Environment

Defence Construction Canada

FOX-2 Longstaff Bluff
Baseline Landfill Monitoring

Prepared by:

AECOM
17007 – 107th Avenue
Edmonton, AB, Canada T5S 1G3
www.aecom.com

780 486 7000 tel
780 486 7070 fax

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1. FOX-2 Longstaff Bluff

1.1 Introduction

The FOX-2 Longstaff Bluff DEW Line site is located on the western coast of Baffin Island, just south of the Baird Peninsula overlooking Rushmore Bay to the west and Piling Bay to the south and southeast. The exact location is 68° 53' 49" north latitude and 75° 09' 37" west longitude. The nearest community is Hall Beach, located 245 kilometres (km) to the west across Foxe Basin. The site consists of five areas: the Airstrip Area, the West Beach Area, the Station Area, the East Landing Area, and the East Beach Area.

FOX-2 was an auxiliary site within the original DEW Line system and was decommissioned in 1991. A Short Range Radar (SRR) station occupies a site approximately 150 metres (m) southeast of the former station area. NWS has a property reserve on this area, and an area at the Beach POL (Petroleum, Oil and Lubricant) where the SRR fuel tanks are located. The environmental cleanup and demolition of facilities commenced in 2009 and was completed in 2011.

Site investigations were carried out at FOX-2 in 1990, 1992, 1993 and 2005 as part of an assessment of the environmental status of DEW Line installations. The engineering component of the assessment was completed by AECOM and the environmental component by the Environmental Sciences Group (ESG). Input on traditional land use was provided by Nunavut Tunngavik Incorporated (NTI). Design requirements for landfill closure were based on the geophysical and geotechnical investigations performed by AECOM and EBA Engineering Consultants Ltd. (EBA), and the environmental data provided by ESG.

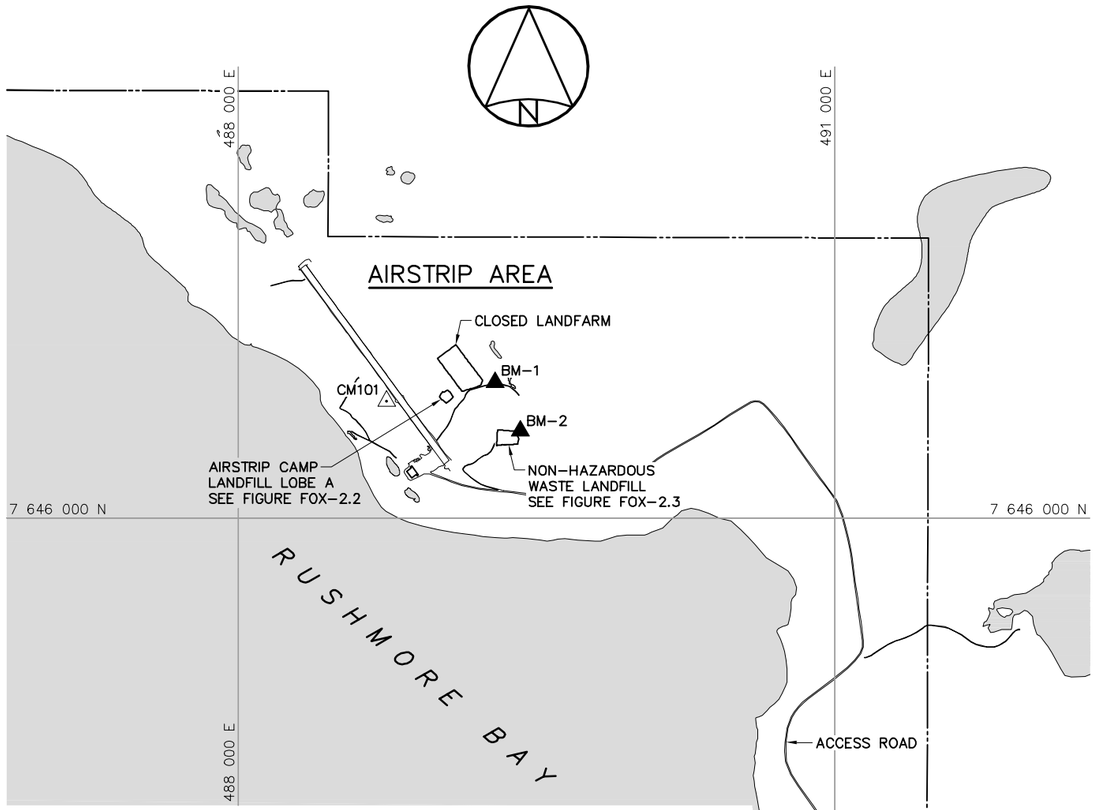
The cleanup included the closure and remediation of five existing landfills and the construction of two new engineered facilities: a Non-Hazardous Waste Landfill for the disposal of site debris and demolition waste, and a Tier II Disposal Facility for the disposal of contaminated soil. The existing and new landfills, as shown on the location plan, Figure FOX-2.1, include:

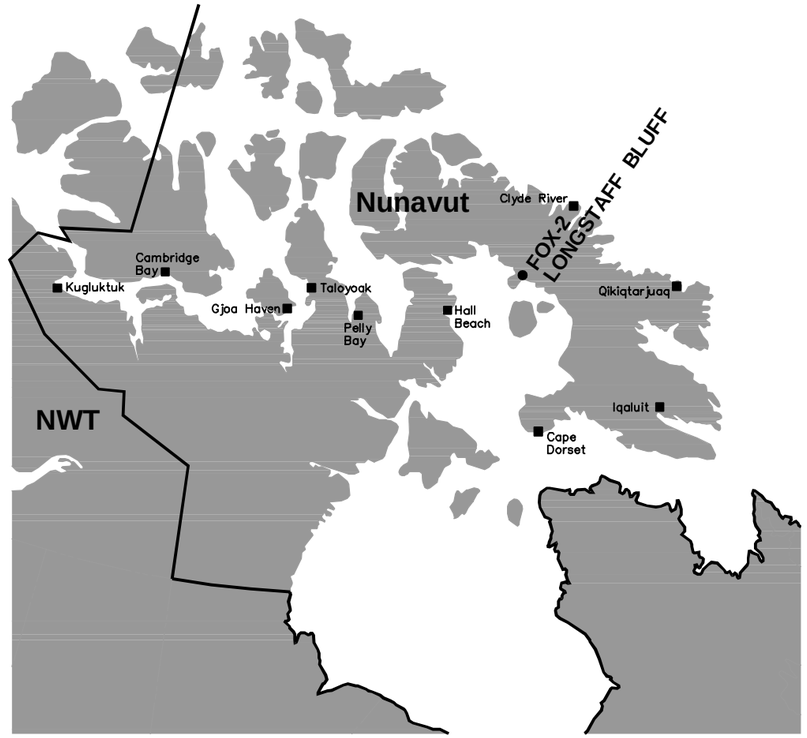
- Airstrip Camp Landfill Lobe A
- Non-Hazardous Waste Landfill (new)
- West Landfill Lobe E
- Tier II Disposal Facility (new)
- Upper Site Landfill Lobe A

In accordance with the NTI-DND Cooperation Agreement, landfill monitoring is carried out following cleanup of the site. The landfills where monitoring is required are listed above and identified in Figure FOX-2.1. They are described in further detail below. The monitoring schedule for the FOX-2 Longstaff Bluff site is provided in Table 1.1. Bolded italicised rows indicate the monitoring events completed internally by the DEW Line Clean-up project team.

This report has been prepared as a summary of the baseline assessment work carried out at FOX-2 Longstaff Bluff, and includes site investigation information as well as sample analytical data collection during environmental cleanup. Soil and groundwater sampling was done by ESG, with analytical work completed by Queen's University and the Royal Military College laboratories in Kingston, Ontario. The final construction inspection of the landfills was carried out by AECOM.

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





LOCATION OF LONGSTAFF BLUFF WITHIN NUNAVUT TERRITORY
SCALE: NTS

GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

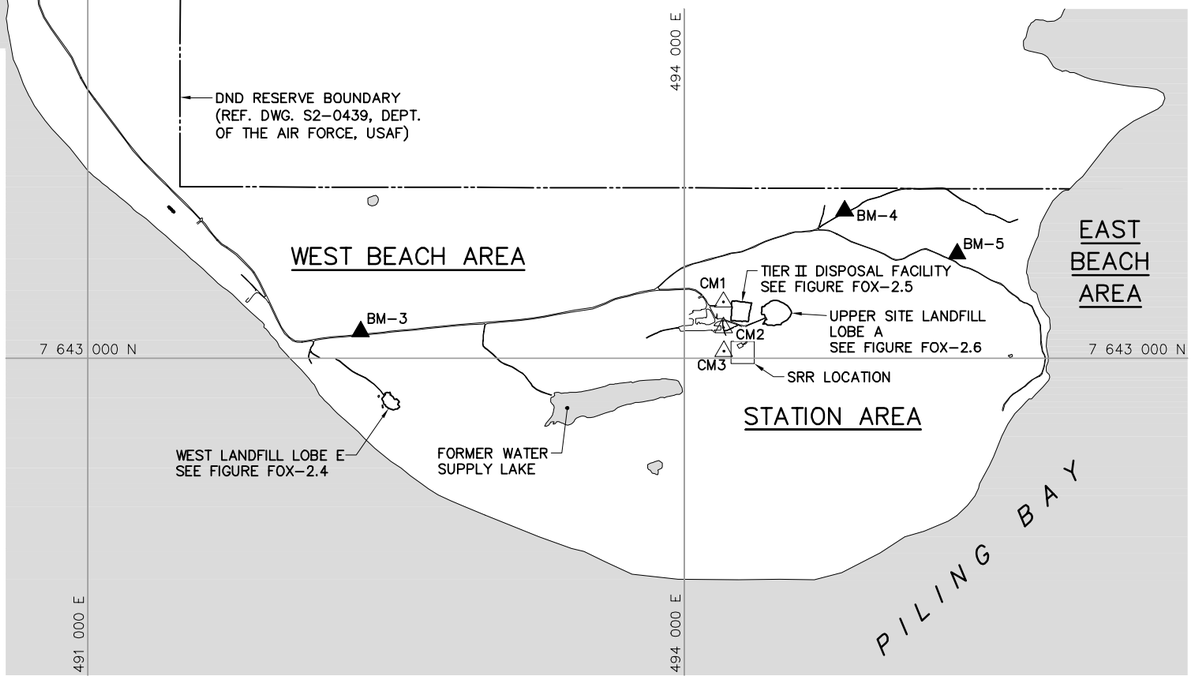
- △ CM1 — SURVEY CONTROL MONUMENT (4)
- ▲ BM–1 — PERMANENT BENCHMARK LOCATION (5)
- ——·—— APPROXIMATE LOCATION OF PROPERTY BOUNDARY
- BODY OF WATER

SURVEY CONTROL MONUMENTS				
NO.	UTM COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
CM1	7 643 282.694	494 194.669	150.604	FOX–2 BASELINE STA. 0+00
CM2	7 643 154.373	494 195.664	155.980	FOX–2 BASELINE STA. N/A
CM3	7 643 035.836	494 196.504	158.975	FOX–2 BASELINE STA. N/A
CM101	7 646 589.787	488 746.333	12.088	FOX–2 BASELINE STA. 12+00

NOTE: BASELINE STATIONS SHOWN ARE IN IMPERIAL UNITS.

PERMANENT BENCHMARK (AS–BUILT)				
NO.	UTM COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
BM–1	7 646 684.430	489 291.060	29.490	25mm DIA. STEEL PIPE
BM–2	7 646 440.000	489 417.870	29.760	25mm DIA. STEEL PIPE
BM–3	7 643 133.590	492 370.950	37.280	25mm DIA. STEEL PIPE
BM–4	7 643 740.820	494 804.820	80.570	25mm DIA. STEEL PIPE
BM–5	7 643 525.070	495 369.930	43.210	25mm DIA. STEEL PIPE

NOTE: COORDINATES AND ELEVATIONS INDICATED ARE TOP OF BENCHMARK PIPE.



RECORD DRAWING
NOT FOR CONSTRUCTION

0 300 600 m SCALE 1:30000

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-2 LONGSTAFF BLUFF

LOCATION PLAN
FIGURE FOX-2.1

AECOM

Table 1.1: Monitoring Schedule – FOX-2 Longstaff Bluff

No. Of Years After Construction	Monitoring Event Number	Year
Prior to and during*	***Baseline***	***1990, 1992, 1993, 2005 & 2009-2011***
1*	***1***	***2012***
2	2	2013
3	3	2014
4	4	2015
5	5	2016
7	6	2018
10	7	2021
15	8	2026
25	9	2036

* Monitoring events completed by the DEW Line Clean-up project team.

1.2 Background

1.2.1 Geology and Background Geochemical Conditions

The landscape at FOX-2 is characterized by an extensive bedrock upland comprised of highly deformed Precambrian metasediment. Three large valleys trending east-west divide the otherwise continuous bedrock upland. A veneer of marine reworked sediments blanket the bedrock along the coastal zone. Several comparatively narrow, steep-sided, flat-bottomed valleys dissect the uplands along the eastern coast. The valley bottoms are dominated by marine reworked sediments which may extend several hundred metres above sea level (m.a.s.l.).

Elevations range from only a few m.a.s.l. along the coastline to approximately 150 m.a.s.l. at the Station Area.

The surface expression is controlled largely by the steeply dipping, thinly bedded metasediments which form low relief (<2 m) high frequency “ridges”. Strand lines which collectively impart a gently undulating surface expression are common within the raised marine sediments, and are particularly well developed within the narrow valleys that dissect the terrain along the east coast.

Surface materials consist of bedrock, raised glacio-marine deposits, felsenmeer till, and some fluvial sediments. Bedrock and felsenmeer are common throughout the coastal zone and marine strandlines are evident as high as 100 m.a.s.l. Although not common, fluvial sediments are developed within large valleys.

Felsenmeer deposits (mechanically weathered) occur at elevations above 100 m.a.s.l. The felsenmeer consists mostly of angular cobble-gravel and sand-sized material distribution as a thin, discontinuous veneer over parent bedrock.

Raised marine sequences are predominant along the coasts and are well developed along the floors of the narrow, steep-sided valleys fingering inland along the east coast. Surface materials consist mostly of gravels and sands and gravels.

Ten terrain units can be recognized in the vicinity of the FOX-2 site. Terrain Unit 1 encompasses most of the area surrounding the upper base facilities and is comprised of a felsenmeer-covered upland, approximately 150 m.a.s.l. Surface materials are highly pervious. Drainage from the unit is strongly influenced by the well developed east-west structural grain of the region.

Terrain Unit 2 comprises an area of marine-sediments overlying bedrock. Surface materials are coarse textured, consisting mostly of sand, gravel, and cobble-sized fragments. The surface is generally flat, but the landscape slopes gently seaward. The lower site bulk POL facilities and lower site staging areas are located in unit 2.

The airstrip is located within Terrain Unit 3. Surface materials in this unit are comprised of a sand, gravel, and cobble-sized veneer of marine reworked sediments which overlie bedrock. Bedrock outcrops occur throughout much of the unit. The surface expression has been altered by numerous gravel extraction operations. The landscape slopes gently seaward.

Terrain Unit 4 comprises an area of slumped glacio-marine sediments adjacent to the eastern coast. Surface materials consist mostly of sand-, gravel-, and cobble-sized fragments which mantle the underlying bedrock. The surface materials are well drained and the surface drainage patterns are not well developed.

Terrain Unit 5 comprises a small rectangular area of raised marine sediments. The unit consists of sand, gravel, and cobble-sized materials with some boulders scattered throughout. The surface drainage patterns are not well developed in this unit.

Terrain Units 6 through 10 are located adjacent to the lakes at site and are generally low-lying, poorly drained soils.

Soil samples were collected in locations removed from site activities within appropriate terrain units to establish background geochemical conditions in areas investigated at the site. Sample results are presented in Table 1.2. Inorganic element concentrations were well below criteria for cadmium, lead, zinc, and chromium. Several results for copper, nickel, cobalt, and arsenic exceeded Tier II contaminated soil levels. Section 1.3.3 discusses the elevated background concentration of trace metallic elements at the site.

1.2.2 Biophysical Environment

Longstaff Bluff is located on the west coast of Baffin Island, approximately 162 m.a.s.l. Mean annual precipitation is 219.7 millimetres (mm), 89.3 mm is received as rain and 120.4 centimetres (cm) as snow. On average, 63 days per year have measurable precipitation. Mean annual wind speed is 16.8 kilometres per hour, with wind speeds slightly reduced in summer. Winds are predominantly from the east. Climate normals for the site, from 1961 to 1990, are provided in Table 1.3.

The topography in the vicinity of the main site and the lower site consists of a series of parallel ridges running east-west, with very few lakes or catchment areas. The lakes which do occur are generally located in natural depressions isolated from other water bodies. A small east-west oriented lake is located approximately 300 m south of the upper site, within a valley.

Drainage from the upper site is generally down gradient north and south away from the main module train area. Drainage to the south may be intercepted by the lake south of the upper site as previously described. Drainage to the north migrates through the bouldery ground surface and is quickly intercepted by roadway ditching. The airstrip receives drainage from a large upslope area to the northeast. This drainage is intercepted by a dyke paralleling the airstrip which directs the flow northeast to the end of the airstrip.

Longstaff Bluff is located on a bedrock knoll with coarse textured, intermittent and thin soils. Vegetation cover of generally less than 15 percent (%) is dominated by purple saxifrage, mountain avens, and willows associated with sedges, mosses and lichens. On the beach near the airstrip, wet meadows surround ponds and are dominated by grasses, sedges and cotton grass with total vegetation cover 40% to 60%.

Animals known to inhabit this region include barren-ground caribou, polar bears, Arctic fox, Arctic hare, and lemmings. During the 2005 investigation, several caribou were observed around the site, as were lemmings, Arctic hare and an Arctic wolf. Specifically, caribou and Arctic hares frequented the station and airstrip area; the latter were also noted at the beach POL. Arctic foxes were observed near the airstrip and on the road that leads to the upper site, and a wolf was seen around the airstrip area. Lemmings were present around the station area, as was evidenced by the presence of scat. Polar bears were not noted during the site visit; however, polar bears have been reported at this site in the past.

A variety of marine mammals pass through Hudson Strait and summer in Foxe Basin as the ice begins to melt. Such mammals include beluga whales, narwhals, bowhead whales, walrus, bearded seals, harp seal, and ringed seals. Ringed seals, and beluga whales were seen off-shore during the site investigation and Arctic char were present in the water surrounding the site.

Raptors, including Peregrine Falcon, Snowy Owl, Rough-legged Hawk and Gyrfalcon are known to occur in the area. Gulls and ptarmigan were sited during the investigation. A variety of other waterfowl, shore birds, and avifauna may also be sited in the area.

1.2.3 Traditional Land Use

Recreational fishing for arctic char was reported along the beach and at a small lake near the station. Flint Lake and Piling Lake near Longstaff Bluff have an important commercial harvest of arctic char.

No ecological sites or areas with special conservation land status are designated in this area.

The 2005 archaeological investigation identified more than 350 archaeological features spread over 17 locations in the Longstaff Bluff area. Features noted include tent rings, caches, stone shelters, cairns, hearths, quartz scatter, kayak rests, stone kayak models, possible festival houses, and fox traps. Because of their magnitude and complexity, several sites have been assessed as highly significant. The majority of archaeological features are located between the site access roads and the shore on both the east and west sides of the site.

Table 1.2: FOX-2 Longstaff Bluff – Summary of Site Background Soil Analytical Data

Sample #	Surface/ Reference Tag #	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
F2-059			1990			56		<1	<10		66	35	<0.05	<0.01	<5			
00-11522	11520		2000	25	40	44	22	<1.0	<10	100	88	11						
00-11523			2000	0	47	34	14	<1.0	<10	88	86	16						
00-11524	11523		2000	30	48	40	19	<1.0	<10	74	62	16						
00-11525	11523		2000	65	48	42	27	<1.0	<10	89	75	20						
00-11526			2000	0	80	110	30	<1.0	<10	95	57	10						
00-11527	11526		2000	30	88	140	25	<1.0	<10	110	40	6						
00-11528			2000	0	20	26	10	<1.0	<10	57	53	10						
00-11529			2000	0	29	29	11	<1.0	<10	64	47	18						
00-11532	11530		2000	30	30	35	24	<1.0	<10	76	45	17						
00-11533			2000	0	24	25	9	<1.0	<10	48	42	20						
00-11534	11533		2000	35	38	30	12	<1.0	<10	75	55	25						
00-11535			2000	0	27	34	12	<1.0	<10	67	59	15						
00-11536	11535		2000	30	32	30	11	<1.0	<10	70	63	15						
00-11537	11535		2000	70	49	32	12	<1.0	<10	74	54	27						
00-11538			2000	0	45	37	14	<1.0	<10	79	61	32						
00-11539	11538		2000	30	55	38	14	<1.0	<10	71	57	25						
00-11542	11538		2000	75	48	38	15	<1.0	<10	81	59	35						
00-11543			2000	0	45	37	13	<1.0	<10	75	58	26						
00-11544	11543		2000	30	28	29	12	<1.0	<10	61	52	24						
00-11545	11543		2000	75	58	34	13	<1.0	<10	67	42	46						
00-11546			2000	5	38	29	10	<1.0	<10	71	56	20						
00-11547			2000	10	34	33	12	<1.0	<10	64	51	13						
00-11548	11547		2000	30	33	25	10	<1.0	<10	58	41	20						
00-11549	11547		2000	50	28	22	8	<1.0	<10	47	41	15						
00-11552	11550		2000	30	27	29	10	<1.0	<10	54	45	15						
00-11553			2000	5	36	68	27	<1.0	<10	93	55	19						
00-11554	11553		2000	30	34	24	9	<1.0	<10	46	35	36						
00-11555			2000	5	31	30	13	<1.0	<10	77	58	19						
00-11556			2000	5	21	21	8	<1.0	<10	39	34	17						
00-11557	11556		2000	40	22	21	8	<1.0	<10	35	28	20						
00-11558			2000	0	21	21	9	<1.0	<10	47	43	14						
00-11559			2000	0	23	28	11	<1.0	<10	70	65	10						

Sample #	Surface/ Reference Tag #	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
00-11562			2000	10	140	69	35	<1.0	15	120	68	18						
00-11563			2000	25	14	11	6	<1.0	<10	28	25	22						
00-11564			2000	5	21	23	8	<1.0	<10	42	37	14						
00-11565			2000	5	23	25	10	<1.0	<10	54	54	10						
00-11566	11565		2000	30	21	18	7	<1.0	<10	40	39	10						
00-11567			2000	5	60	49	17	<1.0	<10	82	62	29						
00-11568	11567		2000	30	26	29	13	<1.0	<10	60	58	14						
00-11569	11567		2000	60	41	39	15	<1.0	<10	70	59	21						
00-11572	11570		2000	30	22	28	10	<1.0	<10	60	63	8						
00-11573			2000	0	35	11	6	<1.0	11	80	71	7						
00-11574			2000	0	28	35	16	<1.0	<10	90	70	9						
00-11575	11574		2000	20	45	56	20	<1.0	<10	96	82	11						
00-11576			2000	5	29	34	14	<1.0	<10	74	66	10						
00-11577	11576		2000	30	24	33	13	<1.0	<10	72	65	13						
00-11578			2000	30	21	27	11	<1.0	<10	57	63	15						
00-11579			2000	10	42	10	5	<1.0	<10	64	63	11						
00-11582			2000	0	700	210	85	<1.0	33	280	47	26						
00-11583			2000	10	110	53	20	<1.0	26	90	71	47						
00-11584			2000	0	73	18	10	<1.0	19	40	57	1						
00-11585			2000	5	36	7	<5.0	<1.0	11	71	54	3						
00-11586	11585		2000	25	36	7	<5.0	<1.0	13	74	60	9						
00-11587			2000	10	150	96	48	<1.0	<10	190	80	11						
00-11588			2000	0	18	25	9	<1.0	<10	44	70	5						
00-11589			2000	20	46	35	13	<1.0	<10	60	46	31						
00-11592	11590		2000	50	45	27	10	<1.0	<10	58	43	34						
00-11593			2000	30	19	24	10	<1.0	<10	58	58	8						
00-11594			2000	5	23	36	14	<1.0	<10	78	89	10						
00-11595	11594		2000	40	44	38	16	<1.0	<10	79	75	18						
00-11596			2000	5	84	130	31	<1.0	<10	110	69	13						
00-11597	11596		2000	20	68	84	19	<1.0	<10	87	70	15						
00-11598	11596		2000	50	90	170	50	<1.0	<10	160	64	17						
00-11599			2000	5	76	89	31	<1.0	11	160	69	22						
00-11602			2000	5	61	56	20	<1.0	<10	99	68	36						
00-11603	11602		2000	40	49	47	17	<1.0	<10	97	73	26						

Sample #	Surface/ Reference Tag #	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
00-11604			2000	20	39	29	10	<1.0	<10	59	48	30						
00-11605			2000	5	60	41	15	<1.0	11	80	51	37						
00-11606	11605		2000	30	58	41	14	<1.0	10	77	47	35						
00-11607			2000	5	46	31	11	<1.0	<10	66	42	32						
00-11608			2000	5	50	38	14	<1.0	<10	73	49	35						
00-11609	11608		2000	30	50	39	14	<1.0	<10	75	50	34						
00-11612	11610		2000	30	96	46	16	<1.0	21	100	57	63						
00-11613			2000	0	41	36	14	<1.0	<10	74	51	29						
00-11614	11613		2000	30	48	40	14	<1.0	<10	78	52	31						
00-11615			2000	5	62	41	16	<1.0	11	76	51	36						
00-11616	11615		2000	30	46	33	13	<1.0	<10	65	45	30						
00-11617			2000	5	50	32	12	<1.0	12	65	47	55						
00-11618			2000	0	47	36	13	<1.0	10	65	45	34						
00-11619			2000	0	48	42	15	<1.0	<10	71	51	34						
00-11622			2000	0	27	16	9	<1.0	<10	110	93	3						
00-11623			2000	0	64	14	9	<1.0	11	110	94	2						
00-11624			2000	0	110	110	34	<1.0	17	190	120	7						
00-11625			2000	0	42	26	10	<1.0	13	58	63	16						
00-11626			2000	0	17	27	10	<1.0	<10	64	51	6						
00-11627			2000	5	53	49	29	<1.0	14	170	74	31						
00-11628	11627		2000	30	52	52	36	<1.0	13	160	76	32						
00-11629			2000	10	45	33	11	<1.0	<10	58	42	26						
00-11632			2000	5	47	37	16	<1.0	<10	59	66	12						
00-11857			2000	10	37	30	15	<1.0	<10	71	67	15						
00-11858	11857		2000	45	41	34	15	<1.0	<10	70	69	16						
00-11859	11857		2000	70	83	46	24	<1.0	12	96	68	47						
00-11862	11860		2000	40	71	42	19	<1.0	<10	78	62	14						
00-11863	11860		2000	70	91	48	23	<1.0	<10	100	62	17						
00-11864			2000	80	40	27	15	<1.0	<10	86	73	14						
00-11865			2000	80	50	33	19	<1.0	11	72	61	18						
00-18456			2000	0	46	31	16	<1.0	<10	88	71	13						
00-18457	18456		2000	60	27	36	15	<1.0	<10	86	84	20						
00-18458			2000	0	36	31	19	<1.0	<10	89	77	17						
00-18459	18458		2000	65	96	54	31	<1.0	16	130	69	38						

Sample #	Surface/ Reference Tag #	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
00-18462	18460		2000	50	34	31	15	<1.0	<10	74	72	18						
00-18463	18460		2000	20	34	31	15	<1.0	<10	72	72	57						
00-18466			2000	0	47	34	16	<1.0	<10	78	69	20						
00-18467	18466		2000	50	63	43	20	<1.0	11	85	69	32						
00-25652	25650		2000	70	21	14	6	<1.0	<10	34	26	15						
00-25653	25650		2000	120	42	33	11	<1.0	<10	53	39	19						
00-25654			2000	20	66	25	9	<1.0	<10	44	29	20						
00-25655	25654		2000	50	29	27	10	<1.0	<10	49	36	26						
00-25656	25654		2000	80	31	24	12	<1.0	<10	43	35	110						
00-25657			2000	20	63	46	18	<1.0	<10	98	73	16						
00-25658	25657		2000	75	92	65	22	<1.0	<10	110	75	15						
00-25659			2000	5	82	70	32	<1.0	13	160	81	25						
00-25662	25659		2000	95	120	150	34	<1.0	<10	190	75	22						
00-25663			2000	50	110	87	27	<1.0	10	130	85	15						
00-25664	25663		2000	90	77	65	23	<1.0	<10	110	76	25						
00-25687			2000	0	100	92	28	<1.0	<10	130	73	17						
00-25688	25687		2000	30	81	78	24	<1.0	<10	110	53	16						
00-25689			2000	0	47	36	14	<1.0	<10	70	60	24						
00-25693	25689		2000	30	39	29	12	<1.0	<10	58	50	29						
00-25694			2000	0	33	36	11	<1.0	<10	58	50	13						
00-25695	25694		2000	40	40	39	12	<1.0	<10	57	51	12						
00-25696			2000	0	31	33	11	<1.0	<10	55	47	15						
00-25697			2000	0	42	39	15	<1.0	<10	73	60	29						
00-25698	25697		2000	30	45	41	15	<1.0	<10	76	60	23						
00-25699	25696		2000	30	33	36	13	<1.0	<10	64	54	16						
00-25702	25700		2000	30	30	36	13	<1.0	<10	64	56	27						
00-25703			2000	5	27	29	11	<1.0	<10	63	56	19						
00-25704	25703		2000	50	41	43	17	<1.0	<10	98	84	15						
00-25705			2000	15	47	45	16	<1.0	<10	100	64	31						
00-25706	25705		2000	100	24	24	11	<1.0	<10	58	45	26						
00-25707			2000	0	49	35	14	<1.0	<10	75	64	38						
00-25708	25707		2000	55	66	35	15	<1.0	14	84	53	83						
00-25709	25707		2000	110	18	11	7	<1.0	<10	31	29	31						
00-25712	25710		2000	70	41	39	16	<1.0	11	100	84	14						

Sample #	Surface/ Reference Tag #	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
00-25713			2000	0	48	55	17	<1.0	11	92	67	29						
00-25714	25713		2000	100	35	28	12	<1.0	<10	55	43	29						
00-25717	25716		2000	30	200	320	87	<1.0	<10	290	53	15						
05-11520/21			2005	0	29	37	19	<1.0	<10	82	73	9						
05-11530/31			2005	0	88	100	57	<1.0	11	220	63	63						
05-11540/41	11538		2005	50	50	35	13	<1.0	<10	76	55	35						
05-11550/51			2005	5	20	21	9	<1.0	<10	59	39	18						
05-11560/61	11559		2005	40	31	31	12	<1.0	<10	72	66	23						
05-11570/71			2005	10	16	21	9	<1.0	<10	48	47	13						
05-11580/81			2005	0	71	11	8	<1.0	59	61	60	78						
05-11590/91			2005	10	52	33	11	<1.0	<10	63	46	39						
05-11600/01			2005	20	52	51	20	<1.0	<10	94	77	7						
05-11610/11			2005	5	99	45	14	<1.0	21	100	59	63						
05-11620/21	11619		2005	30	53	40	15	<1.0	13	77	51	37						
05-11630/31			2005	10	41	19	7	<1.0	<10	57	47	23						
05-11860/61			2005	15	81	41	17	<1.0	<10	75	66	19						
05-18460/61			2005	0	48	43	21	<1.0	<10	103	99	25						
05-25650/51			2005	5	35	36	13	<1.0	<10	73	60	21						
05-25660/61	25659		2005	45	84	62	27	<1.0	12	120	79	24						
05-25700/01			2005	0	19	25	10	<1.0	<10	59	49	16						
05-25710/11			2005	0	45	43	15	<1.0	<10	87	65	37						
05-25716			2005	0	270	330	100	<1.0	12	310	52	23						
		N Value			156	157	156	157	157	156	157	157	1	1	1			
		Average			55	46	17	<1.0	<10	84	59	23	<0.05	<0.01	<5			
		Standard Deviation			62	43	13			43	15	15						
		Minimum			14	7	<5		<10	28	25	1						
		Maximum			700	330	100	<1.0	59	310	120	110	<0.05	<0.01	<5			
		95% Confidence Limit			10	7	2			7	2	2						

Table 1.3: Climate Normals for Longstaff Bluff

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Precipitation													
Mean Rainfall	0	0	0	0.2	0.8	6.6	33	38.8	15.4	0.7	0	0	95.3
Mean Snowfall	5.2	4.5	5.1	10.6	18	6.8	0.3	2.1	17.7	27.6	15.4	5.5	118.9
Precipitation (mm)	5.2	4.5	5.1	10.6	18.9	13.4	33.2	40.8	33.1	28.4	15.1	5.5	213.8
No. days w/ meas. rain	0	0	0	0	*	2	8	10	4	*	*	*	25
No. days w/ meas. snow	3	3	3	6	9	3	*	1	7	10	7	4	55
Temperature													
Mean Daily Max.	-24	-25.1	-23.7	-15.3	-5	3.6	10.3	8.2	1.5	-6.7	-14.9	-21.5	-9.4
Mean Daily Min.	-32.1	-33.2	-31.1	-22.6	-11.1	-1.7	3.6	2.3	-2.7	-11.9	-21.9	-28.8	-15.9
Daily Mean	-27.5	-28.7	-27	-18.9	-8	1	7	5.3	-0.5	-9.2	-18.3	-24.9	-15.9
Extreme Max.	-0.2	-1.1	-1.4	-0.6	10	17.8	24	20.6	13.3	3.5	0.6	0	
Extreme Min.	-48.8	-48.9	-45.3	-40	-26.1	-16.6	-5	-4.8	-13.3	-32	-40	-45.5	
Degree Days													
Above 18°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Below 18°C	1427.6	1326.3	1394.4	1111	808.6	510.6	342.2	394.9	556.6	855.9	1086.2	1322.4	11137
Above 5°C	0	0	0	0	0	9.8	80.8	40.2	1.9	0	0	0	133
Below 0°C	869.6	818.9	836.4	571	253.2	29.7	0.1	0.7	48.6	298	546.2	764.4	5037
Month-end Snow Cover (cm)	44	44	45	49	38	5	0	0	8	30	40	41	

X – data exists, but not enough to derive a value.
** -- quantity is less than 1.*
Information as provided by Environment Canada – Climate Normals 1961-1990 for Longstaff Bluff, Nunavut.

1.3 Landfill Monitoring Program

The general components of the landfill monitoring program at FOX-2 include:

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

The requirements for landfill monitoring, as laid out in Environmental Provisions of the NTI-DND Agreement, are summarized in Table 1.4. 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 Landfill, High Potential Environmental Risk (Class A)	Not required, as landfill to be excavated.			
Existing Landfills, Moderate Potential Environmental Risk (Class B)	√	√	√	√
Existing Landfills, Low Potential Environmental Risk (Class C)	√		√	
New Landfill, Non-Hazardous Waste Landfill	√	√	√	
New Landfill, Tier II Disposal Facility	√	√	√	√

A summary of these requirements, as related to the specific landfills at FOX-2, is provided in Table 1.5. The rationale for the monitoring requirement is provided in the landfill-specific sections.

Table 1.5: FOX-2 Longstaff Bluff Landfill Monitoring Requirements

Landfill Designation	Visual Inspection	Groundwater Sampling	Soil Sampling	Thermal Monitoring
Airstrip Camp Landfill Lobe A	√		√	
Non-Hazardous Waste Landfill	√	√	√	
West Landfill Lobe E	√		√	
Tier II Disposal Facility	√	√	√	√
Upper Site Landfill Lobe A	√	√	√	√

1.3.1 Visual Inspection

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

1.3.2 Soil Sampling

Background (naturally occurring) conditions refer to native soil geochemistry and represent soil quality from an area not impacted by site activities. Soil sampling to establish general site background conditions was completed in 2005. 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 up-gradient and down-gradient of each landfill. Up-gradient samples are targeted to areas near the landfill, but not influenced by migration of contaminants through the landfill. Up-gradient samples are meant to be representative of contaminant input conditions to the landfill and serve as the primary basis upon which to compare the down-gradient contaminant concentrations.

Down-gradient soil samples are collected at surface/shallow depths from designated areas at the toe of each landfill and from areas of preferential drainage. These soil samples are collected and analyzed to document whether there has been migration of contaminants, either historically or recently, from the landfill area. Although contaminants are primarily transported in water (surface and groundwater), they have a tendency to adsorb 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 down-gradient of a landfill are compared to contaminant concentrations of samples collected up-gradient. Down-gradient samples are also compared to overall site background contaminant levels because they help in establishing a more broad level of naturally occurring contaminant concentrations that can be found at the site, particularly where different soil or rock types are present. Contaminant concentrations in down-gradient samples that are significantly higher than background or up-gradient concentrations, particularly where there have been changes over time; provide evidence of contaminants having migrated to, and possibly beyond, the soil sampling location. This 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 in Appendix A of 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, zinc, and 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 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.

1.3.3 Naturally Elevated Concentrations of Trace Metals

Previous investigations indicated the potential that the geologic units in the Longstaff Bluff region have naturally high concentrations of various trace metallic elements. As a result a detailed background characterization was completed by ESG (ESG, 2006)[1] during the site investigation in 2005. The goal of the investigation was threefold: to differentiate natural and anthropogenic concentrations; to define boundaries for excavation; and, to calculate a site specific clean-up criteria. The detailed background investigation indicated four trace metals naturally exceeded the DLCU Clean-up Criteria: Copper; nickel; cobalt and arsenic. The site specific criteria can be found in Table 1.6 below. The Airstrip Landfill area and the West Landfill area were expected to be located in sites with "hotspots" of elevated concentrations above even the site specific criteria.

