Aboriginal Affairs and Northern Development Canada | Affaires autochtones et Développement du Nord Canada

PIN-D ROSS POINT
LONG-TERM MONITORING PLAN

March 28, 2013

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1.0 Introduction

PIN-D Ross Point Fjord was an Intermediate Distant Early Warning (DEW) Line site; a remediation project was conducted at the site between 2011 and 2012. 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

PIN-D Ross Point is located on the north shore of Johansen Bay, overlooking Coronation Gulf, approximately 500 metres from the coast. The nearest communities are Kugluktuk, located approximately 185 kilometres to the Southwest, and Cambridge Bay, located approximately 250 kilometres to the East. The GPS Coordinates of the site are 68°35'48.74"N - 111°07'3.47"W (see Figure 1).

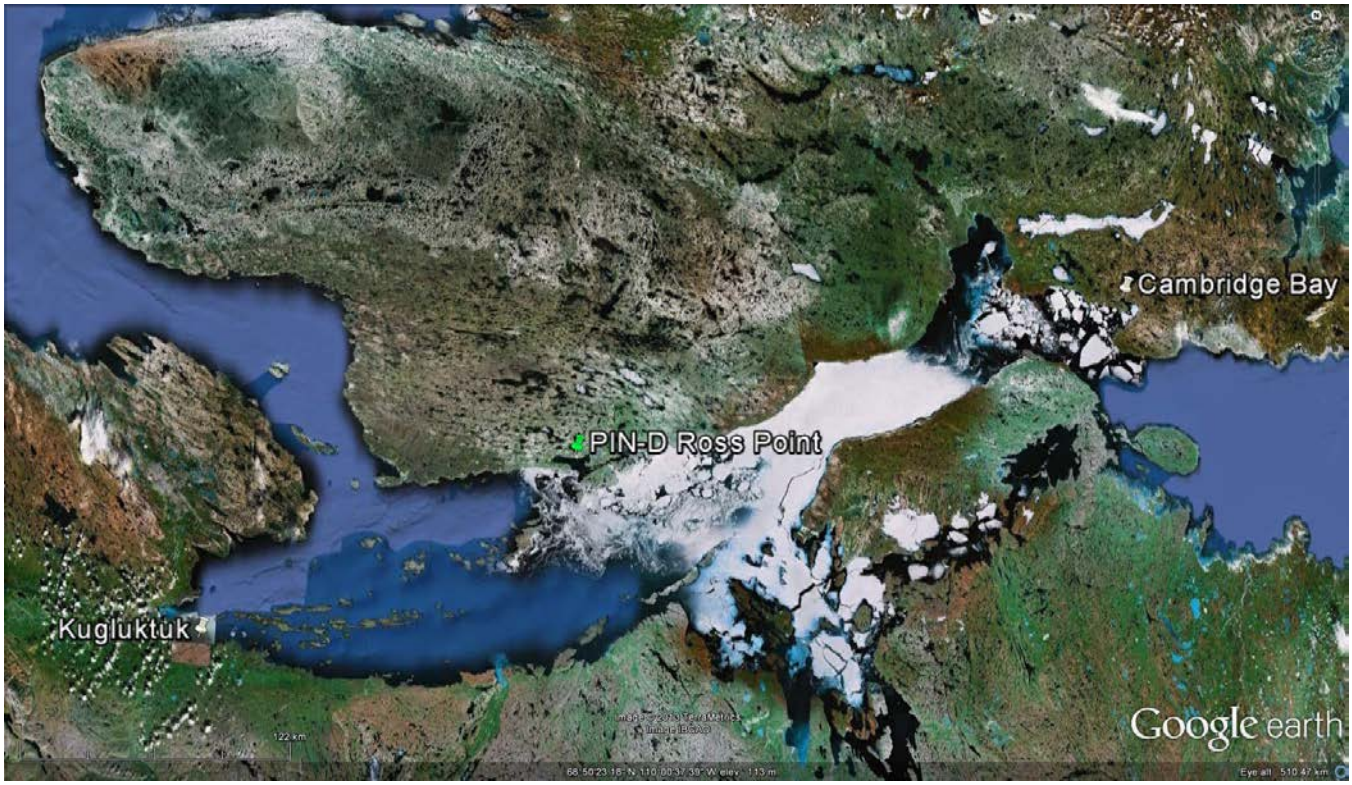


Figure 1: PIN-D Ross Point Location

1.2 Site Characteristics

The Ross Point site was reserved by the Department of National Defence in 1956 and the PIN-D Intermediate Distant Early Warning (DEW) Line Site was constructed in 1959, and subsequently deactivated in 1963.

