DEW Line Clean-up Project - CAM-3 Shepherd Bay Baseline Landfill Monitoring

Prepared by:

AECOM Canada Ltd.
2540 Kensington Road NW, Calgary, AB, Canada T2N 3S3
T 403.270.9200 F 403.270.0399 www.aecom.com

Project Number:

0171-142 RPT-014-09

Date:

February 20, 2009

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1. CAM-3 Shepherd Bay

1.1 Introduction

The CAM-3 Shepherd Bay DEW Line site is located on the southwest coast of the Boothia Peninsula in Nunavut at 68°48'38" north latitude and 96°26'01" west longitude. The site is approximately 60 km southeast of the community of Taloyoak, and consists of a beach area, along the shore of Shepherd Bay, and a main station area. The station is about 10 km inland from the beach.

CAM-3 was downsized in 1989 to a Long Range Radar (LRR) station within the North Warning System after being an auxiliary DEW Line station. The environmental clean-up and demolition of facilities not required for the operation of the LRR site commenced in 2002 and was completed during the summer of 2007. The clean-up included the closure and remediation of five existing landfills, the construction of a landfill for the disposal of non-hazardous wastes generated from demolition and site debris collection, and the construction of a Tier II Soil Disposal Facility for disposal of Tier II impacted soils. These landfills, as shown on the overall site plan, Figure CAM-3.1, include:

- Beach Landfill;
- Non-Hazardous Waste Landfill;
- Station Landfill;
- Tier II Soil Disposal Facility;
- Northeast Landfill; and
- USAF and NWS Landfills.

Two site assessments of CAM-3 were carried out independently, with the first by UMA Engineering Ltd. (UMA) in association with Hardy BBT Ltd. and Jacques Whitford Group (Jacques) in 1990, and the second by the Environmental Sciences Group (ESG) in 1989 and 1990. In 2000 and 2001, a detailed site investigation was completed to delineate contamination identified in the assessments, and to collect additional geophysical, geotechnical, demolition, and debris information. Input on traditional land use was provided by Nunavut Tunngavik Incorporated (NTI) at that time. Design and requirements for landfill closure were based on the 2000 and 2001 site investigation data. Finally, additional soil and groundwater sampling was completed as part of landfill baseline monitoring in 2006 and 2007, during site clean-up.

In accordance with the NTI-DND Cooperation Agreement, landfill monitoring will be carried out following the clean-up of the site. The monitoring schedule for the CAM-3 Shepherd Bay 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 CAM-3 Shepherd Bay. 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. Landfill inspections were carried out by 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 – CAM-3 Shepherd Bay

No. of Years after Construction	Monitoring Event Number	Year
Prior to and during	Baseline	1989/1990, 2000-2007
1	1	2008
2	2	2009
3	3	2010
4	4	2011
5	5	2012
7	6	2014
10	7	2017
15	8	2022
25	9	2032

1.2 Background

1.2.1 Geology and Background Geochemical Conditions

CAM-3 is located on a bedrock controlled U-shaped ridge that rises above the surrounding topography. The general topography of the site is subdued, with no bedrock outcropping except the shallow bedrock present in the U-shaped ridge. Low-lying tundra areas and slightly elevated former beach ridges comprise the main terrain. The sediment type within the ridges varies form sand to cobble-sized rubble, and generally has a coarsening upward trend. The sediment of the site originates from the limestone and dolostone bedrock of the area. The low-tundra areas typically have soil and sediment of a fine sand and silt, and are often veneered with organic-rich muds or silts. Frost features are present throughout the site.

Surface water drainage patterns of CAM-3 are poorly developed, but drainage is generally directed westwards toward the ocean. The former beach ridges are commonly breached with significant drainage channels, and the overall drainage off the ridges follows the subparallel pattern. The surface drainage around the station flows semi-radially off the ridge. The undulating to nearly flat low-tundra area has shallow, semi-circular thermokarst lakes and ponds, and poorly developed drainage channels. The water table at the site is generally close to the surface.

To establish site background geochemical conditions, soil samples were collected in locations removed from site activities but in similar terrain units to the worked areas. Terrain unit 3 comprises most of the landscape surrounding CAM-3 and is described as sands and gravels that are often veneered by organic rich silts or muds. The terrain is low-lying and poorly drained. Terrain unit 4 consists of well sorted, angular to

subangular gravel, sand and cobble-sized material. It includes raise beach ridges and interridge swales. Terrain unit 5 has a lack of vegeation and surface materials consisting of well sorted sands and gravels. It includes the active beach area. No background assessment was completed for Terrain Units 1 and 2, as no environmental sampling was conducted in these terrain types. Sample results are presented in Table 1.2. Inorganic element concentrations were low for all samples.

1.2.2 Biophysical Environment

The vegetation of the CAM-3 site is typical of low-Arctic tundra and has a nearly continuous cover of vegetation outside of disturbed areas, with much higher vegetation density within the moist, low-lying tundra soil. Willows, sedges, mountain avens, saxifrage, Arctic poppy, lousewort, forbs (flowering herbs), sedges, grasses and mosses are common species present at the site. Bistort was found around the sewage outfall.

Shepherd Bay is located in the mid-Arctic eco-climate region. This region is characterized by short, cold summers and long, dry, cold winters. Freeze-up usually begins in late September and is complete by November. The station area and most of the landfills are situated 10 km inland from Shepherd Bay at approximately 50 m above sea level. The mean annual rain and snowfall at this site are 79.9 mm and 64.6 cm respectively. The most precipitation is received between July and October and there are approximately 59 days of measurable precipitation per year. The mean annual temperature is -16.1^{o}C, with extremes of temperatures ranging from 32.2^{o}C in October to -57.8^{o}C in February.

Commonly observed in the vicinity of the station, feeding on the lush vegetation around the sewage lagoon are barren-ground caribou. These caribou are part of the Wager herd, which calves in early June in an area north of Wager Bay. Arctic fox dens were noted in an area northwest of the Airstrip, and near the road to the beach, approximately one km west of the station, with frequent fox sighting around the station. Lemmings and their burrows were also observed in many areas of the site. Signs of Arctic hares have also been observed. An Arctic wolf was seen in the station vicinity on two occasions in 2000. Muskoxen, polar bears and grizzly bears are uncommon or rare in this area and according to station personnel and the team bear monitor from Taloyoak in 2000, polar bears are not know to frequent the area. The beach area in the vicinity of the site was an excellent fishing location for Arctic char.

During the 2000, season there were at least four pairs of snowy owls nesting in the station vicinity, with one nest in close proximity to the USAF Landfill. A peregrine falcon was nesting at the hangar with young in 2000 and a rough-legged hawk with young was nesting there in 2001. Jaegar, ravens, Canada geese, tundra swans, phalarope and longspur were also noted in 2000. Flocks of oldsquaw have been observed along the beach area, and three broods of white fronted geese were noted on the water supply lake northeast of the site. Numerous species of shorebirds are found in the area of the site including semi-palmated sandpipers, bairds sandpiper and Lapland longspur. Ruddy turnstones and red phalaropes are also common.

1.2.3 Traditional Land Use

The area around the CAM-3 site has a long history of traditional use for local Inuit; many tent rings and caches are located at the beach.

As noted above, the station is approximately 60 km south of the nearest community of Taloyoak. Gjoa Haven is located 100 km west of the site and Kugaaruk is located 175 km east of the site. Residents of the communities of Taloyoak, Gjoa Haven and Kugaaruk hunt, trap and fish in Shepherd Bay. Arctic fox are trapped and seals and birds are harvested in this general area. There is also a major caribou migration near the site every year. Drinking water is generally not obtained from the site and no sedentary organisms are harvested in the area.

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Table 1.2: Background - 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]
00-16700/16701	Terrain unit 3	2000	0	3.9	<5.0	<5.0	<1.0	<10	<15	<20	1.3		<0.1
00-16702	Terrain unit 3	2000	30	3.9	<5.0	<5.0	<1.0	<10	<15	<20	1.8		<0.1
00-16698	Terrain unit 4	2000	3	5.6	<5.0	<5.0	<1.0	<10	33	<20	3.1		<0.1
00-16699	Terrain unit 4	2000	30	4.7	<5.0	<5.0	<1.0	<10	17	<20	2.0		<0.1
00-16696	Terrain unit 5	2000	0	5.8	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		
00-16697	Terrain unit 5	2000	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1
	N Value			6	6	6	6	6	6	6	6		5
	Average			4.2	<5.0	<5.0	<1.0	<10	<15	<20	1.5		<0.1
	Standard Deviation			1.6							1.0		
	Minimum			1.5							0.5		
	Maximum			6					33		3		
	95% Confidence Limit			1.3							0.8		

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Table 1.3: Climate Normals for the CAM-3 Shepherd Bay Site

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Precipitation													
Mean Rainfall	0	0	0	0	0.2	11.2	22.8	29.9	13.9	0.5	0	0	78.6
Mean Snowfall	4.4	4.7	5	7.9	7.5	3.7	0.2	2.7	9.5	20.3	9.6	6.4	81.8
Precipitation (mm)	4.2	4.6	4.4	7.8	7.7	15	23	32.7	23.3	19.3	9.6	6.3	158
#. days w/meas. rain	0	0	0	0	*	3	7	10	5	*	0	0	26
#. days w/meas. snow	4	3	3	4	5.0	2	*	1	5	10	5	4	47
Temperature													
Mean Daily Max.	N	N	N	-17.1	-6	3.6	11.6	9.2	1.4	-8.2	-19.5	N	N
Mean Daily Min.	-40.3	-40.6	-37.3	-28.2	-14.5	-2.3	3.5	2.3	-3.2	-15.4	-28.6	-35.8	-20
Daily Mean	N	N	N	-22.3	-10.2	0.7	7.6	5.8	-0.8	-11.8	-23.6	N	N
Extreme Max.	-3.3	-5.5	-7.7	2.2	6.7	19.6	25.4	24.4	15	5.6	0	-3.3	
Extreme Min.	-54.4	-57.8	-55.6	-46.7	-31.7	-18.9	-6.7	-5.6	-16.1	-36.1	-47.2	-50.6	
Degree Days													
Above 18^{o}C	N	N	N	0	0	0	0	0	0	0	N	N	N
Below 18^{o}C	N	N	N	1224.5	875.9	520.8	319.6	378.7	566.6	926.3	N	N	N
Above 5^{o}C	N	N	N	0	0	14.3	95.3	56.6	3.7	0	N	N	N
Below 0^{o}C	N	N	N	684.5	318.5	41.6	0	0.8	61.8	369.1	N	N	N
Month-end Snow Cover (cm)	31	33	36	36	23	1	0	0	5	18	26	30	

** less than 0.5 greater than 0.01*

Information as provided by Environment Canada - Climate Normals 1961-1990 for Shepherd Bay, Nunavut.

1.2.4 Landfill Monitoring Program

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

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

The requirements for landfill monitoring, as laid out in Environmental Provisions of the NTI-DND Agreement, are summarized in Table 1.4. Detailed landfill monitoring requirements are described in the Landfill Monitoring Plan – Part B – Nunavut Settlement Region.

Table 1.4. 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 CAM-3, is provided in Table 1.5. The rationale for the monitoring requirements is provided in the landfill-specific sections.

Table 1.5. General Landfill Monitoring Requirements

Landfill Designation	Visual Inspection	Groundwater Sampling	Soil Sampling	Thermal Monitoring
Beach Landfill	√		√	
Non-Hazardous Waste Landfill	√	√	√	
Station Landfill	√		√	
Tier II Disposal Facility	√	√	√	√
Northeast Landfill	√		√	
USAF Landfill	√	√	√	√
NWS Landfill	√		√	

1.2.5 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.

1.2.6 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 2000. 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 from the landfill area. Although contaminants are primarily transported in water (surface and groundwater), they have a tendency to sorb 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 1.8.

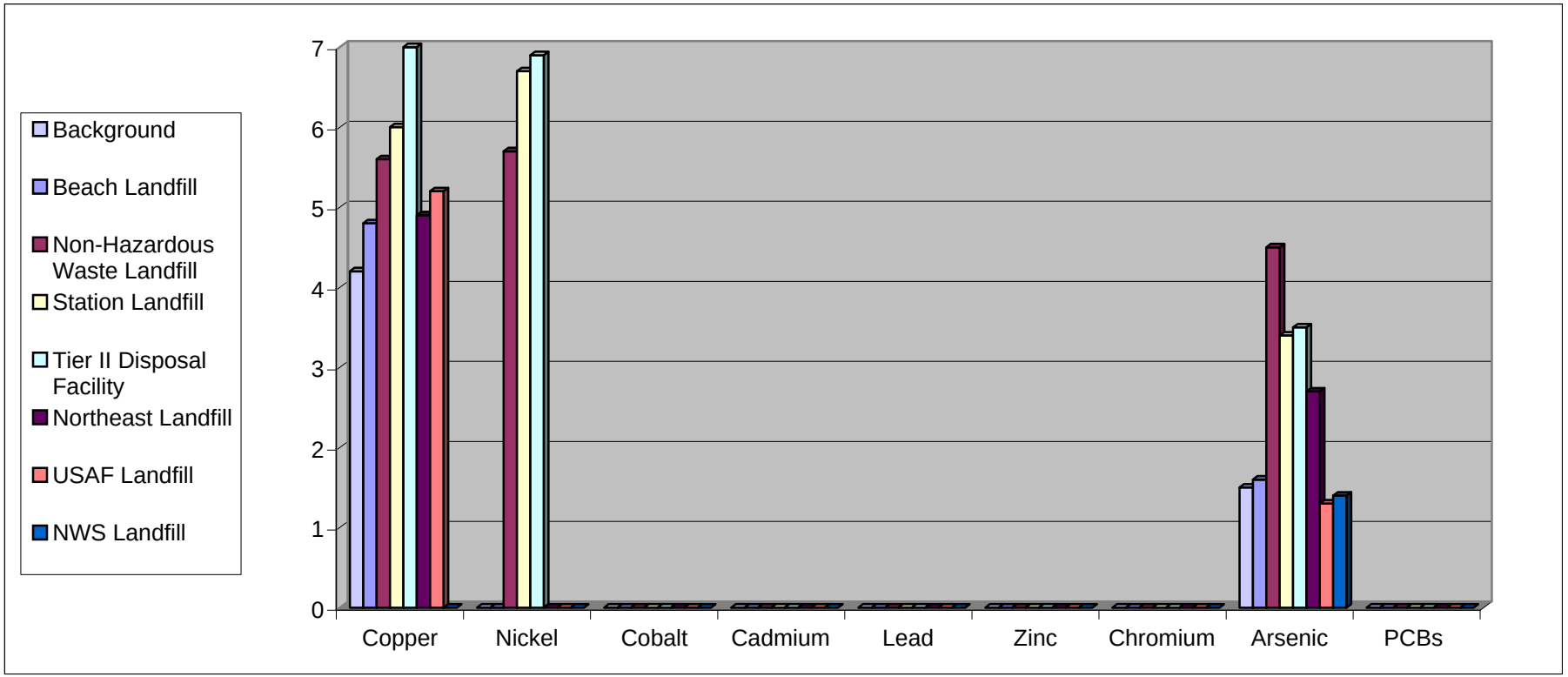
The requirement for the analyses of baseline samples is to provide record information on the environmental status of the landfill should potential problems be identified during the monitoring program. Analytical results are presented under the discussion for each landfill.

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 in Table 1.8, 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 1.6. Additional statistical data is presented under the discussion for each landfill.

Table 1.6: CAM-3 Shepherd Bay - Summary of Arithmetic Mean - Soil Baseline Data

Area	Arithmetic Mean (in mg/kg)								
	Copper	Nickel	Cobalt	Cadmiu	Lead	Zinc	Chromi	Arsenic	PCBs
Background	4.2	<5.0	<5.0	<1.0	<10	<15	<20	1.5	<0.1
Beach Landfill	4.8	<5.0	<5.0	<1.0	<10	<15	<20	1.6	<0.1 to <0.0030
Non-Hazardous Waste Landfill	5.6	5.7	<5.0	<1.0	<10	<15	<20	4.5	<0.1 to <0.0030
Station Landfill	6.0	6.7	<5.0	<1.0	<10	<15	<20	3.4	<0.5 to <0.0030
Tier II Disposal Facility	7.0	6.9	<5.0	<1.0	<10	<15	<20	3.5	<0.1 to <0.0030
Northeast Landfill	4.9	<5.0	<5.0	<1.0	<10	<15	<20	2.7	<0.1 to <0.0030
USAF Landfill	5.2	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.5 to <0.0030
NWS Landfill	<5.0 to <3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.1 to <0.0030

Figure 1.1. CAM-3 Shepherd Bay - Summary of Arithmetic Mean - Soil Baseline Data



1.2.7 Groundwater Sampling

In some cases, temporary monitoring wells were installed during the site investigation for the collection of groundwater samples to assist with determination of contaminant migration. At CAM-3, groundwater data is available for the USAF landfill which was collected during the site investigation. During the construction phase, permanent groundwater monitoring wells are installed at all existing landfills classified as a moderate environmental risk (Class B landfills) and at new landfills built to support site remediation. At CAM-3, this includes the existing USAF Landfill (classified as Class B), the Non-Hazardous Waste Landfill (new), and the Tier II Disposal Facility (new). Groundwater monitoring wells were installed hydraulically upgradient and downgradient of the landfills as indicated in Table 1.5 and Table 1.9. 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. A summary of mean baseline concentrations of contaminants in groundwater is provided in Table 1.7.

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

- Water elevation.
- Total water 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 inside:

- 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 1.8. A summary of the landfill monitoring installations/sampling locations is provided in Table 1.9.

Table 1.7: CAM-3 Shepherd Bay - Summary of Arithmetic Mean - Groundwater Baseline Data

Area	Arithmetic Mean (in mg/kg)								
	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic	PCBs
Non-Hazardous Waste Landfill*	0.022	0.035	<0.003	<0.0010	<0.010	0.021	0.047	0.004	<0.000020
Tier II Disposal Facility	0.021	0.068	0.0046	<0.0010	<0.010	0.125	0.126	0.0042	<0.0002 to <0.000020
USAF Landfill	0.019	0.044	0.0048	<0.0010	<0.010	0.156	0.076	0.0032	<0.003 to <0.000020

**Note: The Non-Hazardous Waste Landfill Mean contains data only from MW-1*

Figure 1.2. CAM-3 Shepherd Bay - Summary of Arithmetic Mean - Groundwater Baseline Data

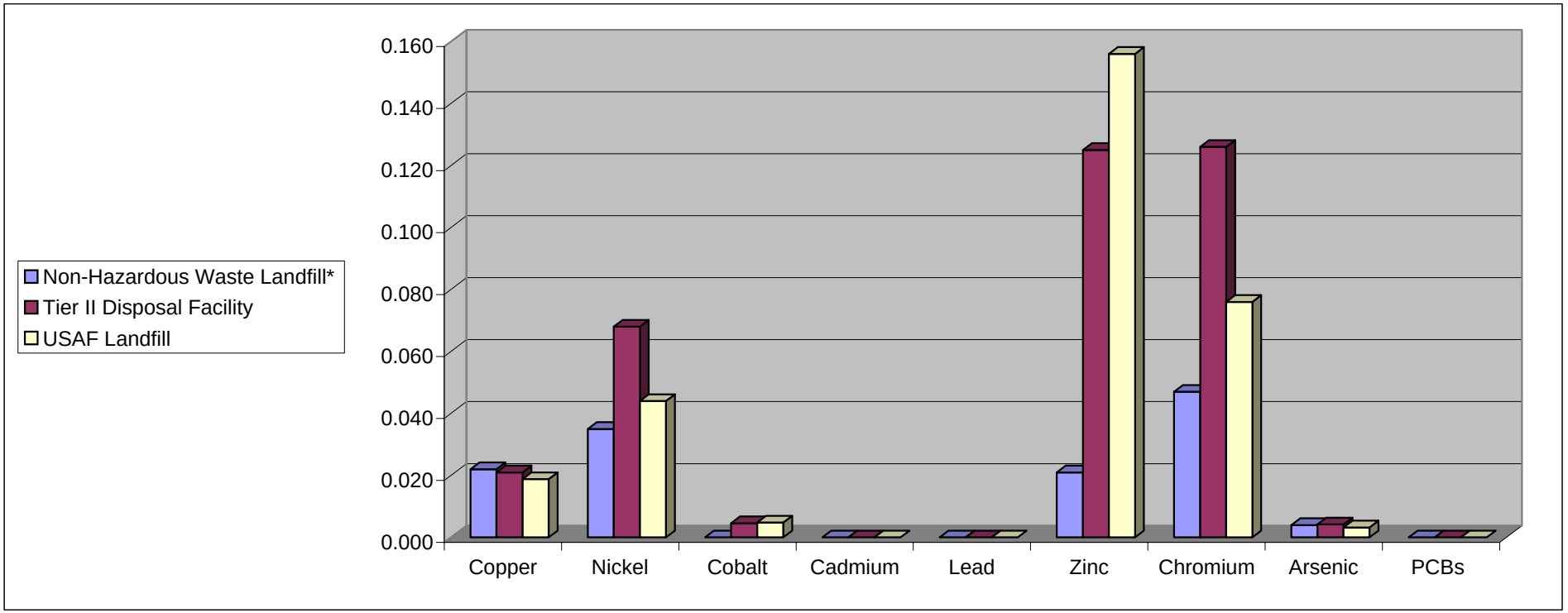


Table 1.8. Detection Limits for Analytical Requirements

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	<0.05	<0.003
TPH	<40	<1

1.2.8 Thermal Monitoring

For Class B landfills and Tier II Soil Disposal Facilities where a component of the design includes the placement of sufficient fill to promote aggradation of permafrost through the landfill contents, geothermal modeling 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. Modeling also determines the length of time required for the landfill contents to freeze-back following the placement of additional surface fill. Geothermal modeling 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 (1957-2000 climate normals data from Environment Canada for Shepherd Bay, Nunavut), an estimated 1 in 100 warm year air temperature, an estimated ten consecutive years of 1 in 100 warm years, 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 CAM-3, a typical active layer depth based on mean climatic data is 1.5 m for the Tier II Soil Disposal Facility. The predicted active layer depth for a 1 in 100 warm year is 2.0 and for ten consecutive 1 in 100 warm years is 2.1 m. The predicted mean active layer depth for the landfill after 100 years of global warming (using the best estimate approximation method as opposed to more conservative estimates) is 1.9 m. The active layer depth used for the Tier II Soil Disposal Facility design at CAM-3 is the resultant active layer depth from modeling 10 consecutive 1 in 100 warm years, which also accounts for a climate change – a depth of 2.1 m. It is expected to take one year for the landfill contents to freeze back with this depth of cover fill. These same design parameters were used for the leachate containment design of the USAF Landfill.

During landfill construction, vertical thermistors were installed within the landfill 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.

1.3 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 1.9: Summary of Landfill Monitoring Installations/Sampling Locations CAM-3 Shepherd

Landfill Designation/Monitoring Locations	Coordinates[1]		Elevation
	North (m)	East (m)	(masl)
Beach Landfill			
C3-1 (soil)	10976.7	2707.8	
C3-2 (soil)	10997.2	2626.6	
C3-3 (soil)	11019.8	2663.9	
Non-Hazardous Waste Landfill			
MW-1 (soil and groundwater)	10721.1	10338.8	42.2
MW-2 (soil and groundwater)	10773.4	10285.6	39.2
MW-3 (soil and groundwater)	10741.2	10273.6	39.6
Station Landfill			
C3-4 (soil)	9840.1	10027.7	
C3-5 (soil)	9790.0	9928.2	
C3-6 (soil)	9762.2	9985.1	
C3-7 (soil)	9758.2	10050.7	
C3-8 (soil)	9711.4	10092.9	
Tier II Soil Disposal Facility			
VT-5 (ground temperature)	9610.4	10348.5	43.7
VT-6 (ground temperature)	7615.4	10315.6	44.0
VT-7 (ground temperature)	9588.2	10307.0	43.1
VT-8 (ground temperature)	9583.7	10337.5	43.3
MW-4 (soil and groundwater)	9642.0	10333.7	41.8
MW-5 (soil and groundwater)	9563.7	10295.8	37.0
MW-6 (soil and groundwater)	9550.3	10322.7	36.9
MW-7 (soil and groundwater)	9560.2	10366.5	36.9
Northeast Landfill			
C3-9 (soil)	11247.6	10453.9	
C3-10 (soil)	11279.8	10545.0	
C3-11 (soil)	11164.5	10538.3	
C3-12 (soil)	11055.4	10418.6	
C3-13 (soil)	10978.6	10340.0	
C3-14 (soil)	11065.7	10322.5	
C3-15 (soil)	11160.7	10331.6	
C3-16 (soil)	11256.1	10315.3	
C3-17 (soil)	11337.9	10375.9	
C3-18 (soil)	11423.6	10404.7	
USAF Landfill			
VT-1 (ground temperature)	11447.0	12226.9	48.8
VT-2 (ground temperature)	11412.9	12220.3	46.6
VT-3 (ground temperature)	11416.6	12289.8	46.4
VT-4 (ground temperature)	11422.1	12321.3	45.1
MW-12 (soil and groundwater)	11501.2	12196.3	44.9
MW-13 (soil and groundwater)	11366.9	12268.4	45.4
MW-14 (soil and groundwater)	11367.0	12348.0	42.6
MW-15 (soil and groundwater)	11451.4	12323.4	43.2
NWS Landfill			
C3-19 (soil)	11565.2	12313.1	
C3-20 (soil)	11515.4	12360.9	
C3-21 (soil)	11498.2	12332.7	

Note 1: Coordinates referenced to local grid system. Monitoring well and thermistor coordinates as provided by the cleanup contractor.

LEGEND:

CM1 △ SURVEY CONTROL MONUMENT

SURVEY CONTROL MONUMENTS (LOCAL COORDINATES)				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
CM1	10 000.000	10 000.000	41.775	CAM-3 BASELINE
CM3	10 357.750	10 111.994	41.450	GSC MON. 749725
CM107	9 926.007	9 982.062	43.107	DMA MON. 11811
CM108	9 962.344	9 970.897	42.690	DMA RM. 11811
CM1124	10 121.226	9 933.143	43.418	TECSULT
CM1125	10 152.084	9 927.809	43.406	TECSULT

0 300 600 900m

300 150 1: 30000

3 000 E 4 000 E 5 000 E 6 000 E 7 000 E 8 000 E 9 000 E 10 000 E 11 000 E 12 000 E 13 000 E

13 000 N

12 000 N

11 000 N

10 000 N

9 000 N

SHEPHERD BAY

BEACH AREA

BEACH LANDFILL
SEE FIGURE CAM-3.2

ACCESS ROAD

DND RESERVE BOUNDARY

FORMER
WINTER WATER
SUPPLY LAKE

FORMER SUMMER WATER
SUPPLY LAKE

NORTHEAST LANDFILL
SEE FIGURE CAM-3.6

USAF AND NWS LANDFILL
SEE FIGURE CAM-3.7

ACCESS ROAD

NON-HAZARDOUS LANDFILL
SEE FIGURE CAM-3.3

CM3
CM1125
CM1124
CM1
CM108
CM107

STATION LANDFILL SEE
FIGURE CAM-3.4

STATION AREA

TIER II DISPOSAL FACILITY SEE
FIGURE CAM-3.5

B SIZE 11" x 17" (279.4mm x 431.8mm)
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DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

AECOM

Overall Site Plan
Figure CAM-3.1

2. Beach Landfill

The Beach Landfill is located approximately 100 meters south of the beach POL tanks and 50 metres from the ocean. The landfill is within a flat disturbed area that was difficult to distinguish from the native granular deposits along the beach. Two anomalies were identified during geophysical surveys, covering an estimated area of 1,500 m^2. The landfill was well covered with minimal debris visible at surface. No evidence of contaminant migration was detected. Type A (lubricating oil) hydrocarbon staining was identified within the landfill proximity.

Based on the evaluation of the landfill as a source of contamination, potential pathways and receptors, the Beach Landfill was classified as a low potential environmental risk. The landfill remediation included regrading and the placement of additional granular fill to direct flow around the sides of the landfill and the removal of contaminated soil.

The long term monitoring plan will consist of visual monitoring and periodic collection of soil samples. Approximate locations for the collection of soil samples are identified on Figure CAM-3.2.

2.1 Baseline Data

Sample locations from baseline soil samples are shown in Figure CAM-3.2. A summary of the baseline soil analytical data is provided in Table 2.1. Baseline data is comprised of site investigation information collected upgradient of the landfill in 2000, and samples collected at permanent monitoring locations up and downgradient of the landfill from 2006 to 2007.

Mean baseline concentrations for copper, nickel, cobalt, lead, zinc, and arsenic were noted to be similar to or higher than background conditions. PCBs were non-detect at all up and downgradient sample locations in 2000, 2006 and 2007. TPH (lubricating oil and grease) was detected in 2000 at two locations downgradient of the landfill, with concentrations of 290 mg/kg and 100 mg/kg. The remaining TPH detections had no detection of hydrocarbons at all.

B SIZE 11" x 17" (279.4mm x 431.8mm)

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SHEPHERD BAY

N

49 625 E
49 650 E
49 675 E
49 700 E
49 725 E
49 600 E

39 800 N
39 775 N
39 750 N
39 725 N

95m
96m
97m
98m
99m

17199
17192
17189
18126
18127
C3-3
17190
17191
18128
18129
17194
17193
DND RESERVE BOUNDARY
C3-2
17195
17196
18007
18006
18005
18014
18012
17188
18133
18134
ACCESS ROAD
C3-1
16910
16911

LEGEND:

- ■ MONITORING SOIL SAMPLE LOCATION
- ⊕ 16910 BASELINE SAMPLE

0 5 10 15m
5 2.5 1:500

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

MAGNETIC GRADIENT (gammas/m)

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

AECOM

Beach Landfill
Figure CAM-3.2

Table 2.1: Beach 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																	
00-17188	Beach Landfill	2000	0	3.4	<5.0	<5.0	<1.0	<10	16	<20	<1.0		<0.1				
00-18133	EBA TP # 2	2000	20	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1	<40			
00-18134	EBA TP # 2	2000	60	6.8	<5.0	<5.0	<1.0	<10	17	<20	1.1		<0.1	<40			
06-21444/45	C3-01	2006	0	7.3	<5.0	<5.0	<1.0	<10	<15	<20	2.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21446/47	C3-01	2006	30	7.1	<5.0	<5.0	<1.0	<10	<15	<20	1.8	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22083/84	C3-01	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22085/86	C3-01	2007	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.0	<0.10	<0.0030	10	<10	<4.0	10
Downgradient Soil Samples																	
00-17189	Beach Landfill	2000	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.1						
00-17190	Beach Landfill	2000	0	3.9	<5.0	<5.0	<1.0	<10	<15	<20	1.3						
00-17191	Beach Landfill	2000	0	3.4	<5.0	<5.0	<1.0	<10	<15	<20	<1.0						
00-17193	Beach Landfill	2000	0	4.3	<5.0	<5.0	<1.0	<10	19	<20	<1.0		<0.1	<40			
00-17194	Beach Landfill	2000	0	3.6	<5.0	<5.0	<1.0	<10	45	<20	2.2		<0.1	<40			
00-17195	Beach Landfill	2000	0	7.6	<5.0	<5.0	<1.0	<10	21	<20	<1.0		<0.1	<40			
00-17196	Beach Landfill	2000	0	6.1	5.1	<5.0	<1.0	11	33	<20	5.4		<0.1	<40			
00-18005	Beach Landfill	2000	0											<40			
00-18007	Beach Landfill	2000	0											290	100% lube oil & grease		
00-18009	Beach Landfill	2000	0											<40			
00-18012	Beach Landfill	2000	0											100	100% lube oil & grease		
00-18014	Beach Landfill 17200	2000	40											<40			
00-18126	EBA TP # 4	2000	20	4.2	<5.0	<5.0	<1.0	<10	<15	<20	1.3		<0.1	<40			
00-18127	EBA TP # 4	2000	50	5.5	<5.0	<5.0	<1.0	<10	<15	<20	1.4		<0.1	<40			
00-18128	EBA TP # 3	2000	20	4.6	<5.0	<5.0	<1.0	<10	<15	<20	2.1		<0.1	<40			
00-18129	EBA TP #3	2000	60	6.4	<5.0	<5.0	<1.0	<10	<15	<20	1.6		<0.1	<40			
06-21458/59	C3-02	2006	0	5.2	<5.0	<5.0	<1.0	<10	<15	<20	2.3	<0.10	<0.0030	21	<10	<4.0	21
06-21460/61	C3-02	2006	30	6.6	<5.0	<5.0	<1.0	<10	<15	<20	2.8	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21448/49	C3-03	2006	0	6.2	5.4	<5.0	<1.0	<10	15	<20	2.4	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21450/51	C3-03	2006	30	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	3.1	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22091/92	C3-02	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.2	<0.10	<0.0030	16	<10	<4.0	16
07-22093/94	C3-02	2007	30	4.7	<5.0	<5.0	<1.0	<10	<15	<20	2.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22087/88	C3-03	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.0	<0.10	<0.0030	14	<10	<4.0	14
07-22089/90	C3-03	2007	30	18	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	10	<10	<4.0	10
	N Value			26	26	26	26	26	26	26	26	12	26	30			
	Average			4.8	<5.0	<5.0	<1.0	<10	<15	<20	1.6	<0.10	<0.1 to <0.0030	<10 to <40			
	Standard Deviation			3.3							1.1						
	Minimum			1.5							0.5						
	Maximum			18	5.4			11	45		5			290			
	95% Confidence Limit			1.3							0.4						

3. Non-Hazardous Waste Landfill

The Non-Hazardous Waste Landfill is located south of the existing Northeast Landfill, and to the north of the junction between the main station access road and the road to the beach area. The landfill was constructed for the disposal of non-hazardous wastes and debris generated and collected during site clean-up.

The design of this landfill includes perimeter berms, and the placement of a cover of compacted granular fill over the landfilled material. Three groundwater monitoring wells were installed at the landfill perimeter.

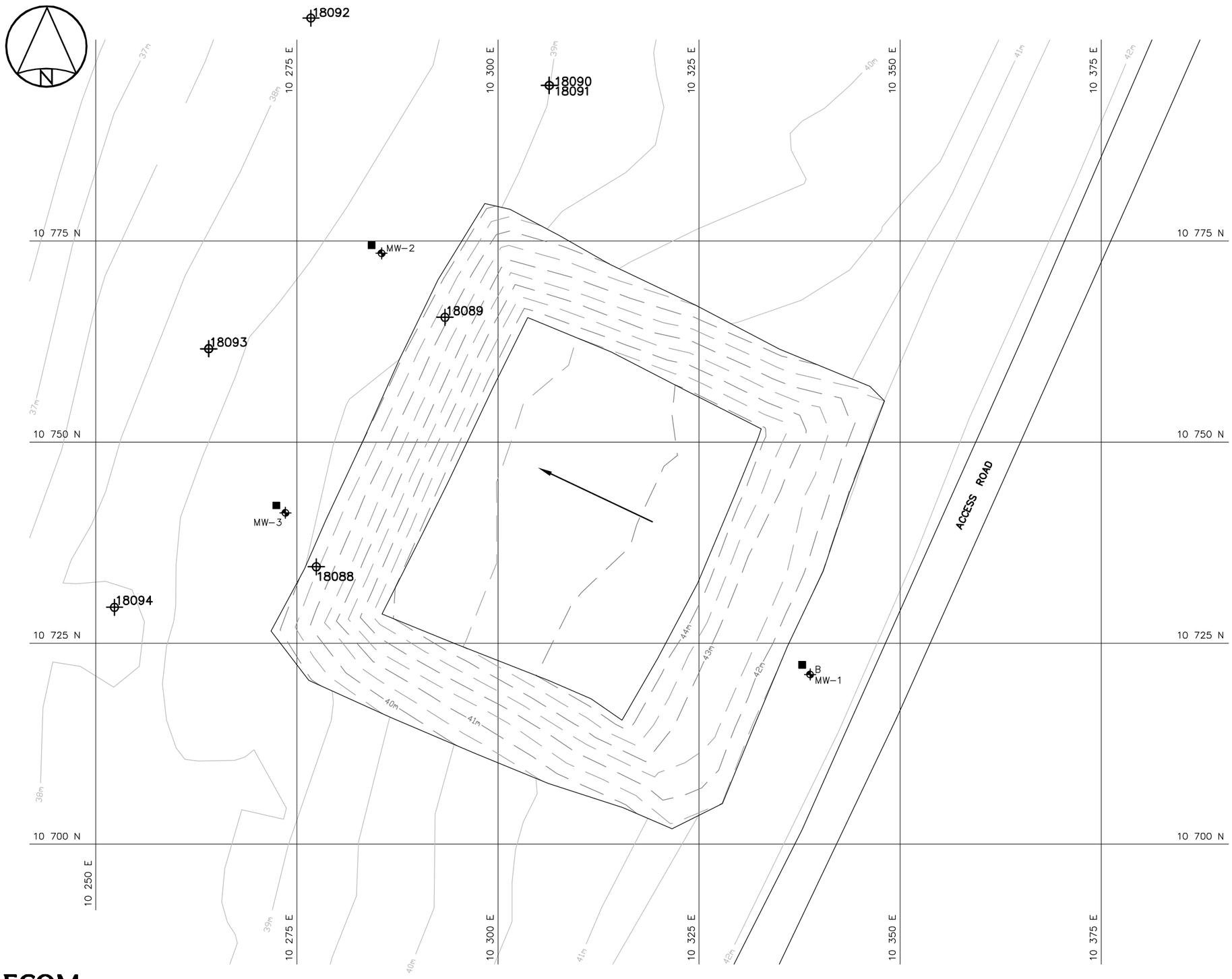
The long term monitoring plan will consist of visual monitoring and periodic collection of soil and groundwater samples. Approximate locations for the collection of soil and groundwater samples are identified on Figure CAM-3.3.

