ARCADIS Design & Consultancy for natural and built assets

Indigenous and Northern Affairs Canada – Nunavut Regional Office

EVALUATION OF PHASE I LONG TERM MONITORING

PIN-B Clifton Point and Cape Christian

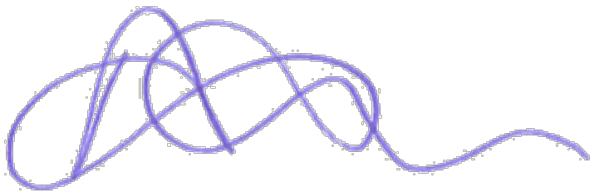
March 21, 2016

EVALUATION OF PHASE I LONG TERM MONITORING

PIN-B Clifton Point and Cape Christian

Stephanie Joyce, C.Chem.

Project Manager



Andrew Henderson, P. Eng.

Senior Review

Prepared for:

Lillianne Kydd

Contaminants Specialist

Indigenous and Northern Affairs Canada – Nunavut Regional Office

969 Qinugiuk Building, 2nd Floor

Iqaluit, NU X0A 0H0

Prepared by:

Arcadis Canada Inc.

329 Churchill Avenue North

Suite 200

Ottawa

Ontario K1Z 5B8

Tel 613 721 0555

Fax 613 721 0029

Our Ref.:

1697-1501/100347-000

Date:

March 21, 2016

CONTENTS

TABLES (within report)

TABLES (at end of report)

FIGURES

ACRONYMS AND ABBREVIATIONS

AMSRP	Abandoned Military Site Remediation Protocol
AST	Above-ground Storage Tank
CCME	Canadian Council of Ministers of the Environment
CEQG	Canadian Environmental Quality Guidelines
DEW	Distant Early Warning
FIGQG	Federal Interim Groundwater Quality Guidelines
INAC	Indigenous and Northern Affairs Canada
LORAN	Long Range Navigation
LTM	Long Term Monitoring
NHWL	Non-Hazardous Waste Landfill
PCBs	Polychlorinated Biphenyls
PHC	Petroleum Hydrocarbon
POL	Petroleum, Oil and Lubricants
RDL	Reportable Detection Limit
RPD	Relative Percent Difference

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Indigenous and Northern Affairs Canada – Nunavut Regional Office (INAC) to conduct long-term monitoring (LTM) activities at three former Distant Early Warning (DEW) Line sites: PIN-B, Clifton Point; PIN-D, Ross Point and FOX-C, Ekalugad Fiord; and one former Long Range Navigation (LORAN) site: Cape Christian, all in Nunavut. This project was completed under INAC Standing Offer Number 4600000861, Order number 4500335455.

As defined in the Abandoned Military Site Remediation Protocol (AMSRP), Phase I of the LTM occurs in Year 1, 3 and 5 following construction of a non-hazardous waste landfill (NHWL). Thermal equilibrium and physical stability of a NHWL should be achieved during Phase I, as indicated in the AMSRP. The 2015 monitoring events constituted Year 5 and the end of Phase I of the LTM activities for both the PIN-B and Cape Christian sites. As indicated in their respective LTM Plans, an evaluation of monitoring data is planned at the end of each Phase to determine if subsequent monitoring is required. This report contains the results of the evaluation at the end of Phase I for both sites.

PIN-B

The physical integrity of the NHWL and surrounding areas were assessed during each monitoring event using systematic visual observations and empirical measurements to record evidence of erosion, ponding, frost action, settlement and lateral movement of the landfills. A photographic record was completed to document the condition of the structures and substantiate the visual observations. Minor features noted at the NHWL included two small animal burrows (one first observed in 2011 and the second observed in 2015) on the slope of the north corner, two drainage pathways on the southwest and southeast sides (both first observed in 2011) and two areas of settlement on the southeast surface and northeast (slope) corners (both first observed in 2013). Fewer new features were noted in each progressive monitoring event, with only one new animal borrow noted in 2015. In addition, existing features did not deteriorate in subsequent years. These consistent observations demonstrate the stability of the NHWL.

Over the three LTM events, only three groundwater samples have been collected to date. Of these, two have been from MW3 and one was from MW1. Two monitoring wells, MW2 and MW4 have never been sampled.

The groundwater results from 2013 consisted of one groundwater sample collected from MW3. The sample exhibited concentrations of copper and zinc marginally above the Federal Interim Groundwater Quality Guidelines (FIGQGs). The groundwater results from 2015, consisting of groundwater samples collected from MW1 and MW3, exhibited concentrations of aluminum, copper, cadmium, iron and zinc above the FIGQGs. Petroleum hydrocarbon compounds (PHCs) and polychlorinated biphenyls (PCBs) have never been detected in any of the samples collected from the monitoring wells at PIN-B.

Background concentrations are not available at PIN-B for comparison purposes and only three groundwater samples have been collected to date. The FIGQGs applied in this situation provide very conservative guidelines because the lowest value of all exposure pathways is used. In addition, they

apply to groundwater samples collected by standard methods, which means field filtering and preserving samples. As per the Sampling Plan, groundwater samples were not field filtered nor preserved during collection. Because analysis of unfiltered total metals includes metal ions adsorbed to sediment particles, the technique used for the collection of samples in the programs tends to over represent concentrations in groundwater. These metal exceedances may be attributable to background conditions but given the sparse analytical data available, definitive conclusions are hard to make.

No soil monitoring has been conducted to date, as no indications of seepage or staining were noted during the visual inspections.