The site is situated on a mesa 150 metres above sea-level and was typical of all Intermediate sites and consisted of a module train, warehouse, garage, Inuit house, Petroleum/Oil/Lubricant (POL) tanks, and a Doppler antenna. In addition to the main site a beach landing area was constructed along with gravel roads linking the various facilities. Two airstrips were constructed at the site. The minor airstrip (~300 metres long) is closest to the station area and oriented northeast-southwest. The main airstrip (~500 metres long) has an approximate east-west orientation and closely approaches the minor airstrip at its eastern end.

In 1985 some of the surface contaminants at PIN-D were cleaned up under a program conducted by DND, EC, and AANDC. During the 1994 investigation the module train and garage were still intact, however they had suffered damage from prolonged weathering. The Warehouse had been dismantled down to the concrete base. The four POL tanks (two at the beach and two at the main station) had been removed but the station pumphouse was intact, although the pump had been removed. The pipeline connecting the beach and station tanks was mostly intact and marked with barrels. The refuelling pipeline at the beach was mostly removed but pieces remain.

The area is characterized by low mesas and hills composed of dolomite and glacial till. The station facilities were constructed on one of the mesas. A steep cliff extends along the southern edge of the station with gentler slopes leading out east and west. A gentle slope to the north leads towards the major airstrip and freshwater lake; access to these areas is provided by a road. The main landfill is located at the west end of the minor airstrip. A second small landfill is located at the top edge of a slope above a small lake at the northeast base of the mesa. There is very little soil at the upper site as such little vegetation. During the investigation it was noted that the lower slopes and depressions contained a fair amount of vegetation; mainly grasses, sedges, and willows. The wildlife typically found in this region includes polar bears, caribou, muskoxen, wolf, arctic fox, snowshoe hare, raven, osprey, shorebirds, seabirds, and waterfowl.

2.0 Monitoring Areas

The monitoring program for the PIN-D Ross Point 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 PIN-D started in 2011 and was completed in August 2012. A site map detailing the location of the NHWL can be found in Appendix A.

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 the As-Built Drawing.

2.2.2 Contents

The NHWL at PIN-D contains the following materials:

- Non-hazardous site debris, such as scrap metal and wood
- Type A Petroleum Hydrocarbon (PHC) contaminated soil
- Tier I contaminated soil (see Table 1)
- Asbestos Containing Material (ACM)
- Items as detailed above from PIN-E Cape Peel were also disposed of in the PIN-D NHWL. These items were transported from PIN-E to PIN-D for disposal in mid-August 2012.

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 C 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 4 monitoring wells installed around the NHWL. These samples will be analysed and the results will be compared to those from background samples. Details on the

moniroting wells can be found in Appendix D. 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 PIN-D Ross Point site will begin in 2013 and continue until 2037. 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)	Year	Site Monitoring Scheduled (X)
2013	X	**2026**	
2014		**2027**	X
2015	X	**2028**	
2016		**2029**	
2017	X	**2030**	
2018		**2031**	
2019	X	**2032**	X
2020		**2033**	
2021		**2034**	
2022	X	**2035**	
2023		**2036**	
2024		**2037**	X
2025			

2.4 Monitoring Plan Summary

The monitoring plan at PIN-D Ross Point begin in 2013 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

