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

FOX-C EKALUGAD FJORD LONG-TERM MONITORING PLAN

March 23, 2008

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Appendices

1.0 Introduction

FOX-C Ekalugad Fjord was an Intermediate Distant Early Warning (DEW) Line site; a remediation project was conducted at the site between 2005 and 2008. The remediation involved the demolition and disposal of buildings, structures and other debris, as well as the clean up of hazardous materials and contaminated soil.

1.1 Location

FOX-C Ekalugad Fjord It is located on the Northeast coast of Baffin Island, Nunavut on the south shore of Ekalugad Fjord. The two nearest communities are Qikiqtarjuaq, located approximately 240 kilometres to the Southeast, and Clyde River, which is located approximately 260 kilometres to the North. The GPS Coordinates of the site are 68°42'0"N - 68°33'0"E (see Figure 1).

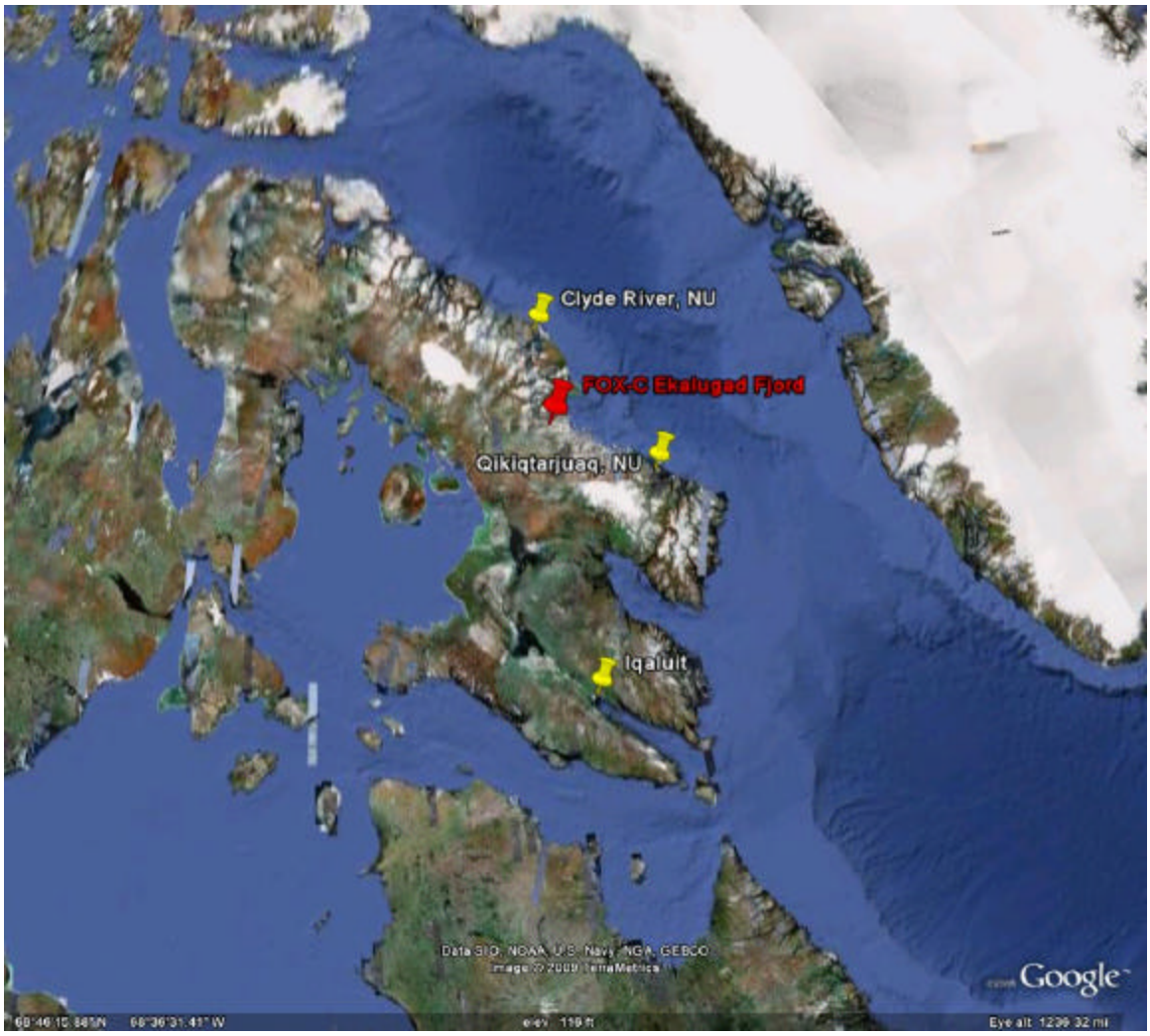


Figure 1: FOX-C Ekalugad Fjord Location

1.2 Site Characteristics

The FOX-C Intermediate Distant Early Warning (DEW) Line Site was constructed in 1957 and subsequently abandoned in 1963. The site can be broken down into three main areas: Upper Station, Mid Station, and Lower Station (including the Lake and Beach Areas).

The Upper Station is located on a summit at an elevation of 770 metres above mean sea level. The main site facilities were located here and included a module train, warehouse, garage, a former Quonset building, Inuit house, bulk fuel storage tanks, a radar tower and other site debris. An access road leads east through the Mid Station down to a junction near the Lake Area and is approximately 5.9 kilometres long.

The Mid Station is located at the base of the summit approximately 500 metres east of the Upper Station. A glacier located across from the Mid Station feeds a river that flows alongside the access road to the Lake. Located at the Mid Station was a dump area, barrel storage pad, four former Quonset buildings and numerous barrel and debris areas.

At the Lower Station near the Lake Area the access road from the Upper Station splits into two parts. One section heads southwest to the Lake Area and is approximately 1.1 kilometres long. A river flows out of the lake and empties into the ocean at the beach.

The other section of the road heads north to the Beach Area and is approximately 2.2 kilometres long. At the Beach Area there were two POL storage tanks, barrel caches and abandoned construction equipment. The landing area at the beach was used to allow ships to transfer fuel to the POL storage tanks.

2.0 Monitoring Areas

The monitoring program for the FOX-C Ekalugad Fjord site includes the natural environment as well as the Non-Hazardous Waste Landfill (NHWL); the only structure remaining on-site after the completion of remediation.