Based on the visual inspections, the NHWL appears to be stable and performing as designed. However, given the sparse analytical data available to date, Arcadis recommends that monitoring activities progress to Phase II of the LTM Plan. Additional data would provide more confidence that the higher metal concentrations are considered background, if that is the case, or reveal any trends, if metals are leaching from the NHWL. In addition, given the uncertainty of the future arctic environment due to potential climate changes, continued monitoring would be a prudent decision.

Given the low solubility of PCBs in water, analyses of PCBs could be discontinued as they were not detected in the first five years of monitoring, as per the AMSRP.

Cape Christian

The physical integrity of the NHWL and surrounding areas were assessed during each monitoring event using systematic visual observations and empirical measurements to record evidence of erosion, ponding, frost action, settlement and lateral movement of the landfills. A photographic record was completed to document the condition of the structures and substantiate the visual observations. The two significant seepage faces, as well as the saturated soil along the perimeter of the north, west, and southwest corners of the landfill observed in the first monitoring event (2011) were not observed in 2015. No new features indicating the deterioration of the performance of the landfill were identified during the Year 5 monitoring event and conditions remained stable when comparing results from the previous two monitoring events.

Over the three LTM events, seven groundwater samples have been collected to date: two samples from each of MW1, MW2 and MW4, and one sample from MW3.

Samples collected during 2011 showed exceedances of the FIGQGs for total and dissolved cadmium and total copper. In addition, the sample from MW2 contained total and dissolved cobalt concentrations in excess of the upper limit of acceptability (ULA; calculated to be 67 and 62 µg/L for total and dissolved cobalt, respectively, based on groundwater samples collected prior to and during remediation activities in 2009 and 2010).

The samples collected during 2013 contained concentrations of aluminium, cadmium, chromium, copper, iron, lead and zinc in excess of the FIGQGs. No exceedances of the ULAs were reported.

These reported metal exceedances could be representative of background conditions. Metal concentrations that exceeded the FIGQGs did not exceed the ULA, which is significant since the ULA is based on background concentrations. The one ULA exceedance for cobalt occurred in 2011. Concentrations decreased by more than half by 2013. Since the ULA is based on groundwater quality data collected over only two years, the high concentration of cobalt observed in 2011 could still be considered as representative of background conditions. Further data collection would provide additional corroboration that the observed cobalt concentrations are indeed part of the background water quality.

PHCs and PCBs have never been detected in any of the samples collected from the monitoring wells at Cape Christian.

Over the three LTM events, six soil samples have been collected from the north and west sides of the Cape Christian NHWL, as well as two background samples. PCBs have never been detected in any of the samples. PHC Fractions F2 and F3 were detected in four of the soil samples; however no exceedances of the Canadian Council of Ministers of the Environment (CCME) guidelines were noted. All samples collected contained detectable metal concentrations; however no metal concentrations exceeded the CCME guidelines.

Based on the visual inspections, the NHWL appears to be stable and performing as designed. However, given the sparse analytical data available to date, Arcadis recommends that monitoring activities progress to Phase II of the LTM Plan. Additional data would provide more confidence that the higher metal concentrations are considered background, if that is the case, or reveal any trends, if metals are leaching from the NHWL. In addition, given the uncertainty of the future arctic environment due to potential climate changes, continued monitoring would be a prudent decision.

Given the low solubility of PCBs in water, analyses of PCBs could be discontinued as they were not detected in the first five years of monitoring, as per the AMSRP.

1 INTRODUCTION

Arcadis Canada Inc. (Arcadis) was retained by Indigenous and Northern Affairs Canada – Nunavut Regional Office (INAC) to conduct long-term monitoring (LTM) activities at three former Distant Early Warning (DEW) Line sites: PIN-B, Clifton Point; PIN-D, Ross Point and FOX-C, Ekalugad Fiord; and one Long Range Navigation site: Cape Christian, all in Nunavut. This project was completed under INAC Standing Offer Number 4600000861, Order number 4500335455.

Results of the long term monitoring activities in 2015 are presented in the following Arcadis reports:

- Long Term Monitoring, 2015, PIN-B, Clifton Point, Nunavut, final report dated January 20, 2016;
- Long Term Monitoring, 2015, PIN-D, Ross Point, Nunavut, final report dated January 20, 2016; and
- Long Term Monitoring, 2015, Cape Christian, Clyde River, Nunavut, final report dated February 9, 2016.

No site visit was conducted at FOX-C due to adverse weather conditions and thus, no report was prepared.

LTM activities were conducted as per the LTM Plans, prepared for each site following remediation activities. Remediation was completed in 2010, 2012, 2010 and 2008 for PIN-B, PIN-D, Cape Christian and FOX-C, respectively. LTM Plans were prepared in accordance with the Abandoned Military Site Remediation Protocol (AMSRP, INAC, 2009). Schedules for monitoring activities provided in the LTM Plans had the following general format:

- Phase I: Years 1, 3 and 5;
- Phase II: Years 7, 10, 15 and 25 (if required); and
- Phase III: Beyond year 25 (if required).

The 2015 monitoring events constituted Year 5 and the end of Phase I of the LTM activities for both the PIN-B and Cape Christian sites. As indicated in their LTM Plans, an evaluation of the monitoring data is needed at the end of each Phase, to determine if subsequent monitoring is required. This report contains the results of the evaluation at the end of Phase I for both sites.

2 BACKGROUND

2.1 PIN-B Clifton Point

PIN-B Clifton Point is located on the coast of Amundsen Gulf (Beaufort Sea) in Nunavut. The nearest communities are Paulatuk, NWT, about 220 km to the northwest, and Kugluktuk, Nunavut about 220 km to the southeast. The site is situated about 1 km inland from the coast.