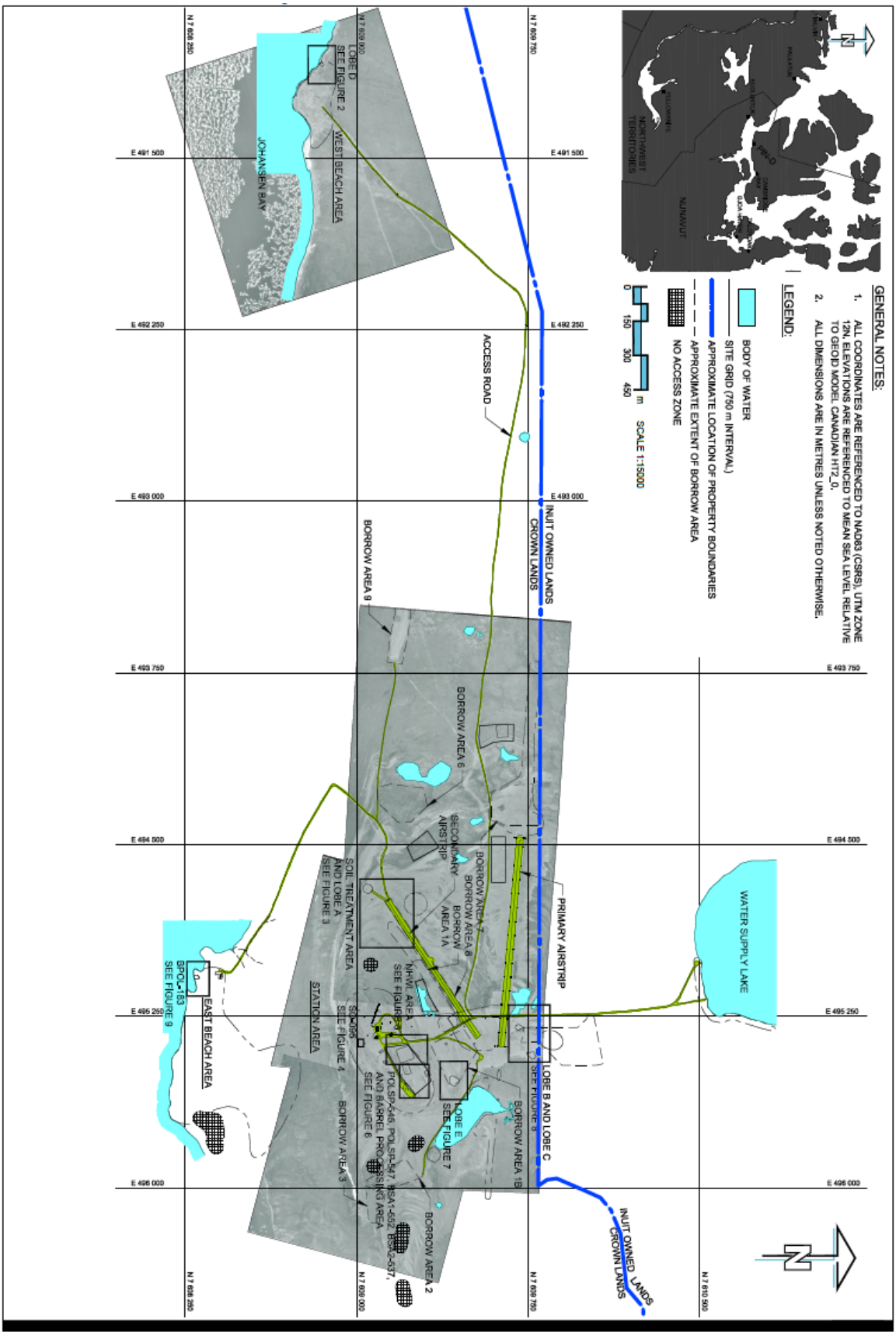
Area	Water
NHWL	**Monitoring Well ID #**
	MW-1
	MW-2
	MW-3
	MW-4