3.1 Baseline Data

Sample locations from baseline soil samples are shown in Figure CAM-3.3. A summary of the baseline soil analytical data is provided in Table 3.1. Baseline data is comprised of site investigation information collected downgradient of the landfill in 2000, and samples collected at permanent monitoring locations up and downgradient of the landfill from 2006 and 2007.

Mean baseline concentrations for copper, nickel, cobalt, lead, and zinc were noted to be similar or higher than background conditions for the site. The maximum concentration of zinc was 76 mg/kg sampled in 2000. PCBs were non-detect at all up and downgradient sample locations in 2000, 2006 and 2007. TPH was non-detect for most samples, with some having concentrations of F3 fractions of 25 mg/kg and 21 mg/kg in 2007.

A summary of baseline groundwater data is provided in Table 3.2. Baseline data was collected from permanent monitoring locations in 2007. Only the upgradient monitoring well (MW-01) contained water to collect a sample. Copper, nickel, zinc, chromium, and arsenic were the only parameters detected and were found at low concentrations.



LEGEND:

- MONITORING WELL LOCATION
- MONITORING SOIL SAMPLE LOCATION
- 18090 BASELINE SAMPLE

MONITORING WELLS			
NO.	COORDINATES		GROUND ELEV.
	NORTHING	EASTING	
MW-1	10 721.1	10 338.8	42.2
MW-2	10 773.5	10 285.5	39.2
MW-3	10 741.2	10 273.6	39.6

0 5 10 15m
5 2.5 1:500

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

AECOM

Non-Hazardous Waste Landfill
Figure CAM-3.3

Table 3.1: 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
Upgradient Soil Samples																	
06-21350/51	MW-01	2006	0	5.7	<5.0	<5.0	<1.0	<10	<15	<20	3.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21352/53	MW-01	2006	30	6.9	5.2	<5.0	<1.0	<10	<15	<20	3.2	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22143/44	MW-01	2007	0	3.3	<5.0	<5.0	<1.0	<10	<15	<20	3.1	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22145/46	MW-01	2007	30	4.4	6.5	<5.0	<1.0	<10	<15	<20	5.2	<0.10	<0.0030	<10	<10	<4.0	<9.0
Downgradient Soil Samples																	
00-18088	Proposed Landfill #3	2000	0	6.4	8.4	<5.0	<1.0	<10	20	<20	5		<0.1				
00-18089	Proposed Landfill #3	2000	0	5.6	7.1	<5.0	<1.0	<10	17	<20	5.2		<0.1				
00-18090	Proposed Landfill #3	2000	0	5.7	5.7	<5.0	<1.0	<10	20	<20	6.1		<0.1				
00-18091	Proposed Landfill #3	2000	0	5.4	6.1	<5.0	<1.0	<10	23	<20	7.3		<0.1				
00-18092	Proposed Landfill #3	2000	0	6.7	7.9	<5.0	<1.0	<10	24	<20	8		<0.1				
00-18093	Proposed Landfill #3	2000	0	5.7	6.8	<5.0	<1.0	<10	<15	<20	6		<0.1				
00-18094	Proposed Landfill #3	2000	0	3.9	<5.0	<5.0	<1.0	<10	<15	<20	3.1		<0.1				
00-18095	Proposed Landfill #3	2000	0	7.6	<5.0	<5.0	<1.0	<10	76	<20	2.5		<0.1				
00-18096	Proposed Landfill #3	2000	0	6.2	8.6	<5.0	<1.0	<10	16	22	6		<0.1				
00-18097	Proposed Landfill #3	2000	0	4.9	7.4	<5.0	<1.0	<10	<15	<20	2.2		<0.1				
06-21354/55	MW-02	2006	0	8.2	6.1	<5.0	<1.0	<10	<15	<20	3.7	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21356/57	MW-02	2006	30	7.8	7.2	<5.0	<1.0	<10	<15	<20	4.1	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21358/59	MW-03	2006	0	7.9	6.0	<5.0	<1.0	<10	<15	<20	4.5	<0.10	<0.0030	14	<10	<4.0	14
06-21360/61	MW-03	2006	30	5.9	5.2	<5.0	<1.0	<10	<15	<20	4.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22135/36	MW-02	2007	0	4.4	6.4	<5.0	<1.0	<10	<15	<20	3.8	<0.10	<0.0030	21	<10	<4.0	21
07-22137/38	MW-02	2007	30	3.9	5.6	<5.0	<1.0	<10	<15	<20	4.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22139/40	MW-03	2007	0	4.3	5.8	<5.0	<1.0	<10	<15	<20	5.0	<0.10	<0.0030	25	<10	<4.0	25
07-22141/42	MW-03	2007	30	3.0	<5.0	<5.0	<1.0	<10	<15	<20	4.7	<0.10	<0.0030	14	<10	<4.0	14
	N Value			22	22	22	22	22	22	22	22	12	22	12			
	Average			5.6	5.7	<5.0	<1.0	<10	<15	<20	4.5	<0.10	<0.1 to <0.0030	<10			
	Standard Deviation			1.5	2.0						1.5						
	Minimum			3.0	2.5						2.2						
	Maximum			8	9				76	22	8			25			
	95% Confidence Limit			0.6	0.8						0.6						

Table 3.2: Non-Hazardous Waste Landfill - Baseline 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 Samples																
07-22265	MW-01	2007	0.022	0.035	<0.0030	<0.0010	<0.010	0.021	0.047	0.004	<0.00040	<0.000020		<0.050	<0.50	<1.0
N Value			1	1	1	1	1	1	1	1	1	1		1	1	1
Average			0.022	0.035	<0.003	<0.001	<0.010	0.021	0.047	0.004	<0.00040	<0.000020		<0.050	<0.5	<1.0
Standard Deviation																
Minimum																
Maximum																
95% Confidence Limit																

4. Station Landfill

The Station Landfill is located approximately 200 m southeast of the module train along a ridge on the south side of the access road between the station and airstrip, as shown in Figure CAM-3.1 appended to this annex. Geophysics identified five lobes of debris, for a combined area of 6,100 square metres. The debris had been primarily dumped and covered off the edge of the ridge, with some debris having been placed in separate piles away from the ridge and subsequently covered with fill. No evidence of contaminant migration was detected. Localized Tier II contamination was detected associated with surface debris.

Based on the evaluation of the landfill as a source of contamination, potential pathways and receptors, the Station Landfill was classified as a low potential environmental risk. The remediation of this landfill consisted of regrading with the placement of additional granular fill, and excavation of the Tier II soil. Three of the lobes in close proximity to one another were regraded as one continuous area, while the other two lobes were regraded separately.

The long term monitoring plan consists of visual monitoring and periodic collection of soil samples. Approximate locations for the collection of soil samples are identified on Figure CAM-3.4.

4.1 Baseline Data

Sample locations from baseline soil samples are shown in Figure CAM-3.4. A summary of the baseline soil analytical data is provided in Table 4.1. Baseline data is comprised of site investigation information collected up and downgradient of the landfill in 2000, and samples collected at permanent monitoring locations up and downgradient of the landfill also in 2006 and 2007.

Soil baseline concentrations of inorganic elements at the Station Landfill are consistent with or slightly higher than site background levels. PCBs were not detected in any samples except for two taken at the same location in 2006 and 2007. The surface samples taken at C3-04 in 2006 and 2007 had PCB concentrations of 0.0268 mg/kg and 0.067 mg/kg respectively. There were various detections of low level concentrations of hydrocarbons both up and downgradient of the landfill. In 2000, elevated total hydrocarbon concentrations of 2,200 mg/kg were detected at one location upgradient of the landfill.

LEGEND:

- CM27 — SURVEY CONTROL MONUMENT
- TBM20 — TEMPORARY BENCHMARK
- ■ — MONITORING SOIL SAMPLE LOCATION
- 17570 — BASELINE SAMPLE

MAGNETIC GRADIENT (gammas/m)

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

BENCHMARKS

NO.	COORDINATES (m) NORTHING	COORDINATES (m) EASTING	ELEV. (m)	DESCRIPTION
TBM200	9 711.840	10 171.347	41.516	NAIL
BM-3	9 845.782	10 064.384	–	25mm DIA. STEEL PIPE

0 10 20 30m
10 5 1:1000

AECOM

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

Station Landfill
Figure CAM-3.4

AECOM

Table 4.1: Station 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																	
00-17272	Station Landfill	2000	0	4.7	<5.0	<5.0	<1.0	43	35	<20	2.2						
00-17565	SL ML#1	2000	0	3.8	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	78	100% fuel oil		
00-17566	SL ML#1	2000	20	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	2200	100% fuel oil		
00-17567	SL ML#2	2000	0	3.8	<5.0	<5.0	<1.0	<10	15	<20	1.4	<0.1	<0.1	<40			
00-17568	SL ML#2	2000	20	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.1	<0.1	42	100% fuel oil		
00-18065	EBA TP # 37	2000	0	5.1	6.7	<5.0	<1.0	<10	<15	<20	4.8		<0.1	<40			
00-18066	EBA TP # 37	2000	60	4.8	6.1	<5.0	<1.0	<10	<15	<20	2.0		<0.1	<40			
00-18067	EBA TP # 37	2000	100	4.9	<5.0	<5.0	<1.0	<10	<15	<20	4.5		<0.1	<40			
00-17569	SL ML#3	2000	0	3.2	<5.0	<5.0	<1.0	<10	<15	<20	1.5	<0.1	<0.1	<40			
00-17570/17571	SL ML#3	2000	20	5.0	5.3	<5.0	<1.0	<10	<15	<20	2.9	<0.1	<0.1	<40			
00-18068	EBA TP # 38	2000	0	5.9	5.7	<5.0	<1.0	<10	16	<20	2.8		<0.1	<40			
00-18069	EBA TP # 38	2000	80	7.9	7.2	<5.0	<1.0	<10	15	<20	1.0		<0.1	<40			
00-17270/17271	Station Landfill	2000	0	4.4	<5.0	<5.0	<1.0	<10	<15	<20	2.5						
06-21440/41	C3-04	2006	0	5.1	<5.0	<5.0	<1.0	<10	<15	<20	2.7	<0.10	0.0268	<10	<10	<4.0	<9.0
06-21442/43	C3-04	2006	30	7.7	7.0	<5.0	<1.0	<10	<15	<20	4.8	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22063/64	C3-04	2007	0	4.2	<5.0	<5.0	<1.0	16	20	<20	<1.0	<0.10	0.067	39	<10	<4.0	39
07-22065/66	C3-04	2007	30	4.7	6.5	<5.0	<1.0	<10	<15	<20	3.0	<0.10	<0.0030	11	<10	<4.0	11
Downgradient Soil Samples																	
00-16021/16022	Station Landfill	2000	0	6.1	7.4	<5.0	<1.0	<10	<15	<20	4.1		<0.5	<40			
00-17210	Station Landfill	2000	0	5.6	5.6	<5.0	<1.0	<10	35	<20	3.2						
00-17211	Station Landfill	2000	0	4.9	5.2	<5.0	<1.0	<10	17	<20	2.9						
00-17213	Station Landfill	2000	0	6.1	7.2	<5.0	<1.0	<10	<15	<20	3.7						
00-17214	SL 16021	2000	0										<0.5	<40			
00-17215	SL 16021	2000	0										<0.5	<40			
00-17216	SL 16021	2000	0											310			
00-17217	SL 16021	2000	0										<0.5	<40			
00-17218	SL 16021	2000	0										<0.5	<40			
00-17219	SL 16021	2000	0											290			
00-17267	Station Landfill	2000	0	4.9	<5.0	<5.0	<1.0	<10	<15	<20	3.2						
00-17572	SL ML#4	2000	30	8.5	9.8	<5.0	<1.0	<10	<15	20	2.8	<0.1	<0.1	<40			
00-17573	SL ML#4	2000	0	10.0	11.0	5.4	<1.0	<10	15	23	3.4	<0.1	<0.1	<40			
00-17574	SL ML#5	2000	0	8.3	6.8	<5.0	<1.0	<10	48	<20	3.5	<0.1	<0.1	47	100% fuel oil		
00-17575	SL ML#5	2000	30	6.3	8.2	<5.0	<1.0	<10	<15	<20	6.4	<0.1	<0.1	<40			
00-17576	SL ML#6	2000	0	5.3	6.8	<5.0	<1.0	<10	<15	<20	3.5	<0.1	<0.1	<40			
00-17577	SL ML#6	2000	20	5.4	7.7	<5.0	<1.0	<10	<15	<20	5.5	<0.1	<0.1	<40			
00-17578	SL ML#7	2000	0	4.3	6.1	<5.0	<1.0	<10	<15	<20	2.8	<0.1	<0.1	41	100% fuel oil		
00-17579	SL ML#7	2000	20	5.9	7.6	<5.0	<1.0	<10	<15	<20	3.6	<0.1	<0.1	<40			
00-17580/17581	SL ML#8	2000	0	6.5	9.1	<5.0	<1.0	<10	<15	15	3.1	<0.1	<0.1	<40			
00-17582	SL ML#8	2000	20	4.9	5.7	<5.0	<1.0	<10	<15	<20	3.4	<0.1	<0.1	<40			
00-17583	SL ML#9	2000	0	7.1	9.6	<5.0	<1.0	<10	<15	22	5.1	<0.1	<0.1	<40			
00-17584	SL ML#9	2000	20	7.3	9.9	<5.0	<1.0	<10	<15	23	4.6	<0.1	<0.1	<40			

Table 4.1: Station 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
00-17585	SL ML#10	2000	0	3.8	5.3	<5.0	<1.0	<10	<15	<20	2.5	<0.1	<0.1	<40			
00-17586	SL ML#10	2000	20	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.0	<0.1	<0.1	<40			
00-18070/18071	EBA TP # 41	2000	30	5.1	5.8	<5.0	<1.0	<10	<15	<20	4.0		<0.1	<40			
00-18072	EBA TP # 41	2000	60	6.1	7.7	<5.0	<1.0	<10	<15	<20	4.1		<0.1	<40			
00-18075	EBA TP # 43	2000	30	5.0	5.7	<5.0	<1.0	<10	<15	<20	5.0		<0.1	<40			
00-18076	EBA TP # 43	2000	60	6.0	6.3	<5.0	<1.0	<10	<15	<20	4.5		<0.1	<40			
00-18077	EBA TP # 44	2000	0	7.6	8.3	<5.0	<1.0	<10	<15	<20	4.3		<0.1	<40			
00-18078	EBA TP # 44	2000	30	8.6	9.2	<5.0	<1.0	<10	15	<20	5.0		<0.1	<40			
00-18079	EBA TP # 44	2000	50	8.2	9.0	<5.0	<1.0	<10	<15	<20	6.7		<0.1	<40			
06-21436/37	C3-05	2006	0	8.3	7.8	<5.0	<1.0	<10	<15	<20	4.5	<0.10	<0.0030	12	<10	<4.0	12
06-21438/39	C3-05	2006	30	7.3	6.7	<5.0	<1.0	<10	<15	<20	5.0	<0.10	<0.0030	12	<10	<4.0	12
06-21432/33	C3-06	2006	0	9.2	8.6	<5.0	<1.0	<10	<15	<20	5.2	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21434/35	C3-06	2006	30	12	12	5.4	<1.0	<10	<15	25	4.6	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21394/95	C3-07	2006	0	10	11	<5.0	<1.0	<10	27	21	4.7	<0.10	0.026	23	<10	<4.0	23
06-21396/97	C3-07	2006	30	7.1	7.1	<5.0	<1.0	<10	<15	<20	4.4	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21390/91	C3-08	2006	0	9.4	11	<5.0	<1.0	<10	<15	<20	2.7	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21392/93	C3-08	2006	30	8.7	10	<5.0	<1.0	<10	<15	<20	3.3	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22067/68	C3-05	2007	0	4.9	7.1	<5.0	<1.0	<10	<15	<20	2.5	<0.10	<0.0030	19	<10	<4.0	19
07-22069/70	C3-05	2007	30	4.3	6.3	<5.0	<1.0	<10	<15	<20	2.6	<0.10	<0.0030	29.2	<10	6.2	23
07-22071/72	C3-06	2007	0	6.1	8.1	<5.0	<1.0	<10	<15	<20	3.2	<0.10	<0.0030	26	<10	<4.0	26
07-22073/74	C3-06	2007	30	10	14	6.0	<1.0	<10	<15	35	3.3	<0.10	<0.0030	12	<10	<4.0	12
07-22075/76	C3-07	2007	0	4.3	6.3	<5.0	<1.0	<10	<15	<20	3.2	<0.10	<0.0030	42	<10	<4.0	42
07-22077/78	C3-07	2007	30	4.9	7.4	<5.0	<1.0	<10	<15	<20	4.5	<0.10	<0.0030	28.3	<10	5.3	23
07-22079/80	C3-08	2007	0	4.7	8	<5.0	<1.0	<10	<15	<20	2.8	<0.10	<0.0030	25.2	<10	6.2	19
07-22081/82	C3-08	2007	30	5.1	8.6	<5.0	<1.0	<10	<15	<20	2.5	<0.10	<0.0030	10	<10	<4.0	10
	N Value			59	59	59	59	59	59	59	59	42	58	60			
	Average			6.0	6.7	<5.0	<1.0	<10	<15	<20	3.4	<0.10	<0.5 to <0.0030	<40			
	Standard Deviation			2.2	2.7						1.4						
	Minimum			1.5	2.5						0.5						
	Maximum			12	14	6		43	48	35	7		0.067	2200			
	95% Confidence Limit			0.6	0.7						0.4						

5. Tier II Disposal Facility

A Tier II Soil Disposal Facility has been constructed at the Shepherd Bay site for the disposal of Tier II soil excavated during the clean-up. The Facility is located along the south edge of the U-shaped ridge of the site, to the south of the airstrip and to the east of the Station Landfill.

The design of this landfill included a double containment system consisting of a liner system and the construction of saturated, low-permeability berms, followed by the placement of sufficient surface fill to promote freezing of landfill contents and containment berms. The liner was placed along the bottom of the landfill, along the berms, and over the top of the landfill contents and thermistors were installed within the landfill in the berms and the main body of the landfill. Four monitoring wells were installed at the landfill perimeter.

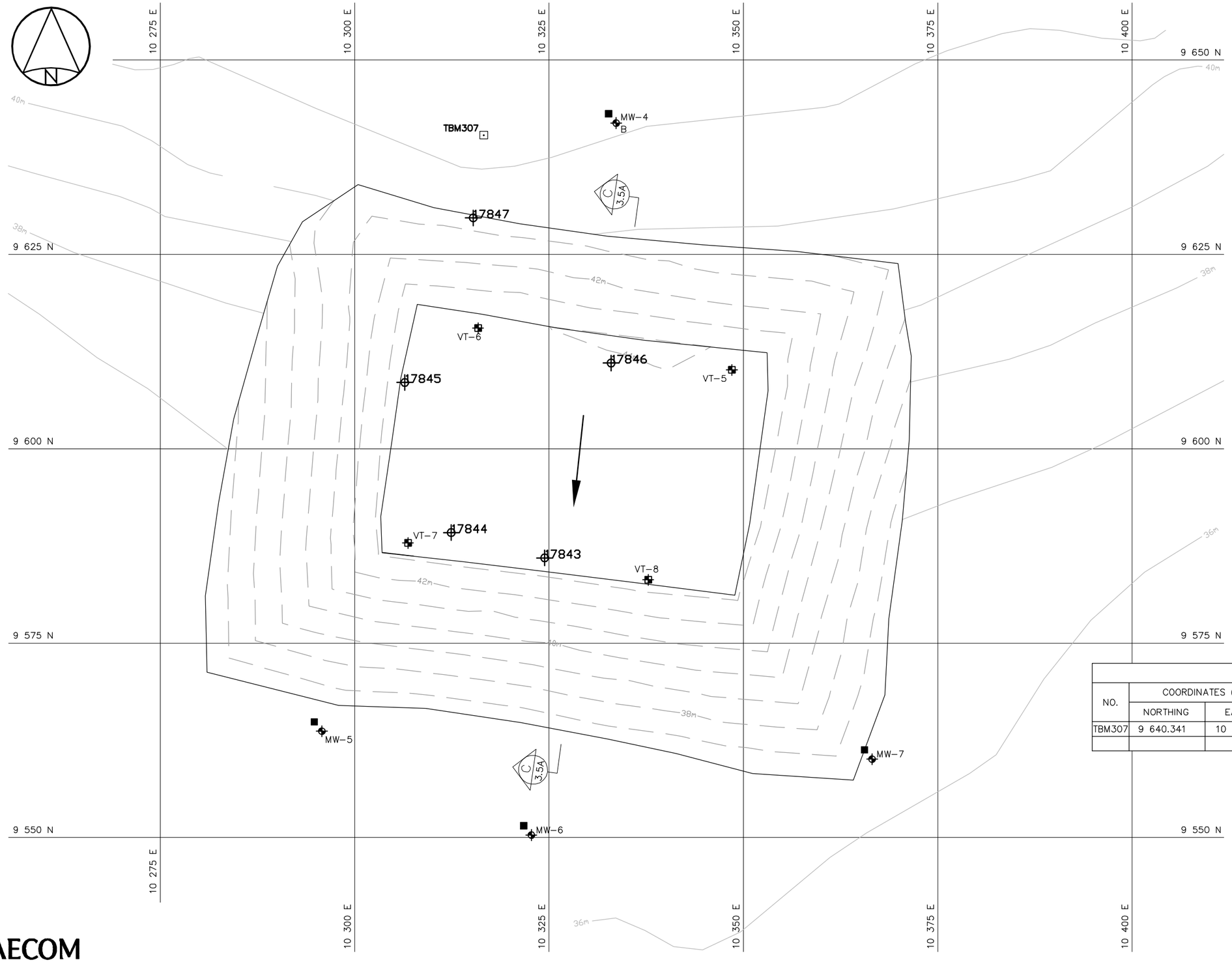
The long term monitoring plan consists of visual monitoring, periodic collection of soil and groundwater samples, and monitoring of subsurface ground temperatures in the berms and in the main body of the disposal facility. Locations for the collection of soil and groundwater samples and thermistor installations are identified on Figure CAM-3.5.

5.1 Baseline Data

Sample locations from baseline soil samples are shown in Figure CAM-3.5. A summary of the baseline soil analytical data is provided in Table 5.1. Baseline data is comprised of site investigation information collected within the proposed landfill footprint in 2000, and samples collected at permanent monitoring locations up and downgradient of the landfill from 2006 and 2007.

Mean baseline concentrations for copper, nickel, cobalt, lead, and zinc were consistent with or slightly higher than background conditions for the site. PCBs were not detected in any of the samples from 2000, 2006 or 2007. TPH was detected at several locations both up and downgradient of the landfill, some with concentrations. Most of the TPH detected were F2, F3 and F4 fractions at low concentrations and there were some samples with no detection of hydrocarbons at all.

A summary of baseline groundwater data is provided in Table 5.2. Baseline data was collected from permanent monitoring locations in 2006 and 2007. Concentrations for copper, nickel, cobalt, lead, zinc, chromium and arsenic were detected in the baseline samples. No PCBs were detected and no TPH was detected in any of the water samples.



LEGEND:

- TBM20 ⊡ TEMPORARY BENCHMARK
- ⊕ MONITORING WELL LOCATION
- VT⊕ VERTICAL THERMISTOR
- ■ MONITORING SOIL SAMPLE LOCATION
- ⊕7845 BASELINE SAMPLE

MONITORING WELLS			
NO.	COORDINATES		GROUND ELEV.
	NORTHING	EASTING	
MW–4	9 641.9	10 333.6	41.9
MW–5	9 563.7	10 295.8	37.0
MW–6	9 550.3	10 322.7	36.9
MW–7	9 560.1	10 366.6	36.9

THERMISTORS			
NO.	COORDINATES		GROUND ELEV.
	NORTHING	EASTING	
VT–5	9 610.1	10 348.5	44.2
VT–6	9 615.5	10 315.9	44.0
VT–7	9 587.9	10 306.9	43.3
VT–8	9 583.1	10 337.8	43.4

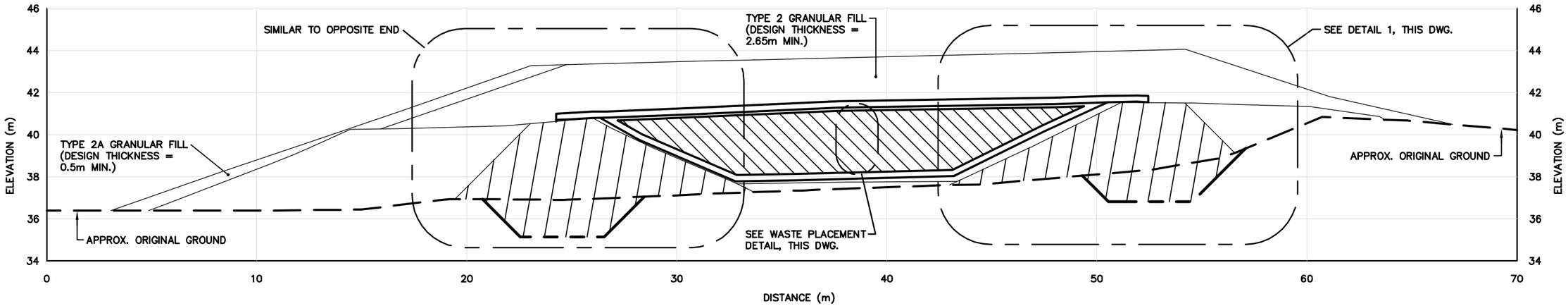
BENCHMARKS				
NO.	COORDINATES (m)		ELEV. (m)	DESCRIPTION
	NORTHING	EASTING		
TBM307	9 640.341	10 316.602	41.308	NAIL

0 5 10 15m
5 2.5 1:500

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

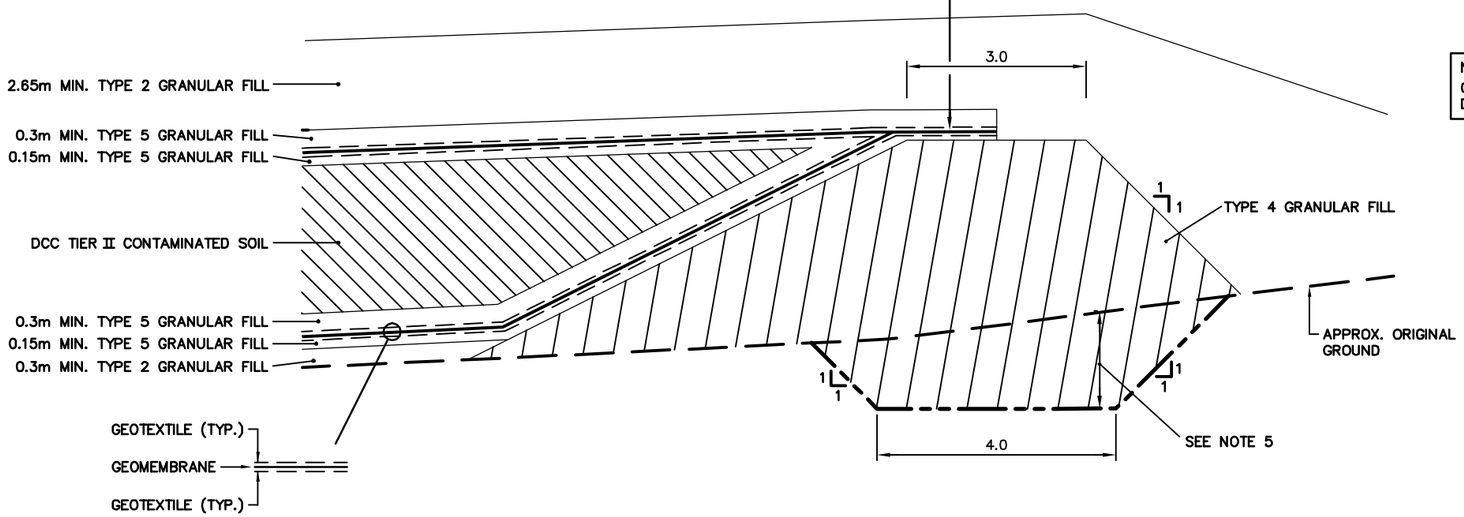
AECOM

Tier II Disposal Facility
Figure CAM-3.5



SECTION C 3.5

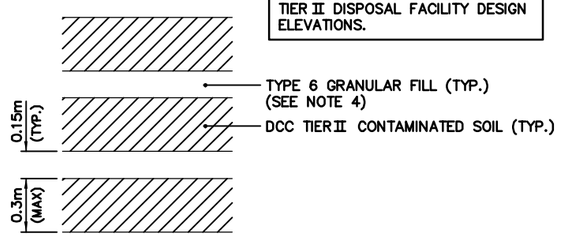
NOTE:
LINERS ARE IN CONTACT WITH EACH OTHER OVER THE TOP OF THE BERM AND PERIMETER WELDED.



DETAIL 1 N.T.S.

NOTE:
GEOMEMBRANE LINERS WERE PROTECTED DURING INTERIM CONSTRUCTION.

ADDITIONAL TIER II LAYERS ADDED AS REQUIRED TO ACHIEVE THE TIER II DISPOSAL FACILITY DESIGN ELEVATIONS.



WASTE PLACEMENT DETAIL
N.T.S.

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DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

Tier II Disposal Facility Cross Section and Detail

Figure CAM 3.5A

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Table 5.1: Tier II 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																	
00-17847	Proposed Airstrip South	2000	0	6	6.1	<5.0	<1.0	<10	<15	<20	6.1		<0.1				
06-21318/19	MW-04	2006	0	7.2	5.1	<5.0	<1.0	<10	<15	<20	5.2	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21320/21	MW-04	2006	30	7.0	5.2	<5.0	<1.0	<10	<15	<20	3.3	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22187/88	MW-04	2007	0	5.4	7.2	<5.0	<1.0	<10	<15	<20	4.0	<0.10	<0.0030	17	<10	<4.0	17
07-22189/90	MW-04	2007	30	6.1	12	<5.0	<1.0	<10	<15	<20	3.7	<0.10	<0.0030	<10	<10	<4.0	<9.0
Downgradient Soil Samples																	
00-17843	Proposed Airstrip South	2000	0	11	7.7	<5.0	<1.0	<10	<15	<20	1.5		<0.1				
00-17844	Proposed Airstrip South	2000	0	3.6	<5.0	<5.0	<1.0	<10	<15	<20	3.1		<0.1				
00-17845	Proposed Airstrip South	2000	0	6.9	7.5	<5.0	<1.0	<10	16	<20	7		<0.1				
00-17846	Proposed Airstrip South	2000	0	6.1	5.4	<5.0	<1.0	<10	17	<20	7.8		<0.1				
06-21322/23	MW-05	2006	0	9.8	9.4	<5.0	<1.0	<10	<15	<20	2.9	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21324/25	MW-05	2006	30	9.2	10	<5.0	<1.0	<10	<15	20	3.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21326/27	MW-06	2006	0	7.5	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21328/29	MW-06	2006	30	9.3	<5.0	<5.0	<1.0	<10	<15	<20	1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21330/31	MW-07	2006	0	8.2	8.6	<5.0	<1.0	<10	<15	<20	3.2	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21332/33	MW-07	2006	30	6.7	6.0	<5.0	<1.0	<10	<15	<20	2.1	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22175/76	MW-05	2007	0	6.9	11	<5.0	<1.0	<10	<15	<20	2.8	<0.10	<0.0030	4.3	<10	4.3	<9.0
07-22177/78	MW-05	2007	30	7.6	13	<5.0	<1.0	<10	<15	<20	3.5	<0.10	<0.0030	10	<10	<4.0	10
07-22179/80	MW-06	2007	0	5.1	<5.0	<5.0	<1.0	<10	22	<20	1.0	<0.10	<0.0030	108	<10	8	100
07-22181/82	MW-06	2007	30	6.3	5.1	<5.0	<1.0	<10	17	<20	3.2	<0.10	<0.0030	30.1	<10	8.1	22
07-22183/84	MW-07	2007	0	5.1	9.1	<5.0	<1.0	<10	<15	<20	4.3	<0.10	<0.0030	15.2	<10	4.2	11
07-22185/86	MW-07	2007	30	5.1	7.8	<5.0	<1.0	<10	17	<20	2.9	<0.10	<0.0030	<10	<10	<4.0	<9.0
	N Value			21	21	21	21	21	21	21	21	16	21	16			
	Average			7.0	6.9	<5.0	<1.0	<10	<15	<20	3.5	<0.10	.1 to <0.00	<10			
	Standard Deviation			1.8	3.1						1.8						
	Minimum			3.6	2.5						1.0						
	Maximum			11	13				22	20	8			108			
	95% Confidence Limit			0.8	1.3						0.8						

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Table 5.2: Tier II Disposal Facility - Baseline 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
Downgradient Groundwater Samples																
06-21081	MW-05	2006	0.031	0.059	0.0045	<0.0010	<0.010	0.15	0.094	0.0047	< 0.00040	<0.000020		<0.050	<0.50	<1.0
06-21082	MW-06	2006	0.039	0.26	0.011	<0.0010	<0.010	0.027	0.54	0.0083	< 0.00040	<0.000020		<0.050	<0.50	<1.0
06-21083	MW-07	2006	0.035	0.043	0.0039	<0.0010	<0.010	0.026	0.080	0.0041	< 0.00040	<0.000020		<0.050	<0.50	<1.0
07-22268	MW-05	2007	<0.0050	0.010	<0.0030	<0.0010	0.034	0.076	0.01	<0.0030	<0.0004	<0.0002		<0.050	<0.50	<1.0
07-22269	MW-06	2007	0.0070	0.0090	<0.0030	<0.0010	<0.010	0.015	0.0060	<0.0030	<0.0004	<0.0002		<0.050	<0.50	<1.0
07-22272	MW-07	2007	0.014	0.027	0.0050	<0.0010	0.045	0.45	0.029	0.0050	<0.0004	<0.0002		<0.050	<0.50	<1.0
N Value			6	6	6	6	6	6	6	6	6	6		6	6	6
Average			0.021	0.068	0.0046	<0.0010	<0.010	0.125	0.126	0.0042	<0.00040	<0.000020		<0.050	<0.50	<1.0
Standard Deviation			0.016	0.097	0.0037			0.167	0.205	0.0025						
Minimum			0.003	0.009	0.0015			0.015	0.006	0.0015						
Maximum			0.039	0.263	0.0115		0.045	0.450	0.537	0.0083						
95% Confidence Limit			0.012	0.078	0.0029			0.134	0.164	0.0020						

6. Northeast Landfill

The Northeast Landfill is located approximately 1 kilometre north of the module train. Geophysics identified 12 lobes of debris, for a combined area of 21,800 m^2. The landfill is located along the crest of a former beach ridge, which slopes gently to the east and has a well defined toe to the west; the east portion is relatively flat and the western portion slopes down to a wet low-lying area. Localized Tier I and Tier II contamination, and Type A (lubricating oil) soil contamination was identified with some of the lobes, however, the impacts were all associated with surface debris or staining. No evidence of contaminant migration was identified.