According to the PIN-B Long-Term Monitoring Plan (INAC, 2011), the PIN-B Intermediate DEW Line Site was constructed in 1957 and closed and abandoned in 1963. While active, the site consisted of a five-module building train, a warehouse, a garage, a small house for Inuit staff, a petroleum, oil and lubricants (POL) storage facility with associated distribution system, and a radar tower. A cargo handling area and POL storage facility were located in the beach area. Two airstrips and gravel roads were constructed at the site.

A non-hazardous waste landfill (NHWL) was constructed in 2009 and 2010, with final remediation completed in 2010. The NHWL was designed to contain non-hazardous materials only, including:

- Soil impacted with petroleum hydrocarbon (PHC) fractions F3 and F4;
- 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; and
- Tier 1 contaminated soil (Lead concentration between 200 and 500 ppm and polychlorinated biphenyl (PCB) concentrations between 1 and 5 ppm).

Three monitoring events have been conducted at PIN-B, constituting Phase I of the LTM Plan. Results of the LTM activities conducted to date are included in the following reports:

- Long Term Monitoring, 2015, PIN-B, Clifton Point, Nunavut, final report dated January 20, 2016 by Arcadis;
- *Long Term Monitoring, 2013, PIN-B, Clifton Point, Nunavut*, final report dated January 20, 2014 by Franz Environmental Inc. (currently Arcadis); and
- *Long Term Monitoring, 2011, PIN-B, Clifton Point, Nunavut*, final report dated January 17, 2012 by Franz Environmental Inc. (currently Arcadis).

2.2 Cape Christian

The Cape Christian site is located at Latitude 70° 31' N and Longitude 68° 17' W, near the mouth of the Clyde River, on the northeast coast of Baffin Island. It is situated approximately 16 km northeast of the Hamlet of Clyde River.

According to INAC's Cape Christian LTM plan, from 1954 to 1974, the United States Coast Guard operated a Long Range Navigation (LORAN) communications station at the Cape Christian site. The station was comprised of five buildings: the main station, garage, hazmat building, terminal building, and the survival hut. Six above-ground storage tanks (ASTs), each with a capacity of 102,600 L, and associated piping for fuel transfer and storage were also part of the station infrastructure. Barrels containing POL, and other chemicals were supplied to the station during its years of operation, and used barrels were fully or partially buried at the site. The site was abandoned in 1975 without decommissioning.

INAC led the remediation of the site between 2008 and 2011, with the NHWL constructed in 2009 and 2010. The NHWL contains the following:

- Tier I contaminated soil (i.e., soil with lead content up to 500 parts per million (ppm) and PCB content up to 5 ppm);
- PHC fractions F3 and F4 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; and
- Double-bagged asbestos.

Three monitoring events have been conducted at Cape Christian, constituting Phase I of the LTM Plan. Results of the LTM activities conducted to date are included in the following reports:

- *Long Term Monitoring, 2015, Cape Christian, Nunavut*, Final Report, dated February 9, 2016 by Arcadis Canada Inc.;
- *Long Term Monitoring, 2013, Cape Christian, Nunavut*, Final Report, dated January 20, 2014 by Franz Environmental Inc. (currently Arcadis); and
- *Long Term Monitoring, 2011, Cape Christian, Nunavut*, Final Report, dated January 17, 2012 by Franz Environmental Inc. (currently Arcadis).

3 GUIDELINES

3.1 Groundwater

There are no groundwater guidelines provided in the PIN-B or Cape Christian LTM Plans. In the absence of site-specific guidelines, the AMSRP guidance on post-construction monitoring indicates that "comparison to background and baseline values is recommended."

For PIN-B, there is insufficient historical or baseline data to obtain significant means and standard deviations for comparison, so results are compared quantitatively to the *Federal Interim Groundwater Quality Guidelines* (FIGQGs). For a conservative approach, the Tier 1 criteria were applied, which are the lowest guidelines of all exposure pathways.

For Cape Christian, background groundwater samples were collected in 2009 and 2010, prior to and during remediation activities, by RMC Analytical Sciences Group and EBA Engineering Ltd. (EBA). Calculation of the mean and upper limit of acceptability (ULA) were conducted using these results, wherever possible. The ULA is equal to the average concentration plus three times the standard deviation of each parameter. Results were also compared to the FIGQGs Tier 1 guidelines.

3.2 Soil

At Cape Christian, historical baseline soil data collected by EBA Engineering, Inc. was used to obtain the mean and standard deviation of analytical results for comparison with results from the LTM field programs. The ULA was calculated for each parameter, wherever possible. These values are presented in the tables at the end of this report, and used for comparison purposes.

Soil sample results were also compared to the following Canadian Council of Ministers of the Environment (CCME) guidelines:

- *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health* (CCME, 1999, with updates) for residential/parkland use and coarse grained soil;
- *Canada-Wide Standards for Petroleum Hydrocarbons in Soil* (CCME, 2008a) - Tier 1 Residential/Parkland, coarse-grained soil, non-potable groundwater.

4 EVALUATION OF PIN-B DATA

4.1 Visual Monitoring Summary

The physical integrity of the NHWL and surrounding areas were assessed during each monitoring event using systematic visual observations and empirical measurements to record evidence of erosion, ponding, frost action, settlement and lateral movement of the landfills. A photographic record was completed to document the condition of the structures and substantiate the visual observations.

Minor features noted at the NHWL included two small animal burrows (likely arctic fox), on the slope of the north corner, two drainage pathways on the southwest and southeast sides and two areas of settlement in the southeast (surface) and northeast (slope) corners. None of these features is considered to have any significant impact on the integrity or performance of the NHWL.