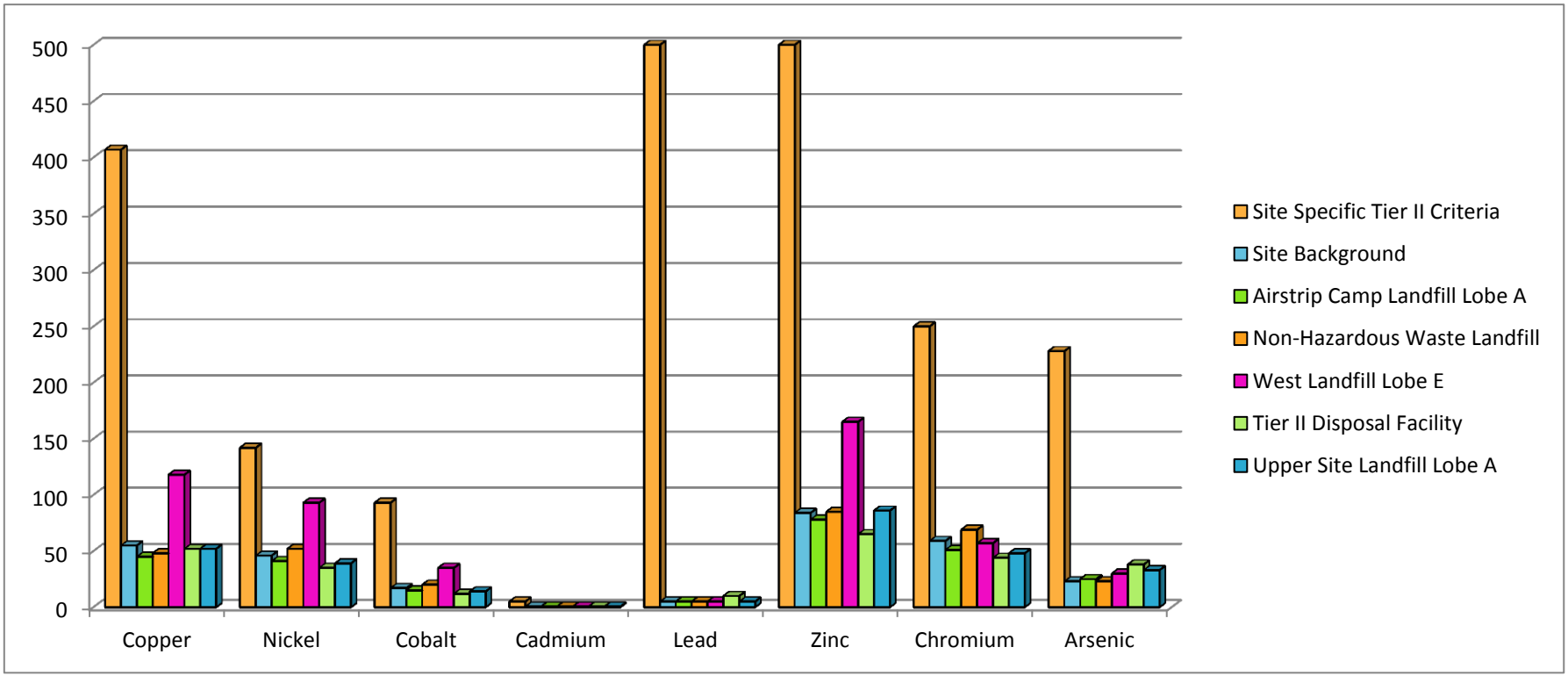
The 2006 ESG report is located in Appendix D on the DVD included with this report.

[1] *Environmental Sciences Group, Naturally Elevated Concentration of Trace Metals (Cu, Ni, Co and As) at the FOX-2 DEW Line Site, Longstaff Bluff, Nunavut, September, 2006.*

Table 1.6: FOX-2 Longstaff Bluff – Summary of Arithmetic Mean – Soil Baseline Data

Area	Arithmetic Mean (in mg/kg)								Range
	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic	PCBs
Site Specific Criteria	407	142	93	5	500	500	250	228	5
Site Background	55	46	17	<1.0	<10	84	59	23	<0.01
Airstrip Camp Landfill Lobe A	45	41	15	<1.0	<10	78	51	25	<0.0030 to <0.1
Non-Hazardous Waste Landfill	48	52	20	<1.0	<10	85	69	23	<0.0030 to <0.1
West Landfill Lobe E	118	93	35	<1.0	<10	165	57	30	<0.0030 to <0.1
Tier II Disposal Facility	52	35	12	<1.0	10	65	44	38	<0.0030 to <0.1
Upper Site Landfill Lobe A	52	39	14	<1.0	<10	86	48	33	<0.0030 to 8.6

Figure 1.1: FOX-2 Longstaff Bluff – Summary of Arithmetic Mean – Soil Baseline Data



1.3.4 Groundwater Sampling

During the construction phase, groundwater monitoring wells are installed at all existing landfills classified as moderate environmental risk (Class B landfills) and new landfills. No existing landfills at FOX-2 had monitoring wells installed, but wells were installed at the two new landfills constructed; the Non-Hazardous Waste Landfill and the Tier II Disposal Facility. Groundwater monitoring wells were installed hydraulically up-gradient and down-gradient of the landfills as indicated in 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 down-gradient are reviewed in conjunction with soil analytical data to evaluate potential impacts associated with the landfill. Baseline groundwater data exists from the site investigation at temporary wells, as well as the site clean-up period. A summary of arithmetic mean baseline data 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 collection of groundwater samples from a monitoring well:

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

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

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

- Colour and odour
- pH, conductivity and temperature

Groundwater samples are analyzed for the following parameters:

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

Minimum MDLs are specified in Table 1.8. A summary of the FOX-2 landfill monitoring installations / sampling locations is provided in Table 1.9.

Table 1.7: FOX-2 Longstaff Bluff – Summary of Arithmetic Mean – Groundwater Baseline Data

Area	Arithmetic Mean (in mg/kg)							
	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic
Non-Hazardous Waste Landfill	0.003	0.34	0.037	<0.001	<0.01	0.05	0.0959	0.009
Tier II Disposal Facility	0.157	0.27	0.061	<0.001	0.033	0.191	0.093	0.0462
Upper Site Landfill Lobe A	0.095	0.209	0.044	<0.001	<0.01	0.1986	0.1638	0.036

Figure 1.2: FOX-2 Longstaff Bluff – Summary of Arithmetic Mean – Groundwater Baseline Data

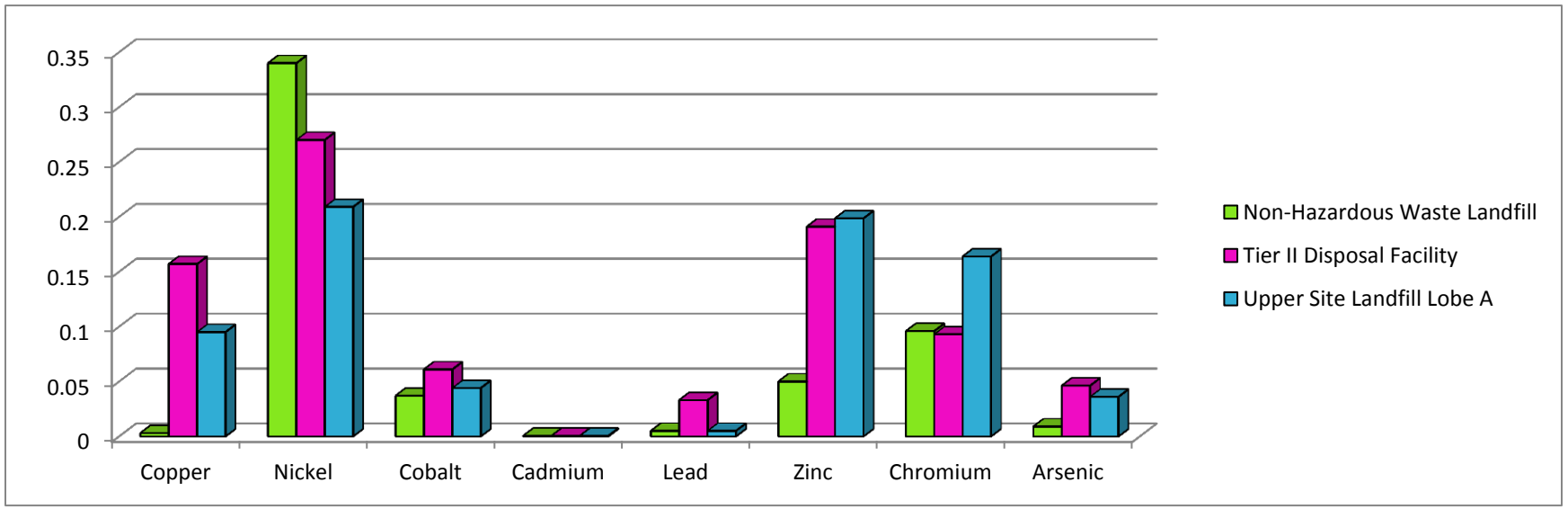


Table 1.8: Detection Limits for Analytical Requirements

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

1.3.5 Thermal Monitoring

For Class B landfills and Tier II 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 avoid active layer penetration into the landfill contents following remediation. Geothermal modelling considers soil type, soil thermal properties, presence or absence of insulating cover (vegetation or snow drift), measured ground temperatures at the site or at nearby sites, measured air temperature and climatic data (1956 to 1990 climate normals data from Environment Canada for Longstaff Bluff, Nunavut), an estimated 1 in 100 warm year air temperature, an estimated ten consecutive 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 FOX-2, a typical active layer depth based on ten consecutive mean years of climatic data is 1.9 m for the Tier II Soil Disposal Facility. The predicted active layer depth for a 1 in 100 warm year following ten mean years is 2.3 m and for ten consecutive 1 in 100 warm years is 2.5 m. The predictive 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 2.3 m. The active layer depth used for the Tier II Disposal facility at FOX-2 is the resultant active layer depth from modeling 100 years of global warming plus one 1:100 warm year – a depth of 3.5 m. It is expected to take one year for the landfill contents to freeze back with this depth of cover fill.

A typical active layer depth based on ten consecutive mean years of climatic data is 2.0 m for the Upper Site Landfill Lobe A. The predicted active layer depth for a 1 in 100 warm year following ten mean years is 2.3 m and for ten consecutive 1 in 100 warm years is 2.6 m. The predictive 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 2.3 m. The active layer depth used for the Upper Site Landfill Lobe A at FOX-2 is the resultant active layer depth from modeling 100 years of global warming plus one 1:100 warm year – a depth of 3.5 m. It is expected to take one year for the landfill contents to freeze back with this depth of cover fill.

During landfill construction, vertical thermistors were installed within the landfills to record ground temperatures. Measured ground temperatures will be compared to the active layer depth and freeze back time modeled during design. It is anticipated that all landfills where freeze back is an integral part of the design will reach thermal equilibrium within approximately five years following closure. If thermal equilibrium is not achieved within five years, it may be necessary to increase the term of the thermal monitoring.

1.4 Scope of Report

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

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

Table 1.9: Summary of Landfill Monitoring Installations/Sampling Locations FOX-2 Longstaff Bluff

	UTM Coordinates		Elevation
Landfill Designation/Monitoring Locations	**North (m)**	**East (m)**	**(m.a.s.l.)**
Airstrip Camp Landfill Lobe A			
F2-06 (soil)	7646629.6	489076.0	-
F2-07 (soil)	7646620.1	489008.8	-
F2-08 (soil)	7646594.2	489009.2	-
F2-09 (soil)	7646573.8	489033.5	-
Non-Hazardous Waste Landfill			
MW-05 (soil and groundwater)	7646429.6	489418.7	29.6
MW-06 (soil and groundwater)	7646358.2	489299.1	21.9
MW-07 (soil and groundwater)	7646398.2	489288.7	22.9
MW-08 (soil and groundwater)	7646440.0	489295.9	23.9
West Landfill Lobe E			
F2-01 (soil)	7642813.3	492542.1	-
F2-02 (soil)	7642787.7	492564.8	-
F2-03 (soil)	7642735.5	492516.2	-
F2-04 (soil)	7642759.1	492484.7	-
F2-05 (soil)	7642787.2	492470.5	-
Tier II Disposal Facility			
MW-09 (soil and groundwater)	7643176.6	494276.9	156.4
MW-10 (soil and groundwater)	7643288.9	494341.7	149.1
MW-11 (soil and groundwater)	7643300.1	494284.2	148.1
MW-12 (soil and groundwater)	7643300.8	494232.0	148.6
VT-1 (temperature)	7643203.9	494253.2	160.7
VT-2 (temperature)	7643242.4	494267.8	158.8
VT-3 (temperature)	7643233.5	494299.8	159.1
VT-4 (temperature)	7643253.3	494312.5	158.2
Upper Site Landfill Lobe A			
MW-13 (soil and groundwater)	7643177.7	494363.1	155.7
MW-14 (soil and groundwater)	7643301.8	494476.7	148.2
MW-15 (soil and groundwater)	7643264.3	494530.4	147.7
MW-16 (soil and groundwater)	7643213.3	494543.4	147.1
VT-5 (temperature)	7643235.1	494453.1	157.7
VT-6 (temperature)	7643235.0	494484.3	155.6
VT-7 (temperature)	7643189.6	494439.1	157.1
VT-8 (temperature)	7643234.1	494506.7	153.9

2. Airstrip Camp Landfill Lobe A

The Airstrip Camp Landfill Lobe A is located 380 m northeast of the hangar and adjacent to the Airstrip. It consists of one lobe, covering an area of approximately 1,170 square metres (m^2). The landfill soil is composed primarily of cobbles with sand and silt. During the assessment, existing erosion was not noted at the landfill.

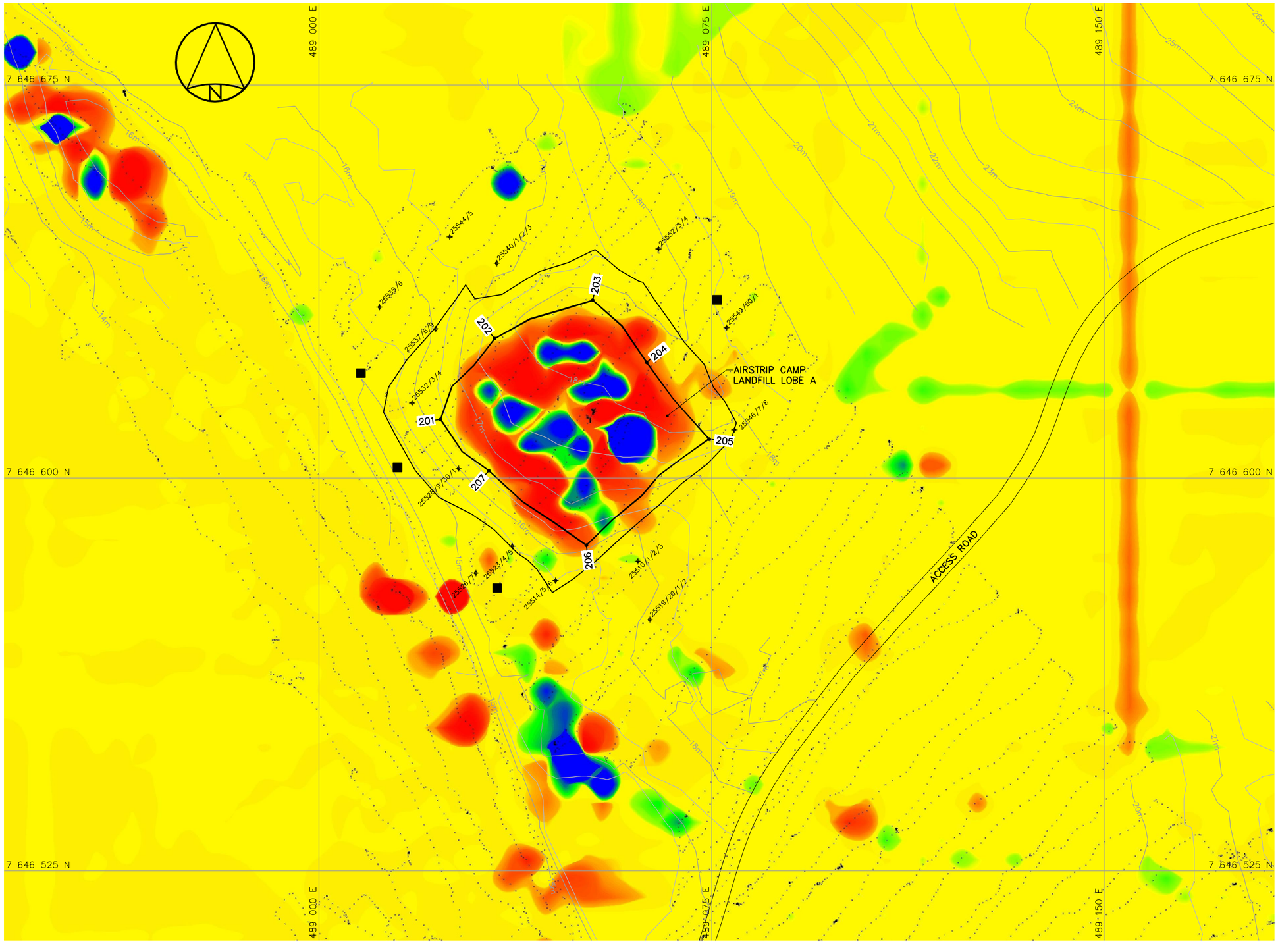
Little to no surface debris was observed at the landfill during assessment. Iron oxide precipitate was visible on the landfill surface near the south corner where groundwater was discharging and migrating towards the area of ponded water against the airstrip diversion berm. However, surface contamination or evidence of contaminant migration was not detected.

Based on an assessment of the Airstrip Camp Landfill as a contaminant source, the potential for migration, and down gradient receptors, the landfill was classified as a low potential environmental risk. The Tier II contaminated soil was excavated and the two remaining contaminated areas were included in the regraded areas. All visible debris was removed. The landfill was regraded with 0.6 m of Type 1 granular fill over 0.4 m of Type 2 granular fill.

The long term monitoring plan consists of visual monitoring and collection of soil samples. Approximate locations for the collection of soil samples are identified on Figure FOX-2.2

2.1 Baseline Data

Sample locations for soil baseline data are shown on Figure FOX-2.2. A summary of the baseline soil analytical data is provided in Table 2.1. Baseline data is comprised of site investigation information collected up and down-gradient of the landfill in 2005 and samples collected at permanent monitoring locations up and down-gradient of the landfill in 2010 and 2011. Mean soil baseline concentrations of inorganic elements were consistent with or lower than site background levels, with the exception of arsenic which was slightly elevated. All PCB results were not detectable. Low levels of TPH were detected at both the up-gradient and down-gradient sample locations. Concentrations of TPH ranged between <10 milligrams per kilogram (mg/kg) and 52 mg/kg.



GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- 201 — COORDINATE POINT
- ■ — MONITORING SOIL SAMPLE LOCATION (4)
- 25552 — SOIL SAMPLE TAG LOCATION

400 280 220 180 150 120 95 80 65 50 41 38 33 −36 −39 −42 −55 −70 −85 −100 −130 −160 −190 −240 −300 −360

MAGNETIC GRADIENT (gammas/m)

AIRSTRIP CAMP LANDFILL (LOBE A) REGRADED (AS–BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
201	7 646 611.2	489 023.2	16.4
202	7 646 626.6	489 033.5	17.8
203	7 646 633.9	489 052.3	18.2
204	7 646 622.1	489 062.5	18.3
205	7 646 607.4	489 074.5	17.9
206	7 646 587.2	489 051.1	16.1
207	7 646 601.4	489 032.4	16.7

RECORD DRAWING
NOT FOR CONSTRUCTION

0 7.5 15 m SCALE 1:750

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-2 LONGSTAFF BLUFF

AIRSTRIP CAMP LANDFILL LOBE A

FIGURE FOX-2.2

AECOM

Table 2.1: Airstrip Camp Landfill Lobe A – Baseline Soil Data

Sample #	Surface/ Reference Tag #	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
Up gradient Soil Samples																		
25546	25546		2005	5	120	73	16	<1.0	12	110	56	19		<0.1				
25547	25546		2005	25	65	51	20	<1.0	25	91	46	24		<0.1				
25548	25546		2005	60	68	55	19	<1.0	14	91	51	21		<0.1				
25549	25549		2005	5	32	30	11	<1.0	<10	53	44	12		<0.1				
05-25550/51	25549		2005	60	34	36	13	<1.0	<10	71	58	16		<0.1				
25552	25552		2005	5	36	33	12	<1.0	<10	66	52	21		<0.1				
25553	25552		2005	55	36	34	16	<1.0	12	66	47	27		<0.1				
25554	25552		2005	90	47	41	16	<1.0	11	75	55	29		<0.1				
10-20373*/74	20373	F2-6	2010	0-10	40	49	18	< 1.0	< 10	90	55	27		< 0.0030	13	< 10	< 4.0	13
10-20375*/76	20373	F2-6	2010	20-30	39	48	17	< 1.0	< 10	81	57	24		< 0.0030	<10	< 10	< 4.0	< 9.0
11-09126*/27	9126	F2-6	2011	0-10	26	35	13	< 1.0	< 10	72	56	17	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09128*/29	9126	F2-6	2011	20-30	33	43	16	< 1.0	< 10	81	56	28	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
Down gradient Soil Samples																		
05-25510/11	25510		2005	5	46	34	18	<1.0	<10	72	48	17		<0.1				
25512	25510		2005	35														
25513	25510		2005	65	58	45	23	<1.0	<10	70	44	26		<0.1				
25514	25514		2005	5	39	32	12	<1.0	<10	68	44	22		<0.1				
25515	25514		2005	40	48	40	16	<1.0	<10	72	45	35		<0.1				
25516	25517		2005	5														
25519	25519		2005	5														
05-25520/21	25519		2005	45														
25522	25519		2005	85														
25523			2005	0	48	42	15	<1.0	29	95	57	23		<0.1				
25524	25523		2005	20														
25525	25523		2005	60	52	39	12	<1.0	<10	77	46	28		<0.1				
25526	25526		2005	5														
25527	25526		2005	40														
25528	25528		2005	5	47	44	14	<1.0	<10	82	54	26		<0.1				
25529	25528		2005	45														
05-25530/31	25528		2005	85	40	33	12	<1.0	<10	67	45	34		<0.1				
25532	25532		2005	5														
25533	25532		2005	55														

Sample #	Surface/ Reference Tag #	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
25534	25532		2005	95	47	43	14	<1.0	<10	76	51	28		<0.1				
25535	25535		2005	5														
25536	25535		2005	50														
25537	25537		2005	5														
25538	25537		2005	40														
25539	25537		2005	80	33	31	12	<1.0	<10	60	44	19		<0.1				
05-25540/41	25540		2005	5	42	38	14	<1.0	10	77	55	24		<0.1				
25542	25540		2005	50														
25543	25540		2005	90														
25544	25544		2005	10														
25545	25544		2005	95														
10-20369*/70	20369	F2-7	2010	0-10	39	36	13	< 1.0	< 10	68	42	30		< 0.0030	<10	< 10	< 4.0	< 9.0
10-20371*/72	20369	F2-7	2010	20-30	45	43	14	< 1.0	< 10	78	49	24		< 0.0030	<10	< 10	< 4.0	< 9.0
10-20365*/66	20365	F2-8	2010	0-10	74	69	24	< 1.0	16.7	120	61	66		< 0.0030	<10	< 10	< 4.0	< 9.0
10-20367*/68	20365	F2-8	2010	20-30	53	69	21	< 1.0	12.2	110	54	39		< 0.0030	<10	< 10	< 4.0	< 9.0
10-20361*/62	20361	F2-9	2010	0-10	36	35	16	< 1.0	< 10	73	49	27		0.0095	24	< 10	4	20
10-20363*/64	20361	F2-9	2010	20-30	44	43	17	< 1.0	< 10	85	51	26		< 0.0030	52	< 10	< 4.0	52
11-09130*/31	9130	F2-7	2011	0-10	29	32	12	< 1.0	< 10	62	49	19	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09132*/33	9130	F2-7	2011	20-30	29	31	12	< 1.0	< 10	67	56	19	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09134*/35	9134	F2-8	2011	0-10	40	39	14	< 1.0	10.4	75	54	34	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09136*/37	9134	F2-8	2011	20-30	25	30	13	< 1.0	< 10	69	58	18	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09138*/39	9138	F2-9	2011	0-10	29	34	14	< 1.0	< 10	71	54	22	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09140*/41*	9138	F2-9	2011	20-30	41	39	18	< 1.0	< 10	78	55	22	< 0.1	< 0.050	14	< 10	< 4.0	14
		N Value			35	35	35	35	35	35	35	35	8	35	16			
		Average			45	41	15	<1.0	<10	78	51	25	<0.10	<0.1	<10			
		Standard Deviation			17	11	3			14	5	9						
		Minimum			25	30	11		<10	53	42	12		<0.0030	<10			
		Maximum			120	73	24	<1.0	29	120	61	66	<0.1	<0.1	52			
		95% Confidence Limit			6	4	1			5	2	3						

3. Non-Hazardous Waste Landfill

The Non-Hazardous Waste Landfill is a new landfill constructed for the disposal of non-hazardous wastes and debris generated and collected during clean-up activities. The landfill is located 400 m northeast of the hangar.

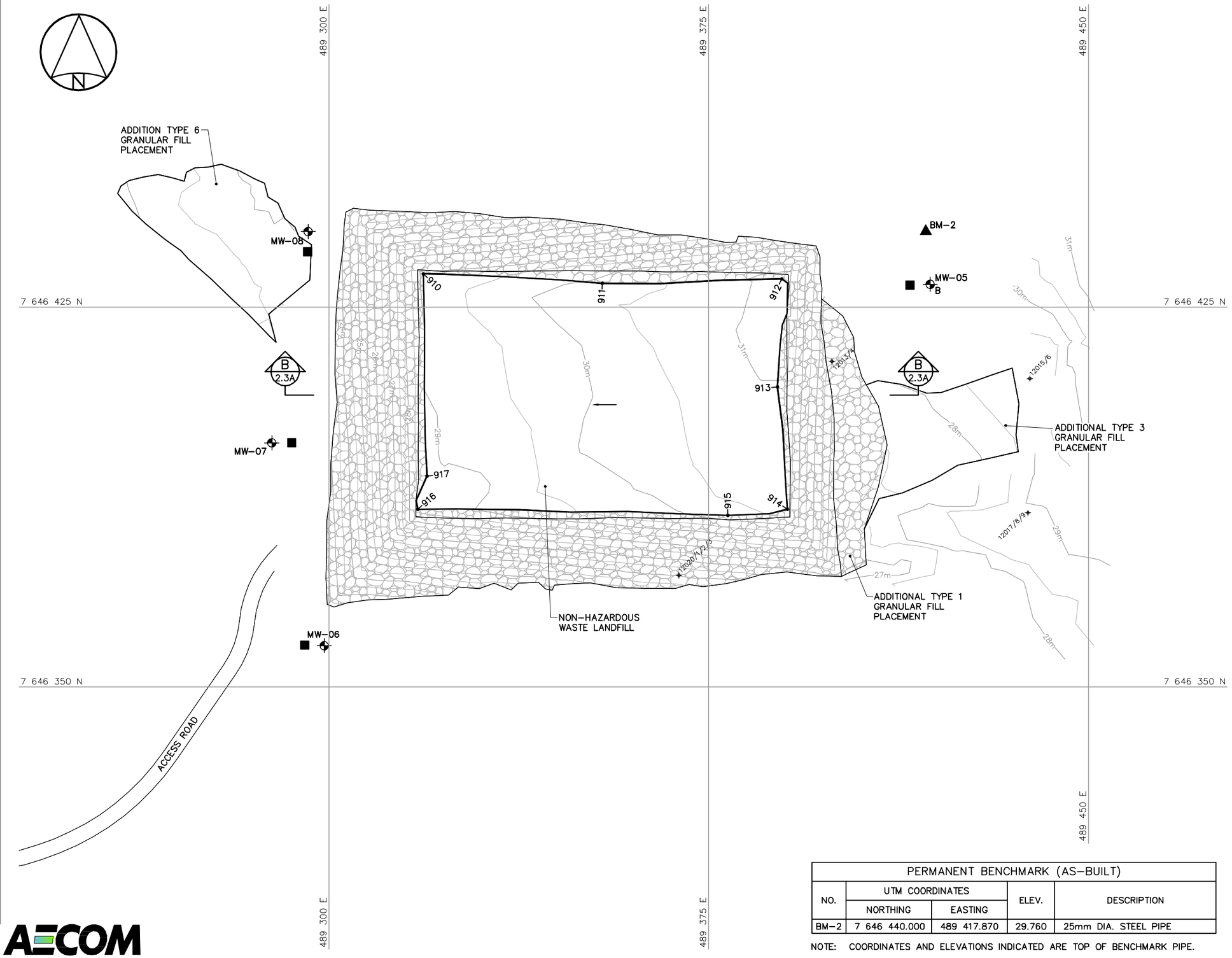
The design of this landfill includes perimeter berms and placement of a cover of compacted granular fill over the landfilled material. Four groundwater monitoring wells were installed around the perimeter of the landfill.

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 of Figure FOX-2.3.

3.1 Baseline Data

Locations for baseline soil samples are shown on Figure FOX-2.3. A summary of baseline soil analytical data is provided in Table 3.1. Baseline data is comprised of samples collected in the vicinity of the Non-Hazardous Waste Landfill during the site investigation in 2005, and samples collected at permanent monitoring locations during 2009, 2010 and 2011. The mean baseline concentration for nickel, cobalt, zinc, and chromium was noted to be higher than background concentrations. All other inorganic element concentrations were consistent with, or below, the background concentrations. All PCB results were not detectable. Low level TPH concentrations were detected. Hydrocarbon concentrations ranged between <10 mg/kg to 112 mg/kg.

A summary of baseline groundwater data is provided in Table 3.2. Baseline data was collected from permanent monitoring locations in 2010 and 2011. MW-06 and MW-08 (both down-gradient) were the only monitoring wells with groundwater for collection during both monitoring events. Low concentrations of copper, nickel, cobalt, zinc, chromium, and arsenic were detected in all both wells. Lead was detected only in MW-08. Cadmium, mercury, PCB and TPH results were all below detection limits.



GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- BM-2 — APPROXIMATE PERMANENT BENCHMARK LOCATION (1)
- 910 — COORDINATE POINT
- MONITORING WELL LOCATION (3)
- B — BACKGROUND MONITORING WELL LOCATION (1)
- MONITORING SOIL SAMPLE LOCATION (4)
- 12015 — SOIL SAMPLE TAG LOCATION

NON-HAZARDOUS WASTE LANDFILL FINAL GRADING (AS-BUILT)			
NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
910	7 646 431.6	489 318.6	29.2
911	7 646 429.7	489 354.0	30.1
912	7 646 430.6	489 389.4	31.3
913	7 646 409.3	489 388.6	31.0
914	7 646 385.1	489 390.5	30.6
915	7 646 383.9	489 378.8	30.3
916	7 646 385.1	489 317.5	28.6
917	7 646 391.7	489 319.3	28.9

NOTE:
COORDINATE POINTS AND ELEVATIONS PROVIDED ARE TO THE FINAL GRADE OF ORGANIC MATERIAL ON THE PLATEAU AND PRIOR TO THE PLACEMENT OF TYPE 1 GRANULAR FILL ON SIDE SLOPES.

NON-HAZARDOUS WASTE LANDFILL MONITORING WELLS (AS-BUILT)			
NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
MW-05	7 646 429.6	489 418.7	29.6
MW-06	7 646 358.2	489 299.1	21.9
MW-07	7 646 398.2	489 288.7	22.9
MW-08	7 646 440.0	489 295.9	23.9

RECORD DRAWING
NOT FOR CONSTRUCTION

0 7.5 15 m SCALE 1:750

PERMANENT BENCHMARK (AS-BUILT)				
NO.	UTM COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
BM-2	7 646 440.000	489 417.870	29.760	25mm DIA. STEEL PIPE

NOTE: COORDINATES AND ELEVATIONS INDICATED ARE TOP OF BENCHMARK PIPE.

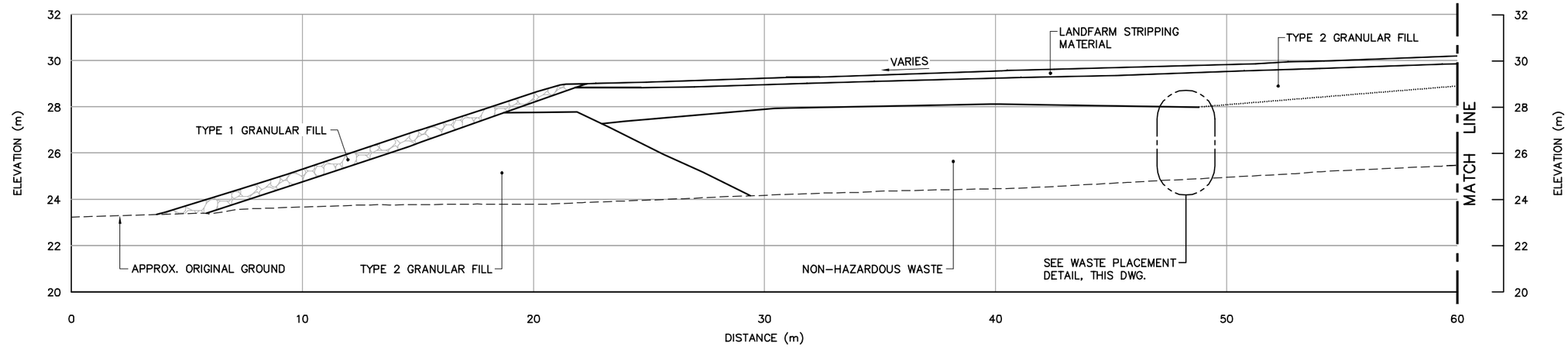
AECOM

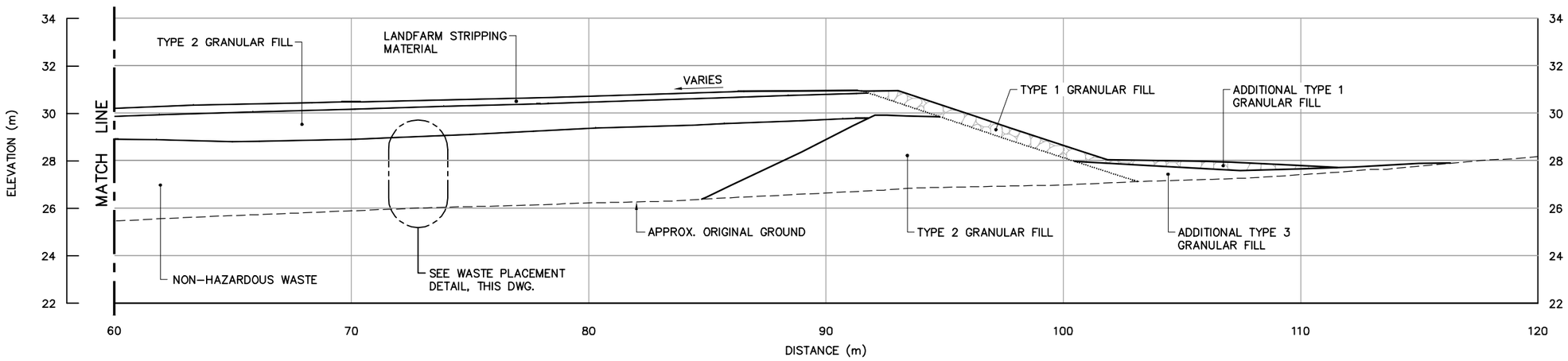
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-2 LONGSTAFF BLUFF

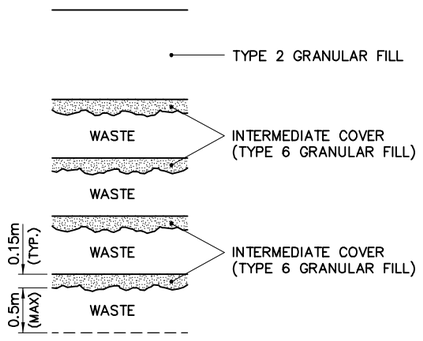
NON-HAZARDOUS WASTE LANDFILL

FIGURE FOX-2.3





SECTION B 2.3



WASTE PLACEMENT DETAIL
SCALE: NTS

GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

GENERATED BASED ON AS-BUILT SURVEY INFORMATION

CONSTRUCTED AS PER DESIGN, NO AS-BUILT SURVEY INFORMATION

RECORD DRAWING
NOT FOR CONSTRUCTION

0 2 4 m SCALE 1:200

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-2 LONGSTAFF BLUFF

NON-HAZARDOUS WASTE LANDFILL CROSS SECTION AND DETAIL

FIGURE FOX-2.3A

AECOM

Table 3.1: Non-Hazardous Waste Landfill – Baseline Soil Data

Sample #	Surface/ Reference Tag #	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
Up gradient Soil Samples																		
09-20052*/53*	20052	MW-05	2009	0-10	22	33	13	< 1.0	< 10	73	68	9		0.0095	112	< 10	12	100
09-20054*/55*	20052	MW-05	2009	30-40	45	64	19	< 1.0	< 10	80	63	18		< 0.003	25	< 10	8	17
10-20098*/99	20098	MW-05	2010	0-10	18	32	16	< 1.0	< 10	78	67	17	< 0.1	< 0.0030	55		< 4.0	55
10-20100*/01	20098	MW-05	2010	30-40	24	35	15	< 1.0	< 10	78	94	5	< 0.1	< 0.0030	<9.0		< 4.0	< 9.0
11-09297*/98	9297	MW-05	2011	0-10	25	52	19	< 1.0	11	100	72	23	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09299*/300	9297	MW-05	2011	30-40	32	58	20	< 1.0	10	97	73	25	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
Down gradient Soil Samples																		
12013	12013		2005	20	71	61	21	<1.0	11	96	70	41		<0.1				
12014	12013		2005	60	59	55	20	<1.0	<10	98	62	35		<0.1				
12015	12015		2005	20	55	55	16	<1.0	<10	78	69	23		<0.1				
12016	12015		2005	60	67	47	17	<1.0	<10	79	69	29		<0.1				
12017	12017		2005	20	58	44	17	<1.0	11	83	74	31		<0.1				
12018	12017		2005	50	86	42	16	<1.0	<10	85	75	38		<0.1				
12019	12017		2005	70	52	35	14	<1.0	<10	64	58	32		<0.1				
05-12020/21	12020		2005	10	46	60	20	<1.0	<10	86	89	21		<0.1				
12022	12020		2005	30	38	37	12	<1.0	<10	52	49	22		<0.1				
12023	12020		2005	70	62	59	23	<1.0	<10	76	61	36		<0.1				
10-20104/05*	20104	MW-06	2010	0-10	37	39	17	< 1.0	< 10	86	68	16	< 0.1	< 0.0030	47		< 4.0	47
10-20106*/07	20104	MW-06	2010	30-40	86	66	24	< 1.0	< 10	98	75	25	< 0.1	< 0.0030	17		< 4.0	17
10-20110*/11*	20110	MW-07	2010	0-10	23	64	25	< 1.0	< 10	94	80	15	< 0.1	< 0.0030	10		< 4.0	10
10-20112/13*	20110	MW-07	2010	30-40	21	34	13	< 1.0	< 10	60	61	15	< 0.1	< 0.0030	<9.0		< 4.0	< 9.0
10-20115/16*	20115	MW-08	2010	0-10	49	63	18	< 1.0	< 10	90	61	19	< 0.1	< 0.0030	<9.0		< 4.0	< 9.0
10-20117*/18	20115	MW-08	2010	30-40	37	61	22	< 1.0	11	81	62	19	< 0.1	< 0.0030	<9.0		< 4.0	< 9.0
11-09301*/02	9301	MW-06	2011	0-10	57	57	22	< 1.0	11	110	77	22	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09303*/04	9301	MW-06	2011	30-40	60	56	19	< 1.0	10	98	77	23	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09306*/07	9306	MW-07	2011	0-10	50	49	21	< 1.0	11	81	77	25	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09308*/09	9306	MW-07	2011	30-40	30	37	13	< 1.0	14	66	57	22	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09311*/12	9311	MW-08	2011	0-10	77	75	38	< 1.0	18	110	62	20	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09313*/14	9311	MW-08	2011	30-40	62	79	35	< 1.0	14	110	63	21	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
		N Value			28	28	28	28	28	28	28	28	16	28	18			
		Average			48	52	20	<1.0	<10	85	69	23	<0.1	<0.1	<10			

Sample #	Surface/ Reference Tag #	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
		Standard Deviation			20	13	6			15	10	8						
		Minimum			18	32	12		<10	52	49	5		<0.0030	<9.0			
		Maximum			86	79	38	<1.0	18	110	94	41	<0.1	<0.1	112			
		95% Confidence Limit			7	5	2			6	4	3						

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
Down gradient Groundwater Samples																
10-20109	MW-06	2010	0.029	0.180	0.016	< 0.0010	< 0.010	0.0231	0.0304	0.0076	< 0.00040	< 0.000020	<1.0	< 0.050	< 0.50	< 1.0
10-20119	MW-08	2010	0.038	0.390	0.045	< 0.0010	0.0131	0.0577	0.1200	0.0144	< 0.00040	< 0.000020	<1.0	< 0.050	< 0.50	< 1.0
11-09305	MW-06	2011	0.022	0.133	0.016	< 0.0010	< 0.010	0.0200	0.0950	< 0.0030	< 0.00040	< 0.0030	<1.0	< 0.050	< 0.50	< 1.0
11-09310	MW-08	2011	0.044	0.655	0.072	< 0.0010	< 0.010	0.1000	0.1380	0.0050	< 0.00040	< 0.0030	<1.0	< 0.050	< 0.50	< 1.0
N Value			4	4	4	4	4	4	4	4	4	4	4			
Average			0.033	0.340	0.037	<0.0010	<0.010	0.050	0.0959	0.0090	<0.00040	<0.0030	<1.0			
Standard Deviation			0.010	0.238	0.027			0.037	0.0471	0.0054						
Minimum			0.022	0.133	0.016		<0.010	0.020	0.0304	<0.0030		<0.000020				
Maximum			0.044	0.655	0.072	<0.0010	0.0131	0.100	0.1380	0.0144	<0.00040	<0.0030	<1.0			
95% Confidence Limit			0.010	0.233	0.026			0.037	0.0461	0.0053						

4. West Landfill Lobe E

The West Landfill Lobe E is located 1.4 km north of the Station Area within a former borrow area. A geophysical survey identified an anomaly of buried debris 1,780 m^2 in size. The landfill is located within a small overburden terrace, at the junction of the rocky, steep, bedrock uplands terrains and the lower-lying, gently sloping, marine deposits that occur near the existing shoreline.

