIGURE PIN-3.2

UMA | AECOM

DOS NAME: P3-RD02.DWG DJ - 05/11/08



SECTION C 3.2



SECTION D 3.2

RECORD DRAWING
NOT FOR CONSTRUCTION

0 3 6 9m
3 1.5 1:300

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3 - LADY FRANKLIN POINT

EXISTING MAIN LANDFILL SECTIONS

FIGURE PIN-3.2a

UMA | AECOM

DGS NAME: P3-R002.DWG DJ - 05/11/08

Table 2.1: Main Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
Upgradient Soil Samples																	
00-13762		2000	0	12	<5.0	<5.0	<1.0	<10	32	<20	1.3		<0.1				
00-13764	00-13762	2000	120	8.7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
01-7833		2001	0	44	12	<5.0	<1.0	<10	16	<20	1.7	<0.1	<0.1				
01-7834	01-7833	2001	30	7.5	8.7	<5.0	<1.0	<10	15	<20	<1.0	<0.1	<0.1				
01-7835	01-7833	2001	70	5.7	5.5	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7836		2001	0	73	17	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7837	01-7836	2001	20	11	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7838	01-7836	2001	70	6.8	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7839		2001	0	8.7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7840	01-7839	2001	40	10	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7841	01-7839	2001	40	10	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7842		2001	0	8.7	6.1	5.2	<1.0	<10	<15	<20	1.1	<0.1	<0.1				
01-7843	01-7842	2001	60	9.7	6.4	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7844		2001	0	10	7.5	<5.0	<1.0	<10	20	<20	1.4	<0.1	<0.1				
01-7845	01-7844	2001	40	10	5.1	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-6950	01-7844	2001	60	11	13	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.1				
01-6952		2001	0	10	5.2	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.1				
01-6953	01-6952	2001	30	4.7	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.1	<0.1				
01-6954	01-6952	2001	70	3.3	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.1	<0.1				
01-6955		2001	0	9.8	7.7	<5.0	<1.0	<10	19	<20	<1.0	<0.1	<0.1				
01-6956	01-6955	2001	40	5.9	5	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
03-9604	MW-5	2003	0	9.6	5.0	<5.0	<1.0	<10	18	<20	<1.0	<0.1	<0.003	<40			
03-9606	MW-5	2003	30	7.5	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	<40			
04-15332	MW-5	2004	0	7.8	<5.0	<5.0	<1.0	<10	<15	<20	2.1	<0.1	<0.003	<10	<10	<4	<9
04-15334	MW-5	2004	30	7.9	<5.0	<5.0	<1.0	<10	<15	<20	1.7	<0.1	<0.003	<10	<10	<4	<9
Downgradient Soil Samples																	
L523		1989	0	16.2	14.2	<5.0	<1.0	<10	<15	<10	0.7	<0.5	0.058				
L524		1989	0	15.6	11	6	<1.0	<10	20	<10	1.2	<0.5	0.095				
L544		1989	0	24	15.5	<5.0	<1.0	<10	16	<20	2.5	<0.5	<0.001				
L546		1989	0	26	34	<5.0	<1.0	<10	20	<20	2.2	<0.5	0.029				
00-12500		2000	0	9.6	7.5	<5.0	<1.0	<10	24	<20	3.3		0.1				
00-12503		2000	0	4.4	<5.0	<5.0	<1.0	<10	<15	<20	1.5		<0.1				

Table 2.1: Main Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
00-12504		2000	0	4.9	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-12505		2000	0	9.7	<5.0	<5.0	<1.0	<10	<15	<20	1.5		<0.1	<40			
00-12506		2000	0	14	5.4	<5.0	<1.0	<10	21	<20	1.1		<0.1				
00-12512		2000	0	16	<5.0	<5.0	<1.0	<10	18	<20	1.1		0.2	<40			
00-12514		2000	0	5.6	<5.0	<5.0	<1.0	<10	15	<20	1.3		<0.1	<40			
00-12515		2000	0	7.4	<5.0	<5.0	<1.0	<10	<15	<20	1.4		<0.1				
00-12519		2000	0	11	<5.0	<5.0	<1.0	<10	20	<20	1.1		<0.1				
00-12522		2000	0	8	<5.0	<5.0	<1.0	<10	<15	<20	1.1		<0.1				
00-12523		2000	0	7.7	<5.0	<5.0	<1.0	<10	<15	<20	1.1		<0.1				
00-12524		2000	0	9.4	<5.0	<5.0	<1.0	<10	23	<20	<1.0						
00-12525		2000	0	15	<5.0	<5.0	<1.0	<10	<15	<20	1		<0.1				
00-13655		2000	0	74	10	<5.0	<1.0	<10	<15	<20	1.1						
00-13656		2000	0	8	13	<5.0	<1.0	<10	30	<20	1.1		<0.1				
00-13658	00-13657	2000	35	9.6	<5.0	<5.0	<1.0	<10	<15	<20	1.2						
00-13659		2000	0	9.5	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13660		2000	0	11	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13662		2000	0	39	9.3	<5.0	<1.0	<10	33	<20	1.3						
00-13663	00-13662	2000	60	9	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13664		2000	0	17	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13665	00-13664	2000	40	9.5	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13667		2000	0	10	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13668	00-13667	2000	20	8.5	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13670		2000	0	7.6	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13672	00-13670	2000	60	3.8	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13674		2000	0	7.7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13682		2000	0	20	7.8	<5.0	<1.0	<10	<15	<20	1.8		<0.1				
00-13754		2000	0	8.4	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13756	00-13754	2000	120	4.8	<5.0	<5.0	<1.0	<10	<15	<20	<1.0			<40			
00-13758		2000	0	15	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1	<40			
00-13759	00-13758	2000	45	9.7	<5.0	<5.0	<1.0	<10	49	<20	1						
00-13765		2000	0	18	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13766	00-13765	2000	70	15	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13767	00-13767	2000	80	8.6	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				

Table 2.1: Main Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
00-13768	00-13768	2000	70	5.4	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13769		2000	0	9.2	<5.0	<5.0	<1.0	12	21	<20	<1.0		<0.1				
00-13770	00-13769	2000	90	21	6	<5.0	<1.0	<10	20	<20	<1.0						
00-13773	00-13772	2000	55	9.3	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
01-6956	01-6955	2001	40	5.9	5	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7762		2001	0	5.3	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7763	01-7762	2001	40	6.7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7764		2001	0	6.1	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7786		2001	0	12	13	5.7	<1.0	14	29	22	1.7	<0.1	<0.1				
01-7787	01-7786	2001	90	12	7.3	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7788		2001	0	12	7	<5.0	<1.0	<10	17	<20	1.2	<0.1	<0.1				
01-7790		2001	0	6.6	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7792	01-7790	2001	70	7.2	7.6	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7793		2001	0	9.7	5.5	<5.0	<1.0	<10	18	<20	<1.0	<0.1	<0.1				
01-7794	01-7793	2001	60	8.7	5.9	<5.0	<1.0	<10	<15	<20	1.2	<0.1	<0.1				
01-7795		2001	30	8.4	<5.0	<5.0	<1.0	<10	15	<20	<1.0	<0.1	<0.1				
01-7796	01-7795	2001	80	8.5	<5.0	<5.0	<1.0	<10	18	<20	<1.0	<0.1	<0.1				
01-7797	00-13660	2001	30	5.7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7798		2001	0	5.7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7799	01-7798	2001	60	9.4	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7816	01-7818	2001	40	6.3	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7817	01-7818	2001	30	12	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7818	00-13664	2001	0	12	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7819	00-13644	2001	40	12	<5.0	<5.0	<1.0	<10	<15	<20	1.8	<0.1	<0.1				
01-7820	00-13660	2001	30	6.7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7822		2001	30	68	12	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.1				
01-7824	00-13655	2001	20	11	5.7	<5.0	<1.0	<10	<15	<20	1.3	<0.1	<0.1				
01-7825	00-13655	2001	45	11	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7826		2001	0	6.1	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7827	01-7826	2001	50	7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7829		2001	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-7832		2001	0	8.4	5.4	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-17960	01-17960	2001	0	6.5	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				

Table 2.1: Main Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
01-17962	01-17960	2001	40	8.6	5.8	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
01-17963	01-17963	2001	0	7.3	6.1	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	2200	100% lube oil		
01-17964	01-17963	2001	30	4.3	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	340	100% lube oil		
01-17965	01-17963	2001	60	5.6	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
01-17967	01-17966	2001	80	5	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
01-17968	01-17968	2001	0	7.6	5.5	<5.0	<1.0	<10	<15	<20	1.3	<0.1	<0.1				
01-17969	01-17968	2001	50	9.6	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-17970	01-17970	2001	0	10	6.6	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-17972	01-17970	2001	80	12	5.5	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-17973	01-17973	2001	0	6.5	5.1	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-17974	01-17973	2001	80	6	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-17976	01-1795	2001	55	13	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
01-17977	01-17977	2001	0	11	5.2	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-17978	01-17977	2001	40	10	6.2	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-17979	01-17979	2001	0	20	8.6	5.5	<1.0	<10	19	<20	<1.0	<0.1	<0.1				
01-17980	01-17979	2001	60	9.2	6.3	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-17982	01-17982	2001	0	13	9.5	5.6	<1.0	20	<15	<20	1.7	<0.1	<0.1				
01-17983	01-17982	2001	75	10	6.3	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-17984	01-17984	2001	0	49	12	<5.0	<1.0	<10	16	<20	1.2	<0.1	<0.1				
01-17985	01-17984	2001	100	5.6	<5.0	<5.0	<1.0	<10	<15	<20	2	<0.1	<0.1				
01-17986	01-17986	2001	0	10	6.2	<5.0	<1.0	<10	<15	<20	1.5	<0.1	<0.1				
01-17987	01-17986	2001	85	13	5.6	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
04-15328	MW-6	2004	0	36	9.2	<5.0	<1.0	<10	<15	<20	3.0	<0.1	<0.003	41	<10	<4	41
04-15330	MW-6	2004	30	8.5	<5.0	<5.0	<1.0	<10	<15	<20	1.5	<0.1	<0.003	<10	<10	<4	<9
04-15324	MW-7	2004	0	26	8.9	<5.0	<1.0	<10	17	<20	2.5	<0.1	<0.003	12	<10	<4	12
04-15326	MW-7	2004	20	11	<5.0	<5.0	<1.0	<10	<15	<20	2.6	<0.1	<0.003	29	<10	<4	29
04-15320	MW-8	2004	0	4.9	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	12	<10	<4	12
04-15322	MW-8	2004	30	5.4	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	18	<10	<4	18
	N Value			125	125	125	125	125	125	125	125	84	109	21			
	Average			12.2	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
	Standard Deviation			11.8													
	Minimum			<3.0	<5.0	<5.0		<10	<15	<20	<1.0	<0.1	<0.001	<10			

Table 2.1: Main Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
	Maximum			74	34	6		20	49	22	3.3	<0.5	0.20	2200			
	95% Confidence Limit			2.1													

3.0 NWS Landfill

The NWS Landfill is located approximately 700 metres west of the main station area. The area was in use as the active burn pit for waste materials in 1992; waste materials were first burned, and then covered with gravel. The landfill area is approximately 8,000 square metres, with buried debris present in three separate lobes. The east lobe was most recently in use, while the central portion appears to contain buried equipment, and the west, barrels and domestic refuse. The depth of the landfill is estimated to be at least 1.5 m. At the time of investigation, surface or partially exposed debris affected approximately 30 percent of the landfill area. Two areas of Tier II contaminated soil (both copper) were present on the landfill surface, however there was no evidence of contaminant migration from the landfill.

The average slope of the landfill is approximately 10 percent, with a maximum slope of approximately 40 percent on the southwestern side. Cover materials are comprised of poorly graded, angular gravel. Overall, surface water run-off potential is considered low due to the limited precipitation, and low slopes. Localized areas on the western half of the landfill are likely subject to increased run-off. Drainage tends to flow to the southeast towards Coronation Gulf, approximately 600 metres away. Vegetative cover is diverse but low, at approximately 20-40 percent coverage. Habitat usage is considered moderate, with sightings of muskox, caribou, fox, hare, and birds in the general area. There was no evidence of birds nesting in the area. The nearest potential freshwater drinking water sources is over 1 kilometre away.

Based on the available information, the NWS Landfill was classified as moderate potential environmental risk. Remediation for this landfill area included excavation and removal of surface contaminated soils, and regrading with the placement of 1.0 m of granular fill over the existing landfill cover.

The long term monitoring plan consists of visual monitoring for signs of settlement or erosion, and periodic collection of soil samples to monitor for contaminant migration. Approximate locations for the collection of soil samples are identified on Figure PIN-3.3 below.

3.1 Baseline Data

Sample locations for baseline soil samples are shown in Figure PIN-3.3. A summary of the baseline soil analytical data is provided in Table 3.1. Baseline data is comprised of landfill assessment data for soil samples collected up- and downgradient of the landfill during site investigation events, and data from soil samples collected at the permanent monitoring locations during site cleanup in 2004. Note that data for samples collected within contaminated soil areas are not included because the areas were excavated during landfill remediation. Soil baseline concentrations of inorganic elements at the NWS Landfill are consistent with site background levels. Low-level PCBs and total petroleum hydrocarbons (TPH) were detected in soil from localized locations surrounding the landfill.

BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
TBM4	9 950.050	9 396.331	10.502	REBAR
TBM213	10 008.686	9 243.422	10.406	SPIKE
TBM308	10 052.477	9 266.119	10.543	50mm X 50mm WOODEN HUB
TBM309	9 977.065	9 308.858	10.857	50mm X 50mm WOODEN HUB
TBM310	9 872.263	9 364.098	9.273	50mm X 50mm WOODEN HUB
BM-1	9 875.548	9 285.067	8.370	25mm DIA. STEEL PIPE

MAGNETIC GRADIENT (gammas/m)

300
220
170
130
95
75
55
35
15
-5
-25
-45
-65
-85
-110
-150
-190
-260
-340

LEGEND:

- TBM4 — TEMPORARY BENCHMARK
- BM-1 — PERMANENT BENCHMARK
- 101 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION
- +6952 — BASELINE SOIL SAMPLE LOCATION

COORDINATE POINTS (AS-BUILT) NWS LANDFILL			
NO.	COORDINATES		ELEV.
	NORTHING	EASTING	
101	10 023.5	9 162.1	7.9
102	10 035.1	9 172.4	8.2
103	10 043.6	9 186.1	8.9
104	9 997.4	9 194.7	7.6
105	10 007.4	9 154.5	6.8
106	10 022.0	9 149.3	7.2
107	10 004.0	9 208.8	9.4
108	9 975.7	9 249.2	10.2
109	9 952.9	9 248.0	8.7
110	9 953.8	9 206.9	7.4
111	9 997.6	9 307.0	11.1
112	9 990.4	9 357.8	11.0
113	9 938.9	9 377.2	11.5
114	9 927.0	9 315.5	9.6
115	9 940.1	9 286.5	9.3
116	9 921.2	9 269.3	8.8
117	9 925.4	9 254.0	8.6
118	9 942.4	9 265.1	9.0
119	9 969.5	9 269.6	10.5
120	9 977.3	9 288.8	10.9

RECORD DRAWING
NOT FOR CONSTRUCTION

0 10 20 30m
10 5 1:1000

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3 - LADY FRANKLIN POINT

EXISTING NWS LANDFILL

FIGURE PIN-3.3

UMA | AECOM

DOS NAME: P3-R003.DWG DJ - 05/11/08

Table 3.1: NWS Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
NWS Landfill - Upgradient Soil Samples																	
00-13518		2000	0	16	6.6	<5.0	<1.0	<10	18	<20	<1.0		<0.1				
00-13519		2000	0	13	<5.0	<5.0	<1.0	<10	23	<20	<1.0			170	42% fuel oil, 58% Lube		
00-13520	00-13519	2000	45	6.9	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13607		2000	0	9	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13618		2000	0	15	5.1	<5.0	<1.0	<10	<15	<20	2.6		<0.1	270	100% Lube Oil		
00-13647		2000	0	11	<5.0	<5.0	<1.0	<10	30	<20	1.8						
00-13648	00-13647	2000	40	9.4	<5.0	<5.0	<1.0	<10	44	<20	1.2						
00-13779		2000	0	12	<5.0	<5.0	<1.0	<10	21	<20	<1.0		<0.1				
00-13803	00-13779	2000	70	17	5	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13804		2000	0	6.4	<5.0	<5.0	<1.0	<10	21	<20	<1.0		<0.1	<40			
00-13806	00-13806	2000	30	15	<5.0	<5.0	<1.0	<10	18	<20	1.4						
01-17989		2001	0	9	5.9	<5.0	<1.0	<10	46	<20	1.2	<0.1	<0.1				
01-17990		2001	110	9.3	<5.0	<5.0	<1.0	<10	18	<20	<1.0	<0.1	<0.1				
01-17993		2001	40	4.1	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
04-15376	P3-1	2004	0	6.9	<5.0	<5.0	<1.0	<10	18	<20	1.8	<0.1	<0.003	130	<10	<4	130
04-15378	P3-1	2004	30	5.5	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.1	<0.003	<10	<10	<4	<9
NWS Landfill - Downgradient Soil Samples																	
L525		1989	0	13.3	6.1	<5.0	<1.0	<10	27	<10	1.3	<0.5	0.028				
L527		1989	0	5.3	14.3	<5.0	<1.0	<10	13	<10	0.5	<0.5	0.001				
L528		1989	0	45	8.2	<5.0	<1.0	34	79	<10	2.5	<0.5	0.029				
00-13615		2000	0	24	9.4	<5.0	<1.0	<10	19	<20	1						
00-13622		2000	0	19	6.3	<5.0	<1.0	<10	<15	<20	1.2						
00-13623	00-13622	2000	40	19	6.6	<5.0	<1.0	<10	<15	<20	1.2						
00-13625		2000	0	18	5.1	<5.0	<1.0	<10	<15	<20	1.7		<0.1				
00-13628		2000	0	13	<5.0	<5.0	<1.0	<10	<15	<20	1.9						
00-13630		2000	0	37	6.4	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13636		2000	0	21	7.4	<5.0	<1.0	<10	15	<20	<1.0						
00-13637	00-13636	2000	45	16	7.7	<5.0	<1.0	<10	<15	<20	1.2						
00-13644		2000	0	15	7.3	<5.0	<1.0	<10	<15	<20	1.8			<40			
00-13645	00-13644	2000	35	22	6	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13653		2000	0	8.8	<5.0	<5.0	<1.0	<10	<15	<20	1.2		<0.1				
00-13654	00-13653	2000	40	9.9	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13778		2000	0	14	5.5	<5.0	<1.0	<10	28	<20	<1.0		<0.1				
00-13780	00-13778	2000	140	8.3	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13807	00-13807	2000	80	12	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						

Table 3.1: NWS Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
00-13808		2000	0	13	<5.0	<5.0	<1.0	<10	15	<20	2.1		<0.1				
00-13810	00-13813	2000	130	13	6.3	5.3	<1.0	<10	<15	<20	2.3						
00-13813		2000	0	17	6.7	<5.0	<1.0	<10	<15	<20	1.7		<0.1				
01-17923		2001	0	9	5.7	<5.0	<1.0	<10	<15	<20	2.7	<0.1	<0.1				
01-17952		2001	0	9.0	5.7	<5.0	<1.0	<10	<15	<20	2.7	<0.1	<0.1				
01-17953	01-17952	2001	110	13	5.3	<5.0	<1.0	<10	<15	<20	1.3	<0.1	<0.1				
01-17988		2001	0	12	<5.0	<5.0	<1.0	<10	62	<20	<1.0	<0.1	<0.1				
01-18124		2001	0	15	6.5	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1				
01-18125	01-18124	2001	100	12	5.2	<5.0	<1.0	<10	<15	<20	1.2	<0.1	<0.1				
01-18127		2001	85	13	5.3	<5.0	<1.0	<10	<15	<20	1.2	<0.1	<0.1				
04-15380	P3-2	2004	0	6.9	<5.0	<5.0	<1.0	<10	<15	<20	1.7	<0.1	<0.003	88	65	4	19
04-15382	P3-2	2004	30	14	<5.0	<5.0	<1.0	<10	<15	<20	1.2	<0.1	<0.003	21	<10	<4	21
04-15384	P3-3	2004	0	13	5.4	<5.0	<1.0	<10	<15	<20	1.7	<0.1	<0.003	47	<10	5	42
04-15386	P3-3	2004	30	12	<5.0	<5.0	<1.0	<10	26	<20	1.8	<0.1	<0.003	47	<10	<4	47
04-15388	P3-4	2004	0	18	11	<5.0	<1.0	<10	<15	<20	1.6	<0.1	<0.003	392	19	13	360
04-15390	P3-4	2004	30	6.7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	14	<10	<4	14
	N Value			50	50	50	50	50	50	50	50	21	34	12			
	Average			13.7	5.0	<5.0	<1.0	<10	<15	<20	1.2	<0.1	<0.1	102.0			
	Standard Deviation			7.2	2.6						0.7			121.0			
	Minimum			4.1	2.5	<5.0		<10	13		0.5	<0.1	0.001	<10			
	Maximum			45	14.3	5.3		34	79		2.7	<0.5	<0.1	392			
	95% Confidence Limit			2.0	0.7						0.2			68.5			

4.0 South Landfill

The South Landfill is located approximately 1450 metres south of the main station area and adjacent to the Beach POL area. Buried debris is present in four separate lobes. Three of the lobes are bounded to the south by an access road and to the north by a former borrow area, while the fourth lobe is to the south of the access road. The landfill lobes encompass a total area of approximately 6800 square metres and the estimated depth of landfilled material is one metre. At the time of investigation, surface debris was estimated to affect 35 percent of the area. No contaminated soil or contaminant migration was documented during site investigations.

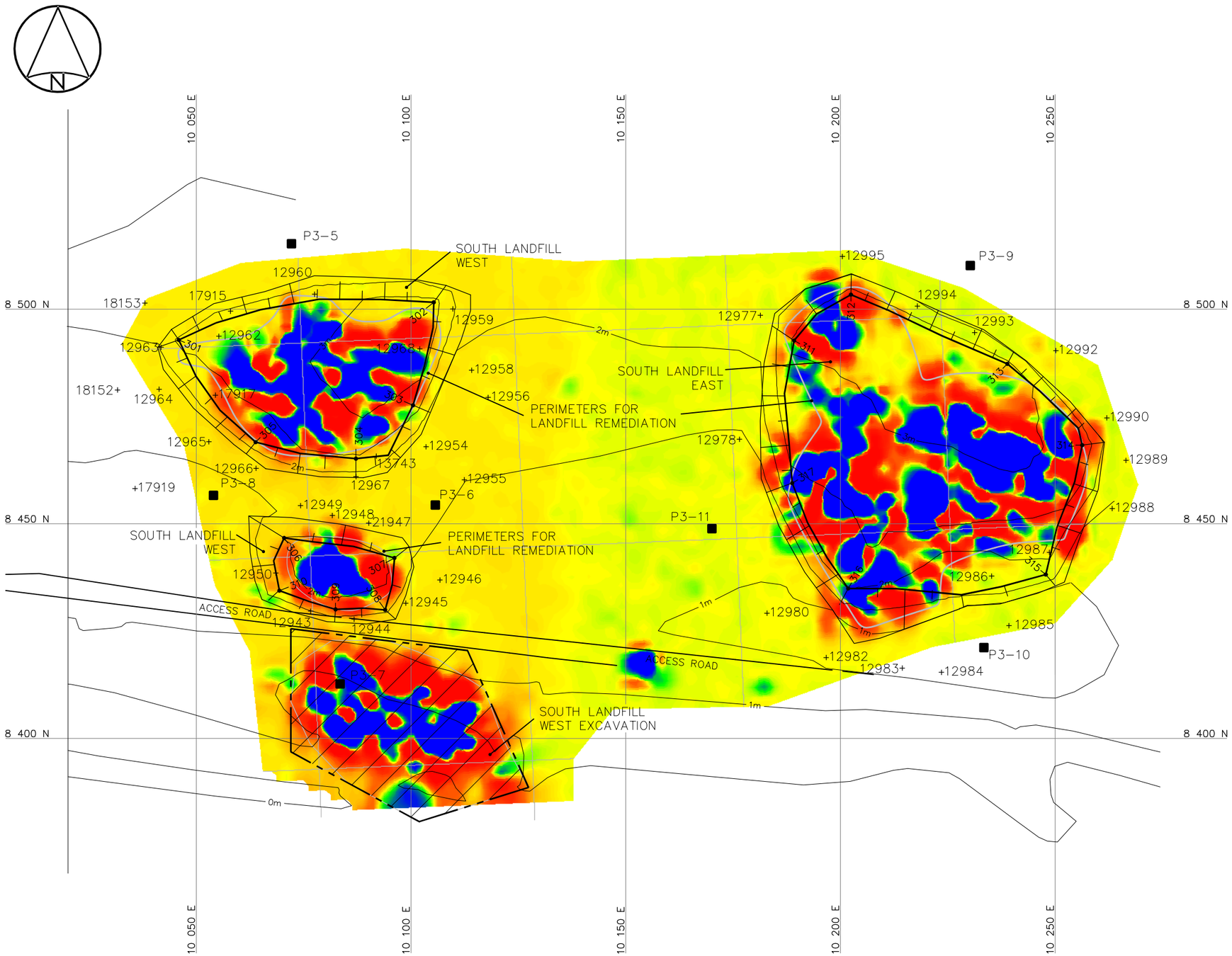
The grade of the landfill surface is less than ten percent. Cover materials are comprised of poorly drained sand and gravel, with sandy silt below the surface. Overall, surface water run-off potential is considered low due to the limited precipitation, and negligible slopes. Drainage tends to flow to the south towards the Coronation Gulf, approximately 25 to 140 metres away. Ground cover is considered minimal to the south (less than 20 percent vegetation), and moderate to the east (with up to 80 percent vegetation). Habitat usage is rated as high, with sightings of muskox, caribou, fox, hare, and nesting birds. The ocean is 25 m away from the lobe to the south of the road, and a minimum of 50 metres away from the lobes to the north of the road. Potential freshwater drinking water sources are greater than 1 kilometre away.

Based on the available information, the South Landfill lobe to the south of the road was considered a moderate potential environmental risk because of proximity to the ocean and potential for erosion. The lobes to the north of the road were classified as low to moderate potential environmental risk. The remediation for this landfill area included excavation of the lobe south of the road, and for the lobes north of the road, regrading with the placement of 1.0 m of granular fill over the existing landfill surface.