3.0 Quality Assurance/Quality Control

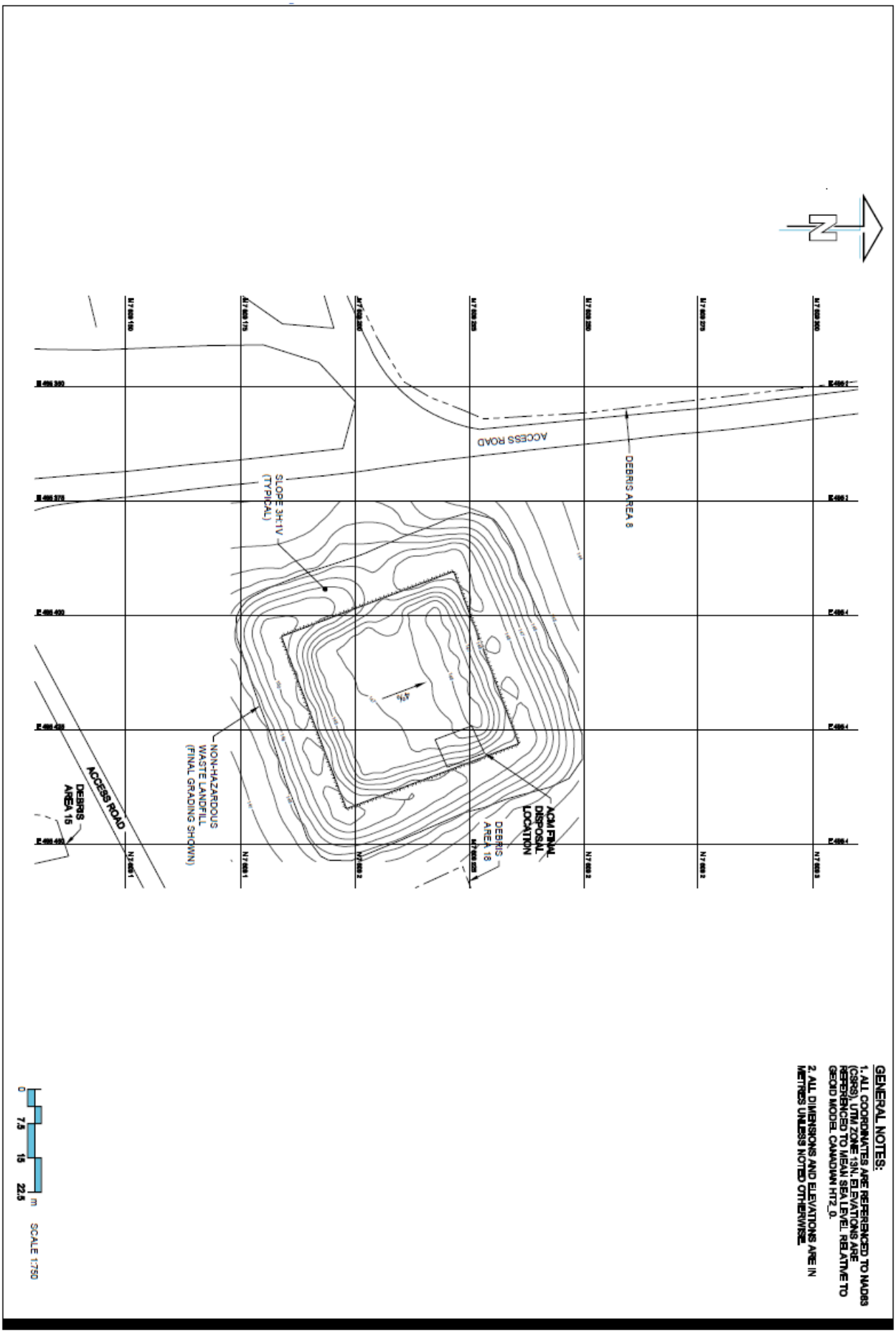
All sampling, sample preservation and analyses will be conducted in accordance with methods prescribed in the current edition of “Standard Methods for the Examination of Water and Wastewater”. All analysis will be performed in a Canadian Association of Environmental Analytical Laboratories (CAEAL) Accredited 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: PIN-D Ross Point Site Map


GENERAL NOTES:
1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 12N. ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL RELATIVE TO GEOID MODEL CANADIAN H12_0.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
LEGEND:
BODY OF WATER
SITE GRID (750 m INTERVAL)
APPROXIMATE LOCATION OF PROPERTY BOUNDARIES
APPROXIMATE EXTENT OF BORROW AREA
NO ACCESS ZONE
0 150 300 450 m
SCALE 1:15000
NUNAVUT
NORTHWEST TERRITORIES
LOBE D
SEE FIGURE 2
WEST BEACH AREA
JOHANSEN BAY
ACCESS ROAD
INUIT OWNED LANDS
CROWN LANDS
BORROW AREA 9
BORROW AREA 6
SECONDARY AIRSTRIP
BORROW AREA 7
BORROW AREA 8
BORROW AREA 1A
PRIMARY AIRSTRIP
WATER SUPPLY LAKE
SOIL TREATMENT AREA AND LOBE A
SEE FIGURE 3
BPC-183
SEE FIGURE 9
EAST BEACH AREA
STATION AREA
SDC05
SEE FIGURE 4
NHM AREA
SEE FIGURE 5
LOBE E
SEE FIGURE 7
LOBE B AND LOBE C
SEE FIGURE 8
BORROW AREA 1B
BORROW AREA 3
BORROW AREA 2
POL SP-546, POL SP-547, BSA1-552, BSA1-537, AND BARREL PROCESSING AREA
SEE FIGURE 6
E 491 500
E 492 250
E 493 000
E 493 750
E 494 500
E 495 250
E 496 000
N 7 608 250
N 7 609 000
N 7 609 750
N 7 610 500

Appendix B: Non-Hazardous Waste Landfill As-Built Drawing



GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 19N. ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL RELATIVE TO GEOID MODEL CANQUAM HT2_0.

2. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.