The overall grade for the landfill area is approximately 10%. Landfill cover during the site assessment was good, consists of gravel with sand, and had minimal exposed debris; some partially exposed barrels were noted along the northwest toe and some sinkholes were present in the landfill surface in the same general area. Erosion was not noted at the landfill during the site assessment, likely because the majority of drainage through the landfill area is subsurface.

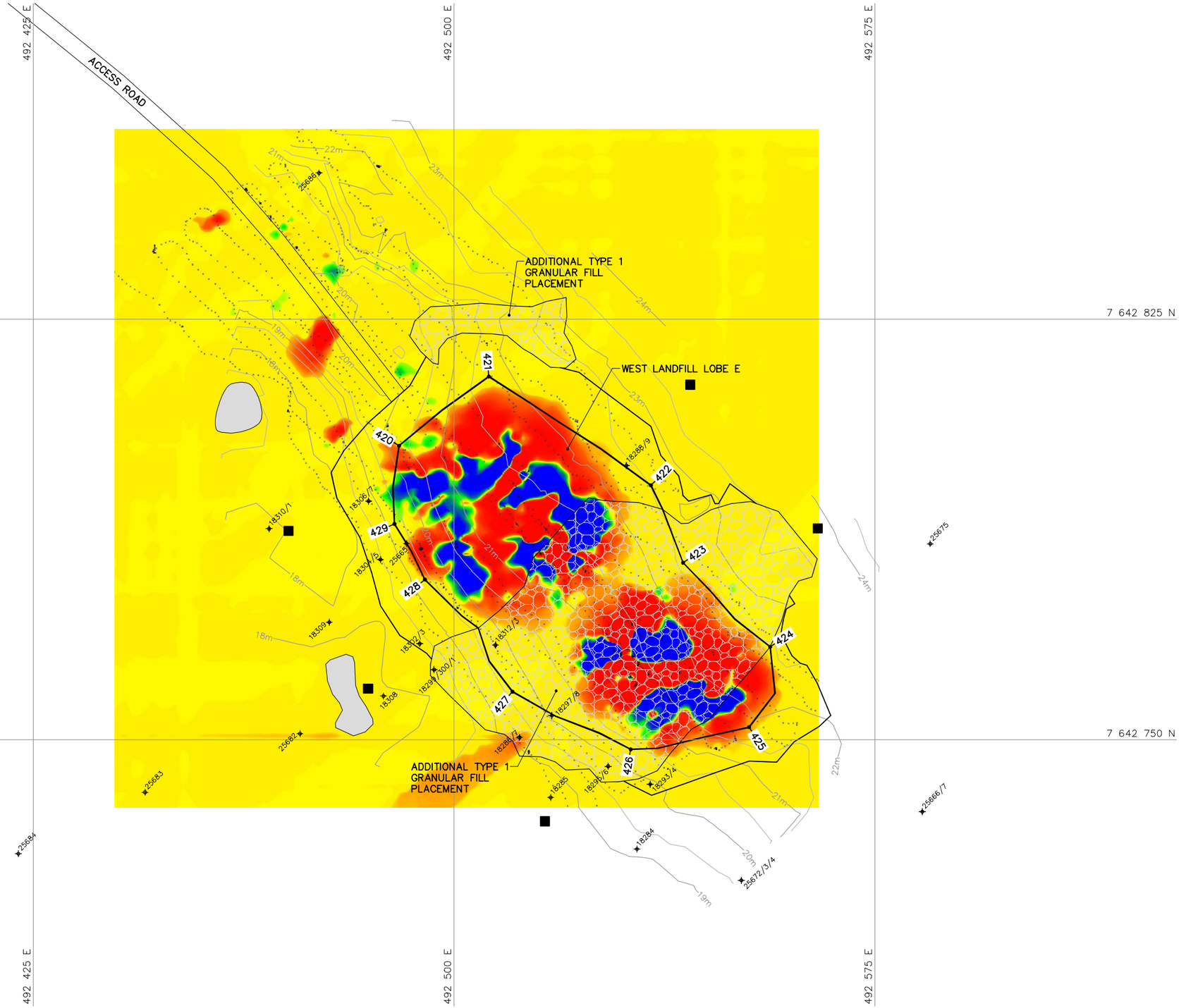
The West Landfill is located in one of the primary geochemical “hotspots” on the site. Strong iron oxide precipitates resulting from groundwater migrating through up gradient bedrock and soils, gives the appearance that the landfill is leaching. Additional samples were collected up gradient of the landfill and it was determined that the landfill was not leaching. Based on this assessment, contamination was not identified at the landfill.

The West Landfill Lobe E is classified as a low potential environmental risk. Contaminant source and pathways components were low due to the restricted potential for contaminant migration and low quantity of debris exposure. The receptors component was also low, due to low receptor sensitivity proximal to the landfill area. Accordingly, the landfill was remediated by removing the surface debris and regrading the landfill with 0.75 m of Type 2 granular fill with areas of Type 1 granular fill reinforcement.

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 of Figure FOX-2.4.

4.1 Baseline Data

Sample locations for soil baseline data are shown in Figure FOX-2.4. 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 down-gradient of the landfill in 2005 and samples collected at permanent monitoring locations up and down-gradient of the landfill in 2010, and 2011. Mean soil baseline concentrations of inorganic elements are consistent with or lower than site background levels, with the exception of copper, nickel, cobalt, and zinc concentrations which are slightly higher than background levels. All PCB results were below detection limits. Low levels of TPH were detected at both the up-gradient and down-gradient sample locations. Concentrations of TPH ranged between <10 mg/kg and 44 mg/kg.

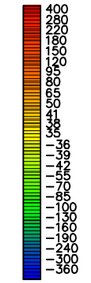


GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- 420 — COORDINATE POINT
- ■ — MONITORING SOIL SAMPLE LOCATION (5)
- 18310 — SOIL SAMPLE TAG LOCATION



MAGNETIC GRADIENT (gammas/m)

WEST LANDFILL (LOBE E) REGRADED (AS–BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
420	7 642 802.4	492 490.2	20.4
421	7 642 814.8	492 506.2	21.9
422	7 642 795.4	492 535.1	22.5
423	7 642 781.5	492 540.8	22.6
424	7 642 766.6	492 556.3	22.5
425	7 642 752.3	492 552.6	21.9
426	7 642 748.3	492 531.5	20.4
427	7 642 758.6	492 510.4	19.7
428	7 642 778.6	492 494.8	19.4
429	7 642 788.5	492 489.4	19.3

RECORD DRAWING
NOT FOR CONSTRUCTION

0 7.5 15 m SCALE 1:750

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-2 LONGSTAFF BLUFF

WEST LANDFILL LOBE E

FIGURE FOX-2.4

AECOM

Table 4.1: West Landfill Lobe E – Baseline Soil Data

Sample #	Surface/ Reference Tag #	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
Up gradient Soil Samples																		
25666				0	73	91	27	<1.0	5	210	63	13		<0.1				
25667				0	100	100	33	<1.0	11	230	66	19		<0.1				
25675				0	99	21	11	<1.0	17	130	110	7						
25686				0	170	120	62	<1.0	34	110	68	87						
10-20357*/58		F2-1		0-10	37	49	20	<1.0	<10	130	61	81		< 0.0030	24	< 10	< 4.0	24
10-20359*/60		F2-1		20-30	27	31	12	<1.0	<10	61	37	19		< 0.0030	<10	< 10	< 4.0	< 9.0
10-20353*/54		F2-2		0-10	120	67	40	<1.0	11	160	47	34		< 0.0030	39	< 10	< 4.0	39
10-20355*/56		F2-2		20-30	62	59	20	<1.0	<10	130	44	15		< 0.0030	<10	< 10	4.1	< 9.0
11-09143*/44		F2-1		0-10	140	120	65	< 1.0	14	190	65	23	< 0.1	< 0.050	26	< 10	< 4.0	26
11-09145*/46		F2-1		20-30	79	64	41	< 1.0	< 10	120	66	23	< 0.1	< 0.050	44	< 10	< 4.0	44
11-09147*/48		F2-2		0-10	58	41	17	< 1.0	< 10	95	54	22	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09149*/50*		F2-2		20-30	60	38	16	< 1.0	< 10	92	49	21	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
Down gradient Soil Samples																		
18284	18284			10	37	46	16	<1.0	<10	97	58	17						
18285	18285			10	240	130	75	<1.0	<10	320	49	31		<0.1				
18286	18286			10	150	110	51	<1.0	<10	240	51	24						
18287	18287			10	120	100	43	<1.0	<10	220	47	27						
18293	18293			15	51	87	22	<1.0	<10	180	73	15						
18294	18293			40	31	66	12	<1.0	<10	64	52	10						
18295	18295			10	240	260	85	<1.0	12	480	67	30		<0.003				
18296	18295			50	240	300	90	<1.0	10	460	58	28		<0.003				
18297	18297			15	250	280	82	<1.0	18	500	61	41		<0.1				
18298	18297			40	150	190	78	<1.0	14	270	47	25		<0.1				
18299	18299			15	24	28	12	<1.0	<10	70	41	51		<0.003	<40			
05-18300/01	18299			40	41	47	15	<1.0	10	100	53	59		<0.003	<40			
18302	18302			15	35	40	17	<1.0	<10	88	54	49		<0.003				
18303	18302			30	78	48	20	<1.0	<10	91	71	32		<0.003				
18304	18304			10	49	52	20	<1.0	<10	96	60	56		<0.003				
18305	18304			30	46	47	18	<1.0	<10	90	53	39		<0.003				
18306				0	43	100	15	<1.0	<10	79	48	22		<0.003				
18307	18306			10	47	100	21	<1.0	<10	110	51	21		<0.003				
18308				10	290	110	67	<1.0	16	190	44	43		<0.003				

Sample #	Surface/ Reference Tag #	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
18309				0	43	46	19	<1.0	<10	120	86	23						
05-18310/11				10	45	47	17	<1.0	<10	100	65	19						
18312				15	65	110	28	<1.0	<10	160	49	22		<0.1				
18313	18312			50	100	190	50	<1.0	<10	300	55	27		<0.1				
25665				0	61	92	24	<1.0	<10	130	52	39		<0.1	<40			
05-25672	25672			5	53	50	18	<1.0	5	92	63	20		<0.1				
25673	25672			35	41	72	20	<1.0	5	100	49	22		<0.1				
25674	25672			70														
25682				0	320	140	100	<1.0	14	330	58	45		<0.1				
25683				0	620	190	43	<1.0	30	240	34	80		<0.1				
25684				0	550	130	45	<1.0	23	270	57	62		<0.1				
10-20349*/50		F2-3		0-10	220	99	52	<1.0	<10	210	37	25		< 0.0030	34	< 10	5	29
10-20351*/52		F2-3		20-30	140	100	40	<1.0	<10	170	46	43		< 0.0030	16	< 10	< 4.0	16
10-20347*/48		F2-4		20-30	67	44	20	<1.0	17	100	78	33		< 0.0030	<10	< 10	< 4.0	< 9.0
10-20343*/44		F2-5		0-10	59	52	24	<1.0	12	110	73	22		< 0.0030	33	< 10	4	29
10-20345*/46		F2-5		20-30	61	47	20	<1.0	10	100	64	14		< 0.0030	<10	< 10	< 4.0	< 9.0
11-09151*/52		F2-3		0-10	140	170	41	< 1.0	< 10	75	< 20	2	< 0.1	< 0.050	42	< 10	< 4.0	42
11-09153*/54		F2-3		20-30	98	93	40	< 1.0	11	190	64	25	< 0.1	< 0.050	13	< 10	< 4.0	13
11-09155*/56		F2-4		0-10	100	65	23	< 1.0	14	110	65	11	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09157*/58		F2-4		20-30	82	67	21	< 1.0	12	110	67	9	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09159*/60		F2-5		0-10	48	46	19	< 1.0	< 10	85	65	13	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09161*/62		F2-5		20-30	42	50	21	< 1.0	< 10	94	71	11	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
		N Value			52	52	52	52	52	52	52	52	10	45	22			
		Average			118	93	35	<1.0	<10	165	57	30	<0.1	<0.1	<40			
		Standard Deviation			120	63	23			105	15	19						
		Minimum			24	21	11		<10	61	<20	2		<0.0030	<10			
		Maximum			620	300	100	<1.0	34	500	110	87	<0.1	<0.1	44			
		95% Confidence Limit			32	17	6			28	4	5						

5. Tier II Disposal Facility

A Tier II Disposal Facility has been constructed at the FOX-2 site for the disposal of Tier II soil excavated during the clean-up. The facility is located at the Station Area, 100 m north of the SRR station.

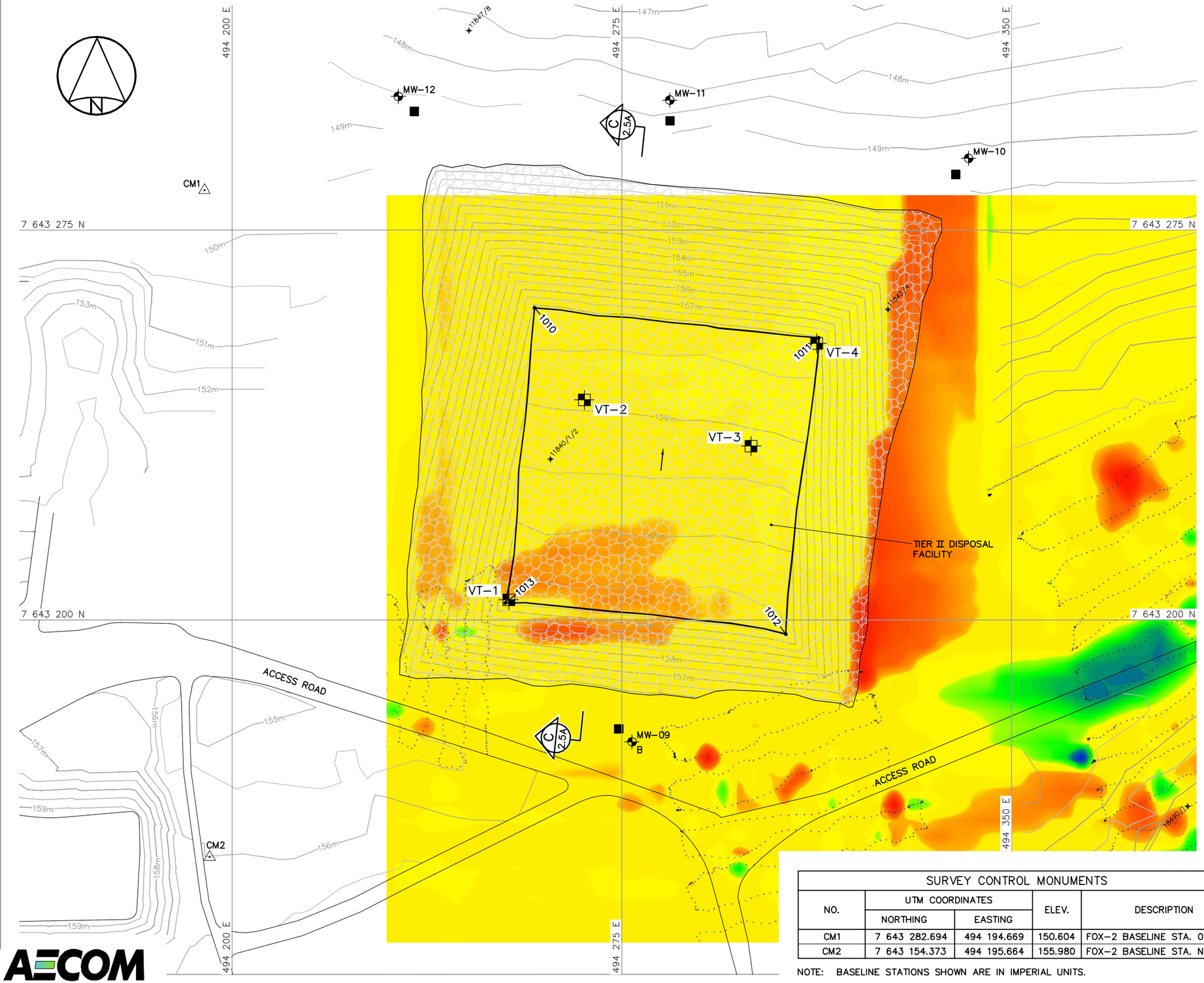
The Tier II Disposal Facility design is a double containment system. The landfill was constructed with the placement of low-permeability, saturated, compacted berms keyed into frozen/saturated ground below existing ground, the installation of a liner system over the berms and along the landfill base, and the placement of a surface liner system over the landfill contents with the placement of sufficient overlying granular fill to promote freeze back of landfill contents. Four groundwater monitoring wells were installed at the landfill perimeter, and four thermistors were installed within the landfill to monitor ground temperatures.

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 FOX-2.5.

5.1 Baseline Data

Sample locations for the baseline soil samples are shown on Figure FOX-2.5. A summary of the baseline soil analytical data is provided in Table 5.1. Baseline soil data is comprised of samples collected in the vicinity of the Tier II Disposal Facility during the site investigation in 2005, and samples collected at permanent monitoring locations during 2009, 2010 and 2011. Arsenic soil baseline concentrations are slightly elevated above the background levels. The remaining inorganic elements are consistent, or below, the background levels. PCB concentrations were below detection limits. Low level TPH concentrations (F2 and F3 fractions) were detected at several of the sample locations. Hydrocarbon concentrations ranged between <10 mg/kg to 55 mg/kg.

A summary of baseline groundwater data is provided in Table 5.2. Baseline data was collected from permanent monitoring locations in 2009, 2010 and 2011. MW-11 was dry during all monitoring events. MW-10 and MW-12 were sampled in 2010 (both wells) and 2011 (MW-12 only). MW-09 was sampled in all three years. Low level copper, nickel, cobalt, lead, zinc, chromium, and arsenic were detected in all wells. Cadmium was detected in low levels in MW-09 and MW-12. Mercury, PCB, and TPH concentrations were below detection limits.



400
280
220
180
150
120
95
80
65
50
41
38
35
−36
−39
−42
−55
−70
−85
−100
−130
−160
−190
−240
−300
−360

MAGNETIC GRADIENT (gammas/m)

GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- CM1 — SURVEY CONTROL MONUMENT (2)
- 1010 — COORDINATE POINT
- MONITORING WELL LOCATION (3)
- B — BACKGROUND MONITORING WELL LOCATION (1)
- GROUND TEMPERATURE CABLE LOCATION (4)
- MONITORING SOIL SAMPLE LOCATION (4)
- 11847 — SOIL SAMPLE TAG LOCATION

TIER II DISPOSAL FACILITY FINAL GRADING (AS-BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
1010	7 643 260.1	494 258.2	158.1
1011	7 643 254.3	494 312.9	158.0
1012	7 643 197.3	494 306.5	160.5
1013	7 643 203.3	494 252.5	160.5

TIER II DISPOSAL FACILITY MONITORING WELLS (AS-BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
MW-09	7 643 176.6	494 276.9	156.4
MW-10	7 643 288.9	494 341.7	149.1
MW-11	7 643 300.1	494 284.2	148.1
MW-12	7 643 300.8	494 232.0	148.6

TIER II DISPOSAL FACILITY GROUND TEMPERATURE CABLES (AS-BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
VT-1	7 643 203.9	494 253.2	160.7
VT-2	7 643 242.4	494 267.8	158.8
VT-3	7 643 233.5	494 299.8	159.1
VT-4	7 643 253.3	494 312.5	158.2

SURVEY CONTROL MONUMENTS

NO.	UTM COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
CM1	7 643 282.694	494 194.669	150.604	FOX-2 BASELINE STA. 0+00
CM2	7 643 154.373	494 195.664	155.980	FOX-2 BASELINE STA. N/A

NOTE: BASELINE STATIONS SHOWN ARE IN IMPERIAL UNITS.

RECORD DRAWING
NOT FOR CONSTRUCTION

0 7.5 15 m SCALE 1:750

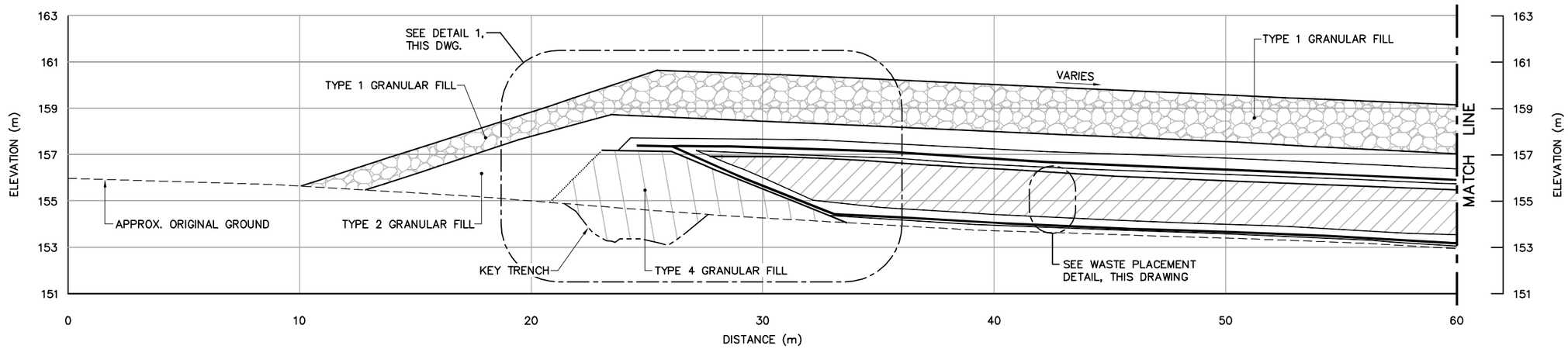
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

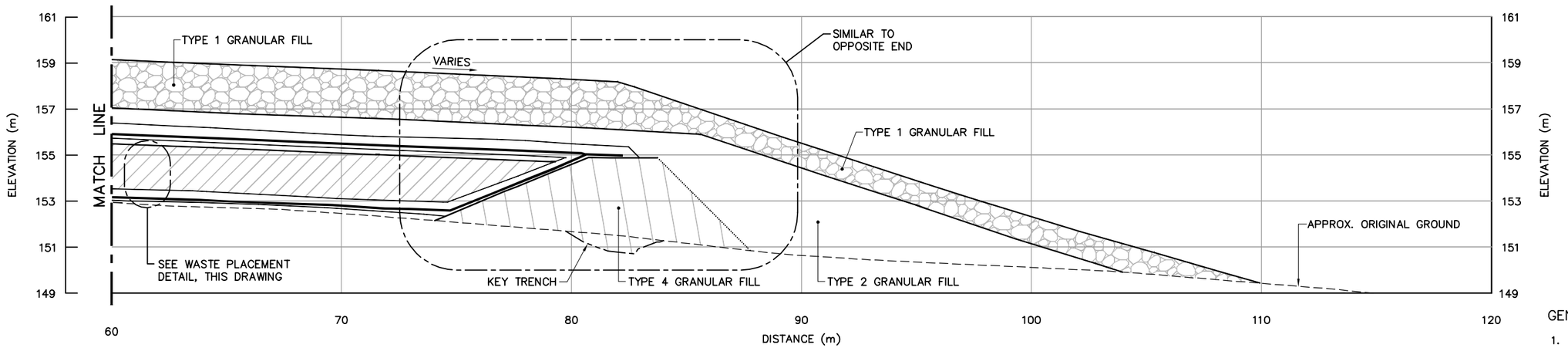
FOX-2 LONGSTAFF BLUFF

TIER II DISPOSAL FACILITY

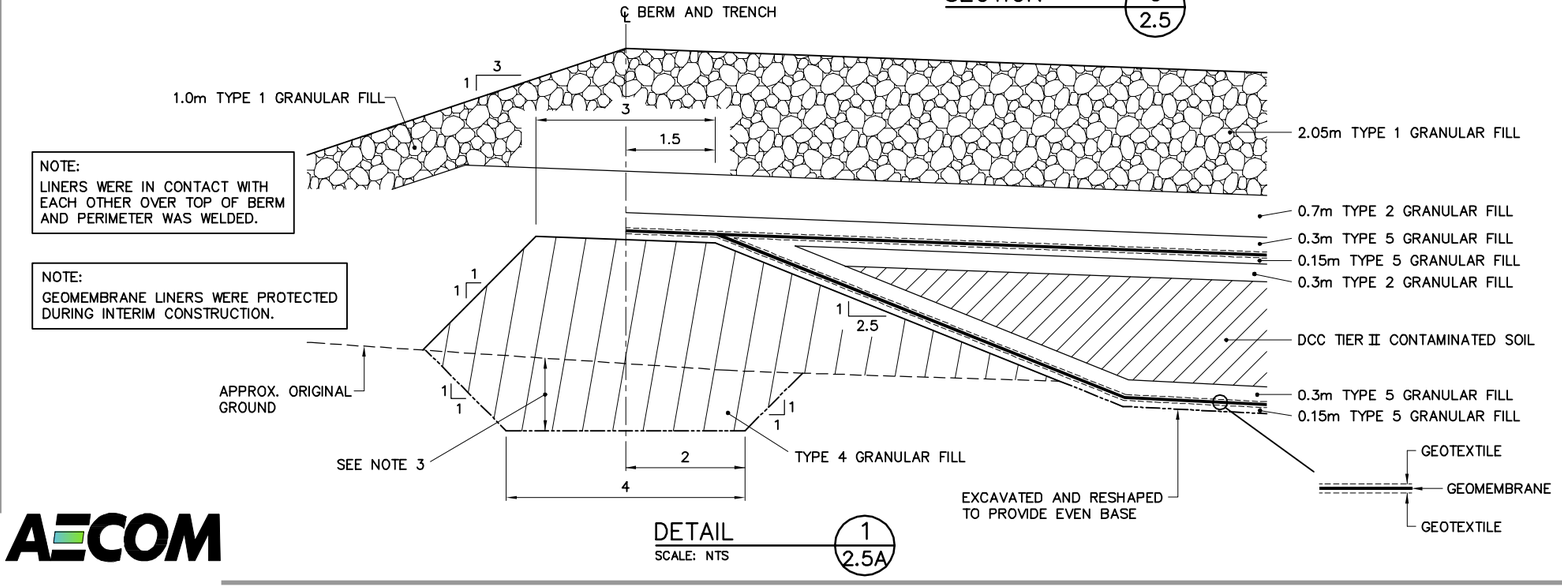
FIGURE FOX-2.5

AECOM





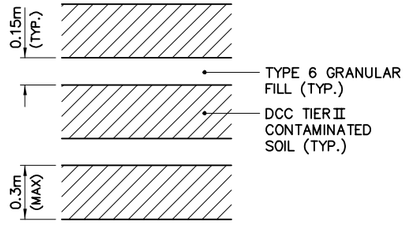
SECTION C 2.5



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

NOTE:
GEOMEMBRANE LINERS WERE PROTECTED DURING INTERIM CONSTRUCTION.

DETAIL 1 2.5A
SCALE: NTS



WASTE PLACEMENT DETAIL
SCALE: NTS

RECORD DRAWING
NOT FOR CONSTRUCTION

0 2 4 m SCALE 1:200

GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. KEY TRENCH WAS EXCAVATED TO SATURATED GROUND, ICE SATURATED PERMAFROST OR SOUND BEDROCK. EXCAVATION DEPTH WAS FIELD CONFIRMED BY THE SITE ENGINEER.

LEGEND:

——— GENERATED BASED ON AS–BUILT SURVEY INFORMATION

..... CONSTRUCTED AS PER DESIGN, NO AS–BUILT SURVEY INFORMATION

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-2 LONGSTAFF BLUFF

TIER II DISPOSAL FACILITY CROSS SECTION AND DETAILS

FIGURE FOX-2.5A

AECOM

Table 5.1: Tier II Disposal Facility – Baseline Soil Data

Sample #	Surface/ Reference Tag #	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
Up gradient Soil Samples																		
09-38039*/40	38039	MW-09	2009	0-10	38	37	14	< 1.0	< 10	66	42	31		< 0.0030	31	< 10	4	27
09-38041*/42	38039	MW-09	2009	30-40	35	33	12	< 1.0	< 10	60	38	27		< 0.0030	51	< 10	< 4.0	51
10-20120*/21*	20120	MW-09	2010	0-10	41	36	14	< 1.0	11	70	43	30	< 0.1	< 0.0030	25		< 4.0	25
10-20122*/23	21020	MW-09	2010	30-40	31	43	17	< 1.0	< 10	76	46	27	< 0.1	< 0.0030	32		< 4.0	32
11-09279*/80	9279	MW-09	2011	0-10	26	26	9	< 1.0	12	61	47	23	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09281*/82	9279	MW-09	2011	30-40	31	28	9	< 1.0	12	64	43	25	< 0.1	< 0.050	11	< 10	< 4.0	11
Down gradient Soil Samples																		
05-11840/41			2005	0	39	24	9	<1.0	<10	50	43	26		<0.1				
11842	11840		2005	35	37	22	8	<1.0	<10	46	40	34		<0.1				
11843	11843		2005	10	48	37	13	<1.0	<10	68	45	39		<0.1				
11844	11843		2005	25	36	28	10	<1.0	<10	56	42	20		<0.1				
11845	11845		2005	5	46	36	13	<1.0	<10	63	36	41		<0.1				
11846	11845		2005	25	39	30	11	<1.0	<10	55	35	33		<0.1				
11847	11847		2005	5	56	36	12	<1.0	11	65	43	35		<0.1				
11848	11847		2005	30	65	35	12	<1.0	16	68	48	61		<0.1				
10-20127*/28	20127	MW-10	2010	0-10	160	52	12	< 1.0	27	93	59	70	< 0.1	< 0.0030	55		8	47
10-20129/30*	20127	MW-10	2010	30-40	91	45	17	< 1.0	19	78	56	71	< 0.1	< 0.0030	11		< 4.0	11
10-20133/34*	20133	MW-11	2010	0-10	55	38	12	< 1.0	11	67	45	35	< 0.1	< 0.0030	17		< 4.0	17
10-20135*/36	20133	MW-11	2010	30-40	60	45	15	< 1.0	11	67	48	41	< 0.1	< 0.0030	50		< 4.0	50
10-20137*/38	20137	MW-12	2010	0-10	47	37	12	< 1.0	< 10	61	47	43	< 0.1	< 0.0030	23		< 4.0	23
10-20139/40*	20137	MW-12	2010	30-40	49	37	13	< 1.0	10	63	52	35	< 0.1	< 0.0030	27		< 4.0	27
11-09293*/94	9293	MW-10	2011	0-10	45	29	10	< 1.0	11	53	37	38	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09295*/96	9293	MW-10	2011	30-40	55	31	10	< 1.0	13	61	45	57	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09289*/90	9289	MW-11	2011	0-10	67	44	11	< 1.0	13	75	48	36	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09291*/92	9289	MW-11	2011	30-40	70	42	12	< 1.0	14	72	47	37	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09285*/86	9285	MW-12	2011	0-10	44	36	13	< 1.0	10	64	39	36	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
11-09287*/88	2985	MW-12	2011	30-40	43	33	12	< 1.0	< 10	59	36	35	< 0.1	< 0.050	<10	< 10	< 4.0	< 9.0
		N Value			26	26	26	26	26	26	26	26	16	26	18			
		Average			52	35	12	<1.0	10	65	44	38	<0.1	<0.1	20			
		Standard Deviation			26	7	2		5	10	6	13			17			
		Minimum			26	22	8		<10	46	35	20		<0.0030	<10			

Sample #	Surface/ Reference Tag #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH [mg/kg]	TPH Identity		
																F1	F2	F3
		Maximum			160	52	17	<1.0	27	93	59	71	<0.1	<0.1	55			
		95% Confidence Limit			10	3	1		2	4	2	5			8			

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
Up gradient Groundwater Samples																
09-38043	MW-09	2009	0.110	0.260	0.052	< 0.0010	< 0.010	0.116	0.057	0.0130	< 0.00040	< 0.000020	<1.0	< 0.050	0.7	< 1.0
10-20126	MW-09	2010	0.230	0.220	0.055	0.0018	0.032	0.221	0.110	0.0550	< 0.00040	< 0.000020	<1.0	0.14	<0.50	< 1.0
11-09278	MW-09	2011	0.019	0.048	0.014	< 0.0010	< 0.010	0.029	0.021	< 0.0030	< 0.00040	< 0.0030	<1.0	< 0.050	<0.50	< 1.0
Down gradient Groundwater Samples																
10-20132	MW-10	2010	0.0863	0.32	0.080	< 0.0010	0.0226	0.150	0.061	0.0341	< 0.00040	< 0.000020	<1.0	< 0.050	<0.50	< 1.0
10-20142	MW-12	2010	0.076	0.470	0.094	< 0.0010	0.0222	0.2600	0.078	0.0374	< 0.00040	< 0.000020	<1.0	< 0.050	<0.50	< 1.0
11-09284	MW-12	2011	0.420	0.299	0.072	0.0020	0.1090	0.3700	0.229	0.1360	< 0.00040	< 0.0030	<1.0	< 0.050	<0.50	< 1.0
N Value			6	6	6	6	6	6	6	6	6	6	6			
Average			0.157	0.270	0.061	<0.0010	0.033	0.191	0.093	0.0462	<0.00040	<0.0030	<1.0			
Standard Deviation			0.147	0.138	0.028		0.039	0.119	0.073	0.0479						
Minimum			0.019	0.048	0.014	<0.0010	0.022	0.029	0.021	0.0130		<0.000020				
Maximum			0.420	0.470	0.094	0.0020	0.109	0.370	0.229	0.1360	<0.00040	<0.0030	<1.0			
95% Confidence Limit			0.117	0.110	0.022		0.031	0.096	0.058	0.0383						

6. Upper Site Landfill Lobe A

The Upper Site Landfill Lobe A is located 70 m east of the Tier II Disposal Facility. A geophysical survey identified an anomaly of buried debris 4,040 m^2 in size.