The long-term monitoring plan consists of visual monitoring for signs of settlement or erosion, and periodic collection of soil samples to monitor for contaminant migration. Approximate locations for the collection of soil samples are identified on Figure PIN-3.4.

4.1 Baseline Data

Sample locations for baseline soil samples are shown in Figure PIN-3.4. A summary of the baseline soil analytical data is provided in Table 4.1. Baseline data is comprised of landfill assessment data for soil samples collected up- and downgradient of the landfill during site investigation events, and data from soil samples collected at the permanent monitoring locations during site cleanup in 2004. Soil baseline concentrations of inorganic elements at the South Landfill were consistent with site background concentrations. Low-level PCBs and total petroleum hydrocarbons (TPH) were detected in soil from localized locations surrounding the landfill.



LEGEND:

- 301→ COORDINATE POINT
- ■ MONITORING SOIL SAMPLE LOCATION
- +6952 BASELINE SOIL SAMPLE LOCATION

COORDINATE POINTS (AS-BUILT)
SOUTH LANDFILL – WEST

NO.	COORDINATES		ELEV.
	NORTHING	EASTING	
301	8 492.9	10 045.9	2.6
302	8 501.6	10 105.3	3.2
303	8 477.6	10 100.5	2.9
304	8 465.2	10 087.2	2.5
305	8 469.1	10 063.8	2.2
306	8 446.7	10 070.4	2.0
307	8 442.1	10 096.1	2.0
308	8 430.0	10 094.0	1.6
309	8 430.1	10 082.4	1.9
310	8 434.4	10 069.3	1.8

COORDINATE POINTS (AS-BUILT)
SOUTH LANDFILL – EAST

NO.	COORDINATES		ELEV.
	NORTHING	EASTING	
311	8 492.7	10 189.2	3.1
312	8 503.4	10 202.4	3.2
313	8 487.3	10 238.9	3.1
314	8 468.3	10 256.3	2.9
315	8 438.2	10 247.8	1.8
316	8 435.0	10 201.8	2.0
317	8 459.5	10 188.8	2.4

RECORD DRAWING
NOT FOR CONSTRUCTION

0 10 20 30m
10 5 1:1000

DWG NAME: P3-R002.DWG DJ – 05/11/08

UMA | AECOM

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3- LADY FRANKLIN POINT

EXISTING SOUTH LANDFILL

FIGURE PIN-3.4

Table 4.1: South Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
Upgradient Soil Samples																	
00-12959		2000	0	3.2	<5.0	<5.0	<1.0	<10	<15	<20	0.3		<0.1				
00-12960		2000	0	4.8	<5.0	<5.0	<1.0	<10	<15	<20	0.4		<0.1				
00-12963		2000	0	14	5.7	<5.0	<1.0	<10	<15	<20	0.8		<0.1				
00-12968		2000	0	8.9	<5.0	<5.0	<1.0	<10	<15	<20	0.7		<0.1				
00-12969		2000	0	11	6.1	<5.0	<1.0	<10	22	<20	0.9		<0.1				
00-12977		2000	0	7.2	<5.0	<5.0	<1.0	<10	20	<20	0.5		<0.1				
00-12994		2000	0	8.4	<5.0	<5.0	<1.0	<10	<15	<20	0.7		<0.1				
00-12995		2000	0	6.2	7.4	<5.0	<1.0	<10	<15	<20	0.7		<0.1				
04-15312	P3-5	2004	0	14	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	105	<10	<4	105
04-15314	P3-5	2004	30	8.8	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	16	<10	<4	16
04-15402	P3-9	2004	0	9.7	<5.0	<5.0	<1.0	<10	<15	<20	1.2	<0.1	<0.003	27	27	<4	<9
04-15404	P3-9	2004	30	21	6	<5.0	<1.0	<10	<15	<20	1.4	<0.1	<0.003	51	11	14	26
Downgradient Soil Samples																	
L516		1989	0	11.5	5.9	<5.0	<1.0	<10	9	<10	1	<0.5	0.002				
L517		1989	0	3.1	<5.0	<5.0	<1.0	<10	6	<10	<0.3	<0.5	0.0009				
L518		1989	0	5.5	5.1	<5.0	<1.0	<10	7	<10	<0.3	<0.5	0.0012				
00-12924		2000	0	12	5.2	<5.0	<1.0	<10	32	<20	1.0		<0.1				
00-12925		2000	0	8.6	<5.0	<5.0	<1.0	<10	18	<20	1.1		<0.1				
00-12926		2000	0	7.3	<5.0	<5.0	<1.0	<10	<15	<20	0.9		<0.1	<40			
00-12927		2000	0	11	5.4	<5.0	<1.0	<10	26	<20	1.1		<0.1				
00-12928		2000	0	5.9	<5.0	<5.0	<1.0	<10	<15	<20	0.6		<0.1				
00-12929		2000	0	7.8	<5.0	<5.0	<1.0	<10	17	<20	0.6		<0.1				
00-12930		2000	0	6.7	<5.0	<5.0	<1.0	19	15	<20	1.2		<0.1				
00-12932		2000	0	9.1	5.4	<5.0	<1.0	<10	40	<20	0.8		<0.1				
00-12934		2000	0	8.6	<5.0	<5.0	<1.0	<10	29	<20	1.0		<0.1				
00-12935		2000	0	20	7.1	<5.0	<1.0	<10	16	<20	1.2		<0.1				
00-12936		2000	0	9.6	11	<5.0	<1.0	<10	71	<20	0.6		<0.1				
00-12937		2000	0	7.8	<5.0	<5.0	<1.0	<10	<15	<20	0.5		<0.1				
00-12938	12937	2000	50	14	5.7	<5.0	<1.0	<10	<15	<20	0.8		<0.1				
00-12939		2000	0	6.0	5.1	<5.0	<1.0	<10	24	<20	0.6		<0.1	<40			
00-12942		2000	0	10	<5.0	<5.0	<1.0	15	15	<20	0.7		<0.1				
00-12943		2000	0	30	7.7	<5.0	<1.0	<10	<15	<20	1.2		<0.1				
00-12944		2000	0	20	6.2	<5.0	<1.0	<10	20	<20	1.6						
00-12945		2000	0	11	5.7	<5.0	<1.0	<10	<15	<20	1.1		<0.1				

Table 4.1: South Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
00-12947		2000	0	8.3	<5.0	<5.0	<1.0	<10	16	<20	0.7		<0.1				
00-12948		2000	0	6.6	<5.0	<5.0	<1.0	<10	<15	<20	0.7		<0.1				
00-12949		2000	0	5.9	<5.0	<5.0	<1.0	<10	<15	<20	1.8		<0.1	<40			
00-12950		2000	0	9.8	5.2	<5.0	<1.0	<10	<15	<20	1.5		<0.1				
00-12953		2000	0	10	<5.0	<5.0	<1.0	<10	<15	<20	0.9		<0.1				
00-12954		2000	0	5.9	<5.0	<5.0	<1.0	<10	17	<20	0.4		<0.1				
00-12956		2000	0	9.1	<5.0	<5.0	<1.0	<10	<15	<20	0.3		<0.1				
00-12957		2000	0	11	<5.0	<5.0	<1.0	<10	<15	<20	2.3		<0.1				
00-12958		2000	0	5.8	<5.0	<5.0	<1.0	<10	30	<20	0.5		<0.1				
00-12964		2000	0	8.2	<5.0	<5.0	<1.0	<10	21	<20	1.1		<0.1	<40			
00-12966		2000	0	16	30	26	<1.0	<10	24	<20	1.0		<0.1				
00-12970		2000	0	13	8.3	<5.0	<1.0	<10	<15	<20	0.9		<0.1				
00-12972		2000	0	4.0	<5.0	<5.0	<1.0	<10	<15	<20	0.6		<0.1				
00-12973		2000	0	5.4	6.4	6.4	<1.0	<10	<15	<20	1.0		<0.1				
00-12975		2000	0	5.6	6.6	<5.0	<1.0	<10	<15	<20	0.6		<0.1	<40			
00-12976		2000	0	11	13	6.3	<1.0	<10	16	<20	0.9		<0.1				
00-12978		2000	0	19	<5.0	<5.0	<1.0	<10	18	<20	2.2		<0.1				
00-12979		2000	0	14	16	<5.0	<1.0	<10	<15	<20	0.7		<0.1				
00-12980		2000	0	12	15	5.9	<1.0	<10	<15	<20	1.0		<0.1	70	Breakdown unknown		
00-12982		2000	0	6.2	<5.0	<5.0	<1.0	<10	<15	<20	0.6		<0.1				
00-12984		2000	0	6.5	7.7	<5.0	<1.0	<10	<15	<20	0.6		<0.1	<40			
00-12985		2000	0	5.7	<5.0	<5.0	<1.0	<10	<15	<20	0.9		<0.1	110	Breakdown unknown		
00-12986		2000	0	7.2	8.6	<5.0	<1.0	<10	<15	<20	0.7		<0.1				
00-12988		2000	0	4.1	<5.0	<5.0	<1.0	<10	<15	<20	0.4		<0.1	70	Breakdown unknown		
00-12989		2000	0	6.7	7.9	<5.0	<1.0	<10	<15	<20	0.5		<0.1				
00-12990		2000	0	3.8	<5.0	<5.0	<1.0	<10	<15	<20	0.5		<0.1				
00-12996		2000	0	12	6.6	<5.0	<1.0	<10	24	<20	1.5		<0.1	<40			
00-12998		2000	0	6.9	8.1	<5.0	<1.0	<10	<15	<20	0.8		<0.1				
00-13000		2000	0	6.6	<5.0	<5.0	<1.0	<10	<15	<20	1.1		<0.1	<40			
00-13002		2000	0	9.0	<5.0	<5.0	<1.0	<10	<15	<20	1.1		<0.1				
00-13003		2000	0	6.3	<5.0	<5.0	<1.0	<10	<15	<20	0.8		<0.1				
00-13740		2000	0	15	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1	<40			
00-13742	13740	2000	65	15	<5.0	<5.0	<1.0	<10	<15	<20	<1.0			<40			
00-13743	13743	2000	120	12	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13745	13743	2000	30	9.2	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						

Table 4.1: South Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
00-13746	13746	2000	60	11	<5.0	<5.0	<1.0	<10	<15	<20	1.0		<0.1				
00-13748	13750	2000	40	15	6.1	<5.0	<1.0	<10	<15	<20	<1.0						
00-13749	13749	2000	30	7.8	<5.0	<5.0	<1.0	<10	22	<20	<1.0		<0.1				
00-13750		2000	0	4.4	<5.0	<5.0	<1.0	<10	<15	<20	<1.0			<40			
00-13774		2000	0	23	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1	<40			
00-13775	13774	2000	30	12	<5.0	<5.0	<1.0	<10	<15	<20	<1.0			<40			
00-13777		2000	0	9.7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
04-15308	P3-6	2004	0	7.6	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	50	<10	<4	50
04-15310	P3-6	2004	30	20	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	75	<10	<4	75
04-15304	P3-7	2004	0	14	5.5	<5.0	<1.0	<10	<15	<20	1.6	<0.1	<0.003	16	<10	<4	16
04-15306	P3-7	2004	30	18	6.4	<5.0	<1.0	<10	<15	<20	1.2	<0.1	<0.003	29	16	<4	13
04-15316	P3-8	2004	0	11	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	20	<10	<4	20
04-15318	P3-8	2004	30	14	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	55	<10	<4	55
04-15410	P3-10	2004	0	13	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	123	13	<4	110
04-15412	P3-10	2004	30	6.7	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	64	10	<4	54
04-15406	P3-11	2004	0	7.8	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.003	951	21	<4	930
	N Value			84	84	84	84	84	84	84	84	16	78	29			
	Average			10.1	<5.0	<5.0	<1.0	<10	<15	<20	0.8	<0.1	<0.1	72.1			
	Standard Deviation			4.9							0.4			171.9			
	Minimum			3.1	<5.0	<5.0		<10	<15		<1.0	<0.1	0.0009	16			
	Maximum			30	30	26		19	71		2.3	<0.5	<0.1	951			
	95% Confidence Limit			1.0							0.1			62.6			

5.0 North Landfill

The North Landfill is located approximately 650 metres north-northwest of the main station area. The surrounding area is disturbed, apparently due to gravel borrow activities. The buried material exists in three lobes, with a total landfill area of 1900 square metres. The depth of the landfill was estimated as 1 metre. At the time of investigation, surface debris was minimal and comprised approximately 20 percent of the area. No contaminated soil or evidence of leachate migration was detected at the landfill.

The overall landfill area is flat, with the landfill lobes consisting of mounds raised above surrounding grade. Bedrock is at or near surface surrounding the mounds. Cover materials are comprised of poorly graded, angular gravel. Overall, surface water run-off is considered low due to the limited precipitation, and negligible slopes. Drainage tends to flow to the north and northeast. The ocean is approximately 400 metres to the north, but there are no direct pathway between the landfill and the ocean. Vegetative cover is estimated as approximately 30 percent near the landfill. The habitat usage is rated as high, with sightings of muskox, caribou, fox, hare, and birds nesting in the area. The nearest potential drinking water source is approximately 800 metres away.

Based on the available information, the North Landfill was classified as low potential environmental risk. The remediation for this landfill included removal of surface debris and regrading with the placement of a minimum of 0.75 m of granular fill over the existing landfill surface.

The long-term monitoring plan consists of visual monitoring for signs of settlement or erosion, and periodic collection of soil samples to monitor for contaminant migration. Approximate locations for the collection of soil are identified on Figure PIN-3.5.

5.1 Baseline Data

Sample locations for baseline soil samples are shown in Figure PIN-3.5. A summary of the baseline soil analytical data is provided in Table 5.1. Baseline data is comprised of landfill assessment data for soil samples collected up- and downgradient of the landfill during the site assessment and detailed investigation in 1989 and 2000 respectively, and data for soil samples collected at the permanent monitoring locations during site cleanup in 2004. A comparison if baseline concentrations of inorganic elements at the North landfill to site background conditions notes no significant differences. Low-level PCBs and TPH were detected in localized areas.

COORDINATE POINTS (AS-BUILT) NORTH LANDFILL			
NO.	COORDINATES		ELEV.
	NORTHING	EASTING	
201	10 717.7	9 839.2	8.8
202	10 703.6	9 854.8	9.3
203	10 663.8	9 797.4	9.2
204	10 671.7	9 794.6	9.0
205	10 680.2	9 793.2	8.7
206	10 709.8	9 883.9	9.5
207	10 707.9	9 895.8	9.4
208	10 698.5	9 896.4	9.7
209	10 697.0	9 886.2	9.6
210	10 702.9	9 923.7	9.3
211	10 703.0	9 935.1	9.4
212	10 695.4	9 936.9	9.5
213	10 683.4	9 935.1	9.4
214	10 683.0	9 926.7	9.3
215	10 696.2	9 923.4	9.4

BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
TBM11	10 699.796	9 891.328	9.788	

LEGEND:

- TBM11 ⊡ TEMPORARY BENCHMARK
- 201• COORDINATE POINT
- ■ MONITORING SOIL SAMPLE LOCATION
- +6952 BASELINE SOIL SAMPLE LOCATION

MAGNETIC GRADIENT (gammas/m): 300, 220, 170, 130, 95, 75, 55, 35, 15, -5, -25, -45, -65, -85, -110, -150, -190, -260, -340

9 825 E, 9 850 E, 9 875 E, 9 900 E, 9 925 E, 9 950 E

10 725 N, 10 700 N, 10 675 N, 10 650 N

P3-14, P3-15, P3-16, P3-13, P3-12

+12908, +12909, +12910, +12917, +12916, +12918, +12903, +12904, +12905, +12906, +12894, +12895, +12896, +12888, +12898, +12899, +12900, +12902

12919+, 12890+, 12892, 12893+

201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215

TBM11

8m, 9m

NORTH LANDFILL

PERIMETER FOR LANDFILL REMEDIATION

RECORD DRAWING
NOT FOR CONSTRUCTION

0 5 10 15m
5 2.5 1:500

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3 - LADY FRANKLIN POINT

EXISTING NORTH LANDFILL

FIGURE PIN-3.5

UMA | AECOM

DOS NAME: P3-RD06.DWG DJ – 05/11/08

Table 5.1: North Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
Upgradient Soil Samples																	
00-12894		2000	0	4.6	<5.0	<5.0	<1.0	<10	<15	<20	0.7		<0.1	<40			
00-12903		2000	0	5.9	<5.0	<5.0	<1.0	<10	<15	<20	0.5						
00-12904		2000	0	10	<5.0	<5.0	<1.0	<10	15	<20	0.9		<0.1				
00-12905		2000	0	8.2	<5.0	<5.0	<1.0	<10	16	<20	0.6		<0.1				
00-12906		2000	0	5.4	<5.0	<5.0	<1.0	<10	<15	<20	0.9		<0.1				
00-12915		2000	0	77	35	<5.0	<1.0	<10	<15	<20	1.4		<0.1	75	100% fuel oil		
00-12916		2000	0	8.3	6.6	<5	<1.0	<10	<15	<20	0.9		<0.1				
00-12917		2000	0	12	<5.0	<5.0	<1.0	<10	<15	<20	0.6		<0.1				
00-12918		2000	0	1.5	<5.0	<5.0	<1.0	<10	<15	<20	0.4		<0.1				
04-15392	P3-12	2004	0	6.3	<5.0	<5.0	<1.0	<10	<15	<20	1.6	<0.1	<0.003	10	<10	<4	10
Downgradient Soil Samples																	
L505		1989	0	4.9	7.5	6.1	<1.0	<10	11	24	1	<0.5	0.0013				
L506		1989	0	1.5	<5.0	<5.0	<1.0	<10	10	27	1.1	<0.5	0.0037				
L507		1989	0	35	16.5	<5.0	1.4	13	12	<10	0.3	<0.5	0.014				
L508		1989	0	5	<5.0	<5.0	<1.0	15	13	<10	0.8	<0.5	0.0058				
L509		1989	0	6.4	11.4	<5.0	<1.0	<10	13	<10	1.2	<0.5	0.0011				
00-12888		2000	0	4.9	5.3	<5.0	<1.0	<10	<15	<20	0.9	<0.5					
00-12889		2000	0	8.4	<5.0	<5.0	<1.0	<10	<15	<20	0.9		<0.1				
00-12890		2000	0	6.5	<5.0	<5.0	<1.0	<10	<15	<20	1.1		<0.1				
00-12892		2000	0	8.2	<5.0	<5.0	<1.0	<10	<15	<20	3.9		<0.1				
00-12893		2000	0	14	27	12	<1.0	<10	<15	<20	3.2		<0.1				
00-12896		2000	0	8.1	6.6	<5.0	<1.0	<10	<15	<20	0.8		<0.1				
00-12897		2000	0	4.9	<5.0	<5.0	<1.0	<10	<15	<20	1.6		<0.1				
00-12898		2000	0	5.2	<5.0	<5.0	<1.0	<10	<15	<20	2.9		<0.1				
00-12900		2000	0	5.3	<5.0	<5.0	<1.0	<10	<15	<20	1.2		<0.1	<40			
00-12902		2000	0	9.2	<5.0	<5.0	<1.0	<10	15	<20	0.6		<0.1				
00-12907		2000	0	1.5	<5.0	<5.0	<1.0	<10	<15	<20	0.9		<0.1				
00-12908		2000	0	13	<5.0	<5.0	<1.0	<10	29	<20	1.1		<0.1				
00-12909		2000	0	5.3	<5.0	<5.0	<1.0	<10	23	<20	0.6		<0.1				
00-12910		2000	0	12	<5.0	<5.0	<1.0	<10	16	<20	0.9		<0.1				
00-12913		2000	0	11	<5.0	<5.0	<1.0	<10	16	<20	1.1		<0.1				
00-12914		2000	0	20	13	<5.0	<1.0	<10	<15	<20	1.9		<0.1	140	6% fuel oil, 64% lub		

Table 5.1: North Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
00-12919		2000	0	17	<5.0	<5.0	<1.0	<10	21	<20	1.4		<0.1				
00-12920		2000	0	5.2	<5.0	<5.0	<1.0	<10	47	<20	0.8		<0.1				
00-12922		2000	0	12	<5.0	<5.0	<1.0	10	31	<20	1.1		<0.1				
04-15394	P3-13	2004	0	3.5	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.1	<0.003	12	<10	<4	12
04-15396	P3-14	2004	0	6.1	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.1	<0.003	<10	<10	<4	<9
04-15398	P3-15	2004	0	7.7	<5.0	<5.0	<1.0	<10	<15	<20	1.2	<0.1	<0.003	30	<10	<4	30
04-15400	P3-16	2004	0	9.2	7.5	<5.0	<1.0	<10	<15	<20	2.0	<0.1	<0.003	27	<10	<4	27
	N Value			38	38	38	38	38	38	38	38	11	38	9			
	Average			10.3	<5.0	<5.0	<1.0	<10	<15	<20	1.2	<0.5	<0.1	37.7			
	Standard Deviation			12.6							0.7			43.5			
	Minimum			1.5	<5.0	<5.0	<1.0	<10	10	<20	0.3	<0.1	0.0011	5			
	Maximum			77	35	12	1.4	15	47	27	3.9	<0.5	<0.1	140			
	95% Confidence Limit			4.0							0.2			28.4			

6.0 DCC Tier II Soil Disposal Facility

A DCC Tier II Soil Disposal Facility has been constructed at the Lady Franklin Point site for the disposal of Tier II soil excavated during the cleanup. The location of the Tier II Soil Disposal Facility is south of the east end of the airstrip.

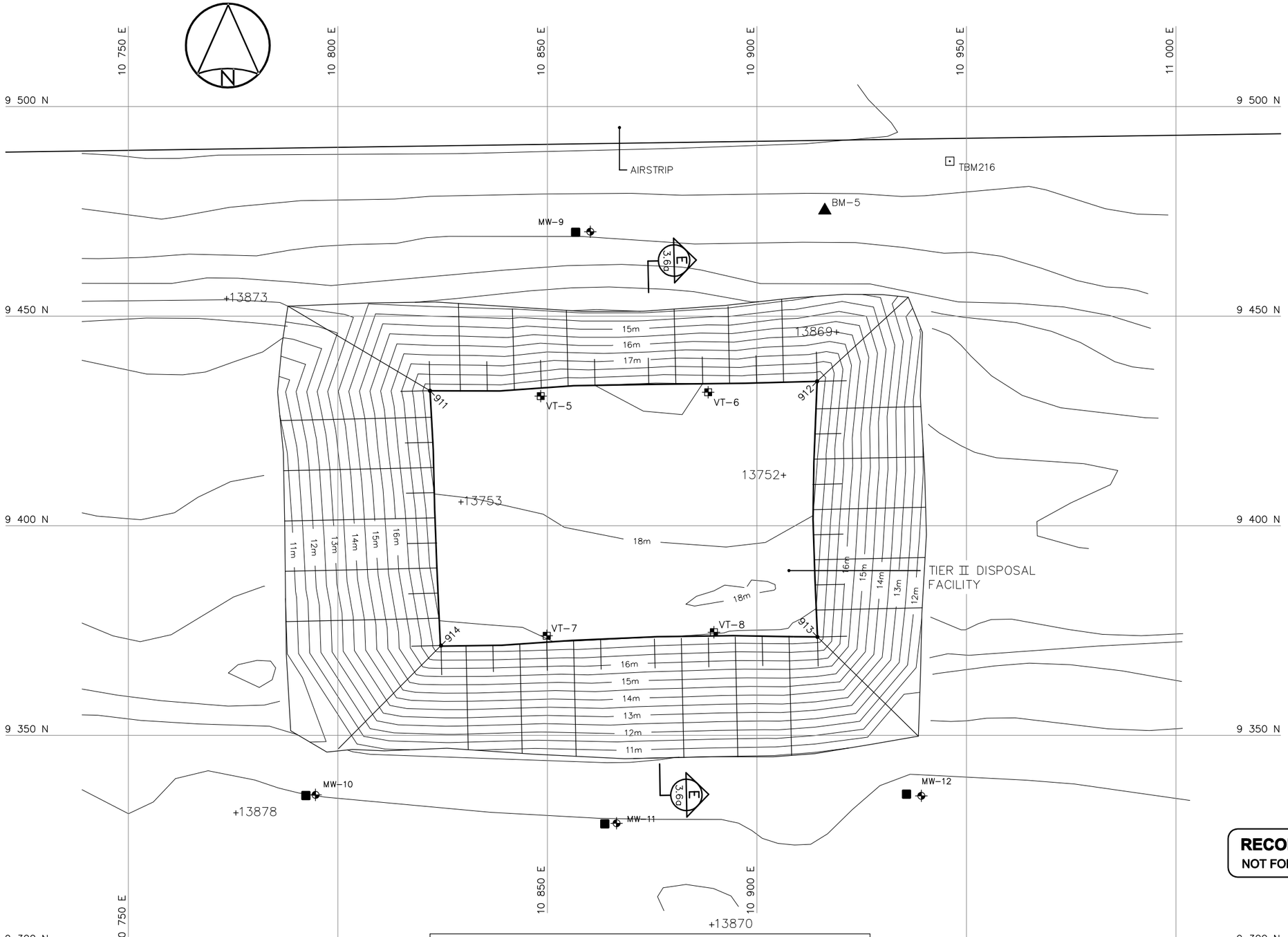
The design of this landfill included a double containment system consisting of a liner system and the placement of sufficient surface fill to promote freezing of landfill contents. The liner was placed along the bottom of the landfill, along the berms, and over the top of the landfill contents. A cross-section illustrating landfill design is provided in Figure PIN-3.6a. Thermistors were installed within the landfill and monitoring wells were installed beyond the landfill perimeter.

The long term monitoring plan consists of visual monitoring for signs of settlement or erosion, collection of soil and groundwater, and monitoring of subsurface ground temperatures within the landfill. Approximate locations for the collection of soil and groundwater samples and ground temperature data are identified on Figure PIN-3.6.