Appendix C: Visual Monitoring Checklist

PIN-D ROSS POINT
VISUAL MONITORING CHECKLIST

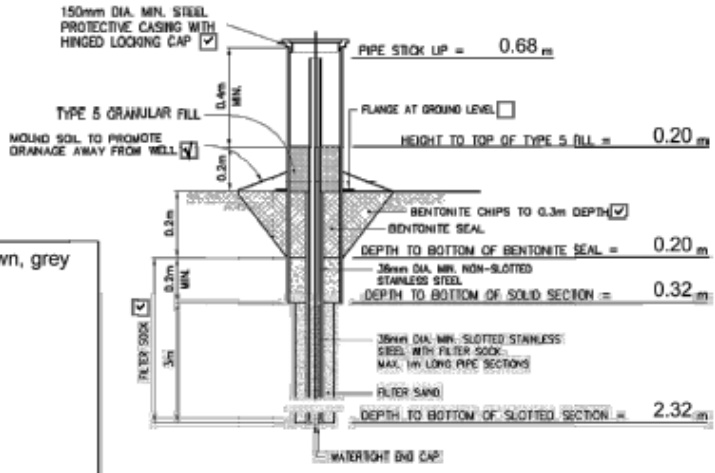
ITEM	PRESENCE/ ABSENCE	EXTENT	DESCRIPTION/ PHOTOGRAPHIC REFERENCE
Instructions	*Yes or No*	*Provide dimensions as applicable: Length, Width, Depth*	*Features of note, photographic reference with scale, point of view & direction*
Settlement			
Erosion			
Frost Action			
Animal Burrows			
Vegetation		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

Appendix D: Monitoring Well Installation Logs

MONITORING WELL INSTALLATION REPORT

(BEDROCK DEPTH < 0.7 m)

SITE:	PIN-D, Ross Point, Nunavut	WELL NO.:	MW-1
DRILLING METHOD:	Air Rotary	DRILLING RIG:	Mobile Augers
LOCATION: NORTHING	7609254.26	EASTING	495370.94
GROUND ELEVATION:	143.31	DATE:	September 25, 2011
DEPTH OF HOLE:	2.32 m	HOLE DIAMETER:	0.13 m



DEPTH (m)	DRILL COMMENTS
0 to 2.32	BEDROCK - dry, light brown, grey

GROUT NOT REQUIRED FOR THIS TYPE OF INSTALLATION AS NO FROST HEAVE ANTICIPATED.

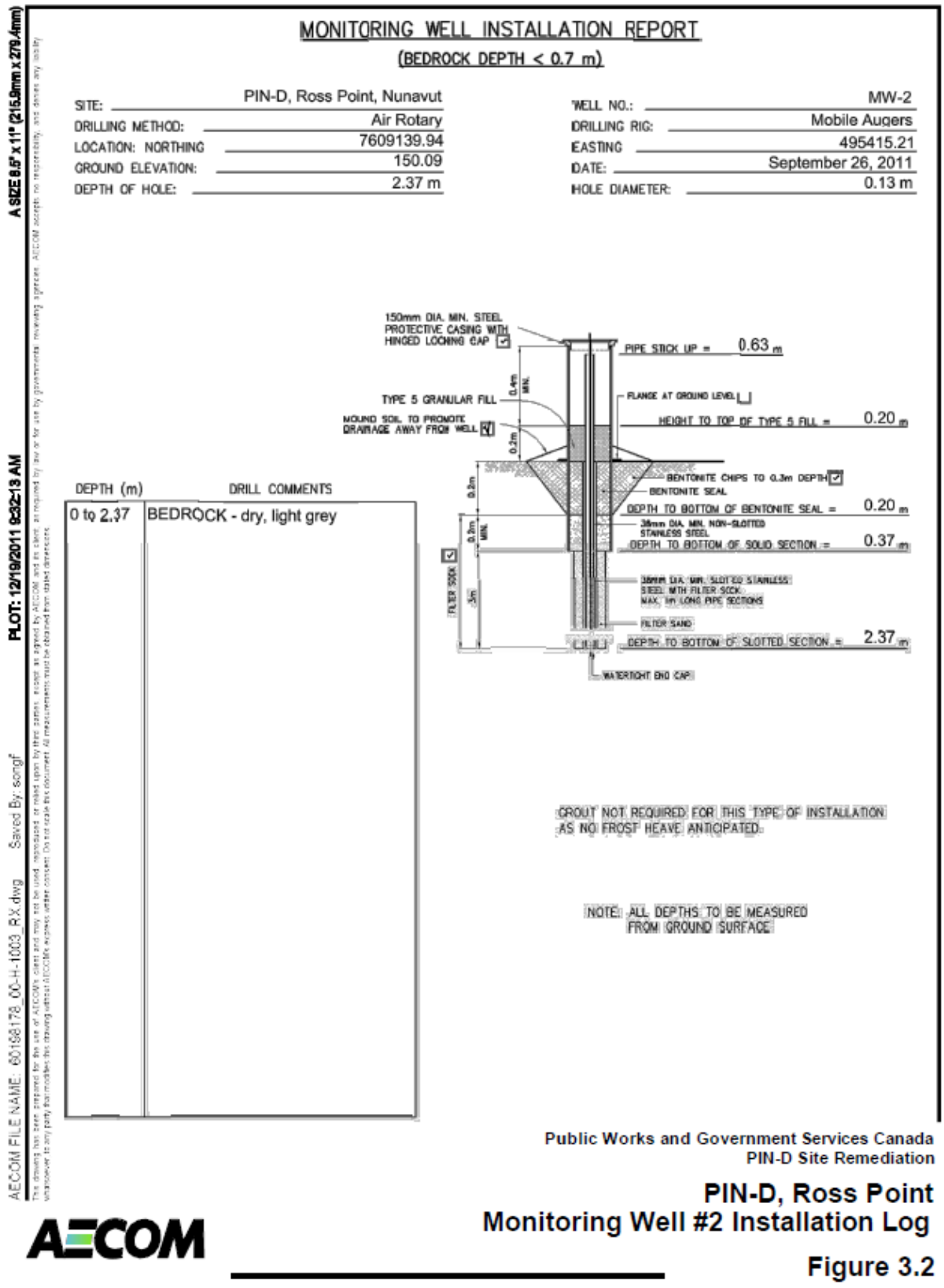
NOTE: ALL DEPTHS TO BE MEASURED FROM GROUND SURFACE.