Cover at the landfill was generally good at the time of the site assessment, with minimal exposed debris on the surface, and occasional exposed debris along the toe. There is a partially buried steel structure in the centre of the landfill and a 1 m deep void was visible. There were surface stains and scattered debris on the landfill surface, as well as significant quantities of scattered debris at the landfill toe, extending out 200 m beyond the toe.

One hazardous contaminated soil area, two Tier II soil areas, two Tier I soil areas and two Type A soil areas were identified during the site assessment. As the impacts were so widespread, it was not possible to distinguish whether the landfill was acting as a contaminant source. As a result, the landfill was conservatively estimated as leaching.

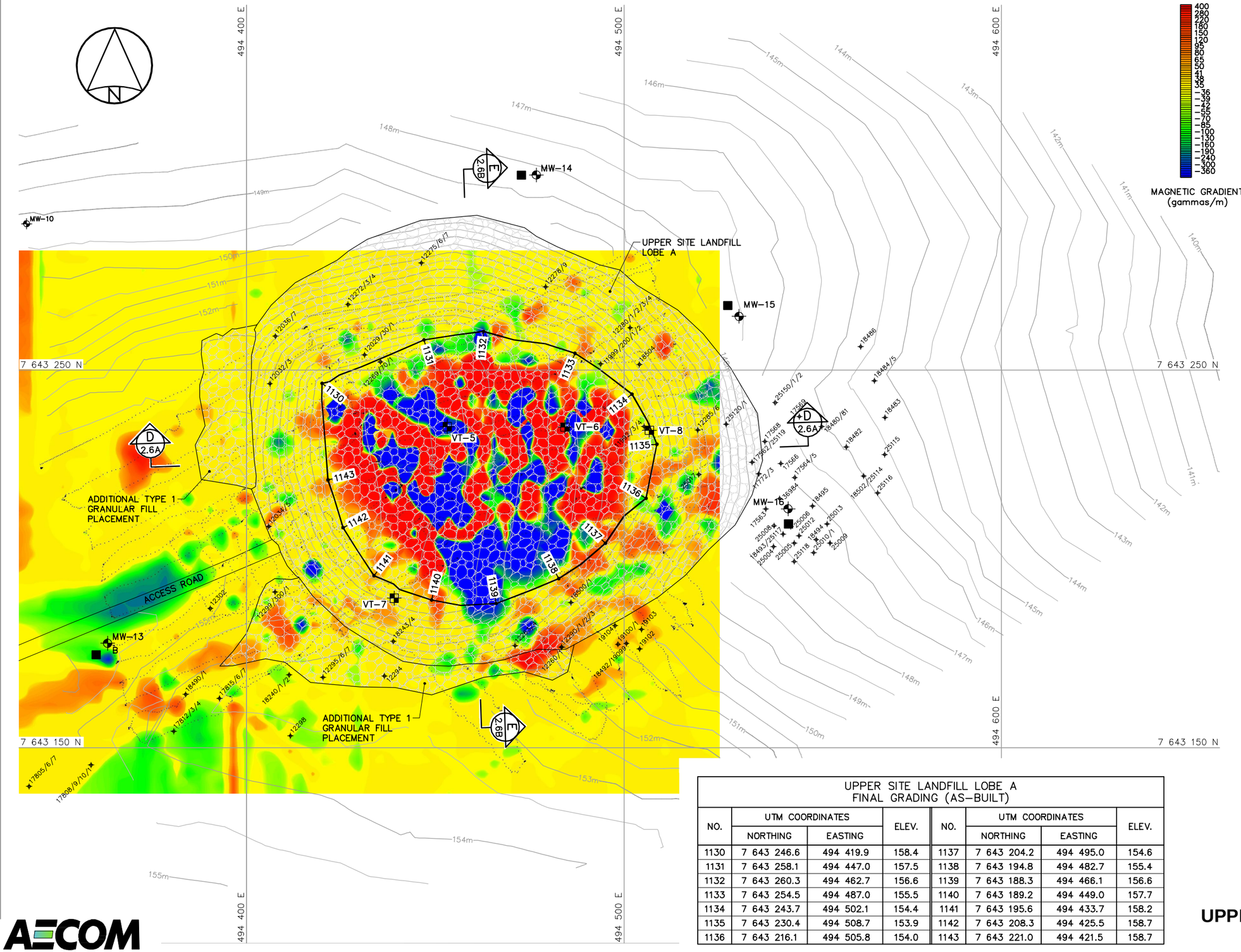
Landfill remediation included the installation of a leachate containment system. Leachate containment design included the excavation of a trench to saturated and/or frozen ground beyond the landfill perimeter, and the placement of a synthetic liner system anchored into the trench and extended over the full landfill surface. Saturated, compacted, well-graded silty sand and gravel (Type 4 granular) was placed within the trench and over the entire landfill surface overlying the liner system. Finally, a sufficient cover of granular fill was placed over the surface and key trench to promote the aggradation of permafrost into the landfill contents and the overlying Type 4 granular material sections. For erosion protection from surface drainage, the top cover section along the down-gradient slope was comprised of Type 1 (rip rap) granular material. Four groundwater monitoring wells were installed at the landfill perimeter, and four thermistors were installed 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 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 FOX-2.6.

6.1 Baseline Data

Sample locations for the baseline soil samples are shown on Figure FOX-2.6. A summary of the baseline soil analytical data is provided in Table 6.1. Baseline soil data is comprised of samples collected in the vicinity of the Tier II Disposal Facility during the site investigation in 2005, and samples collected at permanent monitoring locations during 2009, 2010 and 2011. Zinc and chromium soil baseline concentrations are slightly elevated above the background levels. The remaining inorganic elements are consistent, or below, the background levels. Low level PCBs were detected both up gradient and down gradient of the landfill. Concentrations ranged between <0.0030 to 8.6 mg/kg. TPH concentrations (F2 and F3 fractions) were detected at several of the sample locations. Hydrocarbon concentrations ranged between <10 mg/kg to 7,700 mg/kg.

A summary of baseline groundwater data is provided in Table 6.2. Baseline data was collected from permanent monitoring locations in 2009, 2010 and 2011. BMW-13 was dry during all sampling events. MW-15 was dry during the 2009 monitoring event and MW-16 was dry during the 2009 and 2010 monitoring events. Low level copper, nickel, cobalt, zinc, and chromium were detected in all three wells. Arsenic and lead were detected in MW-14, and MW-16. Cadmium was detected in MW-16. Mercury, PCB, and TPH concentrations were below detection limits.



GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- 1130 — COORDINATE POINT
- MONITORING WELL LOCATION (3)
- B — BACKGROUND MONITORING WELL LOCATION (1)
- GROUND TEMPERATURE CABLE LOCATION (4)
- MONITORING SOIL SAMPLE LOCATION (4)
- 17568 — SOIL SAMPLE TAG LOCATION

UPPER SITE LANDFILL LOBE A
MONITORING WELLS (AS-BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
MW-13	7 643 177.7	494 363.1	155.7
MW-14	7 643 301.8	494 476.7	148.2
MW-15	7 643 264.3	494 530.4	147.7
MW-16	7 643 213.3	494 543.4	147.1

UPPER SITE LANDFILL LOBE A
GROUND TEMPERATURE CABLES (AS-BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
VT-5	7 643 235.1	494 453.1	157.7
VT-6	7 643 235.0	494 484.3	155.6
VT-7	7 643 189.6	494 439.1	157.1
VT-8	7 643 234.1	494 506.7	153.9

UPPER SITE LANDFILL LOBE A
FINAL GRADING (AS-BUILT)

NO.	UTM COORDINATES		ELEV.	NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING			NORTHING	EASTING	
1130	7 643 246.6	494 419.9	158.4	1137	7 643 204.2	494 495.0	154.6
1131	7 643 258.1	494 447.0	157.5	1138	7 643 194.8	494 482.7	155.4
1132	7 643 260.3	494 462.7	156.6	1139	7 643 188.3	494 466.1	156.6
1133	7 643 254.5	494 487.0	155.5	1140	7 643 189.2	494 449.0	157.7
1134	7 643 243.7	494 502.1	154.4	1141	7 643 195.6	494 433.7	158.2
1135	7 643 230.4	494 508.7	153.9	1142	7 643 208.3	494 425.5	158.7
1136	7 643 216.1	494 505.8	154.0	1143	7 643 221.0	494 421.5	158.7

RECORD DRAWING
NOT FOR CONSTRUCTION

0 10 20 m SCALE 1:1000

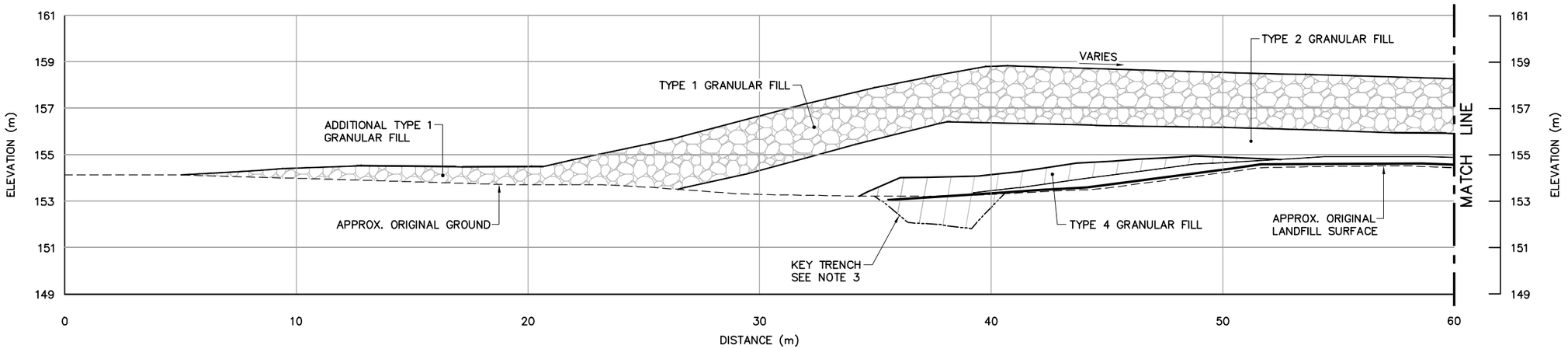
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

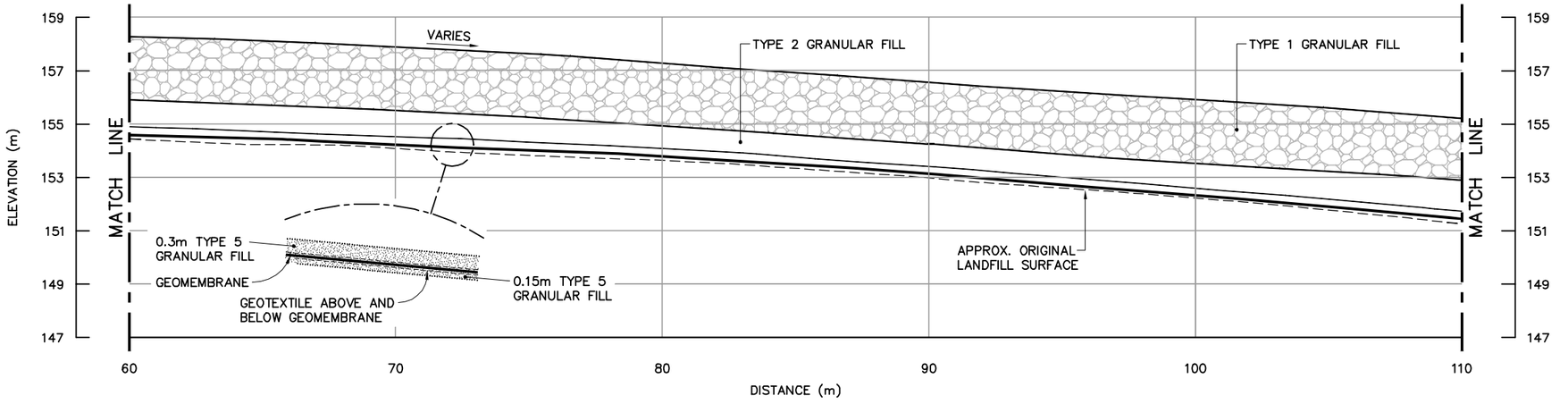
FOX-2 LONGSTAFF BLUFF

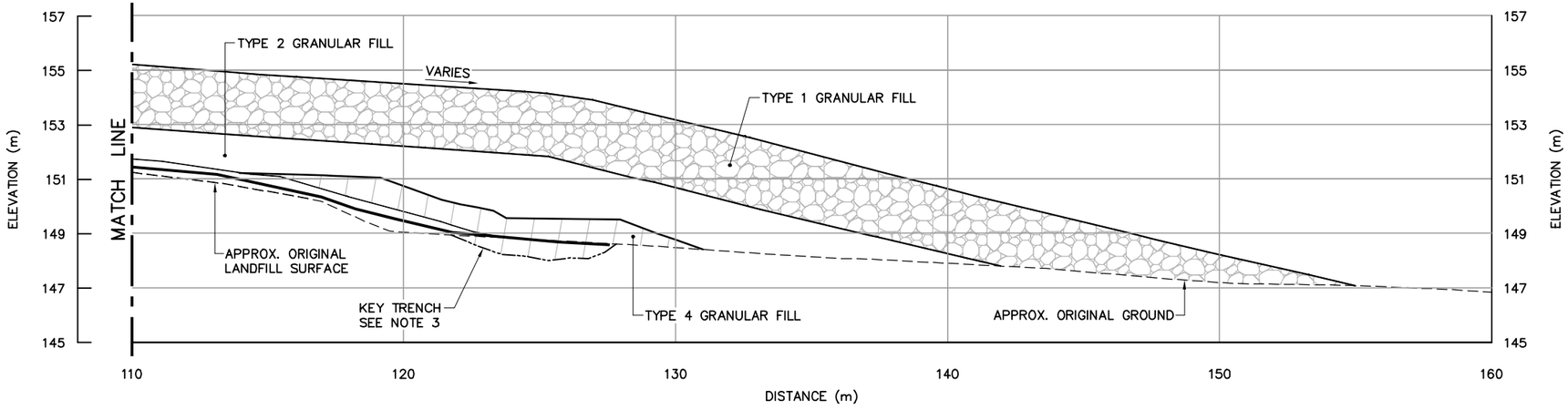
UPPER SITE LANDFILL LOBE A

FIGURE FOX-2.6

AECOM







SECTION D 2.6

GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. KEY TRENCH WAS EXCAVATED TO SATURATED GROUND, ICE SATURATED PERMAFROST OR SOUND BEDROCK. EXCAVATION DEPTH WAS FIELD CONFIRMED BY THE SITE ENGINEER.

LEGEND:

GENERATED BASED ON AS-BUILT SURVEY INFORMATION

CONSTRUCTED AS PER DESIGN, NO AS-BUILT SURVEY INFORMATION

RECORD DRAWING
NOT FOR CONSTRUCTION

0 2 4 m SCALE 1:200

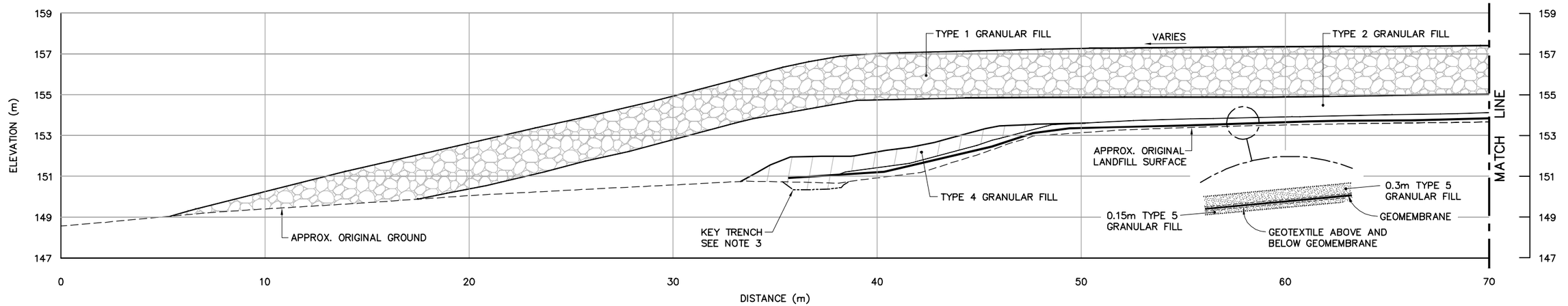
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

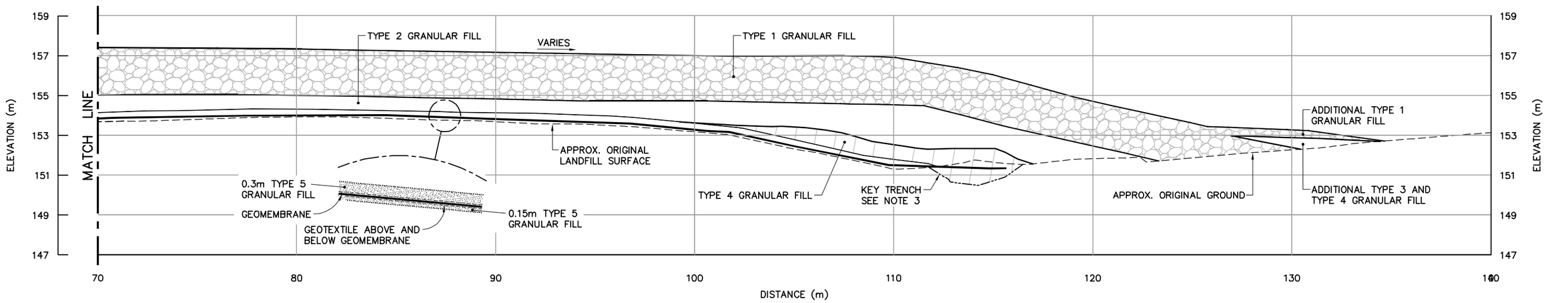
FOX-2 LONGSTAFF BLUFF

UPPER SITE LANDFILL LOBE A CROSS SECTION

FIGURE FOX-2.6A

AECOM





SECTION E 2.6

GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. KEY TRENCH WAS EXCAVATED TO SATURATED GROUND, ICE SATURATED PERMAFROST OR SOUND BEDROCK. EXCAVATION DEPTH WAS FIELD CONFIRMED BY THE SITE ENGINEER.

LEGEND:

——— GENERATED BASED ON AS–BUILT SURVEY INFORMATION

..... CONSTRUCTED AS PER DESIGN, NO AS–BUILT SURVEY INFORMATION

RECORD DRAWING
NOT FOR CONSTRUCTION

0 2 4 m SCALE 1:200

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-2 LONGSTAFF BLUFF

UPPER SITE LANDFILL LOBE A CROSS SECTION

FIGURE FOX-2.6B

AECOM

Table 6.1: Upper Site Landfill Lobe A – Baseline Soil Data

Sample #	Surface/ Reference Tag #	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
Up gradient Soil Samples																		
12032	12032		2005	15	35	27	10	<1.0	<10	54	39	28		<0.1				
12033	12032		2005	45	37	28	11	<1.0	<10	53	37	29		<0.1				
12034	12034		2005	10	82	51	12	<1.0	150	450	120	27		0.2				
12035	12034		2005	25	57	40	15	<1.0	16	91	48	42		<0.1				
12036	12036		2005	10	35	29	11	<1.0	<10	56	40	32		<0.1				
12037	12036		2005	35	43	33	13	<1.0	<10	59	38	40		<0.1				
12299	12299		2005	15	29	25	9	<1.0	<10	52	46	26		<0.1				
05-12300/01	12299		2005	50	40	36	15	<1.0	<10	62	41	37		0.2				
12302	12302		2005	10	43	34	13	<1.0	<10	61	49	35		<0.1				
05-18240/41	18240		2005	5	44	46	16	<1.0	<10	83	50	25		<0.1				
18242	18240		2005	60	49	45	15	<1.0	<10	85	47	28		<0.1				
18243	18243		2005	10	50	46	19	<1.0	<10	87	51	35						
18244	18243		2005	30	50	46	15	<1.0	<10	84	50	32		<0.1				
12294	12294		2005	25	40	32	11	<1.0	<10	64	48	25		<0.1				
12295	12295		2005	15	50	44	17	<1.0	<10	80	48	28		<0.1				
12296	12295		2005	30	48	46	17	<1.0	<10	82	51	25		<0.1				
12297	12295		2005	65	50	44	16	<1.0	<10	84	50	27		<0.1				
12298	12298		2005	15	52	34	13	<1.0	<10	71	52	24		<0.1				
17805	17805		2005	15	76	42	12	<1.0	11	95	59	49		<0.1				
17806	17805		2005	40	71	46	14	<1.0	11	99	60	38		<0.1				
17807	17805		2005	85	58	46	15	<1.0	<10	92	56	35		<0.1				
17808	17808		2005	15	99	59	16	<1.0	13	110	57	34		<0.1				
17809	17808		2005	40														
05-17810/11	17808		2005	70	69	53	21	<1.0	<10	97	56	41		<0.1				
17812	17812		2005	15	46	32	10	<1.0	<10	71	56	40		<0.1				
17813	17812		2005	40														
17814	17812		2005	70	48	41	13	<1.0	<10	75	46	26		<0.1				
17815	17815		2005	15	49	37	12	<1.0	<10	72	49	22		<0.1	<40			
17816	17815		2005	35	63	45	13	<1.0	<10	88	52	31		<0.1				
17817	17815		2005	60														
05-18490/91	18490		2005	0	51				140	89								
09-38035*/36	38035	MW-13	2009	0-10	30	24	8	< 1.0	15	64	41	20		0.0	73	< 10	8.1	65

Sample #	Surface/ Reference Tag #	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
09-38037*/38	38035	MW-13	2009	30-40	33	31	10	< 1.0	< 10	58	39	33		< 0.0030	100	< 10	< 4.0	100
10-20143/44*	20143	MW-13	2010	0-10	33	34	12	< 1.0	17	72	53	26	< 0.10	0.0331	78		< 4.0	78
10-20145*/46	20143	MW-13	2010	30-40	41	35	15	< 1.0	< 10	67	49	53	< 0.10	< 0.0030	<9.0		< 4.0	< 9.0
11-09256*/57	9256	MW-13	2011	0-10	32	27	11	< 1.0	< 10	60	40	28		< 0.050	<10	< 10	< 4.0	< 9.0
11-09258*/59	9256	MW-13	2011	30-40	53	41	17	< 1.0	14	73	43	35		< 0.050	<10	< 10	< 4.0	< 9.0
Down gradient Soil Samples																		
12269	12269		2005	10	40	34	15	<1.0	<10	68	42	24		<0.1				
05-12270/71	12269		2005	40	40	33	13	<1.0	<10	63	41	25		<0.1				
12272	12272		2005	20														
12273	12272		2005	45														
12274	12272		2005	75														
12275	12275		2005	10														
00-12276	12275		2005	35														
00-12277	12275		2005	55														
00-12278	12278		2005	10											<40			
00-12279	12278		2005	50														
05-12280/81	12280		2005	15	36	34	14	<1.0	<10	65	46	26		<0.1				
00-12282	12280		2005	40	41	33	14	<1.0	<10	66	44	70		<0.1				
00-12283	12280		2005	65	44	33	14	<1.0	<10	69	42	29		<0.1				
00-12284	12280		2005	90														
00-11999	11999		2005	10	71				<10	96				<0.1				
05-12000/01	11999		2005	25	46	41	16	<1.0	<10	75	50	29		<0.1				
00-12002	11999		2005	70	46	41	17	<1.0	<10	75	47	47		<0.1				
00-12266	12266		2005	5	88	69	25	<1.0	17	160	67	51		<0.1				
00-12267	12266		2005	10	47	37	15	<1.0	<10	71	43	37		<0.1				
00-12029	12029		2005	10	39	37	13	<1.0	<10	67	47	28		<0.1				
05-12030/31	12029		2005	30	41	37	15	<1.0	<10	66	44	29		<0.1				
12263	12263		2005	10	46	39	15	<1.0	<10	67	44	30		<0.1				
12264	12263		2005	35	47	39	15	<1.0	<10	71	44	29		<0.1				
18504			2005	0	<40				<30	72								
05-18500/01			2005	0	<40				110	110								
19104			2005	0	49				<30	81								
05-19100/01			2005	0	43				<10	69								
19102			2005	0	35				<10	64								
19103			2005	0	44				<30	82								

Sample #	Surface/ Reference Tag #	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
18492			2005	0	71				460	100								
19099	18492		2005	30	45				31	87								
11992	11992		2005	10	42	38	16	<1.0	<10	67	47	35		<0.1				
11993	11992		2005	40	51	39	13	<1.0	<10	74	48	39		<0.1				
11994	11992		2005	80	45	33	13	<1.0	<10	64	40	29		<0.1				
12285	12285		2005	20	33	32	13	<1.0	<10	62	37	24		<0.1	<40			
12286	12285		2005	50	31	31	12	<1.0	<10	61	39	19		<0.1	<40			
25015			2005	0	94				33	320				7.6	7700			
25017			2005	0	<40				32	48				<0.5	440			
05-25120/21			2005	0										<0.5				
17562			2005	0	94				42	210				6.2	>8,000			
17563			2005	0	58				100	79				8.6				
17564			2005	0	<40				<30	76				<0.5				
17565	17564		2005	15	59				37	80								
17566			2005	0	86				66	170				<0.5				
17568			2005	0	61				<30	87				<0.5				
17569			2005	0	50				79	90								
11772			2005	0	43	31	9	<1.0	<10	68	47	28		<0.5	<40			
11773			2005	0	42				<30	69				<0.5				
05-25000/01			2005	0	83				35	130								
25002			2005	0	60				<30	110								
25119	17562		2005	30										3.0	<40			
05-18480/81			2005	0	61				45	110								
18482			2005	0	59				<30	85				<0.5				
05-18483			2005	0	69				33	96								
18484			2005	0	45				<30	78								
18485	18484		2005	20	45				<30	84								
18486			2005	0	77				<30	91								
18502			2005	0	81				34	120				1.6				
18494			2005	0	<40				76	80				<0.5	770			
18495			2005	0	48				46	66				<0.5				
25005			2005	0	180				40	140								
25006			2005	0	60				<30	77								
25008			2005	0	60				<30	74				<0.5				
25009			2005	0	<40				<30	70					170			

Sample #	Surface/ Reference Tag #	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
05-25010/11			2005	0	33				<30	58					160			
25012			2005	0	<40				<30	66					<26			
25013			2005	0	54				<30	76					400			
25114	18502		2005	30										<0.5				
25115			2005	0										<0.5				
25116			2005	0										0.6				
25117	25117		2005	30	55				33	75								
25118			2005	0	47				<10	77								
09-38027*/28	38027	MW-14	2009	0-10	47	41	15	< 1.0	< 10	78	49	32		< 0.0030	95	< 10	4.7	90
09-38029*/30	38027	MW-14	2009	30-40	46	41	15	< 1.0	< 10	76	46	36		< 0.0030	65	< 10	5.2	60
09-38057*/58*	38057	MW-15	2009	0-10	44	70	11	< 1.0	< 10	69	50	26		< 0.0030	256	< 10	16.1	240
09-38059*/60*	38057	MW-15	2009	30-40	49	34	11	< 1.0	11	74	43	31		< 0.0030	134	< 10	12.4	122
09-38031*/32	38031	MW-16	2009	0-10	94	57	13	< 1.0	15	102	56	51		0.0048	117	< 10	6.6	110
09-38033*/34	38031	MW-16	2009	30-40	72	44	11	< 1.0	13	88	49	45		< 0.0030	358	< 10	18	340
10-20148*/49	20148	MW-14	2010	0-10	50	43	16	< 1.0	< 10	76	53	34	< 0.10	< 0.0030	28		< 4.0	28
10-20150/51*	20148	MW-14	2010	30-40	49	43	15	< 1.0	< 10	76	50	37	< 0.10	< 0.0030	13		< 4.0	13
10-20154*/55	20154	MW-15	2010	0-10	54	42	15	< 1.0	< 10	76	41	38	< 0.10	< 0.0030	60		< 4.0	60
10-20156*/57	20154	MW-15	2010	30-40	53	40	14	< 1.0	< 10	76	44	35	< 0.10	0.0430	10		< 4.0	10
10-20159*/60*	20159	MW-16	2010	0-10	97	53	19	< 1.0	31	101	63	56	< 0.10	0.0126	53		< 4.0	53
10-20161/62*	20159	MW-16	2010	30-40	43	35	10	< 1.0	31	66	48	33	< 0.10	< 0.0030	19		< 4.0	19
11-09261*/62	9261	MW-14	2011	0-10	45	37	12	< 1.0	11	71	45	32		< 0.050	<10	< 10	< 4.0	< 9.0
11-09263*/64	9261	MW-14	2011	30-40	45	37	13	< 1.0	< 10	70	44	31		< 0.050	<10	< 10	< 4.0	< 9.0
11-09266*/67	9266	MW-15	2011	0-10	39	32	10	< 1.0	< 10	66	40	22		< 0.050	<10	< 10	< 4.0	< 9.0
11-09268*/69	9266	MW-15	2011	30-40	73	37	11	< 1.0	10	84	43	26		< 0.050	<10	< 10	< 4.0	< 9.0
11-09271*/72	9271	MW-16	2011	0-10	54	38	11	< 1.0	12	75	44	28		< 0.050	260	< 10	< 4.0	260
11-09273*/74	9271	MW-16	2011	30-40	50	38	10	< 1.0	11	74	45	26		< 0.050	61	< 10	< 4.0	61
		N Value			110	70	70	70	110	110	70	70	8	93	58			
		Average			52	39	14	<1.0	<10	86	48	33	<0.10	<0.5	<10			
		Standard Deviation			21	9	3			48	11	9						
		Minimum			29	24	8		<10	48	37	19		<0.0030	<10			
		Maximum			180	70	25	<1.0	460	450	120	70	<0.10	8.6	7700			
		95% Confidence Limit			4	2	1			9	3	2						

Table 6.2: Upper Site Landfill Lobe A – 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
Down gradient Groundwater Samples																
09-20056	MW-14	2009	0.014	0.167	0.038	< 0.0010	< 0.010	0.0450	0.0340	0.0030	< 0.00040	< 0.000020	<1.0	<0.050	<0.50	<1.0
10-20153	MW-14	2010	0.019	0.206	0.035	< 0.0010	< 0.010	0.0368	0.0626	< 0.0030	< 0.00040	< 0.000020	<1.0	< 0.050	< 0.50	< 1.0
10-20158	MW-15	2010	0.012	0.218	0.013	< 0.0010	< 0.010	0.0117	0.3360	< 0.0030	< 0.00040	< 0.000020	<1.0	0.100	< 0.50	< 1.0
11-09260	MW-14	2011	0.122	0.153	0.038	< 0.0010	0.0120	0.3230	0.1230	0.0190	< 0.00040	< 0.0030	<1.0	< 0.050	< 0.50	< 1.0
11-09265	MW-15	2011	0.111	0.292	0.056	< 0.0010	< 0.010	0.0860	0.1990	< 0.0030	< 0.00040	< 0.0030	<1.0	< 0.050	< 0.50	< 1.0
11-09270	MW-16	2011	0.293	0.220	0.084	0.0010	0.0450	0.6890	0.2280	0.0860	< 0.00040	< 0.0030	<1.0	< 0.050	< 0.50	< 1.0
N Value			6	6	6	6	6	6	6	6	6	6	6			
Average			0.095	0.209	0.044	<0.0010	<0.010	0.1986	0.1638	0.0360	<0.00040	<0.0030	<1.0			
Standard Deviation			0.109	0.049	0.024			0.2658	0.1129	0.0440						
Minimum			0.012	0.153	0.013	<0.0010	<0.010	0.0117	0.0340	0.0030		<0.000020				
Maximum			0.293	0.292	0.084	0.001	0.0450	0.6890	0.3360	0.0860	<0.00040	<0.0030	<1.0			
95% Confidence Limit			0.087	0.039	0.019			0.2127	0.0904	0.0352						

Appendix A

FOX-2 Longstaff Bluff Year 1 Monitoring Data

FOX-2 Longstaff Bluff – 2012 Landfill Monitoring

In August, 2012, 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 2012 (year 1 of monitoring) at each landfill.

Landfill Designation	Visual Inspection	Groundwater Sampling	Soil Sampling	Thermal Monitoring
Airstrip Camp Landfill Lobe A	√		√	
Non-Hazardous Waste Landfill	√	√	√	
West Landfill Lobe E	√		√	
Tier II Disposal Facility	√	√	√	√
Upper Site Landfill Lobe A	√	√	√	√

This appendix serves as a compilation of the AECOM geotechnical report (AECOM 2012) and the ESG environmental report (ESG 2012) 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 thermistors installation (where applicable)
- Evaluation of 2012 soil analytical data, as compared to baseline conditions
- Summary of 2012 soil analytical data
- Summary of 2012 groundwater analytical data
- 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 1 Airstrip Camp Landfill Lobe A – Year 1 Data

Figures:

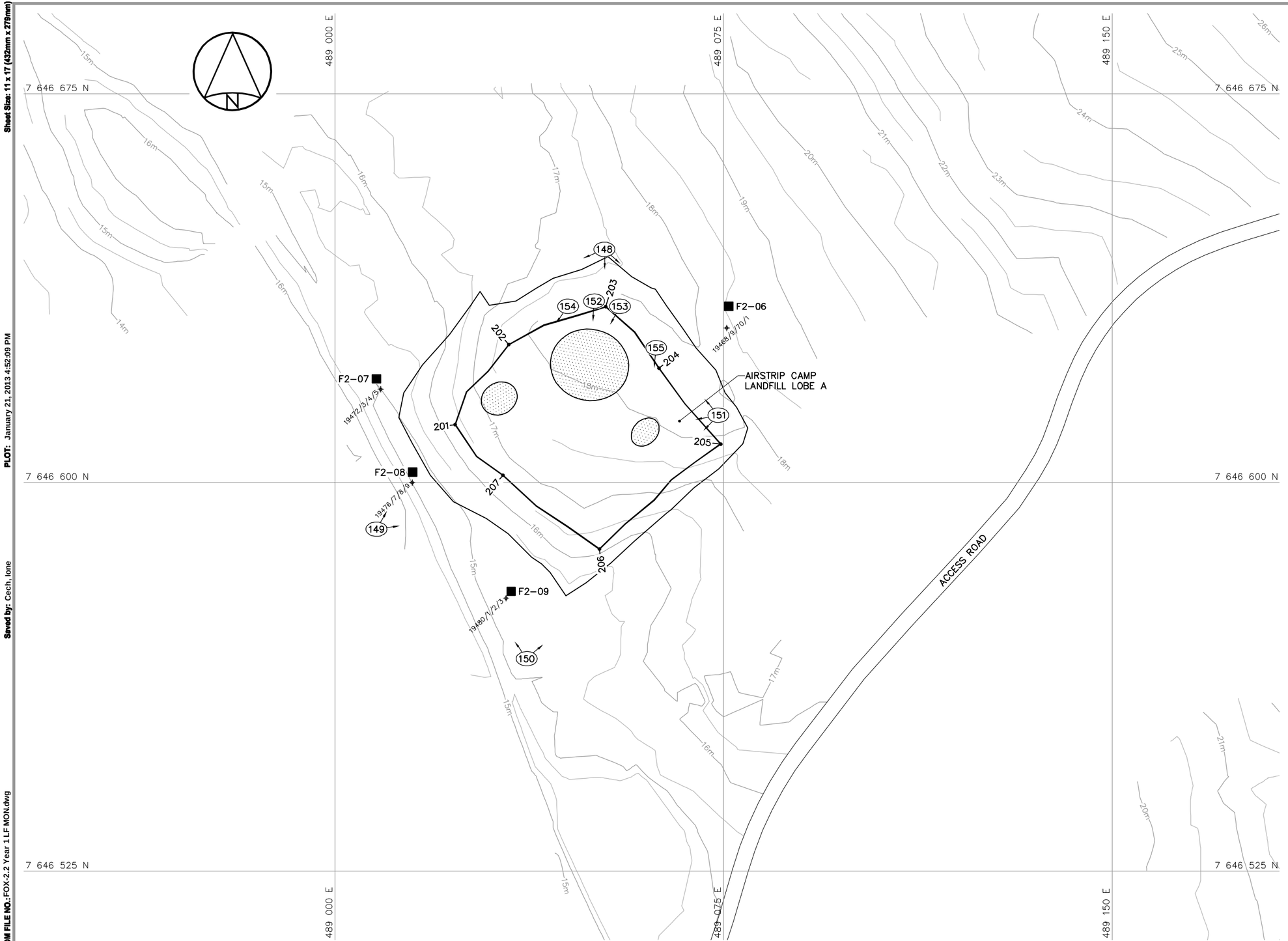
- FOX-2.2: Site Plan – Airstrip Camp Landfill Lobe A

Tables:

- Landfill Visual Inspection – Airstrip Camp Landfill Lobe A
- Airstrip Camp Landfill Lobe A – Evaluation of Year 1 Soil Data
- Airstrip Camp Landfill Lobe A – Year 1 (2012) Soil Data

Photographic Records:

- Photos 1 and 2
- Photos 3 and 4
- Photos 5 and 6
- Photos 7 and 8
- Photos 9 and 10
- Photos 11 and 12
- Photos 13 and 14



GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- 201 — COORDINATE POINT
- ■ — MONITORING SOIL SAMPLE LOCATION (4)
- MONITORING SITE FEATURE
- 148 — APPROX. PHOTOGRAPHIC VIEWPOINT
- 19468 — 2012 SOIL SAMPLE TAG LOCATION

AIRSTRIP CAMP LANDFILL (LOBE A) REGRADED (AS-BUILT)			
NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
201	7 646 611.2	489 023.2	16.4
202	7 646 626.6	489 033.5	17.8
203	7 646 633.9	489 052.3	18.2
204	7 646 622.1	489 062.5	18.3
205	7 646 607.4	489 074.5	17.9
206	7 646 587.2	489 051.1	16.1
207	7 646 601.4	489 032.4	16.7

RECORD DRAWING
NOT FOR CONSTRUCTION

0 7.5 15 m SCALE 1:750

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-2 LONGSTAFF BLUFF

AIRSTRIP CAMP LANDFILL LOBE A

FIGURE FOX-2.2

AECOM

DEW Line Cleanup: Post-Construction - Landfill Monitoring
Visual Inspection Checklist and Preliminary Stability Assessment

Site Name:	**FOX-2 Longstaff Bluff**
Landfill Designation:	**Airstrip Camp Landfill Lobe A**
Date of Inspection:	**30-Aug-12**
Inspected By:	**Kristen Tackney, P.Geol. (AECOM)**

Checklist Item	Present Yes/No	Location (Describe relative to existing monuments/features and relative to landfill design i.e. surface, berms, toe)	Length	Width	Depth	Extent relative to Area of Landfill (%)	Description	Photographic Records Focal length, location, view point & direction (relative to magnetic north) Feature of note Scale	Additional Comments	Severity Rating
Settlement	Yes	Surface	5 m	5 m	0.3 m	Occasional	Minor Settlement/ Rough Finish Grading	Photos FOX-2 133-136 WP 152-155		Acceptable
Erosion	No									
Frost Action	No									
Sloughing and Cracking	No									
Animal Burrows	No									
Vegetation	No									
Staining	No									
Vegetation Stress	No									
Seepage Points	No									
Debris Exposed	No									
Presence/Condition - Monitoring Instruments	No									
Features of Note	No									
Landfill Performance										Acceptable

Airstrip Camp Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2012	Comments
Copper	35	45 +/- 6	120	Six of eight samples were above the 95% confidence limit.	The surface samples at F2-6 and F2-8 and the surface and depth samples at F2-7 and F2-9 exceeded the 95% confidence limit. The results were below the baseline maximum.
Nickel	35	41 +/- 4	73	Seven of the eight samples exceeded the 95% confidence limit.	The surface and depth samples at F2-6, F2-7, and F2-9 and the surface sample at F2-8 exceeded the 95% confidence limit.The surface sample at F2-8 exceeded the baseline maximum with a concentration of 100.0 mg/kg.
Cobalt	35	15.4 +/- 1.1	23.7	Six of eight samples were above the 95% confidence limit.	The surface and depth samples at F2-6 and F2-9, the surface sample at F2-8, and the depth sample at F2-7 exceeded the 95% confidence limit. The surface sample at F2-8 exceeded the baseline maximum with a concentration of 25.2 mg/kg.
Cadmium	35	<1.0	<1.0	Concentrations consistent with baseline mean (non-detect).	
Lead	35	<10	29	Seven of the eight samples exceeded the baseline mean (non-detect).	The surface and depth samples at F2-6, F2-7, and F2-9 and the surface sample at F2-8 exceeded the baseline mean. None of the samples exceeded the baseline maximum.
Zinc	35	78 +/- 5	120	Six of eight samples were above the 95% confidence limit.	The surface and depth samples at F2-6 and F2-9, the surface sample at F2-8, and the depth sample at F2-7 exceeded the 95% confidence limit. The surface sample at F2-8 and the surface and depth samples at F2-9 exceeded the baseline maximum with concentrations of 140, 150, and 130 mg/kg, respectively.
Chromium	35	51 +/- 2	61	Seven of the eight samples exceeded the 95% confidence limit.	The surface and depth samples at F2-6 and F2-9, the surface sample at F2-8, and the depth sample at F2-7 exceeded the 95% confidence limit. All of the above samples had results above the baseline maximum, with concentrations of 73 and 82 (F2-6), 76 (F2-7), 73 (F2-8), and 88 and 73 mg/kg (F2-9).
Arsenic	35	25.4 +/- 3.0	66.2	All eight samples exceeded the 95% confidence limit.	The surface sample at F2-7 exceeded the baseline maximum with a concentration of 76.1 mg/kg.
Mercury	8	<0.10	<0.1	Concentrations consistent with baseline mean (non-detect).	
PCBs	35	<0.1	<0.1	Concentrations consistent with baseline mean (non-detect).	
TPH	16	<10	52	Concentrations consistent with baseline mean (non-detect), with one except.	The depth sample at F2-8 exceeded the baseline maximum with a concentration of 11 mg/kg.