6.1 Baseline Data

Sample locations for baseline soil samples are shown in Figure PIN-3.6. A summary of the baseline soil analytical data is provided in Table 6.1. Baseline data is comprised of samples collected during the site investigation within and surrounding the landfill footprint prior to construction, and soil samples collected at the permanent monitoring locations during site cleanup in 2003 and 2004. Mean baseline concentrations for inorganic elements at the Tier II Disposal Facility are consistent with site background levels. Low-level PCBs were noted at one sample location during baseline; low-level TPH was also present at that same location, as well as two others. The TPH levels detected were all F3 fraction.

A summary of baseline groundwater data is provided in Table 6.2. Baseline data was collected from permanent monitoring locations in 2004. Samples could only be obtained from two of the four wells, as the other wells were dry. Groundwater baseline concentrations at the Tier II Facility are significantly higher than the concentrations observed in the one site background groundwater sample for almost all inorganic elements. Very low-level PCBs were detected in one of the baseline groundwater samples; TPH was not detected in either sample.



LEGEND:

- TBM216 — TEMPORARY BENCHMARK
- BM-5 — PERMANENT BENCHMARK
- MW-12 — MONITORING WELL LOCATION
- VT — VERTICAL THERMISTOR
- 911 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION
- +6952 — BASELINE SOIL SAMPLE LOCATION

COORDINATE POINTS (AS-BUILT) FINAL LANDFILL SURFACE			
NO.	NORTHING	EASTING	ELEV.
911	9 432.2	10 822.0	18.34
912	9 434.4	10 914.4	18.49
913	9 373.5	10 914.5	17.33
914	9 371.3	10 824.5	17.34

MONITORING WELLS			
NO.	NORTHING	EASTING	ELEV.
MW-9	9 470.139	10 860.245	15.26
MW-10	9 335.781	10 794.677	10.88
MW-11	9 329.010	10 866.509	10.65
MW-12	9 335.553	10 939.239	10.96

THERMISTORS			
NO.	NORTHING	EASTING	ELEV.
VT-5	9 430.905	10 848.417	18.62
VT-6	9 431.839	10 888.360	18.59
VT-7	9 373.743	10 849.853	17.50
VT-8	9 374.578	10 889.744	17.52

BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
TBM216	9 486.951	10 946.044	15.334	SPIKE
BM-5	9 475.214	10 916.196	15.430	25mm DIA. STEEL PIPE

RECORD DRAWING
NOT FOR CONSTRUCTION

0 10 20 30m
10 5 1:1000

UMA | AECOM

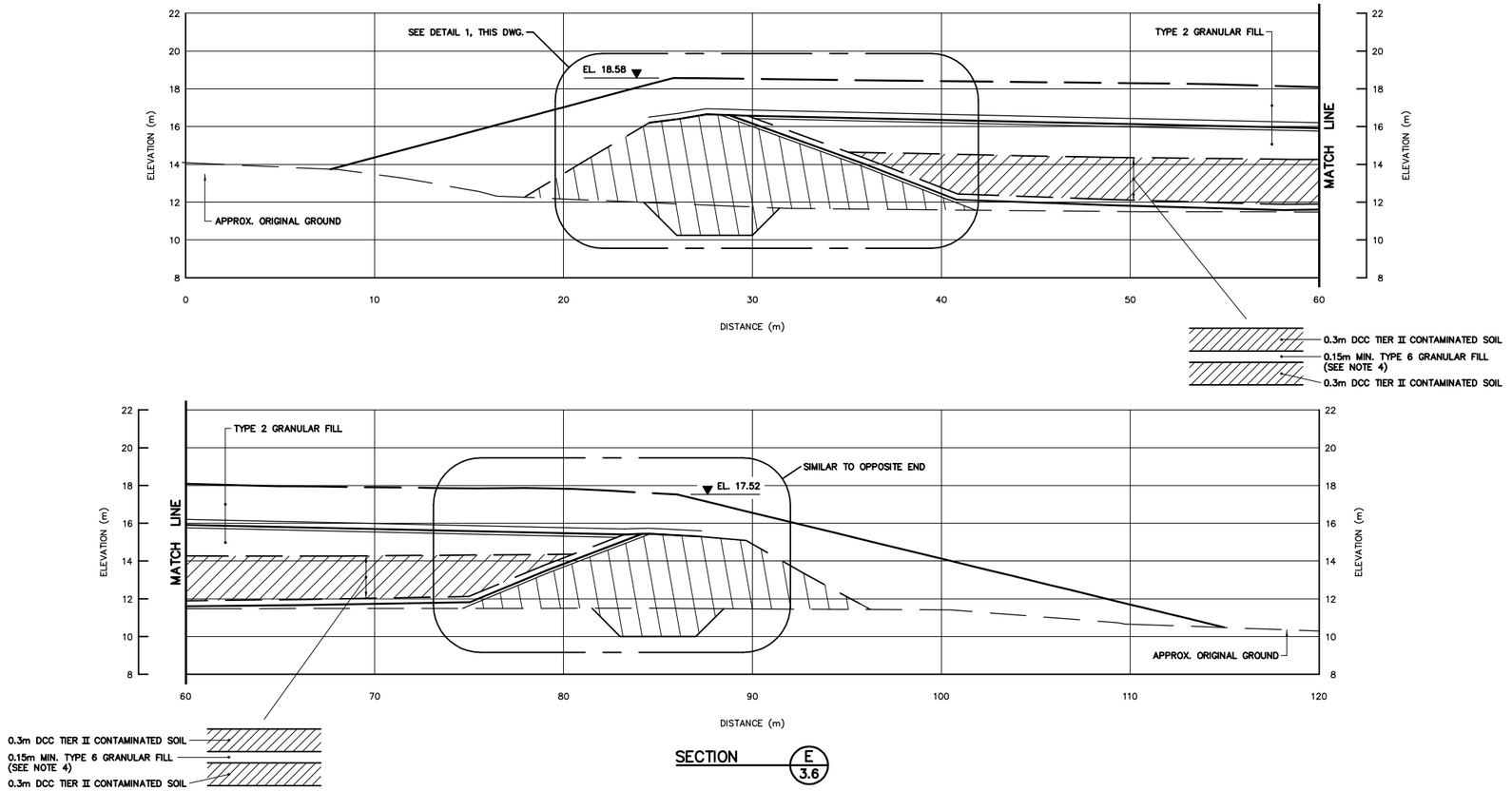
DWG NAME: P3-R007.DWG DJ - 05/11/08

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

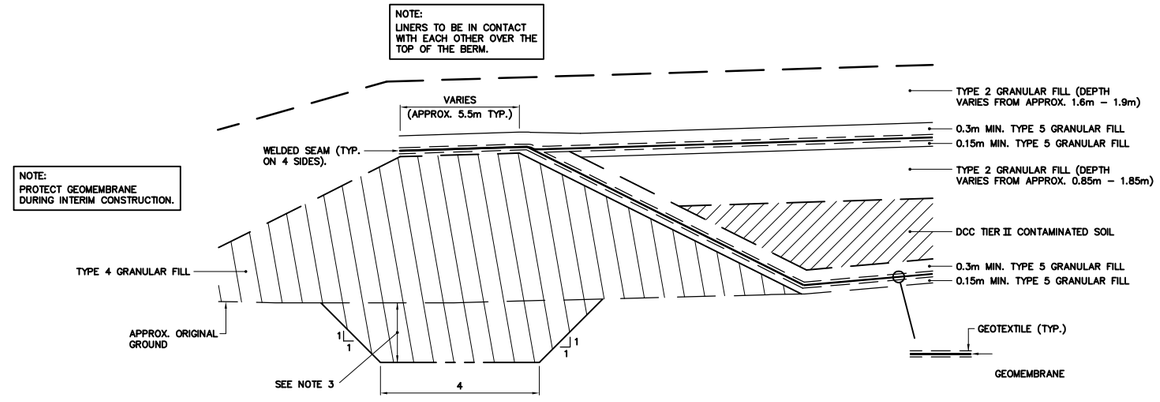
PIN-3 - LADY FRANKLIN POINT

DCC TIER II SOIL DISPOSAL FACILITY

FIGURE PIN-3.6



SECTION E 3.6



DETAIL 1 3.6

TYPICAL FILL PLACEMENT

RECORD DRAWING
NOT FOR CONSTRUCTION

0 3 6 9m
3 1.5 1:300

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3 - LADY FRANKLIN POINT

DCC TIER II SOIL DISPOSAL FACILITY SECTION & DETAIL

FIGURE PIN-3.6a

UMA | AECOM

DGN NAME: P3-RD02.DWG DJ - 05/11/08

Table 6.1: Tier II Soil Disposal Facility - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
Upgradient Soil Samples																	
00-13873	13873	2000	45	12	5.3	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
03-9612	MW-9	2003	0	12	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	<40			
03-9614	MW-9	2003	30	11	5.1	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	<40			
04-15360	MW-9	2004	0	11	5.5	<5.0	<1.0	<10	<15	<20	1.2	<0.1	<0.003	<10	<10	<4	<9
04-15362	MW-9	2004	30	11	5.5	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	<10	<10	<4	<9
Downgradient Soil Samples																	
00-13752	13752	2000	40	8.9	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13818		2000	0	15	5	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13753	13818	2000	50	11	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13819		2000	0	16	<5.0	<5.0	<1.0	<10	16	<20	1.2						
00-13820		2000	0	12	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13868		2000	0	9.8	5.3	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
00-13870		2000	0	40	5.3	<5.0	<1.0	<10	18	<20	<1.0		<0.1	<40			
00-13872	13870/71	2000	40	11	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13878		2000	50	8	<5.0	<5.0	<1.0	<10	17	<20	1.6						
04-15364	MW-10	2004	0	41	7.3	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	160	<10	<4	160
04-15366	MW-10	2004	30	9.3	7.1	<5.0	<1.0	<10	<15	<20	1.4	<0.1	<0.003	<10	<10	<4	<9
04-15368	MW-11	2004	0	9.8	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	0.005	99	<10	<4	99
04-15370	MW-11	2004	30	6.3	<5.0	<5.0	<1.0	<10	<15	<20	2.0	<0.1	<0.003	<10	<10	<4	<9
04-15372	MW-12	2004	0	17	5.8	<5.0	<1.0	<10	<15	<20	2.0	<0.1	<0.003	310	<10	<4	310
04-15374	MW-12	2004	30	8.3	6.8	<5.0	<1.0	<10	<15	<20	1.5	<0.1	<0.003	<10	<10	<4	<9
	N Value			20	20	20	20	20	20	20	20	10	15	11			
	Average			14.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	<10			
	Standard Deviation			9.4													
	Minimum			6.3	<5.0				<15		<1.0		<0.003	<10			
	Maximum			41	7.3				18		2		<0.1	310			
	95% Confidence Limit			4.1													

7.0 Non-Hazardous Waste Landfill

The Non-Hazardous Waste Landfill is located to the north of the airstrip between two access roads running north-south between the airstrip and the main station area. The areal extent of the landfill is approximately 5000 $m^{2,}$ with a depth of 2 metres. It is a new landfill constructed for the disposal of non-hazardous wastes, site debris, and DCC Tier I and Type A hydrocarbon (lubricating oil and greases) contaminated soil.

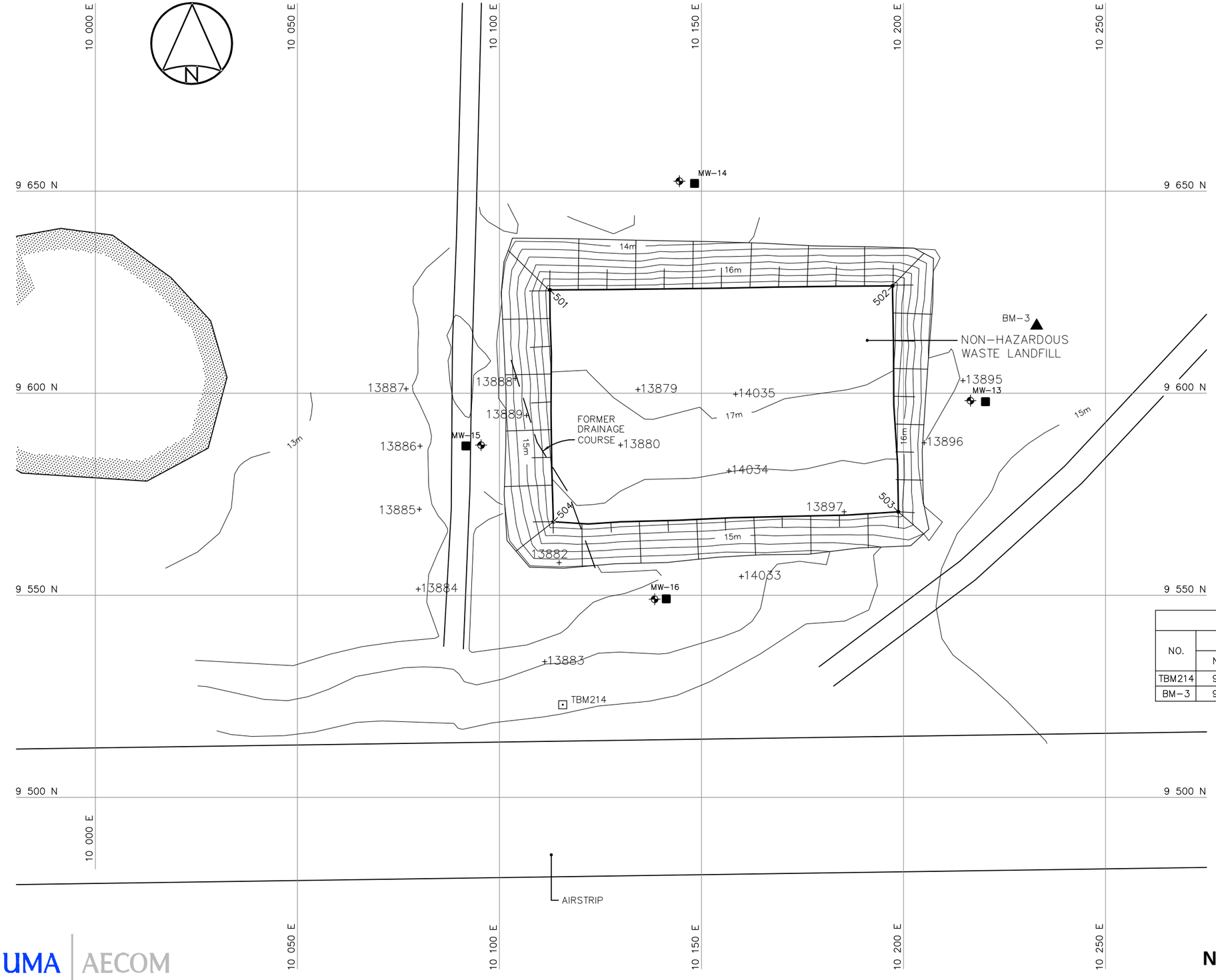
The design of this landfill included compacted perimeter berms, and the placement of 1.0 m of compacted granular fill over the landfilled material. The landfilled material was placed in lifts of 0.5 m with intermediate fill of 0.15 m between lifts. Four groundwater monitoring wells were installed at the landfill perimeter.

The long term monitoring plan consists of visual monitoring for signs of erosion or settlement, and periodic collection of soil and groundwater samples for analysis. Monitoring well and soil sample locations are identified in Figure PIN-1.3.

7.1 Baseline Data

Sample locations for baseline soil samples are shown in Figure PIN-3.7. A summary of the baseline soil analytical data is provided in Table 7.1. Baseline data is comprised of samples collected during the site investigation within and surrounding the landfill footprint prior to construction, and soil samples collected at the permanent monitoring locations during site cleanup in 2003 and 2004. Mean baseline concentrations for inorganic elements at the Non-Hazardous Waste Landfill are consistent with site background levels. Low-level PCBs were noted at one sample location during baseline; TPH was also present at that same location at a concentration of 3400 mg/kg (all F3 fractions). Low-level TPH concentrations were also observed in other baseline locations.

A summary of baseline groundwater data is provided in Table 7.2. Baseline data was collected from permanent monitoring locations in 2003 and 2004. Groundwater baseline concentrations at the Non-Hazardous Waste Landfill are notably higher than the concentrations observed in the one site background groundwater sample for copper, nickel, zinc, and chromium. No PCBs or TPH were detected in groundwater.



LEGEND:

- TBM214 — TEMPORARY BENCHMARK
- BM-3 — PERMANENT BENCHMARK
- MW-13 — MONITORING WELL LOCATION
- 501 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION
- +6952 — BASELINE SOIL SAMPLE LOCATION

COORDINATE POINTS (AS-BUILT) NON-HAZARDOUS WASTE LANDFILL

NO.	NORTHING	EASTING	ELEV.
501	9 625.6	10 112.5	17.31
502	9 626.5	10 197.3	17.33
503	9 570.6	10 198.7	16.23
504	9 568.2	10 113.4	16.38

MONITORING WELLS

NO.	NORTHING	EASTING	ELEV.
MW-13	9 598.156	10 216.575	15.12
MW-14	9 652.461	10 144.538	14.28
MW-15	9 587.139	1 0095.465	14.49
MW-16	9 549.004	10 138.411	14.42

BENCHMARKS

NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
TBM214	9 522.916	10 115.689	14.439	SPIKE
BM-3	9 616.683	10 232.970	14.890	25mm DIA. STEEL PIPE

RECORD DRAWING
NOT FOR CONSTRUCTION

0 10 20 30m
10 5 1:1000

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3 - LADY FRANKLIN POINT

NON - HAZARDOUS WASTE LANDFILL

FIGURE PIN-3.7

UMA | AECOM

DOS NAME: P3-RD08.DWG DJ - 05/11/08

Table 7.1: Non-Hazardous Waste Landfill - Baseline Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
00-13879		2000	0	11	<5.0	<5.0	<1.0	13	26	<20	1.3		<0.1	<40	n/a	n/a	
00-13880		2000	0										<0.1				
00-13882		2000	0	9.7	<5.0	<5.0	<1.0	<10	<15	<20	2.2		<0.1	<40	n/a	n/a	
00-13884		2000	0	11	<5.0	<5.0	<1.0	<10	31	<20	1.1		<0.1				
00-13886		2000	0	7.3	<5.0	<5.0	<1.0	<10	17	<20	1.0		<0.1	<40	n/a	n/a	
00-13888		2000	0	10	<5.0	<5.0	<1.0	<10	<15	<20	1.0		<0.1	<40	n/a	n/a	
00-13889		2000	0	4.2	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-13895		2000	0	6.9	<5.0	<5.0	<1.0	<10	<15	<20	1.1		<0.1	<40	n/a	n/a	
00-13897		2000	0	11	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1	<40	n/a	n/a	
00-14033		2000	0	5.9	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-14035		2000	0	23	15	<5.0	<1.0	12	<15	<20	2.4						
03-9608	MW-13	2003	0	7.8	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	<40	n/a	n/a	
03-9610	MW-13	2003	30	11	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	<40	n/a	n/a	
04-15346	MW-13	2004	0	12	<5.0	<5.0	<1.0	<10	21	<20	1.7	<0.1	<0.003	104	<10	4	100
04-15348	MW-13	2004	30	12	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.003	18	<10	<4	18
04-15356	MW-14	2004	0	13	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	0.011	3400	<10	<4	3400
04-15358	MW-14	2004	10	6.1	<5.0	<5.0	<1.0	<10	<15	<20	7.7	<0.1	<0.003	<9	<10	<4	<9
04-15352	MW-15	2004	0	7.2	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	192	<10	<4	192
04-15354	MW-15	2004	30	5.9	<5.0	<5.0	<1.0	<10	22	<20	<1.0	<0.1	<0.003	22	<10	<4	22
04-15350	MW-16	2004	0	7.5	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	83	<10	<4	83
	N Value			19	19	19	19	19	19	19	10	9	17	15			
	Average			9.6	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.1	<0.003	<40			
	Standard Deviation			4.1							1.7						
	Minimum			4.2	<5.0			<10	<15		<1.0		<0.003	<9			
	Maximum			23	15			13	31		7.7		<0.1	3400			
	95% Confidence Limit			1.9							0.7						

Note: No clear up- or downgradient after construction complete.

Appendix
PIN-3 Lady Franklin Point Year 1 Monitoring Data

PIN-3 Lady Franklin Point – 2005 Landfill Monitoring

In August 2005, a visual inspection of each landfill and downloading of ground temperature data, where required, was carried out by EBA Engineering Consultants Ltd. (EBA). Soil and groundwater samples were collected where applicable by the Environmental Sciences Group (ESG). Samples were analyzed at Queen's University and Royal Military College laboratories, in Kingston, Ontario.

The following table documents the specific monitoring requirements for 2005 (year 1 of monitoring) at each landfill.

Landfill Designation	Visual Inspection	Groundwater Sampling	Soil Sampling	Thermal Monitoring
Main Landfill	√	√	√	√
NWS Landfill	√		√	
South Landfill – West	√		√	
South Landfill – East	√		√	
North Landfill	√		√	
DCC Tier II Soil Disposal Facility	√	√	√	√
Non-Hazardous Waste Landfill	√	√	√	

This appendix serves as a compilation of the EBA geotechnical report (EBA 2005) and the ESG environmental report (ESG 2005) to document the results of landfill monitoring from year 1. The data is organized by landfill in separate annexes. The following information is provided in each annex:

- Visual inspection checklist;
- Visual inspection drawing mark-up;
- Visual inspection photos;
- Thermal monitoring summary (where applicable);
- Plots of ground temperatures with depth at each thermistor installation (where applicable);
- Evaluation of 2005 soil analytical data, as compared to baseline conditions;
- Summary of 2005 soil analytical data;
- Summary of groundwater data – baseline and 2005 (where applicable); and
- Monitoring well development/sampling reports (where applicable).

Summary of Significant Observations

With the exception of thermal data, no interpretation or recommendations have been provided in this appendix; these shall be provided by the Environmental Working Group – Nunavut Tunngavik Incorporated (EWG-NTI). Meeting minutes from the review shall be appended to this report.

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Annex Main Landfill- Year 1 Data

Figures:

- PIN-3.2: Site Plan – Main Landfill
- Figure A-2: Ground Temperature Profile Main Landfill Facility Vertical GTC VT-1
- Figure A-3: Ground Temperature Profile Main Landfill Facility Vertical GTC VT-2
- Figure A-4: Ground Temperature Profile Main Landfill Facility Vertical GTC VT-3
- Figure A-5: Ground Temperature Profile Main Landfill Facility Vertical GTC VT-4

Tables:

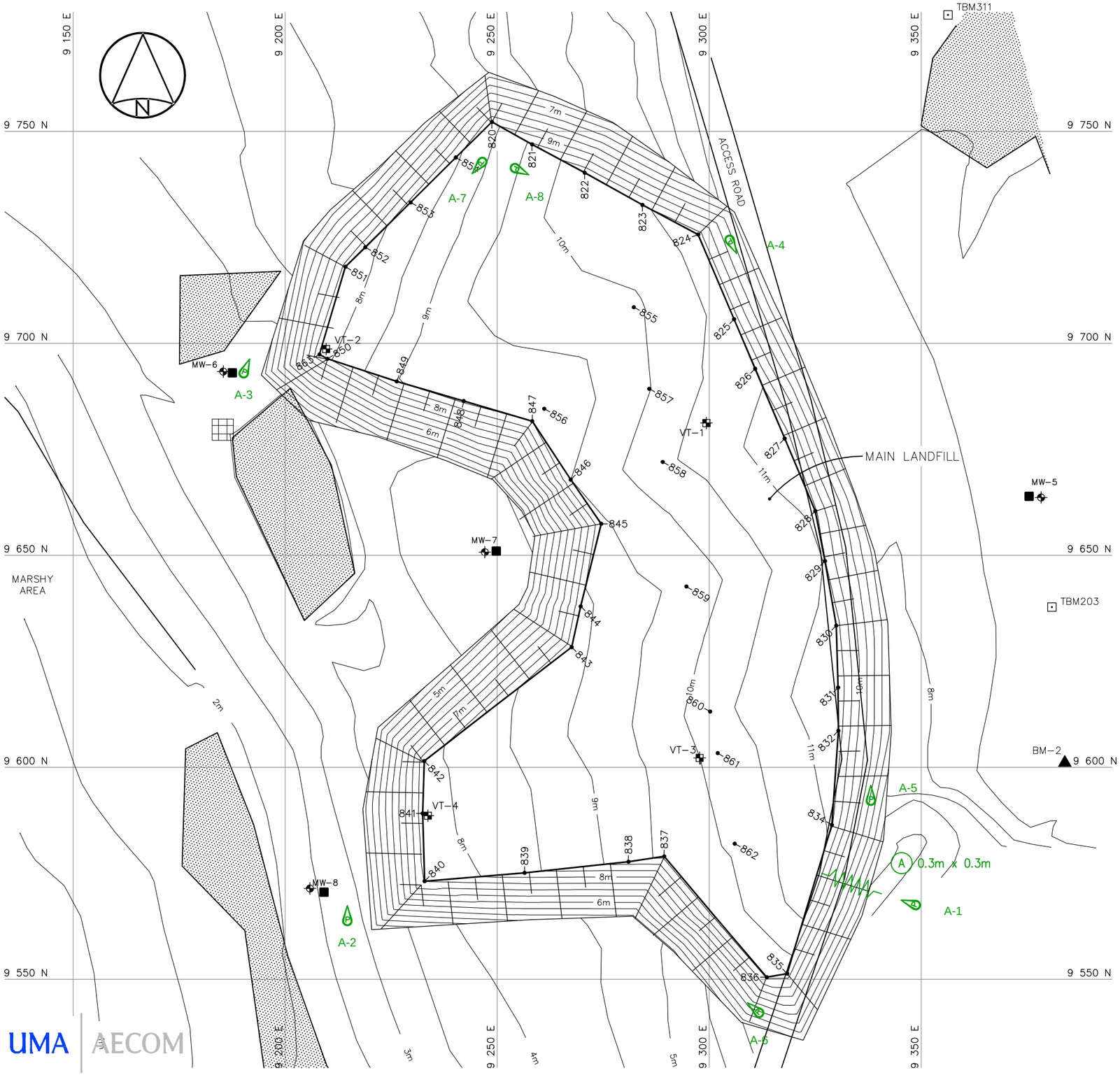
- Landfill Visual Inspection – PIN-3 Lady Franklin Point Main Landfill
- Main Landfill – Evaluation of 2005 Soil Analytical Data
- Main Landfill – Summary of 2005 Soil Data
- Main Landfill – Summary of 2005 Groundwater Data

Photographic Records:

- Photos A-1 and A-2
- Photo A-3 and A-4
- Photo A-5 and A-6
- Photo A-7 and A-8
- Photo A-9

Well Sampling Records:

- Well MW-5
- Well MW-6
- Well MW-7
- Well MW-8



BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
TBM203	9 637.763	9 380.841	8.869	SPIKE
TBM311	9 777.439	9 356.332	8.842	50mm X 50mm WOODEN HUB
BM–2	9 601.307	9 384.159	9.277	25mm DIA. STEEL PIPE

RECORD DRAWING
NOT FOR CONSTRUCTION

LEGEND:

- TBM203 — TEMPORARY BENCHMARK
- BM–2 — PERMANENT BENCHMARK
- MW–5 — MONITORING WELL LOCATION
- VT — VERTICAL THERMISTOR
- 820 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION
- PHOTOGRAPH REFERENCE
- SETTLEMENT (NTS)
- EROSION (NTS)
- PONDING
- (A) OBSERVATION OF CHECKLIST ITEM

MONITORING WELLS			
NO.	NORTHING	EASTING	ELEV.
MW–5	9 663.625	9 378.293	9.57
MW–6	9 693.324	9 185.410	4.07
MW–7	9 650.712	9 247.115	4.66
MW–8	9 571.398	9 205.859	3.08

THERMISTORS			
NO.	NORTHING	EASTING	ELEV.
VT–1	9 681.173	9 299.360	10.70
VT–2	9 698.633	9 209.688	7.92
VT–3	9 602.196	9 297.756	10.01
VT–4	9 588.565	9 233.678	7.82

COORDINATE POINTS (AS–BUILT) FINAL LANDFILL SURFACE			
NO.	NORTHING	EASTING	ELEV.
820	9 752.2	9 248.8	8.86
821	9 746.9	9 258.2	9.58
822	9 740.2	9 270.7	10.34
823	9 732.6	9 284.3	10.46
824	9 725.6	9 297.4	10.71
825	9 705.7	9 305.9	10.73
826	9 694.0	9 310.9	10.87
827	9 677.5	9 317.8	11.36
828	9 660.4	9 325.0	11.09
829	9 648.6	9 327.3	11.02
830	9 633.4	9 330.0	11.20
831	9 618.8	9 330.4	11.40
832	9 608.6	9 330.5	11.26
833			
834	9 586.4	9 329.0	11.05
835	9 551.3	9 318.4	9.75
836	9 550.5	9 313.6	9.56
837	9 579.0	9 289.4	9.64
838	9 577.7	9 281.0	9.20
839	9 575.1	9 256.5	8.36
840	9 573.1	9 232.9	7.53
841	9 589.1	9 232.4	7.82
842	9 601.5	9 232.8	7.86
843	9 628.3	9 267.6	8.84
844	9 637.9	9 269.7	8.87
845	9 657.4	9 274.6	9.43
846	9 667.8	9 267.4	9.50
847	9 681.6	9 258.3	9.02
848	9 686.4	9 242.1	9.12
849	9 691.0	9 226.3	8.99
850	9 696.3	9 210.0	7.93
851	9 718.0	9 214.2	7.68
852	9 722.6	9 218.9	7.83
853	9 733.2	9 229.6	8.17
854	9 743.8	9 240.3	8.42
855	9 708.5	9 282.3	9.91
856	9 684.6	9 261.1	9.04
857	9 689.3	9 285.9	9.98
858	9 672.0	9 289.1	10.39
859	9 642.6	9 294.6	9.64
860	9 613.1	9 300.2	10.28
861	9 603.3	9 302.0	10.12
862	9 582.0	9 306.0	10.08
863	9 697.4	9 208.1	7.80

0 10 20 30m
10 5 1:1000

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DJ – 05/11/06
DGS NAME: P3-R002.DWG

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3 - LADY FRANKLIN POINT

EXISTING MAIN LANDFILL

FIGURE PIN-3.2

Main Landfill – Evaluation of Ground Temperature Data

Data was collected between September 15, 2004 and August 15, 2005. Ground temperature profiles for vertical thermistors VT-1 to VT-4 are attached, and show profiles for eight readings beginning in September 2004. The temperature profiles demonstrate that the granular fill is frozen over the entire length of the ground temperature cables between October 2004 and April 2005. Between April and August 2005, the active layer began to develop. The following table shows the depth of the active layer on August 15, 2005 as defined by the 0°C isotherm (valid for the non-saline granular fills used for construction). The maximum active layer depth, typically around September 15, tends to be about 5 to 10% deeper than August 15 (refer to Tier II thermal data). Also shown are the temperatures of the thermistors sensors below the liner for VT-1 and 3 and within the key trench VT-2 and 4.

Summary of Main Landfill Thermal Results				
	VT-1	**VT-2**	**VT-3**	**VT-4**
Depth (m) of 0°C Isotherm (Aug 15/05)	2.43	2.07	2.39	2.05
Depth (m) to liner or key trench	3.50	4.40	2.95	4.30
Temperature range below liner (°C) (Aug 15/05)	-3.5 to -5.5	-3.6	-3.2 to -5.8	-3.9 to -4.1

The landfill contents and the key trench fill are both frozen, as of August 15, 2005, as indicated by the temperatures of the thermistors located below the liner or within the key trench. Furthermore, based on the observed active layer depths from August, the landfill contents and fill thickness above the key trench should remain frozen for the remainder of the 2005 thawing season. The measured active layers are within the range determined from thermal calculations and the temperatures from within the landfill contents are consistent with the thermal analyses. Based on thermal analyses, it is not expected that thermal equilibrium has been established yet and that temperatures below the liner should continue to cool as equilibrium is established between the landfill and the site climatic conditions (EBA 2005).

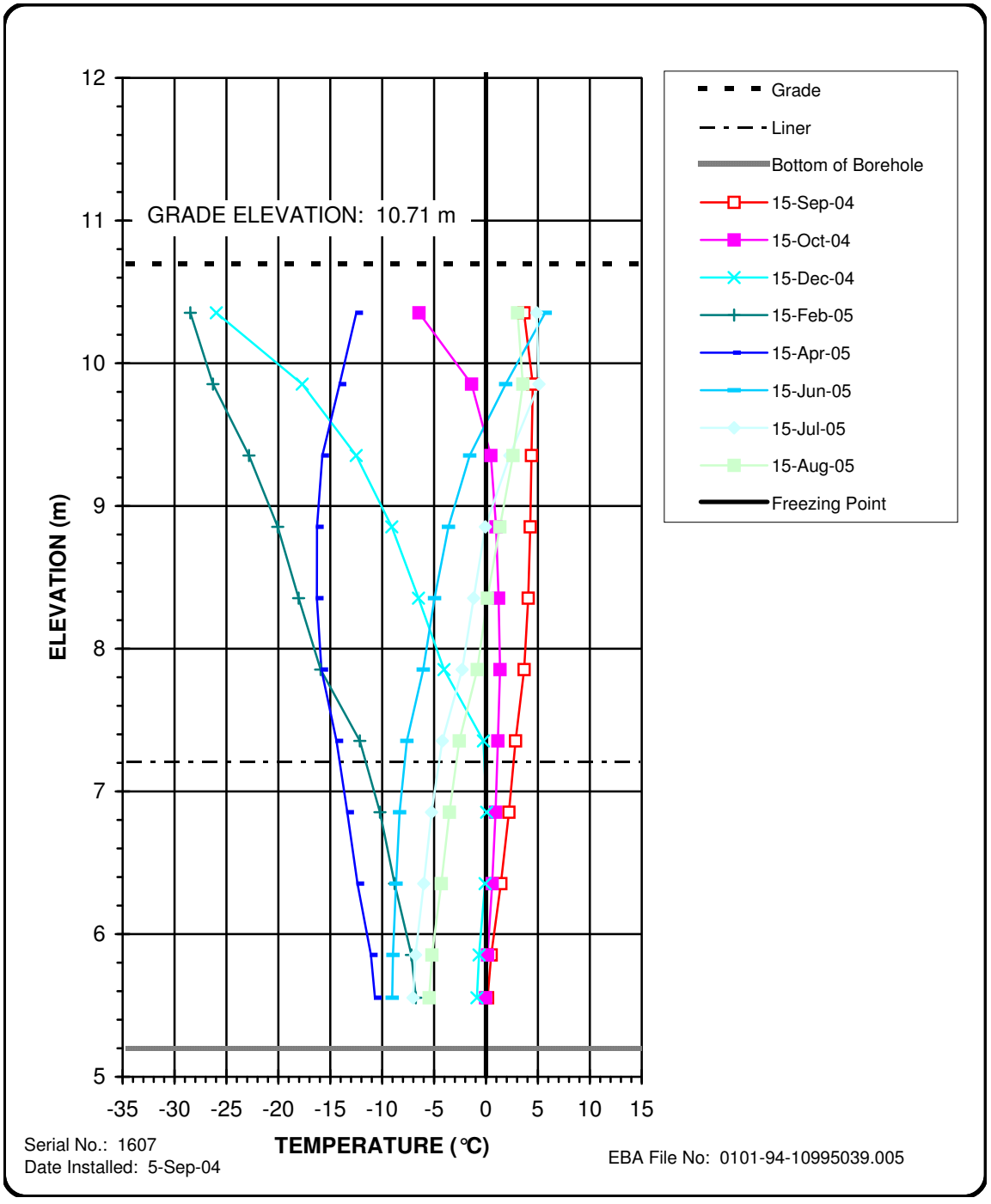


Figure A-2
Ground Temperature Profile
Main Landfill Facility
Vertical GTC VT-1

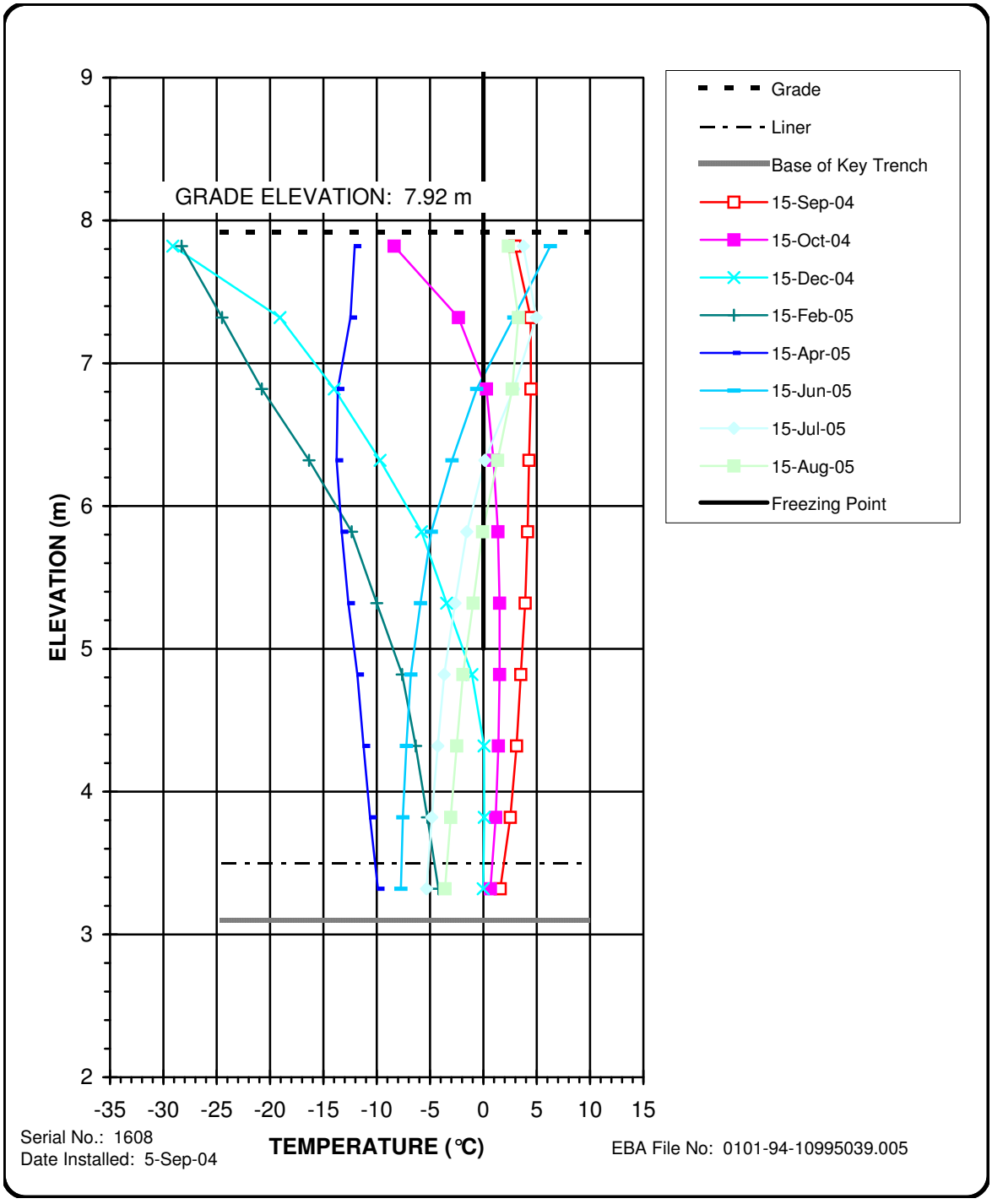


Figure A-3
Ground Temperature Profile
Main Landfill Facility
Vertical GTC VT-2

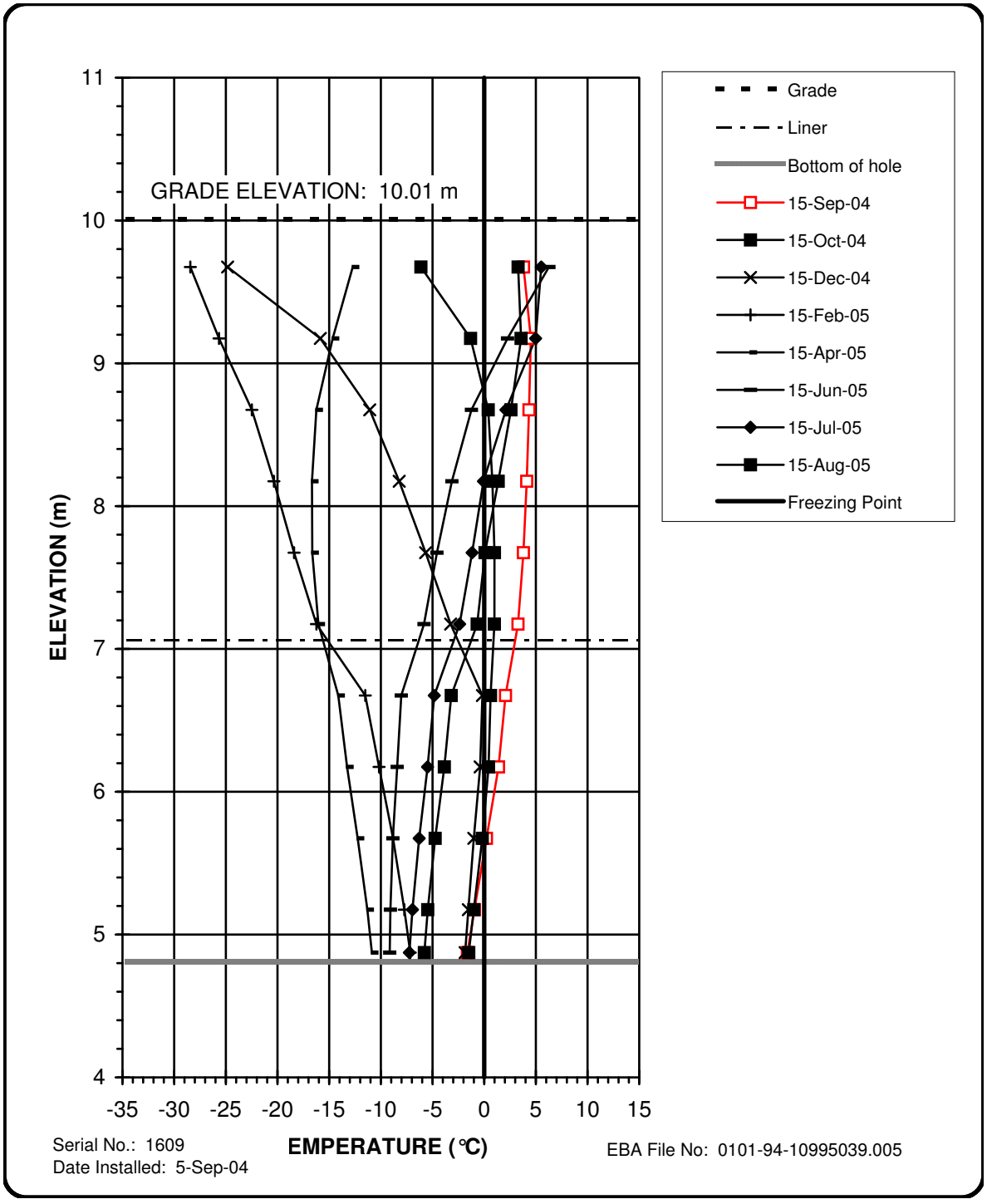


Figure A-4
Ground Temperature Profile
Main Landfill Facility
Vertical GTC VT-3

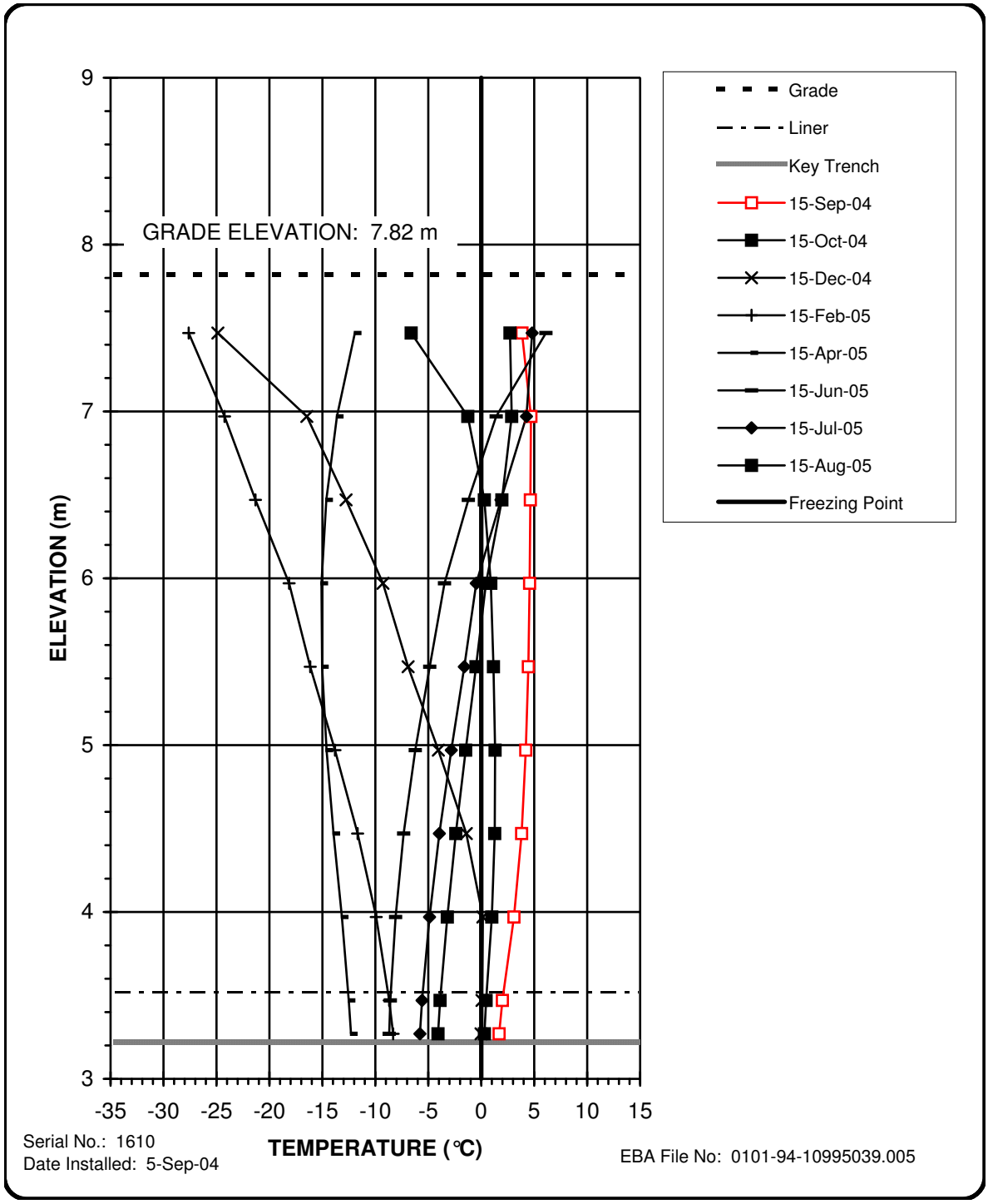


Figure A-5
Ground Temperature Profile
Main Landfill Facility
Vertical GTC VT-4

Landfill Visual Inspection

Site Name: PIN-3, Lady Franklin Point
Landfill Designation: **Main Landfill**
Date Inspected: August 23-25, 2005
Inspected by: Samuel A. Proskin, P.Eng. (NWT, NU)
EBA Engineering Consultants Ltd.
Signature:

Checklist Item	Present (Yes/No)	Location	Dimensions Length x Width x Depth	Extent Relative to Area of Landfill	Description	Photographic Records
Settlement						
Erosion	Yes	A.25 m north of SE toe	0.3 x 0.3 x 0.3 m	Isolated	Acceptable: a minor feature that should be tracked.	A-1
Condition of Monitoring Instruments	VT 1, 2 and 4 locks are in good shape, VT-3 was rusted and cut off and replaced with a Masterlock padlock. Datalogger batteries may have to be replaced in 2006.					
Other Features of Note.	No					
Landfill Performance Rating	Acceptable					A-2 to 9

No evidence of settlement, frost action, animal burrows, vegetation or vegetation stress, staining, seepage/ponded water or exposed debris

Main Landfill - EVALUATION OF 2005 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2005	Comments
Copper	125	12.2 +/- 2.1	74	Measured concentrations within or less than 95% confidence interval	
Nickel	125	<5.0	34	Measured concentrations within or less than 95% confidence interval (non-detect).	
Cobalt	125	<5.0	6	Measured concentrations within or less than 95% confidence interval (non-detect).	
Cadmium	125	<1.0		Measured concentrations within or less than 95% confidence interval (non-detect).	
Lead	125	<10	20	Measured concentrations within or less than 95% confidence interval (non-detect).	
Zinc	125	<15	49	Measured concentrations within or less than 95% confidence interval (non-detect).	
Chromium	125	<20	22	Measured concentrations within or less than 95% confidence interval (non-detect).	
Arsenic	125	<1.0	3.3	Measured concentrations within or less than 95% confidence interval for 5 of 8 samples	Both upgradient samples (at MW-5) & downgradient depth at MW-6 had concentrations above detection limit (2.0, 1.4, 1.1mg/kg respectively) but below baseline max.
Mercury	84	<0.1	<0.5	Measured concentrations within or less than 95% confidence interval (non-detect).	
PCBs	109	<0.1	0.2	Measured concentrations within or less than 95% confidence interval (non-detect).	
TPH	21	<40	2200	Measured concentrations within or less than 95% confidence interval	Low-level TPH (F2 and F3) detected (max 22 mg/kg) but below previous detection limit.

Main Landfill - Summary of 2005 Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
Main Landfill - Baseline Concentrations				**12.2 +/- 2.1**	**<5.0**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**<1.0**	**<0.1**	**<0.1**	**<40**			
Main Landfill - Maximum Concentrations				**74**	**34**	**6**		**20**	**49**	**22**	**3.3**	**<0.5**	**0.2**	**2200**			
Upgradient Soil Samples																	
05-26652	MW-5	2005	0	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	2	<0.1	<0.003	25	<10	7	18
05-26654	MW-5	2005	30	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.1	<0.003	6	<10	6	<9
Downgradient Soil Samples																	
05-26648	MW-6	2005	0	12	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	19	<10	5	14
05-26650	MW-6	2005	30	6.6	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.003	5	<10	5	<9
05-26644	MW-7	2005	0	7.5	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	<10	<10	<4	<9
05-26646	MW-7	2005	30	8.6	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	17	<10	4	13
05-26640	MW-8	2005	0	5.9	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	21	<10	4	17
05-26642	MW-8	2005	30	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	16	11	5	<9

Main Landfill - Summary of 2005 Groundwater Data

Sample #	Location	Date	Cu [mg/L]	Ni [mg/L]	Co [mg/L]	Cd [mg/L]	Pb [mg/L]	Zn [mg/L]	Cr [mg/L]	As [mg/L]	Hg [mg/L]	PCBs [mg/L]	TPH [mg/L]	TPH Identity		
														F1	F2	F3
Upgradient Groundwater Sample																
05-26748	MW-5	2005	0.0076	0.013	<0.003	<0.001	<0.010	0.019	<0.005	<0.003	<0.0004	<0.00002	<1.0	<0.05	<0.5	<1.0
Downgradient Groundwater Samples																
05-26747	MW-6	2005	0.0065	0.015	<0.003	<0.001	<0.010	0.014	0.035	<0.003	<0.0004	<0.00002	<1.0	<0.05	<0.5	<1.0
05-26746	MW-7	2005	0.0099	0.013	<0.003	<0.001	<0.010	0.022	0.019	<0.003	<0.0004	<0.00002	<1.0	<0.05	<0.5	<1.0
05-26745	MW-8	2005	0.008	0.037	0.0036	<0.001	<0.010	0.019	0.064	0.0037	<0.0004	<0.00002	<1.0	<0.05	<0.5	<1.0

Photo A-1
Main Landfill.
Close-up view of erosion feature.

Photo A-2
Main Landfill.
North view of southwest slope.

Photo A-3
Main Landfill.
North view of northwest slope.

Photo A-4
Main Landfill.
South view of northeast slope.

Photo A-5
Main Landfill.
North view of southeast slope.

Photo A-6
Main Landfill.
Northwest view of south slope.

Photo A-7
Main Landfill.
Southwest view of top from north corner.

Photo A-8
Main Landfill.
Southeast view of top from north corner.

Photo A-9
Main Landfill.
Aerial view.