2.1 Natural Environment Monitoring

Natural environment data has been collected during the environmental assessment and remediation of the site as well as during community meetings. This data includes local and traditional knowledge of the site and will serve as a reference for post construction monitoring.

2.1.1 Monitoring Requirements

Natural environment data will be collected during site visits as well as during community meetings with people who use or visit the site/area frequently. The purpose of collecting this new data is not to find correlations with the landfill monitoring data but rather to provide anecdotal data related to the presence of wildlife and changes over time.

The site specific data to be collected during the site visit will include:

- Wildlife sightings (species, number, gender, juveniles)
- Other evidence of recent presence of wildlife (droppings, tracks, feathers/fur, carcass remains, etc.)
- Wildlife activity (summering/nesting/denning, migratory/passing through)
- Qualitative assessment of relative numbers versus previous years (more, same, less)
- Revegetation of disturbed areas versus previous years (more, same, less)

Information regarding visits made to the site by local people may also be collected through consultations with local community members and/or local Hunter and Trapper Associations (HTOs) and/or the Qikiqtani Inuit Association (QIA). The type of information that may be collected includes:

- Wildlife sightings
- Use by people for traditional activities
- Season(s)
- Activities (hunting, fishing, trapping, camping, other harvesting)
- Relative frequency versus previous years (more, same, less)
- Wildlife species present (sightings or evidence)
- Wildlife presence versus previous years (more, same, less)
- Health of wildlife observed or harvested (good, average, poor)
- Relative health of wildlife versus previous years (better, same, worse)

2.2 Non-Hazardous Waste Landfill (NHWL)

Construction of the NHWL at FOX-C started in 2006, continued in 2007, and was completed in September 2008. A site map detailing the location of the NHWL can be found in Appendix B.

2.2.1 Design

The NHWL was designed to contain non-hazardous materials only. It was constructed on native ground with the organic matter stripped and consists of four perimeter berms constructed of granular material. The non-hazardous waste was placed in the landfill in layers consisting of 0.5 metre lifts of waste covered by 0.15 metres of granular fill. Once all the layers were completed a final cover consisting of a minimum of 1.0 metres of granular fill was used to cap the landfill. See Appendix B for a detailed schematic of the design.