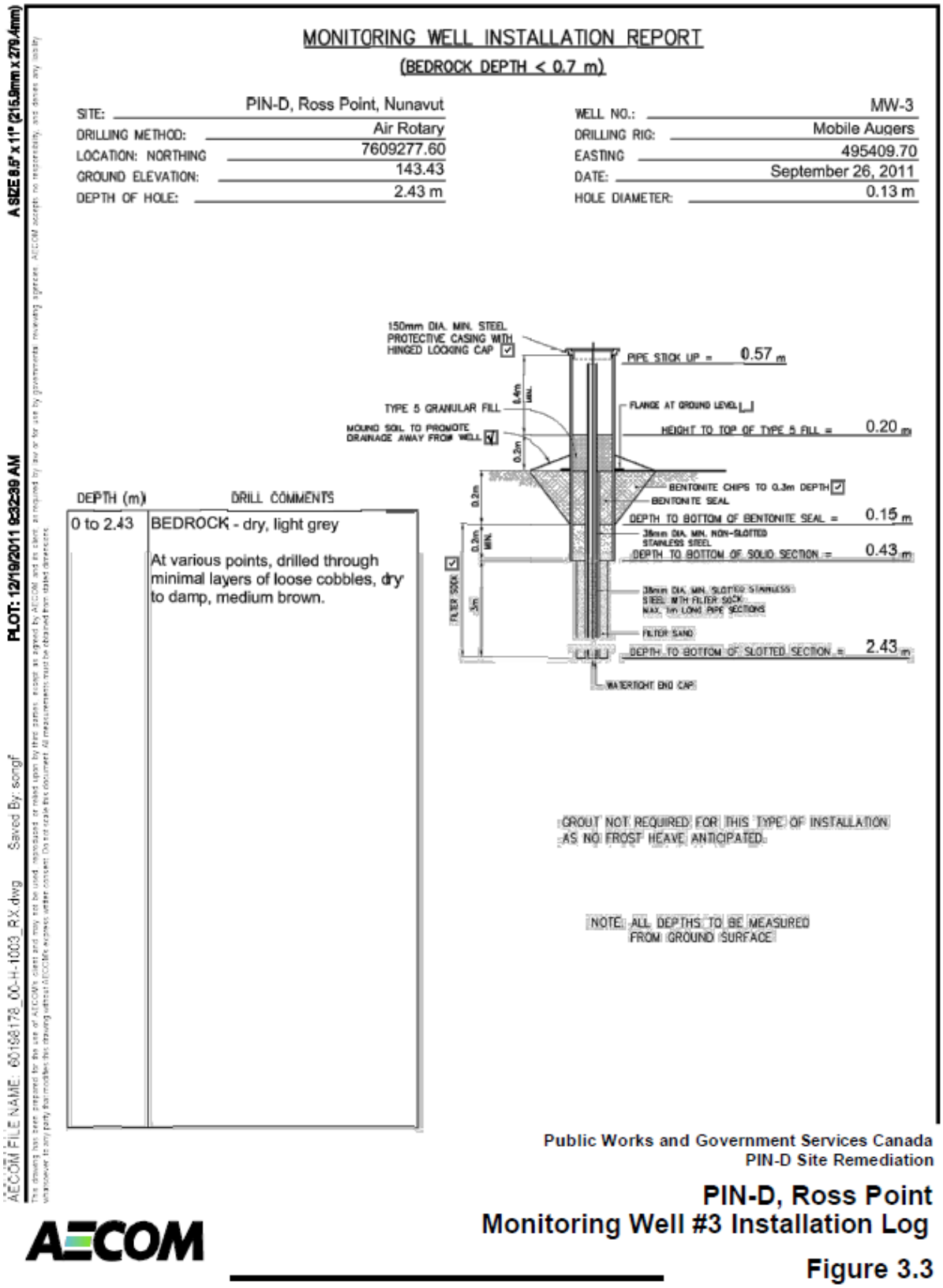
A SIZE 8.5" x 11" (215.9mm x 279.4mm)
PLOT: 12/19/2011 9:31:44 AM
AECOM FILE NAME: 60168178_00-H-1003_R.X.dwg Saved By: songf