Table 4: Monitoring Well Observations (MW-05)

Development of Monitoring Wells (2005)			
Site Name:	PIN-3-mon		
Date of Sampling Event:	25-Aug-05	Time: 10:26 am	
Names of Samplers:	Alissa Lunney		
	Vanessa Bacher		
	Tim Casson		
Monitoring Well ID:	BMW-05		
Landfill Name:	Main Landfill		
Sample Number:	26748		
Condition of Well:	good		
Purging: (Y/N)	Y	Procedure/Equipment:	Waterra Tube with foot valve
Volume Purged Water=			
Sampling Equipment:	Waterra Tube with foot valve		
Filtration: (Y/N)			
Acidification: (Y/N)			
Decontamination required: (Y/N)	Y		
Number washes:	1		
Number rinses:	2		
Measured Data			
Well height above ground=	60		
Diameter of well (cm)=	2.54		
Depth of installation (cm)=	390	From ground surface	
Length screened section (cm)=	333		
Depth to top of screen=	57	From ground surface	
Depth to water surface (cm)=	179	Method:	Electric meter
Static water level (cm)=	119	From ground surface	
Depth to bottom (cm)=	276	Evidence of sludge etc:	
		Evidence of freezing/siltation: (compare to installation record)	
Free product thickness (mm)=	n/a	Method:	Interface meter
pH=	7.49		
Conductivity (uS/cm)=	957		
Temperature (degC)=	3.5		
Depth of water (cm)=	97		
Well volume of water (mL)=	491.51		
Turbidity (NTU)=	not available		
Length screen collecting water=	97		
Shape factor=	38.48		

n/a=not applicable

Table 5: Monitoring Well Observations (MW-06)

Development of Monitoring Wells (2005)			
Site Name:	PIN-3-mon		
Date of Sampling Event:	25-Aug-05	Time: 10:00 am	
Names of Samplers:	Alissa Lunney		
	Vanessa Bacher		
	Tim Casson		
Monitoring Well ID:	MW-06		
Landfill Name:	Main Landfill		
Sample Number:	26747		
Condition of Well:	good		
Purging: (Y/N)	Y	Procedure/Equipment:	Waterra Tube with foot valve
Volume Purged Water=	1		
Sampling Equipment:	Waterra Tube with foot valve		
Filtration: (Y/N)	N		
Acidification: (Y/N)	N		
Decontamination required: (Y/N)	Y		
Number washes:	1		
Number rinses:	2		
Measured Data			
Well height above ground=	62		
Diameter of well (cm)=	2.54		
Depth of installation (cm)=	473	From ground surface	
Length screened section (cm)=	300		
Depth to top of screen=	53	From ground surface	
Depth to water surface (cm)=	158	Method:	Electric meter
Static water level (cm)=	96	From ground surface	
Depth to bottom (cm)=	246	Evidence of sludge etc:	
		Evidence of freezing/siltation: (compare to installation record)	
Free product thickness (mm)=	n/a	Method:	Interface meter
pH=	9.37		
Conductivity (uS/cm)=	714		
Temperature (degC)=	4		
Depth of water (cm)=	88		
Well volume of water (mL)=	445.90		
Turbidity (NTU)=	not available		
Length screen collecting water=	88		
Shape factor=	34.70		

n/a=not applicable

Table 6: Monitoring Well Observations (MW-07)

Development of Monitoring Wells (2005)			
Site Name:	PIN-3-mon		
Date of Sampling Event:	25-Aug-05	Time: 9:15 am, 2:00pm	
Names of Samplers:	Alissa Lunney		
	Vanessa Bacher		
	Tim Casson		
Monitoring Well ID:	MW-07		
Landfill Name:	Main Landfill		
Sample Number:	26746	Had to return to well at 2 pm to fill 1L HDPE bottle	
Condition of Well:	good	(not enough water)	
Purging: (Y/N)	Y	Procedure/Equipment:	Waterra Tube with foot valve
Volume Purged Water=	1		
Sampling Equipment:	Waterra Tube with foot valve		
Filtration: (Y/N)	N		
Acidification: (Y/N)	N		
Decontamination required: (Y/N)	Y		
Number washes:	1		
Number rinses:	2		
Measured Data			
Well height above ground=	55		
Diameter of well (cm)=	2.54		
Depth of installation (cm)=	480	From ground surface	
Length screened section (cm)=	300		
Depth to top of screen=	60	From ground surface	
Depth to water surface (cm)=	231	Method:	Electric meter
Static water level (cm)=	176	From ground surface	
Depth to bottom (cm)=	264	Evidence of sludge etc:	
		Evidence of freezing/siltation: (compare to installation record)	
Free product thickness (mm)=	n/a	Method:	Interface meter
pH=	11.13		
Conductivity (uS/cm)=	1968		
Temperature (degC)=	4.8		
Depth of water (cm)=	33		
Well volume of water (mL)=	167.21		
Turbidity (NTU)=	not available		
Length screen collecting water=	33		
Shape factor=	13.85		

n/a=not applicable

Table 7: Monitoring Well Observations (MW-08)

Development of Monitoring Wells (2005)			
Site Name:	PIN-3-mon		
Date of Sampling Event:	25-Aug-05	Time: 9:00 am	
Names of Samplers:	Alissa Lunney		
	Vanessa Bacher		
	Tim Casson		
Monitoring Well ID:	MW-08		
Landfill Name:	Main Landfill		
Sample Number:	26744\45 (duplicate)		
Condition of Well:	good		
Purging: (Y/N)	Y	Procedure/Equipment:	Waterra Tube with foot valve
Volume Purged Water=	1		
Sampling Equipment:	Waterra Tube with foot valve		
Filtration: (Y/N)	N		
Acidification: (Y/N)	N		
Decontamination required: (Y/N)	Y		
Number washes:	1		
Number rinses:	2		
Measured Data			
Well height above ground=	60		
Diameter of well (cm)=	2.54		
Depth of installation (cm)=	475	From ground surface	
Length screened section (cm)=	300		
Depth to top of screen=	55	From ground surface	
Depth to water surface (cm)=	131.5	Method:	Electric meter
Static water level (cm)=	71.5	From ground surface	
Depth to bottom (cm)=	242	Evidence of sludge etc:	
		Evidence of freezing/siltation: (compare to installation record)	
Free product thickness (mm)=	n/a	Method:	Interface meter
pH=	7.01		
Conductivity (uS/cm)=	280		
Temperature (degC)=	2.1		
Depth of water (cm)=	110.5		
Well volume of water (mL)=	559.91		
Turbidity (NTU)=	not available		
Length screen collecting water=	110.5		
Shape factor=	42.95		

n/a=not applicable

Annex NWS Landfill - Year 1 Data

Figure:

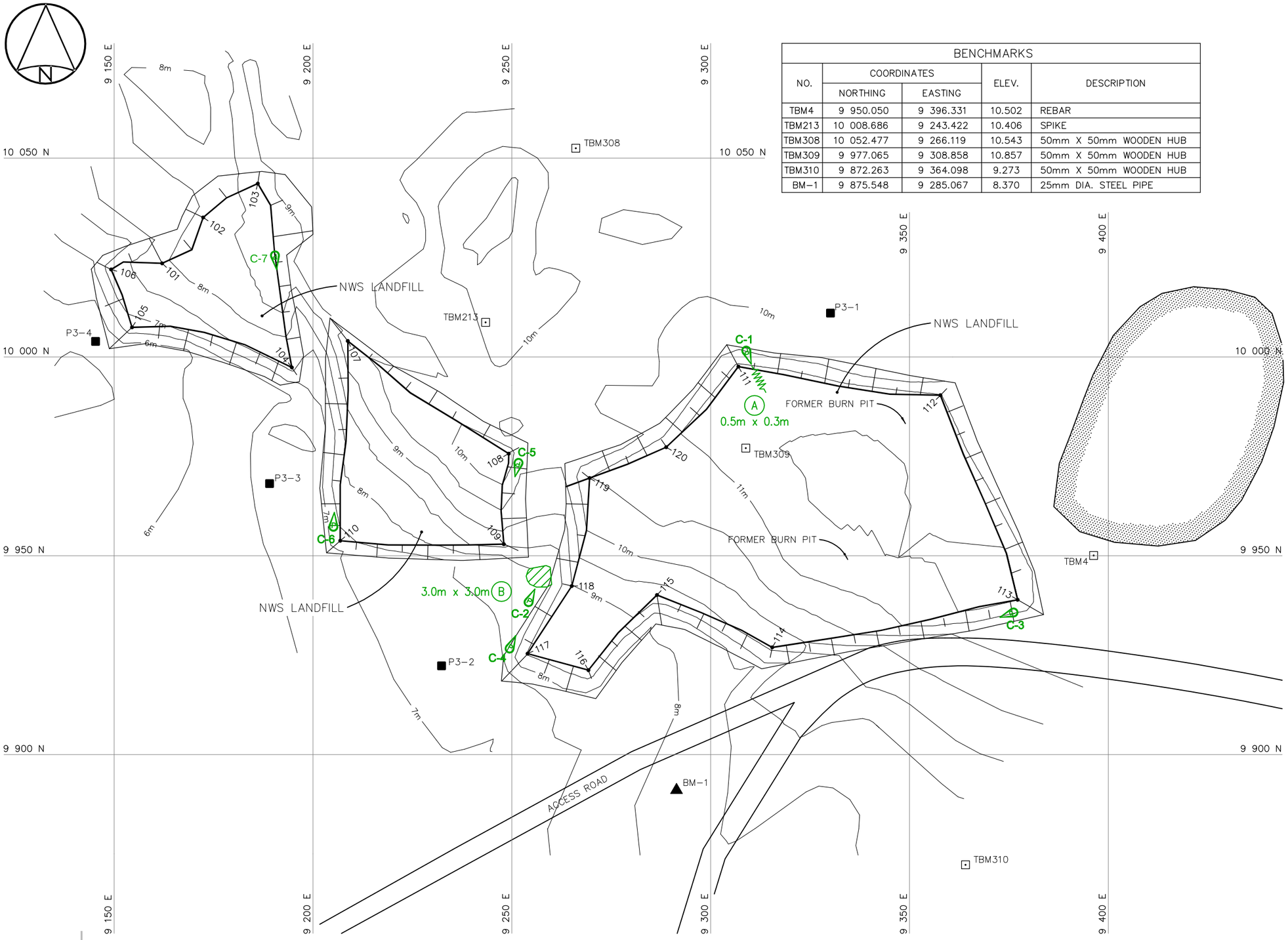
- PIN-3.3: Site Plan – NWS Landfill

Tables:

- Landfill Visual Inspection – PIN-3 Lady Franklin Point NWS Landfill
- NWS Landfill – Evaluation of 2005 Soil Analytical Data
- NWS Landfill – Summary of 2005 Soil Data

Photographic Records:

- Photos C-1 and C-2
- Photo C-3 and C-4
- Photo C-5 and C-6
- Photo C-7 and C-8



BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
TBM4	9 950.050	9 396.331	10.502	REBAR
TBM213	10 008.686	9 243.422	10.406	SPIKE
TBM308	10 052.477	9 266.119	10.543	50mm X 50mm WOODEN HUB
TBM309	9 977.065	9 308.858	10.857	50mm X 50mm WOODEN HUB
TBM310	9 872.263	9 364.098	9.273	50mm X 50mm WOODEN HUB
BM-1	9 875.548	9 285.067	8.370	25mm DIA. STEEL PIPE

LEGEND:

- TBM4 — TEMPORARY BENCHMARK
- BM-1 — PERMANENT BENCHMARK
- 101 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION
- PHOTOGRAPH REFERENCE
- SETTLEMENT (NTS)
- EROSION (NTS)
- PONDING
- (A) OBSERVATION OF CHECKLIST ITEM

COORDINATE POINTS (AS-BUILT) NWS LANDFILL			
NO.	COORDINATES		ELEV.
	NORTHING	EASTING	
101	10 023.5	9 162.1	7.9
102	10 035.1	9 172.4	8.2
103	10 043.6	9 186.1	8.9
104	9 997.4	9 194.7	7.6
105	10 007.4	9 154.5	6.8
106	10 022.0	9 149.3	7.2
107	10 004.0	9 208.8	9.4
108	9 975.7	9 249.2	10.2
109	9 952.9	9 248.0	8.7
110	9 953.8	9 206.9	7.4
111	9 997.6	9 307.0	11.1
112	9 990.4	9 357.8	11.0
113	9 938.9	9 377.2	11.5
114	9 927.0	9 315.5	9.6
115	9 940.1	9 286.5	9.3
116	9 921.2	9 269.3	8.8
117	9 925.4	9 254.0	8.6
118	9 942.4	9 265.1	9.0
119	9 969.5	9 269.6	10.5
120	9 977.3	9 288.8	10.9

RECORD DRAWING
NOT FOR CONSTRUCTION

0 10 20 30m
10 5 1:1000

UMA | AECOM

DWG NAME: P3-RD03.DWG DJ – 05/11/08

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3 - LADY FRANKLIN POINT

EXISTING NWS LANDFILL

FIGURE PIN-3.3

Landfill Visual Inspection

Site Name: PIN-3, Lady Franklin Point
Landfill Designation: **NWS Landfill**
Date Inspected: August 23-25, 2005
Inspected by: Samuel A. Proskin, P.Eng. (NWT, NU)
EBA Engineering Consultants Ltd.
Signature:

Checklist Item	Present (Yes/No)	Location	Dimensions Length x Width x Depth	Extent Relative to Area of Landfill	Description	Photographic Records
Erosion	Yes	A.Between NWS Centre and East: At stake 111	0.5 x 0.3 x 0.2	isolated	Acceptable: slight washout upstream of a boulder	C-1
Seepage/Ponded Water	Yes	B. Between NWS Centre and East: At toe between NWS main and East regraded area	3 x 3 x 0.2	isolated	Acceptable: Ponded water area is clear with fines settling to bottom	C-2
Condition of Monitoring Instruments	None					
Other Features of Note.	No					
Landfill Performance Rating	Acceptable					C-3 to 8

No evidence of settlement, frost action, animal burrows, vegetation or vegetation stress, staining, or exposed debris.

NWS Landfill - EVALUATION OF 2005 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2005	Comments
Copper	50	13.7 +/- 2.0	45	Measured concentrations within or less than 95% confidence interval for 7 of 8 samples.	Downgradient surface sample at P3-3 above 95% confidence interval (20 mg/kg), but lower than baseline max.
Nickel	50	5.0 +/- 0.7	14.3	Measured concentrations within 95% confidence interval for 5 of 8 samples.	Downgradient surface % depth samples at P3-3 and surface at P3-4 above 95% confidence interval (10, 5.8, and 6.3 mg/kg), lower than baseline max.
Cobalt	50	<5.0	5.3	Measured concentrations within 95% confidence interval (non-detect).	
Cadmium	50	<1.0		Measured concentrations within 95% confidence interval (non-detect).	
Lead	50	<10	34	Measured concentrations within 95% confidence interval, with one exception.	Surface sample at P3-3 above 95% confidence interval (14 mg/kg), but lower than baseline maximum.
Zinc	50	<15	79	Measured concentrations within 95% confidence interval, with two exceptions.	Upgradient surface sample at P3-1 and downgradient surface sample at P3-3 above 95% confidence interval (16 and 37 mg/kg respectively), but lower than baseline maximum.
Chromium	50	<20		Measured concentrations within 95% confidence interval (non-detect).	
Arsenic	50	1.19 +/- 0.2	2.7	Measured concentrations within 95% confidence interval for 3 of 8 samples.	Upgradient surface sample at P3-1, downgradient samples at P3-2 (depth), P3-3 & P3-4 (surface) above 95% confidence interval (2.4, 1.7, 2.9, 2.0 mg/kg respectively). Sample at P3-3 above baseline max.
Mercury	21	<0.1	<0.5	Measured concentrations within 95% confidence interval (non-detect).	
PCBs	34	<0.1	<0.1	Measured concentrations within 95% confidence interval.	Detectable, low-level PCBs in P3-3 surface sample (0.0046 mg/kg), but below previous detection limit.
TPH	12	102 +/- 68.5	392	Measured concentrations within 95% confidence interval.	Detectable, low level TPH concentrations in all but two samples (primarily F3), levels lower than or consistent with those observed in 2004.

NWS Landfill - Summary of 2005 Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
NWS Landfill - Mean Baseline Concentrations				**13.7 +/- 2.0**	**5.0 +/- 0.7**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**1.19 +/- 0.2**	**<0.1**	**<0.1**	**102 +/- 68.5**			
NWS Landfill - Maximum Baseline Concentrations				**45**	**14.3**	**5.3**		**34**	**79**		**2.7**	**<0.5**	**<0.1**	**392**			
NWS Landfill - Upgradient Soil Samples																	
05-26668	P3-1	2005	0	7.2	<5.0	<5.0	<1.0	<10	16	<20	2.4	<0.1	<0.003	54	<10	<4	54
05-26670	P3-1	2005	30	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.1	0.0034	12	<10	<4	12
NWS Landfill - Downgradient Soil Samples																	
05-26656	P3-2	2005	0	6.6	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.003	22	<10	6	16
05-26658	P3-2	2005	30	9.6	5.7	<5.0	<1.0	<10	<15	<20	1.7	<0.1	<0.003	<10	<10	<4	<9
05-26662	P3-3	2005	0	20	10	<5.0	<1.0	14	37	<20	2.9	<0.1	0.0046	160	<10	<4	160
05-26660	P3-3	2005	30	9.0	5.8	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	14	<10	4	10
05-26664	P3-4	2005	0	7.4	6.3	<5.0	<1.0	<10	<15	<20	2.0	<0.1	<0.003	11	<10	<4	11
05-26666	P3-4	2005	30	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.2	<0.1	<0.003	<10	<10	<4	<9

Photo C-1
NWS Landfill.
Close-up of erosion feature.

Photo C-2
NWS Landfill.
Close-up of ponded water feature.

Photo C-3
NWS Landfill.
Southwest view of east regraded area.

Photo C-4
NWS Landfill.
North view of west side of regraded area.

Photo C-5
NWS Landfill.
South view of Main regraded area.

Photo C-6
NWS Landfill.
North view of Main regraded area.

Photo C-7
NWS Landfill.
South view of west regraded area.

Photo C-8
NWS Landfill.
Aerial view.

Annex South Landfill - Year 1 Data

Figure:

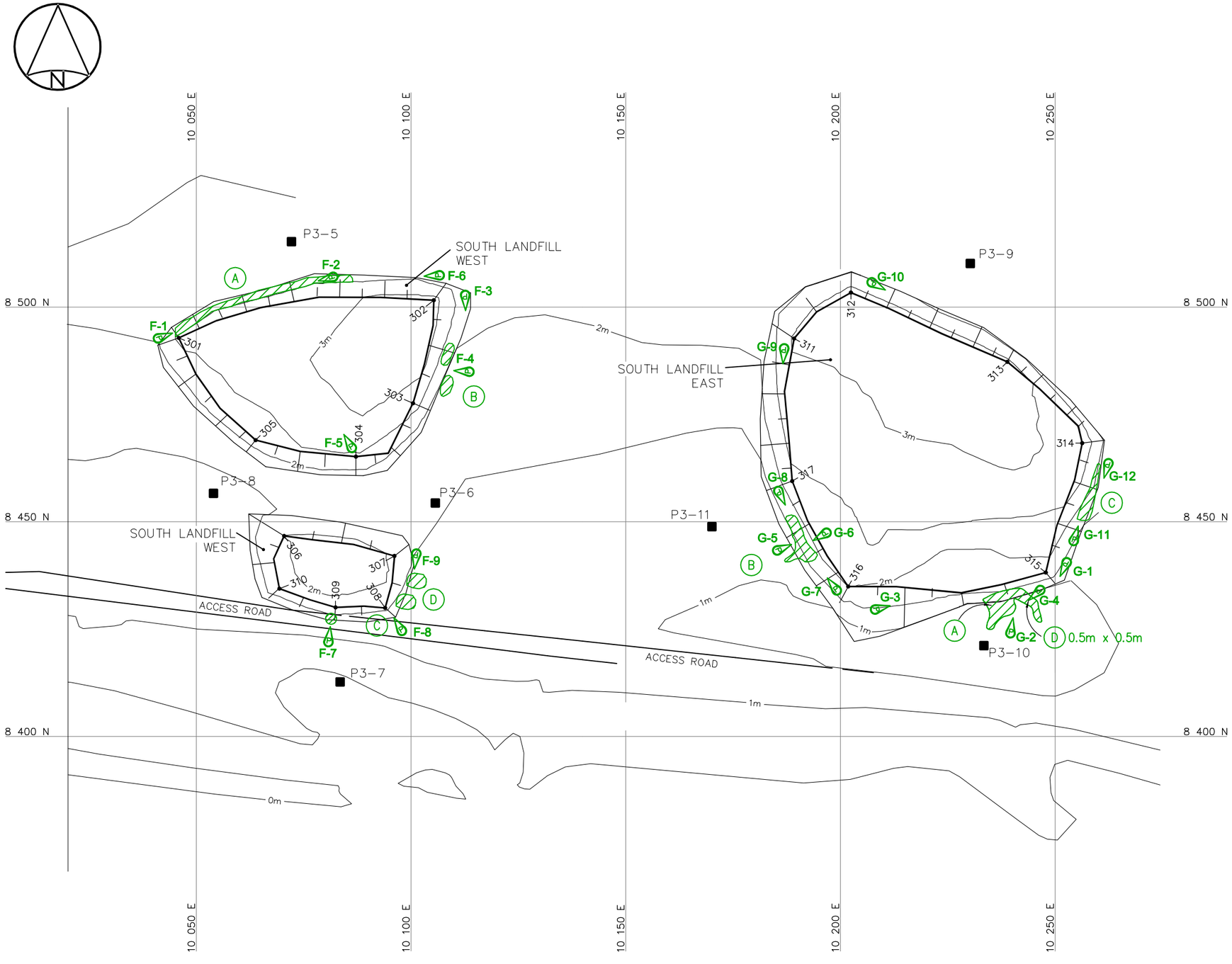
- PIN-3.4: Site Plan – South Landfill

Tables:

- Landfill Visual Inspection – PIN-3 Lady Franklin Point South Landfill West
- Landfill Visual Inspection – PIN-3 Lady Franklin Point South Landfill East
- South Landfill – Evaluation of 2005 Soil Analytical Data
- South Landfill – Summary of 2005 Soil Data

Photographic Records:

- Photos F-1 and F-2
- Photos F-3 and F-4
- Photos F-5 and F-6
- Photos F-7 and F-8
- Photo F-9
- Photos G-1 and G-2
- Photos G-3 and G-4
- Photos G-5 and G-6
- Photos G-7 and G-8
- Photos G-9 and G-10
- Photos G-11 and G-12



LEGEND:

- 301 — COORDINATE POINT
- ■ MONITORING SOIL SAMPLE LOCATION
- PHOTOGRAPH REFERENCE
- SETTLEMENT (NTS)
- EROSION (NTS)
- PONDING
- (A) OBSERVATION OF CHECKLIST ITEM

COORDINATE POINTS (AS–BUILT)
SOUTH LANDFILL – WEST

NO.	COORDINATES		ELEV.
	NORTHING	EASTING	
301	8 492.9	10 045.9	2.6
302	8 501.6	10 105.3	3.2
303	8 477.6	10 100.5	2.9
304	8 465.2	10 087.2	2.5
305	8 469.1	10 063.8	2.2
306	8 446.7	10 070.4	2.0
307	8 442.1	10 096.1	2.0
308	8 430.0	10 094.0	1.6
309	8 430.1	10 082.4	1.9
310	8 434.4	10 069.3	1.8

COORDINATE POINTS (AS–BUILT)
SOUTH LANDFILL – EAST

NO.	COORDINATES		ELEV.
	NORTHING	EASTING	
311	8 492.7	10 189.2	3.1
312	8 503.4	10 202.4	3.2
313	8 487.3	10 238.9	3.1
314	8 468.3	10 256.3	2.9
315	8 438.2	10 247.8	1.8
316	8 435.0	10 201.8	2.0
317	8 459.5	10 188.8	2.4

RECORD DRAWING
NOT FOR CONSTRUCTION

0 10 20 30m
10 5 1:1000

DJ – 05/11/08
DGN NAME: P3–R002.DWG

UMA | AECOM

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3- LADY FRANKLIN POINT

EXISTING SOUTH LANDFILL

FIGURE PIN-3.4

Landfill Visual Inspection

Site Name: PIN-3, Lady Franklin Point
Landfill Designation: **South Landfill West**
Date Inspected: August 23-25, 2005
Inspected by: Samuel A. Proskin, P.Eng. (NWT, NU)
EBA Engineering Consultants Ltd.
Signature:

Checklist Item	Present (Yes/No)	Location	Dimensions Length x Width x Depth (metres)	Extent Relative to Area of Landfill	Description	Photographic Records
Seepage/Ponded Water	Yes	A: At toe of NW and NE slopes B: At toe of E slope	A: 15 x 9 x 0.5 B: 5 x 5 x 0.25	A: isolated B: isolated	A: natural ponded area adjacent to landfill; soil is visually damp extending 1 to 3 m upslope B: 3 isolated ponds, soil is visually damp about 1 to 2 m upslope	F-1 F-2- F-3, F-4
Seepage/Ponded Water in South Extension	Yes	C: Toe of S berm D: East of SE corner and E berm	C: 3 x 0.5 0.1 D: 9 x 9 x 0.2	C: isolated D: isolated	C: shallow pond D: natural ponded area	F-7, F-8, F-9
Condition of Monitoring Instruments	None					
Other Features of Note.	No					
Landfill Performance Rating	Acceptable					F-5, F-6

No evidence of settlement, erosion, frost action, animal burrows, vegetation or vegetation stress, staining, exposed debris

Landfill Visual Inspection

Site Name: PIN-3, Lady Franklin Point
Landfill Designation: **South Landfill East**
Date Inspected: August 23-25, 2005
Inspected by: Samuel A. Proskin, P.Eng. (NWT, NU)
EBA Engineering Consultants Ltd.
Signature:

Checklist Item	Present (Yes/No)	Location	Dimensions Length x Width x Depth (metres)	Extent Relative to Area of Landfill	Description	Photographic Records
Seepage/Ponded Water	Yes	A: Along toe of SE berm B: Along toe of SW berm C: Along toe of E berm	A: 8 m x 8 m x 0.15 m B: 20 x 10 x 0.2 C: Along toe, 4 m wide	A; B; and C: occasional	A,B: Natural ponded areas adjacent to toe. rusty colored water (rainbow on surface); Toe slope is visibly damp about 1 to 3 m upslope of toe. C: Damp area but no standing water;	A: G-1 to 3 B: G-5 to 9 C: G-11, 12
Staining	Yes	D: At ponded water A	D: 0.5 x 0.5	isolated	D: probably from natural organics	G-4
Condition of Monitoring Instruments	None					
Other Features of Note.	No					
Landfill Performance Rating	Acceptable					G-10, 13

No evidence of settlement, erosion, frost action, animal burrows, vegetation or vegetation stress, exposed debris

South Landfill - EVALUATION OF 2005 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2005	Comments
Copper	84	10.1 +/- 1.0	30	Measured concentrations within or less than 95% confidence interval for 6 of 13 samples.	Upgradient samples at P3-9 (both) and downgradient samples at P3-6 (depth), P3-7 (both), and P3-8 (both) greater than 95% conf. interval but below baseline max. Sample concentrations above 95% conf. interval ranged from 13 to 16 mg/kg.
Nickel	84	<5.0	30	Measured concentrations within 95% confidence interval (non-detect) for 9 of 13 samples	Upgradient depth sample at P3-9 & downgradient samples at P3-7 (both) & P3-8 (surface) above detection limit but below baseline max (concentrations up to 6.3 mg/kg).
Cobalt	84	<5.0	26	Measured concentrations within 95% confidence interval (non-detect) for 12 of 13 samples	Upgradient depth sample at P3-9 above detection limit (5.6 mg/kg), but below baseline max.
Cadmium	84	<1.0		Measured concentrations within 95% confidence interval (non-detect).	
Lead	84	<10	19	Measured concentrations within 95% confidence interval (non-detect).	
Zinc	84	<15	71	Measured concentrations within 95% confidence interval (non-detect) for 11 of 13 samples	Both samples at P3-7 (downgradient) above detection limit (16 & 17 mg/kg), well below baseline max.
Chromium	84	<20		Measured concentrations within 95% confidence interval (non-detect).	
Arsenic	84	0.81 +/- 0.1	2.3	Measured concentrations within or less than 95% confidence interval for 5 of 13 samples.	Upgradient surface sample at P3-9 and downgradient surface and depth samples at P3-6, P3-7, P3-8, and P3-11 (only depth) greater than 95% conf. interval but below baseline max. Sample concentrations above 95% conf. interval ranged from 1.0 to 1.9 mg/kg.
Mercury	16	<0.1	<0.5	Measured concentrations within 95% confidence interval (non-detect).	