2.2.2 Contents

The NHWL at FOX-C contains the following:

- Tier I contaminated soil (see Table 1)
- F3 and F4 fraction hydrocarbon contaminated soil
- Non-hazardous demolition debris, such as timbers, plywood, and sheet metal
- Non-hazardous site debris, such as scrap metal and wood
- Non-hazardous debris/soil excavated from landfills
- Creosote timbers
- Double-bagged asbestos

Table #1: DEW Line Cleanup Criteria Tier I Contaminant Criteria

Parameter	Criteria
Lead	200 to 500 ppm
PCBs	1 to <5 ppm

2.2.3 Monitoring Requirements

The NHWL will be monitored by:

- Visual Monitoring
  - This will check the physical integrity of the NHWL and look for evidence of settlement, erosion, frost action, animal burrows, vegetation, staining, vegetation stress, seepage points, exposed debris, and condition of monitoring instruments (Appendix D contains a Visual Monitoring Checklist).
  - Photographs will be taken to document the condition of the NHWL and substantiate the recorded observations.

- Active Layer Water Monitoring
  - Samples will be taken from the 5 monitoring wells installed around the NHWL. These samples will be analysed and the results will be compared to those from background samples. The parameters that will be analysed include:
    - Petroleum Hydrocarbon Fractions, F1 and F2
    - Total and Dissolved Metals
    - Major Ions
    - Hardness
    - Total Dissolved Solids
    - Total Suspended Solids
    - pH
    - Conductivity
    - Polychlorinated biphenyls (PCBs)
- Soil Monitoring (as required)
  - Soil sampling will be limited to locations where seepage or staining has been identified as part of the visual inspection. When required soil samples will be collected over the interval of 0 to 0.15 metres and 0.35 to 0.50 metres depth. The parameters that will be analysed include:
    - Petroleum Hydrocarbon Fractions, F1 to F4
    - Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, and Zinc
    - Polychlorinated biphenyls (PCBs)

2.3 Monitoring Schedule

The 25 years of monitoring at the FOX-C Ekalugad Fjord site will begin in 2009 and continue until 2033. Monitoring will occur on years 1, 3, 5, 7, 10, 15, 20 and 25. At the completion of the 25 year monitoring program a review will take place and the need for continued monitoring will be assessed. The table below outlines the schedule:

Table #2: Monitoring Schedule

Year	Site Monitoring Scheduled (X)
2009	X
2010	
2011	X
2012	
2013	X
2014	
2015	X
2016	
2017	
2018	X
2019	
2020	
2021	
2022	
2023	X
2024	
2025	
2026	
2027	
2028	X
2029	
2030	
2031	
2032	
2033	X

2.4 Monitoring Plan Summary

The monitoring plan at FOX-C Ekalugad Fjord will begin in 2009 and continue for 25 years. The monitoring will include the natural environment and the NHWL; the parameters that will be monitored include site specific data and regional information, visual characteristics, water, and soil (if required). The monitoring requirements for the natural environment and the NHWL are summarized in the tables below:

Table #3: Natural Environment Monitoring Requirements

Area	Monitoring Parameter
Natural Environment	• Wildlife sightings (species, number, gender, juveniles) • Other evidence of recent presence of wildlife (droppings, tracks, feathers/fur, carcass remains, etc.) • Wildlife activity (summering/nesting/denning, migratory/passing through) • Qualitative assessment of relative numbers versus previous years (more, same, less) • Revegetation of disturbed areas versus previous years (more, same, less)