Table 4-1, on the following page, summarizes the visual inspections conducted in 2011, 2013 and 2015.

Fewer new features were noted in each progressive monitoring event, with only one new animal burrow noted in 2015. In addition, existing features did not deteriorate in subsequent years. These consistent observations demonstrate the stability of the NHWL.

Table 4-1: Visual Inspection Summary for PIN-B (2011-2015)

Checklist Item (Year Added)	Feature Letter	Relative Location	Length (m)	Width (m)	Depth (m)	Extent	Description (Change)	Additional Comments
Animal Burrow (2011)	A	On slope of north corner of the NHWL	1.0	0.25	0.35	<1%	Animal burrowed exposing larger cobbles	Does not affect the landfill integrity at this point
Drainage Pathway (2011)	B	On southwest side of NHWL, draining in a SW direction towards MW2	25	0.5	0.1	<1%	Minor drainage pathway originating from NHWL, running towards SW	Feature appears natural. Does not affect the landfill integrity at this point
Drainage Pathway (2011)	C	On southeast side of NHWL, draining in a SE to SW direction towards MW3	24	0.6	0.25	<1%	Drainage pathway originating from the base of the SE side of the NHWL	Feature appears natural. Does not affect the landfill integrity at this point
Settlement (2013)	D	On surface of NHWL at southeast corner	2	0.75	0.1	<1%	Minor depression on surface of landfill, appears to be result of grading	Feature appears mechanical. Does not affect the landfill integrity at this point
Settlement (2013)	E	On slope of northeast corner of NHWL	1	1	0.1	<1%	Minor depression on berm of landfill, appears to be slight settlement	Does not affect the landfill integrity at this point
Animal Burrow (2015)	F	On slope of north corner of landfill	0.5	0.4	0.2	<1%	Attempted animal burrow that exposes some larger cobbles	Does not affect landfill integrity at this point.

4.2 Analytical Data Summary

4.2.1 Summary of Samples Collected

The following table summarizes the samples collected during Years 1, 3 and 5 of the LTM activities.

Table 4-2: Summary of Samples Collected During Phase I of LTM Activities at PIN-B

Year	GW Samples	Soil Samples
2011	None – MW1 and MW4 were frozen and MW2 and MW3 did not have sufficient water.	None – no evidence of seepage or staining observed
2013	Sample collected from MW3, MW4 was frozen and MW1 and MW2 did not have sufficient water for sample collection	None – no evidence of seepage or staining observed
2015	Samples collected from MW1 and MW3, MW4 was frozen and MW2 did not have sufficient water for sample collection.	None – no evidence of seepage or staining observed

4.2.2 Summary of Results for PIN-B

Groundwater

Over the three LTM events, only three groundwater samples have been collected. Of these, two have been from MW3 and one was from MW1. Two monitoring wells, MW2 and MW4, have never been sampled.

The groundwater results from 2013 consisted of one groundwater sample collected from MW3. The sample exhibited concentrations of total and dissolved copper and total and dissolved zinc marginally above the FIGQGs. The groundwater results from 2015, consisting of groundwater samples collected from MW1 and MW3, exhibited concentrations of total aluminum, total and dissolved copper, total and dissolved cadmium, total iron and total and dissolved zinc above the FIGQGs.

The FIGQGs apply to groundwater samples collected by standard methods, which means field filtering and preserving samples. As per the Sampling Plan, groundwater samples were not field filtered nor preserved during collection. Because analysis of unfiltered total metals includes metal ions adsorbed to sediment particles, the technique used for the collection of samples in the programs tends to over represent concentrations in groundwater. As a result, the FIGQGs represent very conservative guidelines in this situation. The copper guideline is derived from the surface water guideline for the protection of freshwater aquatic life, assuming the groundwater well is <50 m from the surface water (the PIN-B NHWL is approximately 900 m from the shoreline). The cadmium guideline is calculated based on water hardness and can be below laboratory detection limits (as is the case with the 2013 sample from MW1 and the duplicate sample from MW3 in 2015). Given the conservative nature of these guidelines, the

reported exceedances themselves are not a significant concern. If increasing trends were to be observed or metal concentrations remained high for several years, there may be cause for concern.

PHCs and PCBs have never been detected in any of the samples collected from the monitoring wells at PIN-B.

When the 2013 results were compared to the 2015 results, no obvious trends were noted (i.e. parameter concentrations were not consistently higher or lower in 2015 when compared to 2013 results). Only zinc concentrations (total and dissolved) were consistently above the FIGQGs in all samples collected.

As no background groundwater samples were collected during remediation activities, none are available for comparison. These exceedances could well be considered background concentrations; however there isn't enough data available for definitive conclusions. Further data collection would establish baseline conditions, if these exceedances are part of the background water quality, or report any trends, such as increasing concentrations leaching from the NHWL.

Climate change is a reality in the arctic, and consequences are unknown. At this stage, it can be assumed that ground temperature thermal regimes have reached equilibrium within the PIN-B NHWL, based on statements in the AMSRP. Forthcoming climate change could have an effect on ground temperatures and permafrost; future groundwater sample collection would monitor and changes.

Soil

No soil sample collection has been conducted to date, as no indications of seepage or staining were noted during the visual inspection.

5 EVALUATION OF CAPE CHRISTIAN DATA

5.1 Visual Monitoring Summary

The physical integrity of the NHWL and surrounding areas were assessed during each monitoring event using systematic visual observations and empirical measurements to record evidence of erosion, ponding, frost action, settlement and lateral movement of the landfills. A photographic record was completed to document the condition of the structures and substantiate the visual observations.