South Landfill - Summary of 2005 Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
Main Landfill - Baseline Concentrations				**10.1 +/- 1.0**	**<5.0**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**0.81 +/- 0.1**	**<0.1**	**<0.1**	**72.1 +/- 62.6**			
Main Landfill - Maximum Concentrations				**30**	**30**	**26**		**19**	**71**		**2.3**	**<0.5**	**<0.1**	**951**			
Upgradient Soil Samples																	
05-26720	P3-5	2005	0	8.1	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	52	<10	7	45
05-26722	P3-5	2005	30	10	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	6	<10	6	<9
05-26730	P3-9	2005	0	14	<5.0	<5.0	<1.0	<10	<15	<20	1.7	<0.1	<0.003	<10	<10	<4	<9
05-26736	P3-9	2005	30	13	5.3	5.6	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	100	<10	54	46
Downgradient Soil Samples																	
05-26724	P3-6	2005	0	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.0	<0.1	<0.003	<10	<10	<4	<9
05-26726	P3-6	2005	30	16	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.1	<0.003	18	<10	8	10
05-26712	P3-7	2005	0	14	5.7	<5.0	<1.0	<10	16	<20	1.2	<0.1	<0.003	5	<10	5	<9
05-26714	P3-7	2005	30	12	6.4	<5.0	<1.0	<10	17	<20	1.9	<0.1	<0.003	4	<10	4	<9
05-26716	P3-8	2005	0	13	5.6	<5.0	<1.0	<10	<15	<20	1.4	<0.1	0.0053	120	<10	<4	120
05-26718	P3-8	2005	30	15	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.1	0.0031	300	<10	<4	300
05-26732	P3-10	2005	0	7.4	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	<10	<10	<4	<9
05-26734	P3-10	2005	30	5.9	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	4	<10	4	<9
05-26728	P3-11	2005	0	7.0	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.1	<0.003	23	<30	9	14

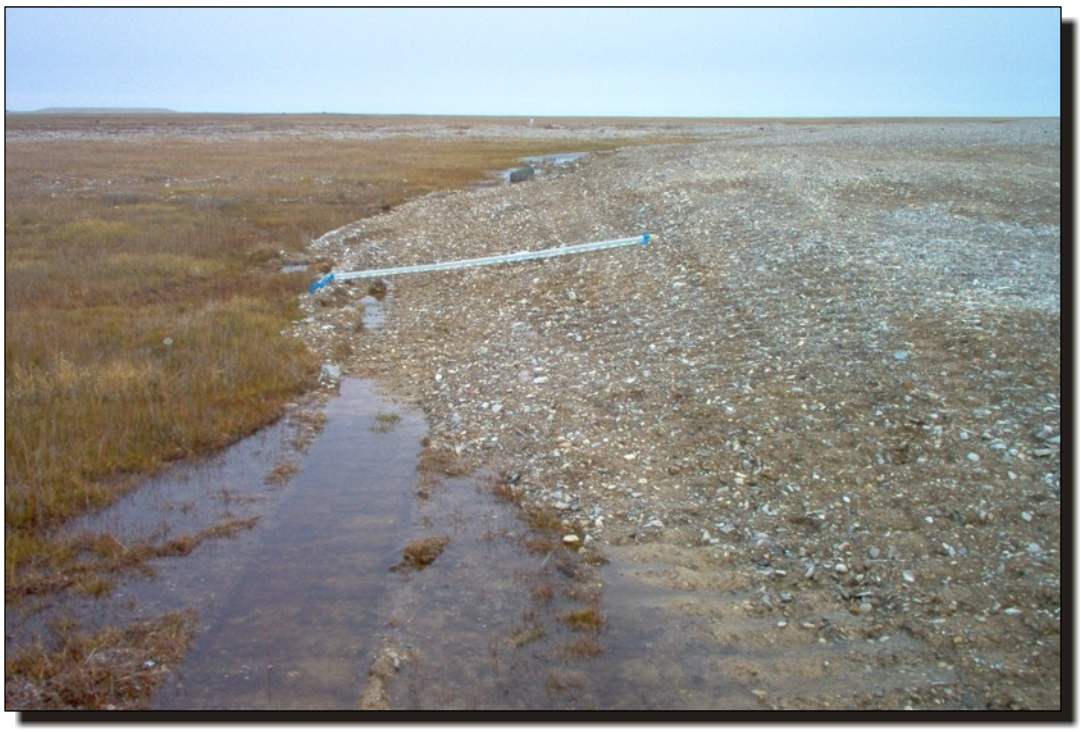


Photo F-1
South Landfill West.
Northeast view of ponded water feature A.

Photo F-2
South Landfill West.
Southwest of ponded water feature A.

Photo F-3
South Landfill West.
South view of ponded water feature B.

Photo F-4
South Landfill West.
West view of ponded water feature B.

Photo F-5
South Landfill West.
Northwest view of surface.

Photo F-6
South Landfill West.
East view of north slope.

Photo F-7
South Landfill West.
North view of ponded water feature C.

Photo F-8
South Landfill West.
Northwest view of ponded water feature D.

Photo F-9
South Landfill West.
South view of ponded water feature D.

Photo G-1
South Landfill East
South view of ponded water feature A.

Photo G-2
South Landfill East.
North view of ponded water feature A.

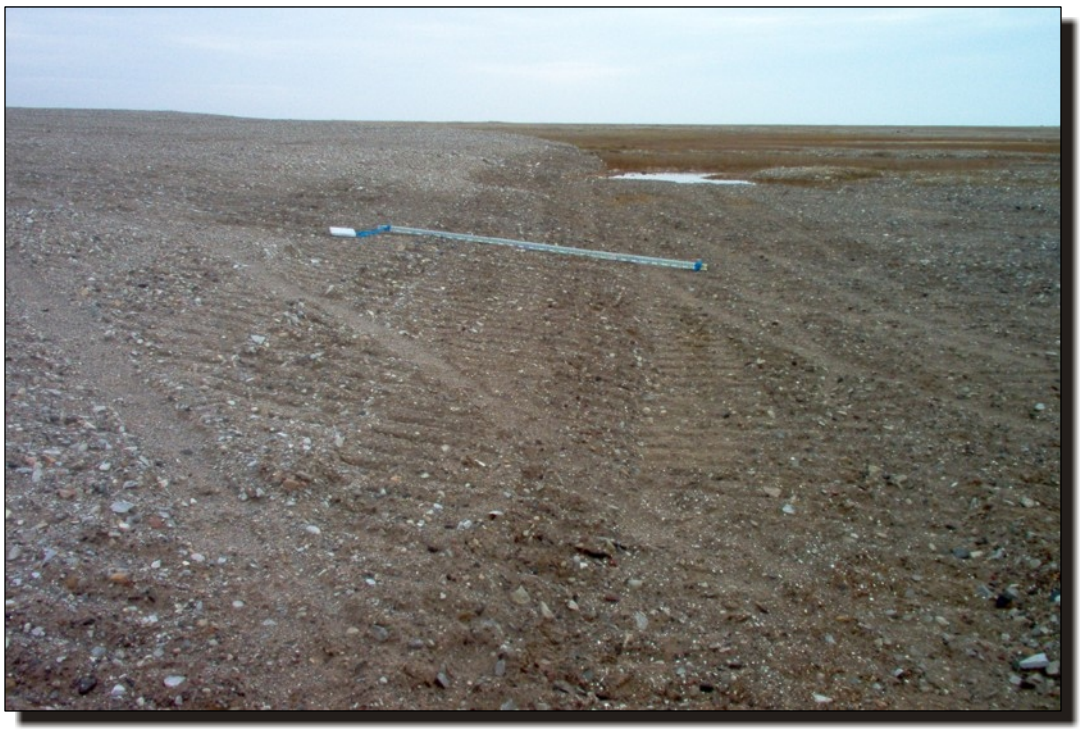


Photo G-3
South Landfill East
East view of south slope.

Photo G-4
South Landfill East.
Close-up of water straining.

Photo G-5
South Landfill East
Northeast view of ponded water feature B.

Photo G-6
South Landfill East.
Southwest view of ponded water feature B.

Photo G-7
South Landfill East.
North view of southwest slope.

Photo G-8
South Landfill East.
South view of southwest slope.

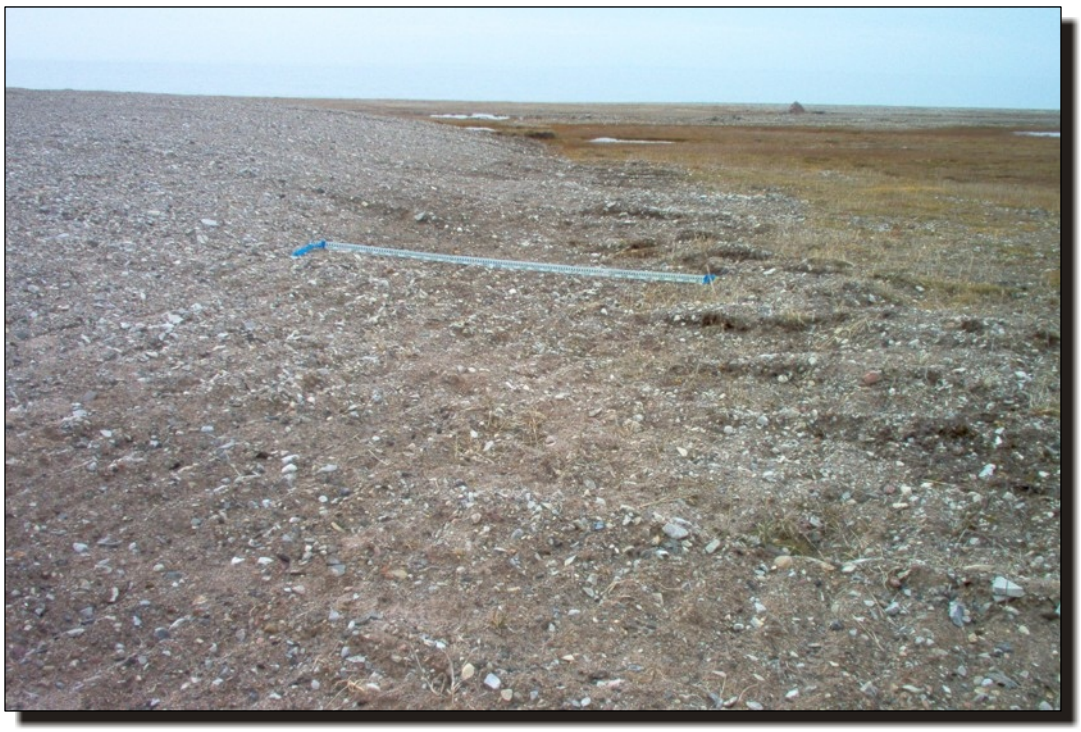


Photo G-9
South Landfill East
South view of east slope.

Photo G-10
South Landfill East.
Southeast view of north slope.

Photo G-11
South Landfill East
North view of damp area C.

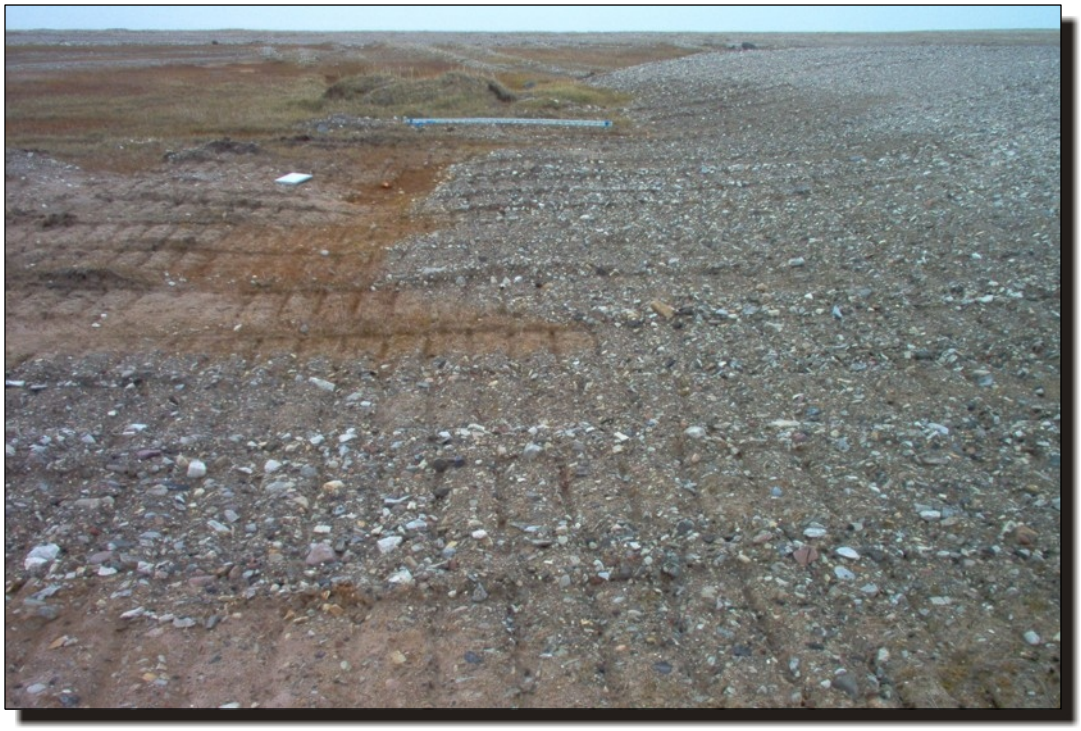


Photo G-12
South Landfill East.
South view of damp area C.

Annex North Landfill - Year 1 Data

Figure:

- PIN-3.5: Site Plan – North Landfill

Tables:

- Landfill Visual Inspection – PIN-3 Lady Franklin Point North Landfill
- North Landfill – Evaluation of 2005 Soil Analytical Data
- North Landfill – Summary of 2005 Soil Data

Photographic Records

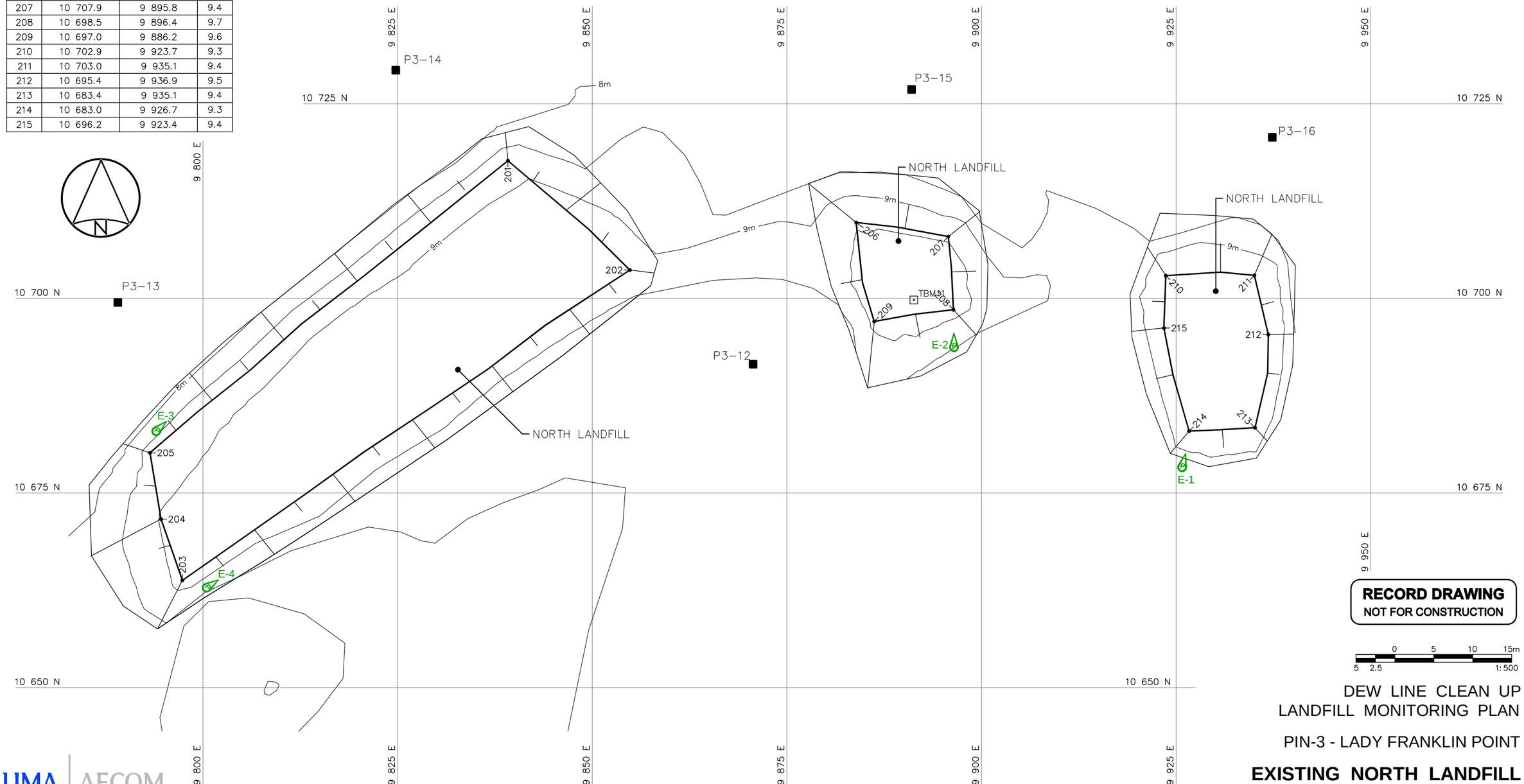
- Photos E-1 and E-2
- Photos E-3 and E-4
- Photo E-5

COORDINATE POINTS (AS-BUILT) NORTH LANDFILL			
NO.	COORDINATES		ELEV.
	NORTHING	EASTING	
201	10 717.7	9 839.2	8.8
202	10 703.6	9 854.8	9.3
203	10 663.8	9 797.4	9.2
204	10 671.7	9 794.6	9.0
205	10 680.2	9 793.2	8.7
206	10 709.8	9 883.9	9.5
207	10 707.9	9 895.8	9.4
208	10 698.5	9 896.4	9.7
209	10 697.0	9 886.2	9.6
210	10 702.9	9 923.7	9.3
211	10 703.0	9 935.1	9.4
212	10 695.4	9 936.9	9.5
213	10 683.4	9 935.1	9.4
214	10 683.0	9 926.7	9.3
215	10 696.2	9 923.4	9.4

BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
TBM11	10 699.796	9 891.328	9.788	

LEGEND:

- TBM11 ⊡ TEMPORARY BENCHMARK
- 201 • COORDINATE POINT
- ■ MONITORING SOIL SAMPLE LOCATION
- PHOTOGRAPH REFERENCE
- SETTLEMENT (NTS)
- EROSION (NTS)
- PONDING
- (A) OBSERVATION OF CHECKLIST ITEM



RECORD DRAWING
NOT FOR CONSTRUCTION

0 5 10 15m
5 2.5 1:500

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3 - LADY FRANKLIN POINT

EXISTING NORTH LANDFILL

FIGURE PIN-3.5

UMA | AECOM

DGS NAME: P3-RD08.DWG DJ – 05/11/08

Landfill Visual Inspection

Site Name: PIN-3, Lady Franklin Point
Landfill Designation: **North Landfill**
Date Inspected: August 23-25, 2005
Inspected by: Samuel A. Proskin, P.Eng. (NWT, NU)
EBA Engineering Consultants Ltd.
Signature:

Checklist Item	Present (Yes/No)	Location	Dimensions Length x Width x Depth	Extent Relative to Area of Landfill	Description	Photographic Records
Condition of Monitoring Instruments	None					
Other Features of Note.	No					
Landfill Performance Rating	Acceptable					E-1 to 5

No evidence of erosion, settlement, frost action, animal burrows, vegetation or vegetation stress, seepage/ponded water, staining, or exposed debris

North Landfill - EVALUATION OF 2005 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2005	Comments
Copper	38	10.3 +/- 4.0	77	Measured concentrations within or less than 95% confidence interval.	
Nickel	38	<5.0	35	Measured concentrations within 95% confidence interval (non-detect) for all but one.	Downgradient surface sample at P3-16 above 95% conf. interval, but below baseline max (7.0 mg/kg).
Cobalt	38	<5.0	12	Measured concentrations within 95% confidence interval (non-detect).	
Cadmium	38	<1.0	1.4	Measured concentrations within 95% confidence interval (non-detect).	
Lead	38	<10	15	Measured concentrations within 95% confidence interval (non-detect).	
Zinc	38	<15	47	Measured concentrations within 95% confidence interval (non-detect) for 3 of 5 samples.	Downgradient samples at P3-13 and P3-15 (surface) above 95% conf. interval, but below baseline max (17 & 15 mg/kg respectively).
Chromium	38	<20	27	Measured concentrations within 95% confidence interval (non-detect).	
Arsenic	38	1.2 +/- 0.2	3.9	Measured concentrations within 95% confidence interval for 1 of 5 samples.	Upgradient and downgradient surface samples at P3-12, P3-13, P3-15 and P3-16 above 95% conf. interval, but below baseline max (1.5, 1.6, 2.3 & 2.2 mg/kg respectively).
Mercury	11	<0.5	<0.5	Measured concentrations within 95% confidence interval (non-detect).	
PCBs	38	<0.1	<0.1	Measured concentrations within 95% confidence interval (non-detect).	Low-level PCBs (below mean detection limit) detected at P3-12 (upgradient), -13, and -14 (all at surface). Max concentration of 0.0043 mg/kg.
TPH	9	37.7 +/- 28.4	140	Measured concentrations within 95% confidence interval.	Low-level TPH detected (primarily F3 with some F2) in all samples. Max concentration of 51 mg/kg.

North Landfill - Summary of 2005 Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
Main Landfill - Baseline Concentrations				**10.3 +/- 4.0**	**<5.0**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**1.2 +/- 0.2**	**<0.5**	**<0.1**	**37.7 +/- 28.4**			
Main Landfill - Maximum Concentrations				**77**	**35**	**12**	**1.4**	**15**	**47**	**27**	**3.9**	**<0.5**	**<0.1**	**140**			
Upgradient Soil Samples																	
05-26706	P3-12	2005	0	6.2	<5.0	<5.0	<1.0	<10	<15	<20	1.5	<0.1	0.0043	14	<10	<4	14
Downgradient Soil Samples																	
05-26708	P3-13	2005	0	5.3	<5.0	<5.0	<1.0	<10	17	<20	1.6	<0.1	0.0039	51	<10	<4	51
05-26710	P3-14	2005	0	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.1	0.0034	22	<10	4	18
05-26704	P3-15	2005	0	7.3	<5.0	<5.0	<1.0	<10	15	<20	2.3	<0.1	<0.003	36	<10	5	31
05-26698	P3-16	2005	0	11	7.0	<5.0	<1.0	<10	<15	<20	2.2	<0.1	<0.003	34	<10	7	27

Photo E-1
North Landfill.
North view of east regraded area.