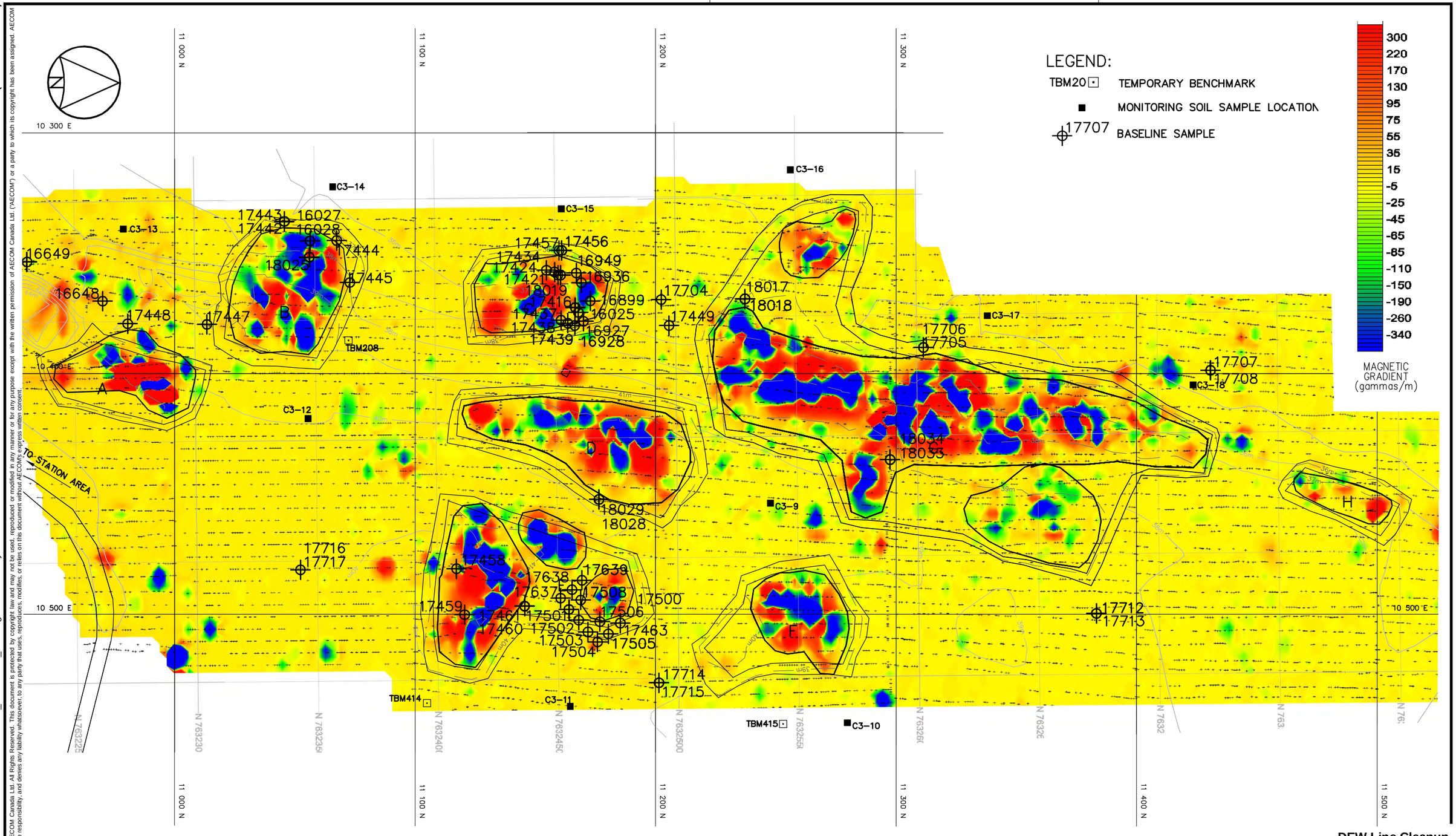
Based on the evaluation of the landfill as a source of contamination, potential pathways and receptors, the Northeast Landfill was classified as a low potential environmental risk. The landfill remediation included the removal of surface debris and localized contaminated areas, along with regrading and the placement of additional granular fill. Several of the lobes in close proximity to one another were regraded as one area.

The long term monitoring plan consists of visual monitoring and periodic collection of soil samples. Approximate locations for the collection of soil samples are identified on Figure CAM-3.6.

6.1 Baseline Data

Sample locations from baseline soil samples are shown in Figure CAM-3.6. A summary of the baseline soil analytical data is provided in Table 6.1. Baseline data is comprised of site investigation information collected up and downgradient of the landfill in 2000 and downgradient of the landfill in 2001, and samples collected at permanent monitoring locations up and downgradient of the landfill in 2006 and 2007.

Mean baseline concentrations for copper, nickel, cobalt, lead, and zinc were noted to be consistent with or higher than background conditions for the site area. The highest zinc concentration was in a sample taken in 2006 at C3-10, upgradient of the landfill. PCBs were not detected in any of the samples taken in 2000, 2006 and 2007. TPH was detected at several locations both up and downgradient of the landfill, some with concentrations as high as 1300 mg/kg in 2000. Most TPH detections were low and there were numerous samples with no detection of hydrocarbons at all.



DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

AECOM

Northeast Landfill
Figure CAM-3.6

Table 6.1: Northeast 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																	
00-17712	ML#7	2000	0	5.3	6.4	<5.0	<1.0	<10	<15	<20	4.6	<0.1	<0.1	<40			
00-17713	ML#7	2000	30	4.6	6.0	<5.0	<1.0	<10	<15	<20	4.2	<0.1	<0.1	<40			
00-17714	ML#8	2000	0	3.7	<5.0	<5.0	<1.0	<10	15	<20	1.8	<0.1	<0.1	62	100% fuel oil		
00-17715	ML#8	2000	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.5	<0.1	<0.1	<40			
00-17716	ML#9	2000	0	3.3	<5.0	<5.0	<1.0	<10	<15	<20	2.0		<0.1				
00-17717	ML#9	2000	30	3.8	<5.0	<5.0	<1.0	<10	<15	<20	1.9		<0.1				
06-21406/07	C3-10	2006	0	12	9.5	<5.0	<1.0	<10	45	<20	2.2	<0.10	<0.0030	192	<10	22	170
06-21408/09	C3-10	2006	30	8.7	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21462/63	C3-11	2006	0	10	<5.0	<5.0	<1.0	<10	<15	<20	2.0	<0.10	<0.0030	40	<10	<4.0	40
06-21464/65	C3-11	2006	30	7.5	<5.0	<5.0	<1.0	<10	<15	<20	2.9	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22111/12	C3-10	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.10	<0.0030	17.8	<10	7.8	10
07-22113/14	C3-10	2007	30	8.6	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	23.9	<10	5.9	18
07-22107/08	C3-11	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	13	<10	<4.0	13
07-22109/10	C3-11	2007	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	19.9	<10	4.9	15
Downgradient Soil Samples																	
00-16927*	NEL 16025	2000	0											100	100% lube oil & grease		
00-16928*	NEL 16025	2000	0					<10									
00-16949*	NEL 16025	2000	0											1300	100% lube oil & grease		
00-17420/1742	NEL 16025	2000	0											540	100% lube oil & grease		
00-17424*	NEL 16025	2000	0											320	100% lube oil & grease		
00-17437*	NEL 16025	2000	0											360			
00-17438*	NEL 16025	2000	0											<40			
00-17439*	NEL 16025	2000	0					<10						180			
00-17442*	ML#1	2000	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.1		<40			
00-17443*	ML#1	2000	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.0	<0.1	<0.1	<40			
00-17444	NEL Area B	2000	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.4		<0.1	<40			
00-17445*	NEL Area B	2000	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.6		<0.1	<40			
00-17447	NEL Area B	2000	0	4.1	<5.0	<5.0	<1.0	<10	<15	<20	2.6		<0.1	<40			
00-17448	NEL Area B	2000	0	5.1	5.2	<5.0	<1.0	<10	<15	<20	3.7		<0.1	<40			
00-17449	NEL Area J	2000	0	4.1	<5.0	<5.0	<1.0	<10	18	<20	1.0		<0.1	<40			
00-17456*	ML #2	2000	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.7	<0.1	<0.1	200	94% lube oil & grease, 6% fuel oil		
00-17457*	ML #2	2000	30	<3.0	<5.0	<5.0	<1.0	<10	16	<20	2.5	<0.1	<0.1	250	89% lube oil & grease, 11% fuel oil		
00-17460/1746	NEL Area G	2000	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.9		<0.1	<40			
00-17500/1750	NEL Area F stain	2000	0											420			
00-17502*	NEL Area F stain	2000	0											510			
00-17503*	NEL Area F stain	2000	0											52	98% lube oil & grease, 2% fuel oil		
00-17504	NEL Area F stain	2000	0											<40			
00-17505*	NEL Area F stain	2000	0											840			
00-17506*	NEL Area F stain	2000	0											140	84% lube oil & grease, 16% fuel oil		
00-17637	NEL Area F stain	2000	0											440			
00-17637*	NEL Area F stain	2000	0											450			
00-17638*	NEL Area F stain	2000	0											<40			
00-17639*	NEL Area F stain	2000	0											450			
00-17704	ML#3	2000	0	8.8	<5.0	<5.0	<1.0	<10	<15	<20	0.5	<0.1	<0.1	<40			
00-17705*	ML#4	2000	0	5.8	5.6	<5.0	<1.0	<10	19	<20	1.5	<0.1	<0.1	<40			
00-17706*	ML#4	2000	30	5.2	8.0	<5.0	<1.0	<10	<15	22	3.5	<0.1	<0.1	<40			
00-17707	ML#5	2000	0	9.2	8.6	<5.0	<1.0	<10	15	<20	1.5	<0.1	<0.1	<40			

Table 6.1: Northeast 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
00-17708	ML#5	2000	30	9.9	12.0	<5.0	<1.0	<10	19	24	4.2	<0.1	<0.1	<40			
00-17709	ML#6	2000	0	5.4	6.0	<5.0	<1.0	<10	<15	<20	2.0	<0.1	<0.1	<40			
00-17710/1771	ML#6	2000	30	7.1	7.1	<5.0	<1.0	<10	<15	<20	3.4	<0.1	<0.1	<40			
00-18017*	EBA TP #7	2000	50	7.8	9.3	<5.0	<1.0	<10	21	<20	4.9		< 0.1	<40			
00-18018*	EBA TP #7	2000	90	6.2	8.1	<5.0	<1.0	<10	<15	<20	6.4		< 0.1	<40			
00-18019*	EBA TP #8	2000	20	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.8		<0.1	<40			
00-18028	EBA TP #12	2000	40	5.0	<5.0	<5.0	<1.0	<10	<15	<20	2.7		<0.1	<40			
00-18029	EBA TP #12	2000	100	3.9	<5.0	<5.0	<1.0	<10	<15	<20	1.9		<0.1	<40			
00-18033	EBA TP #14	2000	40	3.3	<5.0	<5.0	<1.0	13	<15	<20	2.1		<0.1	<40			
00-18034	EBA TP #14	2000	100	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.2		<0.1	<40			
01-14975	TP 14975	2001	0	5.2	<5.0	<5.0	<1.0	<10	<15	<20	3.4		<0.1	<40			
01-14976	TP 14975	2001	20	8.2	7.2	<5.0	<1.0	<10	16	<20	3.1		<0.1	<40			
01-14977	TP 14975	2001	40	8.4	7	<5.0	<1.0	<10	15	<20	2.4		<0.1	<40			
01-14982	TP 14982	2001	0	4.6	<5.0	<5.0	<1.0	<10	<15	<20	2.5		<0.1	<40			
01-14983	TP 14982	2001	40	3.2	<5.0	<5.0	<1.0	<10	<15	<20	1.3		<0.1	<40			
01-14984	TP 14982	2001	60	4.3	<5.0	<5.0	<1.0	<10	<15	<20	3		<0.1	<40			
01-14995	TP 14995	2001	0	5.6	5.2	<5.0	<1.0	<10	16	<20	2.8		<0.1	<40			
01-15049	TP 14995	2001	20	4.1	<5.0	<5.0	<1.0	<10	<15	<20	2.4		<0.1	<40			
01-15050	TP 14995	2001	40	4.4	<5.0	<5.0	<1.0	<10	<15	<20	2.3		<0.1	<40			
01-15051	TP 14995	2001	40	4.3	<5.0	<5.0	<1.0	<10	<15	<20	2.4		<0.1	<40			
06-21466/67	C3-09	2006	0	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	2.8	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21468/69	C3-09	2006	30	5.1	<5.0	<5.0	<1.0	<10	<15	<20	3.2	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21428/29	C3-12	2006	0	7.2	5.0	<5.0	<1.0	<10	<15	<20	3.9	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21430/31	C3-12	2006	30	7.0	5.3	<5.0	<1.0	<10	<15	<20	4.8	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21398/99	C3-13	2006	0	5.2	<5.0	<5.0	<1.0	<10	<15	<20	2.7	<0.10	<0.0030	4	<10	4	<9.0
06-21400/01	C3-13	2006	30	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.10	<0.0030	<10	<10	< 4.0	<9.0
06-21402/03	C3-14	2006	0	5.8	<5.0	<5.0	<1.0	<10	<15	<20	2.5	<0.10	<0.0030	15	<10	<4.0	15
06-21404/05	C3-14	2006	30	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21424/25	C3-15	2006	0	8.4	7.9	<5.0	<1.0	<10	28	<20	2.8	<0.10	<0.0030	33	<10	<4.0	33
06-21426/27	C3-15	2006	30	5.5	<5.0	<5.0	<1.0	<10	<15	<20	2.9	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21470/71	C3-16	2006	0	8.8	7.3	<5.0	<1.0	<10	<15	<20	4.3	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21472/73	C3-16	2006	30	8.9	7.2	<5.0	<1.0	<10	<15	<20	4.6	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21474/75	C3-17	2006	0	7.4	6.5	<5.0	<1.0	<10	18	<20	3.1	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21476/77	C3-17	2006	30	7.5	5.8	<5.0	<1.0	<10	<15	<20	3.9	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21478/79	C3-18	2006	0	8.7	7.1	<5.0	<1.0	<10	<15	<20	3.6	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21480/81	C3-18	2006	30	7.9	7.1	<5.0	<1.0	<10	<15	<20	3.9	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22115/16	C3-9	2007	0	5.0	<5.0	<5.0	<1.0	<10	31	<20	2.0	<0.10	<0.0030	35	<10	6	29
07-22117/18	C3-9	2007	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.9	<0.10	<0.0030	24.2	<10	5.2	19
07-22095/96	C3-12	2007	0	3.8	5.4	<5.0	<1.0	<10	<15	<20	4.2	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22097/98	C3-12	2007	30	4.9	6.1	<5.0	<1.0	<10	<15	<20	5.9	<0.10	<0.0030	10	<10	<4.0	10
07-22099/100	C3-13	2007	0	3.1	<5.0	<5.0	<1.0	<10	<15	<20	2.1	<0.10	<0.0030	12	<10	<4.0	12
07-22101/02	C3-13	2007	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	2.2	<0.10	<0.0030	4.9	<10	4.9	<9.0
07-22103/04	C3-14	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.8	<0.10	<0.0030	29.1	<10	5.1	24
07-22105/06	C3-14	2007	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.2	<0.10	<0.0030	9.3	<10	<4.0	9.3
07-22123/24	C3-15	2007	0	5.2	<5.0	<5.0	<1.0	<10	<15	<20	5.6	<0.10	<0.0030	136.2	<10	6.2	130
07-22125/26	C3-15	2007	30	3.6	<5.0	<5.0	<1.0	<10	<15	<20	2.3	<0.10	<0.0030	19	<10	<4.0	19
07-22127/28	C3-16	2007	0	5.9	6.0	<5.0	<1.0	<10	<15	<20	2.8	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22129/30	C3-16	2007	30	4.0	<5.0	<5.0	<1.0	<10	<15	<20	3.7	<0.10	<0.0030	4.5	<10	4.5	<9.0

Table 6.1: Northeast 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
07-22131/32	C3-17	2007	0	5.7	<5.0	<5.0	<1.0	<10	<15	<20	3.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22133/34	C3-17	2007	30	4.9	5.8	<5.0	<1.0	<10	<15	<20	3.2	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22119/20	C3-18	2007	0	6.6	5.1	<5.0	<1.0	<10	<15	<20	6.6	<0.10	<0.0030	22.9	<10	5.9	17
07-22121/22	C3-18	2007	30	6.3	5.1	<5.0	<1.0	<10	<15	<20	4.8	<0.10	<0.0030	<10	<10	<4.0	<9.0
	N Value			80	80	80	80	82	80	80	80	55	79	95			
	Average			4.9	<5.0	<5.0	<1.0	<10	<15	<20	2.7	<0.10	<0.1 to <0.0030	85.7			
	Standard Deviation			2.6							1.4			193.2			
	Minimum			1.5							0.5			4.0			
	Maximum			12	12			13	45	24	7			1300			
	95% Confidence Limit			0.6							0.3			38.8			

* *sample used for statistical purposes, but located within the landfill*

7. USAF Landfill

The USAF Landfill is located approximately 2.3 kilometres east and 1.4 kilometres north of the main station area on the southeast side of the Winter Water Lake Road. The landfill consisted largely of buried debris covering an area of 6,570 m^2. The landfill area is elevated approximately 1.0 to 2.5 metres above the surrounding tundra at its downgradient edge, and the mound extends out from a large beach ridge and road area. The landfill was covered with sand and gravel with a small amount of vegetation. Off the edge of the landfill, the terrain changes to a poorly drained tundra consisting of a thick organic mat overlying dense silt or clay. Tier II soil was identified on the landfill surface at several locations (generally associated with debris), and Type A (lubricating oil) contamination was also identified downgradient of the landfill. Some evidence of contaminant migration was detected, however, the data indicated that contaminant migration was due to surface transport, and not subsurface.

Based on the evaluation of the landfill as a source of contamination, potential pathways and receptors, the USAF Landfill was classified as a moderate potential environmental risk. Remediation included the excavation of the Type A soil downgradient of the landfill, and the installation of a leachate contaminant system which would effectively encapsulate surficial Tier II soil. A modified leachate containment system was installed at the landfill perimeter during remediation, which addressed the surface contaminant migration potential, but accounted for the existing low-permeability of the surrounding soil away from the landfill (i.e. clay). The landfill remediation also included the installation of four monitoring wells at the landfill perimeter and four thermistors within the landfill footprint to monitor freeze back conditions.

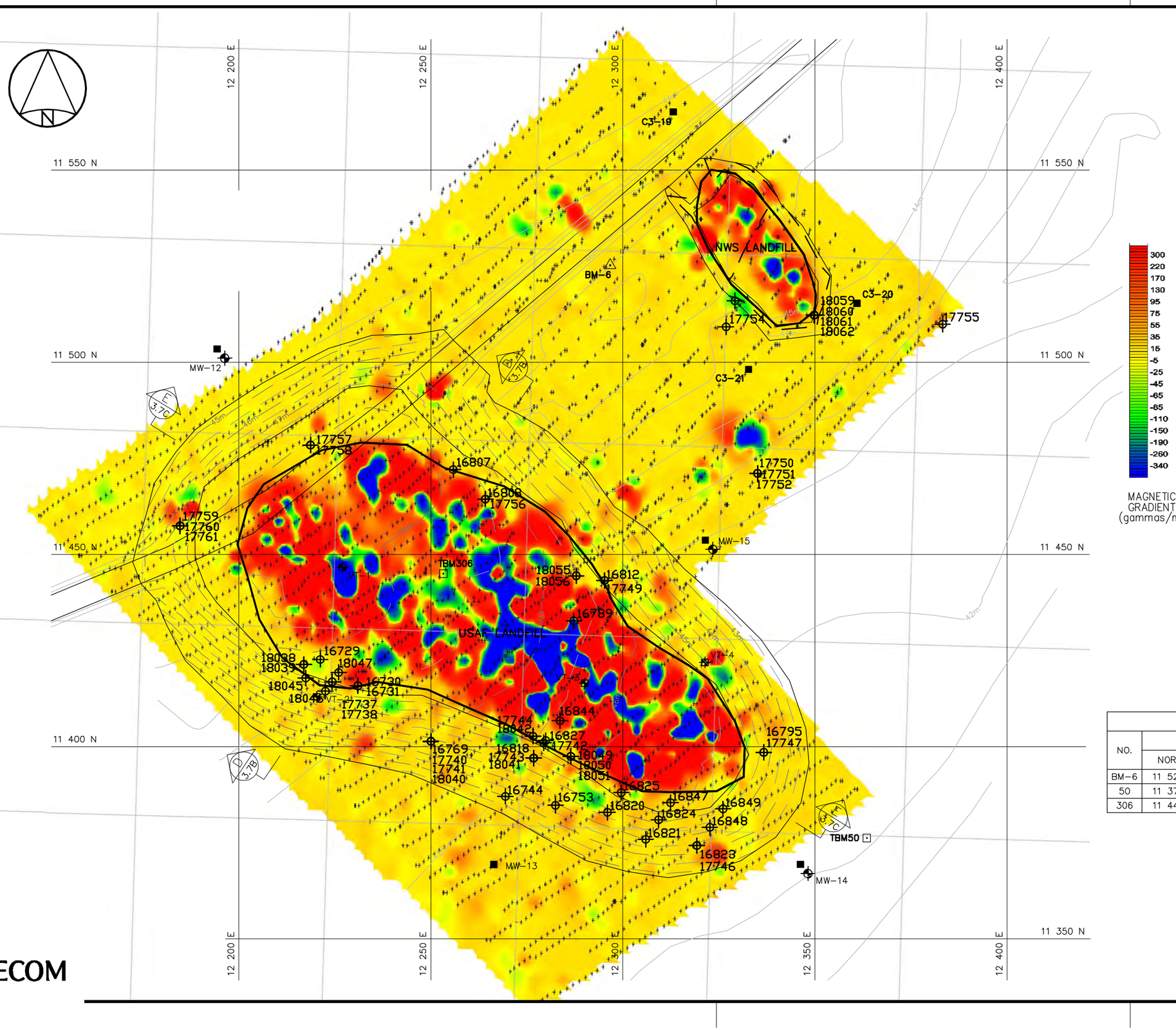
The long term monitoring plan consists of visual monitoring, periodic collection of soil and groundwater samples and downloading of ground temperature data. Approximate locations for the collection of soil and groundwater samples, and thermistor installation locations are identified on Figure CAM-3.7.

7.1 Baseline Data

Sample locations from baseline soil samples are shown in Figure CAM-3.7. A summary of the baseline soil analytical data is provided in Table 7.1. Baseline data is comprised of site investigation information collected up and downgradient of the landfill in 2000, and samples collected at permanent monitoring locations up and downgradient of the landfill in 2006 and 2007.

Mean baseline concentrations for copper, nickel, cobalt, cadmium, lead, zinc, and arsenic were noted to be consistent with or higher than background conditions for the site. The highest zinc concentration (100 mg/kg) was in a sample taken in 2000 downgradient of the landfill. PCBs were not detected in any of the samples collected in 2000, 2006 and 2007. TPH was detected at several locations both up and downgradient of the landfill, some with concentrations as high as 1200 mg/kg in 2000. Most TPH detections were low and there were numerous samples with no detection of hydrocarbons at all.

A summary of baseline groundwater data is provided in Table 7.2. Baseline data was collected from temporary wells installed downgradient in 2000, and permanent monitoring locations in 2006 and 2007. Concentrations for copper, nickel, cobalt, lead, zinc, chromium and arsenic were detected in up and downgradient samples. PCBs (0.00004 mg/kg) were detected at one sample in 2006 at MW-13. No TPH was detected in any of the groundwater samples.



LEGEND:

- CM27 — SURVEY CONTROL MONUMENT
- TBM20 — TEMPORARY BENCHMARK
- MONITORING WELL LOCATION
- VT — VERTICAL THERMISTOR
- MONITORING SOIL SAMPLE LOCATIC
- 16753 — BASELINE SAMPLE

MONITORING WELLS			
NO.	COORDINATES		GROUND ELEV.
	NORTHING	EASTING	
MW–12	11 501.1	12 196.4	44.9
MW–13	11 366.9	12 268.4	42.4
MW–14	11 367.0	12 348.2	42.2
MW–15	11 451.3	12 323.4	43.0

THERMISTORS			
NO.	COORDINATES		GROUND ELEV.
	NORTHING	EASTING	
VT–1	11 446.1	12 227.0	48.3
VT–2	11 413.0	12 220.3	46.7
VT–3	11 416.4	12 290.0	46.4
VT–4	11 421.9	12 321.4	45.1

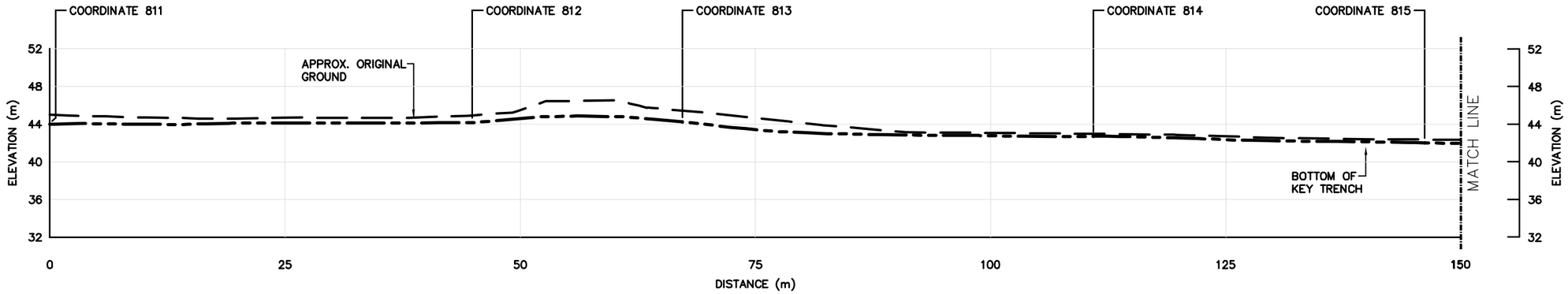
BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
BM–6	11 525.256	12 296.706	–	25mm DIA. STEEL PIPE
50	11 376.196	12 363.492	42.229	REBAR – STONE RING
306	11 445.008	12 253.275	45.804	NAIL

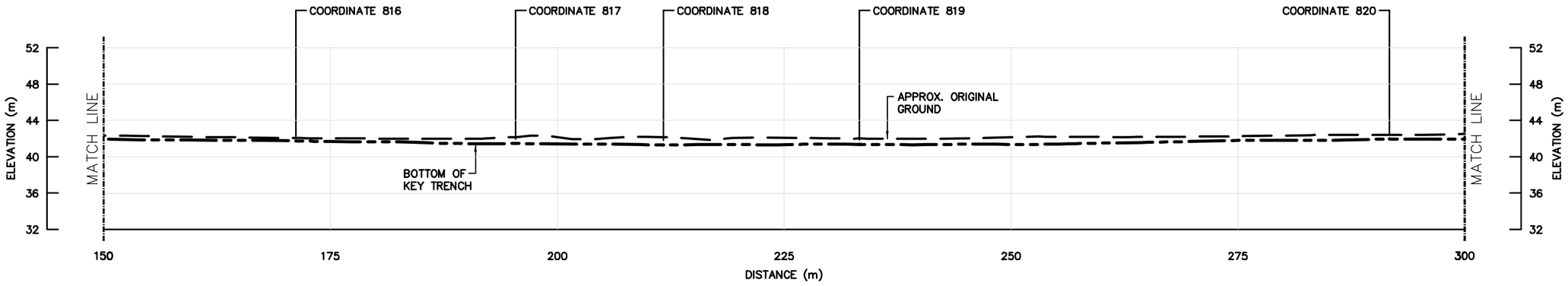
0 10 20 30m
10 5 1:1000

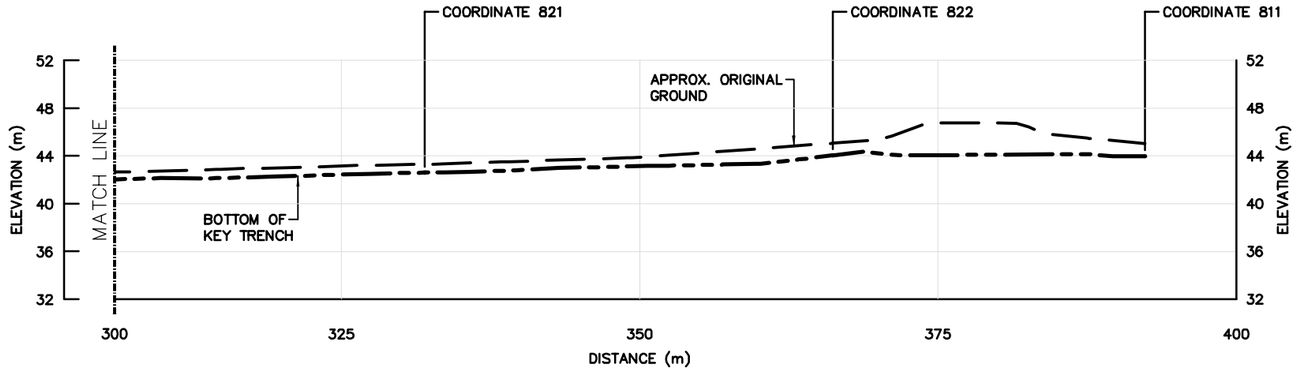
DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

AECOM

USAF and NWS Landfills
Figure CAM-3.7





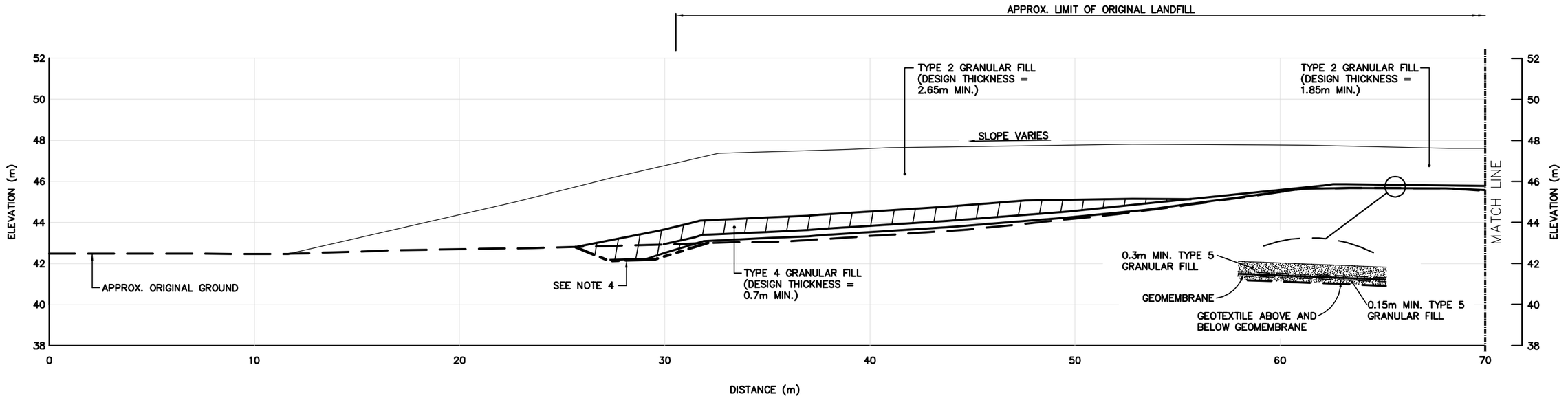


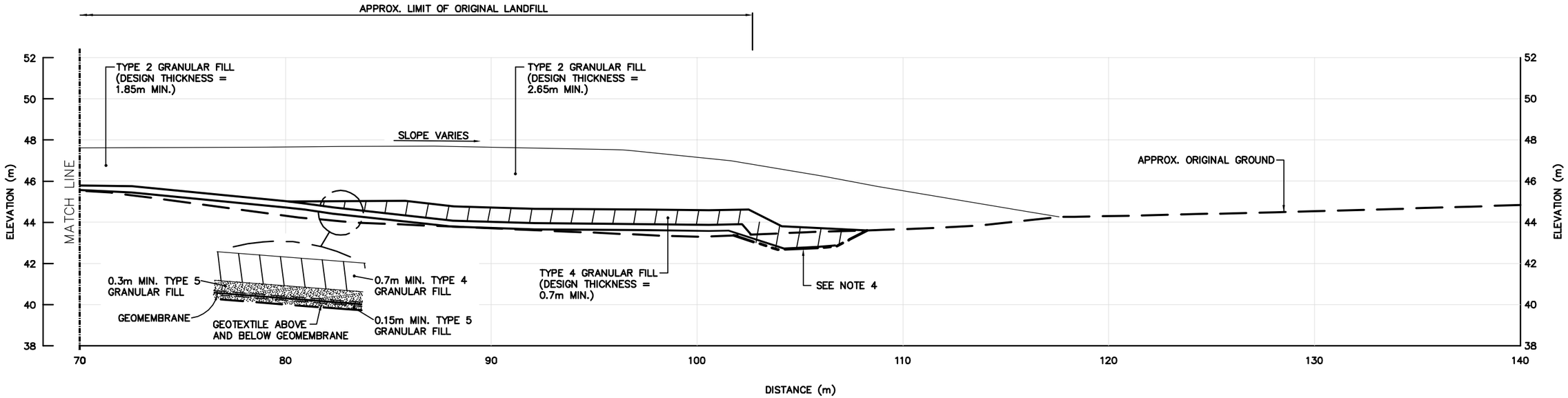
KEY TRENCH CENTRELINE PROFILE

AECOM

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

USAF Landfill
Key Trench Centreline Profile
Figure CAM 3.7A



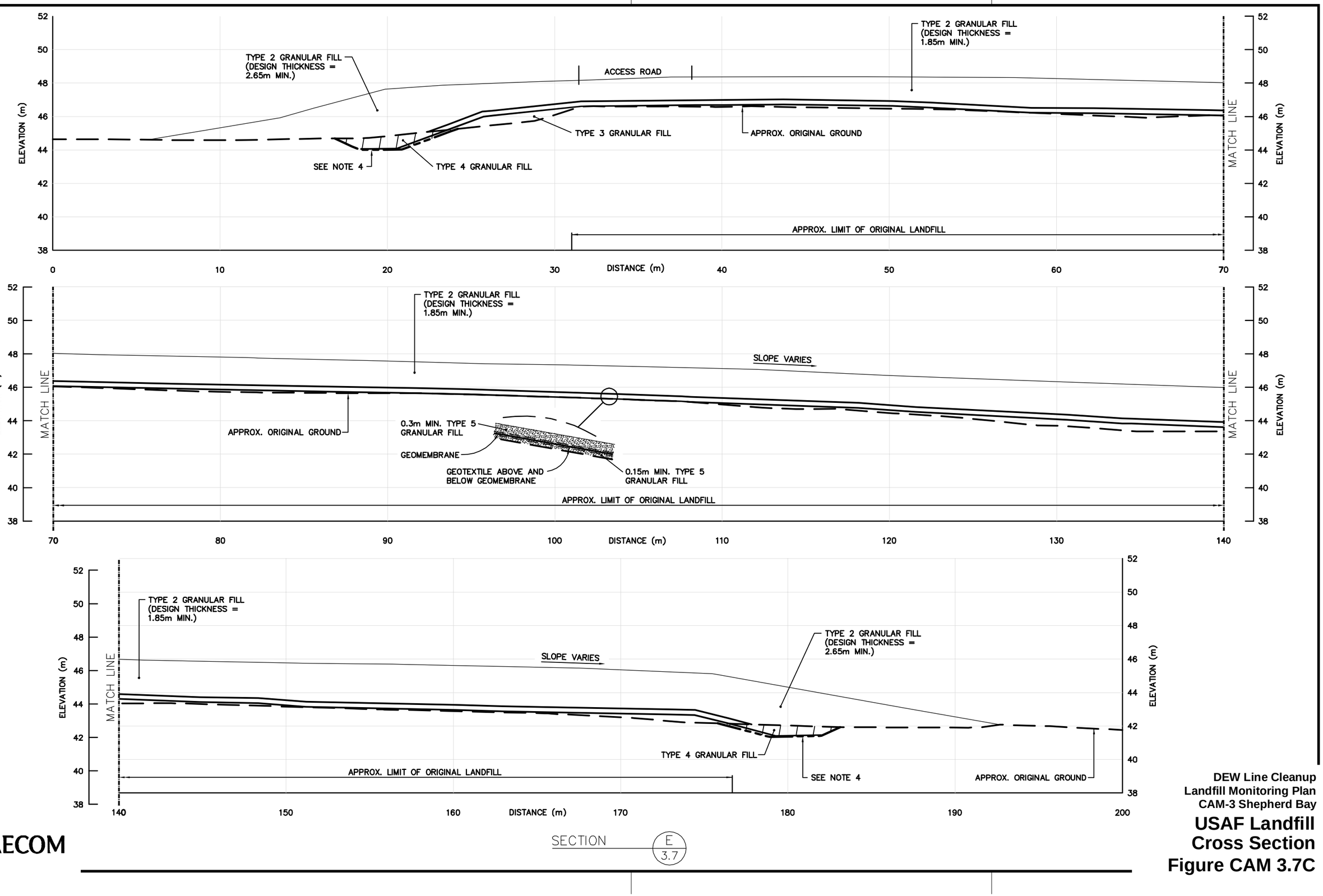


AECOM

SECTION D 3.7

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

USAF Landfill Cross Section Figure CAM 3.7B



SECTION E 3.7

AECOM

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

USAF Landfill Cross Section Figure CAM 3.7C

Table 7.1: USAF 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																	
00-17757*	ML # 11	2000	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
00-17758*	ML # 11	2000	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
00-17759*	ML # 12	2000	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
00-17760/1776	ML # 12	2000	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.1	<0.1	<40			
06-21362/63	MW-12	2006	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21364/65	MW-12	2006	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22159/60	MW-12	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22161/62	MW-12	2007	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.2	<0.10	<0.0030	17	<10	<4.0	17
Downgradient Soil Samples																	
00-16729*	USAF Landfill grid	2000	0											<40			
00-16744*	USAF Landfill grid	2000	0											<40			
00-16753	USAF Landfill grid	2000	0											<40			
00-16769	USAF Landfill grid	2000	0	36	<5.0	<5.0	<1.0	<10	<15	<20	2.2	<0.1	<0.5	<40			
00-16795	USAF Landfill grid	2000	0	7.4	5.4	19	<1.0	<10	100	<20	4.3	<0.1	<0.5	<40			
00-16807*	USAF Landfill grid	2000	0														
00-16808*	USAF Landfill grid	2000	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.5	<40			
00-16812*	USAF Landfill grid	2000	0	17	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.5	<40			
00-16818*	USAF Landfill grid	2000	0	6.9	6.5	<5.0	<1.0	<10	29	<20	2	<0.1	<0.5	<40			
00-16820	USAF Landfill grid	2000	0											<40	80% lube oil & grease		
00-16821	USAF Landfill grid	2000	0	7.9				<10	29								
00-16823	USAF Landfill grid	2000	0	3	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.5	<40			
00-16824	USAF Landfill grid	2000	0	9.1				<10	50						100% lube oil & grease		
00-16847*	USAF Landfill grid	2000	0	4.5				<10	31						100% lube oil & grease		
00-16848	USAF Landfill grid	2000	0	<3.0				<10	26						100% lube oil & grease		
00-16849*	USAF Landfill grid	2000	0	<3.0				<10	27								
00-17737*	ML	2000	0	5.9	7.3	<5.0	<1.0	<10	20	<20	1.4	<0.1	<0.1	<40			
00-17738*	ML	2000	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
00-17740/1774	ML #2	2000	30	2.4	<5.0	<5.0	<1.0	<10	<15	<20	2.2	<0.1	<0.1	<40			
00-17743*	ML #4	2000	30	8.5	7.7	5.9	<1.0	<10	27	<20	1.9		<0.1				
00-17744	ML #4	2000	0	8.3	5.9	<5.0	<1.0	11	27	<20	2.4		<0.1				
00-17746	ML #6	2000	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
00-17747*	ML #7	2000	30	3.1	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
00-17749*	ML #9	2000	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
00-17756*	ML # 10	2000	30	3	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
00-18038*	TP#24	2000	60	5	<5.0	<5.0	<1.0	<10	<15	<20	0.96		<0.1	<40			
00-18039*	TP#24	2000	110	8.3	7.2	5.6	<1.0	<10	23	<20	2.2		<0.1	<40			
00-18040	ML	2000	30											<40	100% lube oil & grease		
00-18041*	ML	2000	30											<40			
00-18042	17744	2000	30											<40			
00-18045*		2000	0											<40			
00-18046*		2000	0											<40			
00-18047*		2000	0											150	100% lube oil & grease		