Public Works and Government Services Canada
PIN-D Site Remediation

PIN-D, Ross Point
Monitoring Well #1 Installation Log

Figure 3.1

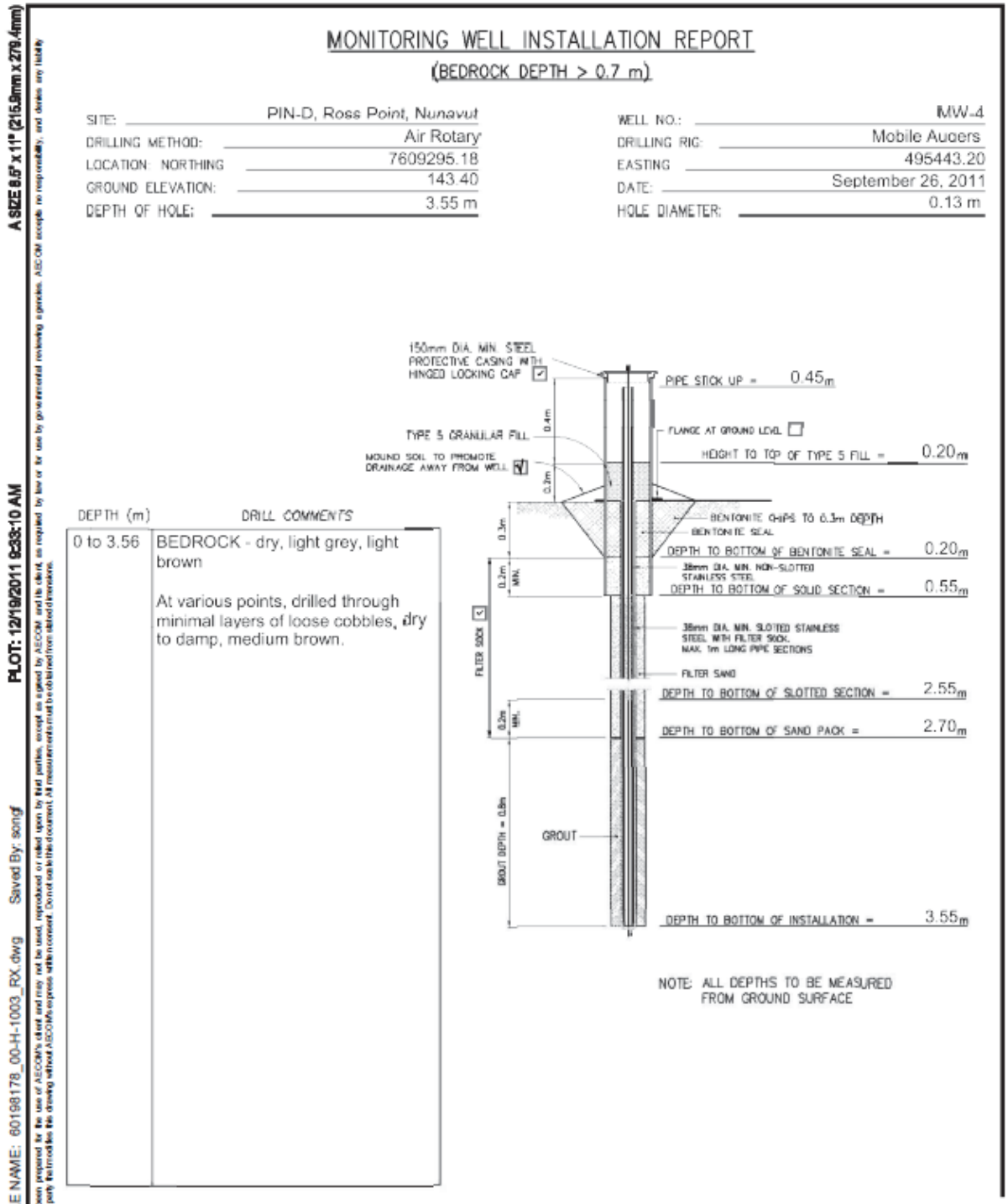

MONITORING WELL INSTALLATION REPORT
(BEDROCK DEPTH < 0.7 m)
SITE: PIN-D, Ross Point, Nunavut
DRILLING METHOD: Air Rotary
LOCATION: NORTHING 7609139.94
GROUND ELEVATION: 150.09
DEPTH OF HOLE: 2.37 m
WELL NO.: MW-2
DRILLING RIG: Mobile Augers
EASTING 495415.21
DATE: September 26, 2011
HOLE DIAMETER: 0.13 m
150mm DIA. MIN. STEEL PROTECTIVE CASING WITH HINGED LOCKING CAP
PIPE STICK UP = 0.63 m
TYPE 5 GRANULAR FILL
MOUND SOIL TO PROMOTE DRAINAGE AWAY FROM WELL
FLANGE AT GROUND LEVEL
HEIGHT TO TOP OF TYPE 5 FILL = 0.20 m
BENTONITE CHIPS TO 0.3m DEPTH
BENTONITE SEAL
DEPTH TO BOTTOM OF BENTONITE SEAL = 0.20 m
38mm DIA. MIN. NON-SLOTTED STAINLESS STEEL
DEPTH TO BOTTOM OF SOLID SECTION = 0.37 m
FILTER SOCK
FILTER SAND
DEPTH TO BOTTOM OF SLOTTED SECTION = 2.37 m
WATERTIGHT END CAP
DEPTH (m)
DRILL COMMENTS
0 to 2.37
BEDROCK - dry, light grey
GROUT NOT REQUIRED FOR THIS TYPE OF INSTALLATION AS NO FROST HEAVE ANTICIPATED.
NOTE: ALL DEPTHS TO BE MEASURED FROM GROUND SURFACE
Public Works and Government Services Canada
PIN-D Site Remediation
PIN-D, Ross Point
Monitoring Well #2 Installation Log
Figure 3.2
AECOM
A SIZE 8.5" x 11" (215.9mm x 279.4mm)
PLOT: 12/19/2011 9:32:13 AM
Saved By: songf
AECOM FILE NAME: 60168178_00-H-1003_RX.dwg



Public Works and Government Services Canada
PIN-D Site Remediation