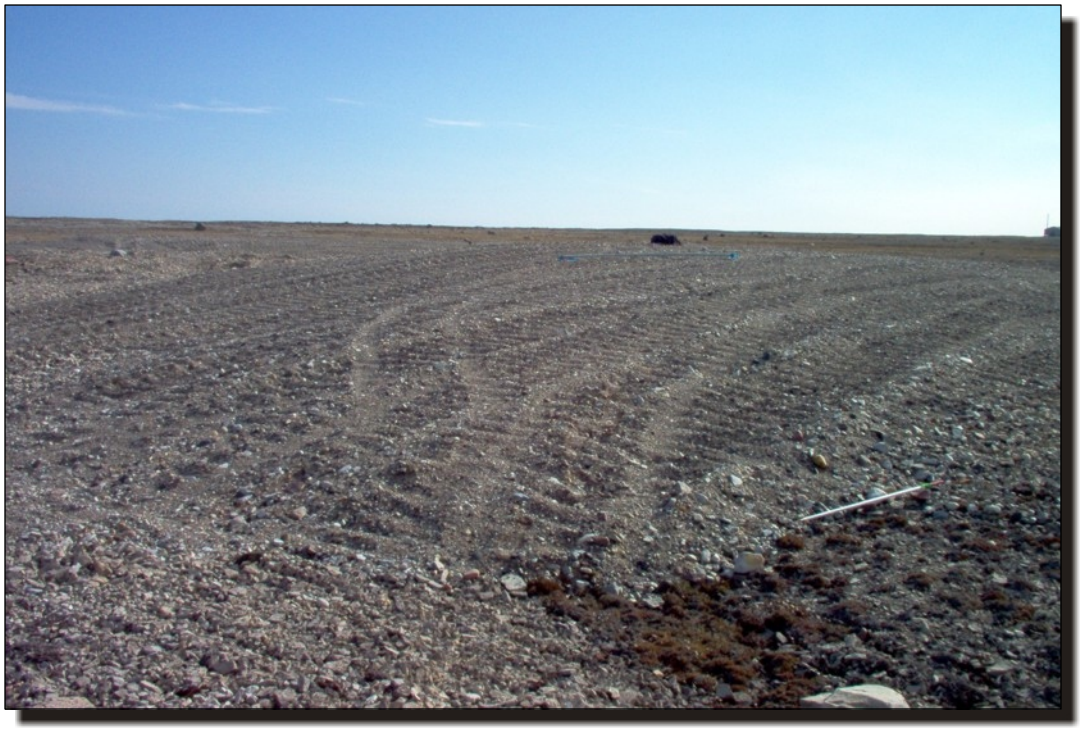


Photo E-2
North Landfill.
North view of central regraded area.

Photo E-3
North Landfill.
Northeast view of west regraded area from northwest corner.

Photo E-4
North Landfill.
Northeast view of west regraded area from southwest corner.

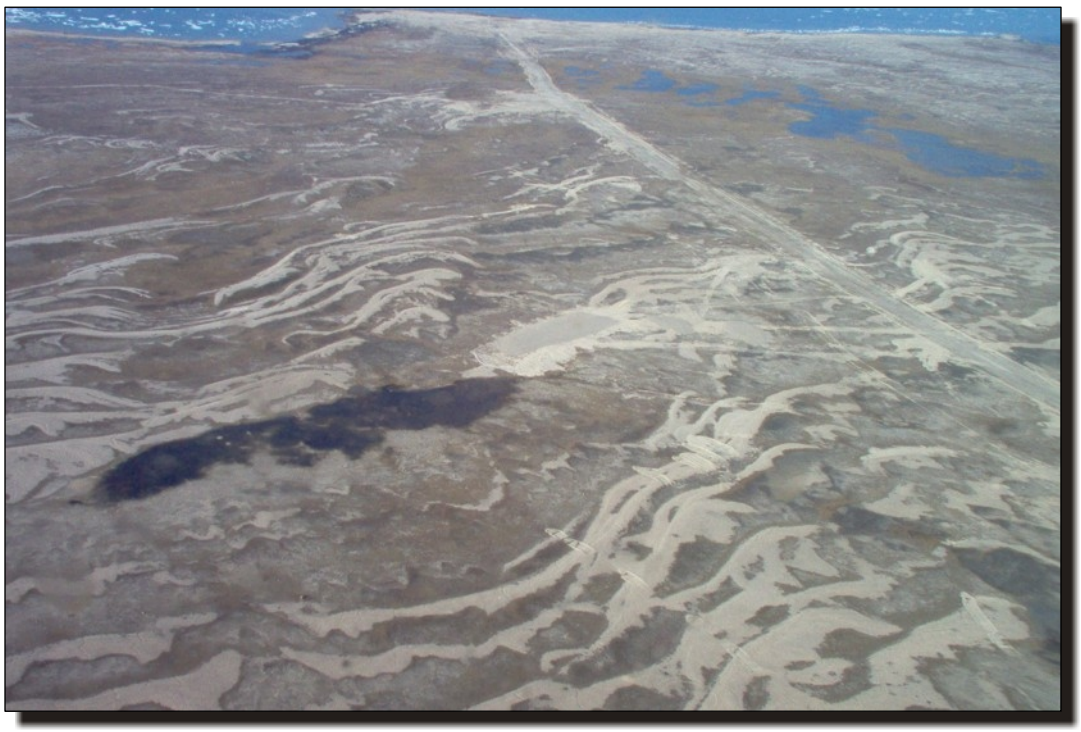


Photo E-5
North Landfill.
Aerial view.

Annex DCC Tier II Soil Disposal Facility- Year 1 Data

Figures:

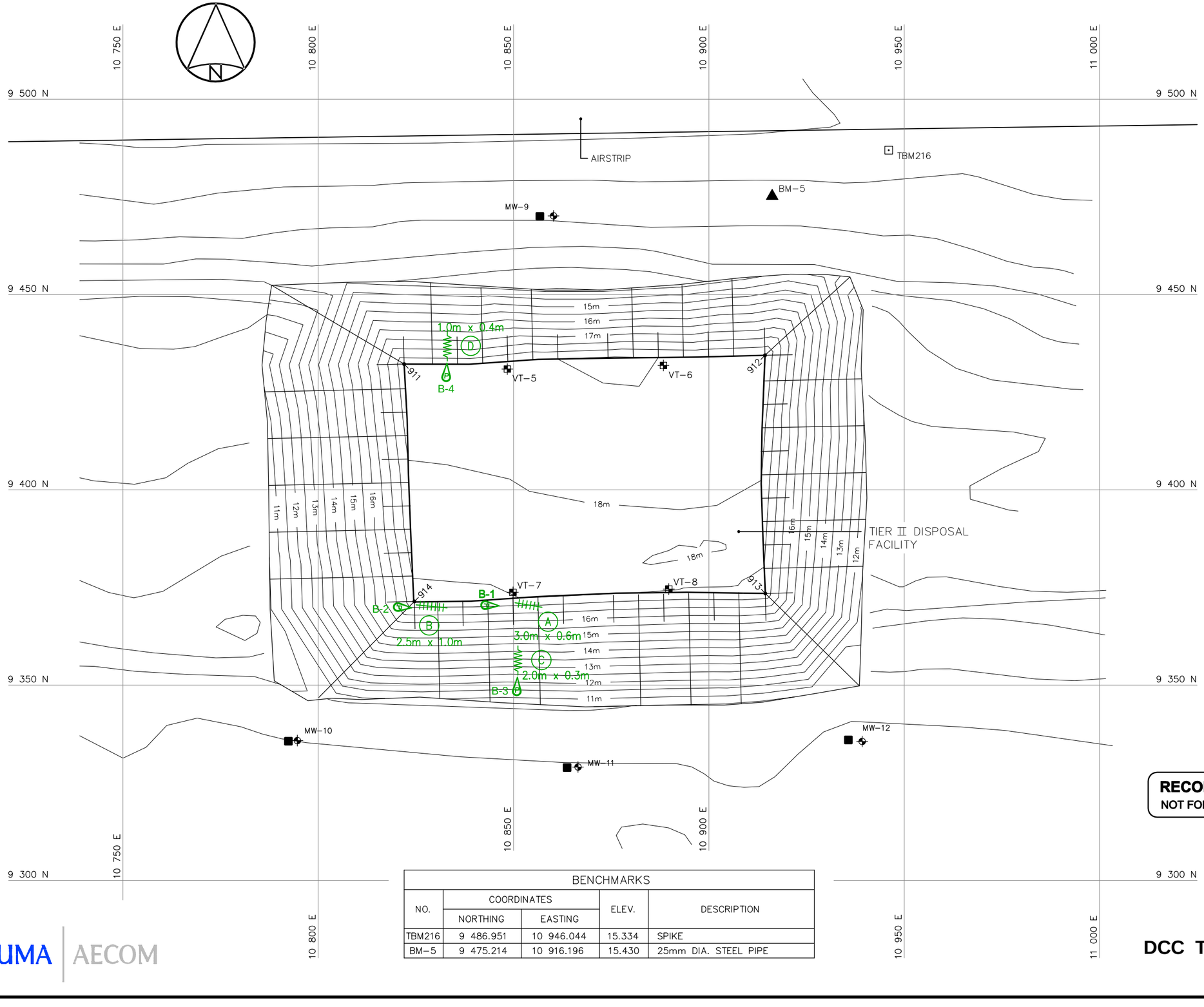
- PIN-3.6: Site Plan – DCC Tier II Soil Disposal Facility
- Figure B-2: Ground Temperature Profile Main Landfill Facility Vertical GTC VT-5
- Figure B-3: Ground Temperature Profile Main Landfill Facility Vertical GTC VT-6
- Figure B-4: Ground Temperature Profile Main Landfill Facility Vertical GTC VT-7
- Figure B-5: Ground Temperature Profile Main Landfill Facility Vertical GTC VT-8

Tables:

- Landfill Visual Inspection – PIN-3 Lady Franklin Point Tier II Landfill
- Tier II Soil Disposal Facility – Evaluation of 2005 Soil Analytical Data
- Tier II Soil Disposal Facility – Summary of 2005 Soil Data
- Tier II Soil Disposal Facility – Summary of 2005 Groundwater Data

Photographic Records:

- Photos B-1 and B-2
- Photo B-3
- Photo B-4
- Photo B-5



LEGEND:

- TBM216 — TEMPORARY BENCHMARK
- BM-5 — PERMANENT BENCHMARK
- MW-12 — MONITORING WELL LOCATION
- VT — VERTICAL THERMISTOR
- 911 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION
- PHOTOGRAPH REFERENCE
- SETTLEMENT (NTS)
- EROSION (NTS)
- PONDING
- (A) OBSERVATION OF CHECKLIST ITEM

COORDINATE POINTS (AS-BUILT) FINAL LANDFILL SURFACE			
NO.	NORTHING	EASTING	ELEV.
911	9 432.2	10 822.0	18.34
912	9 434.4	10 914.4	18.49
913	9 373.5	10 914.5	17.33
914	9 371.3	10 824.5	17.34

MONITORING WELLS			
NO.	NORTHING	EASTING	ELEV.
MW-9	9 470.139	10 860.245	15.26
MW-10	9 335.781	10 794.677	10.88
MW-11	9 329.010	10 866.509	10.65
MW-12	9 335.553	10 939.239	10.96

THERMISTORS			
NO.	NORTHING	EASTING	ELEV.
VT-5	9 430.905	10 848.417	18.62
VT-6	9 431.839	10 888.360	18.59
VT-7	9 373.743	10 849.853	17.50
VT-8	9 374.578	10 889.744	17.52

BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
TBM216	9 486.951	10 946.044	15.334	SPIKE
BM-5	9 475.214	10 916.196	15.430	25mm DIA. STEEL PIPE

RECORD DRAWING
NOT FOR CONSTRUCTION

0 10 20 30m
10 5 1:1000

UMA | AECOM

DWG NAME: P3-R007.DWG DJ - 05/11/08

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3 - LADY FRANKLIN POINT

DCC TIER II SOIL DISPOSAL FACILITY

FIGURE PIN-3.6

DCC Tier II Soil Disposal Facility – Evaluation of Ground Temperature Data

Ground temperature profiles for vertical thermistors VT-5 to VT-8 are attached, and show 11 intervals beginning in June 2004. The table shows the depth of active layer as defined by the 0°C isotherm for three dates: August 18, 2004, September 15, 2004, and August 15, 2005. The active layer reached a maximum around September 15, 2004, which is about 5 to 10% deeper than the August 15 depth for that same year. The active layer depths of August 15, 2005 are within 10% of values of August 18, 2004. Also shown are the temperatures of the bottom thermistor sensors (below the liner, within the landfill contents) on August 15, 2005.

Summary of DCC Tier II Soil Disposal Facility Thermal Results				
	VT-5	**VT-6**	**VT-7**	**VT-8**
Depth (m) of 0°C Isotherm (Aug 18/04)	1.67	1.67	1.85	1.89
Depth (m) of 0°C Isotherm (Sept 15/04)	1.83	1.76	1.93	1.96
Depth (m) of 0°C Isotherm (Aug 15/05)	1.54	1.55	1.84	1.77
Temperature range below liner (°C) (Aug 15/05)	-6.8	-6.4	-6.0	-6.2

The active layer depths inferred from the September 15, 2004 data are less than the thickness of the 3.0 metre granular cover over the Tier II soil; the landfill contents are remaining frozen. The saturated berms, extending into the key trench, have remained frozen since freezing during the winter of 2003/04. The measured active layers are within the range of the thermal calculations (EBA 2005).

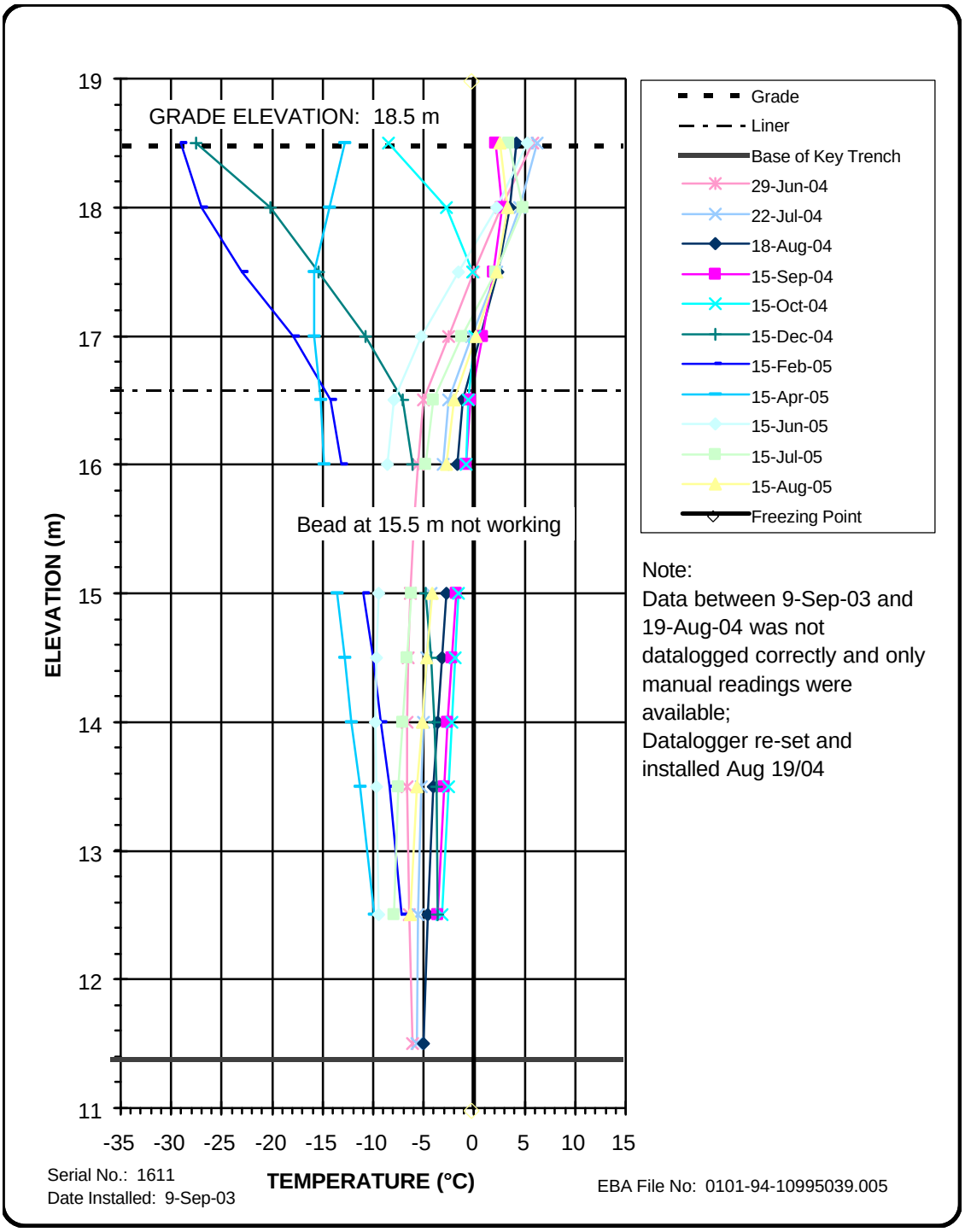


Figure B-2
Ground Temperature Profile
Tier II Disposal Facility
Vertical GTC VT-5

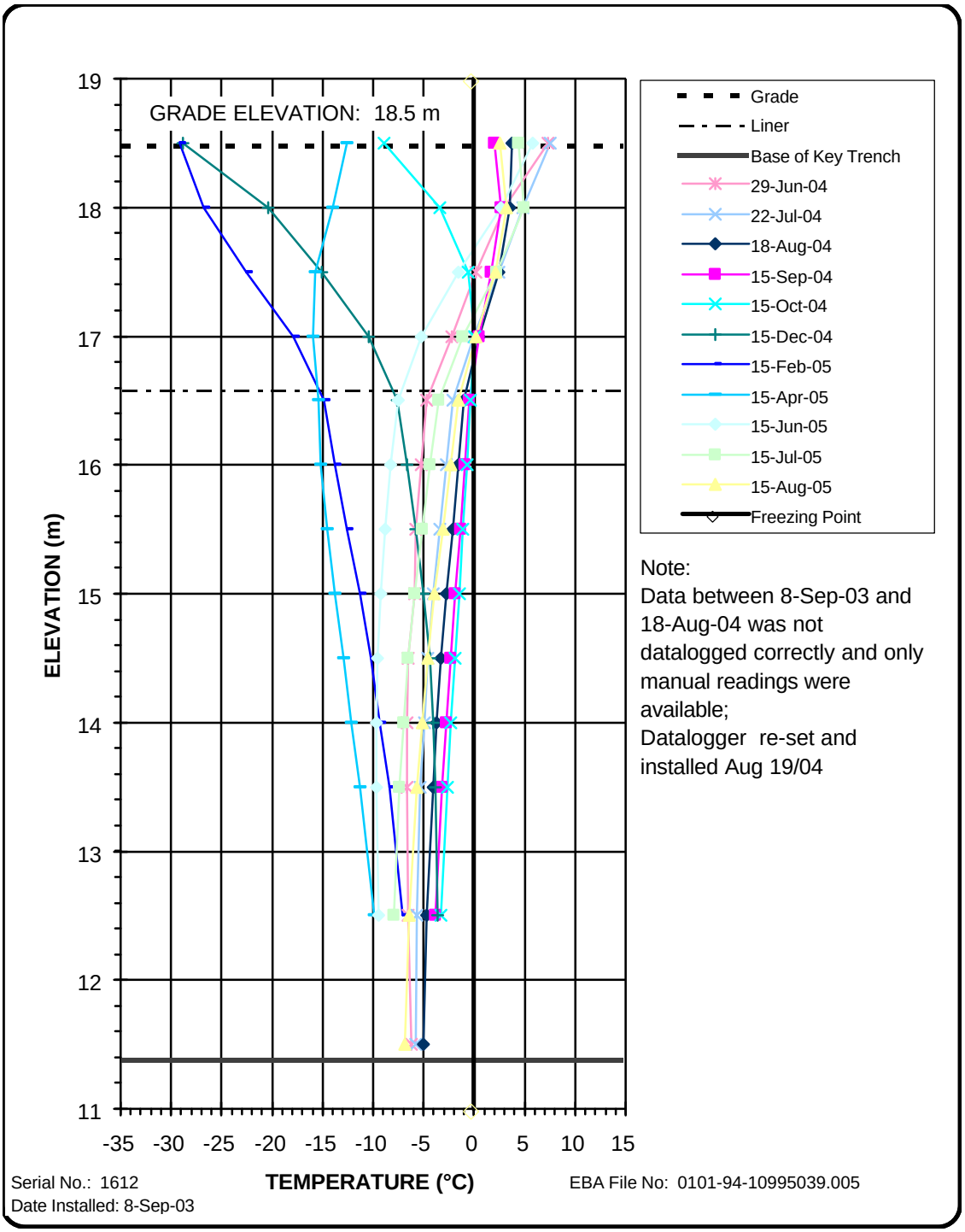


Figure B-3
Ground Temperature Profile
Tier II Disposal Facility
Vertical GTC VT-6

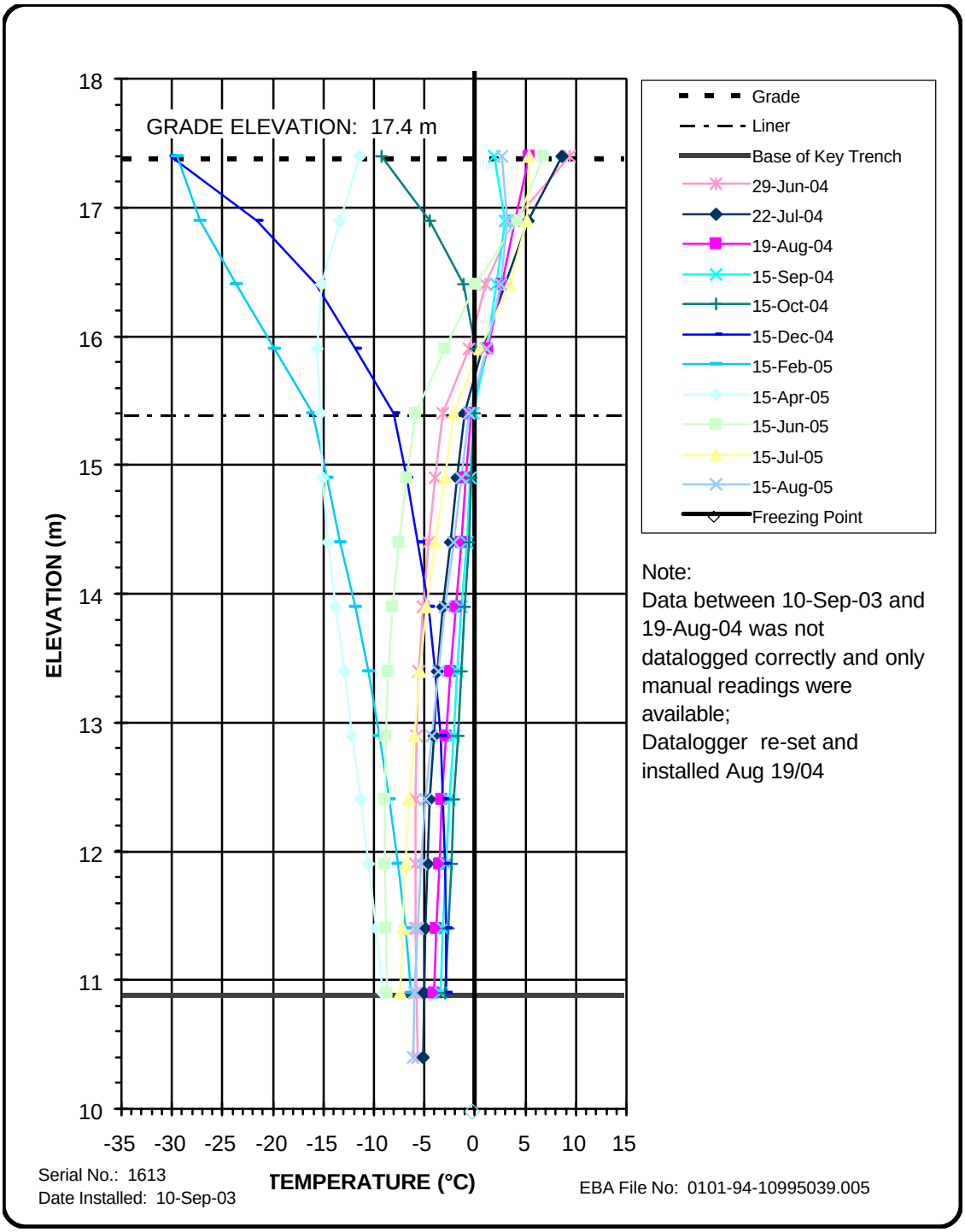


Figure B-4
Ground Temperature Profile
Tier II Disposal Facility
Vertical GTC VT-7

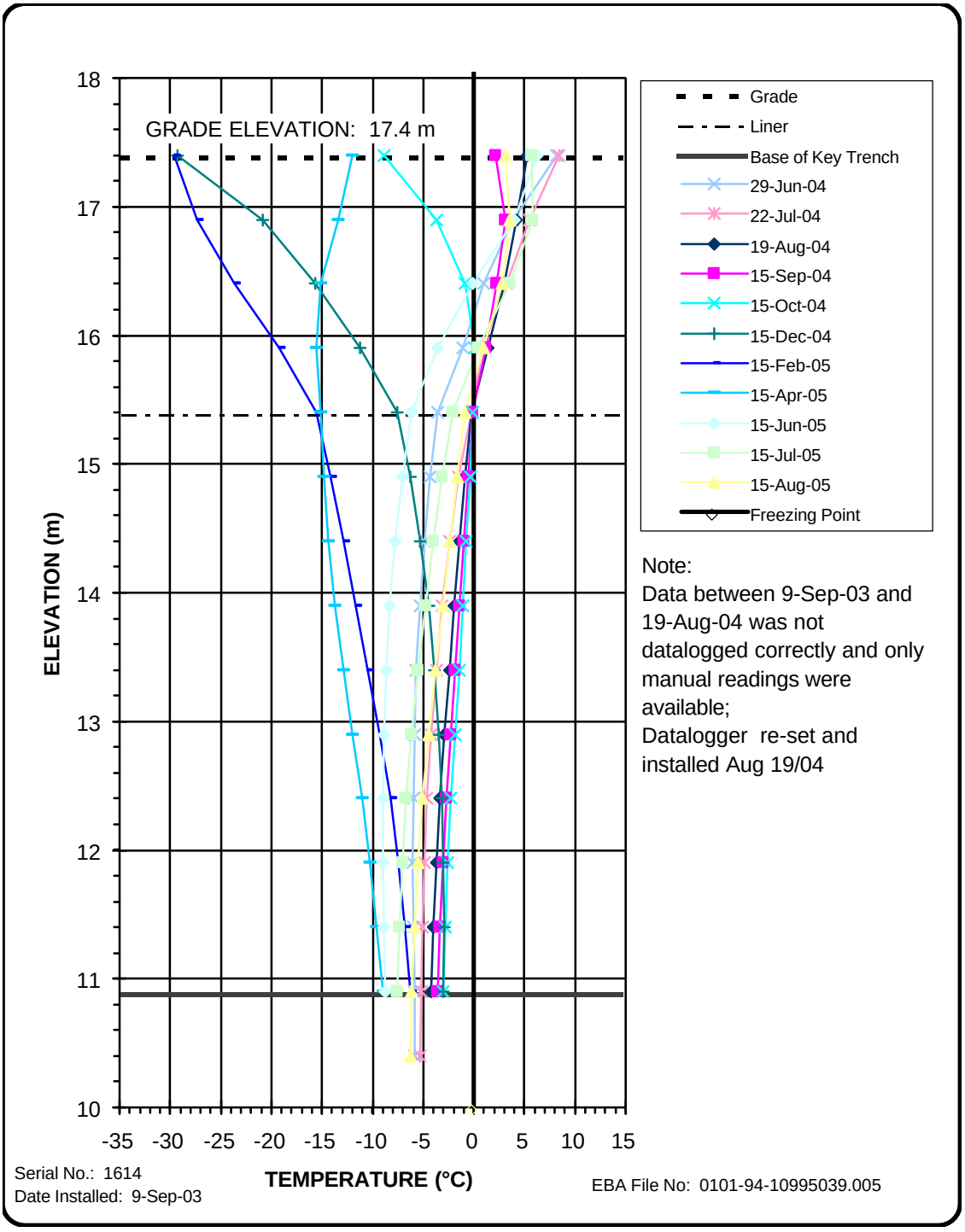


Figure B-5
Ground Temperature Profile
Tier II Disposal Facility
Vertical GTC VT-8