Table 7.1: USAF 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
00-18049*	TP#16	2000	70	8.7	7.3	5.7	<1.0	<10	23	<20	2		<0.1	<40			
00-18050*	TP#16	2000	30	7.8	7.1	5.7	<1.0	<10	28	<20	1.9		<0.1	600	100% lube oil & grease		
00-18051*	TP#16	2000	30	9.1	7.7	5.9	<1.0	<10	25	<20	2.1		<0.1	1200	98% lube oil & grease, 2% fuel oil		
00-18055*	EBA TP #19	2000	40	6.4	5.9	<5.0	<1.0	<10	20	<20	1.9		<0.1	<40			
00-18056*	EBA TP #19	2000	60	10	8.3	6.2	<1.0	<10	25	<20	2.1		<0.1	<40			
06-21366/67	MW-13	2006	0	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21368/69	MW-13	2006	30	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21370/71	MW-14	2006	0	7.3	<5.0	<5.0	<1.0	<10	22	<20	1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21372/73	MW-14	2006	30	8.0	5.2	<5.0	<1.0	<10	15	<20	1.8	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21374/75	MW-15	2006	0	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	18	<10	<4.0	18
06-21376/77	MW-15	2006	30	5.7	<5.0	<5.0	<1.0	<10	<15	<20	1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22163/64	MW-13	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.6	<0.10	<0.0030	21	<10	4	17
07-22165/66	MW-13	2007	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22167/68	MW-14	2007	0	4.3	5.1	<5.0	<1.0	<10	18	<20	1.1	<0.10	<0.0030	44.9	<10	4.9	40
07-22169/70	MW-14	2007	30	3.6	6.0	<5.0	<1.0	<10	17	<20	2.1	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22171/72	MW-15	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.10	<0.0030	78.8	<10	6.8	72
07-22173/74	MW-15	2007	30	5.9	<5.0	<5.0	<1.0	<10	<15	<20	2.6	<0.10	<0.0030	17	<10	<4.0	17
	N Value			47	42	42	42	47	47	42	42	33	42	50			
	Average			5.2	<5.0	<5.0	<1.0	<10	<15	<20	1.3	<0.10	<0.5 to <0.0030	<40			
	Standard Deviation			5.7							0.9						
	Minimum			1.5							0.5						
	Maximum			36	8	19		11	100		4			1200			
	95% Confidence Limit			1.6							0.3						

* *sample used for statistical purposes, but located within the landfill*

Table 7.2: USAF Landfill - Baseline 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 Samples																
06-21182	MW-12	2006	0.021	0.14	0.0041	<0.0010	<0.010	0.017	0.27	<0.0030	< 0.00040	<0.000020		<0.050	<0.50	<1.0
Downgradient Groundwater Samples																
18159	MW @ 16798	2000														
18160	MW @ 18053	2000	0.020	0.013	0.006	<0.001	0.012	0.068	0.013	0.003		<0.003	<1.0			
18161	MW @ 18053	2000	0.020	0.012	0.005	<0.001	0.012	0.057	0.014	0.003		<0.003	<1.0			
18163	MW @ 18049	2000	0.010	0.010	0.009	<0.001	<0.010	0.025	0.011	<0.0030		<0.003	<1.0			
06-21183	MW-13	2006	0.020	0.049	0.0043	<0.0010	<0.010	0.019	0.086	0.0041	< 0.00040	0.000040		<0.050	<0.50	<1.0
06-21184	MW-14	2006	0.037	0.071	0.0049	<0.0010	<0.010	0.93	0.12	0.0046	< 0.00040	<0.000020		<0.050	<0.50	<1.0
06-21185/86	MW-15	2006	0.019	0.059	0.0039	<0.0010	<0.010	0.018	0.11	0.0041	< 0.00040	<0.000020		<0.050	<0.50	<1.0
07-22270/71	MW-13	2007	0.0080	0.013	<0.0030	<0.0010	<0.010	0.019	0.019	<0.0030	<0.00040	<0.000020		<0.050	<0.50	<1.0
07-22266	MW-14	2007	0.019	0.065	0.0070	<0.0010	<0.010	0.031	0.099	0.0060	<0.00040	<0.000020		<0.050	<0.50	<1.0
07-22267	MW-15	2007	0.014	0.013	<0.0030	<0.0010	<0.010	0.38	0.015	0.0030	<0.00040	<0.000020		<0.050	<0.50	<1.0
N Value			10	10	10	10	10	10	10	10	7	10	3	7	7	7
Average			0.019	0.044	0.0048	<0.0010	<0.010	0.156	0.076	0.0032	<0.00040	<0.000020	<1.0	<0.050	<0.50	<1.0
Standard Deviation			0.008	0.041	0.0023			0.293	0.081	0.0015						
Minimum			0.008	0.010	0.0015			0.017	0.011	0.0015						
Maximum			0.037	0.138	0.0092		0.012	0.929	0.265	0.0060						
95% Confidence Limit			0.005	0.026	0.0015			0.182	0.050	0.0009						

8. NWS Landfill

The NWS Landfill is located immediately adjacent to the northwest edge of the USAF Landfill and contains a limited amount of debris in an area approximately 640 m^2. at the time of investigation, the NWS Landfill area was covered with sand and gravel and was well graded. With the exception of a small amount of subsidence 0.3 metres deep in the geophysical survey, there is little visual evidence that there was a landfill in this area. Wet low-lying ground beyond the landfill comprises the native ground of the area. An erosion channel was noted running through the length of the landfill.

The landfill was classified as a low potential environmental risk, based on its evaluation as a source of contamination, pathways and receptors. The remediation of this landfill consisted of the placement of additional granular fill.

The long term monitoring plan consists of visual monitoring and periodic collection of soil samples. Approximate locations for the collection of soil samples are identified on Figure CAM-3.7.

8.1 Baseline Data

Sample locations from baseline soil samples are shown in Figure CAM-3.7. A summary of the baseline soil analytical data is provided in Table 8.1. Baseline data is comprised of site investigation information collected downgradient of the landfill in 2000, and samples collected at permanent monitoring locations up and downgradient of the landfill in 2006 and 2007.

Mean baseline concentrations for copper, nickel, cobalt, cadmium, lead, zinc, chromium and arsenic were noted to be consistent with or lower than background conditions for the site. Copper, nickel, zinc and arsenic were the only metals detected in the baseline soil samples and were found at low concentrations. No PCBs were detected in any of the baseline samples. TPH was detected at several locations both up and downgradient of the landfill at low concentrations and there were numerous samples with no detection of hydrocarbons at all.

AECOM

Table 8.1: 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
Upgradient Soil Samples																	
06-21378/79	C3-19	2006	0	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21380/81	C3-19	2006	30	5.3	5.0	<5.0	<1.0	<10	<15	<20	2.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22155/56	C3-19	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22157/58	C3-19	2007	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
Downgradient Soil Samples																	
00-17750/17751	ML # 1	2000	0	2.4	<5.0	<5.0	<1.0	<10	18	<20	<1.0	<0.1	<0.1	<40			
00-17752	ML # 1	2000	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.1	<0.1	<40			
00-17754	erosion channel	2000	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.1		<0.1				
00-17755	ML #2	2000	0	5.5	<5.0	<5.0	<1.0	<10	23	<20	<1.0	<0.1	<0.1	<40			
00-18059	EBA TP # 22	2000	0	3.7	<5.0	<5.0	<1.0	<10	<15	<20	1.6		<0.1				
00-18060/18061	EBA TP # 22	2000	60	2.3	<5.0	<5.0	<1.0	<10	<15	<20	10.1		<0.1				
00-18062	EBA TP # 22	2000	110	3.4	<5.0	<5.0	<1.0	<10	<15	<20	0.97		<0.1				
00-18063	EBA TP # 21	2000	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1		<0.1				
00-18064	EBA TP # 21	2000	100	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0		<0.1				
06-21382/83	C3-20	2006	0	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21384/85	C3-20	2006	30	<5.0	<5.0	<5.0	<1.0	<10	<15	<20	1.5	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21386/87	C3-21	2006	0	5.2	<5.0	<5.0	<1.0	<10	<15	<20	1.5	<0.10	<0.0030	<10	<10	<4.0	<9.0
06-21388/89	C3-21	2006	30	5.6	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22147/48	C3-20	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.8	<0.10	<0.0030	14	<10	<4.0	14
07-22149/50	C3-20	2007	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22151/52	C3-21	2007	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
07-22153/54	C3-21	2007	30	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1.0	<0.10	<0.0030	<10	<10	<4.0	<9.0
	N Value			21	21	21	21	21	21	21	21	15	21	15			
	Average			<5.0 to <3.	<5.0	<5.0	<1.0	<10	<15	<20	1.4	<0.10	<0.1 to <0.0030	<40			
	Standard Deviation										2.1						
	Minimum										0.5						
	Maximum			6	5				23		10			14			
	95% Confidence Limit										0.9						

Appendix A

CAM-3 Shepherd Bay 2008 Year 1 Monitoring Data

Appendix A

CAM-3 Shepherd Bay 2008 Year 1 Monitoring Data

In August 2008, a visual inspection of each landfill and downloading of ground temperature data, where required, was carried out by AECOM. 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 2008 (year 1 of monitoring) at each landfill.

Landfill Designation	Visual Inspection	Groundwater Sampling	Soil Sampling	Thermal Monitoring
Beach Landfill	√		√	
Non-Hazardous Waste Landfill	√	√	√	
Station Landfill	√		√	
Tier II Disposal Facility	√	√	√	√
Northeast Landfill	√		√	
USAF Landfill	√	√	√	√
NWS Landfill	√			

This appendix serves as a compilation of the AECOM geotechnical data collected in 2008 and the ESG environmental report (ESG 2008) 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;
- A selection of visual inspection photos (all photos will be provided electronically);
- Thermal monitoring summary (where applicable);
- Plots of ground temperatures with depth at each thermistor installation (where applicable);
- Evaluation of 2008 soil analytical data, as compared to baseline conditions;
- Summary of 2008 soil analytical data;
- Summary of 2008 groundwater analytical data; 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.

Annex Beach Landfill- Year 1 Data

Figures:

- CAM-3.2: Site Plan – Beach Landfill

Tables:

- Landfill Visual Inspection – CAM-3 Shepherd Bay Beach Landfill
- Beach Landfill – Evaluation of Year 1 Soil Analytical Data
- Beach Landfill – Year 1 (2008) Soil Data

Photographic Records:

- Photos 1 and 2
- Photos 3 and 4

B SIZE 11" x 17" (279.4mm x 431.8mm)

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AECOM FILE NAME:60171-142-11_00-B-1002_RX.dwg ISS/REV:A

SHEPHERD BAY

N

95m 96m 97m 98m 99m

49 625 E | 49 650 E | 49 675 E | 49 700 E | 49 725 E | 49 750 E | 49 775 E | 49 600 E

39 800 N | 39 775 N | 39 750 N | 39 725 N

DND RESERVE BOUNDARY

ACCESS ROAD

C3-1 | C3-2 | C3-3

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

LEGEND:

- ## PICTURE NUMBER VIEWPOINT
- MONITORING SOIL SAMPLE LOCATION
- SETTLEMENT
- POT HOLE
- PONDING
- SETTLEMENT/EROSION
- EROSION

0 5 10 15m

5 2.5 1:500

AECOM

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

Beach Landfill
Figure CAM-3.2

LANDFILL VISUAL INSPECTION

Site Name: CAM-3 Shepherd Bay

Landfill: Beach Landfill

Date Inspected: August 6, 2008

Inspected By: Anwar Majid, P.Eng.

Signature:

Checklist Item	Present Yes/No	Location	Length (m)	Width (m)	Depth (m)	Extent	Description	Photographic Records (Pictures Provided on Data CD	Severity Rating	Additional Comments
Settlement	Yes	See Figure CAM-3.2	6	6	0.1-0.15	Isolated	Subtle depression	Pictures 5 and 6 on CD	Acceptable	Subtle depression on landfill surface. Water appears to have temporarily ponded in the area. There is potential for additional settlement to occur overtime as the landfill contents settle.
			2	2	0.1-0.15	Isolated	Subtle depression	Pictures 7 and 8 on CD		
			25	2-3	0.1-0.15	Occasional	Subtle depressions	Pictures 9, 10, 11 on CD		Subtle depressions on sideslope at irregular intervals; could be due to improper grading
			6	2	0.15	Isolated	Subtle depression	Pictures 16, 17 on CD		Subtle depression on landfill surface likely due to minor erosion and washing of fines from the erosion resistant Type 2 material.
			30	2-3	0.1-0.15	Occasional	Subtle depressions	Pictures 18, 19 on CD		Subtle depressions on sideslope at irregular intervals; could be due to improper grading
Erosion	Yes	See Figure CAM-3.2	0.5	1.5	0.1	Isolated	Erosion/settlement	Picture 30 on CD	Acceptable	Erosion and subtle depression likely due to washing of fines from the erosion resistant Type 2 material.
			N/A	N/A	N/A	Isolated	Pot Holes	Pictures 22 and 31 on CD	Acceptable	Small pot holes resulting from surface erosion were noted on landfill surface. The pot holes are likely due to washing of fines from the erosion resistant Type 2 material.
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Presence/ Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Ponding	Yes	See Figure CAM 3.2	N/A	N/A	N/A	N/A	N/A	Pictures 12-15, 18-20, and 23-24 on CD	Acceptable	Ponding was observed near the toe of berms at numerous locations. The ponding was not in contact with the landfill body.
Other Features of Note	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Overall Landfill Performance:	**Acceptable**									

Beach Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2008	Comments
Copper	26	4.8+/-1.3	18	Measured concentrations within or less than the 95% confidence interval and less than the baseline max.	
Nickel	26	<5.0	5.4	Measured concentrations within 95% confidence interval (non-detect) with one exception.	The depth sample at downgradient location C3-02 (13 mg/kg) was above the baseline max of 5.4 mg/kg..
Cobalt	26	<5.0		Measured concentrations within 95% confidence interval (non-detect) with one exception.	The depth sample at downgradient location C3-02 (8.6 mg/kg) was above the baseline max of <5 mg/kg.
Cadmium	26	<1.0		Measured concentrations within 95% confidence interval (non-detect).	
Lead	26	<10	11	Measured concentrations within 95% confidence interval (non-detect).	
Zinc	26	<15	45	Measured concentrations within 95% confidence interval (non-detect) with one exception.	The depth sample at downgradient location C3-02 (39.5 mg/kg) was below the baseline max.
Chromium	26	<20		Measured concentrations within 95% confidence interval (non-detect) with one exception.	The depth sample at downgradient location C3-02 (25 mg/kg) was above the baseline max of <20 mg/kg.
Arsenic	26	1.6+/-0.4	5	Measured concentrations within or less than 95% confidence interval with one exception.	The depth sample at downgradient location C3-02 (2.8 mg/kg) was below the baseline max.
Mercury	12	<0.10		Measured concentrations within 95% confidence interval (non-detect).	
PCBs	26	<0.0030		Measured concentrations within 95% confidence interval (non-detect).	
TPH	30	<40	290	Measured concentrations within or less than 95% confidence interval with three exceptions.	Both samples at downgradient location C3-02 (61 mg/kg surface and 64.9 mg/kg depth) were below the baseline max and the depth sample at downgradient location C3-03 (390 mg/kg depth) was above the baseline max of 290 mg/kg.

Beach Landfill - Year 1 (2008) 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
Beach Landfill - Baseline Concentrations				**4.8+/-1.3**	**<5.0**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**1.6+/-0.4**	**<0.10**	**<0.0030**	**<40**			
Beach Landfill - Maximum Concentrations				**18**	**5.4**	**<5.0**	**<1.0**	**11**	**45**	**<20**	**5**	**<0.10**	**<0.0030**	**290**			
Upgradient Soil Samples																	
08-10494/95	C3-01	2008	0	5.7	<5.0	<5.0	<1.0	<10	<15	<20	1.2	<0.10	<0.0030	32.5	<10	<4.0	32.5
08-10496/97	C3-01	2008	40	3.7	<5.0	<5.0	<1.0	<10	<15	<20	1.1	<0.10	<0.0030	12	< 10	< 4.0	12
Downgradient Soil Samples																	
08-10498/99	C3-02	2008	0	3.2	<5.0	<5.0	<1.0	<10	<15	<20	1.5	<0.10	<0.0030	61	< 10	7.9	61
08-10500/01	C3-02	2008	40	7.6	13	8.6	<1.0	<10	39.5	25	2.8	<0.10	<0.0030	64.85	<10	<4.0	64.9
08-10502/03	C3-03	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.9	<0.10	<0.0030	31	< 10	< 4.0	31
08-10504/05	C3-03	2008	40	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.83	<0.10	<0.0030	390	< 10	< 4.0	390

Photograph 1. Panorama - Looking Approximately E ↑

Photograph 2. Settlement on Side Slope (0.1 to 0.2 m), Looking Approximately NE Towards Shepherd Bay ↑

Photograph 3. Ponding Near the Toe of Side Slope - Looking Approximately NW Towards Slope ↑

Photograph 4. Panorama - Looking NE Towards Landfill ↑

Annex Non-Hazardous Waste Landfill - Year 1 Data

Figure:

- CAM-3.3: Site Plan – Non-Hazardous Waste Landfill

Tables:

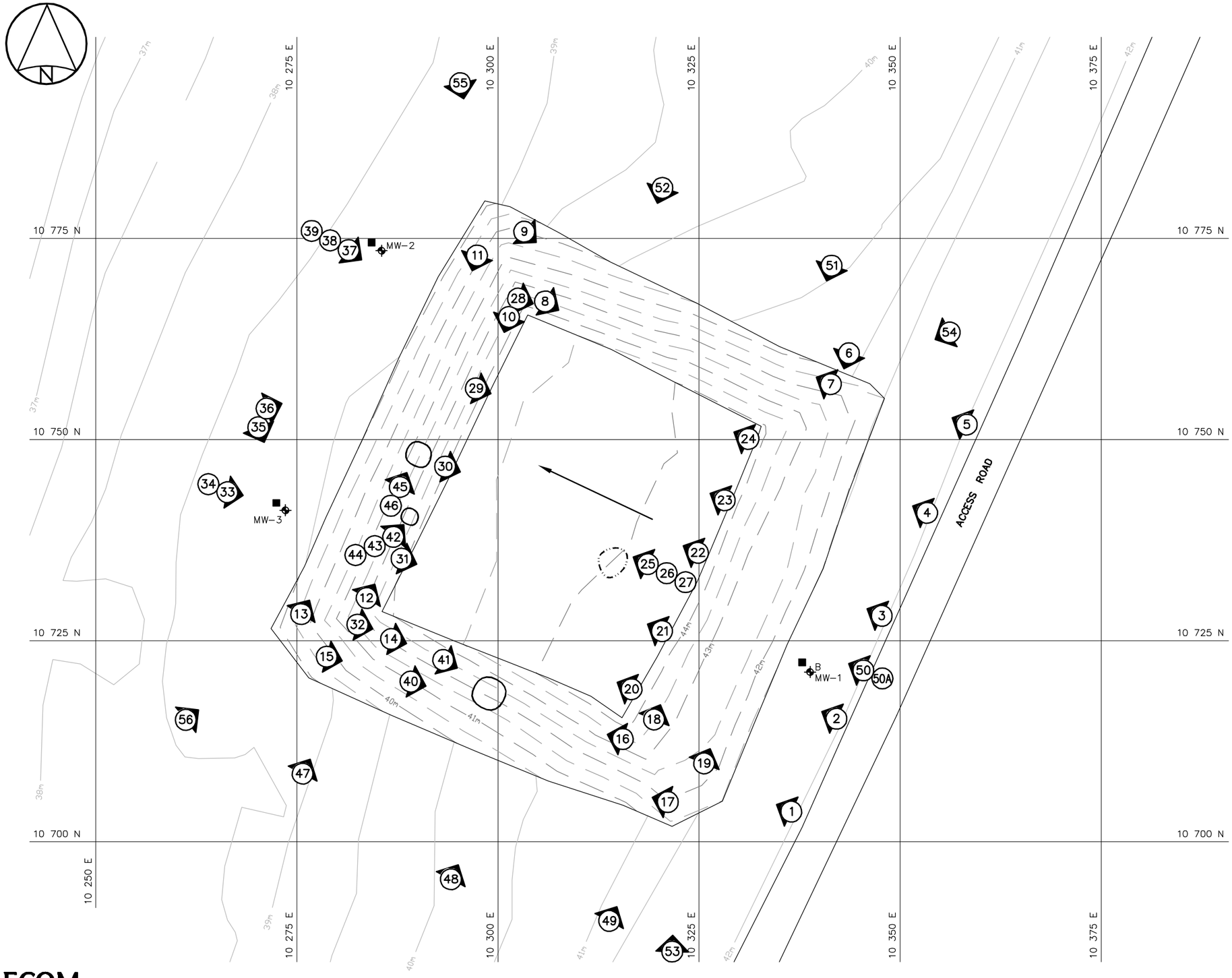
- Landfill Visual Inspection – CAM-3 Shepherd Bay Non-Hazardous Waste Landfill
- Non-Hazardous Waste Landfill – Evaluation of Year 1 Soil Analytical Data
- Non-Hazardous Waste Landfill – Year 1 (2008) Soil Data
- Non-Hazardous Waste Landfill – Year 1 (2008) Groundwater Data

Photographic Records:

- Photos 1 and 2
- Photos 3 and 4
- Photos 5 and 6

Well Sampling Records:

- Well MW-1
- Well MW-2
- Well MW-3



LEGEND:

- ## PICTURE NUMBER VIEWPOINT
- MONITORING WELL LOCATION
- MONITORING SOIL SAMPLE LOCATION
- SETTLEMENT
- EXPOSED DEBRIS

MONITORING WELLS			
NO.	COORDINATES		GROUND ELEV.
	NORTHING	EASTING	
MW-1	10 721.1	10 338.8	42.2
MW-2	10 773.5	10 285.5	39.2
MW-3	10 741.2	10 273.6	39.6

0 5 10 15m
5 2.5 1:500

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

AECOM

Non-Hazardous Waste Landfill
Figure CAM-3.3

LANDFILL VISUAL INSPECTION

Site Name: CAM-3 Shepherd Bay

Landfill: Non-Hazardous Waste Landfill

Date Inspected: August 4, 2008

Inspected By: Anwar Majid, P.Eng.

Signature:

Checklist Item	Present Yes/No	Location	Length (m)	Width (m)	Depth (m)	Extent	Description	Photographic Records (Pictures Provided on Data CD	Severity Rating	Additional Comments
Settlement	Yes	See Figure CAM 3.3	4 2 3	4 2 3	0.20 0.1-0.15 0.15	Isolated	Subtle depressions	Pictures 40-41 on CD Pictures 42-44 on CD Pictures 45 to 46 on CD	Acceptable	Subtle depressions on sideslopes possibly due to improper grading during construction and minor erosion due to migration of fines
Erosion	Yes	N/A	N/A	N/A	N/A	Numerous	Minor surface erosion	Pictures 25-27, and 40-46	Acceptable	Minor erosion was noted on the landfill surface and sideslopes. The minor surface erosion was due to migration of fines from Type 2 material containing sand and gravel and will naturally stabilize over time.
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Debris Exposed	Yes	See Figure CAM-3.3	N/A	N/A	N/A	Isolated	Metal Angle	Pictures 25-27 on CD	Acceptable	Metal angel was observed at one location. The metal angle was partially buried, likely mixed in the fill during placement.
Presence/ Condition of Monitoring Instruments	Yes	See Figure CAM-3.3; MW-1 to MW-3	N/A	N/A	N/A	N/A	N/A	Pictures 33-34, 37-39, 50, 50A on CD	Acceptable	The monitoring wells were in good condition.
Other Features of Note.	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Overall Landfill Performance:	**Acceptable**									

Non-Hazardous Waste Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2008	Comments
Copper	22	5.6+/-0.6	8	Measured concentrations within or less than the 95% confidence interval.	
Nickel	22	5.7+/-0.8	9	Measured concentrations within 95% confidence interval with two exceptions.	The depth sample at upgradient location MW-01 (6.6 mg/kg) and the surface sample at downgradient location MW-03 (6.7 mg/kg) were below the baseline max.
Cobalt	22	<5.0		Measured concentrations within 95% confidence interval (non-detect).	
Cadmium	22	<1.0		Measured concentrations within 95% confidence interval (non-detect).	
Lead	22	<10		Measured concentrations within 95% confidence interval (non-detect).	
Zinc	22	<15	76	Measured concentrations within 95% confidence interval (non-detect).	
Chromium	22	<20	22	Measured concentrations within 95% confidence interval (non-detect).	
Arsenic	22	4.5+/-0.6	8	Measured concentrations within or less than the 95% confidence interval.	
Mercury	12	<0.10		Measured concentrations within 95% confidence interval (non-detect).	
PCBs	22	<0.0030		Measured concentrations within 95% confidence interval (non-detect).	
TPH	12	<10	25	No samples were within 95% confidence interval.	Surface sample at upgradient location MW-01 (22 mg/kg), both samples at downgradient location MW-02 (19 mg/kg surface and 24 mg/kg depth) and depth sample at downgradient location MW-03 (18 mg/kg) were below the baseline max. Depth sample at upgradient location MW-01 (39 mg/kg), and surface sample at downgradient location MW-03 (62 mg/kg) were above baseline max of 25 mg/kg.

Non-Hazardous Waste Landfill - Year 1 (2008) 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				**5.6+/-0.6**	**5.7+/-0.8**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**4.5+/-0.6**	**<0.10**	**<0.0030**	**<10**			
Non-Hazardous Waste Landfill - Maximum Concentrations				**8**	**9**	**<5.0**	**<1.0**	**<10**	**76**	**22**	**8**	**<0.10**	**<0.0030**	**25**			
Upgradient Soil Samples																	
08-10546/47	MW-01	2008	0	5.5	6.2	<5.0	<1.0	<10	<15	<20	4.3	< 0.10	<0.0030	22	<10	< 4.0	22
08-10548/49	MW-01	2008	40	5.2	6.6	<5.0	<1.0	<10	<15	<20	4.8	< 0.10	<0.0030	39	<10	5	34
Downgradient Soil Samples																	
08-10550/51	MW-02	2008	0	3.4	<5.0	<5.0	<1.0	<10	<15	<20	2.6	< 0.10	<0.0030	19	<10	< 4.0	19
08-10552/53	MW-02	2008	40	4.3	6.2	<5.0	<1.0	<10	<15	<20	4.4	< 0.10	<0.0030	24	<10	5	19
08-10554/55	MW-03	2008	0	5.4	6.7	<5.0	<1.0	<10	<15	<20	4.9	< 0.10	<0.0030	62	<10	< 4.0	62
08-10556/57	MW-03	2008	40	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	3.5	< 0.10	<0.0030	18.05	<10	< 4.0	18.1

Non-Hazardous Waste Landfill - Year 1 (2008) 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 Samples																
08-10440	MW-01	2008	0.016	0.036	<0.003	<0.0010	<0.0010	0.0075	0.058	<0.0030	< 0.0004	0.024		< 0.050	< 0.50	< 1.0

Photograph 1. East Facing Slope - Looking NW From Access Road ↑

Photograph 2. North Facing Slope - Looking NW Towards Slope ↑

Photograph 3. East Facing Slope - Looking NE Towards Slope ↑

Photograph 4. West Facing Slope - Looking SE ↑

Photograph 5. West Facing Slope - Looking NE (Settlement On Slope, Approx 2m by 2m by 100 to 150mm), Not a Scarp, Could be due to Improper Grading ↑

Photograph 6. Panorama - Looking SW From Access Road ↑

Table B-40: Monitoring Well Sampling Log (MW#01), 2008

Site Name:	CAM-3					
Date of Sampling Event:	04-Aug-08					
Names of Samplers:	Bryarly McEachern, Peter Shock, Mike Mosclow					
Monitoring Well ID:	MW-01					
Facility:	Non-Hazardous Waste Landfill					
Water Sample Measured Data						
Condition of Well:	Good, new in appearance					
Procedure/Equipment:	measuring tape			Procedure/Equipment:	Interface meter	
Well height above ground (m)=	0.5			Depth to water surface (m)=	1.6	
Diameter of well (m)=	0.04			Static water level* (m)=	1.1	
Depth of installation* (m)=	3.46			Depth to bottom (m)=	1.72	
Length screened section (m)=	2.0			Free product thickness (mm)=	N/A	
Depth to top of screen* (m)=	0.46					
Calculations				**Notes**		
Depth of water (m)=	0.12			Evidence of sludge etc:	no	
Well volume of water (L)=	0.2			Evidence of freezing/siltation: (compare to installation record)		
Length screen collecting water (m)=	0.12					
Development/Purging Information						
Equipment:	Teflon tubing, with stainless steel ball valve					
Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
4-aug, 10:00am	0.8	6.2	7.55	1731	n/a	Faintly opaque, very light silt
Water Sampling				**Soil Sampling**		
Date and time collected:	Aug-4, 11:30am			Date and time collected:	06-Aug	
Sample Number - Water:	08-10440			Sample Number - Soil:	Surface: 10546/47	
					Depth: 10548/49	
Sample containers:	1 L HDPE			Sample containers:	Whirlpaks	
	1 L Teflon				120 mL amber glass jar	
	250 mL amber glass					
Procedure/Equipment:	Teflon tubing, with stainless steel ball valve			Procedure/Equipment:	Disposable scoops and nitrile gloves to sample, shovel to dig.	
Water description:	Faintly opaque, very light silt			Soil description:	surface: 5% vegetation cover. 0-40cm: light brown coarse grain sand with pea gravel, 25% cobbles, no seepage	
Filtration: (Y/N)	N					
Acidification: (Y/N)	N					
Sampling Equipment Decontamination: (Y/N)	Y			Sampling Equipment Decontamination: (Y/N)	Y(shovel)	
Number washes:	1			Number washes:	1	
Number rinses:	2			Number rinses:	1	

n/a=not applicable

*From ground surface. All other measurements are assumed to be from the top of the casing.

Table B-41: Monitoring Well Sampling Log (MW#02), 2008

Site Name:	CAM-3		
Date of Sampling Event:	04-Aug-08		
Names of Samplers:	Bryarly McEachern, Peter Shock, Mike Mosclow		
Monitoring Well ID:	MW-02		
Facility:	Non-Hazardous Waste Landfill		
Water Sample Measured Data			
Condition of Well:	Good, new in appearance		
Procedure/Equipment:	Measuring Tape	Procedure/Equipment:	Interface meter
Well height above ground (m)=	0.47	Depth to water surface (m)=	n/a (dry)
Diameter of well (m)=	0.04	Static water level* (m)=	n/a (dry)
Depth of installation* (m)=	3.54	Depth to bottom (m)=	1.58
Length screened section (m)=	2.0	Free product thickness (mm)=	none
Depth to top of screen* (m)=	0.54		
Calculations		**Notes**	
Depth of water (m)=	0	Evidence of sludge etc:	no
Well volume of water (L)=	0.0	Evidence of freezing/siltation: (compare to installation record)	
Length screen collecting water (m)=	n/a		

Development/Purging Information						
Equipment:	Teflon tubing, with stainless steel ball valve					
Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
Well Dry						

Water Sampling		**Soil Sampling**	
Date and time collected:	04-Aug	Date and time collected:	Aug-6, 5:00pm
Sample Number - Water:	No sample collected	Sample Number - Soil:	Surface: 10550/51
			Depth: (10552/53)
Sample containers:	n/a	Sample containers:	Whirlpaks
			120 mL amber glass jar
Procedure/Equipment:	Teflon tubing, with stainless steel ball valve	Procedure/Equipment:	Whirlpaks
Water description:		Soil description:	120 mL amber glass jar
Filtration: (Y/N)			0-40cm: light brown to gray/brown medium to coarse grain sand with 40% pea gravel/pebbles and 10% larger gravel. Some silt, no seepage
Acidification: (Y/N)			
Sampling Equipment Decontamination: (Y/N)		Sampling Equipment Decontamination: (Y/N)	Y(shovel)
Number washes:		Number washes:	1
Number rinses:		Number rinses:	1

n/a=not applicable

*From ground surface. All other measurements are assumed to be from the top of the casing.