Standing water around the base of the landfill, initially observed in 2011, decreased over the years. The two significant seepage faces, one along the north side of the landfill and the other located 14 metres east of the southeast corner of the landfill, as well as the saturated soil along the perimeter of the north, west, and southwest corners of the landfill observed in the first year monitoring event were not encountered during the Year 5 monitoring event.

Soil staining was observed on both north and west sides of the NHWL. Grading was poor and uneven on the entire extent of the top of the landfill that could generate the potential for water infiltration. Only minor depressions were observed in the landfill area. No new features indicating the deterioration of the performance of the landfill were identified during the Year 5 monitoring event and conditions remained stable when comparing results from the previous two monitoring events.

Table 5-1, on the following pages, summarizes the visual inspections conducted in 2011, 2013 and 2015.

Table 5-1: Visual Inspection Summary for Cape Christian (2011-2015)

Checklist Item (Year 1st Observed)	Feature Letter	Relative Location	Length (m)	Width (m)	Depth (m)	Extent	Description (Change)	Additional Comments
Settlement (2011)	A	8 m south of the northwest corner of the NHWL	22.7	0.8	0.02	<1%	A possible seepage area with small drain connected. Staining at two locations. One of the locations had orange staining.	Soil sample CC-SS3 collected by the south end of the possible seepage area in 2011 and 2013. No further sampling conducted in 2015. Staining appears to have lessened slightly. No ponded water in 2015
Settlement (2011)	B	15 m south of the northwest corner of the NHWL	11.8	0.03	0	<1%	Minor settlement cracks. No significant change (NSC) was observed in 2015 site visit	
Settlement (2011)	C	23 m south of the northwest corner of the NHWL		8.9 m^2		<1%	Dry and stains at toe of NHWL	Minor ponded water, less cracking than previously observed
Settlement (2011)	D	22 m south of the northwest corner of the NHWL		N/A			Sinkhole. Volume calculated using the width of 1 m and the maximum depth of 0.3 m in 2013	Sinkhole was not observed in 2015
Settlement (2011)	E	Southwest corner of the NHWL		N/A			Dry with minimal staining	Dry in 2013 & 2015, soils not saturated, significantly less staining. Feature was not observed in 2015.
Settlement (2011)	F	Southwest corner of the NHWL		0.125 m^3		<1%	Sinkhole	Volume calculated using the width of 0.5 m and the maximum depth of 0.25 m in 2015. Size and extent of feature has decreased from previous observations

Checklist Item (Year 1st Observed)	Feature Letter	Relative Location	Length (m)	Width (m)	Depth (m)	Extent	Description (Change)	Additional Comments
Settlement (2011)	G	6 m east of the southwest corner of the NHWL		N/A			Dry, No staining	Dry in 2013, soils not saturated, moss growth. Feature was not observed in 2015.
Settlement (2011)	H	Northeast corner of the NHWL		N/A			Dry. No staining	Standing water in the area during the 2011 site visit, dry in 2013. Feature not observed in 2015.
Settlement (2011)	I	11 m northeast of the northeast corner of the NHWL		N/A			Saturated soils, No ponding and staining	Was identified as a drainage area with vegetation during the 2011 site visit, area is saturated but not ponded in 2013. No ponding or staining observed in 2015.
Settlement (2011)	J	20 m west of the northeast corner of the NHWL		N/A			Ponded water with staining	Remained unchanged in 2011. Feature not observed in 2015.
Settlement (2011)	K	13 m east of the northeast corner of the NHWL		N/A			Ponded water with staining	Remained unchanged in 2011. Feature not observed in 2015.
Settlement (2011)	L	22 m east of the northeast corner of the NHWL		18.2 m^2		<1%	Ponded water with staining may be due to equipment tracks	Soil sample CC-SS1 collected from this area in 2011/2013. No sampling conducted in 2015. NSC from previous observations.
Settlement (2011)	M	32 m east of the northeast corner of the NHWL		38.4 m^2		<1%	Ponded water with staining may be due to equipment tracks	NSC from previous observations.

Checklist Item (Year 1st Observed)	Feature Letter	Relative Location	Length (m)	Width (m)	Depth (m)	Extent	Description (Change)	Additional Comments
Settlement (2011)	N	15 m east of the northwest corner of the NHWL		89 m^2		<1%	Ponded water with staining may be due to equipment tracks. Decreased size from previous observations. Little to no ponded water in 2015.	Soil sample CC-SS2 collected from this area in 2011/2013. No sampling conducted in 2015.
Settlement (2011)	O	21 m east of the southeast corner of the NHWL		85.2 m^2		<1%	Wet with heavy staining in 2011. Dry with staining 2013. Minor pooling and minor staining in 2015. Appears to have lessened significantly since the first monitoring round.	
Staining (2013)	P	10 m west of toe of NHWL		56.5 m^2		<1%	Soil staining, soils are dry, no ponding of water	New feature in 2013. NSC from previous observations.
Staining (2013)	Q	12 m west of toe of NHWL		17.6 m^2		<1%	Stained soils, dry, no ponding or seepage	New feature in 2013. NSC from previous observations.

Note: NSC - No significant changes

5.2 Analytical Data Summary

5.2.1 Summary of Samples Collected

The following table summarizes the samples collected during Years 1, 3 and 5 of the LTM activities.