Table #4: NHWL General Monitoring Requirements

Area	Monitoring Parameter		
	Visual	Water	Soil
NHWL	X	X	as required

Table #5: NHWL Specific Monitoring Requirements

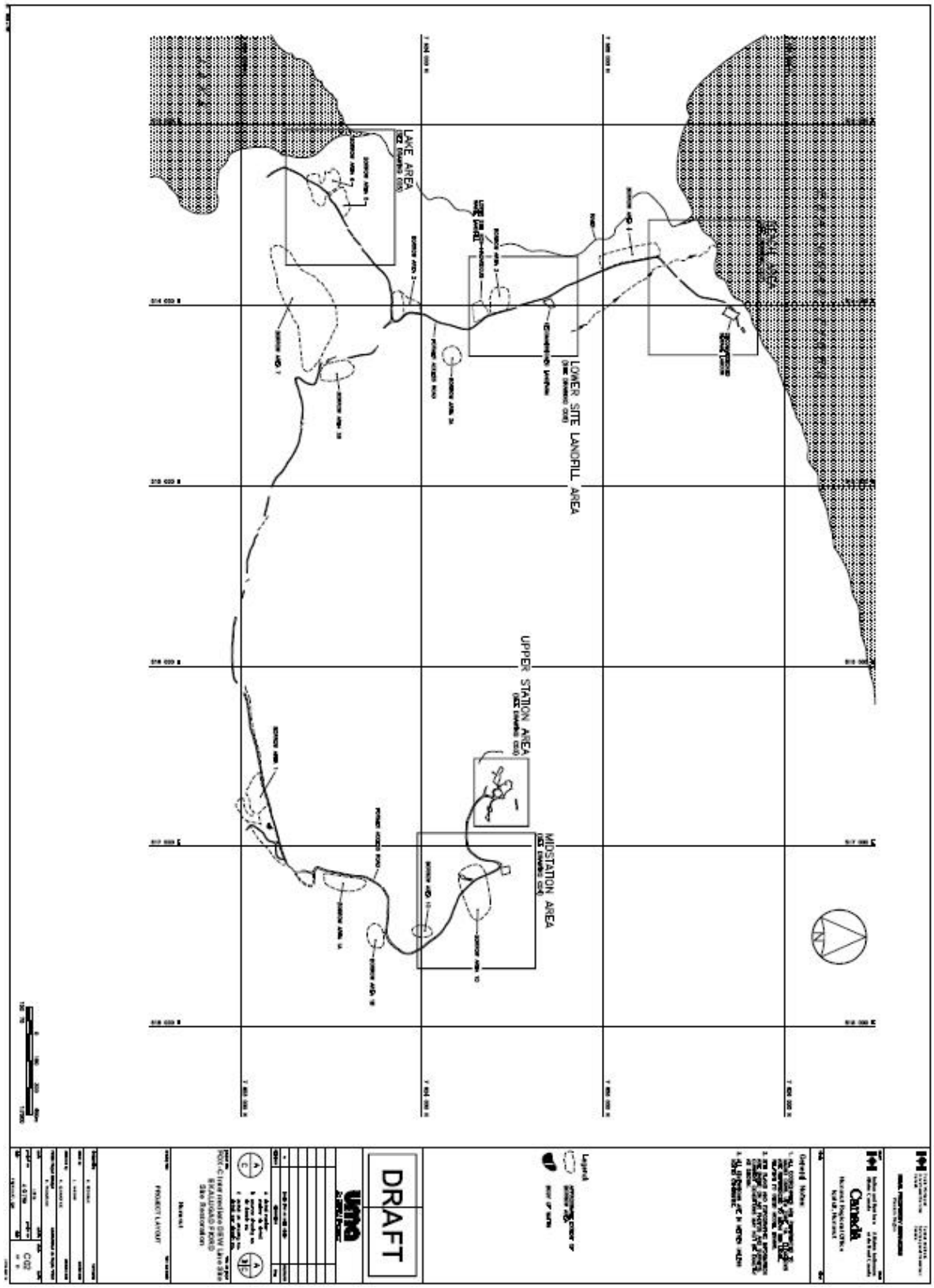
Area	Water		
	ID	Notes	Elevation
NHWL	MW-North		74.8 m
	MW-East	Background	69.8 m
	MW-South		72.4 m
	MW-Southwest		71.5 m
	MW-Northwest		72.0 m