Table B-42: Monitoring Well Sampling Log (MW#03), 2008

Site Name:	CAM-3		
Date of Sampling Event:	04-Aug-08		
Names of Samplers:	Bryarly McEachern, Peter Shock, Mike Mosclow		
Monitoring Well ID:	MW-03		
Facility:	Non-Hazardous Waste Landfill		
Water Sample Measured Data			
Condition of Well:	Good, new in appearance		
Procedure/Equipment:	Measuring Tape	Procedure/Equipment:	Interface meter
Well height above ground (m)=	0.57	Depth to water surface (m)=	n/a (dry)
Diameter of well (m)=	0.04	Static water level* (m)=	n/a
Depth of installation* (m)=	3.50	Depth to bottom (m)=	1.63
Length screened section (m)=	2.0	Free product thickness (mm)=	n/a
Depth to top of screen* (m)=	0.5		
Calculations		**Notes**	
Depth of water (m)=	0	Evidence of sludge etc:	no
Well volume of water (L)=	0.0	Evidence of freezing/siltation: (compare to installation record)	
Length screen collecting water (m)=	n/a		

Development/Purging Information						
Equipment:	Teflon tubing, with stainless steel ball valve					
Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
Well Dry						

Water Sampling		**Soil Sampling**	
Date and time collected:	Aug-4, 11:40am	Date and time collected:	Aug-6, 5:30pm
Sample Number - Water:	No samples collected	Sample Number - Soil:	Surface: 10554/55
			Depth: 10556/57
Sample containers:	n/a	Sample containers:	Whirlpaks
			120 mL amber glass jar
Procedure/Equipment:	Teflon tubing, with stainless steel ball valve	Procedure/Equipment:	Disposable scoops and nitrile gloves to sample, shovel to dig.
Water description:		Soil description:	Surface: no vegetation cover. 0-40cm: light brown to greyish brown medium to coarse grain sand with 40% pea gravel/pebbles and 10% larger gravel. Some silt, no seepage
Filtration: (Y/N)			
Acidification: (Y/N)			
Sampling Equipment Decontamination: (Y/N)		Sampling Equipment Decontamination: (Y/N)	Y (shovel)
Number washes:		Number washes:	1
Number rinses:		Number rinses:	1

n/a=not applicable

*From ground surface. All other measurements are assumed to be from the top of the casing.

Annex Station Landfill - Year 1 Data

Figure:

- CAM-3.4: Site Plan – Station Landfill

Tables:

- Landfill Visual Inspection – CAM-3 Shepherd Bay Station Landfill
- Station Landfill – Evaluation of Year 1 Soil Analytical Data
- Station Landfill – Year 1 (2008) Soil Data

Photographic Records:

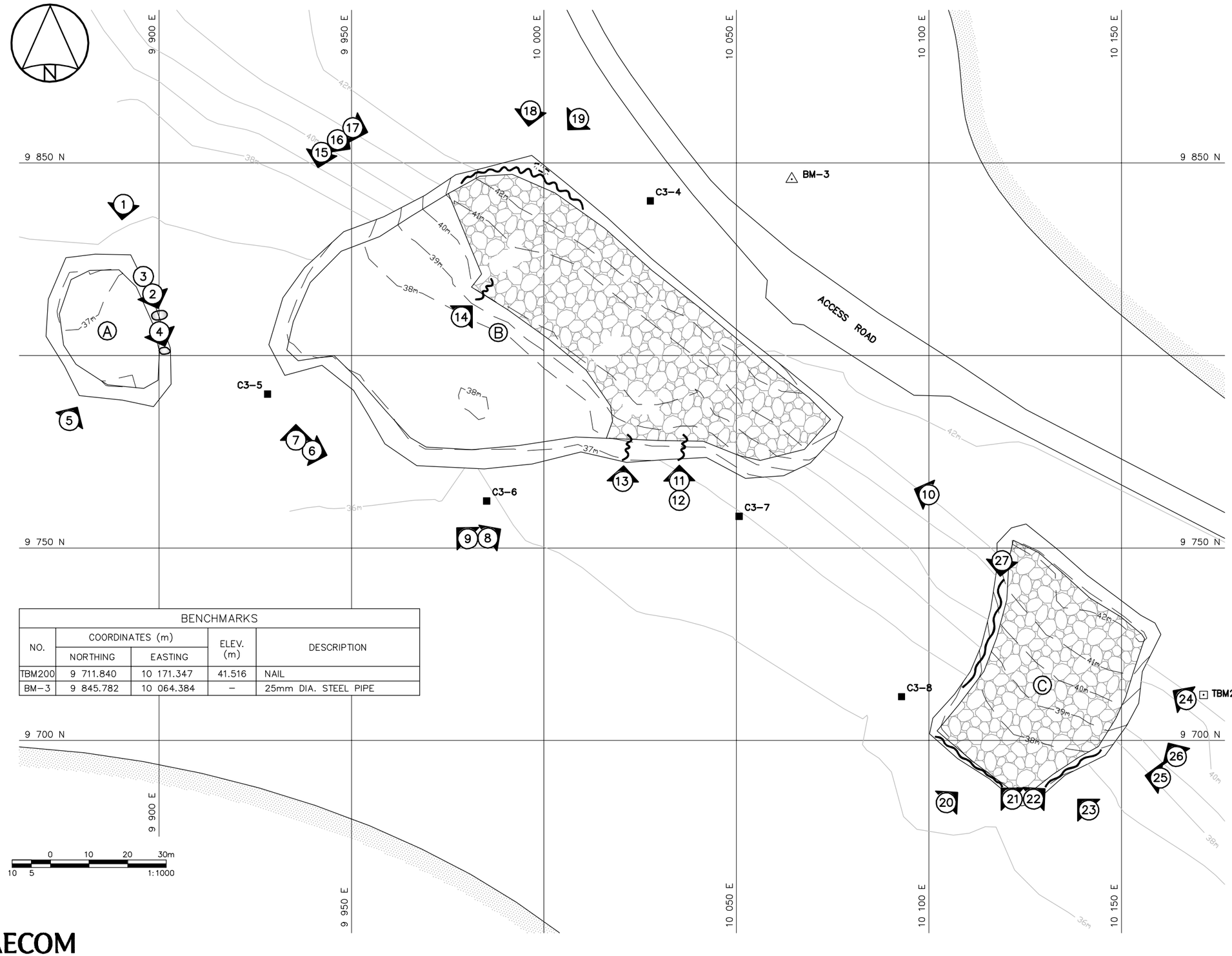
- Photos 1 and 2
- Photos 3 and 4

B SIZE 11" x 17" (279.4mm x 431.8mm)

PLOT: 09/01/22 4:38:12 PM

Saved By: cattone

ISS/REV: A
AECOM FILE NAME: 0171-142-11_00-B-1004_RX.dwg



BENCHMARKS				
NO.	COORDINATES (m)		ELEV. (m)	DESCRIPTION
	NORTHING	EASTING		
TBM200	9 711.840	10 171.347	41.516	NAIL
BM-3	9 845.782	10 064.384	–	25mm DIA. STEEL PIPE

AECOM

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

Station Landfill
Figure CAM-3.4

LANDFILL VISUAL INSPECTION

Site Name: CAM-3 Shepherd Bay

Landfill: Station Landfill

Date Inspected: August 6, 2008

Inspected By: Anwar Majid, P.Eng.

Signature:

Checklist Item	Present Yes/No	Location	Length (m)	Width (m)	Depth (m)	Extent	Description	Photographic Records (Pictures Provided on Data CD	Severity Rating	Additional Comments
Settlement	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Erosion	Yes	See Figure CAM-3.4 (Lobe B)	~ 20	N/A	N/A	Isolated	Erosion in the side ditch	Picture 18 on CD	Acceptable	Erosion on the sideslope of the side ditch was noted. Erosion is likely due to migration of fines due to surface runoff. There is potential for additional erosion to occur as a result of surface runoff.
			N/A	N/A	N/A	Occasional	Erosion on landfill surface south sideslope	Pictures 11-14 on CD		Minor erosion on landfill surface due to channelling of surface runoff. Cobbles and boulders are present on the landfill surface and provide natural armouring.
		See Figure CAM-3.4 (Lobe C)	N/A	N/A	N/A	Occasional	Erosion on sideslopes	Pictures 20-23 and 27		Minor erosion was noted on the sideslopes. The erosion was due to migration of fines from the erosion resistant Type 2 material after landfill construction. The slopes will likely naturally stabilize.
Frost Action	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Animal Burrows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Vegetation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Staining (Lobe A)	Yes	See Figure CAM-3.4	2	1	N/A	Isolated	Staining at the slope toe	Pictures 2 and 3 on CD	Acceptable	Minor rusting/metal oxidation at the toe of slope
			0.5	0.3	N/A	Isolated	Staining at the slope toe	Picture 4 on CD	Acceptable	Minor rusting/metal oxidation at the toe of slope
Vegetation Stress	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Seepage Points	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Debris Exposed	Yes	See Figure CAM-3.4 (Lobe B)	N/A	N/A	N/A	Isolated	Wooden debris	Picture 19 on CD	Acceptable	Wooden debris (a wood piece) was observed on the sideslope. The debris was partially exposed and appears to have been mixed in with the borrow material.
Presence/ Condition of Monitoring Instruments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other Features of Note.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Overall Landfill Performance:	**Acceptable**									

Station Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2008	Comments
Copper	59	6.0+/-0.6	12	Measured concentrations within or less than the 95% confidence interval with one exception.	Surface sample at downgradient location C3-08 (8.0 mg/kg) was below the baseline max.
Nickel	59	6.7+/-0.7	14	Measured concentrations within 95% confidence interval for 7 of 10 samples.	Surface sample at downgradient location C3-05 (7.5 mg/kg), surface sample at downgradient location C3-07 (7.8 mg/kg) and surface sample at downgradient location C3-08 (9.7 mg/kg) were below the baseline max.
Cobalt	59	<5.0	6	Measured concentrations within 95% confidence interval (non-detect).	
Cadmium	59	<1.0		Measured concentrations within 95% confidence interval (non-detect).	
Lead	59	<10	43	Measured concentrations within 95% confidence interval (non-detect).	
Zinc	59	<15	48	Measured concentrations within 95% confidence interval (non-detect) for 6 of 10 samples.	Surface samples at upgradient location C3-04 (48 mg/kg), downgradient locations C3-06 (27 mg/kg), C3-07 (18 mg/kg) and C3-08 (18 mg/kg) were below the baseline max.
Chromium	59	<20	35	Measured concentrations within 95% confidence interval (non-detect).	
Arsenic	59	3.4+/-0.4	7	Measured concentrations within or less than 95% confidence interval for 7 of 10 samples.	Surface samples at downgradient locations C3-05 (4.3 mg/kg), C3-07 (4.0 mg/kg) and C3-08 (6.6 mg/kg) were below the baseline max.
Mercury	42	<0.10		Measured concentrations within 95% confidence interval (non-detect).	
PCBs	58	<0.0030	0.067	Measured concentrations within 95% confidence interval (non-detect) for 8 of 10 samples.	Both samples at upgradient location C3-04 (0.0118 mg/kg surface and 0.00345 mg/kg) depth were below the baseline max.
TPH	60	<40	2200	Measured concentrations within or less than 95% confidence interval for 6 of 10 samples.	Depth sample at downgradient location C3-05 (170 mg/kg), both samples at downgradient location C3-07 (62 mg/kg surface and 59 mg/kg depth) and surface sample at downgradient location C3-08 (51 mg/kg) were below the baseline max.

Station Landfill - Year 1 (2008) 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
Station Landfill - Baseline Concentrations				**6.0+/- 0.6**	**6.7+/- 0.7**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**3.4+/- 0.4**	**<0.10**	**<0.0030**	**<40**			
Station Landfill - Maximum Concentrations				**12**	**14**	**6**	**<1.0**	**43**	**48**	**35**	**7**	**<0.10**	**0.067**	**2200**			
Upgradient Soil Samples																	
08-10558/59	C3-04	2008	0	3.5	<5.0	<5.0	<1.0	<10	48	<20	2.9	< 0.10	0.0118	16	<10	< 4.0	16
08-10560/61	C3-04	2008	40	4.5	5.1	<5.0	<1.0	<10	<15	<20	3.4	< 0.10	0.00345	34.5	<10	<4.0	34.5
Downgradient Soil Samples																	
08-10562/63	C3-05	2008	0	5.3	7.5	<5.0	<1.0	<10	<15	<20	4.3	< 0.10	<0.0030	16	<10	< 4.0	16
08-10564/65	C3-05	2008	40	4.9	7.0	<5.0	<1.0	<10	<15	<20	3.4	< 0.10	<0.0030	170	<10	< 4.0	170
08-10566/67	C3-06	2008	0	6.6	7.1	<5.0	<1.0	<10	27	<20	2.4	< 0.10	<0.0030	<10	<10	< 4.0	< 9.0
08-10568/69	C3-06	2008	40	5.8	7.0	<5.0	<1.0	<10	<15	<20	2.3	< 0.10	<0.0030	<10	<10	<4.0	<9.0
08-10570/71	C3-07	2008	0	5.5	7.8	<5.0	<1.0	<10	18	<20	4.0	< 0.10	<0.0030	62	<10	< 4.0	62
08-10572/73	C3-07	2008	40	4.9	7.2	<5.0	<1.0	<10	<15	<20	3.4	< 0.10	<0.0030	59	<10	< 4.0	59
08-10574/75	C3-08	2008	0	8.0	9.7	<5.0	<1.0	<10	18	<20	6.6	< 0.10	<0.0030	51	<10	< 4.0	51
08-10576/77	C3-08	2008	40	4.7	7.2	<5.0	<1.0	<10	<15	<20	2.4	< 0.10	<0.0030	15	<10	< 4.0	15

Photograph 1. Feature A - Staining at the bottom of the slope - Looking Approximately SE (2mx1m) ↑

Photograph 2. Panorama - Looking Approximately NE ↑

Photograph 3. Erosion in Side Ditch, Fines Washed Away, Course Material Exposed (20m) ↑

Photograph 4. Erosion on Side Slope, Looking Approximately NW, Erosion on Entire Side Slope ↑

Annex Tier II Disposal Facility- Year 1 Data

Figures:

- CAM-3.5: Site Plan – Tier II Soil Disposal Facility
- Thermal Monitoring Annual Report – Tier II Disposal Facility

Tables:

- Landfill Visual Inspection – CAM-3 Shepherd Bay Tier II Disposal Facility
- Tier II Disposal Facility – Evaluation of Year 1 Soil Analytical Data
- Tier II Disposal Facility – Year 1 (2008) Soil Data
- Tier II Disposal Facility – Year 1 (2008) Groundwater Data

Photographic Records:

- Photos 1 and 2
- Photos 3 and 4
- Photos 5 and 6

Monitoring Well Sampling Records:

- Well MW-4
- Well MW-5
- Well MW-6
- Well MW-7

Thermistor Annual Maintenance Records:

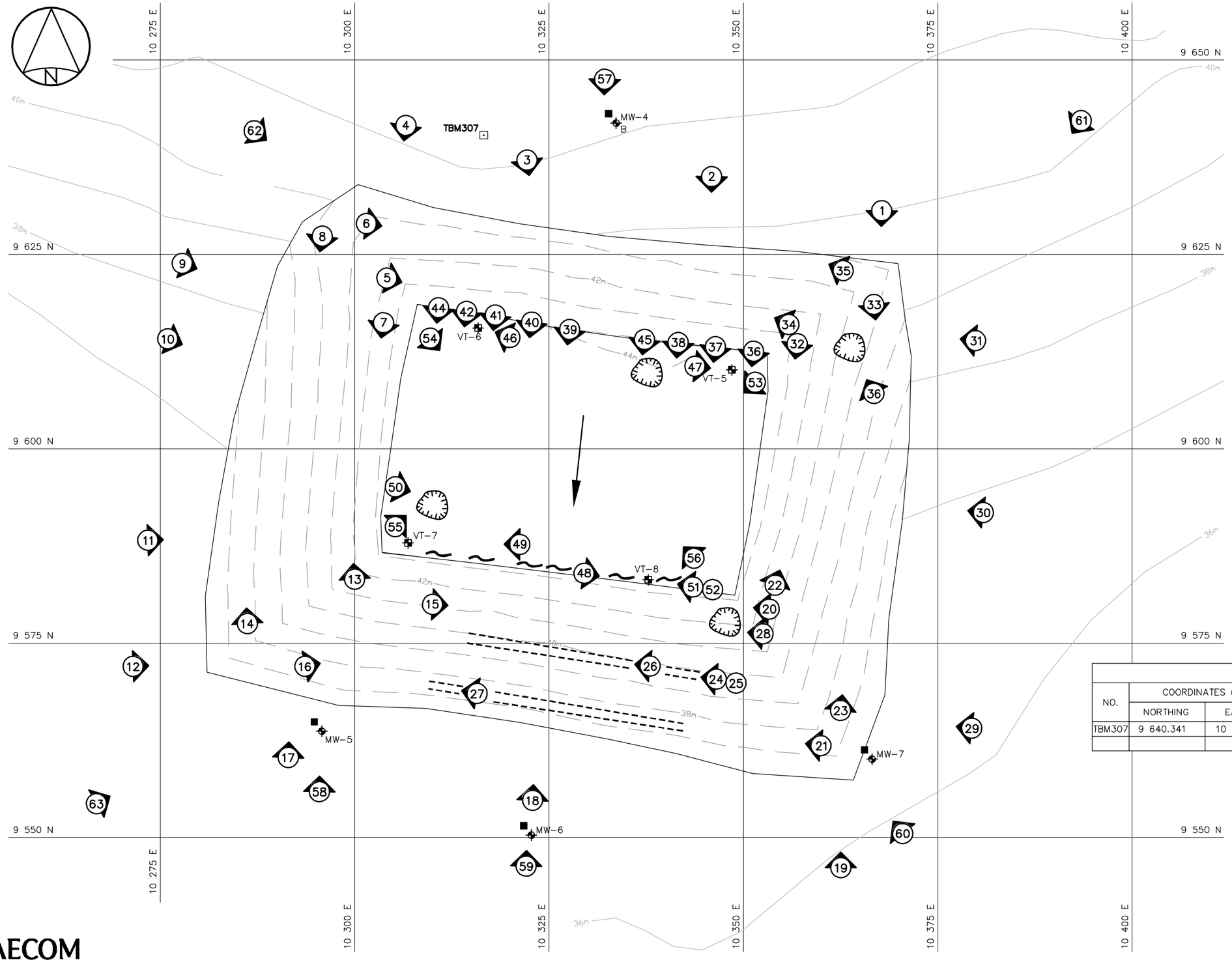
- VT-5
- VT-6
- VT-7
- VT-8

DCC Tier II Disposal Facility – Evaluation of Ground Temperature Data

Ground temperature profiles for vertical thermistors VT-5 to VT-8 are attached, showing ground temperatures curves since September, 2007. The table shows the depth of active layer as defined by the 0°C isotherm for August 5, 2008.

Summary of Tier II Disposal Facility Thermal Results				
	VT-5	VT-6	VT-7	VT-8
Depth (m) of 0°C Isotherm (Aug 5/08)	2.22	2.36	2.39	2.15

The inferred maximum active layer depths noted above are slightly greater than the thickness of the 2.1 metre granular cover over the Tier II soil; the landfill contents are not completely frozen. However, ground temperatures are expected to continue to decline.



LEGEND:

- ## PICTURE NUMBER VIEWPOINT
- TBM20 TEMPORARY BENCHMARK
- MONITORING WELL LOCATION
- VT VERTICAL THERMISTOR
- MONITORING SOIL SAMPLE LOCATION
- POT HOLE
- EROSION
- CRACKS (2–5 mm)

MONITORING WELLS			
NO.	COORDINATES		GROUND ELEV.
	NORTHING	EASTING	
MW–4	9 641.9	10 333.6	41.9
MW–5	9 563.7	10 295.8	37.0
MW–6	9 550.3	10 322.7	36.9
MW–7	9 560.1	10 366.6	36.9

THERMISTORS			
NO.	COORDINATES		GROUND ELEV.
	NORTHING	EASTING	
VT–5	9 610.1	10 348.5	44.2
VT–6	9 615.5	10 315.9	44.0
VT–7	9 587.9	10 306.9	43.3
VT–8	9 583.1	10 337.8	43.4

BENCHMARKS				
NO.	COORDINATES (m)		ELEV. (m)	DESCRIPTION
	NORTHING	EASTING		
TBM307	9 640.341	10 316.602	41.308	NAIL

0 5 10 15m
5 2.5 1:500

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

AECOM

Tier II Disposal Facility
Figure CAM-3.5

THERMAL MONITORING ANNUAL DATA ANALYSIS

Site: **CAM-3 Shepherd Bay**
Landfill: **Tier II Disposal Facility**

Design Infomation:

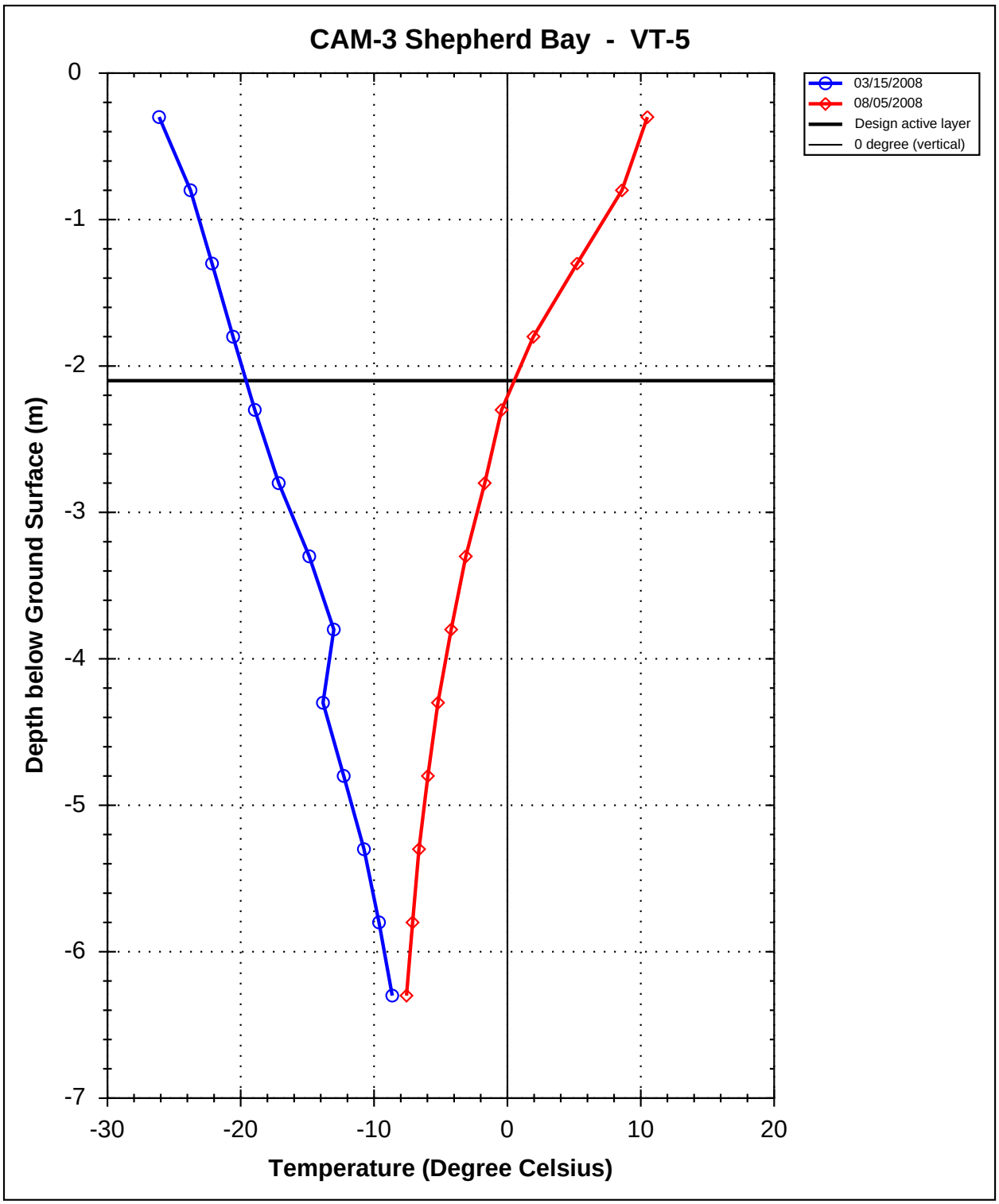
Design Active Layer (m):	-2.1
Mean Active Layer (m):	-1.5
1:100 Year Active Layer (m):	-2.0
Mean Thawing Index (degC Days):	450
Mean Freezing Index (degC Days):	5660
1:100 Year Thawing Index (degC Days):	810

Maximum Active Layer (m):

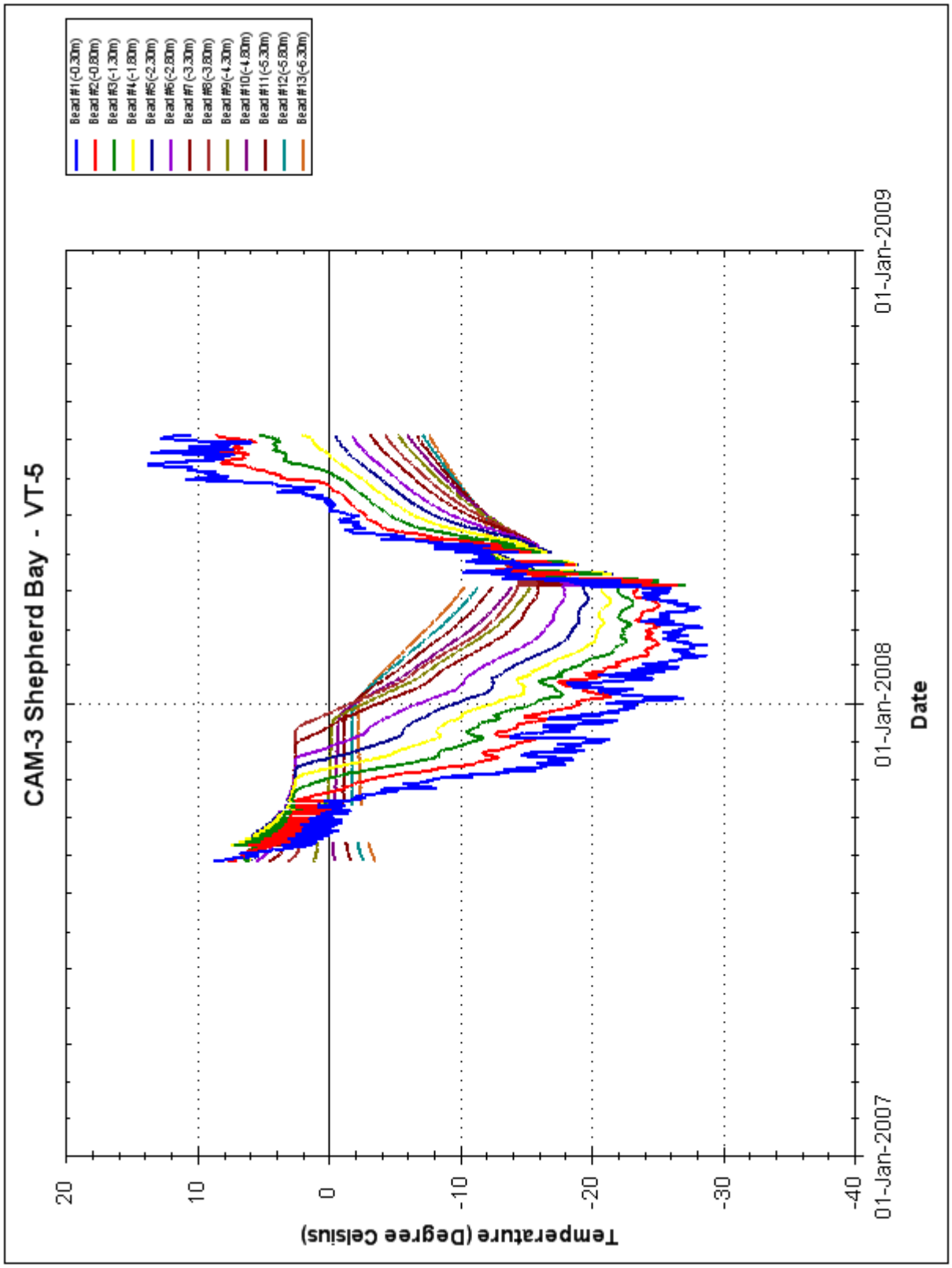
	VT-5	VT-6	VT-7	VT-8
2007	-4.71	-4.16	-4.93	-4.58
2008	-2.22	-2.36	-2.39	-2.15

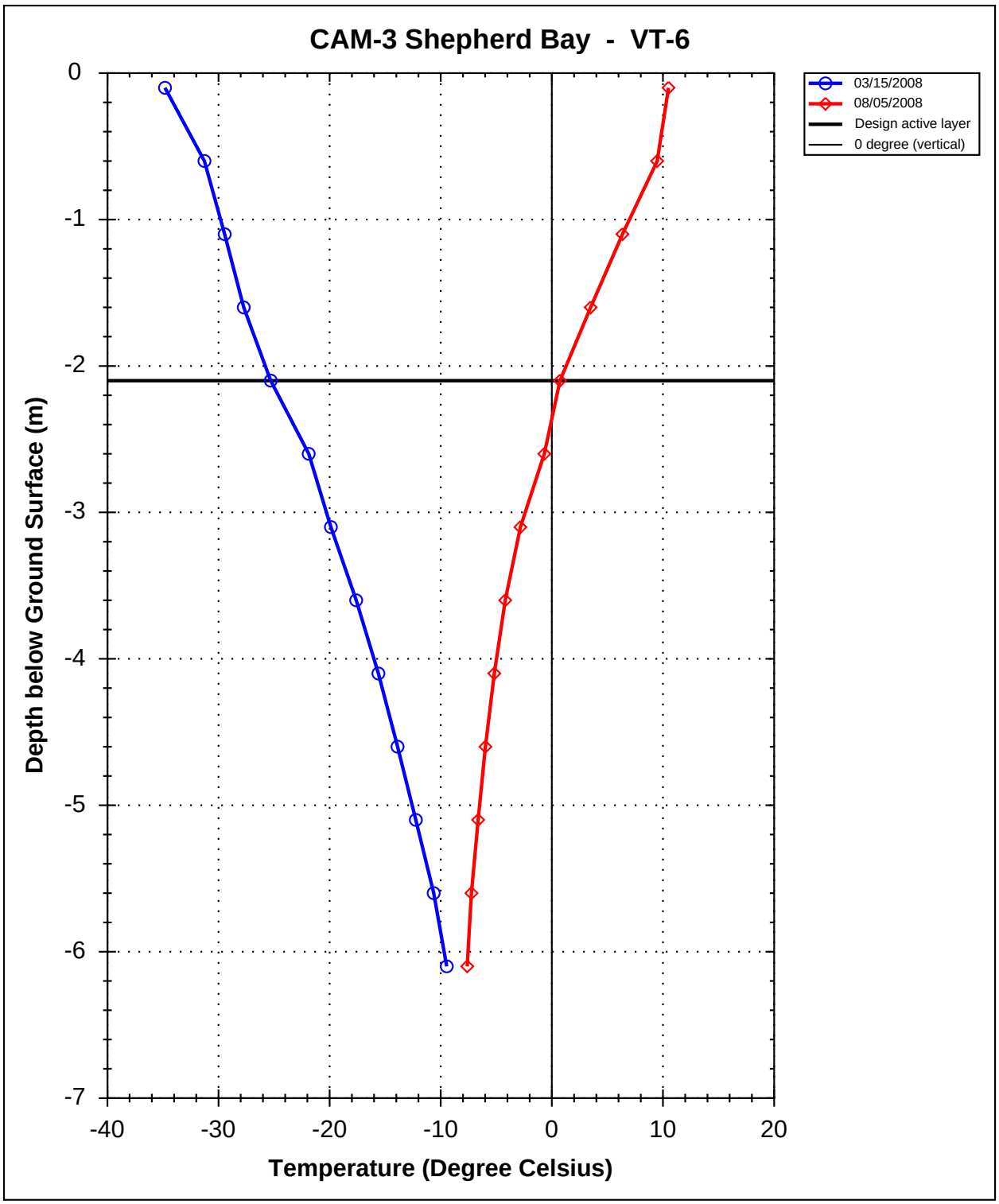
Thawing Index and Freezing Index:

	TI	FI	max AL	min AL	average AL
2007	548	5509	-4.16	-4.93	-4.60
2008	636	5892	-2.15	-2.39	-2.28

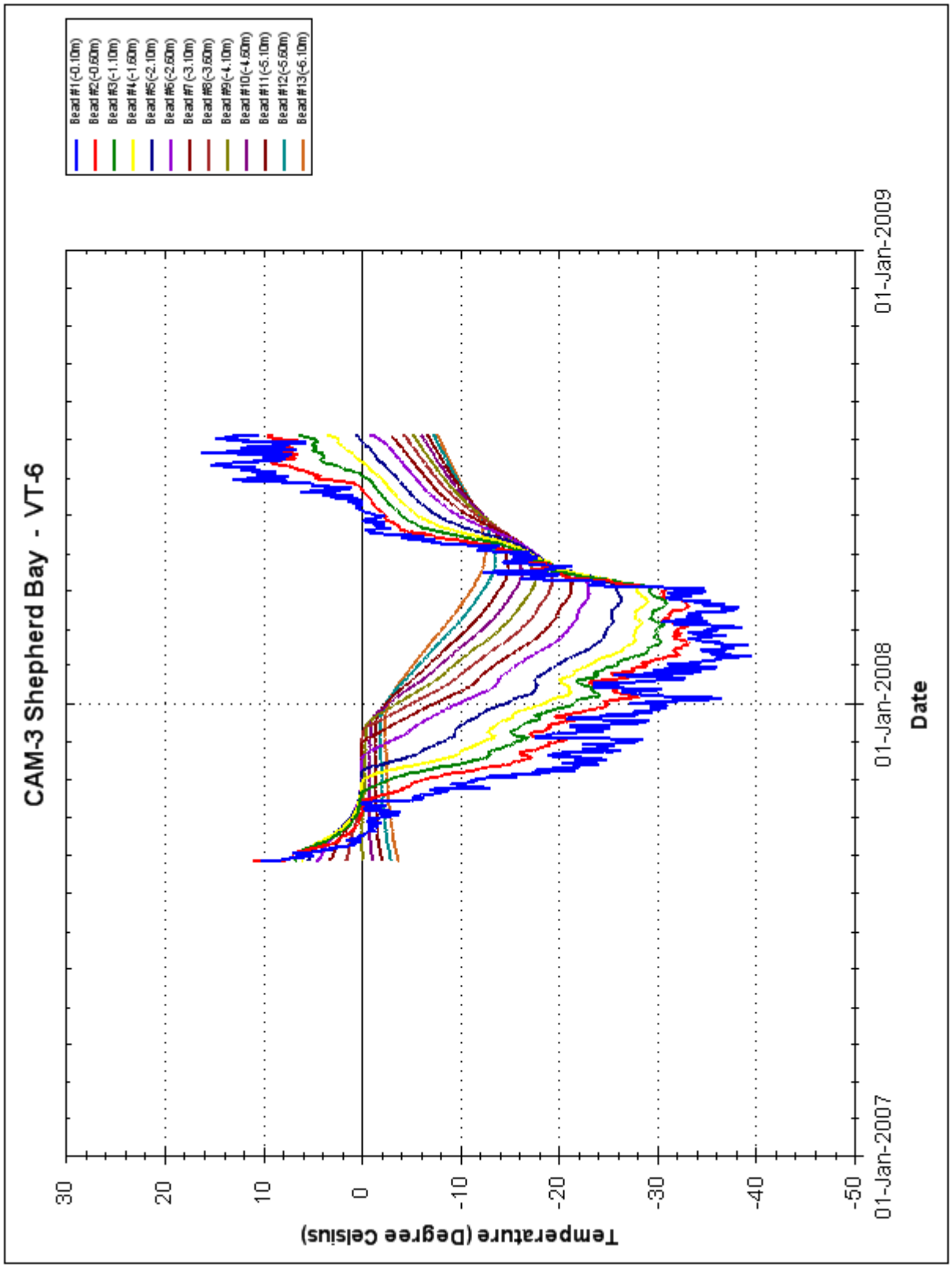

CAM-3 Shepherd Bay - VT-5
03/15/2008
08/05/2008
Design active layer
0 degree (vertical)
Depth below Ground Surface (m)
0
-1
-2
-3
-4
-5
-6
-7
-30
-20
-10
0
10
20
Temperature (Degree Celsius)