Table 5-2: Summary of Samples Collected During Phase I of the LTM Activities at Cape Christian

Year	GW Samples	Soil Samples
2011	Samples were collected from MW1, MW2, MW3 and MW4	Three soil samples (CC1, CC2 and CC3) were collected from areas of staining along the north and west sides of the NHWL; one background sample was collected (CC4).
2013	Samples were collected from MW1, MW2 and MW4. Due to limited sample volume, MW4 was only analysed for PHCs. MW3 was frozen.	Three soil samples (CC-SS1, CC-SS2 and CC-SS3) were collected from areas of staining along the north and west sides of the NHWL; one background sample was collected (CC-BK).
2015	No groundwater samples were collected, as all wells were frozen.	No soil samples were collected, as no changes were noted from previous years and previous results were all below detection limits and/or site criteria.

5.2.2 Summary of Results for Cape Christian

Groundwater

Over the three LTM events, seven groundwater samples have been collected to date: two samples from each of MW1, MW2 and MW4, and one sample from MW3.

PHCs and PCBs have never been detected in any of the samples collected from the monitoring wells at Cape Christian.

Samples collected during 2011 showed exceedances of the FIGQGs for total and dissolved cadmium and total copper. In addition, the sample from MW2 contained cobalt concentrations in excess of the ULA (calculated to be 67 and 62 µg/L for total and dissolved cobalt, respectively). There is no FIGQG for cobalt.

The samples collected during 2013 contained concentrations of total aluminium, total and dissolved cadmium, total chromium, total and dissolved copper, total and dissolved iron, total lead and total and dissolved zinc in excess of the FIGQGs. No exceedances of the ULAs were reported. Fewer

exceedances of dissolved metals were observed, when compared to total metals, indicating that metal ions are likely associated with sediment in the sample.

As noted in Section 4.2.2, the FIGQGs are very conservative guidelines for this situation and reported exceedances are not considered a concern at this time. If increasing trends were to be observed or metal concentrations remained high for several years, there may be cause for concern.

When the 2011 results were compared to the 2013 results, no obvious trends were noted (i.e. parameter concentrations were not consistently higher or lower in 2013 when compared to 2011 results). No parameters were consistently above the FIGQGs or ULAs. No exceedances of the ULA for the metals where FIGQG exceedances were reported were noted, which is significant since the ULA is based on background calculations. The one ULA exceedance for cobalt occurred in 2011. Concentrations had decreased by more than half by 2013. The ULA is based on groundwater quality data collected over only two years during NHWL construction, so the high concentration of cobalt observed in 2011 could be considered variation in background conditions. Further data collection could provide additional corroboration that the observed cobalt concentrations are indeed part of the background water quality and monitor any trends, such as increasing concentrations leaching from the NHWL.

Climate change is a reality in the arctic, and consequences are unknown. At this stage, it can be assumed that ground temperature thermal regimes have reached equilibrium within the Cape Christian NHWL, based on statements in the AMSRP. Forthcoming climate warming could have an effect on ground temperatures and permafrost and future groundwater sample collection would monitor any changes.

Soil

Over the three years of monitoring activities, six soil samples have been collected from the north and west sides of the NHWL at the Cape Christian site. Background samples were collected in each year of soil sample collection, in a location away from the NHWL (220 m southeast in 2011 and 160 m northwest in 2013).

PCBs have never been detected in any of the samples. PHC Fractions F2 and F3 were detected in four of the soil samples; however, no exceedances of the CCME guidelines were noted. All samples collected contained detectable metal concentrations; however, no metal concentrations exceeded the CCME guidelines.

6 RECOMMENDATIONS

6.1 PIN-B

Based on systematic visual observations and measurements, photographic documentation and analytical results, the PIN-B NHWL is considered to be in acceptable condition, is performing as designed, and is containing the enclosed waste. A few metals have been reported in groundwater samples at concentrations that exceed the FIGQGs; specifically aluminium, copper, cadmium, iron and zinc. Background concentrations are not available at PIN-B for comparison purposes and only three groundwater samples have been collected to date. With the sparse data available, possible increasing trends due to the potential leaching of metals from the NHWL cannot be determined. These metal exceedances may be attributed to background conditions but again, given the sparse analytical data available, definitive conclusions are hard to make.

At PIN-B Clifton Point, Arcadis recommends that monitoring activities progress to Phase II of the LTM Plan. Additional data would provide more confidence that the higher metal concentrations are considered to be representative of background conditions, if that is the case, or reveal any trends, if metals are leaching from the NHWL. In addition, given the uncertainty of the future arctic environment due to potential climate changes, continued monitoring would be a prudent decision.

Given the low solubility of PCBs in water, analyses of PCBs could be discontinued as they were not detected in the first five years of monitoring, as per the AMSRP.

6.2 Cape Christian

Physical observations of the NHWL at Cape Christian and complementary analytical results suggest that it is in a good condition and performing as designed to contain the enclosed waste. A few metals have been reported in groundwater samples at concentrations that exceed the FIGQGs; specifically aluminium, cadmium, chromium, copper, iron, lead and zinc. With the sparse data available, any trends (if present) cannot be determined.

Total and dissolved cobalt concentrations in a sample collected in 2011 exceeded the ULA. The ULA is calculated based on only two years of background data, and the 2011 reported cobalt concentration could still be representative of background conditions. However, given the sparse analytical data available to date, definitive conclusions are hard to make.

At Cape Christian, Arcadis recommends that monitoring activities progress to Phase II of the LTM Plan. Additional data would provide more confidence that the higher metal concentrations are considered to be representative of background conditions, if that is the case, or reveal any trends, if metals are leaching from the NHWL. In addition, given the uncertainty of the future arctic environment due to potential climate changes, continued monitoring would be a prudent decision.