3.0 Quality Assurance/Quality Control

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

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

Appendix A: FOX-C Ekalugad Fjord Site Map


LAKE AREA
LOWER SITE LANDFILL AREA
UPPER STATION AREA
MIDSTATION AREA
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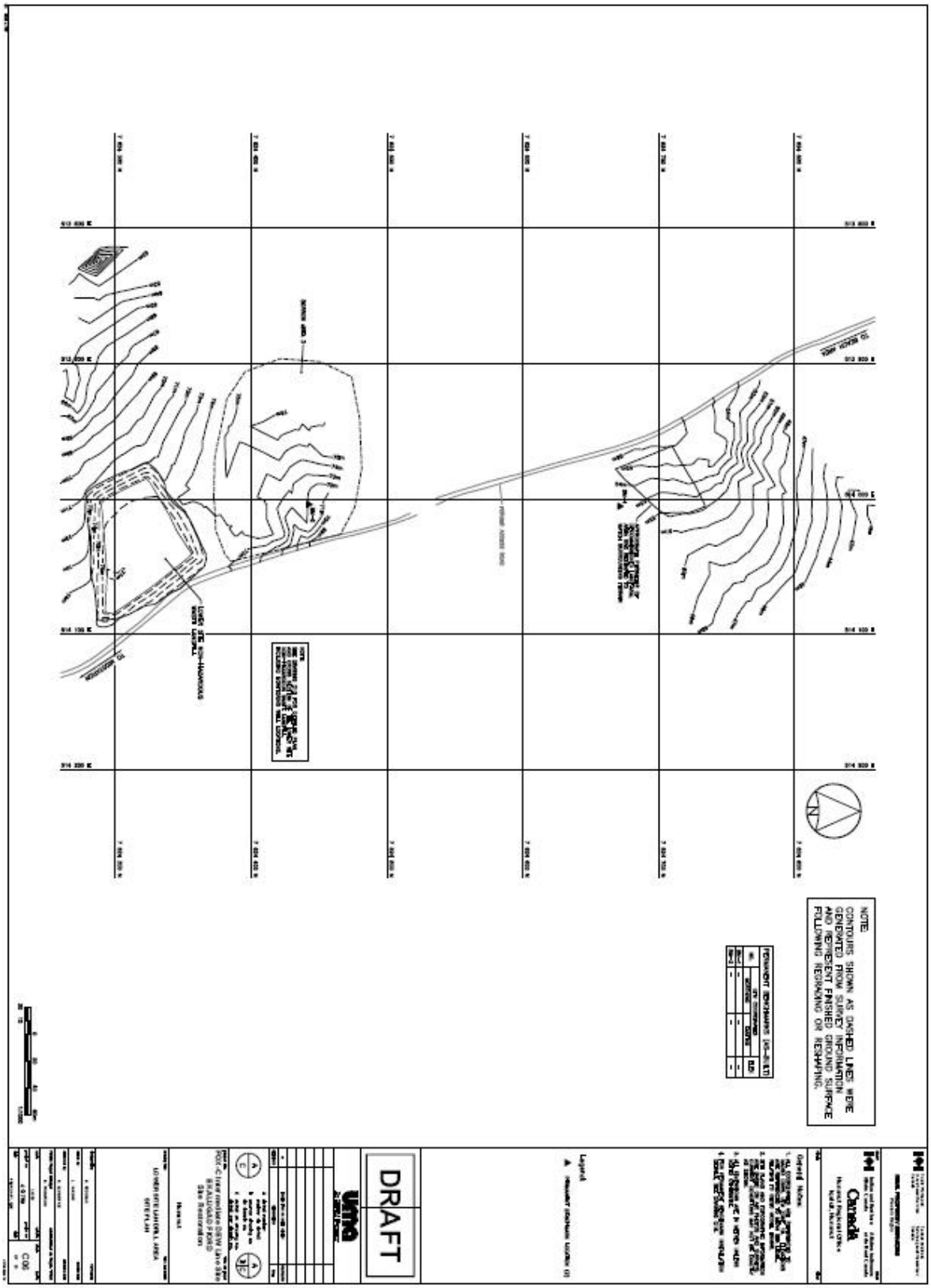
Appendix B: Non-Hazardous Waste Landfill Location Map