PIN-D, Ross Point
Monitoring Well #3 Installation Log

Figure 3.3


MONITORING WELL INSTALLATION REPORT
(BEDROCK DEPTH > 0.7 m)
SITE: PIN-D, Ross Point, Nunavut
DRILLING METHOD: Air Rotary
LOCATION: NORTHING 7609295.18
GROUND ELEVATION: 143.40
DEPTH OF HOLE: 3.55 m
WELL NO.: MW-4
DRILLING RIG: Mobile Augers
EASTING 495443.20
DATE: September 26, 2011
HOLE DIAMETER: 0.13 m
DEPTH (m)
DRILL COMMENTS
0 to 3.56
BEDROCK - dry, light grey, light brown
At various points, drilled through minimal layers of loose cobbles, dry to damp, medium brown.
150mm DIA. MIN. STEEL PROTECTIVE CASING WITH HINGED LOCKING CAP
TYPE 5 GRANULAR FILL
MOUND SOIL TO PROMOTE DRAINAGE AWAY FROM WELL
PIPE STICK UP = 0.45m
FLANGE AT GROUND LEVEL
HEIGHT TO TOP OF TYPE 5 FILL = 0.20m
BENTONITE CHIPS TO 0.3m DEPTH
BENTONITE SEAL
DEPTH TO BOTTOM OF BENTONITE SEAL = 0.20m
38mm DIA. MIN. NON-SLOTTED STAINLESS STEEL
DEPTH TO BOTTOM OF SOLID SECTION = 0.55m
38mm DIA. MIN. SLOTTED STAINLESS STEEL WITH FILTER SOCK, MAX. 1m LONG PIPE SECTIONS
FILTER SOCK
FILTER SAND
DEPTH TO BOTTOM OF SLOTTED SECTION = 2.55m
DEPTH TO BOTTOM OF SAND PACK = 2.70m
GROUT
GROUT DEPTH = 0.8m
DEPTH TO BOTTOM OF INSTALLATION = 3.55m
NOTE: ALL DEPTHS TO BE MEASURED FROM GROUND SURFACE
A SIZE 8.5" x 11" (215.9mm x 279.4mm)
PLOT: 12/19/2011 9:38:10 AM
Saved By: songf
AECOM FILE NAME: 60198178_00-H-1003_RX.dwg
Public Works and Government Services Canada
PIN-D Site Remediation
PIN-D, Ross Point
Monitoring Well #4 Installation Log
Figure 3.4