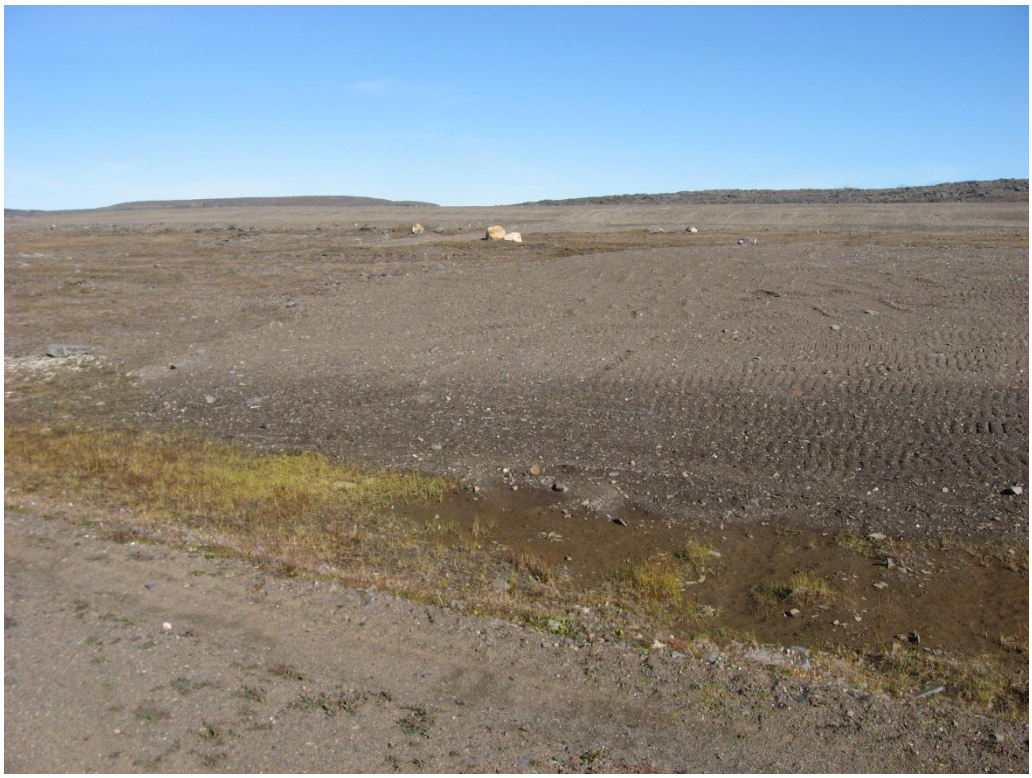
Airstrip Camp Landfill - Year 1 (2012) Soil Data

Sample #	Surface/ Reference Tag #	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
Airstrip Camp Landfill- Baseline Concentrations					**45 +/- 6**	**41 +/- 4**	**15.4 +/- 1.1**	**<1.0**	**<10**	**78 +/- 5**	**51 +/- 2**	**25.4 +/- 3.0**	**<0.10**	**<0.1**	**<10**			
Airstrip Camp Landfill - Maximum Concentrations					**120**	**73**	**23.7**	**<1.0**	**29**	**120**	**61**	***66.2***	**<0.1**	**<0.1**	**52**			
Upgradient Soil Samples																		
12-19468/69	19468	F2-6	2012	0-10	52.0	57.7	16.9	< 0.50	10.6	110	73	31.6	0.02	< 0.020	<50	< 5.0	< 10	< 50
12-19470/71	19468	F2-6	2012	30-40	44.5	58.0	16.5	<0.50	12.4	120	82	48.0	0.0125	< 0.020	<50	< 5.0	< 10	< 50
Downgradient Soil Samples																		
12-19472/73	19472	F2-7	2012	0-10	63.4	54.9	13.6	< 0.50	10.1	81	46	76.1	< 0.010	< 0.020	<50	< 5.0	< 10	< 50
12-19474/75	19472	F2-7	2012	30-40	87.2	67.8	18.6	< 0.50	11.7	120	76	47.1	< 0.010	< 0.020	<50	< 5.0	< 10	< 50
12-19476/77	19476	F2-8	2012	0-10	85.1	100.0	25.2	< 0.50	18	140	73	58.4	0.011	< 0.020	<50	< 5.0	< 10	< 50
12-19478/79	19476	F2-8	2012	30-40	46.7	44.7	12.3	< 0.50	8.7	83	53	47.5	< 0.010	< 0.020	110	< 5.0	< 10	110
12-19480/81	19480	F2-9	2012	0-10	84.4	71.9	20.7	< 0.50	15.3	150	88	60.0	< 0.010	< 0.020	<50	< 5.0	< 10	< 50
12-19482/83	19480	F2-9	2012	30-40	73.6	68.0	17.4	< 0.50	13.9	130	73	51.4	< 0.010	< 0.020	<50	< 5.0	< 10	< 50

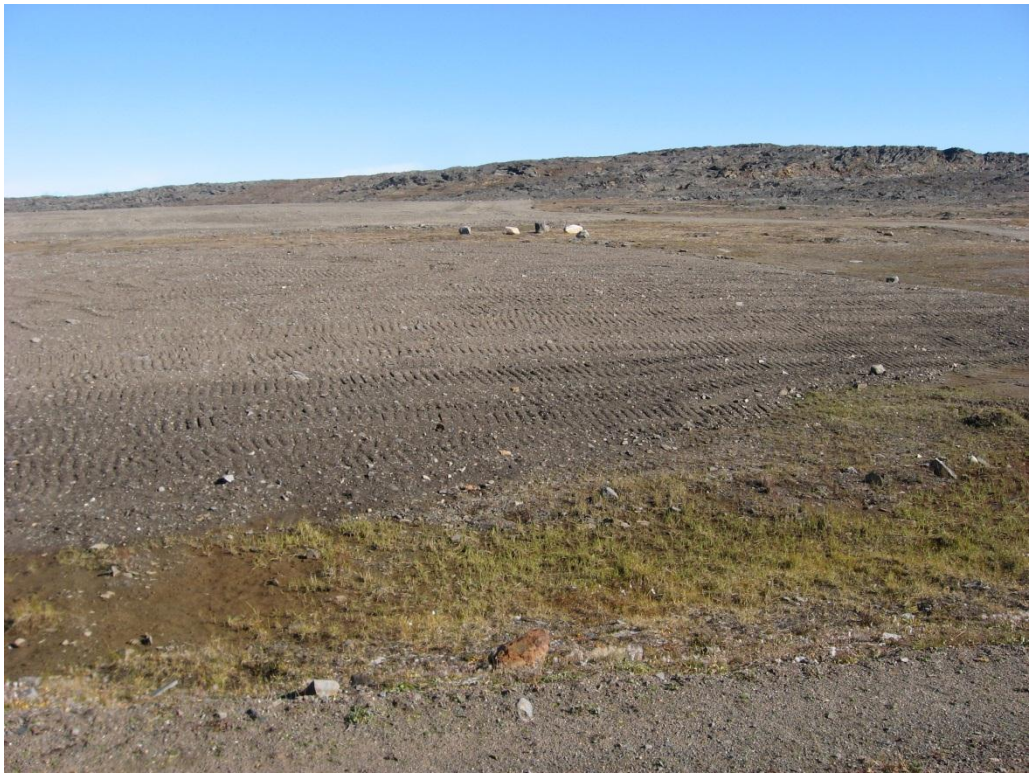
Photograph 1. Airstrip Camp Landfill Lobe A – Looking SE (Way Point 148). ↑

Photograph 2. Looking S (WP 148). ↑

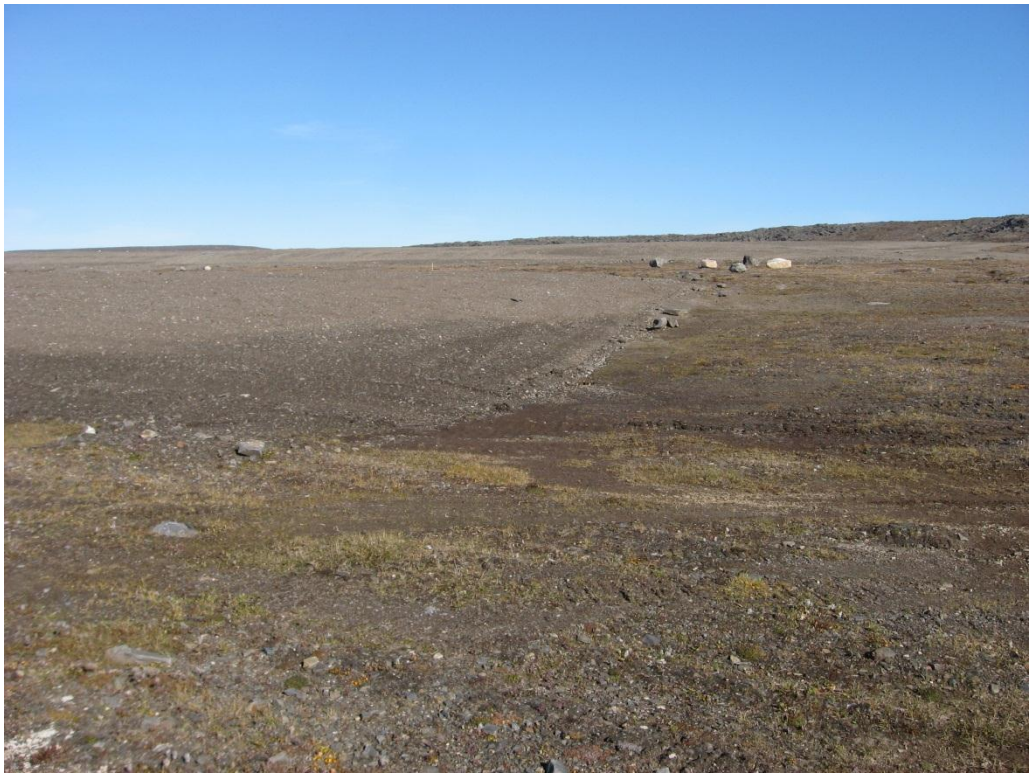
Photograph 3. Looking SW (WP 148). ↑



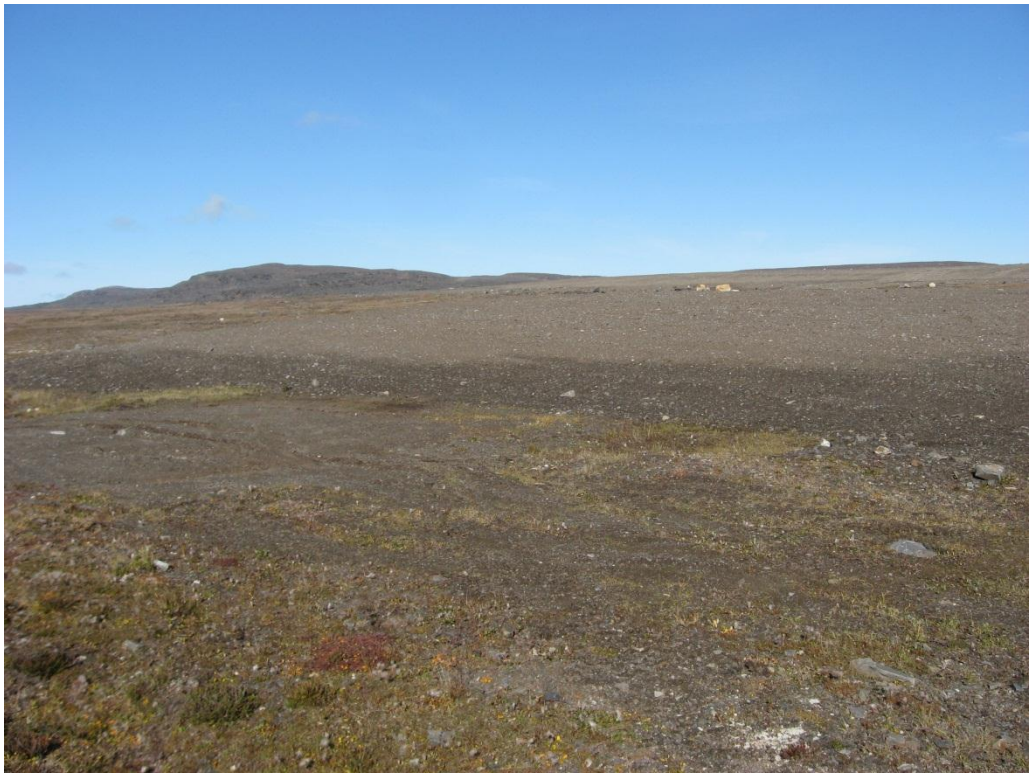
Photograph 4. Looking NE (WP 149). ↑



Photograph 5. Looking E (WP 149). ↑



Photograph 6. Looking NE (WP 150). ↑



Photograph 7. Looking NW (WP 150). ↑

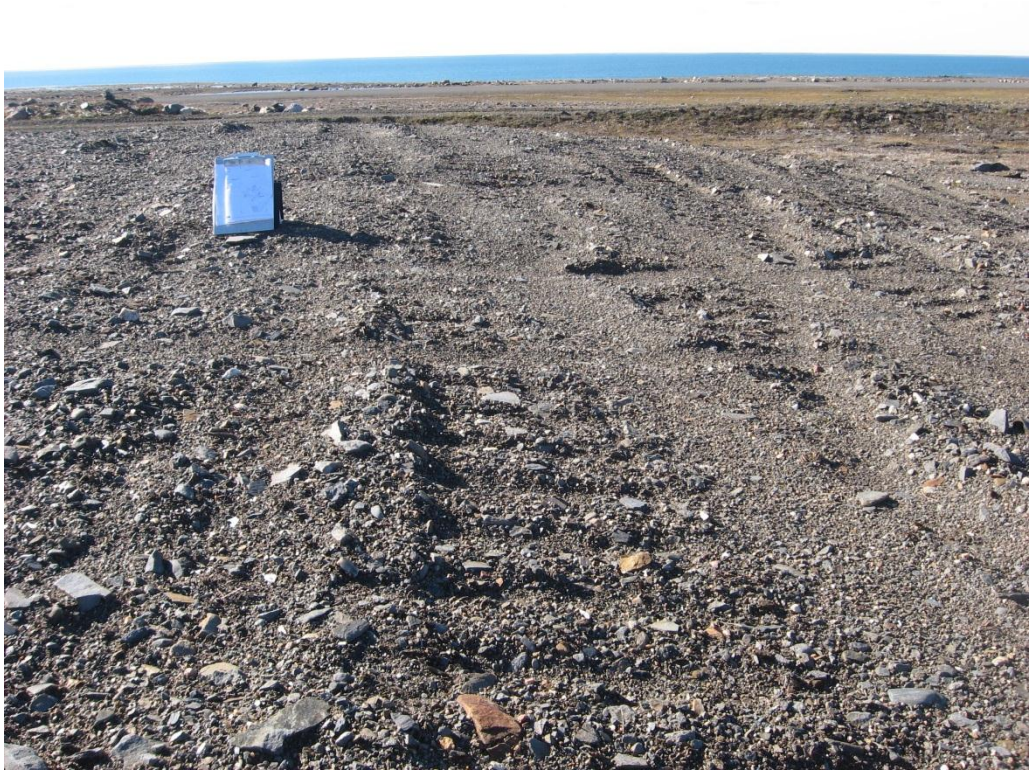
Photograph 8. Looking NW (WP 151). ↑

Photograph 9. Looking W (WP 151). ↑

Photograph 10. Looking SW (WP 151). ↑

Photograph 11. Rough Finish Grading/Minor Settlement – Looking SE (WP 152). ↑

Photograph 12. Rough Finish Grading/Minor Settlement – Looking S (WP 153). ↑



Photograph 13. Rough Finish Grading/Minor Settlement – Looking SW (WP 154). ↑

Photograph 14. Rough Finish Grading/Minor Settlement – Looking SW (WP 155). ↑

Annex 2 Non-Hazardous Waste Landfill – Year 1 Data

Figures:

- FOX-2.3: Site Plan –Non-Hazardous Waste Landfill

Tables:

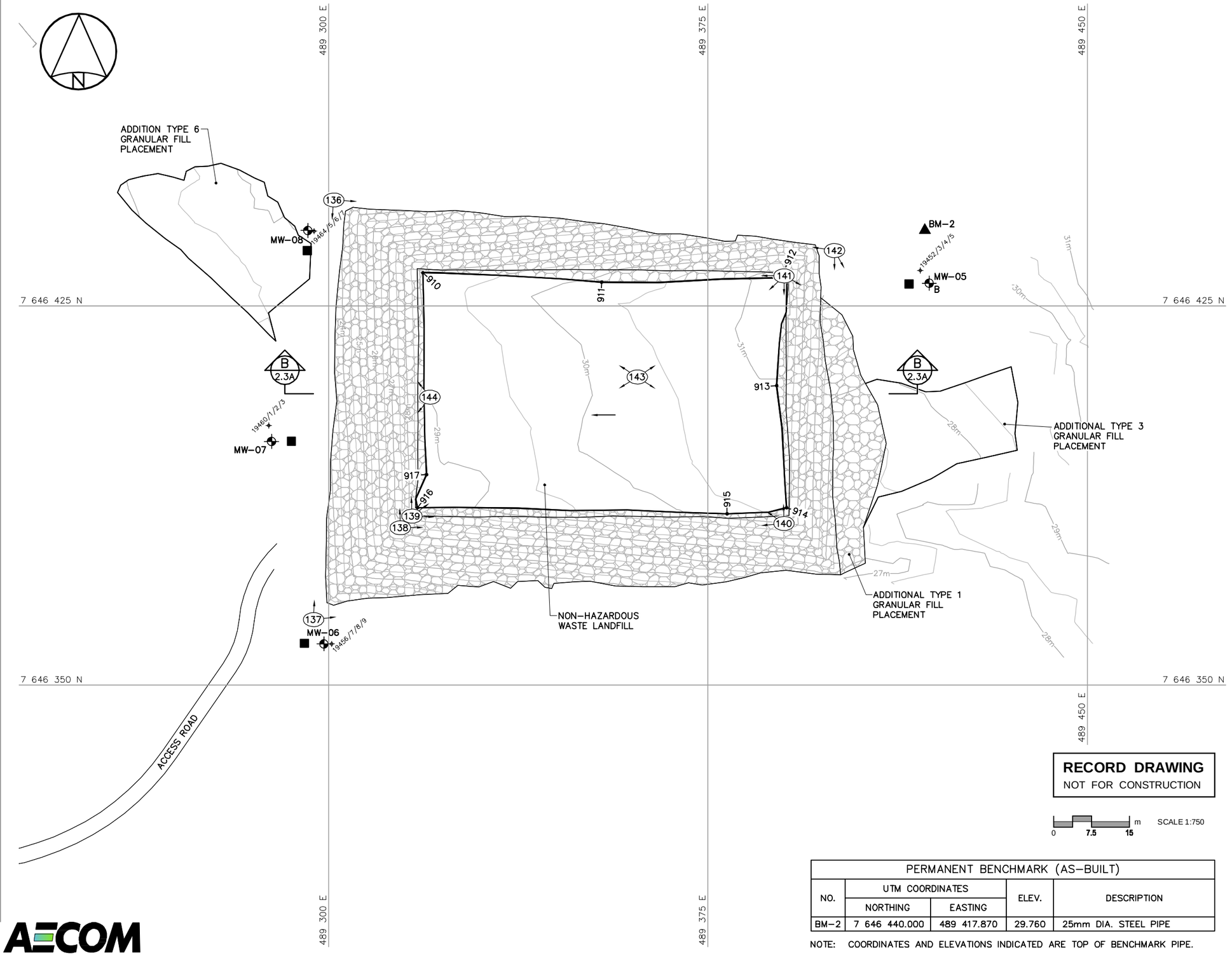
- Landfill Visual Inspection –Non-Hazardous Waste Landfill
- Non-Hazardous Waste Landfill – Evaluation of Year 1 Soil Analytical Data
- Non-Hazardous Waste Landfill – Year 1 (2012) Soil Data
- Non-Hazardous Waste Landfill – Year 1 (2012) Groundwater Data

Photographic Records:

- Photos 15 and 16
- Photos 17 and 18
- Photos 19 and 20
- Photos 21 and 22
- Photos 23 and 24
- Photos 25 and 26
- Photos 27 and 28
- Photos 29 and 30
- Photos 31 and 32
- Photos 33 and 34
- Photos 35 and 36
- Photos 37 and 38
- Photos 39

Well Sampling Records:

- Well MW-05
- Well MW-06
- Well MW-07
- Well MW-08



GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

BM-2	APPROXIMATE PERMANENT BENCHMARK LOCATION (1)
910	COORDINATE POINT
	MONITORING WELL LOCATION (3)
B	BACKGROUND MONITORING WELL LOCATION (1)
	MONITORING SOIL SAMPLE LOCATION (4)
136	APPROX. PHOTOGRAPHIC VIEWPOINT
19452	2012 SOIL SAMPLE TAG LOCATION

NON-HAZARDOUS WASTE LANDFILL FINAL GRADING (AS-BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
910	7 646 431.6	489 318.6	29.2
911	7 646 429.7	489 354.0	30.1
912	7 646 430.6	489 389.4	31.3
913	7 646 409.3	489 388.6	31.0
914	7 646 385.1	489 390.5	30.6
915	7 646 383.9	489 378.8	30.3
916	7 646 385.1	489 317.5	28.6
917	7 646 391.7	489 319.3	28.9

NOTE:
COORDINATE POINTS AND ELEVATIONS PROVIDED ARE TO THE FINAL GRADE OF ORGANIC MATERIAL ON THE PLATEAU AND PRIOR TO THE PLACEMENT OF TYPE 1 GRANULAR FILL ON SIDE SLOPES.

NON-HAZARDOUS WASTE LANDFILL MONITORING WELLS (AS-BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
MW-05	7 646 429.6	489 418.7	29.6
MW-06	7 646 358.2	489 299.1	21.9
MW-07	7 646 398.2	489 288.7	22.9
MW-08	7 646 440.0	489 295.9	23.9

RECORD DRAWING
NOT FOR CONSTRUCTION

0 7.5 15 m SCALE 1:750

PERMANENT BENCHMARK (AS-BUILT)

NO.	UTM COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
BM-2	7 646 440.000	489 417.870	29.760	25mm DIA. STEEL PIPE

NOTE: COORDINATES AND ELEVATIONS INDICATED ARE TOP OF BENCHMARK PIPE.

AECOM

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-2 LONGSTAFF BLUFF

NON-HAZARDOUS WASTE LANDFILL

FIGURE FOX-2.3

DEW Line Cleanup: Post-Construction - Landfill Monitoring
Visual Inspection Checklist and Preliminary Stability Assessment

Site Name:	**FOX-2 Longstaff Bluff**
Landfill Designation:	**Hangar Non-Hazardous Waste Landfill**
Date of Inspection:	**30-Aug-12**
Inspected By:	**Kristen Tackney, P.Geol. (AECOM)**

Checklist Item	Present Yes/No	Location (Describe relative to existing monuments/features and relative to landfill design i.e. surface, berms, toe)	Length	Width	Depth	Extent relative to Area of Landfill (%)	Description	Photographic Records Focal length, location, view point & direction (relative to magnetic north) Feature of note Scale	Additional Comments	Severity Rating
Settlement	No									
Erosion	No									
Frost Action	No									
Sloughing and Cracking	No									
Animal Burrows	No									
Vegetation	No									
Staining	No									
Vegetation Stress	No									
Seepage Points	No									
Debris Exposed	No									
Presence/Condition - Monitoring Instruments	No									
Features of Note	No									
Landfill Performance										Acceptable

Photograph 15. Hangar Non-Hazardous Waste Landfill – Looking E (Way Point 136). ↑

Photograph 16. Looking S (WP 136). ↑

Photograph 17. Looking N (WP 137). ↑

Photograph 18. Looking E (WP 137). ↑

Photograph 19. Looking N (WP 138). ↑

Photograph 20. Looking E (WP 138). ↑

Photograph 21. Looking N (WP 139). ↑

Photograph 22. Looking NE (WP 139). ↑

Photograph 23. Looking E (WP 139). ↑

Photograph 24. Looking W (WP 140). ↑

Photograph 25. Looking NW (WP 140). ↑

Photograph 26. Looking N (WP 140). ↑

Photograph 27. Looking W (WP 141). ↑

Photograph 28. Looking SW (WP 141). ↑

Photograph 29. Looking S (WP 141). ↑

Photograph 30. Looking SE (WP 141). ↑

Photograph 31. Looking W (WP 142). ↑

Photograph 32. Looking S (WP 142). ↑

Photograph 33. Looking SE (WP 142). ↑

Photograph 34. Looking NW (WP 143). ↑

Photograph 35. Looking SW (WP 143). ↑

Photograph 36. Looking SE (WP 143). ↑

Photograph 37. Looking NE (WP 143). ↑

Photograph 38. Looking NW (WP 144). ↑

Photograph 39. Looking SW (WP 144). ↑

Table B-27: 2012 Monitoring Well Sampling Log - MW-05

Site Name:	FOX-2					
Date of Sampling Event:	30-Aug-12					
Names of Samplers:	Kathryn Eagles, Thomas Partridge					
Monitoring Well ID:	MW-05					
Facility:	Non-Hazardous Waste Landfill					
Water Sample Measured Data						
Condition of Well:	Good					
Procedure/Equipment:	tape measure			Procedure/Equipment:	interface meter	
Well height above ground (m)=	0.53			Depth to water surface (m)=	N/A	
Diameter of well (m)=	0.043			Static water level* (m)=	N/A	
Depth of installation* (m)=	3.6			Depth to bottom (m)=	2.2	
Length screened section (m)=	N/A			Free product thickness (mm)=	N/A	
Depth to top of screen* (m)=	N/A					
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)	Frozen water encountered at a depth of 2.2 m	
Length screen collecting water (m)=	N/A					
Development/Purging Information						
Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter					
Note:	The sample was frozen at a depth of 2.2 m. No sample was collected.					

Date & Time	Volume Removed (L)	Temperature (^{0}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Water Sampling		**Soil Sampling**	
Date and time collected:	N/A	Date and time collected:	30-Aug-12
Sample Number - Water:	N/A	Sample Number - Soil:	12-19452/53
			12-19454/55
Sample containers:	N/A	Sample containers:	Whirlpaks
			Jars
Procedure/Equipment:	N/A	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
N/A		Light brown sandy loam with 40% gravel with trace cobble and low clay content. 90% organics cover at surface.	
Filtration/Acidification: (Y/N)	N/A		
Sampling Equipment Decontamination: (Y/N)	N/A	Sampling Equipment Decontamination: (Y/N)	Y
Number washes:	N/A	Number washes:	1
Number rinses:	N/A	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Table B-28: 2012 Monitoring Well Sampling Log - MW-06

Site Name:	FOX-2
Date of Sampling Event:	30-Aug-12
Names of Samplers:	Kathryn Eagles, Thomas Partridge
Monitoring Well ID:	MW-06
Facility:	Non-Hazardous Waste Landfill

Water Sample Measured Data

Condition of Well:	Good		
Procedure/Equipment:	tape measure	Procedure/Equipment:	interface meter
Well height above ground (m)=	0.60	Depth to water surface (m)=	2.4
Diameter of well (m)=	0.043	Static water level* (m)=	1.8
Depth of installation* (m)=	3.4	Depth to bottom (m)=	3.4
Length screened section (m)=	3.0	Free product thickness (mm)=	N/A
Depth to top of screen* (m)=	0.40		

Calculations		**Notes**	
Depth of water (m)=	1.0	Evidence of sludge etc:	No
Well volume of water (L)=	1.5	Evidence of freezing/siltation: (compare to installation record)	None
Length screen collecting water (m)=	1.0		

Development/Purging Information

Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
30-Aug-12	1.0	3.7	6.2	1100	50	no colour, transparent
30-Aug-12	1.0	4.8	6.5	830	20	same as above
30-Aug-12	1.0	4.3	6.7	850	26	same as above

Water Sampling		**Soil Sampling**	
Date and time collected:	30-Aug-12	Date and time collected:	30-Aug-12
Sample Number - Water:	12-15136/37	Sample Number - Soil:	12-19456/57
			12-19458/59
Sample containers:	1 L HDPE, 1 L teflon	Sample containers:	Whirlpaks
	1 L amber glass		Jars
	3x 40 mL vials		
Procedure/Equipment:	waterra tubing and foot valve	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
no colour, transparent		Dark brown loam with 80% gravel and 5% cobble. 5% organic cover at surface.	
Filtration/Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)	Y	Sampling Equipment Decontamination: (Y/N)	Y
Number washes:	1	Number washes:	1
Number rinses:	1	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Table B-29: 2012 Monitoring Well Sampling Log - MW-07

Site Name:	FOX-2
Date of Sampling Event:	30-Aug-12
Names of Samplers:	Kathryn Eagles, Thomas Partridge
Monitoring Well ID:	MW-07
Facility:	Non-Hazardous Waste Landfill

Water Sample Measured Data

Condition of Well:	Good		
Procedure/Equipment:	tape measure	Procedure/Equipment:	interface meter
Well height above ground (m)=	0.60	Depth to water surface (m)=	3.2
Diameter of well (m)=	0.043	Static water level* (m)=	2.6
Depth of installation* (m)=	3.4	Depth to bottom (m)=	3.4
Length screened section (m)=	3.0	Free product thickness (mm)=	N/A
Depth to top of screen* (m)=	0.35		
Calculations		**Notes**	
Depth of water (m)=	0.13	Evidence of sludge etc:	No
Well volume of water (L)=	0.19	Evidence of freezing/siltation: (compare to installation record)	None
Length screen collecting water (m)=	0.13		

Development/Purging Information

Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
30-Aug-12	1.0	4.1	6.5	1400	690	translucent, brown, brown sediment
30-Aug-12	0.75	4.2	6.5	1600	500	same as above
30-Aug-12	0.75	4.1	6.2	1700	710	same as above

Water Sampling		**Soil Sampling**	
Date and time collected:	30-Aug-12	Date and time collected:	30-Aug-12
Sample Number - Water:	12-15138	Sample Number - Soil:	12-19460/61
			12-19462/63
Sample containers:	1 L HDPE, 1 L teflon	Sample containers:	Whirlpaks
	1 L amber glass		Jars
	3x 40 mL vials		
Procedure/Equipment:	waterra tubing and foot valve	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
translucent, brown, brown sediment		medium brown sandy soil, 90% vegetation at surface, 5% gravel, 5% cobbles and boulders	
Filtration/Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)	N	Sampling Equipment Decontamination: (Y/N)	Y
Number washes:	N/A	Number washes:	1
Number rinses:	N/A	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Table B-30: 2012 Monitoring Well Sampling Log - MW-08

Site Name:	FOX-2
Date of Sampling Event:	30-Aug-12
Names of Samplers:	Kathryn Eagles, Thomas Partridge
Monitoring Well ID:	MW-08
Facility:	Non-Hazardous Waste Landfill

Water Sample Measured Data

Condition of Well:	Good		
Procedure/Equipment:	tape measure	Procedure/Equipment:	interface meter
Well height above ground (m)=	0.50	Depth to water surface (m)=	2.6
Diameter of well (m)=	0.043	Static water level* (m)=	2.1
Depth of installation* (m)=	3.5	Depth to bottom (m)=	3.5
Length screened section (m)=	3.0	Free product thickness (mm)=	N/A
Depth to top of screen* (m)=	0.50		
Calculations		**Notes**	
Depth of water (m)=	0.95	Evidence of sludge etc:	No
Well volume of water (L)=	1.4	Evidence of freezing/siltation: (compare to installation record)	None
Length screen collecting water (m)=	0.95		

Development/Purging Information

Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
30-Aug-12	1.0	3.6	6.3	590	100	no colour, transparent, minimal sediment
30-Aug-12	1.0	3.3	6.4	500	130	same as above
30-Aug-12	1.0	3.3	6.2	500	180	same as above

Water Sampling		**Soil Sampling**	
Date and time collected:	30-Aug-12	Date and time collected:	30-Aug-12
Sample Number - Water:	12-15139	Sample Number - Soil:	12-19464/65
			12-19466/67
Sample containers:	1 L HDPE, 1 L teflon	Sample containers:	Whirlpaks
	1 L amber glass		Jars
	3x 40 mL vials		
Procedure/Equipment:	waterra tubing and foot valve	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
no colour, transparent, minimal sediment		brown soil with some organics and gravel. 30% vegetation at surface, 60% gravel, no boulder or cobbles	
Filtration/Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)	Y	Sampling Equipment Decontamination: (Y/N)	Y
Number washes:	1	Number washes:	1
Number rinses:	1	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Annex 3 West Landfill Lobe E – Year 1 Data

Figures:

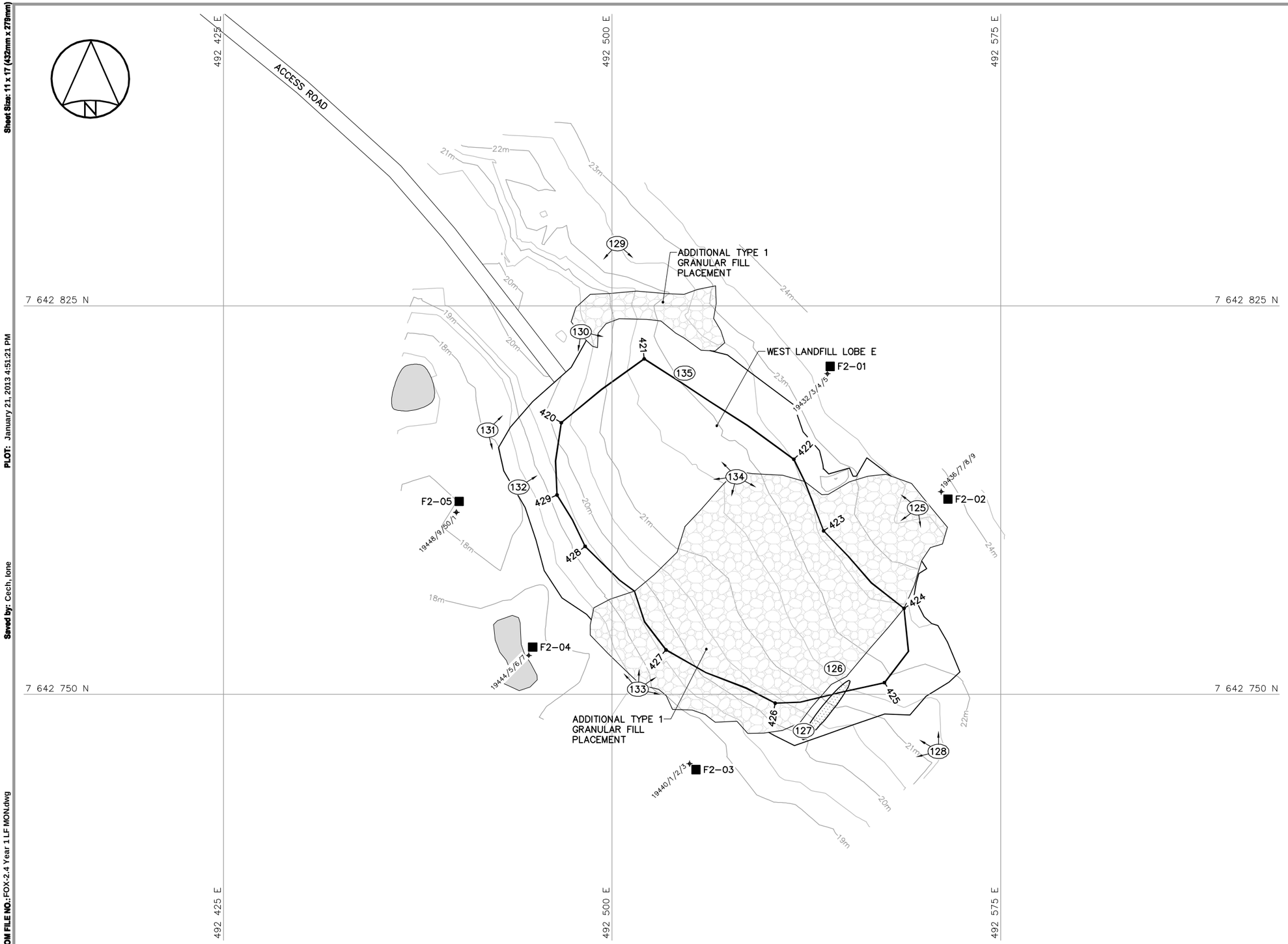
- FOX-2.4: Site Plan – Station West Landfill

Tables:

- Landfill Visual Inspection –West Landfill Lobe E
- West Landfill Lobe E – Evaluation of Year 1 Soil Data
- West Landfill Lobe E – Year 1 (2012) Soil Data

Photographic Records:

- Photos 40 and 41
- Photos 42 and 43
- Photos 44 and 45
- Photos 46 and 47
- Photos 48 and 49
- Photos 50 and 51
- Photos 52 and 53
- Photos 54 and 55
- Photos 56 and 57
- Photos 58 and 59
- Photos 60 and 61
- Photos 62 and 63



GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- 420 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION (5)
- MONITORING SITE FEATURE
- 125 — APPROX. PHOTOGRAPHIC VIEWPOINT
- 19432 — 2012 SOIL SAMPLE TAG LOCATION
- BODY OF WATER

WEST LANDFILL (LOBE E) REGRADED (AS-BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
420	7 642 802.4	492 490.2	20.4
421	7 642 814.8	492 506.2	21.9
422	7 642 795.4	492 535.1	22.5
423	7 642 781.5	492 540.8	22.6
424	7 642 766.6	492 556.3	22.5
425	7 642 752.3	492 552.6	21.9
426	7 642 748.3	492 531.5	20.4
427	7 642 758.6	492 510.4	19.7
428	7 642 778.6	492 494.8	19.4
429	7 642 788.5	492 489.4	19.3

RECORD DRAWING
NOT FOR CONSTRUCTION

0 7.5 15 m SCALE 1:750

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-2 LONGSTAFF BLUFF

WEST LANDFILL LOBE E

FIGURE FOX-2.4

AECOM

DEW Line Cleanup: Post-Construction - Landfill Monitoring
Visual Inspection Checklist and Preliminary Stability Assessment

Site Name:	**FOX-2 Longstaff Bluff**
Landfill Designation:	**West Landfill Lobe E**
Date of Inspection:	**29-Aug-12**
Inspected By:	**Kristen Tackney, P.Geol. (AECOM)**

Checklist Item	Present Yes/No	Location (Describe relative to existing monuments/features and relative to landfill design i.e. surface, berms, toe)	Length	Width	Depth	Extent relative to Area of Landfill (%)	Description	Photographic Records Focal length, location, view point & direction (relative to magnetic north) Feature of note Scale	Additional Comments	Severity Rating
Settlement	Yes	Surface	1 m	0.5 m	0.2 m	Isolated	Minor surficial settlement adjacent to oversize boulder	Photo FOX-2 88 WP 135		Acceptable
Erosion	Yes	Surface	1. 20 m 2. 8 m	1. 2-4 m 2. 2 m	1. 0.25 m 2. 0.1 m	Isolated	Drainage channels from surface run-off	1. Photos FOX-2 68-69 WP 126-127 2. Photo FOX-2 79 WP 132		Acceptable
Frost Action	No									
Sloughing and Cracking	No									
Animal Burrows	No									
Vegetation	No									
Staining	No									
Vegetation Stress	No									
Seepage Points	No									
Debris Exposed	No									
Presence/Condition - Monitoring Instruments	No									
Features of Note	No									
Landfill Performance										Acceptable

West Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2012	Comments
Copper	52	118 +/- 32	620	Six of ten samples were within the 95% confidence limit.	The surface and depth samples at F2-2, and the surface samples at F2-4 and F2-5 had concentrations of 160, 230, 160, and 510 mg/kg, respectively. All results were below the baseline maximum.
Nickel	52	93 +/- 17	300	Six of ten samples were within the 95% confidence limit.	The depth samples at F2-1 and F2-3, and the surface samples at F2-4 and F2-5 had concentrations of 120, 190, 200, and 370 mg/kg, respectively. The surface sample result at F2-5 exceeded the baseline maximum.
Cobalt	52	35 +/- 6	100	All sample results were within the 95% confidence limit, with two exceptions.	The depth sample at F2-3 and the surface sample at F2-5 had concentrations of 44 and 160 mg/kg, respectively. The surface sample at F2-5 exceeded the baseline maximum.
Cadmium	52	<1.0	<1.0	Concentrations consistent with baseline mean (non-detect), with one exception.	The surface sample at F2-5 had a concentration of 1.48 mg/kg. This exceeded the baseline maximum.
Lead	52	<10	34	Six of ten sample results were consistent with the baseline mean (non-detect).	The surface and depth samples at F2-2 and the depth samples at F2-3 and F2-4 had concentrations of 30, 48, 17, and 12 mg/kg, respectively. The depth sample at F2-2 exceeded the baseline maximum.
Zinc	52	165 +/- 28	500	All sample results were within the 95% confidence limit, with three exceptions.	The depth samples at F2-1, F2-3, and F2-4 had concentrations of 220, 460, and 230 mg/kg, respectively. All results were below the baseline mximum.
Chromium	52	57 +/- 4	110	Seven of ten samples exceeded the 95% confidence limit.	The surface and depth samples at F2-2 and F2-3, and the depth samples at F2-1, F2-4, and F2-5 exceeded the 95% confidence limit. The depth sample at F2-3 exceeded the baseline maximum with at concentration of 120 mg/kg.
Arsenic	52	30 +/- 5	87	Six of ten samples were within the 95% confidence limit.	The depth samples at F2-2, F2-3, F2-4, and F2-5 had concentrations of 50.7, 71.4, 42.8, and 61.1 mg/kg, respectively. All results were below the baseline maximum.
Mercury	10	<0.1	<0.1	Concentrations consistent with baseline mean (non-detect), with one exception.	The surface sample at F2-1 had a concentration of 0.373 mg/kg. This result exceeded the baseline maximum.
PCBs	45	<0.1	<0.1	Concentrations consistent with baseline mean (non-detect).	
TPH	22	<40	44	Six of ten sample results were consistent with the baseline mean (non-detect).	The surface samples at F2-1, F2-3, and F2-5 and the dpeth sample at F2-2 had concentrations of 100, 110, 340, and 150 mg/kg, respectively. All four results exceeded the baseline maximum.

West Landfill - Year 1 (2012) Soil Data

Sample #	Surface/ Reference Tag #	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
West Landfill- Baseline Concentrations					**118 +/- 32**	**93 +/- 17**	**35 +/- 6**	**<1.0**	**<10**	**165 +/- 28**	**57 +/- 4**	**30 +/- 5**	**<0.1**	**<0.1**	**<40**			
West Landfill - Maximum Concentrations					**620**	**300**	**100**	**<1.0**	**34**	**500**	**110**	**87.0**	**<0.1**	**<0.1**	**44**			
Upgradient Soil Samples																		
12-19432/33		F2-1		0-10	52	47	30	< 0.50	9	120	17	7.0	0.373	< 0.060	100	< 5.0	< 10	100
12-19434/35		F2-1		30-40	85	120	29	0.53	14	200	91	31.1	0.019	< 0.020	<50	< 5.0	< 10	< 50
12-19436/37		F2-2		0-10	160	33	10	< 0.50	30	120	81	32.0	0.031	< 0.020	<50	< 5.0	< 10	< 50
12-19438/39		F2-2		30-40	230	49	16	< 0.50	48	160	88	50.7	0.031	< 0.020	150	< 5.0	< 10	150
Downgradient Soil Samples																		
12-19440/41		F2-3		0-10	62	44	12	< 0.50	10	92	110	31.9	0.014	< 0.040	110	< 5.0	< 10	110
12-19442/43		F2-3		30-40	140	190	44	< 0.50	17	460	120	71.4	<0.010	< 0.020	<50	< 5.0	< 10	< 50
12-19444/45		F2-4		0-10	160	200	33	0.72	8	190	55	15.4	0.05	< 0.040	<50	< 5.0	< 10	< 50
12-19446/47		F2-4		30-40	130	59	20	< 0.50	12	230	68	42.8	<0.010	< 0.020	<50	< 5.0	< 10	< 50
12-19448/49		F2-5		0-10	510	370	160	1.48	8	130	33	29.7	0.088	< 0.060	340	< 5.0	< 10	340
12-19450/51[ac]		F2-5		30-40	64	56	19	< 0.50	10	120	94	61.1	<0.010	< 0.020	<50	< 5.0	< 10	< 50

Photograph 40. West Landfill Lobe E – Looking S (Way Point 125). ↑

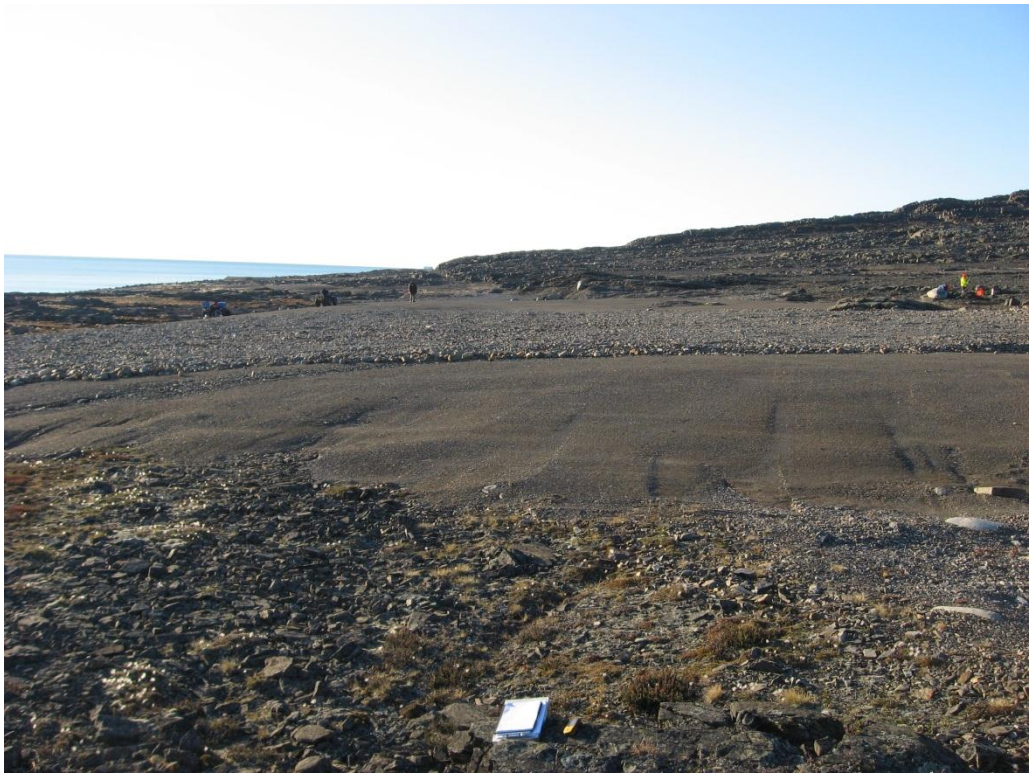
Photograph 41. Looking SW (WP 125). ↑

Photograph 42. Looking NW (WP 125).

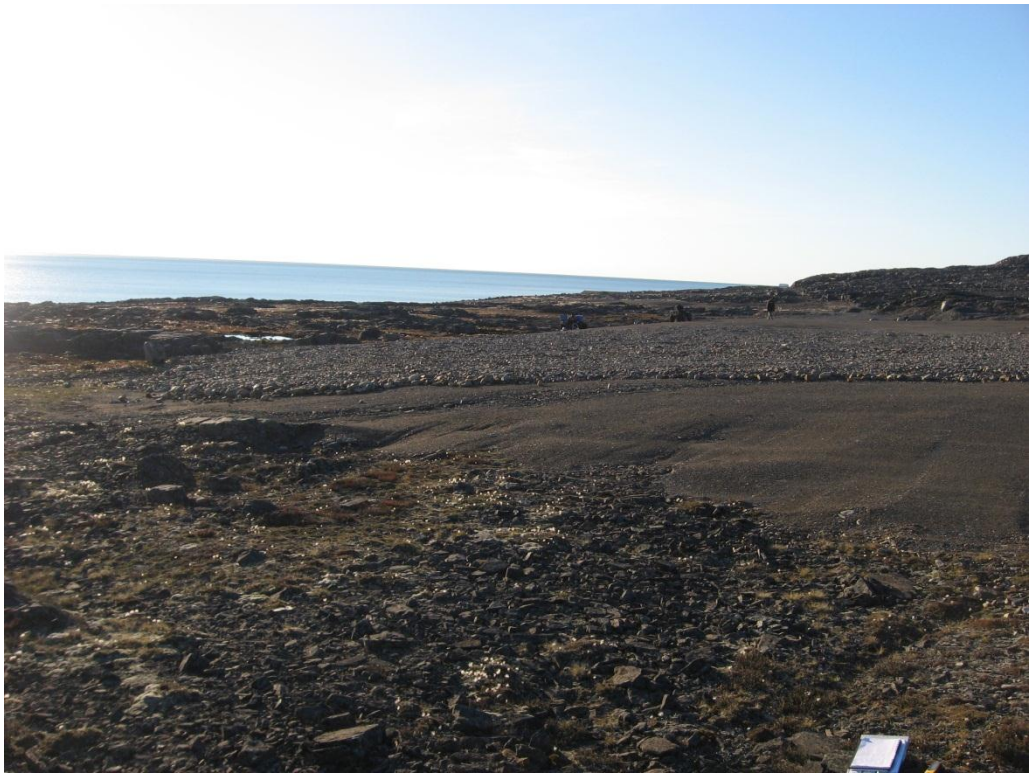
Photograph 43. Erosion from Surface Runoff – Looking SW (WP 126).

Photograph 44. Erosion from Surface Runoff – Looking NE (WP 127). ↑

Photograph 45. Looking N (WP 128). ↑



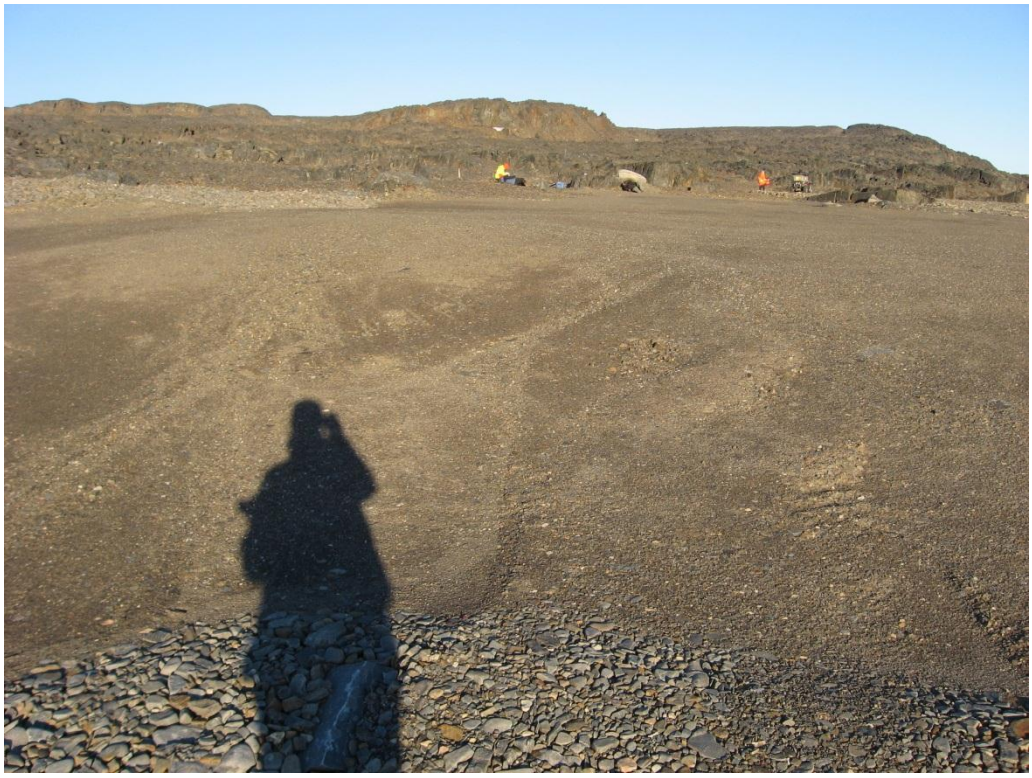
Photograph 46. Looking NW (WP 128). ↑



Photograph 47. Looking W (WP 128). ↑

Photograph 48. Looking SE (WP 129). ↑

Photograph 49. Looking S (WP 129). ↑



Photograph 50. Looking SE (WP 130). ↑

Photograph 51. Looking S (WP 130). ↑

Photograph 52. Looking NE (WP 131). ↑

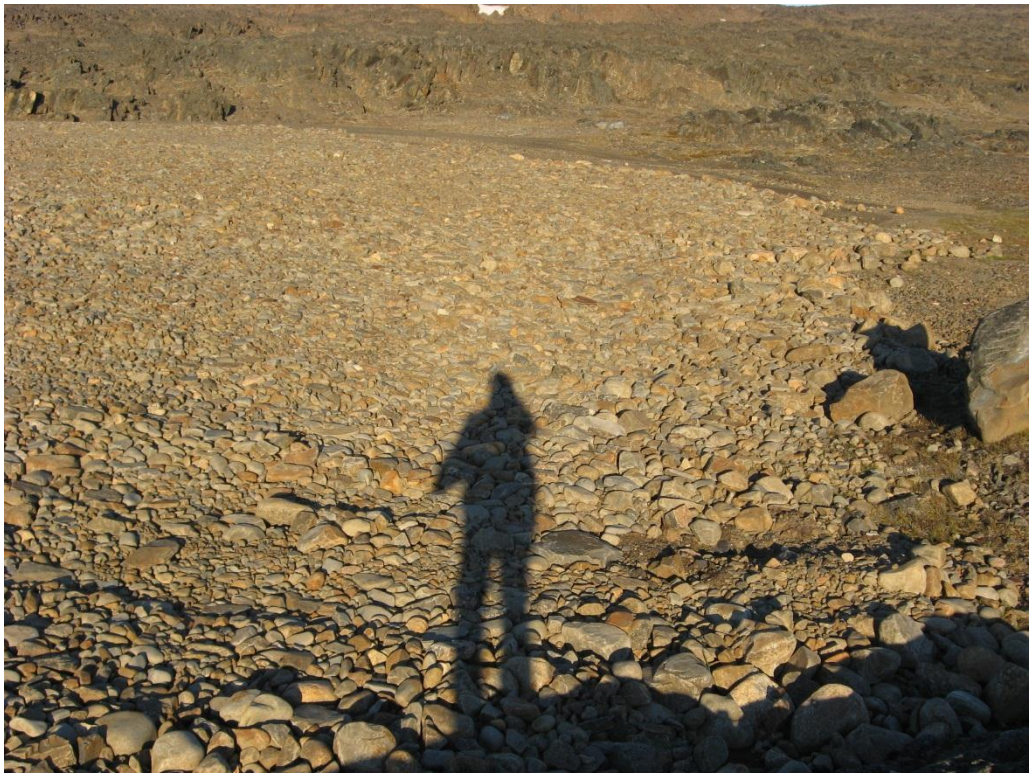
Photograph 53. Looking SE (WP 131). ↑

Photograph 54. Minor Erosion from Surface Runoff – Looking NE (WP 132). ↑

Photograph 55. Looking NW (WP 133). ↑

Photograph 56. Looking N (WP 133). ↑

Photograph 57. Looking NE (WP 133). ↑



Photograph 58. Looking E (WP 133). ↑

Photograph 59. Looking NW (WP 134). ↑

Photograph 60. Looking SW (WP 134). ↑

Photograph 61. Looking S (WP 134). ↑

Photograph 62. Looking SE (WP 134). ↑

Photograph 63. Minor Settlement – Looking N (WP 135). ↑

Annex 4 Tier II Disposal Facility – Year 1 Data

Figures:

- FOX-2.5: Site Plan – Tier II Disposal Facility
- Ground Temperature Profile Tier II Disposal Facility Vertical Thermistor VT-1
- Ground Temperature Profile Tier II Disposal Facility Vertical Thermistor VT-3
- Ground Temperature Profile Tier II Disposal Facility Vertical Thermistor VT-4

Tables:

- Landfill Visual Inspection – Tier II Disposal Facility
- Tier II Disposal Facility – Evaluation of Year 1 Soil Analytical Data
- Tier II Disposal Facility – Year 1 (2012) Soil Data
- Tier II Disposal Facility – Year 1 (2012) Groundwater Data

Photographic Records:

- Photos 64 and 65
- Photos 66 and 67
- Photos 68 and 69
- Photos 70 and 71
- Photos 72 and 73
- Photos 74 and 75
- Photos 76 and 77
- Photos 78 and 79
- Photos 80 and 81
- Photos 82 and 83
- Photos 84 and 85
- Photos 86 and 87
- Photos 88 and 89
- Photos 90 and 91
- Photos 92 and 93

Well Sampling Records:

- Well MW-09
- Well MW-10
- Well MW-11
- Well MW-12

Thermistor Annual Maintenance Records:

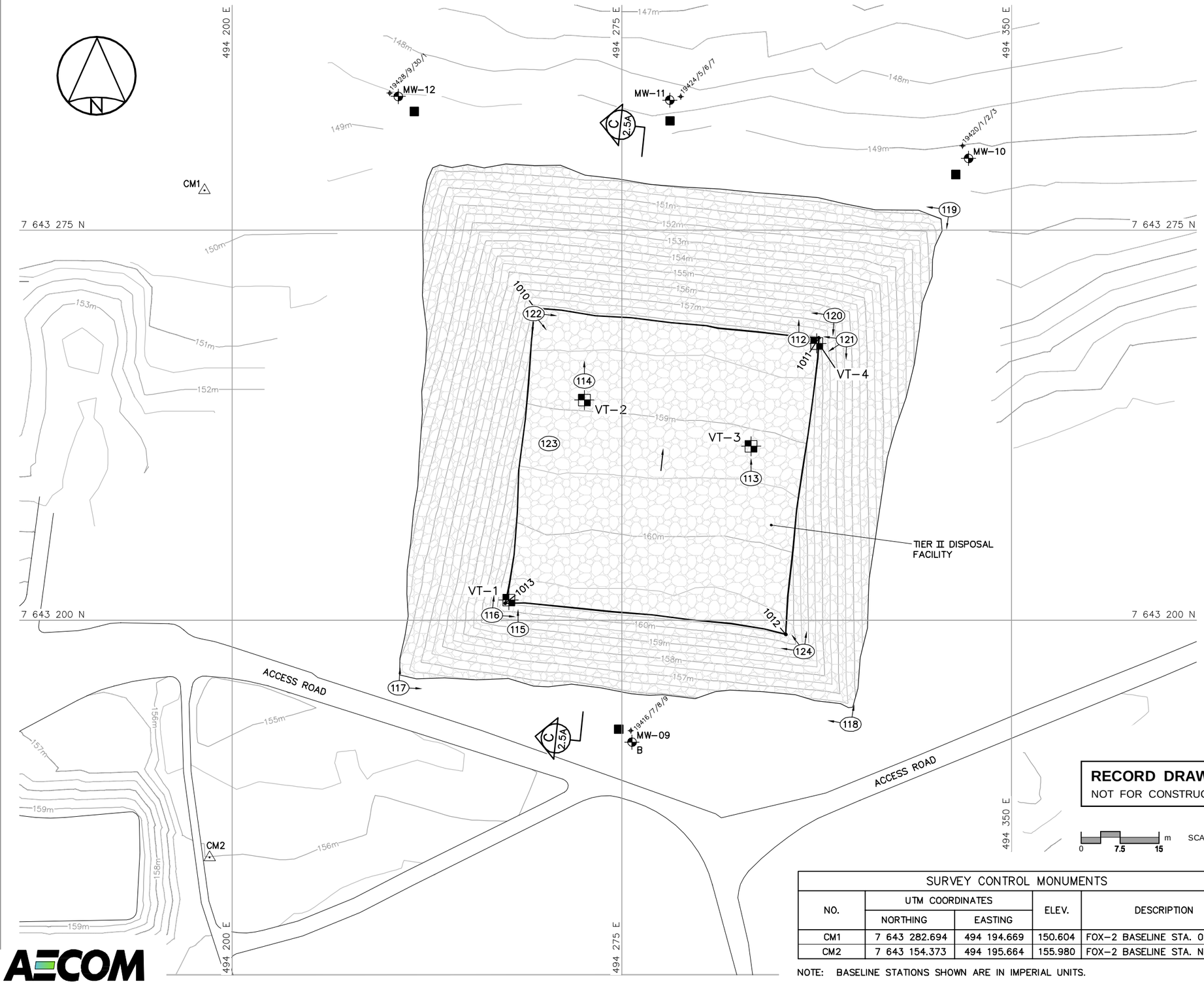
- VT-1
- VT-2
- VT-3
- VT-4

Tier II Disposal Facility – Evaluation of Ground Temperature Data

Ground temperature profiles for the vertical thermistors are attached, showing ground temperature curves since August 2012. The table shows the depth of the active layer as defined by the 0°C isotherm for August 29, 2012.

Summary of Tier II Disposal Facility Thermal Results				
	VT-1	**VT-2**	**VT-3**	**VT-4**
Depth (m) of 0°C Isotherm (August 29/12)	-2.10	N/A	-2.23	-1.78

The inferred active layer depth noted above is less than the thickness of the 3.5 m granular cover over the Tier II soil; the landfill contents are remaining frozen. The ground temperatures are likely warmer and active layers deeper than the long term condition and ground temperatures are expected to cool over the next several years (EBA 2012). VT-2 had a communication error when downloading the data. The thermistor was removed and brought south for repair.



GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- CM1 — SURVEY CONTROL MONUMENT (2)
- 1010 — COORDINATE POINT
- MONITORING WELL LOCATION (3)
- B — BACKGROUND MONITORING WELL LOCATION (1)
- GROUND TEMPERATURE CABLE LOCATION (4)
- MONITORING SOIL SAMPLE LOCATION (4)
- 112 — APPROX. PHOTOGRAPHIC VIEWPOINT
- 19420 — 2012 SOIL SAMPLE TAG LOCATION

TIER II DISPOSAL FACILITY FINAL GRADING (AS-BUILT)			
NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
1010	7 643 260.1	494 258.2	158.1
1011	7 643 254.3	494 312.9	158.0
1012	7 643 197.3	494 306.5	160.5
1013	7 643 203.3	494 252.5	160.5

TIER II DISPOSAL FACILITY MONITORING WELLS (AS-BUILT)			
NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
MW-09	7 643 176.6	494 276.9	156.4
MW-10	7 643 288.9	494 341.7	149.1
MW-11	7 643 300.1	494 284.2	148.1
MW-12	7 643 300.8	494 232.0	148.6

TIER II DISPOSAL FACILITY GROUND TEMPERATURE CABLES (AS-BUILT)			
NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
VT-1	7 643 203.9	494 253.2	160.7
VT-2	7 643 242.4	494 267.8	158.8
VT-3	7 643 233.5	494 299.8	159.1
VT-4	7 643 253.3	494 312.5	158.2

RECORD DRAWING
NOT FOR CONSTRUCTION

0 7.5 15 m SCALE 1:750

SURVEY CONTROL MONUMENTS				
NO.	UTM COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
CM1	7 643 282.694	494 194.669	150.604	FOX-2 BASELINE STA. 0+00
CM2	7 643 154.373	494 195.664	155.980	FOX-2 BASELINE STA. N/A

NOTE: BASELINE STATIONS SHOWN ARE IN IMPERIAL UNITS.

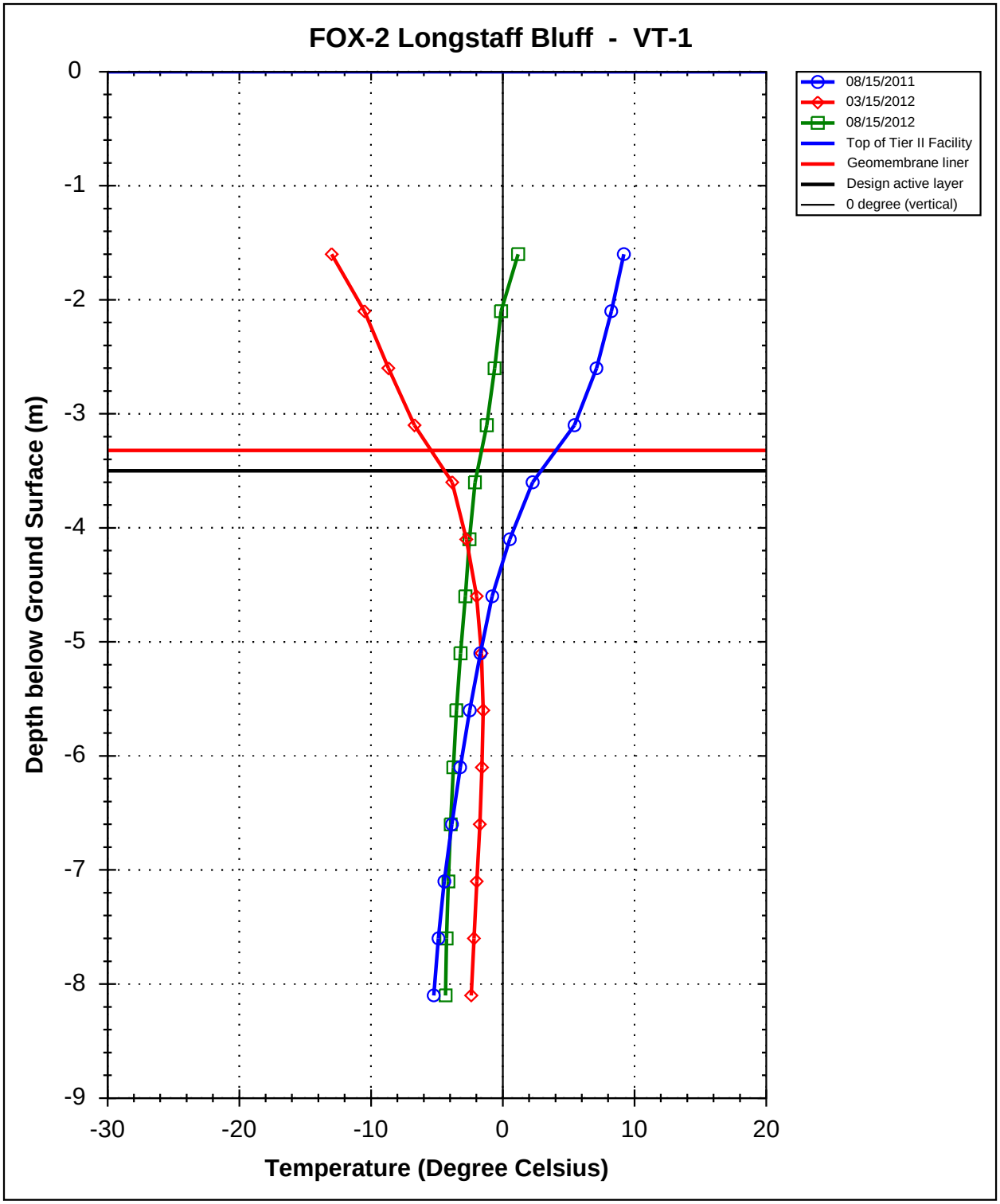
AECOM

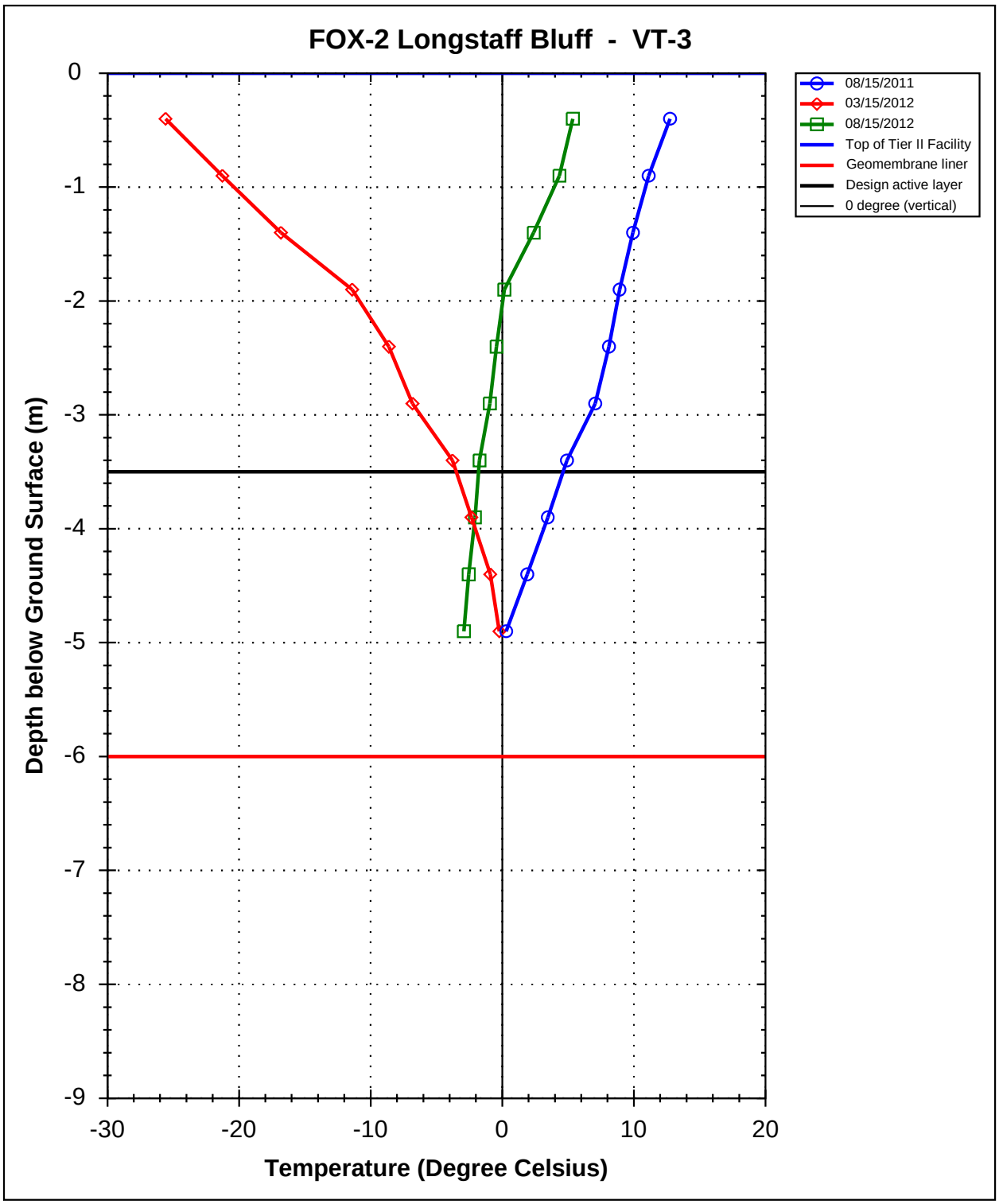
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