NOTE:
CONTOURS SHOWN AS DASHED LINES WERE GENERATED FROM SURVEY INFORMATION AND REPRESENT FINISHED GROUND SURFACE FOLLOWING REGRADING OR RESHAPING.
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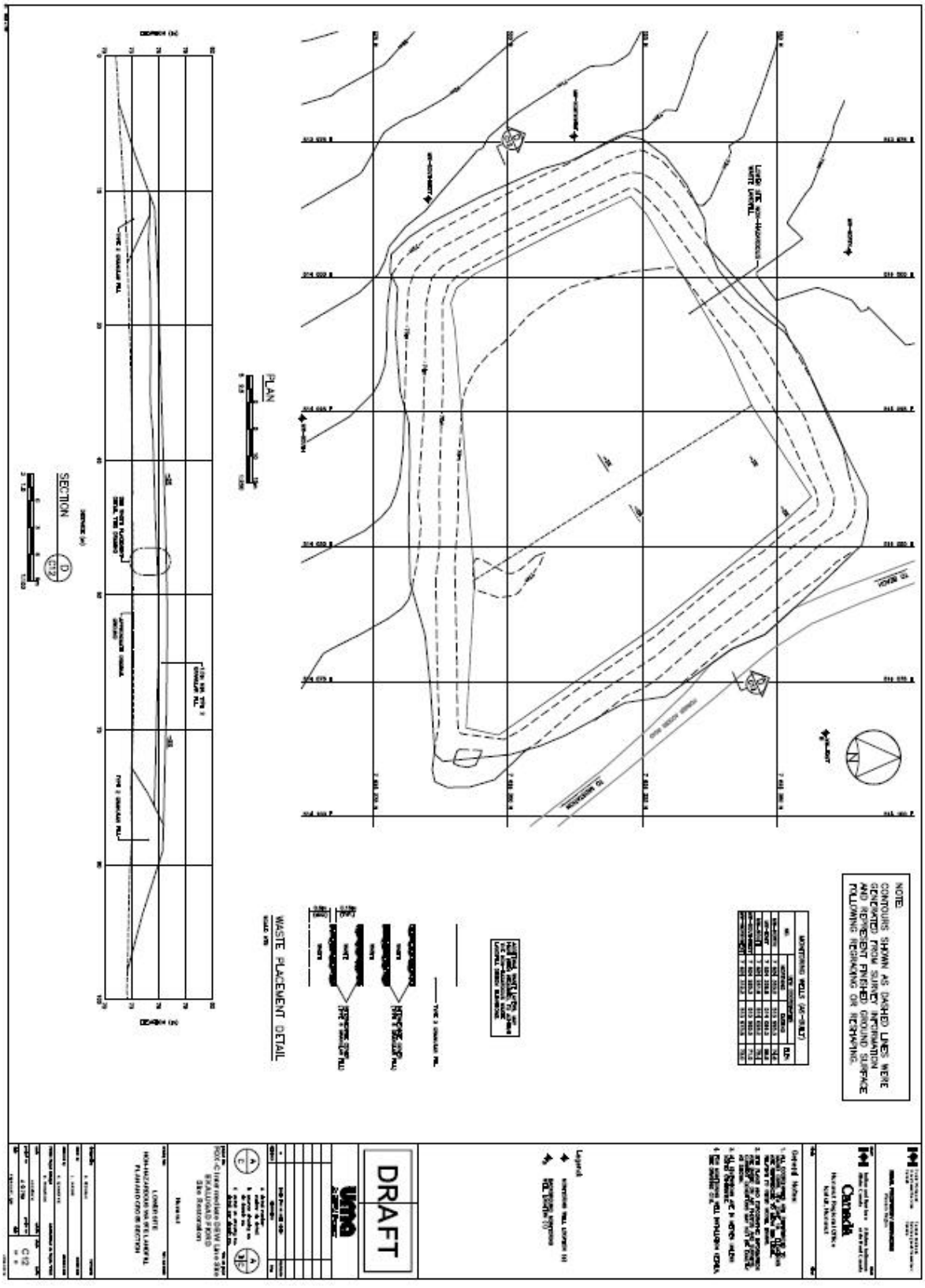
Appendix C: Non-Hazardous Waste Landfill As-Built Drawing


NOTE:
CONTOURS SHOWN AS DASHED LINES WERE GENERATED FROM SURVEY INFORMATION AND REPRESENT FINISHED GROUND SURFACE FOLLOWING REGRADING OR RECAPPING.
MONITORING WELLS (AS-BUILT)
WASTE PLACEMENT DETAIL
PLAN
SECTION
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Appendix D: Visual Monitoring Checklist

FOX-C EKALUGAD FJORD
VISUAL MONITORING CHECKLIST

ITEM	PRESENCE/ ABSENCE	EXTENT	DESCRIPTION/ PHOTOGRAPHIC REFERENCE
Instructions	*Yes or No*	*Provide dimensions as applicable: Length, Width, Depth*	*Features of note, photographic reference with scale, point of view & direction*
Settlement			
Erosion			
Frost Action			
Animal Burrows			
Vegetation			
Staining			
Vegetation Stress			
Seepage Points			
Exposed Debris			
Condition of Monitoring Instruments			
Other Features of Note			