Given the low solubility of PCBs in water, analyses of PCBs could be discontinued as they were not detected in the first five years of monitoring, as per the AMSRP.

Arcadis Canada Inc.

329 Churchill Avenue North

Suite 200

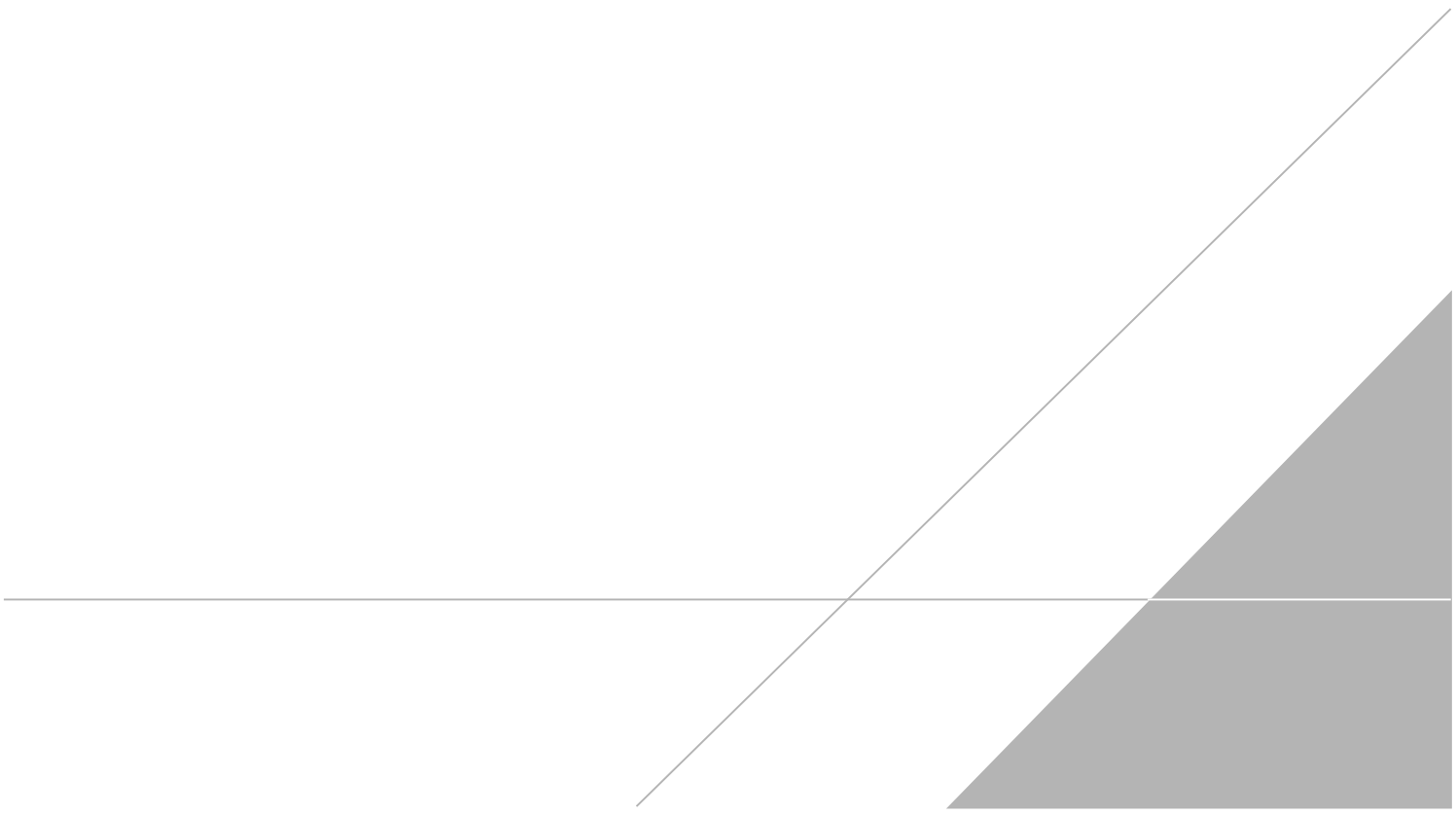
Ottawa, Ontario K1Z 5B8

Tel 613 721 0555

Fax 613 721 0029

www.arcadis-canada.com

TABLES



ARCADIS Design & Consultancy for natural and built assets

PARAMETER	CCME FIGQGs[1]	RDL	MW1	MW3			
			24/07/2015	22/08/2013	24/07/2015	24/07/2015 DUP	RPD
BTEX & F1 Hydrocarbons (ug/L)							
Benzene	140	0.40	<0.40	<0.40	<0.40	<0.40	NA
Toluene	83	0.40	<0.40	<0.40	<0.40	<0.40	NA
Ethylbenzene	11000	0.40	<0.40	<0.40	<0.40	<0.40	NA
o-Xylene	NC	0.40	<0.40	<0.40	<0.40	<0.40	NA
p+m-Xylene	NC	0.80	<0.80	<0.80	<0.80	<0.80	NA
Total Xylenes	3900	0.80	<0.80	<0.80	<0.80	<0.80	NA
F1 (C6-C10)	810	100	<100	<100	<100	<100	NA
F1 (C6-C10) - BTEX	NC	100	<100	<100	<100	<100	NA
F2-F4 Hydrocarbons (ug/L)							
F2 (C10-C16 Hydrocarbons)	1300	100	<100	<100	<100	<100	NA
F3 (C16-C34 Hydrocarbons)	NC	200	-	<200	-	-	
F4 (C34-C50 Hydrocarbons)	NC	200	-	<200	-	-	
Reached Baseline at C50	NC	NA	-	Yes	-	-	

Notes:

1 = Table 2: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (µg/L), Tier 1, Lowest Guideline for coarse grained soils.