Landfill Visual Inspection

Site Name: PIN-3, Lady Franklin Point
Landfill Designation: **Tier II Landfill**
Date Inspected: August 23-25, 2005
Inspected by: Samuel A. Proskin, P.Eng. (NWT, NU)
EBA Engineering Consultants Ltd.
Signature:

Checklist Item	Present (Yes/No)	Location	Dimensions Length x Width x Depth metres	Extent Relative to Area of Landfill	Description	Photographic Records
Settlement	Yes	A.Near VT-7 B.At SW corner crest	A.3 x 0.6 x 0.3 B.2.5 x 1 x 0.15	isolated	Acceptable settlement	B-1 B-2
Erosion	Yes	C. South slope, downslope of VT-7 D.4 m East of NW corner, 5 m downslope	C. 2 x 0.3x 0.15 D.1 x 0.4 x 0.15	isolated	Acceptable; extends from VT-7	B-3 B-4
Condition of Monitoring Instruments	VT-5, 6, 7 and 8 all in good shape; locks were re-used. Datalogger batteries may have to be replaced in 2006.					
Other Features of Note.	No					
Landfill Performance Rating	Acceptable					B-5

No evidence of frost action, animal burrows, vegetation or vegetation stress, seepage/ponded water, staining, or exposed debris

Tier II Soil Disposal Facility - EVALUATION OF 2005 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2005	Comments
Copper	20	14 +/- 4.1	41	Measured concentrations within or less than 95% confidence interval for 6 of 8 samples	Downgradient surface samples at MW-10 and -12 greater than 95% confidence interval (34 & 25 mg/kg respectively) but below baseline max.
Nickel	20	<5.0	7.3	Measured concentrations within 95% confidence interval (non-detect) for 5 of 8 samples.	Downgradient samples at MW-10 (surface), and MW-12 (surface and depth) above detection limit, but below or at baseline max (5.1, 7.3, 5.2 mg/kg respectively).
Cobalt	20	<5.0		Measured concentrations within 95% confidence interval (non-detect).	
Cadmium	20	<1.0		Measured concentrations within 95% confidence interval (non-detect).	
Lead	20	<10		Measured concentrations within 95% confidence interval (non-detect).	
Zinc	20	<15	18	Measured concentrations within 95% confidence interval for 7 of 8 samples.	Downgradient surface sample at MW-12 above baseline max (22 mg/kg).
Chromium	20	<20		Measured concentrations within 95% confidence interval (non-detect).	
Arsenic	20	<1.0	2	All concentrations greater than 95% confidence interval (above detection limit), 6 of 8 samples below baseline maximum.	Downgradient samples at MW-10 (depth: 2.3 mg/kg) and -12 (surface: 2.8 mg/kg) exceeded baseline max. Concentrations for all samples ranged from 1.1 to 2.8 mg/kg.
Mercury	10	<0.1		Measured concentrations within 95% confidence interval (non-detect).	
PCBs	15	<0.003	0.005	Measured concentrations within 95% confidence interval (non-detect) for 6 of 8 samples.	Both upgradient samples (MW-9) just above detection limit (0.0033 & 0.0038 mg/kg), but less than baseline max.
TPH	11	<40	310	Measured concentrations within 95% confidence interval for 5 of 8 samples.	All downgradient surface samples greater than 95% conf. interval (MW-10, -11, -12), sample at MW-12 above baseline max (773 mg/kg). Concentrations from MW-10 & -12 had F1, F2 & F3 present, MW-11 only F3.

Tier II Soil Disposal Facility - Summary of 2005 Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
Main Landfill - Baseline Concentrations				**14 +/- 4.1**	**<5.0**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**<1.0**	**<0.1**	**<0.003**	**<40**			
Main Landfill - Maximum Concentrations				**41**	**7.3**				**18**		**2**		**0.005**	**310**			
Upgradient Soil Samples																	
05-26680	MW-9	2005	0	18	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.1	0.0033	16	<10	7	9
05-26682	MW-9	2005	30	12	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.1	0.0038	14	<10	<4	14
Downgradient Soil Samples																	
05-26684	MW-10	2005	0	34	5.1	<5.0	<1.0	<10	<15	<20	1.5	<0.1	<0.003	51	11	6	34
05-26686	MW-10	2005	30	7.4	<5.0	<5.0	<1.0	<10	<15	<20	2.3	<0.1	<0.003	5	<10	5	<9
05-26676	MW-11	2005	0	6.0	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.003	45	<10	<4	45
05-26678	MW-11	2005	30	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.1	<0.003	10	<10	<4	10
05-26672	MW-12	2005	0	25	7.3	<5.0	<1.0	<10	22	<20	2.8	<0.1	<0.003	773	17	16	740
05-26674	MW-12	2005	30	6.7	5.2	<5.0	<1.0	<10	<15	<20	1.5	<0.1	<0.003	10	<10	<4	10

NOTE: No groundwater data available, all groundwater wells were dry

Photo B-1
Tier II Landfill.
View of settlement feature A near VT-7.

Photo B-2
Tier II Landfill.
View of settlement feature B near southwest corner crest.

Photo B-3
Tier II Landfill.
View of erosion feature C near VT-7.

Photo B-4
Tier II Landfill.
View of erosion feature D near northwest corner.

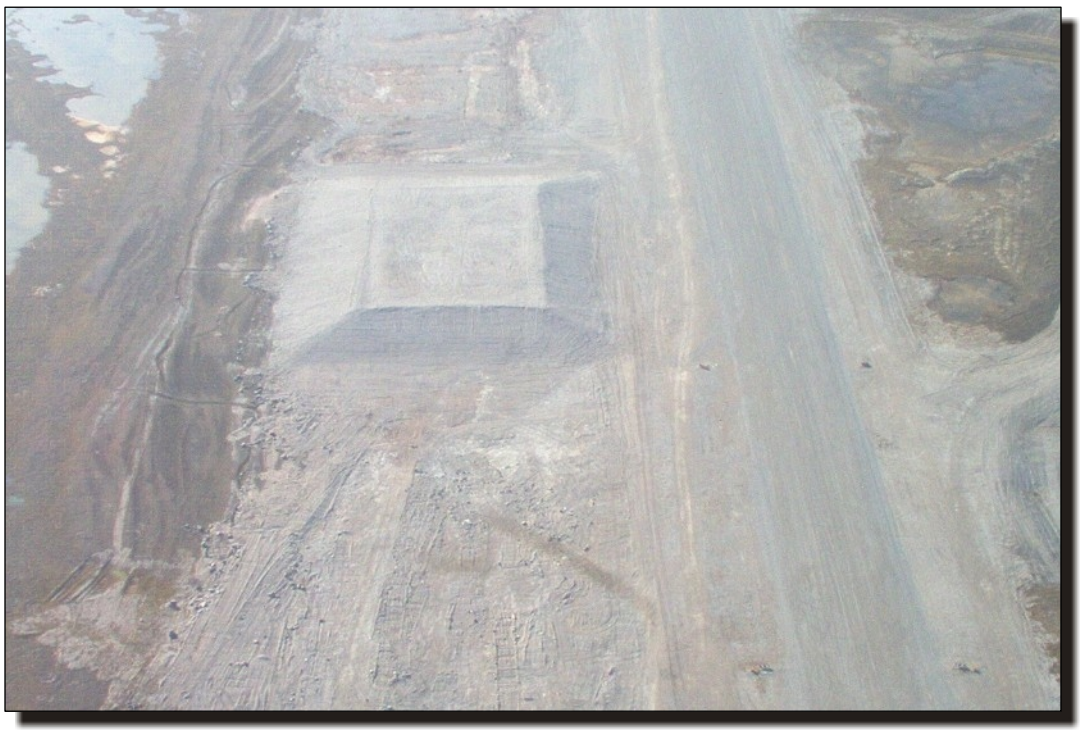


Photo B-5
Tier II Landfill.
Aerial view.

Annex Non-Hazardous Waste Landfill - Year 1 Data

Figure:

- PIN-3.7: Site Plan – Non-Hazardous Waste Landfill

Tables:

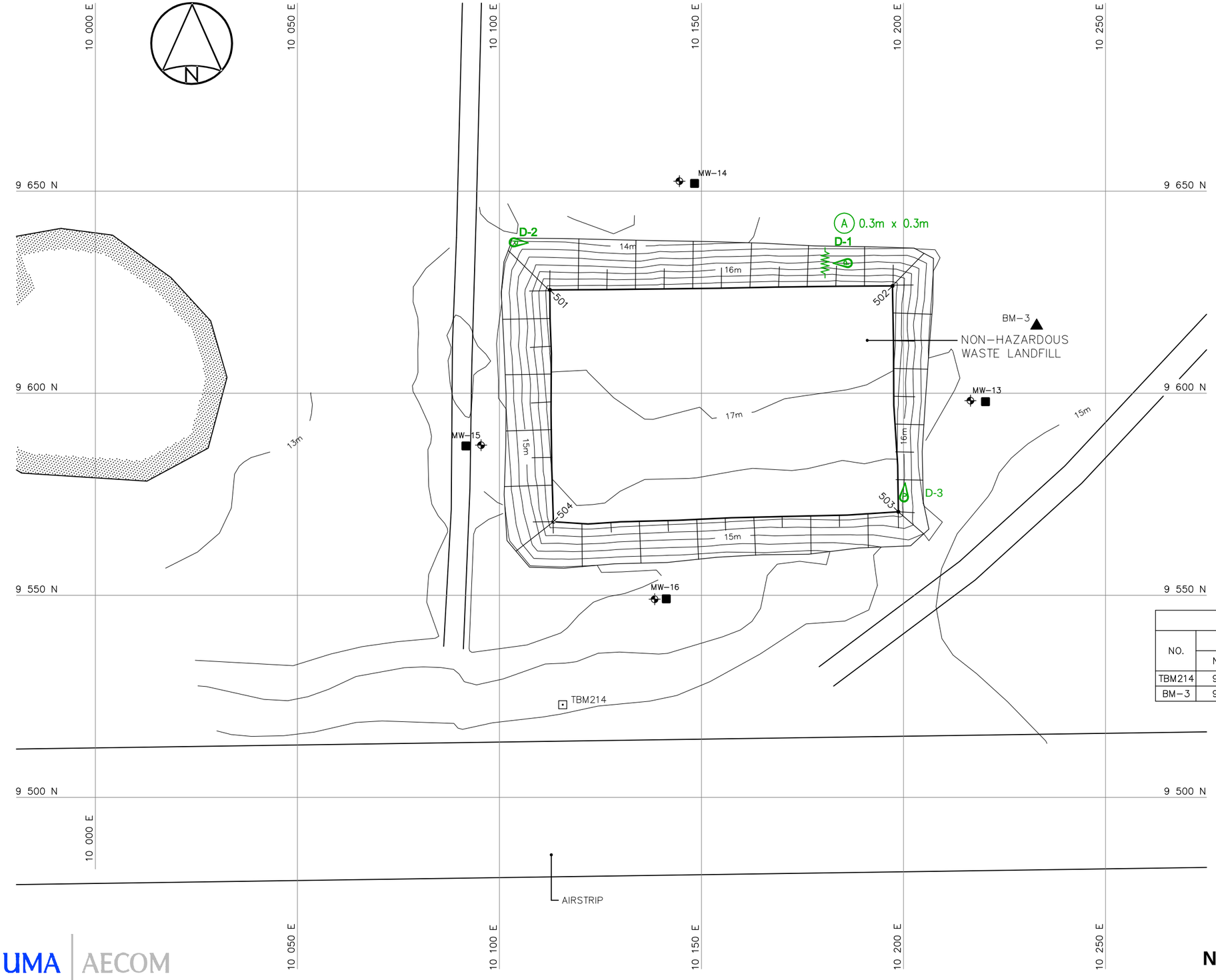
- Landfill Visual Inspection – PIN-3 Lady Franklin Point Non-Hazardous Waste Landfill
- Non-Hazardous Waste Landfill – Evaluation of 2005 Soil Analytical Data
- Non-Hazardous Waste Landfill – Summary of 2005 Soil Data
- Non-Hazardous Waste Landfill – Summary of 2005 Groundwater Data

Photographic Records:

- Photos D-1 and D-2
- Photos D-3 and D-4

Monitoring Well Installation Records:

- Well MW-13
- Well MW-14
- Well MW-15
- Well MW-16



LEGEND:

- TBM214 — TEMPORARY BENCHMARK
- BM-3 — PERMANENT BENCHMARK
- MW-13 — MONITORING WELL LOCATION
- 501 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION
- PHOTOGRAPH REFERENCE
- SETTLEMENT (NTS)
- EROSION (NTS)
- PONDING
- (A) OBSERVATION OF CHECKLIST ITEM

COORDINATE POINTS (AS-BUILT) NON-HAZARDOUS WASTE LANDFILL

NO.	NORTHING	EASTING	ELEV.
501	9 625.6	10 112.5	17.31
502	9 626.5	10 197.3	17.33
503	9 570.6	10 198.7	16.23
504	9 568.2	10 113.4	16.38

MONITORING WELLS

NO.	NORTHING	EASTING	ELEV.
MW-13	9 598.156	10 216.575	15.12
MW-14	9 652.461	10 144.538	14.28
MW-15	9 587.139	1 0095.465	14.49
MW-16	9 549.004	10 138.411	14.42

BENCHMARKS

NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
TBM214	9 522.916	10 115.689	14.439	SPIKE
BM-3	9 616.683	10 232.970	14.890	25mm DIA. STEEL PIPE

RECORD DRAWING
NOT FOR CONSTRUCTION

0 10 20 30m
10 5 1:1000

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

PIN-3 - LADY FRANKLIN POINT

NON - HAZARDOUS WASTE LANDFILL

FIGURE PIN-3.7

UMA | AECOM

DOS NAME: P3-R08.DWG DJ - 05/11/08

Landfill Visual Inspection

Site Name: PIN-3, Lady Franklin Point
Landfill Designation: **Non-Hazardous Waste Landfill**
Date Inspected: August 23-25, 2005
Inspected by: Samuel A. Proskin, P.Eng. (NWT, NU)
EBA Engineering Consultants Ltd.
Signature:

Checklist Item	Present (Yes/No)	Location	Dimensions Length x Width x Depth metres	Extent Relative to Area of Landfill	Description	Photographic Records
Settlement	No					
Erosion	Yes	A.Along North berm, 1/3 distance from NE corner	0.3 x 0.3 x 0.15	isolated	Acceptable erosion next to a boulder. No other signs of erosion	D-1
Condition of Monitoring Instruments	None					
Other Features of Note.	No					
Landfill Performance Rating	Acceptable					D-2 to 4

No evidence of settlement, frost action, animal burrows, vegetation or vegetation stress, seepage/ponded water staining, exposed debris

Non-Hazardous Waste Landfill - EVALUATION OF 2005 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2005	Comments
Copper	19	9.6 +/- 1.9	23	Measured concentrations within or less than 95% confidence interval	
Nickel	19	<5.0	15	Measured concentrations within 95% confidence interval (non-detect).	
Cobalt	19	<5.0		Measured concentrations within 95% confidence interval (non-detect).	
Cadmium	19	<1.0		Measured concentrations within 95% confidence interval (non-detect).	
Lead	19	<10	13	Measured concentrations within 95% confidence interval (non-detect).	
Zinc	19	<15	31	Measured concentrations within 95% confidence interval (non-detect).	
Chromium	19	<20		Measured concentrations within 95% confidence interval (non-detect).	
Arsenic	19	1.3 +/- 0.7	7.7	Measured concentrations within 95% confidence interval.	
Mercury	9	<0.1		Measured concentrations within 95% confidence interval (non-detect).	
PCBs	17	<0.003	<0.1	Measured concentrations within 95% confidence interval (non-detect).	
TPH	15	<40	3400	Measured concentrations within 95% confidence interval for 4 of 6 samples.	Concentration of 51 mg/kg (primarily F3,some F2) in surface samples at both MW-14 and MW-15, but much less than maximum and previous year's concentrations of 3400 and 192 mg/kg respectively.

Non-Hazardous Waste Landfill - Summary of 2005 Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
															F1	F2	F3
Non-Hazardous Waste Landfill - Baseline Concentrations				**9.6 +/- 1.9**	**<5.0**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**1.3 +/- 0.7**	**<0.1**	**<0.003**	**<40**			
Non-Hazardous Waste Landfill - Maximum Concentrations				**23**	**15**			**13**	**31**		**7.7**		**<0.1**	**3400**			
05-26690	MW-13	2005	30	6.8	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.003	12	<10	<4	12
05-26700	MW-14	2005	0	9.5	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.003	51	<10	10	41
05-26702	MW-14	2005	20	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.5	<0.1	<0.003	<10	<10	<4	<9
05-2694	MW-15	2005	0	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.003	51	<10	7	44
05-2696	MW-15	2005	30	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.003	5	<10	5	<9
05-2692	MW-16	2005	0	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.003	33	<10	4	29

Non-Hazardous Waste Landfill - Summary of 2005 Groundwater Data

Sample #	Location	Date	Cu [mg/L]	Ni [mg/L]	Co [mg/L]	Cd [mg/L]	Pb [mg/L]	Zn [mg/L]	Cr [mg/L]	As [mg/L]	Hg [mg/L]	PCBs [mg/L]	TPH [mg/L]	TPH Identity		
														F1	F2	F3
05-26738	MW-13	2005	0.011	0.017	<0.003	<0.001	<0.010	0.028	0.033	<0.003	<0.0004	<0.00002	<1.0	<0.05	<0.5	<1.0
05-26739	MW-14	2005	0.0082	0.031	0.0036	<0.001	<0.010	0.013	0.071	0.0039	<0.0004	<0.00002	<1.0	<0.05	<0.5	<1.0
05-26741	MW-15	2005	0.022	0.032	<0.003	<0.001	0.012	0.031	0.015	<0.003	<0.0004	<0.00002	<1.0	<0.05	<0.5	<1.0
05-26742	MW-16	2005	0.0096	0.021	<0.003	<0.001	<0.010	0.013	0.049	<0.003	<0.0004	<0.00002	<1.0	<0.05	<0.5	<1.0

Photo D-1
Non-Hazardous Waste.
Close-up view of erosion feature near northeast corner.

Photo D-2
Non-Hazardous Waste.
West view of north slope.

Photo D-3
Non-Hazardous Waste.
North view of east slope.

Photo D-4
Non-Hazardous Waste.
Aerial view.

Table 9: Monitoring Well Observations (MW-13)

Development of Monitoring Wells (2005)			
Site Name:	PIN-3-mon		
Date of Sampling Event:	24-Aug-05	Time: 1:45 pm	
Names of Samplers:	Alissa Lunney		
	Vanessa Bacher		
	Tim Casson		
Monitoring Well ID:	MW-13		
Landfill Name:	Non-Haz Facility		
Sample Number:	26738		
Condition of Well:	good		
Purging: (Y/N)	Y	Procedure/Equipment:	Waterra Tube with foot valve
Volume Purged Water=	1		
Sampling Equipment:	Waterra Tube with foot valve		
Filtration: (Y/N)	N		
Acidification: (Y/N)	N		
Decontamination required: (Y/N)	Y		
Number washes:	1		
Number rinses:	2		
Measured Data			
Well height above ground=	58		
Diameter of well (cm)=	2.54		
Depth of installation (cm)=	392	From ground surface	
Length screened section (cm)=	333		
Depth to top of screen=	59	From ground surface	
Depth to water surface (cm)=	157	Method:	Electric meter
Static water level (cm)=	99	From ground surface	
Depth to bottom (cm)=	249	Evidence of sludge etc:	
		Evidence of freezing/siltation: (compare to installation record)	
Free product thickness (mm)=	n/a	Method:	Interface meter
pH=	6.46		
Conductivity (uS/cm)=	650		
Temperature (degC)=	3.4		
Depth of water (cm)=	92		
Well volume of water (mL)=	466.17		
Turbidty (NTU)=			
Length screen collecting water=	92		
Shape factor=	36.61		

n/a=not applicable

Table 11: Monitoring Well Observations (MW-14)

Development of Monitoring Wells (2005)			
Site Name:	PIN-3-mon		
Date of Sampling Event:	24-Aug-05	Time: 2:00 pm	
Names of Samplers:	Alissa Lunney		
	Vanessa Bacher		
	Tim Casson		
Monitoring Well ID:	MW-14		
Landfill Name:	Non-Haz Facility		
Sample Number:	26739/40	(duplicate)	
Condition of Well:	good		
Purging: (Y/N)	Y	Procedure/Equipment:	Waterra Tube with foot valve
Volume Purged Water=	1		
Sampling Equipment:	Waterra Tube with foot valve		
Filtration: (Y/N)	N		
Acidification: (Y/N)	N		
Decontamination required: (Y/N)	Y		
Number washes:	1		
Number rinses:	2		
Measured Data			
Well height above ground=	50		
Diameter of well (cm)=	2.54		
Depth of installation (cm)=	474	From ground surface	
Length screened section (cm)=	300		
Depth to top of screen=	65	From ground surface	
Depth to water surface (cm)=	80	Method:	Electric meter
Static water level (cm)=	30	From ground surface	
Depth to bottom (cm)=	278	Evidence of sludge etc:	
		Evidence of freezing/siltation: (compare to installation record)	
Free product thickness (mm)=	n/a	Method:	Interface meter
pH=	6.78		
Conductivity (uS/cm)=	1206		
Temperature (degC)=	5.6		
Depth of water (cm)=	198		
Well volume of water (mL)=	1003.28		
Turbidity (NTU)=			
Length screen collecting water=	213		
Shape factor=	79.56		

n/a=not applicable

Table 12: Monitoring Well Observations (MW-15)

Development of Monitoring Wells (2005)			
Site Name:	PIN-3-mon		
Date of Sampling Event:	24-Aug-05	Time: 2:15pm	
Names of Samplers:	Alissa Lunney		
	Vanessa Bacher		
	Tim Casson		
Monitoring Well ID:	MW-15		
Landfill Name:	Non-Haz Facility		
Sample Number:	26741		
Condition of Well:	good		
Purging: (Y/N)	Y	Procedure/Equipment:	Waterra Tube with foot valve
Volume Purged Water=	1		
Sampling Equipment:	Waterra Tube with foot valve		
Filtration: (Y/N)	N		
Acidification: (Y/N)	N		
Decontamination required: (Y/N)	Y		
Number washes:	1		
Number rinses:	2		
Measured Data			
Well height above ground=	65		
Diameter of well (cm)=	2.54		
Depth of installation (cm)=	472	From ground surface	
Length screened section (cm)=	304		
Depth to top of screen=	48	From ground surface	
Depth to water surface (cm)=	151	Method:	Electric meter
Static water level (cm)=	86	From ground surface	
Depth to bottom (cm)=	244	Evidence of sludge etc:	
		Evidence of freezing/siltation: (compare to installation record)	
Free product thickness (mm)=		Method:	Interface meter
pH=	6.63		
Conductivity (uS/cm)=	1118		
Temperature (degC)=	3.3		
Depth of water (cm)=	93		
Well volume of water (mL)=	471.24		
Turbidity (NTU)=			
Length screen collecting water=	93		
Shape factor=	36.55		

n/a=not applicable

Table 13: Monitoring Well Observations (MW-16)

Development of Monitoring Wells (2005)			
Site Name:	PIN-3-mon		
Date of Sampling Event:	24-Aug-05	Time: 2:45 pm	
Names of Samplers:	Alissa Lunney		
	Vanessa Bacher		
	Tim Casson		
Monitoring Well ID:	MW-16		
Landfill Name:	Non-Haz Facility		
Sample Number:	26742		
Condition of Well:	good		
Purging: (Y/N)	Y	Procedure/Equipment:	Waterra Tube with foot valve
Volume Purged Water=	1		
Sampling Equipment:	Waterra Tube with foot valve		
Filtration: (Y/N)	N		
Acidification: (Y/N)	N		
Decontamination required: (Y/N)	Y		
Number washes:	1		
Number rinses:	2		
Measured Data			
Well height above ground=	78		
Diameter of well (cm)=	2.54		
Depth of installation (cm)=	445	From ground surface	
Length screened section (cm)=	299		
Depth to top of screen=	37	From ground surface	
Depth to water surface (cm)=	126	Method:	Electric meter
Static water level (cm)=	48	From ground surface	
Depth to bottom (cm)=	339	Evidence of sludge etc:	
		Evidence of freezing/siltation: (compare to installation record)	
Free product thickness (mm)=	n/a	Method:	Interface meter
pH=	7.78		
Conductivity (uS/cm)=	690		
Temperature (degC)=	3.9		
Depth of water (cm)=	213		
Well volume of water (mL)=	1079.29		
Turbidity (NTU)=	not available		
Length screen collecting water=	213		
Shape factor=	79.86		

n/a=not applicable