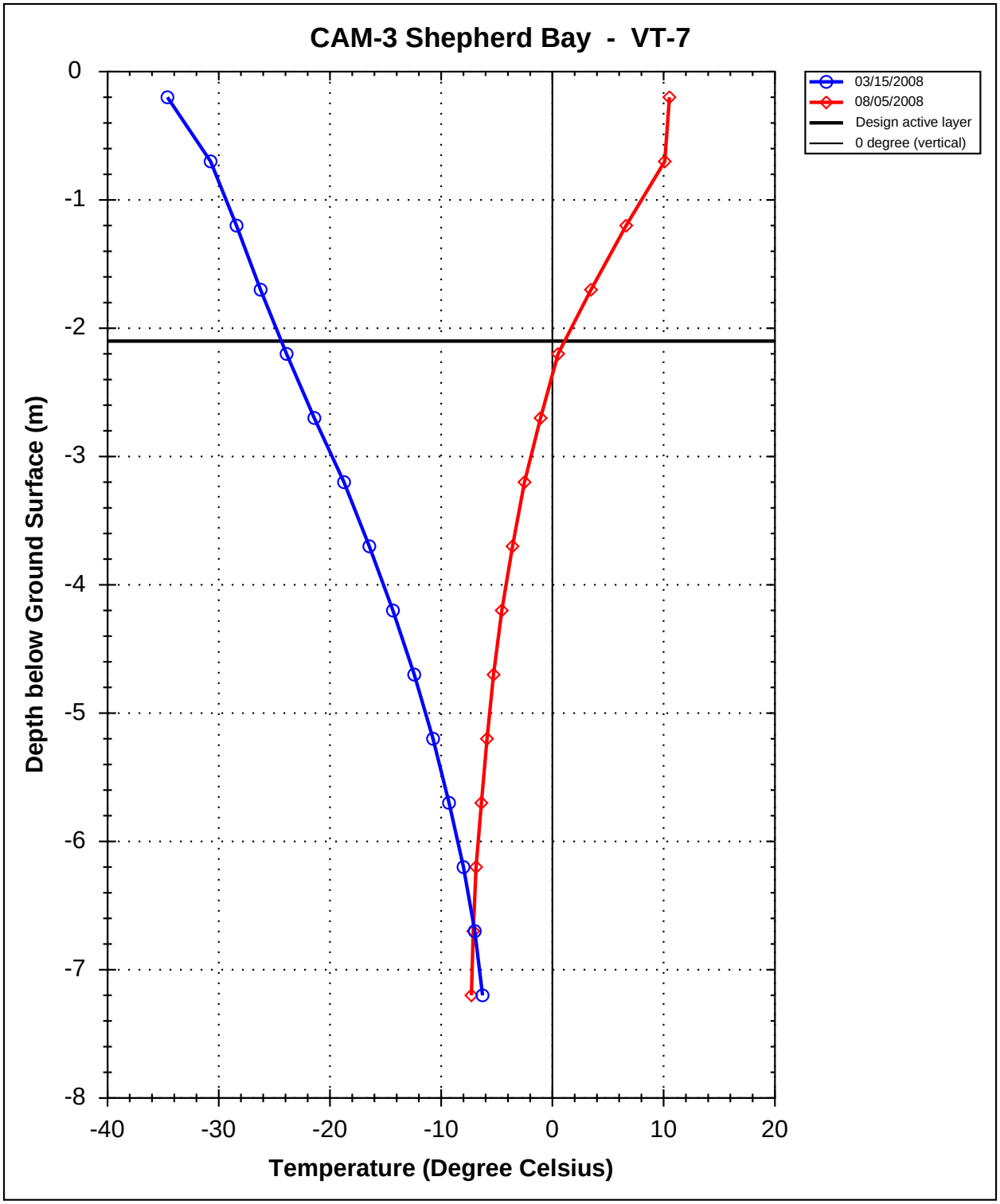
THERMAL MONITORING ANNUAL DATA ANALYSIS



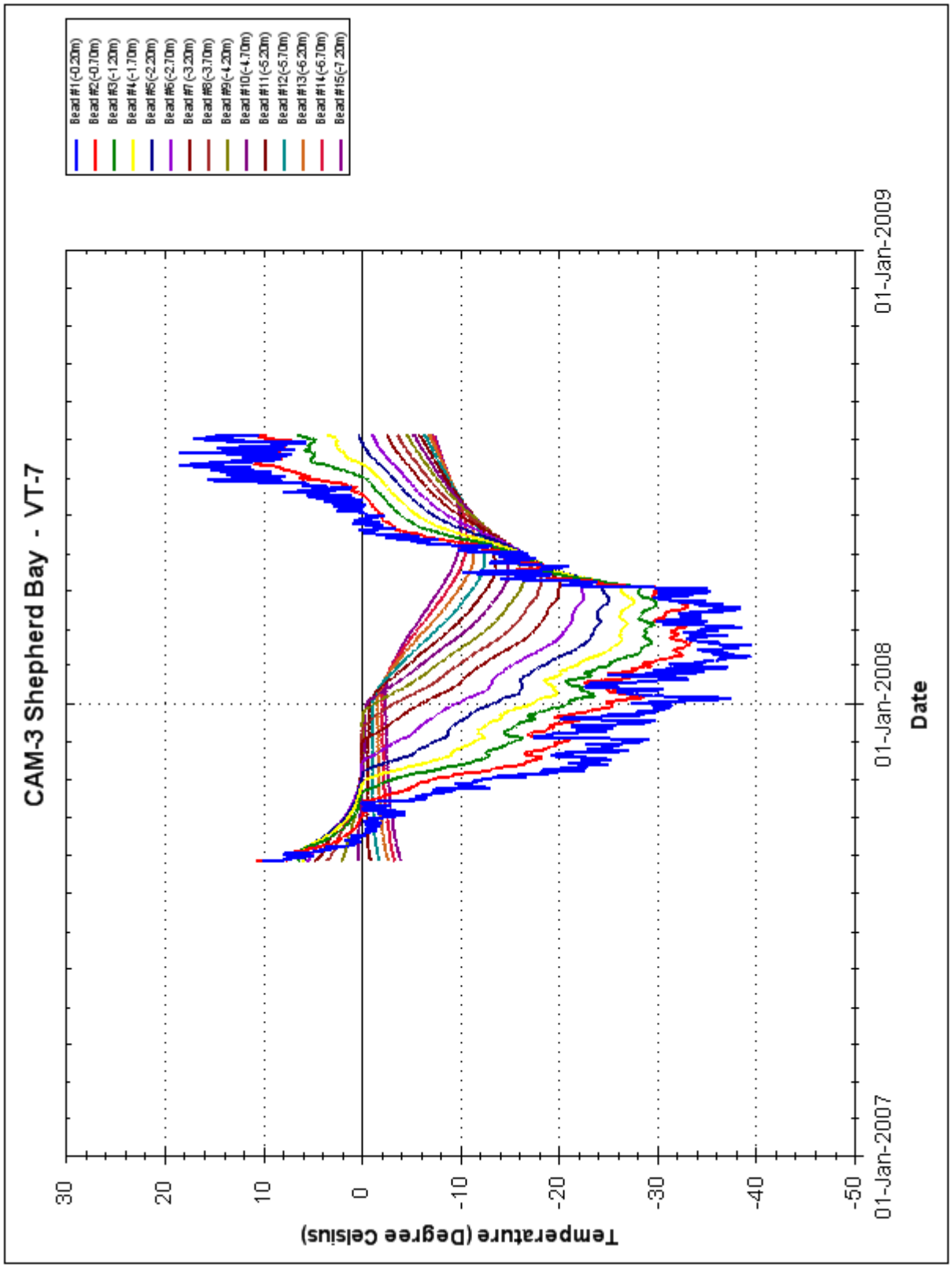

CAM-3 Shepherd Bay - VT-6
03/15/2008
08/05/2008
Design active layer
0 degree (vertical)
Depth below Ground Surface (m)
0
-1
-2
-3
-4
-5
-6
-7
-40
-30
-20
-10
0
10
20
Temperature (Degree Celsius)

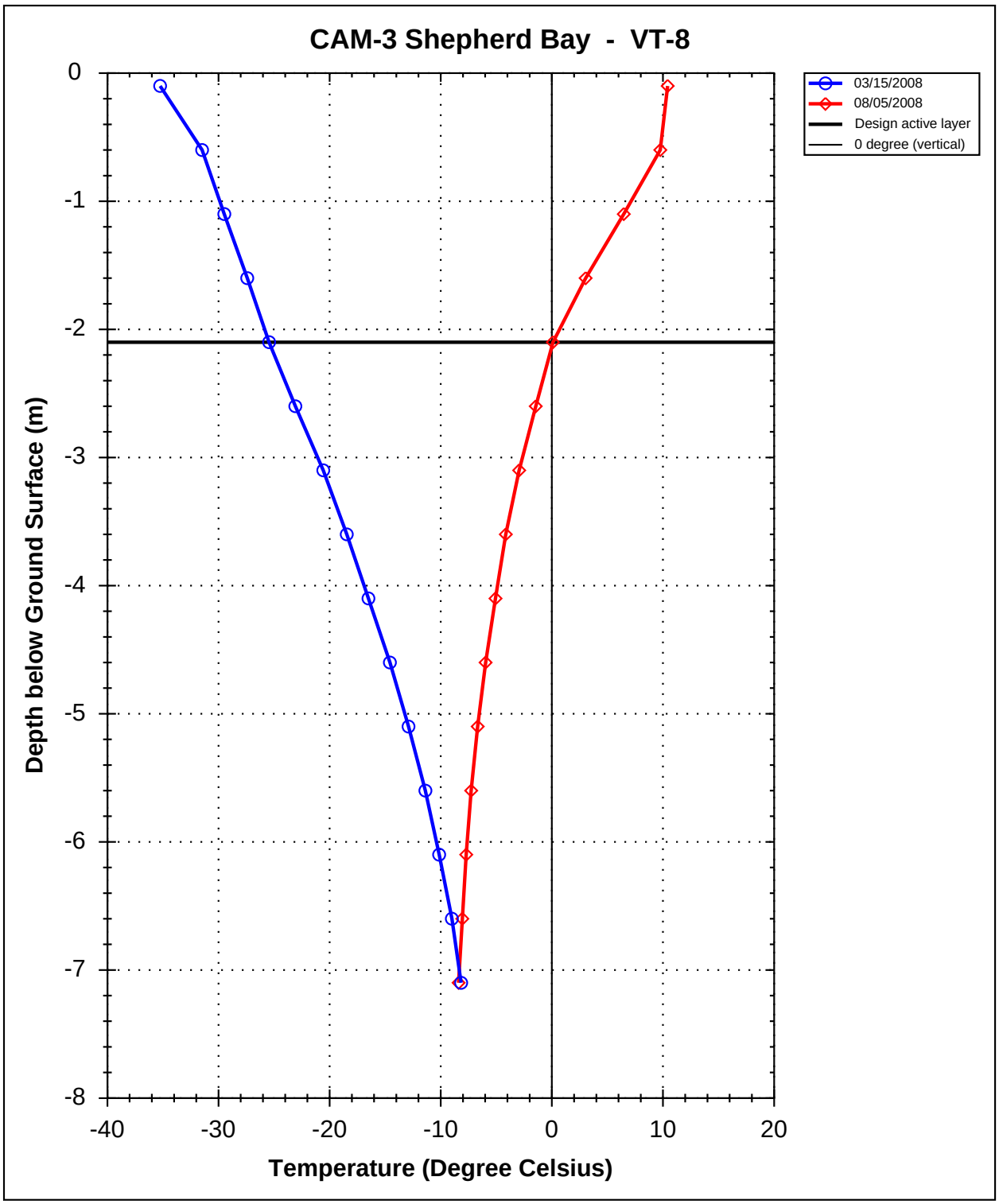
THERMAL MONITORING ANNUAL DATA ANALYSIS



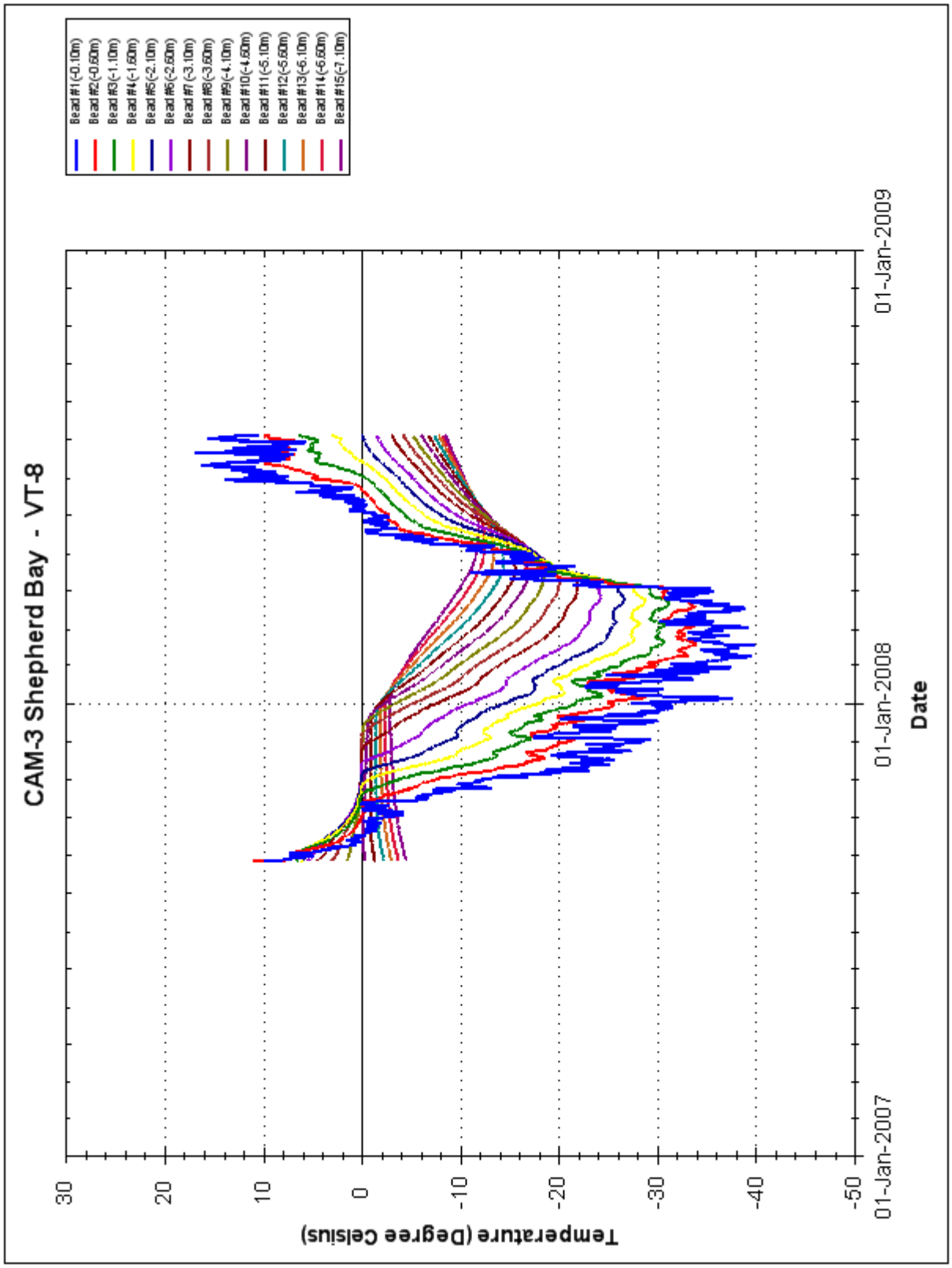

CAM-3 Shepherd Bay - VT-7
Depth below Ground Surface (m)
0
-1
-2
-3
-4
-5
-6
-7
-8
-40
-30
-20
-10
0
10
20
Temperature (Degree Celsius)
03/15/2008
08/05/2008
Design active layer
0 degree (vertical)

THERMAL MONITORING ANNUAL DATA ANALYSIS




CAM-3 Shepherd Bay - VT-8
Depth below Ground Surface (m)
0
-1
-2
-3
-4
-5
-6
-7
-8
-40
-30
-20
-10
0
10
20
Temperature (Degree Celsius)
03/15/2008
08/05/2008
Design active layer
0 degree (vertical)

THERMAL MONITORING ANNUAL DATA ANALYSIS



LANDFILL VISUAL INSPECTION

Site Name: CAM-3 Shepherd Bay

Landfill: Tier II Disposal Facility

Date Inspected: August 4, 2008

Inspected By: Anwar Majid, P.Eng.

Signature:

Checklist Item	Present Yes/No	Location	Length (m)	Width (m)	Depth (m)	Extent	Description	Photographic Records (Pictures Provided on Data CD	Severity Rating	Additional Comments
Settlement	No	N/A	N/A	N/A	N/A	Not observed	N/A	N/A	N/A	N/A
Erosion	Yes	See Figure CAM-3.5	N/A	N/A	N/A	Isolated	Surface erosion	Pictures 48-49 and 51-52 on CD	Acceptable	Minor erosion was noted along the crest of south facing slope. The minor surface erosion was due to migration of fines from the erosion resistant Type 2 material after landfill construction. Further erosion could occur until slope and landfill surface naturally stabilizes.
			N/A	N/A	N/A	Occasional	Pot holes	Pictures 28,36,45, and 50 on CD	Acceptable	Small pot holes resulting from surface erosion were noted on landfill surface and side slopes at different locations. The number and size of pot holes may increase due to further erosion and migration of fines from the Type 2 material.
Frost Action	Yes	See Figure CAM-3.5	N/A	N/A	N/A	Occasional	Tension cracks	Pictures 24-27 on CD	Acceptable	Tension cracks approximately 2-5 mm wide were observed at irregular intervals on the lower half of the south facing slope.
Animal Burrows	No	N/A	N/A	N/A	N/A	Not observed	N/A	N/A	N/A	N/A
Vegetation	No	N/A	N/A	N/A	N/A	Not observed	N/A	N/A	N/A	N/A
Staining	No	N/A	N/A	N/A	N/A	Not observed	N/A	N/A	N/A	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	Not observed	N/A	N/A	N/A	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	Not observed	N/A	N/A	N/A	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	Not observed	N/A	N/A	N/A	N/A
Presence/ Condition of Monitoring Instruments	Yes	See Figure CAM-3.5	N/A	N/A	N/A	N/A	N/A	Pictures 46-49 of thermistor cables and Pictures 57-60 of monitoring wells	Acceptable	Ground temperature cables and data loggers were in good condition and all data was downloaded. The protective casings for thermistor cables and monitoring wells were also in good condition.
Other Features of Note.	Yes	See Figure CAM-3.5	N/A	N/A	N/A	Not observed	N/A	N/A	N/A	N/A
Overall Landfill Performance:	**Acceptable**									

Tier II Disposal Facility - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2008	Comments
Copper	21	7.0+/-0.8	11	Measured concentrations within or less than 95% confidence interval for 6 of 8 samples.	Surface sample at downgradient location MW-05 (7.9 mg/kg) was below the baseline max. Depth sample at downgradient location MW-06 (19 mg/kg) was above the baseline max of 11 mg/kg..
Nickel	21	6.9+/-1.3	13	Measured concentrations within or less than 95% confidence interval for 6 of 8 samples.	Both samples at downgradient location MW-05 (13 mg/kg surface and 11 mg/kg depth) were below the baseline max.
Cobalt	21	<5.0		Measured concentrations within 95% confidence interval (non-detect) with one exception.	The surface sample at downgradient location MW-05 (5.0 mg/kg) was above the baseline max of <5.0 mg/kg.
Cadmium	21	<1.0		Measured concentrations within 95% confidence interval (non-detect).	
Lead	21	<10		Measured concentrations within 95% confidence interval (non-detect).	
Zinc	21	<15	22	Measured concentrations within 95% confidence interval (non-detect).	
Chromium	21	<20	20	Measured concentrations within 95% confidence interval (non-detect) with one exception.	The surface sample at downgradient location MW-05 (22 mg/kg) was above the baseline max of 20 mg/kg.
Arsenic	21	3.5+/-0.8	8	Measured concentrations within or less than 95% confidence interval with one exception.	The depth sample at downgradient location MW-07 (5.1 mg/kg) was below the baseline max.
Mercury	16	<0.10		Measured concentrations within 95% confidence interval (non-detect).	
PCBs	21	<0.0030		Measured concentrations within 95% confidence interval (non-detect).	
TPH	16	<10	108	Measured concentrations within or less than 95% confidence interval for 2 of 8 samples.	Surface sample at upgradient location MW-04 (46.95 mg/kg), both samples at downgradient locations MW-05 (17 mg/kg surface and depth), and MW-06 (66 mg/kg surface and 28 mg/kg depth) and surface sample at downgradient location MW-07 (107 mg/kg) were below the baseline max.

Tier II Disposal Facility - Year 1 (2008) 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
Tier II Disposal Facility - Baseline Concentrations				**7.0+/-0.8**	**6.9+/-1.3**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**3.5+/-0.8**	**<0.10**	**<0.0030**	**<10**			
Tier II Disposal Facility - Maximum Concentrations				**11**	**13**	**<5.0**	**<1.0**	**<10**	**22**	**20**	**8**	**<0.10**	**<0.0030**	**108**			
Upgradient Soil Samples																	
08-10478/79	MW-04	2008	0	4.9	6.6	<5.0	<1.0	<10	<15	<20	3.7	<0.10	<0.0030	46.95	<10	4.7	42.25
08-10480/81	MW-04	2008	40	4.0	6	<5.0	<1.0	<10	<15	<20	3.5	<0.10	<0.0030	<10	< 10	< 4.0	< 9.0
Downgradient Soil Samples																	
08-10482/83	MW-05	2008	0	7.9	13	5.0	<1.0	<10	<15	22	3.9	<0.10	<0.0030	17	< 10	< 4.0	17
08-10484/85	MW-05	2008	40	6.4	11	<5.0	<1.0	<10	<15	<20	2.8	<0.10	<0.0030	17	< 10	< 4.0	17
08-10486/87	MW-06	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.7	<0.10	<0.0030	66	< 10	< 4.0	66
08-10488/89	MW-06	2008	40	19	6.4	<5.0	<1.0	<10	<15	<20	1.4	<0.10	<0.0030	28	< 10	< 4.0	28
08-10490/91	MW-07	2008	0	4.1	6.8	<5.0	<1.0	<10	<15	<20	3.7	<0.10	<0.0030	107	< 10	11	96
08-10492/93	MW-07	2008	40	4.0	7.1	<5.0	<1.0	<10	<15	<20	5.1	<0.10	<0.0030	<10	< 10	< 4.0	< 9.0

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Tier II Disposal Facility - Year 1 (2008) 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
Downgradient Groundwater Samples																
08-10441/42	MW-05	2008	0.0079	0.086	0.0037	<0.0010	0.0031	0.069	0.066	0.0035	< 0.0004	0.039		< 0.050	< 0.50	< 1.0
08-10443	MW-06	2008	0.012	0.023	0.0030	<0.0010	0.0023	0.023	0.024	0.0040	< 0.0004	0.82		< 0.050	< 0.50	< 1.0
08-10444	MW-07	2008	0.0068	0.015	<0.003	<0.0010	0.002	0.42	0.011	<0.0030	< 0.0004	0.22				

Photograph 1. North Facing Slope - Looking North From Access Road ↑

Photograph 2. West Facing Slope - Looking Norht Towards Slope ↑

Photograph 3. South Facing Slope - Looking East Towards Slope ↑

Photograph 4. South Facing Slope - Minor Crack (3-5 mm Wide) on Slope Running E-W ↑

Photograph 5. Landfill Surface - Looking South from Crest of North Facing Slope ↑

Photograph 6. Landfill Surface - Minor Erosion at Crest of Slope, Looking East (Fines Washed Away) ↑

Table B-43: Monitoring Well Sampling Log (MW#04), 2008

Site Name:	CAM-3				
Date of Sampling Event:	04-Aug-08				
Names of Samplers:	Bryarly McEachern, Peter Shock, Mike Mosclow				
Monitoring Well ID:	MW-04 (up gradient)				
Facility:	Tier II Facility				
Water Sample Measured Data					
Condition of Well:	Good, like new				
Procedure/Equipment:	Measuring Tape		Procedure/Equipment:	Interface meter	
Well height above ground (m)=	0.7		Depth to water surface (m)=	n/a (dry)	
Diameter of well (m)=	0.04		Static water level* (m)=	n/a	
Depth of installation* (m)=	3.48		Depth to bottom (m)=	1.95	
Length screened section (m)=	2.0		Free product thickness (mm)=	none	
Depth to top of screen* (m)=	0.48				
Calculations			**Notes**		
Depth of water (m)=	n/a		Evidence of sludge etc:	no	
Well volume of water (L)=	n/a		Evidence of freezing/siltation: (compare to installation record)		
Length screen collecting water (m)=	n/a				
Development/Purging Information					
Equipment:	Teflon tubing, with stainless steel ball valve				
Date & Time / Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
Well dry					
Water Sampling			**Soil Sampling**		
Date and time collected:	04-Aug		Date and time collected:	Aug-5, 6:15pm	
Sample Number - Water:	no sample collected		Sample Number - Soil:	Surface: 10478/79	
				Depth: 10480/81	
Sample containers:	n/a		Sample containers:	Whirlpaks	
				120 mL amber glass jar	
Procedure/Equipment:	Teflon tubing, with stainless steel ball valve		Procedure/Equipment:	Disposable scoops and nitrile gloves to sample, shovel to dig.	
Water description:			Soil description:	0-40cm: cobbly light brown gravel with 30% small pebbles, 30% cobbles, 20% gravel and 20% fine sand. No vegetation present. Soil is dry (part of regrade)	
Filtration: (Y/N)					
Acidification: (Y/N)					
Sampling Equipment Decontamination: (Y/N)			Sampling Equipment Decontamination: (Y/N)	Y(shovel)	
Number washes:			Number washes:	1	
Number rinses:			Number rinses:	1	

n/a=not applicable

*From ground surface. All other measurements are assumed to be from the top of the casing.

Table B-44: Monitoring Well Sampling Log (MW#05),2008

Site Name:	CAM-3					
Date of Sampling Event:	04-Aug-08					
Names of Samplers:	Bryarly McEachern, Peter Shock, Mike Mosclow					
Monitoring Well ID:	MW-05					
Facility:	Tier II Facility					
Water Sample Measured Data						
Condition of Well:	Good, like new					
Procedure/Equipment:	Measuring Tape			Procedure/Equipment:	Interface meter	
Well height above ground (m)=	0.79			Depth to water surface (m)=	0.76	
Diameter of well (m)=	0.04			Static water level* (m)=	0	
Depth of installation* (m)=	3.40			Depth to bottom (m)=	1.6	
Length screened section (m)=	2.0			Free product thickness (mm)=	n/a	
Depth to top of screen* (m)=	0.40					
Calculations				**Notes**		
Depth of water (m)=	0.84			Evidence of sludge etc:	no	
Well volume of water (L)=	1.3			Evidence of freezing/siltation: (compare to installation record)		
Length screen collecting water (m)=	0.41					
Development/Purging Information						
Equipment:	Teflon tubing, with stainless steel ball valve					
Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
Aug-4, 1:45pm	3.8	7.2	7.67	4.63	763	almost clear, very light brown, some silt
Water Sampling				**Soil Sampling**		
Date and time collected:	Aug-4, 2:00pm			Date and time collected:	Aug-5, 6:45pm	
Sample Number - Water:	10441/42			Sample Number - Soil:	Surface: 10482/83	
					Depth: 10484/85	
Sample containers:	1 L HDPE			Sample containers:	Whirlpaks	
	1 L Teflon				120 mL amber glass jar	
	250 mL Amber Glass					
Procedure/Equipment:	Teflon tubing, with stainless steel ball valve			Procedure/Equipment:	Disposable scoops and nitrile gloves to sample, shovel to dig.	
Water description:	almost clear, very light brown colour, some silt			Soil description:	Surface: 70% vegetation cover.	
Filtration: (Y/N)	N				0-10cm, yellowish brown clayey silt with many roots.	
Acidification: (Y/N)	N				10-40cm: yellowish brown clayey silt with some grey streaks and dark grayish-brown streaks	
Sampling Equipment Decontamination: (Y/N)	Y			Sampling Equipment Decontamination: (Y/N)	Y(shovel)	
Number washes:	1			Number washes:	1	
Number rinses:	1			Number rinses:	1	

n/a=not applicable

*From ground surface. All other measurements are assumed to be from the top of the casing.

Table B-45: Monitoring Well Sampling Log (MW#06), 2008

Site Name:	CAM-3					
Date of Sampling Event:	04-Aug-08					
Names of Samplers:	Bryarly McEachern, Peter Shock, Mike Mosclow					
Monitoring Well ID:	MW-06					
Facility:	Tier II Facility					
Water Sample Measured Data						
Condition of Well:	Good, like new					
Procedure/Equipment:	Measuring Tape			Procedure/Equipment:	Interface meter	
Well height above ground (m)=	0.66			Depth to water surface (m)=	0.93	
Diameter of well (m)=	0.04			Static water level* (m)=	0	
Depth of installation* (m)=	4			Depth to bottom (m)=	1.27	
Length screened section (m)=	2			Free product thickness (mm)=	none	
Depth to top of screen* (m)=	0.51					
Calculations				**Notes**		
Depth of water (m)=	0.34			Evidence of sludge etc:	no	
Well volume of water (L)=	0.5			Evidence of freezing/siltation: (compare to installation record)		
Length screen collecting water (m)=	0.1					
Development/Purging Information						
Equipment:	Teflon tubing, with stainless steel ball valve					
Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
4-Aug, 3:15pm	2	5.8	7.18	1890	497	Light brown, translucent, some fine silt
Water Sampling				**Soil Sampling**		
Date and time collected:	Aug-4, 2:30pm			Date and time collected:	Aug-5, 7:15pm	
Sample Number - Water:	08-10443			Sample Number - Soil:	Surface: 10486/87	
					Depth: 10488/89	
Sample containers:	1 L HDPE			Sample containers:	Whirlpaks	
	1 L Teflon				120 mL amber glass jar	
	250 mL Amber Glass					
Procedure/Equipment:	Teflon tubing, with stainless steel ball valve			Procedure/Equipment:	Disposable scoops and nitrile gloves to sample, shovel to dig.	
Water description:	Light brown, translucent, some fine silt			Soil description:	Surface: 90% vegetation cover.	
Filtration: (Y/N)	N				0-5cm: dark brown organic rich humus with many roots.	
Acidification: (Y/N)	N				5-30cm: light brown fine to medium grain sand, <5% gravel and cobbles.	
					30-40cm: brown silty sand, saturated. Water seepage at 35cm	
Sampling Equipment Decontamination: (Y/N)	Y			Sampling Equipment Decontamination: (Y/N)	Y(shovel)	
Number washes:	1			Number washes:	1	
Number rinses:	1			Number rinses:	1	

n/a=not applicable

*From ground surface. All other measurements are assumed to be from the top of the casing.

Table B-46: Monitoring Well Sampling Log (MW#07), 2008

Site Name:	CAM-3					
Date of Sampling Event:	04-Aug-08					
Names of Samplers:	Bryarly McEachern, Peter Shock, Mike Mosclow					
Monitoring Well ID:	MW-07					
Facility:	Tier II Facility					
Water Sample Measured Data						
Condition of Well:	Good, like new					
Procedure/Equipment:	Measuring Tape			Procedure/Equipment:	Interface Meter	
Well height above ground (m)=	0.44			Depth to water surface (m)=	1.24	
Diameter of well (m)=	0.04			Static water level* (m)=	0.68	
Depth of installation* (m)=	3.42			Depth to bottom (m)=	1.83	
Length screened section (m)=	2.0			Free product thickness (mm)=	none	
Depth to top of screen* (m)=	0.42					
Calculations				**Notes**		
Depth of water (m)=	0.59			Evidence of sludge etc:	no	
Well volume of water (L)=	0.90			Evidence of freezing/siltation: (compare to installation record)		
Length screen collecting water (m)=	0.59					
Development/Purging Information						
Equipment:	Teflon tubing, with stainless steel ball valve					
Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
Aug-4, 4:15pm	3	6.4	7.18	2150	537	translucent, light brown, some silt that settles out
Water Sampling				**Soil Sampling**		
Date and time collected:	Aug-4, 4:14pm			Date and time collected:	Aug-5, 7:45pm	
Sample Number - Water:	10444			Sample Number - Soil:	Surface: 10490/91	
					Depth: 10492/93	
Sample containers:	1 L HDPE			Sample containers:	Whirlpaks	
	1 L Teflon				120 mL amber glass jar	
	250 mL Amber Glass (Bottle broke in transit to lab in Kingston)					
Procedure/Equipment:	Teflon tubing, with stainless steel ball valve			Procedure/Equipment:	Disposable scoops and nitrile gloves to sample, shovel to dig.	
Water description:	translucent, light brown, some silt that settles out			Soil description:	Surface: 0% vegetation cover at location of sample, 20% vegetation surrounding sample location.	
Filtration: (Y/N)	N				0-15cm: greyish brown medium grained sand with 30% small pebbles and <5% organics.	
Acidification: (Y/N)	N				15-40cm: yellowish brown fine grained silty sand with 30% pebbles and gravel.	
Sampling Equipment Decontamination: (Y/N)	Y			Sampling Equipment Decontamination: (Y/N)	Y (shovel)	
Number washes:	1			Number washes:	1	
Number rinses:	1			Number rinses:	1	

n/a=not applicable

*From ground surface. All other measurements are assumed to be from the top of the casing.

Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	05/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-3	Thermistor Location:		Tier II Disposal Facility		
Thermistor Number:	VT-5	Inclination:		Vertical		
Install Date:	26/08/2007	First Date Event:		05/08/2008	Last Date Event:	
Coordinates and Elevation:		N (m):	9610.4	E (m):	10348.5 Elev (masl):	43.7
Length of Cable (m):	9.5	3.2		No. of Beads:	13	
Datalogger Serial No:	02020218			Cable Serial No:		

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	26/08/2008	
Battery Levels (V)	Main 11.34	Aux 13.38

Manual Ground Temperature Readings

Bead	k-ohms	°C
1	9.199	11.611
2	10.81	8.265
3	12.538	5.244
4	14.765	1.973
5	16.742	-0.495
6	17.868	-1.760
7	19.206	-3.152
8	20.23	-4.1459

Bead	k-ohms	°C
9	21.29	-5.115
10	22.11	-5.831
11	22.72	-6.341
12	23.04	-6.605
13	23.8	-7.214

Observations and Proposed Maintenance

Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	05/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-3	Thermistor Location:		Tier II Disposal Facility		
Thermistor Number:	VT-6	Inclination:		Vertical		
Install Date:	26/08/2007	First Date Event:		05/08/2008	Last Date Event:	
Coordinates and Elevation:		N (m):	7615.4	E (m):	10315.6 Elev (masl):	44.0
Length of Cable (m):	9.3	3.2		No. of Beads:	13	
Datalogger Serial No:	02020219			Cable Serial No:		

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	26/08/2008	
Battery Levels (V)	Main 11.34	Aux 13.38

Manual Ground Temperature Readings

Bead	k-ohms	°C
1	8.557	13.131
2	10.359	9.142
3	11.806	6.464
4	13.662	3.519
5	15.730	0.726
6	17.413	-1.260
7	18.897	-2.841
8	20.200	-4.117

Bead	k-ohms	°C
9	21.250	-5.083
10	22.180	-5.890
11	22.810	-6.419
12	23.590	-7.048
13	24.070	-7.425

Observations and Proposed Maintenance

Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	05/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-3	Thermistor Location:		Tier II Disposal Facility		
Thermistor Number:	VT-7	Inclination:		Vertical		
Install Date:	26/08/2007	First Date Event:		05/08/2008	Last Date Event:	
Coordinates and Elevation:		N (m):	9588.2	E (m):	10307 Elev (masl):	43.1
Length of Cable (m):	10.4	3.2		No. of Beads:	15	
Datalogger Serial No:	02020360			Cable Serial No:		

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	26/08/2008	
Battery Levels (V)	Main 11.34	Aux 12.77

Manual Ground Temperature Readings

Bead	k-ohms	°C
1	7.858	14.939
2	10.061	9.746
3	11.713	6.625
4	13.625	3.574
5	15.848	0.578
6	17.118	-0.927
7	18.546	-2.479
8	19.551	-3.492

Bead	k-ohms	°C
9	20.520	-4.419
10	21.250	-5.081
11	21.960	-5.703
12	22.480	-6.144
13	22.950	-6.534
14	23.300	-6.818
15	23.500	-6.975

Observations and Proposed Maintenance

Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	05/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-3	Thermistor Location:		Tier II Disposal Facility		
Thermistor Number:	VT-8	Inclination:		Vertical		
Install Date:	26/08/2007	First Date Event:		05/08/2008	Last Date Event:	
Coordinates and Elevation:		N (m):	9583.7	E (m):	10337.5 Elev (masl):	43.3
Length of Cable (m):	10.3	3.2		No. of Beads:	15	
Datalogger Serial No:	02120062			Cable Serial No:		

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	26/08/2008	
Battery Levels (V)	Main 11.34	Aux 12.77

Manual Ground Temperature Readings

Bead	k-ohms	°C
1	8.486	13.307
2	10.297	9.266
3	11.841	6.403
4	13.963	3.084
5	16.267	0.066
6	17.635	-1.506
7	19.032	-2.979
8	20.170	-4.090

Bead	k-ohms	°C
9	21.150	-4.990
10	22.140	-5.854
11	22.940	-6.525
12	23.600	-7.055
13	24.110	-7.456
14	24.520	-7.767
15	24.950	-8.092

Observations and Proposed Maintenance

Annex Northeast Landfill - Year 1 Data

Figure:

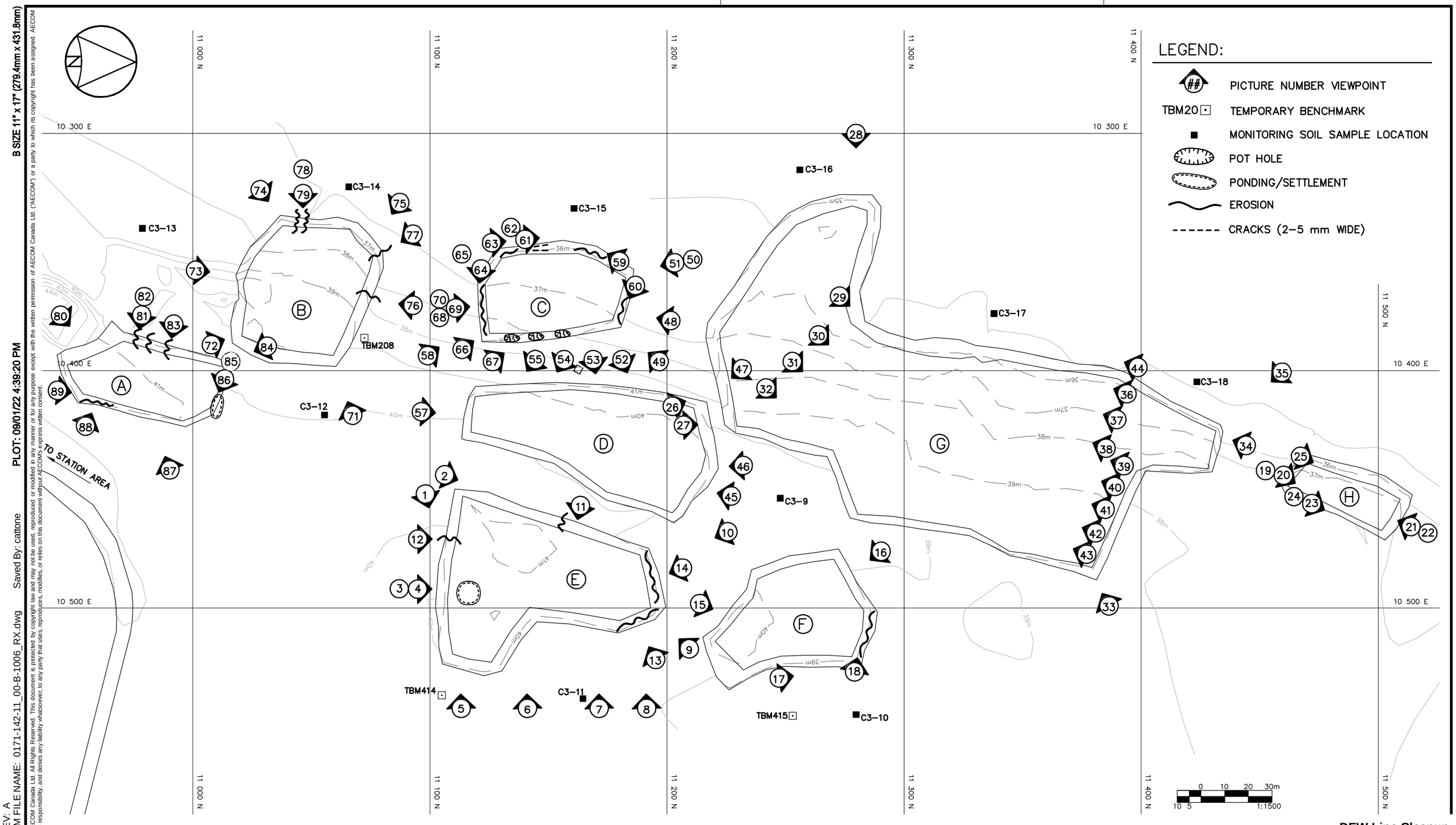
- CAM-3.6: Site Plan – Northeast Landfill

Tables:

- Landfill Visual Inspection – CAM-3 Shepherd Bay Northeast Landfill
- Northeast Landfill – Evaluation of Year 1 Soil Analytical Data
- Northeast Landfill – Year 1 (2008) Soil Data

Photographic Records:

- Photos 1 and 2
- Photos 3 and 4
- Photos 5 and 6



DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

AECOM

Northeast Landfill
Figure CAM-3.6

LANDFILL VISUAL INSPECTION

Site Name: CAM-3 Shepherd Bay

Landfill: Northeast Landfill

Date Inspected: August 6, 2008

Inspected By: Anwar Majid, P.Eng.

Signature:

Checklist Item	Present Yes/No	Location	Length (m)	Width (m)	Depth (m)	Extent	Description	Photographic Records (Pictures Provided on Data CD	Severity Rating	Additional Comments
Settlement/Ponding	Yes	See Figure CAM-3.6, Lobe E	10	10	N/A	Isolated	Ponding/settlement	Pictures 3-4	Acceptable	A depression was noted on the landfill surface. Water appears to have temporarily ponded in the area. It appears that the depression is due to improper grading.
		See Figure CAM-3.6, Lobe A	6	1	N/A	Isolated	Ponding/Settlement	Pictures 85-86		Two subtle depressions were noted on the landfill surface. Water appears to have temporarily ponded. There is potential for additional settlement and ponding to occur.
Erosion	Yes	See Figure CAM-3.6, Lobes E, C, B and A	N/A	N/A	N/A	Occasional	Surface Erosion	**Lobe E:** Pictures 11-12 **Lobe C:** Pictures 59, 60, 63-65, 68-70 **Lobe B:** Pictures 76-79 **Lobe A:** Pictures 81-83 and 88-89	Acceptable	Erosion was observed on the sideslopes at many locations. The erosion is due to migration of fines from the erosion resistant Type 2 material. Small erosion channels were also observed on sideslopes at many locations. The landfills are covered with erosion resistant Type 2 material but the gravel content of the surface fill appeared to be low; therefore, further erosion could occur over time.
			N/A	N/A	N/A	Isolated	Pot holes	**Lobe C:** Pictures 66, 67	Acceptable	Small pot holes resulting from surface erosion were noted on landfill surface of Lobe C. The number and size of pot holes may increase due to erosion.
Frost Action	Yes	See Figure CAM-3.6, Lobe C	N/A	N/A	N/A	Occasional	Tension Cracks	**Lobe C:** Pictures 61-62	Acceptable	Tension cracks approximately 2-5 mm wide were observed at irregular intervals near the toe of the west facing slope.
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Presence/ Condition of Monitoring Instruments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Other Features of Note.	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Overall Landfill Performance:	**Acceptable**									

Northeast Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2008	Comments
Copper	80	4.9+/-0.6	12	Measured concentrations within or less than 95% confidence interval for 17of 20 samples.	Surface samples at downgradient locations C3-15 (5.9 mg/kg), C3-17 (7.7 mg/kg) and C3-18 (6.4 mg/kg) were below the baseline max.
Nickel	80	<5.0	12	Measured concentrations within or less than 95% confidence interval for 12 of 20 samples.	Both samples at downgradient locations C3-12 (5.2 mg/kg surface and 5.4 mg/kg depth), C3-16 (5.9 mg/kg surface and 6.3 mg/kg depth), C3-17 (7.2 mg/kg surface and 5.9 mg/kg depth) and C3-18 (7.8 mg/kg surface and 6.9 mg/kg depth) were below the baseline max.
Cobalt	80	<5.0		Measured concentrations within 95% confidence interval (non-detect).	
Cadmium	80	<1.0		Measured concentrations within 95% confidence interval (non-detect).	
Lead	82	<10	13	Measured concentrations within 95% confidence interval (non-detect).	
Zinc	80	<15	45	Measured concentrations within or less than 95% confidence interval for 16 of 20 samples.	Depth sample at downgradient location C3-09 (33 mg/kg) and surface samples at downgradient locations C3-15 (22 mg/kg), C3-17 (26 mg/kg) and C3-18 (20 mg/kg) were below the baseline max.
Chromium	80	<20	24	Measured concentrations within 95% confidence interval (non-detect).	
Arsenic	80	2.7+/-0.3	7	Measured concentrations within or less than 95% confidence interval for 16 of 20 samples.	Both samples at downgradient locaitons C3-12 (4.0 mg/kg surface and 4.8 mg/kg depth) and C3-18 (3.4 mg/kg surface and 3.3 mg/kg depth) were below the baseline max.
Mercury	55	<0.10		Measured concentrations within 95% confidence interval (non-detect).	
PCBs	79	<0.0030		Measured concentrations within 95% confidence interval (non-detect).	
TPH	95	85.70	1300	Measured concentrations within 95% confidence interval for 16 of 20 samples.	Surface samples at upgradient location C3-10 (145.5 mg/kg), and downgradient locations C3-09 (679 mg/kg), C3-15 (312 mg/kg) and C3-17 (144.55 mg/kg) were below the baseline max.

Northeast Landfill - Year 1 (2008) Soil Data

Sample #	Location	Date	Depth	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
Northeast Landfill - Baseline Concentrations				**4.9+/-0.6**	**<5.0**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**2.7+/-0.3**	**<0.10**	**<0.0030**	**85.7+/-39.8**			
Northeast Landfill - Maximum Concentrations				**12**	**12**	**<5.0**	**<1.0**	**13**	**45**	**24**	**7**	**<0.10**	**<0.0030**	**1300**			
Upgradient Soil Samples																	
08-10510/11	C3-10	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.8	< 0.10	<0.0030	145.5	< 10	5.5	140
08-10512/13	C3-10	2008	40	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.1	< 0.10	<0.0030	<10	< 10	< 4.0	< 9.0
08-10514/15	C3-11	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.0	< 0.10	<0.0030	65.8	< 10	7.8	58
08-10516/17	C3-11	2008	40	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.5	< 0.10	<0.0030	<10	< 10	< 4.0	< 9.0
Downgradient Soil Samples																	
08-10506/07	C3-09	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	2.1	< 0.10	<0.0030	679	< 10	39	640
08-10508/09	C3-09	2008	40	<3.0	<5.0	<5.0	<1.0	<10	33	<20	1.7	< 0.10	<0.0030	53.55	<10	5.05	48.5
08-10518/19	C3-12	2008	0	<3.0	5.2	<5.0	<1.0	<10	<15	<20	4.0	< 0.10	<0.0030	<10	< 10	< 4.0	< 9.0
08-10520/21	C3-12	2008	40	4.4	5.4	<5.0	<1.0	<10	<15	<20	4.8	< 0.10	<0.0030	37	< 10	< 4.0	37
08-10522/23	C3-13	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.9	< 0.10	<0.0030	<10	< 10	< 4.0	< 9.0
08-10524/25	C3-13	2008	40	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.2	< 0.10	<0.0030	<10	< 10	< 4.0	< 9.0
08-10526/27	C3-14	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	2.0	< 0.10	<0.0030	39	< 10	< 4.0	39
08-10528/29	C3-14	2008	40	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	1.5	< 0.10	<0.0030	85	< 10	11	74
08-10530/31	C3-15	2008	0	5.9	<5.0	<5.0	<1.0	<10	22	<20	0.77	< 0.10	<0.0030	312	< 10	12	300
08-10532/33	C3-15	2008	40	4.7	<5.0	<5.0	<1.0	<10	<15	<20	1.6	< 0.10	<0.0030	39	< 10	< 4.0	39
08-10534/35	C3-16	2008	0	5.4	5.9	<5.0	<1.0	<10	<15	<20	2.6	< 0.10	<0.0030	104.5	<10	4.5	100
08-10536/37	C3-16	2008	40	5.5	6.3	<5.0	<1.0	<10	<15	<20	2.4	< 0.10	<0.0030	<10	<10	< 4.0	< 9.0
08-10538/39	C3-17	2008	0	7.7	7.2	<5.0	<1.0	<10	26	<20	2.2	< 0.10	<0.0030	144.55	<10	4.55	140
08-10540/41	C3-17	2008	40	4.0	5.9	<5.0	<1.0	<10	<15	<20	2.3	< 0.10	<0.0030	16	<10	< 4.0	16
08-10542/43	C3-18	2008	0	6.4	7.8	<5.0	<1.0	<10	20	<20	3.4	< 0.10	<0.0030	51	<10	< 4.0	51
08-10544/45	C3-18	2008	40	5.5	6.9	<5.0	<1.0	<10	<15	<20	3.3	< 0.10	<0.0030	20	<10	< 4.0	20

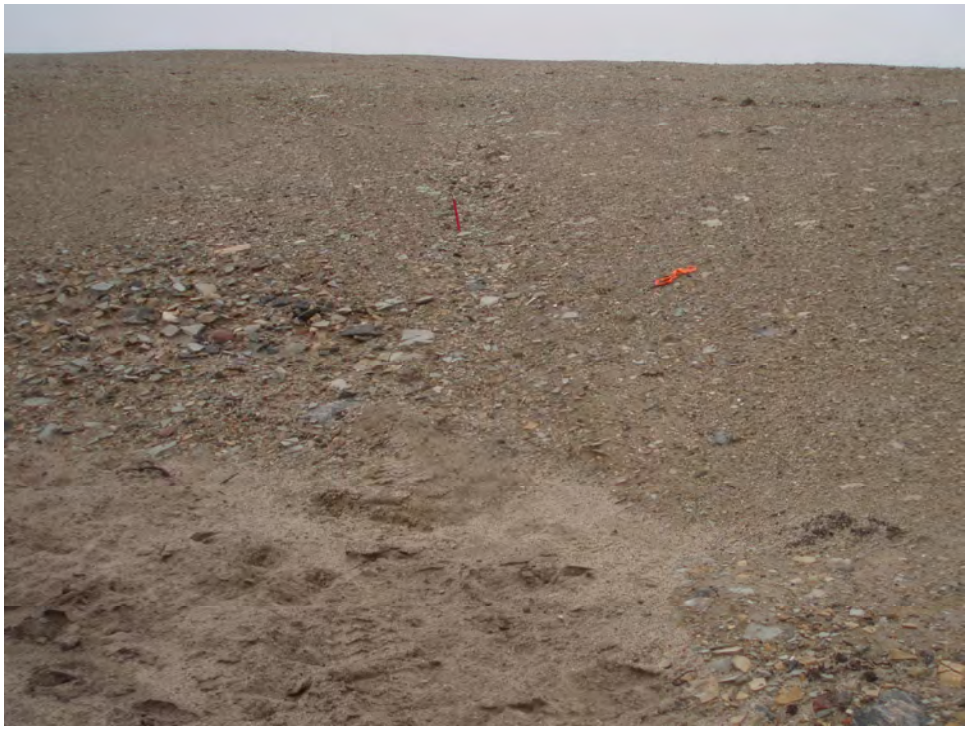
Photograph 1. Panorama - Looking NE From Northwestern Corner ↑

Photograph 2. Looking Approximately W from Toe of the Slope ↑

Photograph 3. Landfill Top Surface - Looking Approximately NE ↑

Photograph 4. Landfill Top Surface - Looking Approximately SE ↑

Photograph 5. Looking Towards Lobe B Approximately S ↑



Photograph 6. Erosion Channel (3x0.15m) - Looking Approximately S ↑

Annex USAF Landfill- Year 1 Data

Figures:

- CAM-3.7: Site Plan – USAF Landfill
- Thermal Monitoring Annual Report – Tier II Disposal Facility

Tables:

- Landfill Visual Inspection – CAM-3 Shepherd Bay USAF Landfill
- USAF Landfill – Evaluation of Year 1 Soil Analytical Data
- USAF Landfill – Year 1 (2008) Soil Data
- USAF Landfill – Year 1 (2008) Groundwater Data

Photographic Records:

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

Monitoring Well Sampling Records:

- Well MW-12
- Well MW-13
- Well MW-14
- Well MW-15

Thermistor Annual Maintenance Records:

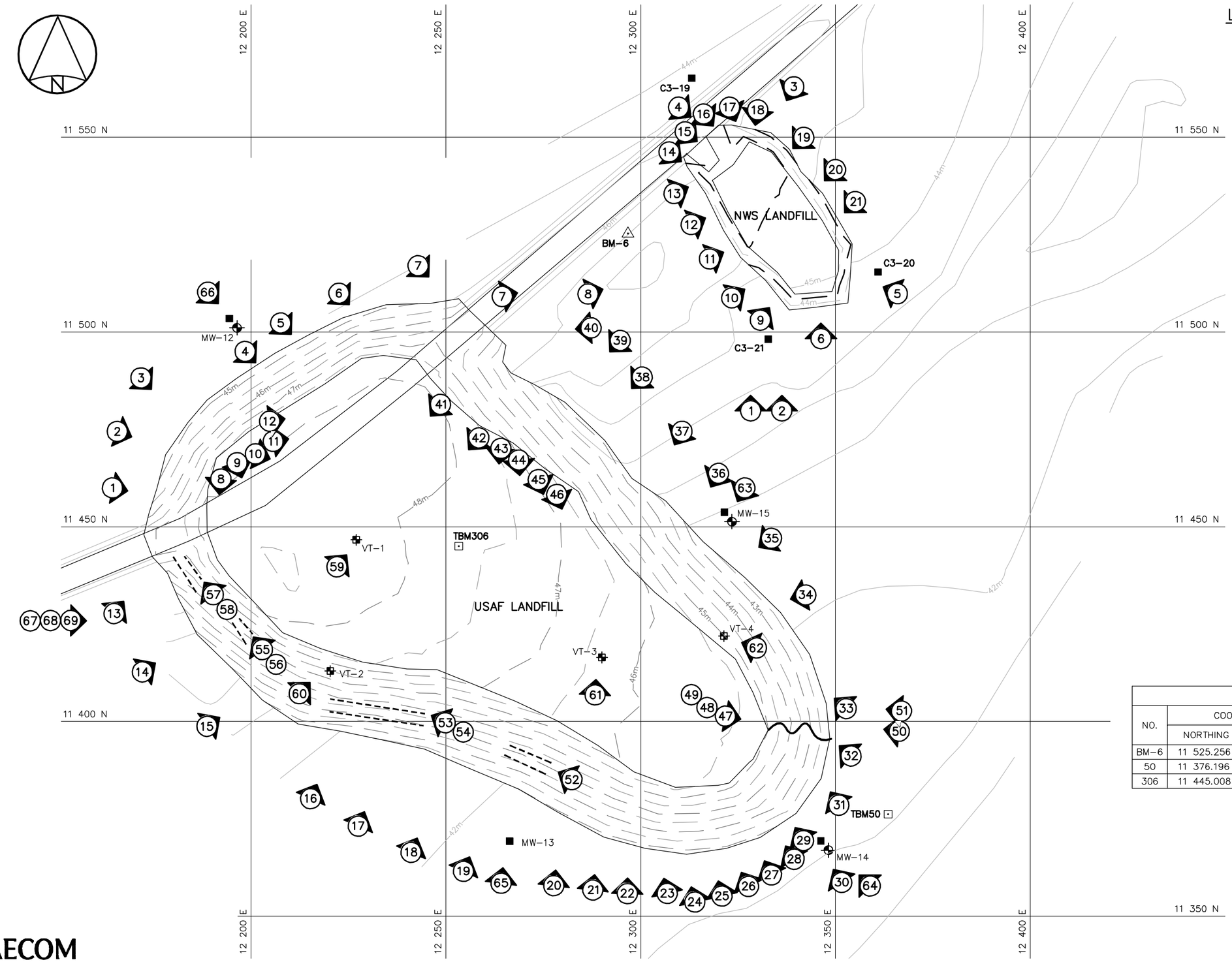
- VT-1
- VT-2
- VT-3
- VT-4

USAF Landfill – Evaluation of Ground Temperature Data

Ground temperature profiles for vertical thermistors VT-1 to VT-4 are attached, showing ground temperatures curves since September, 2007. The table shows the depth of active layer as defined by the 0°C isotherm for August 5, 2008.

Summary of USAF Landfill Thermal Results				
	VT-1	VT-2	VT-3	VT-4
Depth (m) of 0°C Isotherm (Aug 5/08)	2.09	2.21	2.42	NaN

The inferred maximum active layer depths noted above are equal, or slightly greater than the thickness of the 2.1 metre granular cover over the Tier II soil; the active layer is currently penetrating the upper level of the landfill contents in come areas. However, ground temperatures are expected to continue to decline.



LEGEND:

- (##) PICTURE NUMBER VIEWPOINT
- CM27 SURVEY CONTROL MONUMENT
- TBM20 TEMPORARY BENCHMARK
- MONITORING WELL LOCATION
- VT VERTICAL THERMISTOR
- MONITORING SOIL SAMPLE LOCATION
- EROSION
- CRACKS (3–5 mm WIDE)

MONITORING WELLS			
NO.	COORDINATES		GROUND ELEV.
	NORTHING	EASTING	
MW–12	11 501.1	12 196.4	44.9
MW–13	11 366.9	12 268.4	42.4
MW–14	11 367.0	12 348.2	42.2
MW–15	11 451.3	12 323.4	43.0

THERMISTORS			
NO.	COORDINATES		GROUND ELEV.
	NORTHING	EASTING	
VT–1	11 446.1	12 227.0	48.3
VT–2	11 413.0	12 220.3	46.7
VT–3	11 416.4	12 290.0	46.4
VT–4	11 421.9	12 321.4	45.1

BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
BM–6	11 525.256	12 296.706	–	25mm DIA. STEEL PIPE
50	11 376.196	12 363.492	42.229	REBAR – STONE RING
306	11 445.008	12 253.275	45.804	NAIL

0 10 20 30m
10 5 1:1000

DEW Line Cleanup
Landfill Monitoring Plan
CAM-3 Shepherd Bay

AECOM

USAF and NWS Landfills
Figure CAM-3.7

THERMAL MONITORING ANNUAL DATA ANALYSIS

Site: **CAM-3 Shepherd Bay**
Landfill: **USAF Landfill**

Design Infomation:

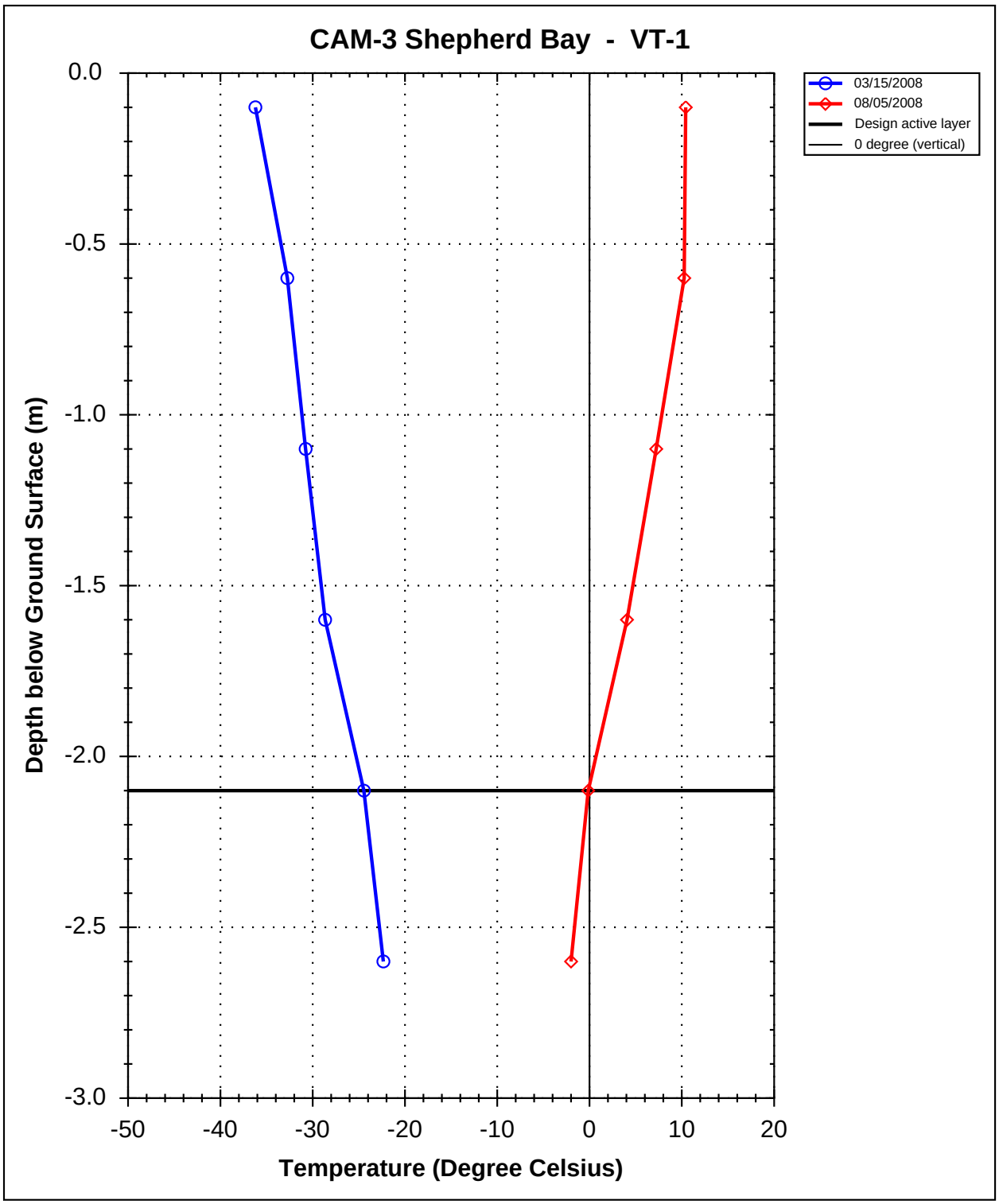
Design Active Layer (m):	-2.1
Mean Active Layer (m):	-1.5
1:100 Year Active Layer (m):	-2.0
Mean Thawing Index (degC Days):	450
Mean Freezing Index (degC Days):	5660
1:100 Year Thawing Index (degC Days):	810

Maximum Active Layer (m):

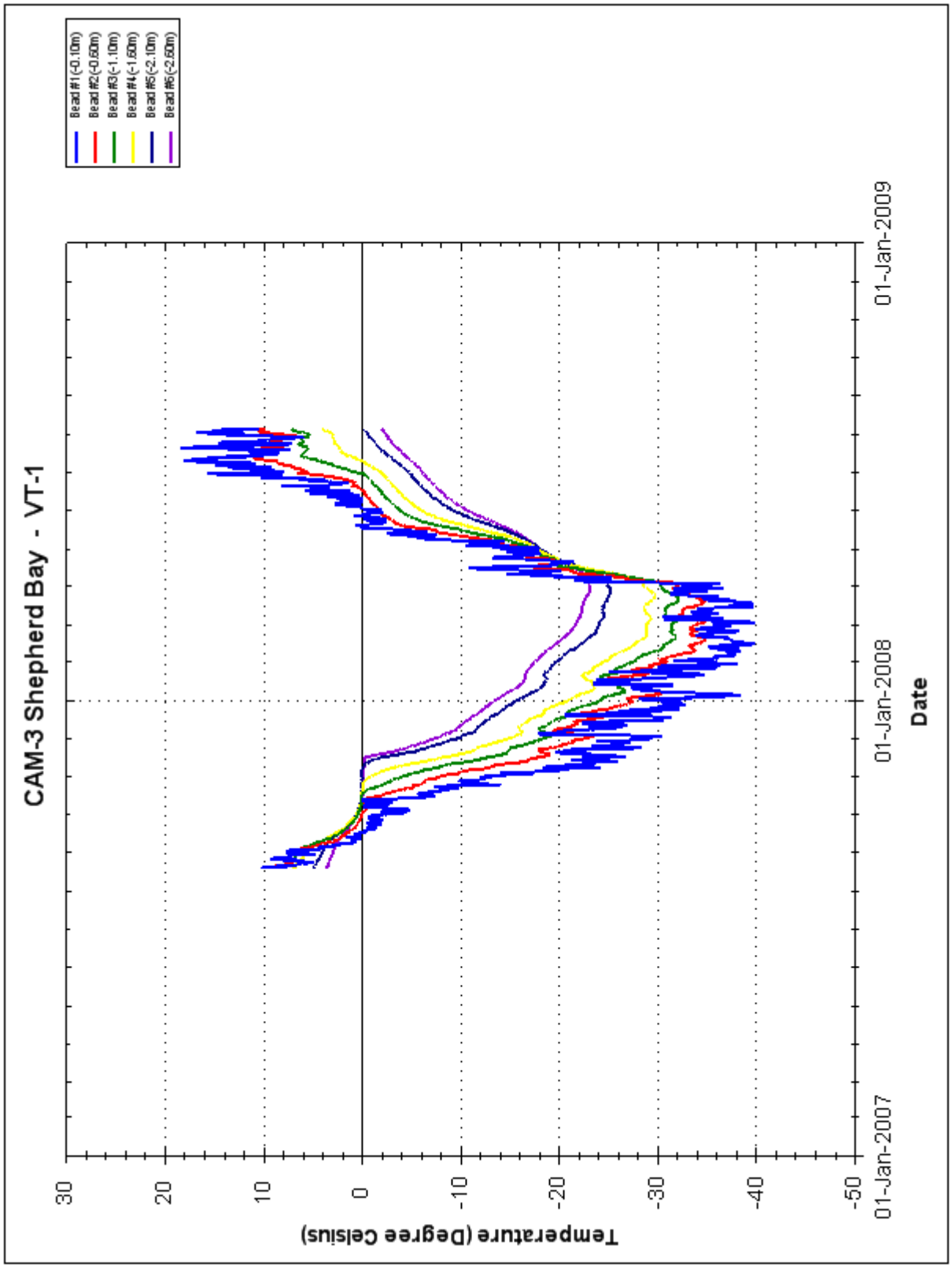
	VT-1	VT-2	VT-3	VT-4
2007	-2.42	-0.51	-3.60	NaN
2008	-2.09	-2.21	-2.42	NaN

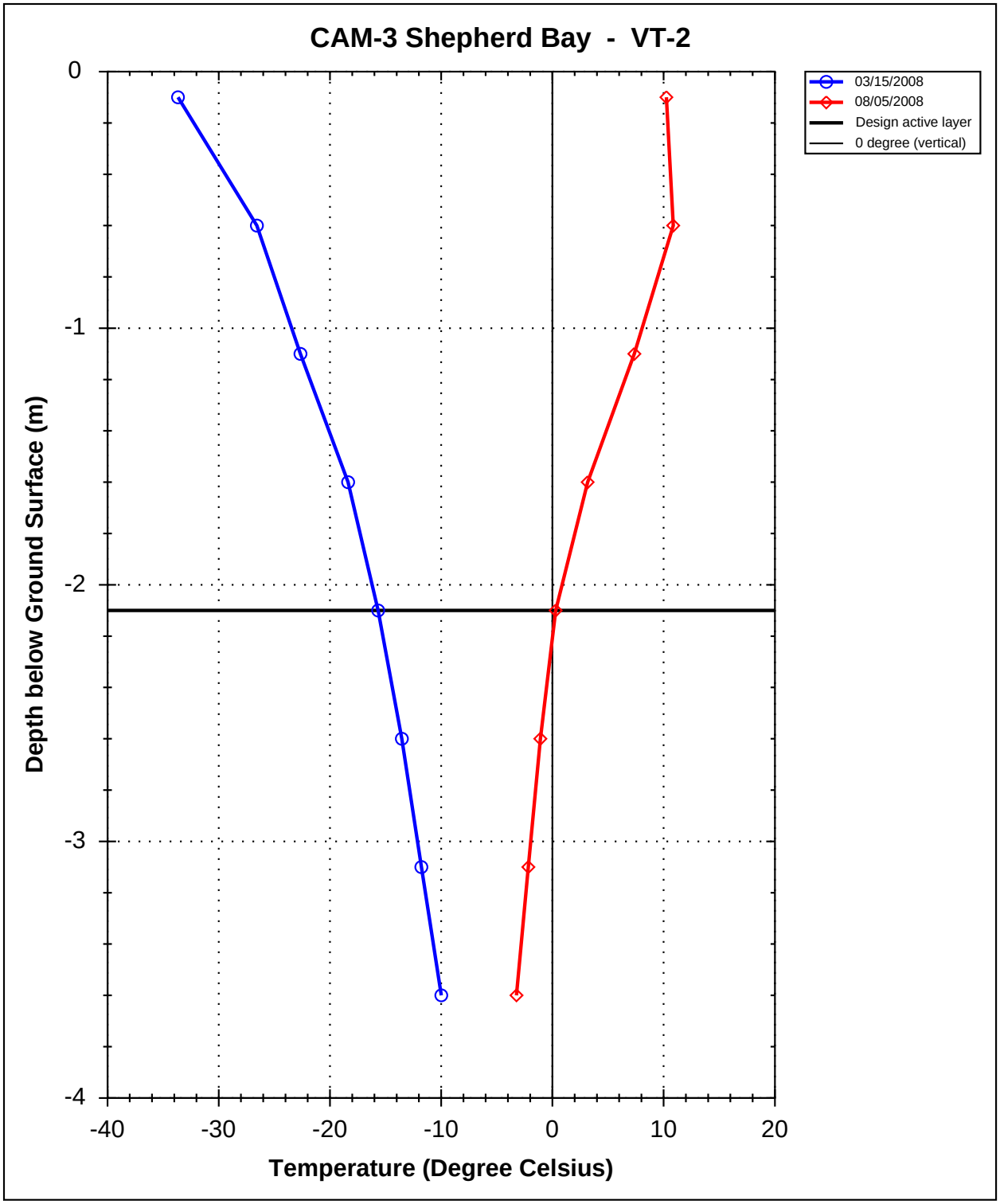
Thawing Index and Freezing Index:

	TI	FI	max AL	min AL	average AL
2007	548	5509	-0.51	-3.60	-2.18
2008	636	5892	-2.09	-2.42	-2.24