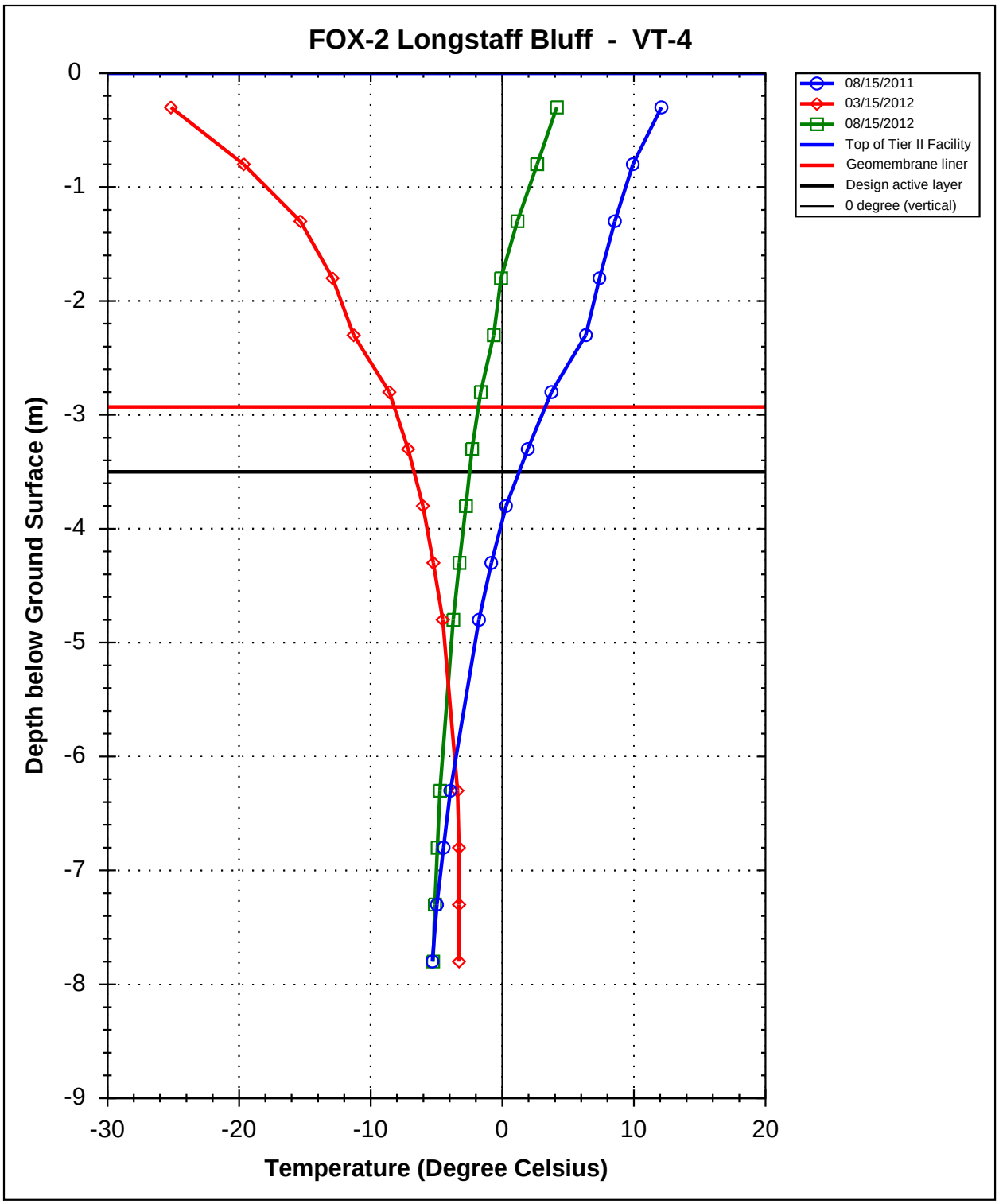
FOX-2 LONGSTAFF BLUFF

TIER II DISPOSAL FACILITY

FIGURE FOX-2.5


FOX-2 Longstaff Bluff - VT-1
Depth below Ground Surface (m)
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-30
-20
-10
0
10
20
Temperature (Degree Celsius)
08/15/2011
03/15/2012
08/15/2012
Top of Tier II Facility
Geomembrane liner
Design active layer
0 degree (vertical)


FOX-2 Longstaff Bluff - VT-3
Depth below Ground Surface (m)
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-30
-20
-10
0
10
20
Temperature (Degree Celsius)
08/15/2011
03/15/2012
08/15/2012
Top of Tier II Facility
Geomembrane liner
Design active layer
0 degree (vertical)


FOX-2 Longstaff Bluff - VT-4
Depth below Ground Surface (m)
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-30
-20
-10
0
10
20
Temperature (Degree Celsius)
08/15/2011
03/15/2012
08/15/2012
Top of Tier II Facility
Geomembrane liner
Design active layer
0 degree (vertical)

DEW Line Cleanup: Post-Construction - Landfill Monitoring
Visual Inspection Checklist and Preliminary Stability Assessment

Site Name:	**FOX-2 Longstaff Bluff**
Landfill Designation:	**Tier II Disposal Facility**
Date of Inspection:	**28-Aug-12 and 29-Aug-12**
Inspected By:	**Kristen Tackney, P.Geol. (AECOM)**

Checklist Item	Present Yes/No	Location (Describe relative to existing monuments/features and relative to landfill design i.e. surface, berms, toe)	Length	Width	Depth	Extent relative to Area of Landfill (%)	Description	Photographic Records Focal length, location, view point & direction (relative to magnetic north) Feature of note Scale	Additional Comments	Severity Rating
Settlement	Yes	Surface	2 m	2 m	0.25 m	Isolated	Minor surficial settlement	Photo FOX-2 61 WP 123		Acceptable
Erosion	No									
Frost Action	No									
Sloughing and Cracking	No									
Animal Burrows	No									
Vegetation	No									
Staining	No									
Vegetation Stress	No									
Seepage Points	No									
Debris Exposed	No									
Presence/Condition - Monitoring Instruments	Yes	As shown on Figure FOX-2					VT-1 to VT-4	Photos FOX-2 35, 38, 41, 42 WP 112-115		Acceptable
Features of Note	No									
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]	2012	Comments
Copper	26	52 +/- 10	160	All sample results were within the 95% confidence limit, with three exceptions.	The depth sample at MW-10 and the surface and depth samples at MW-11 had concentrations of 150, 75, and 84 mg/kg, respectively. All results were below the basline maximum.
Nickel	26	35 +/- 3	52	Four of ten samples were within the 95% confidence limit.	The surface and depth samples at MW-09 and MW-11, the depth sample at MW-10, and the surface sample at MW-12 has concentrations of 55, 51, 52, 52, 61, and 56 mg/kg, respectively. Three of the results were above the baseline maximum.
Cobalt	26	12 +/- 1	17	Six of ten samples were within the 95% confidence limit.	The surface and depth sample at MW09, the depth sample at MW-10, and the surface sample at MW-12 had concentrations of 16, 14, 14, and 15 mg/kg, respectively.
Cadmium	26	<1.0	<1.0	Concentrations consistent with baseline mean (non-detect).	
Lead	26	10 +/- 2	27	Four of ten samples were within the 95% confidence limit.	The surface and depth samples at MW-09 and MW-11, the depth sample at MW-10, and the surface sample at MW-12 has concentrations of 14, 19, 14, 15, 30, and 16 mg/kg, respectively. The depth sample at MW-10 exceeded the baseline maximum.
Zinc	26	65 +/- 4	93	All sample results exceeded the 95% confidence limit.	The surface and depth samples at MW-09, MW-10, MW-11, and MW-12 had concentrations of 110, 110, 87, 110, 90, 91, 92, and 83 mg/kg, respectively. Both samples from MW-09 and the depth sample at MW-10 exceeded the baseline maximum.
Chromium	26	44 +/- 2	59	All sample results exceeded the 95% confidence limit.	The surface and depth samples at MW-09, MW-10, MW-11, and MW-12 had concentrations of 71, 71, 89, 73, 51, 57, 61, and 83 mg/kg, respectively. All samples, with the exception of the samples collected at MW-11, exceeded the baseline maximum.
Arsenic	26	38 +/- 5	71	Four of ten samples were within the 95% confidence limit.	The surface and depth samples at MW-09 nad MW-11, the depth sample at MW-10, and the surface sample at MW-12 had concentrations of 58, 60, 50, 56, 96, and 61 mg/kg, respectively. The depth sample at MW-10 exceeded the baseline maximum.
Mercury	16	<0.1	<0.1	Concentrations consistent with baseline mean (non-detect).	
PCBs	26	<0.1	<0.1	Concentrations consistent with baseline mean (non-detect).	
TPH	18	20 +/- 8	55	Six of ten samples were within the 95% confidence limit.	The surface and depth samples at MW-09 and MW-10 had concentrations of 66, 100, 140, and 57 mg/kg, respectively.

Tier II Disposal Facility - Year 1 (2012) Soil Data

Sample #	Surface/ Reference Tag #	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					**52 +/- 10**	**35 +/- 3**	**12 +/- 1**	**<1.0**	**10 +/- 2**	**65 +/- 4**	**44 +/- 2**	**38 +/- 5**	**<0.1**	**<0.1**	**20 +/- 8**			
Tier II Disposal Facility - Maximum Concentrations					**160**	**52**	**17**	**<1.0**	**27**	**93**	**59**	**71**	**<0.1**	**<0.1**	**55**			
Upgradient Soil Samples																		
12-19416/17		MW-09		0-10	54	55	16	< 0.50	14	110	71	58	< 0.010	< 0.020	66	< 5.0	< 10	66
12-19418/19		MW-09		30-40	51	51	14	< 0.50	19	110	72	60	0.034	< 0.020	100	< 5.0	< 10	100
Downgradient Soil Samples																		
12-19420/21		MW-10		0-10	39	37	11	< 0.50	7	87	89	14	< 0.010	< 0.020	140	< 5.0	< 10	140
12-19422/23		MW-10		30-40	150	61	14	< 0.50	30	110	73	96	0.035	< 0.020	57	< 5.0	< 10	57
12-19424/25		MW-11		0-10	75	52	13	< 0.50	14	90	51	50	< 0.010	< 0.020	<50	< 5.0	< 10	< 50
12-19426/27		MW-11		30-40	84	52	12	< 0.50	15	91	57	56	0.012	< 0.020	<50	< 5.0	< 10	< 50
12-19428/29		MW-12		0-10	52	56	15	< 0.50	16	92	61	61	0.021	< 0.020	<50	< 5.0	< 10	< 50
12-19430/31[ac]		MW-12		30-40	37	34	11	< 0.50	10	83	83	14	< 0.010	< 0.020	<50	< 5.0	< 10	< 50

Tier II Disposal Facility - Year 1 (2012) 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																
12-15133	MW-09	2012	0.037	0.104	0.024	0.00028	0.006	0.05	0.015	0.0073	<0.00010	< 0.000020		< 0.025	< 0.10	< 0.25
Downgradient Groundwater Samples																
12-15134	MW-10	2012	0.078	0.243	0.0625	<0.00090	0.020	0.13	0.025	0.018	<0.00010	< 0.000020		< 0.025	< 0.10	< 0.25
12-15135	MW-12	2012	0.102	0.169	0.052	<0.00090	0.043	0.13	0.041	0.057	<0.00010	< 0.000020		< 0.025	< 0.10	< 0.25

Photograph 64. Tier II Disposal Facility – VT-4 Looking N (Way Point 112). ↑

Photograph 65. VT-4 Data Logger. ↑

Photograph 66. VT-4 Data Logger.

Photograph 67. VT-3 Looking N (WP 113).

Photograph 68. VT-3 Data Logger. ↑

Photograph 69. VT-3 Data Logger (WP 097). ↑

Photograph 70. VT-2 Looking N (WP 114). ↑

Photograph 71. VT-1 Looking N (WP 115). ↑

Photograph 72. VT-1 Data Logger. ↑

Photograph 73. VT-1 Data Logger. ↑

Photograph 74. Looking N (WP 116). ↑

Photograph 75. Looking E (WP 116). ↑

Photograph 76. Looking N (WP 117). ↑

Photograph 77. Looking E (WP 117). ↑

Photograph 78. Looking N (WP 118). ↑

Photograph 79. Looking W (WP 118). ↑

Photograph 80. Looking S (WP 119). ↑

Photograph 81. Looking W (WP 119). ↑

Photograph 82. Looking S (WP 120). ↑

Photograph 83. Looking W (WP 120). ↑

Photograph 84. Looking S (WP 121). ↑

Photograph 85. Looking SW (WP 121). ↑

Photograph 86. Looking W (WP 121). ↑

Photograph 87. Looking S (WP 122). ↑

Photograph 88. Looking SE (WP 122). ↑

Photograph 89. Looking E (WP 122). ↑

Photograph 90. Minor Settlement – Looking SW (WP 123). ↑

Photograph 91. Looking N (WP, 124). ↑

Photograph 92. Looking NW (WP 124). ↑

Photograph 93. Looking W (WP 124). ↑

Table B-12: 2012 Monitoring Well Sampling Log - MW-09

Site Name:	FOX-2
Date of Sampling Event:	29-Aug-12
Names of Samplers:	Kathryn Eagles, Thomas Partridge
Monitoring Well ID:	MW-09
Facility:	Tier II Disposal Facility

Water Sample Measured Data

Condition of Well:	Good		
Procedure/Equipment:	tape measure	Procedure/Equipment:	interface meter
Well height above ground (m)=	0.53	Depth to water surface (m)=	2.0
Diameter of well (m)=	0.043	Static water level* (m)=	1.5
Depth of installation* (m)=	3.6	Depth to bottom (m)=	3.6
Length screened section (m)=	3.0	Free product thickness (mm)=	N/A
Depth to top of screen* (m)=	0.52		

Calculations		**Notes**	
Depth of water (m)=	1.6	Evidence of sludge etc:	No
Well volume of water (L)=	2.3	Evidence of freezing/siltation: (compare to installation record)	None
Length screen collecting water (m)=	1.6		

Development/Purging Information

Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
29-Aug-12	0.75	4.0	7.4	340	45	clear, transparent, some sediment
29-Aug-12	0.75	3.7	7.3	260	170	same as above
29-Aug-12	0.75	3.7	6.5	320	200	same as above
29-Aug-12	0.75	4.0	6.1	340	180	same as above

Water Sampling		**Soil Sampling**	
Date and time collected:	29-Aug-12	Date and time collected:	29-Aug-12
Sample Number - Water:	12-15133	Sample Number - Soil:	12-19416/17
			12-19418/19
Sample containers:	1 L HDPE, 1 L teflon	Sample containers:	Whirlpaks
	1 L amber glass		Jars
	3x 40 mL vials		
Procedure/Equipment:	waterra tubing and foot valve	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
Clear, transparent, with some sediment.		sandy medium brown soil, dry, 5% gravel, 5% boulders and cobble. 5% organics at surface.	
Filtration/Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)	Y	Sampling Equipment Decontamination: (Y/N)	Y
Number washes:	1	Number washes:	1
Number rinses:	1	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Table B-13: 2012 Monitoring Well Sampling Log - MW-10

Site Name:	FOX-2
Date of Sampling Event:	29-Aug-12
Names of Samplers:	Kathryn Eagles, Thomas Partridge
Monitoring Well ID:	MW-10
Facility:	Tier II Disposal Facility

Water Sample Measured Data

Condition of Well:	Good		
Procedure/Equipment:	tape measure	Procedure/Equipment:	interface meter
Well height above ground (m)=	0.60	Depth to water surface (m)=	2.9
Diameter of well (m)=	0.043	Static water level* (m)=	2.3
Depth of installation* (m)=	3.4	Depth to bottom (m)=	3.4
Length screened section (m)=	3.0	Free product thickness (mm)=	N/A
Depth to top of screen* (m)=	0.40		

Calculations		**Notes**	
Depth of water (m)=	0.45	Evidence of sludge etc:	No
Well volume of water (L)=	0.65	Evidence of freezing/siltation: (compare to installation record)	None
Length screen collecting water (m)=	0.45		

Development/Purging Information

Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
29-Aug-12	0.75	3.5	4.8	610	150	translucent, rusty brown
29-Aug-12	0.75	3.9	4.5	600	210	same as above
29-Aug-12	0.75	3.9	4.5	600	170	same as above

Water Sampling		**Soil Sampling**	
Date and time collected:	29-Aug-12	Date and time collected:	29-Aug-12
Sample Number - Water:	12-15134	Sample Number - Soil:	12-19420/21
			12-19422/23
Sample containers:	1 L HDPE, 1 L teflon	Sample containers:	Whirlpaks
	1 L amber glass		Jars
	3x 40 mL vials		
Procedure/Equipment:	waterra tubing and foot valve	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
translucent, rusty brown		medium brown dry soil, 60% vegetation at surface. 5% gravel, 80% cobbles and boulders.	
Filtration/Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)	Y	Sampling Equipment Decontamination: (Y/N)	Y
Number washes:	1	Number washes:	1
Number rinses:	1	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Table B-14: 2012 Monitoring Well Sampling Log - MW-11

Site Name:	FOX-2
Date of Sampling Event:	29-Aug-12
Names of Samplers:	Kathryn Eagles, Thomas Partridge
Monitoring Well ID:	MW-11
Facility:	Tier II Disposal Facility

Water Sample Measured Data

Condition of Well:	Good		
Procedure/Equipment:	tape measure	Procedure/Equipment:	interface meter
Well height above ground (m)=	0.75	Depth to water surface (m)=	N/A
Diameter of well (m)=	0.043	Static water level* (m)=	N/A
Depth of installation* (m)=	3.3	Depth to bottom (m)=	3.3
Length screened section (m)=	3.0	Free product thickness (mm)=	N/A
Depth to top of screen* (m)=	0.29		

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)	None
Length screen collecting water (m)=	N/A		

Development/Purging Information

Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter
Note:	Not enough water to sample.

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Water Sampling		**Soil Sampling**	
Date and time collected:	N/A	Date and time collected:	29-Aug-12
Sample Number - Water:	N/A	Sample Number - Soil:	12-19424/25
			12-19426/27
Sample containers:	N/A	Sample containers:	Whirlpaks
			Jars
Procedure/Equipment:	N/A	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
N/A		medium brown moist soil. 60% vegetation at surface, 5% gravel, high clay content, 40% cobbles and boulders at surface.	
Filtration/Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)	N	Sampling Equipment Decontamination: (Y/N)	Y
Number washes:	N/A	Number washes:	1
Number rinses:	N/A	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Table B-15: 2012 Monitoring Well Sampling Log - MW-12

Site Name:	FOX-2
Date of Sampling Event:	29-Aug-12
Names of Samplers:	Kathryn Eagles, Thomas Partridge
Monitoring Well ID:	MW-12
Facility:	Tier II Disposal Facility

Water Sample Measured Data

Condition of Well:	Good		
Procedure/Equipment:	tape measure	Procedure/Equipment:	interface meter
Well height above ground (m)=	0.60	Depth to water surface (m)=	2.9
Diameter of well (m)=	0.043	Static water level* (m)=	2.3
Depth of installation* (m)=	3.5	Depth to bottom (m)=	3.5
Length screened section (m)=	3.0	Free product thickness (mm)=	N/A
Depth to top of screen* (m)=	0.40		

Calculations		**Notes**	
Depth of water (m)=	0.52	Evidence of sludge etc:	No
Well volume of water (L)=	0.76	Evidence of freezing/siltation: (compare to installation record)	None
Length screen collecting water (m)=	0.52		

Development/Purging Information

Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
29-Aug-12	0.75	4.2	6.0	520	600	opaque, brown
29-Aug-12	0.75	3.2	5.9	510	0.0	transulcent, brown
29-Aug-12	0.75	4.0	6.0	520	0.08	same as above

Water Sampling		**Soil Sampling**	
Date and time collected:	29-Aug-12	Date and time collected:	29-Aug-12
Sample Number - Water:	12-15135	Sample Number - Soil:	12-19428/29
			12-19430/31
Sample containers:	1 L HDPE, 1L teflon	Sample containers:	Whirlpaks
	1 L amber glass		Jars
	3x 40 mL vials		
Procedure/Equipment:	waterra tubing and foot valve	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
transulcent, brown		medium brown dry soil, 20% gravel, 50% vegetation at surface, 50% cobbles and boulders	
Filtration/Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)	Y	Sampling Equipment Decontamination: (Y/N)	Y
Number washes:	1	Number washes:	1
Number rinses:	1	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Thermistor Annual Maintenance Report

Contractor Name:	AECOM	Inspection Date:	Aug 29/12
Prepared By:	KRISTEN TACKNEY.		

Thermistor Information

Site Name:	FOX-2	Thermistor Location	TIER II Disposal facility		
Thermistor Number:	VT-1	Inclination	VERTICAL.		
Install Date:		First Date Event		Last Date Event	
Coordinates and Elevation	WP115. N 7643202		E 0494254	Elev	153m
Length of Cable (m)		Cable Lead Above Ground (m)		Nodal Points	
Datalogger Serial #	07110002			Cable Serial Number	VT-1

COORDINATES RECORDED W GPS → WP 115.

Thermistor Inspection

	Good	Needs Maintenance
Casing	☐	☐ NO
Cover	☐	☐ NO
Data Logger	☐	☐ NO
Cable	☐	☐ NO
Beads	☐	☐ NO.
Battery Installation Date		
Battery Levels	Main (9V) 11.34V	Aux (12V) 13.75V

Manual Ground Temperature Readings (14 beads)

Bead	ohms	Degrees C
1	14.880	1.7
2	16.206	0.0
3	16.470	-0.3
4	17.019	-0.9
5	17.804	-1.8
6	18.189	-2.2
7	18.285	-2.3
8	18.757	-2.8

Bead	ohms	Degrees C
9	19.017	-3.1
10	19.340	-3.3
11	19.600	-3.7
12	19.728	-3.7
13	19.818	-3.8
14	19.93	-3.9

Observations and Proposed Maintenance

Site Number: 1
Desc: FOX-2 VT-1
% full: 43%
date when full: N/A
→ raw & csv files saved c:\Lakewood\ CSV or LRAW
excel file saved c:\Lakewood\ EXCEL\ FOX-2 VT-1 Aug 2012
(*) NO RESTART → memory wraparound ENABLED.

Thermistor Annual Maintenance Report

Contractor Name:	AECOM	Inspection Date:	Aug 29/12
Prepared By:	Kristen Tackney		

Thermistor Information

Site Name:	FOX-2	Thermistor Location	Tier II Disposal Facility
Thermistor Number:	VT-2	Inclination	Vertical.
Install Date:		First Date Event	Last Date Event
Coordinates and Elevation	WP 114 N 7643245	E 0494267	Elev 153m
Length of Cable (m)		Cable Lead Above Ground (m)	Nodal Points
Datalogger Serial #	07110006		Cable Serial Number VT-2

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐ NO
Cover	☑	☐ NO
Data Logger	☐ NO	☑ error message
Cable	☑	☐ NO
Beads	☑	☐ NO
Battery Installation Date		
Battery Levels	Main (9V) —	Aux (12V) —

Manual Ground Temperature Readings

Bead	ohms	Degrees C
1	9.743	10.3
2	11.669	6.6
3	12.381	5.4
4	13.320	3.9
5	14.740	2.0
6	16.137	0.3
7	16.262	0.0
8	16.420	-0.1

Bead	ohms	Degrees C
9	17.115	-1.0
10	17.219	-1.1
11	18.345	-2.3

Observations and Proposed Maintenance

Site Number: 2
Desc: FOX-2 VT-2
~~To full:~~
~~date when full:~~
~~→ raw & csv files saved c:\lakewood\csv or \raw~~
~~excel file saved c:\lakewood\EXCEL\ Fox-2 VT-2 Aug 2012~~
~~(*) NO RESTART → memory wraparound ENABLED.~~

(*) COMMUNICATION ERROR TRYING TO UPDATE the DATA LOGGER CONFIGURATION. (*)

NO DOWNLOAD ∴
↳ brought logger to Edmonton to SEND to LAKEWOOD SYSTEMS.

Thermistor Annual Maintenance Report

Contractor Name:	AECOM	Inspection Date:	Aug 29/12
Prepared By:	Kristen TACKNAY		

Thermistor Information

Site Name:	FOX-2	Thermistor Location	TIER II DISPOSAL FACILITY.		
Thermistor Number:	VT-3	Inclination	VERTICAL		
Install Date:		First Date Event		Last Date Event	
Coordinates and Elevation	WP113	N 7643233	E 0494299	Elev	161m
Length of Cable (m)		Cable Lead Above Ground (m)		Nodal Points	
Datalogger Serial #	07110008			Cable Serial Number	VT-3

Tricky Lock!

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐ NO
Cover	☑	☑ Tricky Lock-
Data Logger	☑	☐ NO
Cable	☑	☐ NO
Beads	☑	☐ NO
Battery Installation Date		
Battery Levels	Main (9V) 11.34V	Aux (12V) 13.87V

Manual Ground Temperature Readings (11 beads)

Bead	ohms	Degrees C
1	11.308	7.2
2	12.162	5.8
3	12.779	4.8
4	14.211	2.7
5	15.980	0.4
6	16.378	-0.1
7	16.597	-0.4
8	17.615	-1.4

Bead	ohms	Degrees C
9	17.669	-1.6
10	18.316	-2.2
11	18.676	-2.6

Observations and Proposed Maintenance

Site Number: 3
Desc: FOX-2 VT-3
% full: 43%
date when full: N/A
→ raw & csv files saved c:\Lakewood\CSV OR \RAW
Excel file saved c:\Lakewood\EXCEL\FOX-2 VT-3 Aug 2012.

* NO Restart → Memory Wraparound ENABLED.

Thermistor Annual Maintenance Report

Contractor Name:	AECOM	Inspection Date:	Aug 29/12
Prepared By:	KRISTEN TACKNEY		

Thermistor Information

Site Name:	FOX-2	Thermistor Location	TIER II DISPOSAL FACILITY		
Thermistor Number:	VT-4	Inclination	VERTICAL.		
Install Date:		First Date Event		Last Date Event	
Coordinates and Elevation	WP 112 N	7643254	E 0494311	Elev	157m
Length of Cable (m)		Cable Lead Above Ground (m)		Nodal Points	
Datalogger Serial #	07110007			Cable Serial Number	VT-4

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑ ✓	☐ NO
Cover	☑ ✓	☐ NO
Data Logger	☐ ✓	☐ NO
Cable	☐ ✓	☐ NO
Beads	☑ ✓	☐ no reading from beads 11 & 12.
Battery Installation Date		
Battery Levels	Main (9V) 11.34V	Aux (12V) 13.63V

Manual Ground Temperature Readings (14 beads - SKIP 11 & 12?)

Bead	ohms	Degrees C
1	12.910	4.6
2	14.009	2.9
3	15.135	1.5
4	16.311	-0.1
5	16.655	-0.5
6	17.480	-1.4
7	17.979	-1.9
8	18.305	-2.3

Bead	ohms	Degrees C
9	18.786	-2.8
10	19.236	-3.2
11	- error -	
12	- error -	
13	20.14	-4.1
14	20.22	-4.2

Observations and Proposed Maintenance

Site Number: 4
Desc: FOX-2 VT-4
% full: 43%
date when full: N/A.
→ raw & csv files saved c:\LAKEWOOD\CSV OR \RAW
Excel file saved c:\Lakewood\EXCEL\FOX-2 VT-4 Aug 2012

⊛ NO RESTART → Memory Wraparound ENABLED.

Annex 5 Upper Site Landfill Lobe A – Year 1 Data

Figures:

- FOX-2.6: Site Plan – Upper Site Landfill Lobe A
- Ground Temperature Profile Tier II Disposal Facility Vertical Thermistor VT-5
- Ground Temperature Profile Tier II Disposal Facility Vertical Thermistor VT-6
- Ground Temperature Profile Tier II Disposal Facility Vertical Thermistor VT-7
- Ground Temperature Profile Tier II Disposal Facility Vertical Thermistor VT-8

Tables:

- Landfill Visual Inspection – Upper Site Landfill Lobe A
- Upper Site Landfill Lobe A – Evaluation of Year 1 Soil Data
- Upper Site Landfill Lobe A – Year 1 (2012) Soil Data

Photographic Records:

- Photos 94 and 95
- Photos 96 and 97
- Photos 98 and 99
- Photos 100 and 101
- Photos 102 and 103
- Photos 104 and 105
- Photos 106 and 107
- Photos 108 and 109
- Photos 110 and 111
- Photos 112 and 113
- Photos 114 and 115
- Photos 116 and 117
- Photos 118 and 119
- Photos 120 and 121
- Photos 122 and 123
- Photos 124 and 125
- Photos 126 and 127

Well Sampling Records:

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

Thermistor Annual Maintenance Records:

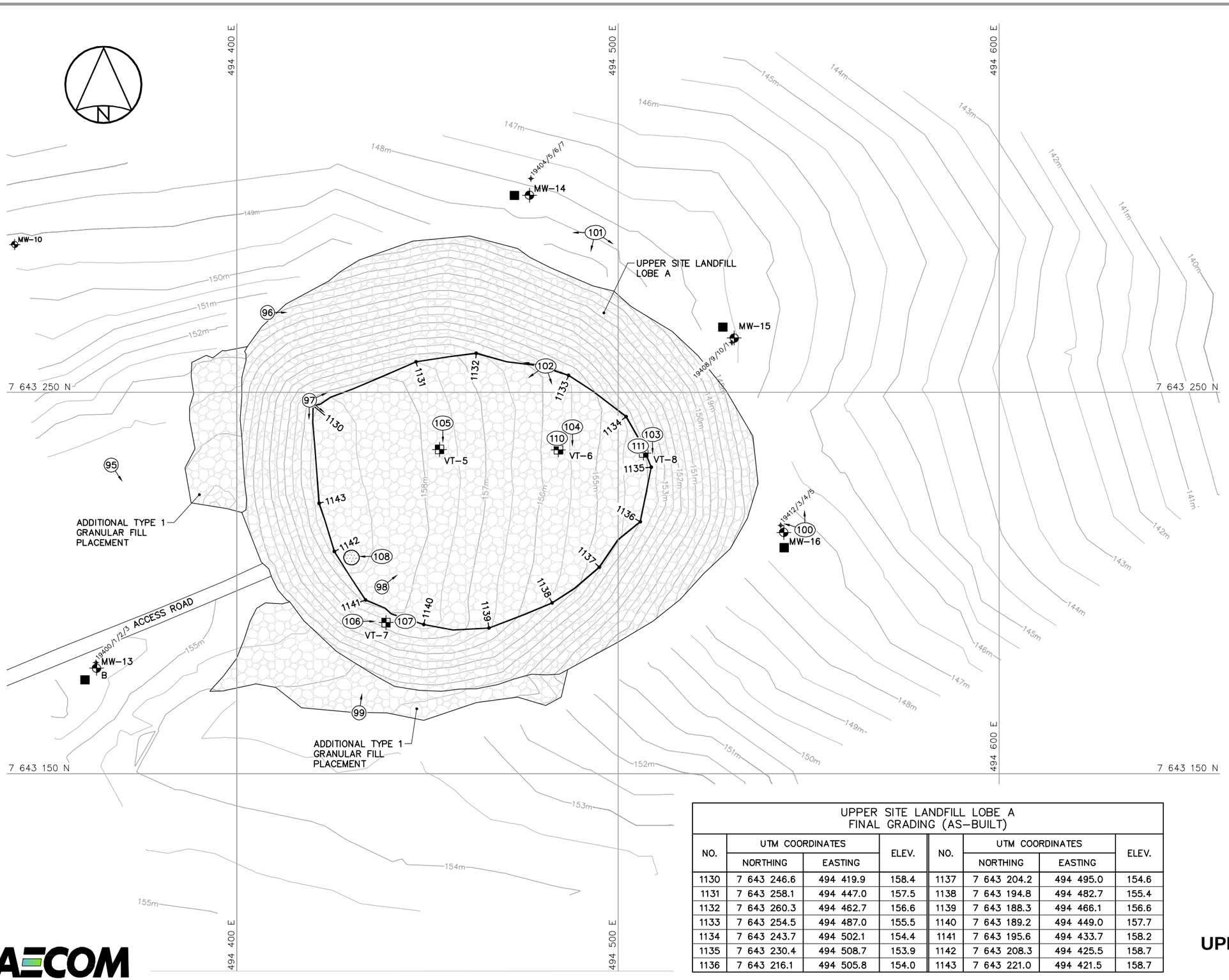
- VT-5
- VT-6
- VT-7
- VT-8

Upper Site Landfill Lobe A – Evaluation of Ground Temperature Data

Ground temperature profiles for the vertical thermistors are attached, showing ground temperature curves since August 2012. The table shows the depth of the active layer as defined by the 0°C isotherm for August 29, 2012.

Summary of Upper Site Landfill Lobe A Thermal Results				
	VT-5	**VT-6**	**VT-7**	**VT-8**
Depth (m) of 0°C Isotherm (August 29/12)	-2.28	-2.49	-2.24	-2.52

The inferred active layer depth noted above is less than the thickness of the 3.5 m granular cover over the landfill contents; the landfill contents are remaining frozen. The ground temperatures are likely warmer and active layers deeper than the long term condition and ground temperatures are expected to cool over the next several years (EBA 2012).



GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 18N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- 1130 — COORDINATE POINT
- MONITORING WELL LOCATION (3)
- B — BACKGROUND MONITORING WELL LOCATION (1)
- GROUND TEMPERATURE CABLE LOCATION (4)
- MONITORING SOIL SAMPLE LOCATION (4)
- MONITORING SITE FEATURE
- 100 — APPROX. PHOTOGRAPHIC VIEWPOINT
- 19400 — 2012 SOIL SAMPLE TAG LOCATION

UPPER SITE LANDFILL LOBE A
MONITORING WELLS (AS-BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
MW-13	7 643 177.7	494 363.1	155.7
MW-14	7 643 301.8	494 476.7	148.2
MW-15	7 643 264.3	494 530.4	147.7
MW-16	7 643 213.3	494 543.4	147.1

UPPER SITE LANDFILL LOBE A
GROUND TEMPERATURE CABLES (AS-BUILT)

NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING	
VT-5	7 643 235.1	494 453.1	157.7
VT-6	7 643 235.0	494 484.3	155.6
VT-7	7 643 189.6	494 439.1	157.1
VT-8	7 643 234.1	494 506.7	153.9

UPPER SITE LANDFILL LOBE A
FINAL GRADING (AS-BUILT)

NO.	UTM COORDINATES		ELEV.	NO.	UTM COORDINATES		ELEV.
	NORTHING	EASTING			NORTHING	EASTING	
1130	7 643 246.6	494 419.9	158.4	1137	7 643 204.2	494 495.0	154.6
1131	7 643 258.1	494 447.0	157.5	1138	7 643 194.8	494 482.7	155.4
1132	7 643 260.3	494 462.7	156.6	1139	7 643 188.3	494 466.1	156.6
1133	7 643 254.5	494 487.0	155.5	1140	7 643 189.2	494 449.0	157.7
1134	7 643 243.7	494 502.1	154.4	1141	7 643 195.6	494 433.7	158.2
1135	7 643 230.4	494 508.7	153.9	1142	7 643 208.3	494 425.5	158.7
1136	7 643 216.1	494 505.8	154.0	1143	7 643 221.0	494 421.5	158.7

RECORD DRAWING
NOT FOR CONSTRUCTION

0 10 20 m SCALE 1:1000

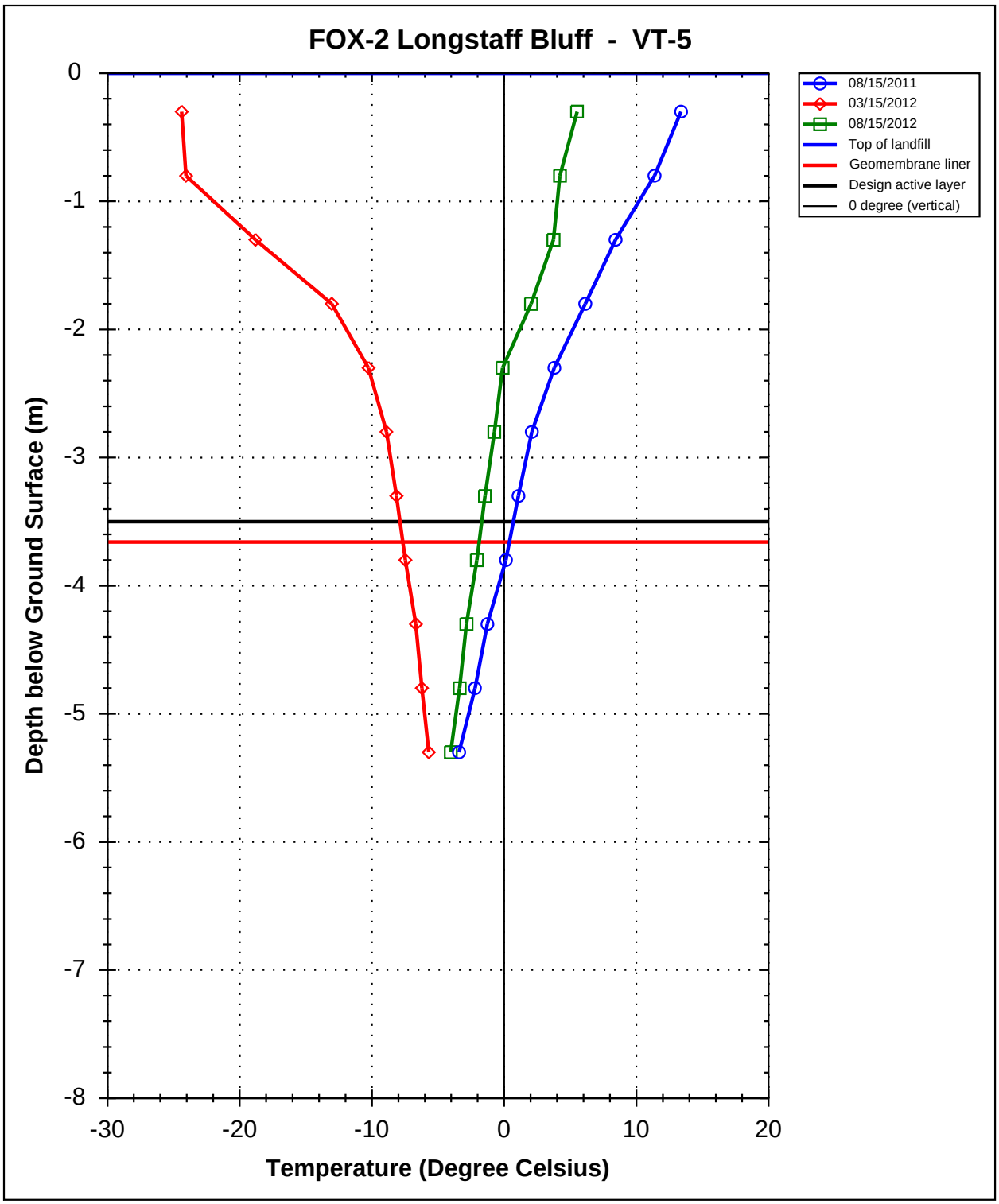
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