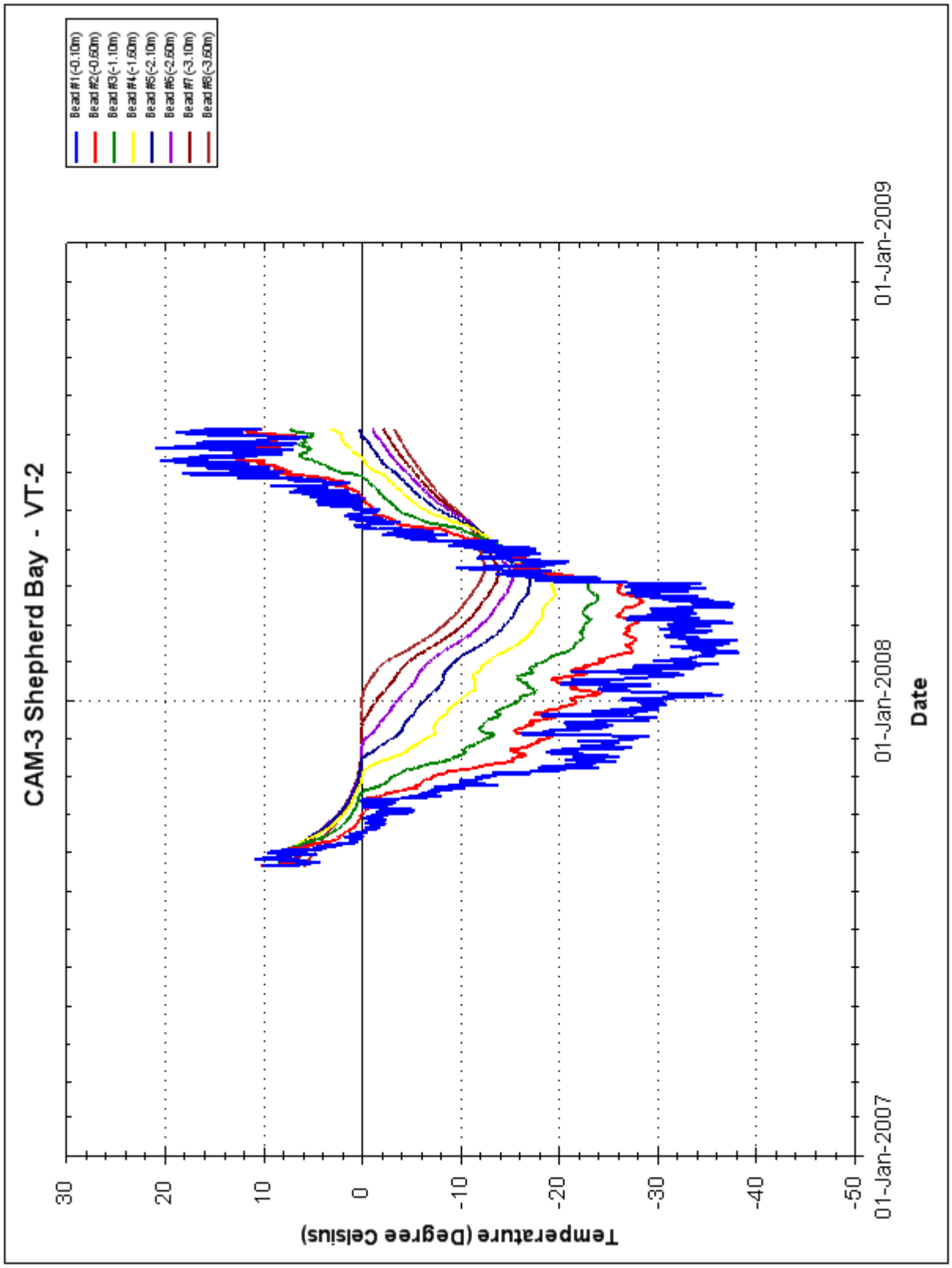

CAM-3 Shepherd Bay - VT-1
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
Depth below Ground Surface (m)
-50
-40
-30
-20
-10
0
10
20
Temperature (Degree Celsius)
03/15/2008
08/05/2008
Design active layer
0 degree (vertical)

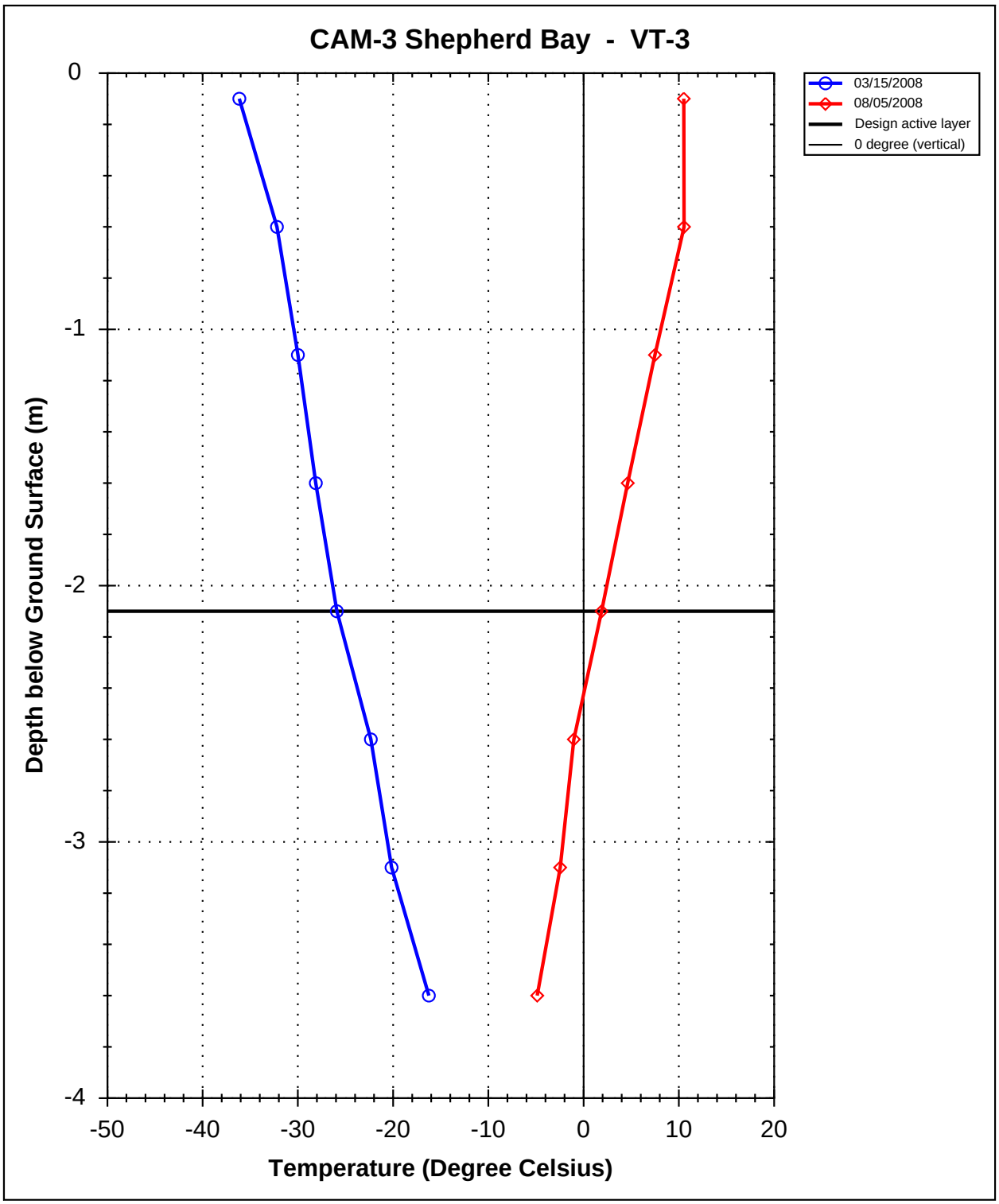
THERMAL MONITORING ANNUAL DATA ANALYSIS



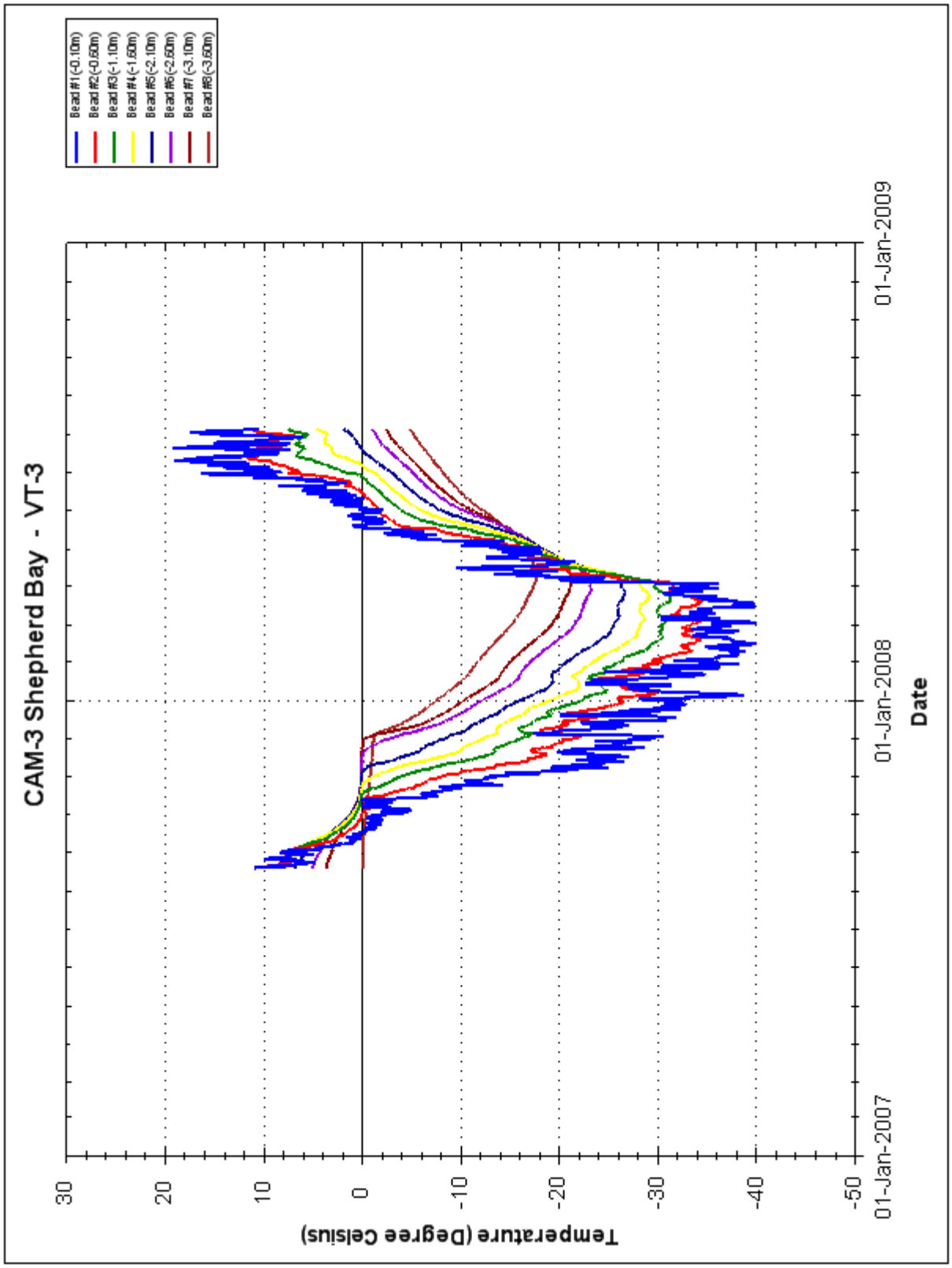

CAM-3 Shepherd Bay - VT-2
0
-1
-2
-3
-4
-40
-30
-20
-10
0
10
20
Depth below Ground Surface (m)
Temperature (Degree Celsius)
03/15/2008
08/05/2008
Design active layer
0 degree (vertical)

THERMAL MONITORING ANNUAL DATA ANALYSIS




CAM-3 Shepherd Bay - VT-3
03/15/2008
08/05/2008
Design active layer
0 degree (vertical)
Depth below Ground Surface (m)
0
-1
-2
-3
-4
-50
-40
-30
-20
-10
0
10
20
Temperature (Degree Celsius)

THERMAL MONITORING ANNUAL DATA ANALYSIS



LANDFILL VISUAL INSPECTION

Site Name: CAM-3 Shepherd Bay

Landfill: USAF Landfill

Date Inspected: August 4, 2008

Inspected By: Anwar Majid, P.Eng.

Signature:

Checklist Item	Present Yes/No	Location	Length (m)	Width (m)	Depth (m)	Extent	Description	Photographic Records (Pictures Provided on Data CD	Severity Rating	Additional Comments
Settlement	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Erosion	Yes	See Figure CAM-3.7	11	0.15-0.2	N/A	Isolated	Surface runoff erosion channel	Pictures 47-49 and 50-51 on CD	Acceptable	Surface runoff has eroded a small channel down slope of the landfill. Erosion appears to have occurred during spring due to some fines migration from the erosion resistant Type 2 material as the slope natural stabilizes. Minor erosion was also observed in the vicinity of erosion channel.
Frost Action	Yes	See Figure CAM-3.7	N/A	N/A	N/A	Occasional	Tension cracks	Pictures 52-58 on CD	Acceptable	Tension cracks approximately 2-5 mm wide were observed at irregular intervals on the lower half of the south facing slope.
Animal Burrows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Vegetation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Staining	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Vegetation Stress	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Seepage Points	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Debris Exposed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Presence/ Condition of Monitoring Instruments	Yes	See Figure Cam-3.7; VT-1 to VT-4 and MW-12 to MW-15	N/A	N/A	N/A	N/A	N/A	Pictures 59-62 of thermistor cables and Pictures 63-66 of monitoring wells	Acceptable	All thermistor cables and data loggers were in good condition except data logger VT-4 which had hardware problems. This data logger was shipped back for repair/replacement. Data was downloaded from all data loggers but VT-4. The protective casings for all instruments were also in good condition.
Other Features of Note.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Overall Landfill Performance:	**Acceptable**									

USAF Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2008	Comments
Copper	47	5.2+/-1.6	36	Measured concentrations within or less than 95% confidence interval with one exception.	Depth sample at upgradient location MW-12 (7.7 mg/kg) was below the baseline max.
Nickel	42	<5.0	8	Measured concentrations within or less than 95% confidence interval with one exception.	Depth sample at upgradient locaiton MW-12 (8.8 mg/kg) was above the baseline max of 8 mg/kg.
Cobalt	42	<5.0	19	Measured concentrations within 95% confidence interval (non-detect).	
Cadmium	42	<1.0		Measured concentrations within 95% confidence interval (non-detect).	
Lead	47	<10	11	Measured concentrations within 95% confidence interval (non-detect).	
Zinc	47	<15	100	Measured concentrations within or less than 95% confidence interval with one exception.	Depth sample at downgradient location MW-14 (18 mg/kg) was below the baseline max.
Chromium	42	<20		Measured concentrations within 95% confidence interval (non-detect).	
Arsenic	42	1.3+/-0.3	4	Measured concentrations within or less than 95% confidence interval for 5 of 8 samples.	Depth samples at upgradient location MW-12 (3.0 mg/kg) and downgradient location MW-14 (1.7 mg/kg) were below the baseline max. Surface sample at downgradient location MW-14 (6.9 mg/kg) was above the baseline max of 4 mg/kg.
Mercury	33	<0.10		Measured concentrations within 95% confidence interval (non-detect).	
PCBs	42	<0.0030		Measured concentrations within 95% confidence interval (non-detect).	
TPH	50	<40	1200	Measured concentrations within or less than 95% confidence interval for 4 of 8 samples.	Both samples at upgradient location MW-12 (52 mg/kg surface and 73.15 mg/kg depth), surface sample at downgradient location MW-14 (44 mg/kg) and depth sample at downgradient location MW-15 (93.1 mg/kg) were below the baseline max.

USAF Landfill - Year 1 (2008) 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
USAF Landfill - Baseline Concentrations				**5.2+/-1.6**	**<5.0**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**1.3+/-0.3**	**<0.10**	**<0.0030**	**<40**			
USAF Landfill - Maximum Concentrations				**36**	**8**	**19**	**<1.0**	**11**	**100**	**<20**	**4**	**<0.10**	**<0.0030**	**1200**			
Upgradient Soil Samples																	
08-10450/51	MW-12	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.38	< 0.10	<0.0030	52	< 10	19	33
08-10452/53	MW-12	2008	40	7.7	8.8	<5.0	<1.0	<10	<15	<20	3.0	< 0.10	<0.0030	73.15	<10	8.65	64.5
Downgradient Soil Samples																	
08-10454/55	MW-13	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.8	< 0.10	<0.0030	17.7	< 10	6.7	11
08-10456/57	MW-13	2008	50	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.8	< 0.10	<0.0030	31.1	< 10	4.1	27
08-10458/59	MW-14	2008	0	4.2	<5.0	<5.0	<1.0	<10	18	<20	6.9	< 0.10	<0.0030	44	< 10	< 4.0	44
08-10460/61	MW-14	2008	40	3.6	<5.0	<5.0	<1.0	<10	<15	<20	1.7	< 0.10	<0.0030	33	<10	<4.0	33
08-10462/63	MW-15	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.3	< 0.10	<0.0030	32.8	< 10	4.8	28
08-10464/65	MW-15	2008	40	3.5	<5.0	<5.0	<1.0	<10	<15	<20	1.4	< 0.10	<0.0030	93.1	< 10	5.1	88

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USAF Landfill - Year 1 (2008) 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
Downgradient Groundwater Samples																
08-10445/46	MW-13	2008	0.082	0.024	0.0043	<0.0010	0.0050	0.058	0.039	0.0050	< 0.0004	2.2		< 0.050	< 0.50	< 1.0
08-10447	MW-14	2008	0.032	0.020	0.0038	<0.0010	0.0096	0.66	0.017	0.0050	< 0.0004	0.15		< 0.050	< 0.50	< 1.0
08-10448	MW-15	2008	0.0093	0.016	<0.0030	<0.0010	0.0032	0.026	0.025	0.0037	< 0.0004	0.098		< 0.050	< 0.50	< 1.0

Photograph 1. West Facing Slope - Looking SE From Toe of the Slope ↑

Photograph 2. East Facing Slope - Looking NW From Toe of Slope ↑

Photograph 3. East Facing Slope - Looking SW From Toe of Slope ↑

Photograph 4. East Facing Slope - Looking NW From Toe of Slope ↑

Photograph 5. Landfill Top Surface - Looking S ↑

Photograph 6. East Facing Slope - Erosion Channel, 11 m by 150 mm on Slope, Looking NW From Toe ↑

Photograph 7. Panorama - Looking Approximately E From the Access Road ↑

Table B-47: Monitoring Well Sampling Log (MW#12), 2008

Site Name:	CAM-3					
Date of Sampling Event:	05-Aug-08					
Names of Samplers:	Bryarly McEachern, Peter Shock, Mike Mosclow					
Monitoring Well ID:	MW-12					
Facility:	USAF Landfill					
Water Sample Measured Data						
Condition of Well:	Good					
Procedure/Equipment:	Measuring Tape			Procedure/Equipment:	Interface Meter	
Well height above ground (m)=	0.51			Depth to water surface (m)=	n/a (dry)	
Diameter of well (m)=	0.04			Static water level* (m)=		
Depth of installation* (m)=	3.53			Depth to bottom (m)=	1.31	
Length screened section (m)=	2.0			Free product thickness (mm)=	n/a	
Depth to top of screen* (m)=	0.53					
Calculations				**Notes**		
Depth of water (m)=				Evidence of sludge etc:	no	
Well volume of water (L)=				Evidence of freezing/siltation: (compare to installation record)		
Length screen collecting water (m)=	0.27					
Development/Purging Information						
Equipment:	Teflon tubing, with stainless steel ball valve					
Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
Well Dry						
Water Sampling				**Soil Sampling**		
Date and time collected:	Aug-5, 9:00am			Date and time collected:	aug-5, 1:30pm	
Sample Number - Water:	no sample collected			Sample Number - Soil:	Surface: 10450/51	
					Depth: 10452/53	
Sample containers:	n/a			Sample containers:	Whirlpaks	
					120 mL amber glass jar	
Procedure/Equipment:	Teflon tubing, with stainless steel ball valve			Procedure/Equipment:	Disposable scoops and nitrile gloves to sample, shovel to dig.	
Water description:				Soil description:	Surface: 100% vegetation cover.	
Filtration: (Y/N)					0-15cm: Organic mat with dark brown soil.	
Acidification: (Y/N)					15-40cm: Medium brown sand	
Sampling Equipment Decontamination: (Y/N)				Sampling Equipment Decontamination: (Y/N)	Y(shovel)	
Number washes:				Number washes:	1	
Number rinses:				Number rinses:	1	

n/a=not applicable

*From ground surface. All other measurements are assumed to be from the top of the casing.

Table B-48: Monitoring Well Sampling Log (MW#13), 2008

Site Name:	CAM-3					
Date of Sampling Event:	05-Aug-08					
Names of Samplers:	Bryarly McEachern, Peter Shock, Mike Mosclow					
Monitoring Well ID:	MW-13					
Facility:	USAF					
Water Sample Measured Data						
Condition of Well:	Good					
Procedure/Equipment:	Measuring Tape			Procedure/Equipment:	Interface Meter	
Well height above ground (m)=	0.39			Depth to water surface (m)=	0.19	
Diameter of well (m)=	0.04			Static water level* (m)=	0	
Depth of installation* (m)=	3.6			Depth to bottom (m)=	1.73	
Length screened section (m)=	2.0			Free product thickness (mm)=	none	
Depth to top of screen* (m)=	0.6					
Calculations				**Notes**		
Depth of water (m)=	1.54			Evidence of sludge etc:	no	
Well volume of water (L)=	2.3			Evidence of freezing/siltation: (compare to installation record)		
Length screen collecting water (m)=	0.74					
Development/Purging Information						
Equipment:	Teflon tubing, with stainless steel ball valve					
Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
5-Aug, 9:15am	7	9.6	7.89	1809	449	Slightly milky, pale gray translucent, no odour, no sheen. Temp may be biased high (+3°C) compared to other 2008 well logs
Water Sampling				**Soil Sampling**		
Date and time collected:	Aug-5, 10:00am			Date and time collected:	Aug-5, 2:00pm	
Sample Number - Water:	10445, 10446 (dup)			Sample Number - Soil:	Surface: 10454/55	
					Depth: 10456/57 depth	
Sample containers:	1 L HDPE			Sample containers:	Whirlpaks	
	1 L Teflon				120 mL amber glass jar	
	250 mL Amber Glass					
Procedure/Equipment:	Teflon tubing, with stainless steel ball valve			Procedure/Equipment:	Disposable scoops and nitrile gloves to sample, shovel to dig.	
Water description:	pale milky grey, translucent, some fines settle out			Soil description:	Surface: 100% vegetation cover.	
Filtration: (Y/N)	N				0-10cm: dark brown humus.	
Acidification: (Y/N)	N				10-30cm: greyish brown medium grain sand, 5% pebbles, 10% gravel/cobbles. 35cm: Water seepage,	
					40-50cm: 60% medium to coarse grain light brown sand, 20% pebbles and 20% gravel. Saturated	
Sampling Equipment Decontamination: (Y/N)	Y			Sampling Equipment Decontamination: (Y/N)	Y(shovel)	
Number washes:	1			Number washes:	1	
Number rinses:	1			Number rinses:	1	

n/a=not applicable

*From ground surface. All other measurements are assumed to be from the top of the casing.

Table B-49: Monitoring Well Sampling Log (MW#14), 2008

Site Name:	CAM-3					
Date of Sampling Event:	05-Aug-08					
Names of Samplers:	Bryarly McEachern, Peter Shock, Mike Mosclow					
Monitoring Well ID:	MW-14					
Facility:	USAF Landfll					
Water Sample Measured Data						
Condition of Well:	Good, looks new					
Procedure/Equipment:	Measuring Tape			Procedure/Equipment:	Interface Meter	
Well height above ground (m)=	0.53			Depth to water surface (m)=	0.74	
Diameter of well (m)=	0.04			Static water level* (m)=	0.21	
Depth of installation* (m)=	3.51			Depth to bottom (m)=	1.51	
Length screened section (m)=	2.0			Free product thickness (mm)=	n/a	
Depth to top of screen* (m)=	0.51					
Calculations				**Notes**		
Depth of water (m)=	0.77			Evidence of sludge etc:	no	
Well volume of water (L)=	1.17			Evidence of freezing/siltation: (compare to installation record)		
Length screen collecting water (m)=	0.47					
Development/Purging Information						
Equipment:	Teflon tubing, with stainless steel ball valve					
Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
Aug-5, 10:30am	1	6.7	-	1790	694	medium greyish brown, silty, translucent
	1					more silt than first liter, translucient
	1.5					darker/murker than previous water, brown in colour, very silty, translucent
Water Sampling				**Soil Sampling**		
Date and time collected:	Aug-5, 11:00am			Date and time collected:	Aug-5, 2:30pm	
Sample Number - Water:	10447			Sample Number - Soil:	Surface: 10458/59	
					Depth: 10460/61	
Sample containers:	1 L HDPE			Sample containers:	Whirlpaks	
	1 L Teflon				120 mL amber glass jar	
	250 mL Amber Glass					
Procedure/Equipment:	Teflon tubing, with stainless steel ball valve			Procedure/Equipment:	Disposable scoops and nitrile gloves to sample, shovel to dig.	
Water description:	Brown, translucent, very silty			Soil description:	Surface: 100% vegetation cover.	
Filtration: (Y/N)	N				0-15cm: dark brown humus, roots extend to 15cm.	
Acidification: (Y/N)	N				15-40cm: silty fine to medium grain, gray sand with 10% gravel, 10% cobbles. 40-50cm: water seepage at 40cm, grey medium grain sand with 10% pebbles, 10% cobbles. Wet.	
Sampling Equipment Decontamination: (Y/N)	Y			Sampling Equipment Decontamination: (Y/N)	Y(shovel)	
Number washes:	1			Number washes:	1	
Number rinses:	1			Number rinses:	1	

n/a=not applicable

*From ground surface. All other measurements are assumed to be from the top of the casing.

Table B-50: Monitoring Well Sampling Log (MW#15).2008

Site Name:	CAM-3				
Date of Sampling Event:	05-Aug-08				
Names of Samplers:	Bryarly McEachern, Peter Shock, Mike Mosclow				
Monitoring Well ID:	MW-15				
Facility:	USAF Landfill				
Water Sample Measured Data					
Condition of Well:	Good, like new				
Procedure/Equipment:	Measuring Tape		Procedure/Equipment:	Interface Meter	
Well height above ground (m)=	0.64		Depth to water surface (m)=	0.26	
Diameter of well (m)=	0.04		Static water level* (m)=	-0.38	
Depth of installation* (m)=	3.43		Depth to bottom (m)=	1.7	
Length screened section (m)=	2.0		Free product thickness (mm)=	n/a	
Depth to top of screen* (m)=	0.43				
Calculations			**Notes**		
Depth of water (m)=	1.44		Evidence of sludge etc:	no	
Well volume of water (L)=	2.2		Evidence of freezing/siltation: (compare to installation record)		
Length screen collecting water (m)=	0.63				
Development/Purging Information					
Equipment:	Teflon tubing, with stainless steel ball valve				

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
Aug-5, 11:45am	6.5	4.9	6.9	-	94.4	Translucent, pale grey, milky colour

Water Sampling		**Soil Sampling**	
Date and time collected:	Aug-5, 1:15pm	Date and time collected:	Aug-5, 3:00pm
Sample Number - Water:	10448, 10449 (field blank)	Sample Number - Soil:	Surface: 10462/63
			Depth: 10464/65
Sample containers:	1 L HDPE x 2	Sample containers:	Whirlpaks
	1 L Teflon x 2		120 mL amber glass jar
	250 mL Amber Glass x 2		
Procedure/Equipment:	Teflon tubing, with stainless steel ball valve	Procedure/Equipment:	Disposable scoops and nitrile gloves to sample, shovel to dig.
Water description:	almost clear, pale grey, a little sediment/silt	Soil description:	Surface: 100% vegetation cover. 0-5cm: dark brown humus with roots. 5-15cm: greyish brown pebbly sand, some roots. 15-40cm: brownish grey gravelly medium to coarse grained sand, pebbles, (~20%), gravel (~40%)
Filtration: (Y/N)	N		
Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)	Y	Sampling Equipment Decontamination: (Y/N)	Y(shovel)
Number washes:	1	Number washes:	1
Number rinses:	1	Number rinses:	1

n/a=not applicable

*From ground surface. All other measurements are assumed to be from the top of the casing.

Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	05/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-3	Thermistor Location:	USAF Landfill			
Thermistor Number:	VT-1	Inclination:	Vertical			
Install Date:	18/08/2007	First Date Event:	05/08/2008	Last Date Event:		
Coordinates and Elevation:		N (m): 11447	E (m):	12226.9	Elev (masl):	48.8
Length of Cable (m):	5.8	Cable Length Above Ground (m):	3.2	No. of Beads:	6	
Datalogger Serial No:	02020211		Cable Serial No:			

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	18/08/2008	
Battery Levels (V)	Main 11.34	Aux 12.65

Manual Ground Temperature Readings

Bead	k-ohms	°C
1	8.135	14.202
2	10.025	9.820
3	11.350	7.267
4	13.231	4.161
5	16.413	-0.108
6	18.145	-2.059

Bead	k-ohms	°C

Observations and Proposed Maintenance

Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	05/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-3	Thermistor Location:	USAF Landfill			
Thermistor Number:	VT-2	Inclination:	Vertical			
Install Date:	18/08/2007	First Date Event:	05/08/2008	Last Date Event:		
Coordinates and Elevation:		N (m): 11412.9	E (m):	12220.3	Elev (masl):	46.6
Length of Cable (m):	6.7	Cable Length Above Ground (m):	3.2	No. of Beads:	8	
Datalogger Serial No:	02020216		Cable Serial No:			

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	18/08/2008	
Battery Levels (V)	Main 11.34	Aux 12.53

Manual Ground Temperature Readings

Bead	k-ohms	°C
1	7.471	16.020
2	9.878	10.125
3	11.394	7.188
4	13.895	3.182
5	16.162	0.194
6	17.318	-1.154
7	18.308	-2.229
8	19.325	-3.271

Bead	k-ohms	°C

Observations and Proposed Maintenance

Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	05/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-3	Thermistor Location:	USAF Landfill			
Thermistor Number:	VT-3	Inclination:	Vertical			
Install Date:	18/08/2007	First Date Event:	05/08/2008	Last Date Event:		
Coordinates and Elevation:		N (m): 11416.6	E (m):	12289.8	Elev (masl):	46.4
Length of Cable (m):	6.8	Cable Length Above Ground (m):	3.2	No. of Beads:	8	
Datalogger Serial No:	02020213		Cable Serial No:			

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	18/08/2008	
Battery Levels (V)	Main 11.34	Aux 12.90

Manual Ground Temperature Readings

Bead	k-ohms	°C
1	8.031	14.476
2	9.979	9.915
3	11.254	7.441
4	12.887	4.691
5	14.864	1.842
6	17.286	-1.118
7	18.543	-2.476
8	20.98	-4.838

Bead	k-ohms	°C

Observations and Proposed Maintenance

Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	05/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-3	Thermistor Location:	USAF Landfill			
Thermistor Number:	VT-4	Inclination:	Vertical			
Install Date:	19/08/2007	First Date Event:	05/08/2008	Last Date Event:		
Coordinates and Elevation:		N (m): 11422.1	E (m):	12321.3	Elev (masl):	45.1
Length of Cable (m):	6.5	Cable Length Above Ground (m):	2.9	No. of Beads:	8	
Datalogger Serial No:	00207019	Cable Serial No:				

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**No**	**Yes, See Comments Below**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	19/08/2008	
Battery Levels (V)	Main 11.34	Aux 11.44

Manual Ground Temperature Readings

Bead	k-ohms	°C
1	7.913	14.789
2	9.298	11.387
3	11.296	7.362
4	13.751	3.389
5	16.332	-0.010
6	17.587	-1.454
7	18.783	-2.726
8	19.76	-3.697

Bead	k-ohms	°C

Observations and Proposed Maintenance

The data could not be downloaded. There was an error message during downloading the data, i.e. "There was an error calculating data in raw file. This is usualy caused by a hardware problem or power interruption to the data logger". After liason with the manufecturer the data logger was disconnected, brought back and sent to manufecture for repair/replacement.

Annex NWS Landfill- Year 1 Data

Figures:

- CAM-3.7: Site Plan – NWS Landfill

Tables:

- Landfill Visual Inspection – CAM-3 Shepherd Bay NWS Landfill
- NWS Landfill – Evaluation of Year 1 Soil Analytical Data
- NWS Landfill – Year 1 (2008) Soil Data

Photographic Records:

- Photos 1 and 2
- Photos 3 and 4

LANDFILL VISUAL INSPECTION

Site Name: CAM-3 Shepherd Bay

Landfill: NWS Landfill

Date Inspected: August 5, 2008

Inspected By: Anwar Majid, P.Eng.

Signature:

Checklist Item	Present Yes/No	Location	Length (m)	Width (m)	Depth (m)	Extent	Description	Photographic Records (Pictures Provided on Data CD	Severity Rating	Additional Comments
Settlement	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Erosion	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Presence/ Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Other Features of Note.	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not observed	N/A
Overall Landfill Performance:	**Acceptable**									

NWS Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2008	Comments
Copper	21	<3.0	6	Measured concentrations within 95% confidence interval (non-detect).	
Nickel	21	<5.0	5	Measured concentrations within 95% confidence interval (non-detect) with one exception.	The depth sample at downgradient location C3-21 (7.7 mg/kg) was above the baseline max.
Cobalt	21	<5.0		Measured concentrations within 95% confidence interval (non-detect).	
Cadmium	21	<1.0		Measured concentrations within 95% confidence interval (non-detect).	
Lead	21	<10		Measured concentrations within 95% confidence interval (non-detect).	
Zinc	21	<15	23	Measured concentrations within 95% confidence interval (non-detect).	
Chromium	21	<20		Measured concentrations within 95% confidence interval (non-detect) with one exception.	The depth sample at downgradient location C3-21 (35 mg/kg) was above the baseline max.
Arsenic	21	1.4+/-0.9	10	Measured concentrations within or less than 95% confidence interval with one exception.	The depth sample at upgradient sample C3-19 (13 mg/kg) was above the baseline max of 10 mg/kg.
Mercury	15	<0.10		Measured concentrations within 95% confidence interval (non-detect).	
PCBs	21	<0.0030		Measured concentrations within 95% confidence interval (non-detect).	
TPH	15	<40	14	Measured concentrations within or less than 95% confidence interval for 4 of 6 samples.	Surface sample at downgradient location C3-20 (14 mg/kg) was below the baseline max. Surface sample at upgradient location C3-19 (504.1 mg/kg) was significantly above the baseline max of 14 mg/kg.

NWS Landfill - Year 1 (2008) 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 - Baseline Concentrations				**<3.0**	**<5.0**	**<5.0**	**<1.0**	**<10**	**<15**	**<20**	**1.4+/-0.9**	**<0.10**	**<0.0030**	**<40**			
NWS Landfill - Maximum Concentrations				**6**	**5**	**<5.0**	**<1.0**	**<10**	**23**	**<20**	**10**	**<0.10**	**<0.0030**	**14**			
Upgradient Soil Samples																	
08-10466/67	C3-19	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.85	<0.10	<0.0030	504.1	< 10	4.1	500
08-10468/69	C3-19	2008	45	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	13	<0.10	<0.0030	<10	< 10	< 4.0	< 9.0
Downgradient Soil Samples																	
08-10470/71	C3-20	2008	0	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.59	<0.10	<0.0030	14	<10	<4.0	14
08-10472/73	C3-20	2008	40	<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.90	<0.10	<0.0030	<10	< 10	< 4.0	< 9.0
08-10474/75	C3-21	2008		<3.0	<5.0	<5.0	<1.0	<10	<15	<20	0.84	<0.10	<0.0030	<10	< 10	< 4.0	< 9.0
08-10476/77	C3-21	2008	40	<3.0	7.7	<5.0	<1.0	<10	<15	35	1.0	<0.10	<0.0030	<10	< 10	< 4.0	< 9.0

Photograph 1. Panorama - Looking NE from VT-4 ↑

Photograph 2. Panorama - Looking S From Access Road ↑

Photograph 3. Looking NW From Toe of the Slope ↑

Photograph 4. Looking SW From Toe of the Slope Towards Slope ↑