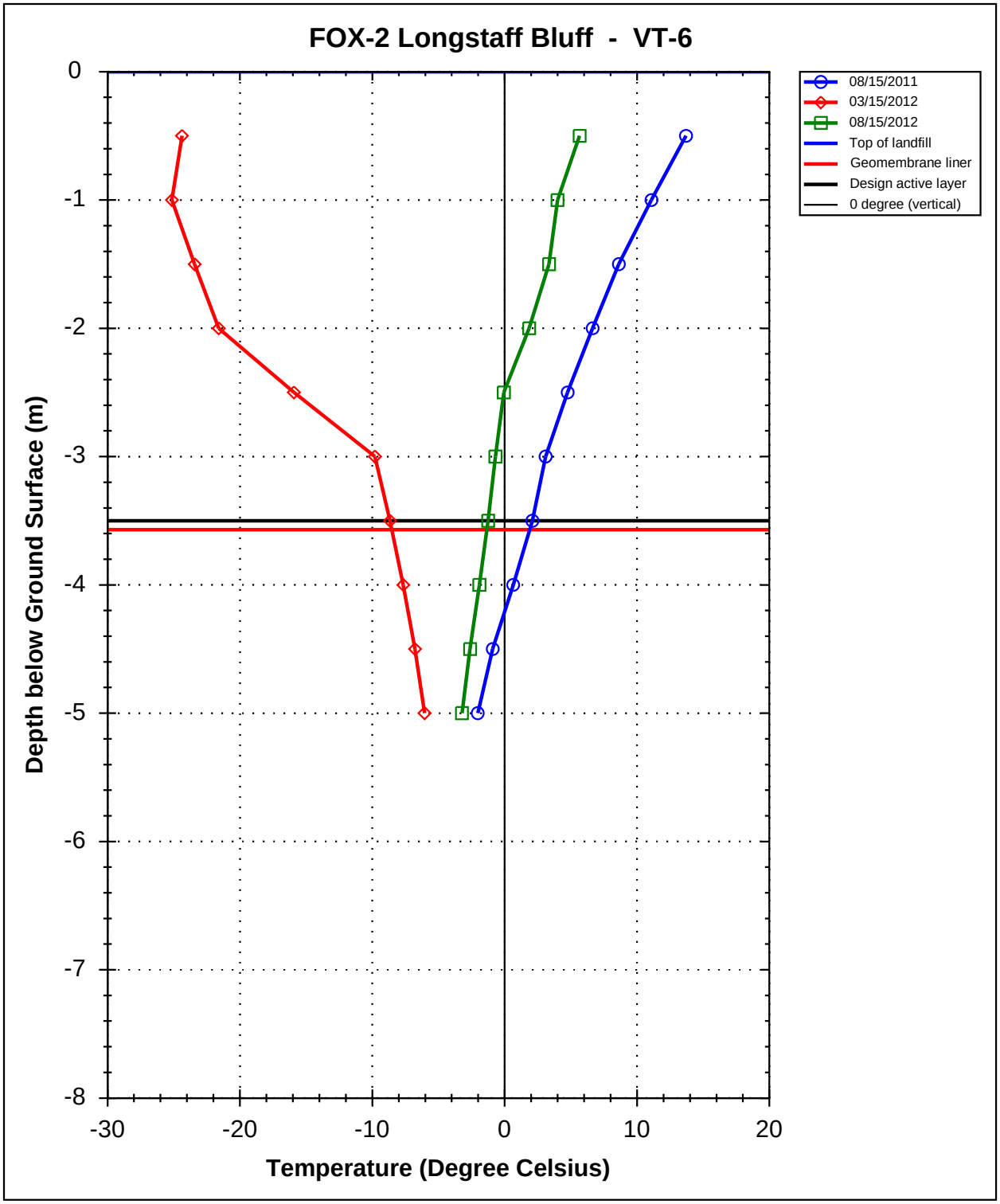
FOX-2 LONGSTAFF BLUFF

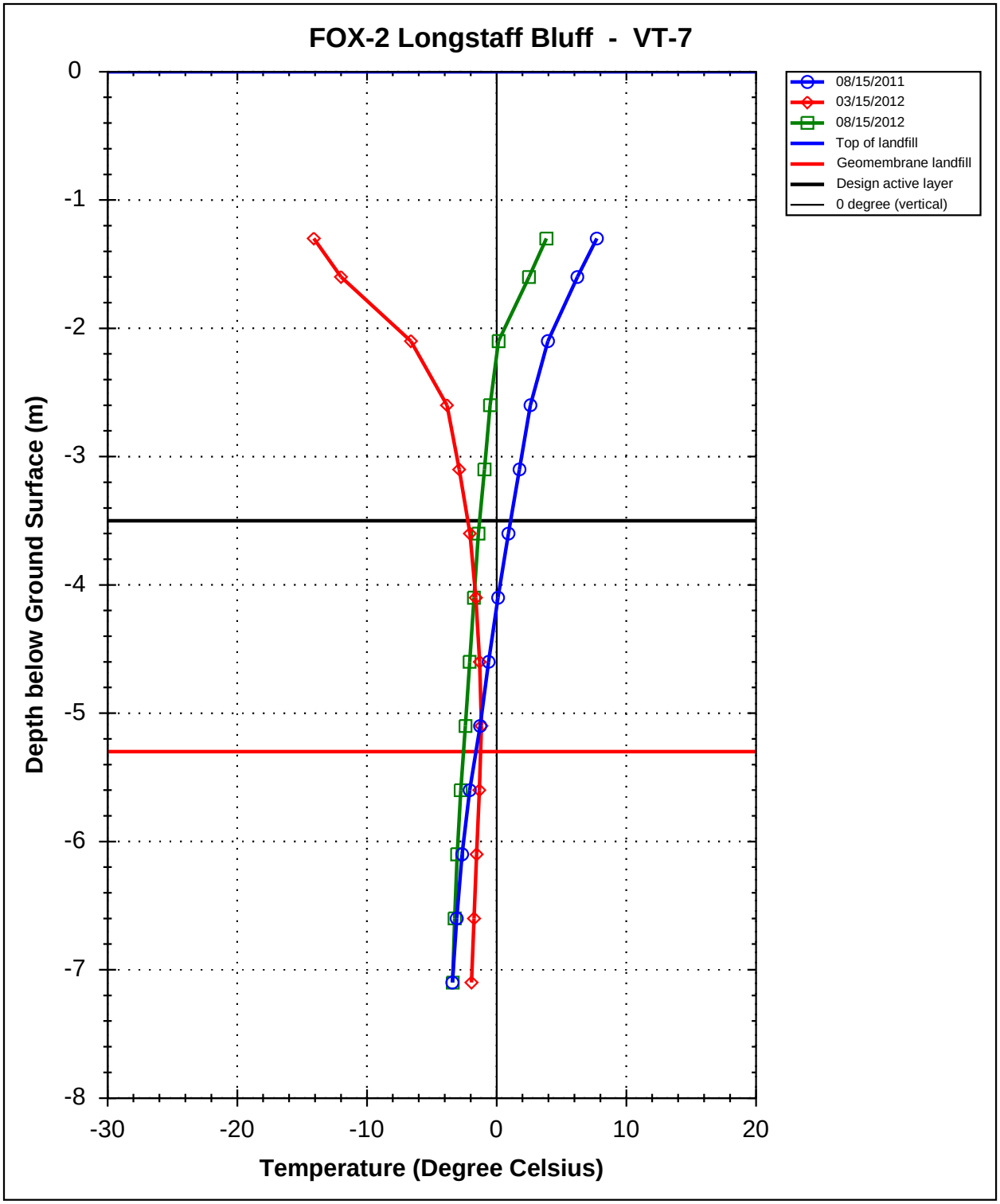
UPPER SITE LANDFILL LOBE A

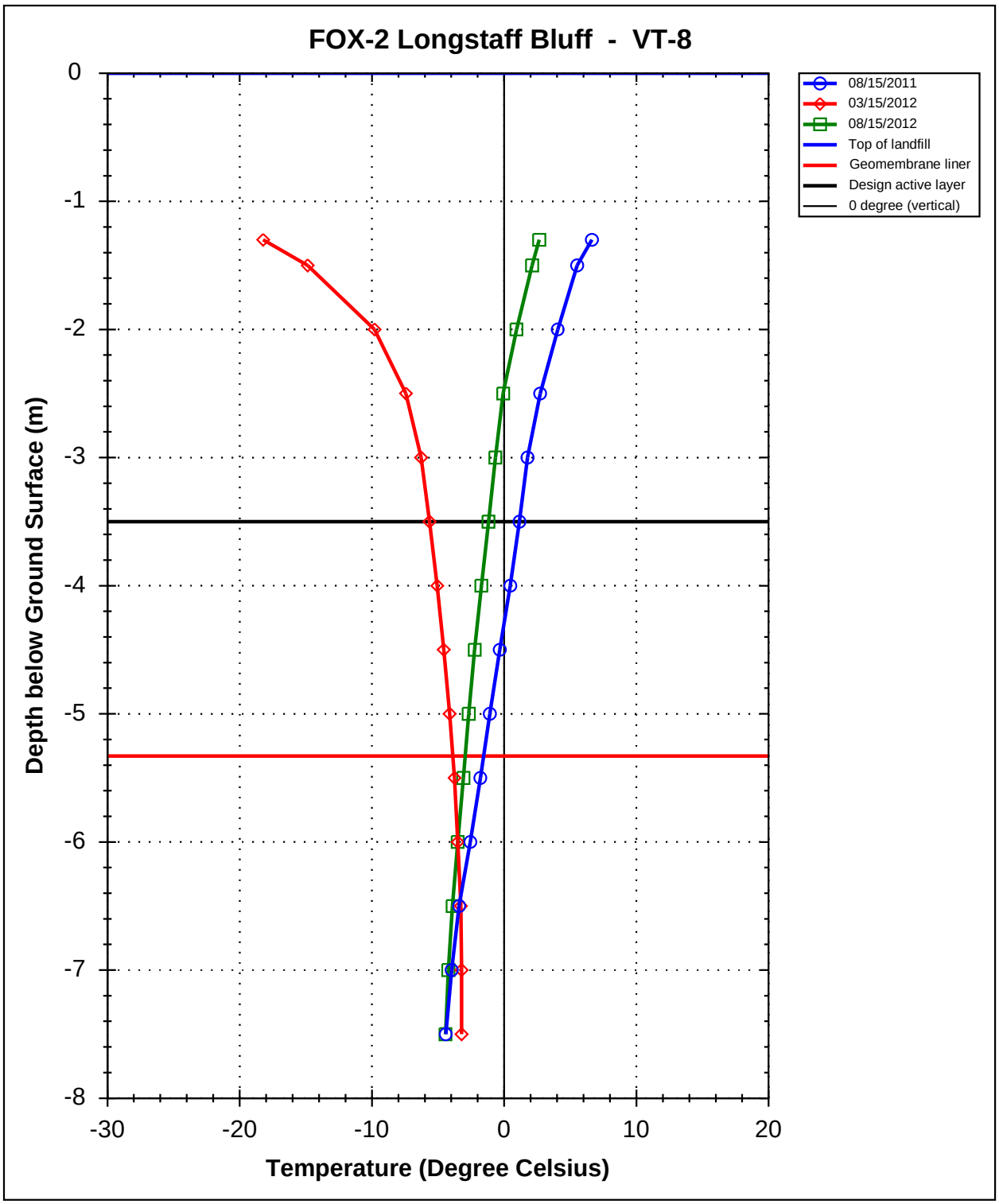
FIGURE FOX-2.6

AECOM


FOX-2 Longstaff Bluff - VT-5
Depth below Ground Surface (m)
Temperature (Degree Celsius)
0
-1
-2
-3
-4
-5
-6
-7
-8
-30
-20
-10
0
10
20
08/15/2011
03/15/2012
08/15/2012
Top of landfill
Geomembrane liner
Design active layer
0 degree (vertical)


FOX-2 Longstaff Bluff - VT-6
Depth below Ground Surface (m)
Temperature (Degree Celsius)
0
-1
-2
-3
-4
-5
-6
-7
-8
-30
-20
-10
0
10
20
08/15/2011
03/15/2012
08/15/2012
Top of landfill
Geomembrane liner
Design active layer
0 degree (vertical)


FOX-2 Longstaff Bluff - VT-7
Depth below Ground Surface (m)
Temperature (Degree Celsius)
0
-1
-2
-3
-4
-5
-6
-7
-8
-30
-20
-10
0
10
20
08/15/2011
03/15/2012
08/15/2012
Top of landfill
Geomembrane landfill
Design active layer
0 degree (vertical)


FOX-2 Longstaff Bluff - VT-8
Depth below Ground Surface (m)
Temperature (Degree Celsius)
0
-1
-2
-3
-4
-5
-6
-7
-8
-30
-20
-10
0
10
20
08/15/2011
03/15/2012
08/15/2012
Top of landfill
Geomembrane liner
Design active layer
0 degree (vertical)

DEW Line Cleanup: Post-Construction - Landfill Monitoring
Visual Inspection Checklist and Preliminary Stability Assessment

Site Name:	**FOX-2 Longstaff Bluff**
Landfill Designation:	**Upper Site Landfill Lobe A**
Date of Inspection:	**28-Aug-12**
Inspected By:	**Kristen Tackney, P.Geol. (AECOM)**

Checklist Item	Present Yes/No	Location (Describe relative to existing monuments/features and relative to landfill design i.e. surface, berms, toe)	Length	Width	Depth	Extent relative to Area of Landfill (%)	Description	Photographic Records Focal length, location, view point & direction (relative to magnetic north) Feature of note Scale	Additional Comments	Severity Rating
Settlement	Yes	Surface	5 m	5 m	0.3 m	Occasional	Minor surficial settlement	Photo FOX-2 23 WP 108	Few low points on surface	Acceptable
Erosion	No									
Frost Action	No									
Sloughing and Cracking	No									
Animal Burrows	No									
Vegetation	No									
Staining	No									
Vegetation Stress	No									
Seepage Points	No									
Debris Exposed	No									
Presence/Condition - Monitoring Instruments	Yes	As shown on Figure FOX-2					VT-5 to VT-8	Photos FOX-2 18-21 WP 103-106	Installed off vertical	Acceptable
Features of Note	No									
Landfill Performance										Acceptable

Upper Site Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA

Parameter	N value Baseline	Arithmetic Mean +/- 95% Confidence Limit Baseline	Maximum Baseline [mg/kg]	2012	Comments
Copper	110	52 +/- 4	180	Six of ten sample results exceeded the 95% confidence limit.	The surface sample at MW-13, the dpeth sample at MW-14, and the surface and depth samples at MW-15 and MW-16 had concetrations of 58, 63, 63, 57, 88, and 69 mg/kg, respectively. All results were below the baseline maximum.
Nickel	70	39 +/- 2	70	Six of ten sample results exceeded the 95% confidence limit.	The surface sample at MW-13, the dpeth sample at MW-14, and the surface and depth samples at MW-15 and MW-16 had concetrations of 71, 52, 52, 45, 58, and 52 mg/kg, respectively. The surface sample at MW-13 exceeded the baseline maximum.
Cobalt	70	14 +/- 1	25	Three of ten sample results exceeded the 95% confidence limit.	The surface sample at MW-13, and the depth samples at MW-14 and MW-15 had concentrations of 16, 17, and 20 mg/kg, respectively. All results were below the baseline maximum.
Cadmium	70	<1.0	<1.0	Concentrations consistent with baseline mean (non-detect).	
Lead	110	<10	460	Six of ten sample results exceeded the baseline mean (non-detect).	The surface and depth samples at MW-13 and MW-16, the depth sample at MW-14, and the surface sample at MW-15 had concentrations of 31, 11, 13, 12, 11, and 13 mg/kg, respectively. The results were below the baseline maximum.
Zinc	110	86 +/- 9	450	Five of ten sample results exceeded the 95% confidence limit.	The surface sample at MW-13, and the surface and depth samples at MW-15 and MW-16 had concentrations of 160, 100, 97, 120, and 100 mg/kg, respectively. All results were below the baseline maximum.
Chromium	70	48 +/- 3	120	Six of ten sample results exceeded the 95% confidence limit.	The surface sample at MW-13, the depth sample at MW-14, and the surface and depth samples at MW-15 and MW-16 had concentrations of 190, 52, 71, 80, 61, and 54 mg/kg, respectively. The surface sample at MW-13 exceeded the baseline maximum.
Arsenic	70	33 +/- 2	70	Five of ten sample results exceeded the 95% confidence limit.	The depth samples at MW-13, the surface and depth samples at MW-14, and the surface samples at MW-15 and MW-16 had concentrations of 64, 38, 50, 41, and 58 mg/kg, respectively. All results were below the baseline maximum.
Mercury	8	<0.10	<0.10	Concentrations consistent with baseline mean (non-detect).	
PCBs	93	<0.5	8.6	Concentrations consistent with baseline mean (non-detect).	
TPH	58	<10	7700	Concentrations consistent with baseline mean (non-detect), with five exceptions.	The surface samples at MW-13 and MW-14, the surface and depth samples at MW-15, and the depth sample at MW-16 had concentrations of 170, 75, 280, 55, and 95 mg/kg, respectively. All results were below the baseline maximum.

Upper Site Landfill - Year 1 (2012) Soil Data

Sample #	Surface/ Reference Tag #	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
Upper Site Landfill- Baseline Concentrations					**52 +/- 4**	**39 +/- 2**	**14 +/- 1**	**<1.0**	**<10**	**86 +/- 9**	**48 +/- 3**	**33 +/- 2**	**<0.10**	**<0.5**	**<10**			
Upper Site Landfill - Maximum Concentrations					**180**	**70**	**25**	**<1.0**	**460**	**450**	**120**	**70**	**<0.10**	**8.6**	**7700**			
Upgradient Soil Samples																		
12-19400/01	19400	MW-13	2012	0-10	58	71	16	< 0.50	31	160	190	26	< 0.010	< 0.020	170	< 5.0	< 10	170
12-19402/03	19400	MW-13	2012	30-40	47	38	13	< 0.50	11	77	45	64	0.013	< 0.020	<50	< 5.0	< 10	< 50
Downgradient Soil Samples																		
12-19404/05	19404	MW-14	2012	0-10	47	41	13	< 0.50	10	76	45	38	< 0.010	< 0.020	75	< 5.0	< 10	75
12-19406/07	19404	MW-14	2012	30-40	63	52	17	< 0.50	11	93	52	50	< 0.010	< 0.020	<50	< 5.0	< 10	< 50
12-19408/09	19408	MW-15	2012	0-10	63	52	14	< 0.50	13	100	71	41	0.03	< 0.020	280	< 5.0	< 10	280
12-19410/11[ac]	19408	MW-15	2012	30-40	57	45	14	< 0.50	10	97	80	34	0.0125	< 0.020	55	< 5.0	< 10	55
12-19412/13	19412	MW-16	2012	0-10	88	58	14	< 0.50	13	120	61	58	0.0011	< 0.020	<50	< 5.0	< 10	< 50
12-19414/15	19412	MW-16	2012	30-40	69	52	20	< 0.50	12	100	54	45	< 0.010	< 0.020	95	< 5.0	< 10	95

Photograph 94. Upper Site Landfill Lobe A – Looking SE (Way Point 095). ↑

Photograph 95. Looking E (WP 095). ↑

Photograph 96. Looking E (WP 096). ↑

Photograph 97. Looking E (WP 097). ↑

Photograph 98. Looking SE (WP 097). ↑

Photograph 99. Looking S (WP 097). ↑

Photograph 100. Looking NE (WP 098). ↑

Photograph 101. Looking N (WP 099). ↑

Photograph 102. Looking W (WP 100). ↑

Photograph 103. Looking N (WP 100). ↑

Photograph 104. Looking SE (WP 101). ↑

Photograph 105. Looking S (WP 101). ↑

Photograph 106. Looking W (WP 101). ↑

Photograph 107. Looking SE (WP 102). ↑

Photograph 108. Looking S (WP 102). ↑

Photograph 109. Looking SW (WP 102). ↑

Photograph 110. Looking W (WP 102). ↑

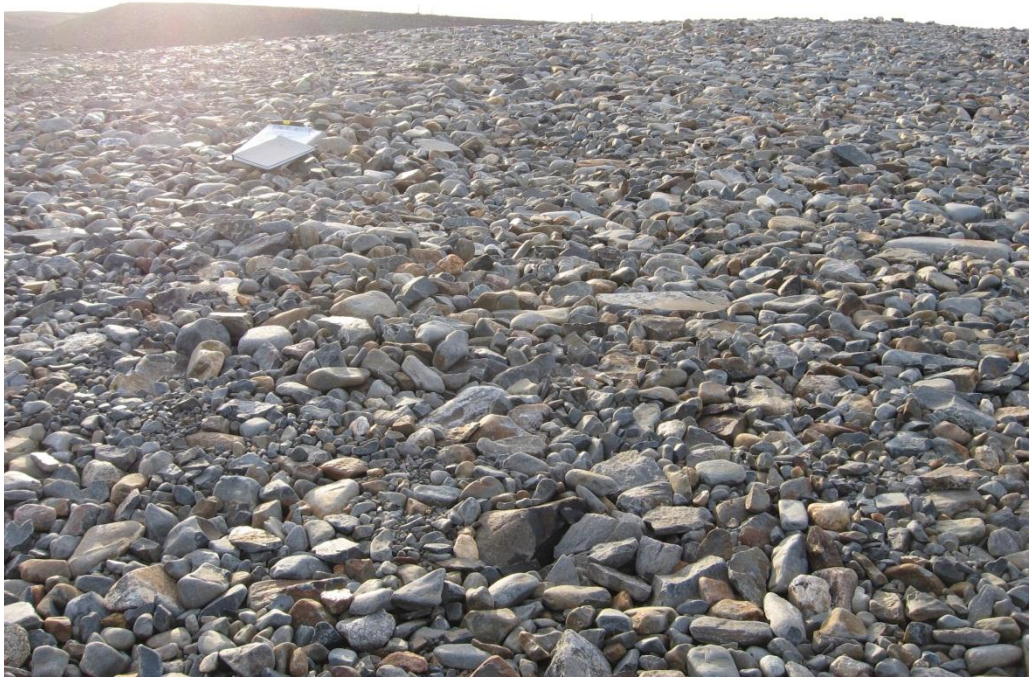
Photograph 111. VT-8 Looking S (WP 103). ↑

Photograph 112. VT-6 Looking S (WP 104). ↑

Photograph 113. VT-5 Looking S (WP 105). ↑

Photograph 114. VT-7 Looking E (WP 106). ↑

Photograph 115. VT-7 Data Logger (WP 107). ↑



Photograph 116. Settlement Feature Looking E (WP 108). ↑

Photograph 117. VT-5 Data Logger (WP 109). ↑

Photograph 118. VT-6 Data Logger (WP 110). ↑

Photograph 119. VT-8 Data Logger (WP 111). ↑

Photograph 120. VT-7 Data Logger. ↑

Photograph 121. VT-7 Data Logger. ↑

Photograph 122. VT-5 Data Logger. ↑

Photograph 123. VT-5 Data Logger. ↑

Photograph 124. VT-6 Data Logger. ↑

Photograph 125. VT-6 Data Logger. ↑

Photograph 126. VT-8 Data Logger. ↑

Photograph 127. VT-8 Data Logger. ↑

Table B-45: 2012 Monitoring Well Sampling Log - MW-13

Site Name:	FOX-2
Date of Sampling Event:	28-Aug-12
Names of Samplers:	Kathryn Eagles, Thomas Partridge
Monitoring Well ID:	MW-13
Facility:	Upper Site Landfill

Water Sample Measured Data

Condition of Well:	Good		
Procedure/Equipment:	tape measure	Procedure/Equipment:	interface meter
Well height above ground (m)=	0.64	Depth to water surface (m)=	2.8
Diameter of well (m)=	0.043	Static water level* (m)=	2.2
Depth of installation* (m)=	3.4	Depth to bottom (m)=	3.2
Length screened section (m)=	3.0	Free product thickness (mm)=	N/A
Depth to top of screen* (m)=	0.44		
Calculations		**Notes**	
Depth of water (m)=	0.32	Evidence of sludge etc:	No
Well volume of water (L)=	0.46	Evidence of freezing/siltation: (compare to installation record)	Frozen water encountered at a depth of 3.2 m
Length screen collecting water (m)=	0.32		

Development/Purging Information

Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
28-Aug-12	0.50	5.3	5.84	210	30	clear, colourless
28-Aug-12	0.50	5	6.11	250	48	same as above
28-Aug-12	0.50	5.2	6.02	340	41	same as above

Water Sampling		**Soil Sampling**	
Date and time collected:	28-Aug-12	Date and time collected:	28-Aug-12
Sample Number - Water:	12-15130	Sample Number - Soil:	12-19400/01
			12-19402/03
Sample containers:	1 L HDPE, 1 L teflon	Sample containers:	Whirlpaks
	1 L amber glass		Jars
	3x 40 mL vials		
Procedure/Equipment:	waterra tubing and foot valve	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
clear, colourless		heterogenous mixture of dark and light brown dry sandy soil, 80% gravel, 10% vegetation as surface, 20% cobble and boulders	
Filtration/Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)	Y	Sampling Equipment Decontamination: (Y/N)	Y
Number washes:	1	Number washes:	1
Number rinses:	1	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Table B-46: 2012 Monitoring Well Sampling Log - MW-14

Site Name:	FOX-2
Date of Sampling Event:	28-Aug-12
Names of Samplers:	Kathryn Eagles, Thomas Partridge
Monitoring Well ID:	MW-14
Facility:	Upper Site Landfill

Water Sample Measured Data

Condition of Well:	Good		
Procedure/Equipment:	tape measure	Procedure/Equipment:	interface meter
Well height above ground (m)=	0.60	Depth to water surface (m)=	2.6
Diameter of well (m)=	0.043	Static water level* (m)=	2.0
Depth of installation* (m)=	3.5	Depth to bottom (m)=	3.5
Length screened section (m)=	3.0	Free product thickness (mm)=	N/A
Depth to top of screen* (m)=	0.49		

Calculations		**Notes**	
Depth of water (m)=	0.89	Evidence of sludge etc:	No
Well volume of water (L)=	1.3	Evidence of freezing/siltation: (compare to installation record)	None
Length screen collecting water (m)=	0.89		

Development/Purging Information

Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
28-Aug-12	0.75	3.1	6.7	310	84	translucent, brown sediment
28-Aug-12	0.75	2.6	5.0	220	77	same as above
28-Aug-12	0.75	3.6	5.6	220	94	same as above

Water Sampling		**Soil Sampling**	
Date and time collected:	28-Aug-12	Date and time collected:	28-Aug-12
Sample Number - Water:	12-15131	Sample Number - Soil:	12-19404/05
			12-19406/07
Sample containers:	1 L HDPE, 1 L teflon	Sample containers:	Whirlpaks
	1 L amber glass		Jars
	3x 40 mL vials		
Procedure/Equipment:	waterra tubing and foot valve	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
brown with sediment		dark brown soil, muddy at surface, 70% gravel, 80% vegetation, 30% cobble and boulders	
Filtration/Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)	Y	Sampling Equipment Decontamination: (Y/N)	Y
Number washes:	1	Number washes:	1
Number rinses:	1	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Table B-47: 2012 Monitoring Well Sampling Log - MW-15

Site Name:	FOX-2
Date of Sampling Event:	28-Aug-12
Names of Samplers:	Kathryn Eagles, Thomas Partridge
Monitoring Well ID:	MW-15
Facility:	Upper Site Landfill

Water Sample Measured Data

Condition of Well:	Good		
Procedure/Equipment:	tape measure	Procedure/Equipment:	interface meter
Well height above ground (m)=	0.80	Depth to water surface (m)=	3.1
Diameter of well (m)=	0.043	Static water level* (m)=	2.3
Depth of installation* (m)=	3.2	Depth to bottom (m)=	3.2
Length screened section (m)=	3.0	Free product thickness (mm)=	N/A
Depth to top of screen* (m)=	0.20		

Calculations		**Notes**	
Depth of water (m)=	0.090	Evidence of sludge etc:	No
Well volume of water (L)=	0.13	Evidence of freezing/siltation: (compare to installation record)	None
Length screen collecting water (m)=	0.090		

Development/Purging Information

Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
28-Aug-12	0.75	2.7	5.9	390	83	clear, transparent, brown sediment
28-Aug-12	0.75	2.6	5.8	300	20	same as above
28-Aug-12	0.85	2.6	5.9	291	29	same as above

Water Sampling		**Soil Sampling**	
Date and time collected:	28-Aug-12	Date and time collected:	28-Aug-12
Sample Number - Water:	12-15132	Sample Number - Soil:	12-19408/09
			12-19410/11
Sample containers:	1 L HDPE, 1 L teflon	Sample containers:	Whirlpaks
	1 L amber glass		Jars
	3x 40 mL vials		
Procedure/Equipment:	waterra tubing and foot valve	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
clear, transparent		dark brown, fine sandy soil, dry, 40% vegetation at surface, 10% gravel, 20% cobble and boulders	
Filtration/Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)		Sampling Equipment Decontamination: (Y/N)	y
Number washes:	1	Number washes:	1
Number rinses:	1	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Table B-48: 2012 Monitoring Well Sampling Log - MW-16

Site Name:	FOX-2
Date of Sampling Event:	28-Aug-12
Names of Samplers:	Kathryn Eagles, Thomas Partridge
Monitoring Well ID:	MW-16
Facility:	Upper Site Landfill

Water Sample Measured Data

Condition of Well:	Good		
Procedure/Equipment:	tape measure	Procedure/Equipment:	interface meter
Well height above ground (m)=	0.27	Depth to water surface (m)=	2.6
Diameter of well (m)=	0.043	Static water level* (m)=	2.4
Depth of installation* (m)=	3.4	Depth to bottom (m)=	2.7
Length screened section (m)=	3.0	Free product thickness (mm)=	N/A
Depth to top of screen* (m)=	0.73		

Calculations		**Notes**	
Depth of water (m)=	0.070	Evidence of sludge etc:	No
Well volume of water (L)=	0.10	Evidence of freezing/siltation: (compare to installation record)	None
Length screen collecting water (m)=	0.070		

Development/Purging Information

Equipment:	waterra tubing with footvalve, turbidity meter and pH, cond and temp meter
Note:	frozen water encountered at a depth of 2.6 m

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Description of water
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Water Sampling		**Soil Sampling**	
Date and time collected:	N/A	Date and time collected:	28-Aug-12
Sample Number - Water:	N/A	Sample Number - Soil:	12-19412/13
			12-19414/15
Sample containers:	N/A	Sample containers:	Whirlpaks
			Jars
Procedure/Equipment:	N/A	Procedure/Equipment:	plastic scoops and metal shovel
Water description:		Soil description:	
N/A		Sandy medium brown soil, dry, 40% vegetation at surface. 10% gravel and 40% boulders at surface.	
Filtration/Acidification: (Y/N)	N		
Sampling Equipment Decontamination: (Y/N)	N	Sampling Equipment Decontamination: (Y/N)	Y
Number washes:	N/A	Number washes:	1
Number rinses:	N/A	Number rinses:	1

N/A = not applicable

*From ground surface. Other measurements are from the top of the casing.

Thermistor Annual Maintenance Report

Contractor Name:	AECOM	Inspection Date:	Aug 28/12
Prepared By:	KRISTEN TACKNEY.		

Thermistor Information

Site Name:	FOX-2	Thermistor Location	UPPER SITE LANDFILL LOBE A.		
Thermistor Number:	VT-5	Inclination	OFF VERTICAL.		
Install Date:		First Date Event		Last Date Event	
Coordinates and Elevation	WP 109 N	7643240	E 0494454	Elev	160m
Length of Cable (m)		Cable Lead Above Ground (m)		Nodal Points	
Datalogger Serial #	07110033			Cable Serial Number	VT-5

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐ NO slightly off vertical (photo 24)
Cover	☑	☐ NO
Data Logger	☑	☐ NO
Cable	☑	☐ NO
Beads	☑	☐ NO
Battery Installation Date		
Battery Levels	Main (9V) 11.34 V	Aux (12V) 13.75 V

Manual Ground Temperature Readings (11 beads)

Bead	ohms	Degrees C
1	11.184	7.5
2	12.687	5.0
3	13.725	3.4
4	15.080	1.5
5	16.351	-0.1
6	16.814	-0.6
7	17.352	-1.2
8	17.838	-1.8

Bead	ohms	Degrees C
9	18.584	-2.5
10	19.081	-3.0
11	19.620	-3.6

Observations and Proposed Maintenance

SITE Number: 5
Desc: FOX-2-VT-5
% full: 43%.
date when full: N/A.

excel file: FOX-2 VT-5 Aug 2012.

↳ raw & csv files saved
c:\Lakewood\CSV OR\[redacted] RAW

(*) I did not restart the data logger
↳ memory wraparound ENABLED.

Thermistor Annual Maintenance Report

Contractor Name:	AECOM	Inspection Date:	Aug 28/12
Prepared By:	KRISTEN TACKNEY		

Thermistor Information

Site Name:	FOX-2	Thermistor Location	UPPER SITE LANDFILL LOBE A.		
Thermistor Number:	VT-6	Inclination			
Install Date:		First Date Event		Last Date Event	
Coordinates and Elevation	WP 110 N 7648238	E 0494484		Elev	154m
Length of Cable (m)		Cable Lead Above Ground (m)		Nodal Points	
Datalogger Serial #	07110035			Cable Serial Number	VT-6

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐ NO slightly off vertical. (photo 25)
Cover	☑	☐ → sticky lock.
Data Logger	☑	☐ NO
Cable	☑	☐ NO
Beads	☑	☐ NO
Battery Installation Date		
Battery Levels	Main (9V) 11.34 V	Aux (12V) 13.63 V

Manual Ground Temperature Readings (10 beads)

Bead	ohms	Degrees C
1	10.859	8.1
2	12.649	5.0
3	13.484	3.7
4	14.776	1.9
5	16.334	0.0
6	16.799	−0.6
7	17.196	−1.1
8	17.729	−1.7

Bead	ohms	Degrees C
9	18.32	−2.3
10	18.74	−2.8

Observations and Proposed Maintenance

Site Number: 6
Desc: Fox-2 VT-6
% full: 43%
date when full: N/A. excel file: Fox-2 VT-6 Aug 2012
↳ raw & csv files saved c:\Lakewood\csv or \raw
⊛ NO RESTART → Memory Wraparound ENABLED.

Thermistor Annual Maintenance Report

Contractor Name:	AECOM	Inspection Date:	Aug 28/12
Prepared By:	Kristen Tackney		

Thermistor Information

Site Name:	FOX-2	Thermistor Location	Upper site Landfill Lobe A		
Thermistor Number:	VT-7	Inclination	OFF Vertical		
Install Date:		First Date Event		Last Date Event	
Coordinates and Elevation	WP107 N	7643190	E 494440	Elev	154m
Length of Cable (m)		Cable Lead Above Ground (m)		Nodal Points	
Datalogger Serial #	0711 0034			Cable Serial Number	VT-7

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐ NO off vertical (photo22).
Cover	☑	☐ NO ↳ installed this way
Data Logger	☑	☐ NO (Kat E. says EBA
Cable	☑	☐ NO (Renata) was onsite).
Beads	☑	☐ NO
Battery Installation Date		
Battery Levels	Main (9V) 11.34V	Aux (12V) 11.63V

Manual Ground Temperature Readings (13 beads)

Bead	ohms	Degrees C
1	13.769	3.3
2	14.712	1.9
3	16.155	0.1
4	16.586	-0.5
5	16.995	-0.9
6	17.377	-1.3
7	17.579	-1.6
8	17.923	-1.9

Bead	ohms	Degrees C
9	18.132	-2.2
10	18.502	-2.5
11	18.803	-2.8
12	18.986	-2.9
13	19.092	-3.1

Observations and Proposed Maintenance

Site Number: 7
Desc: FOX-2 VT-7
To full: 437.
Date when full: N/A
↳ raw & csv file saved c:\Lakewood\csv or \RAW
excel file saved c:\Lakewood\EXCEL\FOX-2 VT-7 Aug 2012.
⊛ NO RESTART → memory wraparound ENABLED.

Thermistor Annual Maintenance Report

Contractor Name:	AECOM	Inspection Date:	Aug 28/12
Prepared By:	KRISTEN TACKNEY		

Thermistor Information

Site Name:	FOX-2	Thermistor Location	UPPER SITE LANDFILL LOBE A.		
Thermistor Number:	VT-8	Inclination	OFF VERTICAL.		
Install Date:		First Date Event		Last Date Event	
Coordinates and Elevation	WP 111 N	7643236	E 0494508.	Elev	150m
Length of Cable (m)		Cable Lead Above Ground (m)		Nodal Points	
Datalogger Serial #	07110010			Cable Serial Number	VT-8

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐ NO off. vertical. (photo 26)
Cover	☑	☐ NO
Data Logger	☑	☐ NO
Cable	☑	☐ NO
Beads	☑	☐ NO
Battery Installation Date		
Battery Levels	Main (9V) 11.34V	Aux (12V) 13.97V

Manual Ground Temperature Readings (14 beads).

Bead	ohms	Degrees C
1	13.580	3.7
2	14.176	2.7
3	15.619	0.9
4	16.342	-0.1
5	16.785	-0.6
6	17.171	-1.0
7	17.698	-1.5
8	17.987	-1.9

Bead	ohms	Degrees C
9	18.377	-2.3
10	18.777	-2.7
11	19.100	-3.1
12	19.523	-3.5
13	19.739	-3.7
14	19.99	-3.9

Observations and Proposed Maintenance

Site Number: 8
Desc: FOX-2 VT-8
% full: 43%
date when full: N/A
↳ raw & csv files saved c:\Lakewood\CSV OR \RAW
excel file saved c:\Lakewood\EXCEL\FOX-2 VT-8 Aug 2012

* NO RESTART → memory wraparound ENABLED.

Appendix B

Laboratory Analytical Reports (on DVD)

Appendix C

Field Notes (on DVD)

Appendix D

Naturally Elevated Concentrations of Trace Metals (Cu, Ni, Co and As) at the FOX-2 DEW Line Site, Longstaff Bluff, Nunavut, Environmental Sciences Group, September 2006 (on DVD)