NA = Not Applicable

NC = No Criteria

RDL= Reportable Detection Limit

RPD= Relative Percent Difference

PARAMETER	CCME FIGQGs[1]	RDL	MW1	MW3			
			24/07/2015	22/08/2013	24/07/2015	DUP 24/07/2015	RPD
Metals (µg/L)							
Aluminum (Al)	100*	0.5/3	320	26.1	150	140	7
Antimony (Sb)	2000	0.02/0.6	<0.60	0.08	<0.60	<0.60	NA
Arsenic (As)	5	0.02/0.2	0.51	0.19	0.28	0.28	NA
Barium (Ba)	500	0.02/10	53	63	53	52	2
Beryllium (Be)	5.3	0.01/1	<1	<0.01	<1	<1	NA
Bismuth (Bi)	NC	0.005/5	<5	<0.005	<5	<5	NA
Boron (B)	5000	50/20	23	<50	<20	<20	NA
Cadmium (Cd)	0.017	0.005/0.02	0.024	0.009	0.029	<0.020	NA
Calcium (Ca)	NC	50/300	36000	37700	36000	36000	0
Chromium (Cr)	8.9	0.10/1	<1	0.11	<1	<1	NA
Cobalt (Co)	NC	0.005/0.3	<0.30	0.045	<0.30	<0.30	NA
Copper (Cu)	3.2 (MW1) 3.5 (MW3)*	0.05/0.2	9.7	4.26	3.3	3.5	6
Iron (Fe)	300	1/60	330	13.8	150	150	NA
Lead (Pb)	4.9 (MW1) 5.8 (MW3)*	0.005/0.2	0.44	0.05	0.38	0.38	NA
Lithium (Li)	NC	0.5/20	<20	1.73	<20	<20	NA
Magnesium (Mg)	NC	50/200	14000	24800	18000	18000	0
Manganese (Mn)	NC	0.05/4	7.4	4.74	8.3	8.2	NA
Molybdenum (Mo)	73	0.05/0.2	0.54	1.4	0.35	0.28	NA
Nickel (Ni)	123*	0.02/0.5	2.2	1.58	2.7	2.5	8
Potassium (K)	NC	50/300	1300	2110	860	850	NA
Selenium (Se)	1	0.04/0.2	<0.20	0.44	<0.20	<0.20	NA
Silicon (Si)	NC	100	1700	1200	1300	1200	8
Silver (Ag)	0.1	0.005/0.1	<0.10	<0.005	<0.10	<0.10	NA
Sodium (Na)	NC	50/500	9400	40200	18000	18000	0
Strontium (Sr)	NC	0.05/20	53	69.5	90	90	NA
Sulphur (S)	NC	3000/200	2200	16500	3300	3400	3
Thallium (Tl)	0.8	0.002/0.2	<0.20	0.009	<0.20	<0.20	NA
Tin (Sn)	NC	0.2/1	<1	<0.2	<1	<1	NA
Titanium (Ti)	100	0.5/1	8.9	<0.5	3.1	2.6	NA
Uranium (U)	15	0.002/0.1	0.62	1.4	0.38	0.35	NA
Vanadium (V)	NC	0.2/1	<1	0.21	<1	<1	NA
Zinc (Zn)	10	0.1/3	29	16.4	680	670	1
Zirconium (Zr)	NC	0.1/3	5.5	0.26	<3	<3	NA

Notes:

1 = Table 2: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (µg/L), Tier 1, Lowest Guideline for coarse grained soils.

* Guideline is for Surface Water (Protection of Aquatic Life). Note that some guidelines are dependent on water hardness and are calculated for each well.

NA = Not Applicable

NC = No Criteria

RDL= Reportable Detection Limit

RPD= Relative Percent Difference

20 = Exceeds selected guideline.

Table 3
Groundwater Chemical Concentrations - Dissolved Metals
INAC Nunvaut Regional Office
PIN-B, Clifton Point, Nunavut

ARCADIS Design & Consultancy for natural and built assets

PARAMETER	CCME FIGQGs[1]	RDL	MW1	MW3			
			24/07/2015	22/08/2013	24/07/2015	DUP 24/07/2015	RPD
Metals (µg/L)							
Aluminum (Al)	100*	0.5/3	7.2	22.4	6.9	4.4	NA
Antimony (Sb)	2000	0.02/0.6	<0.60	0.085	<0.60	<0.60	NA
Arsenic (As)	5	0.02/0.2	0.38	0.225	<0.20	<0.20	NA
Barium (Ba)	500	0.02/10	45	60.5	48	48	NA
Beryllium (Be)	5.3	0.01/1	<1	<0.010	<1	<1	NA
Bismuth (Bi)	NC	0.005/5	<5	<0.0050	<5	<5	NA
Boron (B)	5000	50/20	24	<50	<20	<20	NA
Cadmium (Cd)	0.017	0.005/0.02	<0.020	0.013	0.021	0.02	NA
Calcium (Ca)	NC	50/300	36000	40000	36000	36000	0
Chromium (Cr)	8.9	0.10/1	<1	<0.1	<1	<1	NA
Cobalt (Co)	NC	0.005/0.3	<0.30	0.11	<0.30	<0.30	NA
Copper (Cu)	3.2 (MW1) 3.5 (MW3)*	0.05/0.2	5.6	4.68	2.4	2.2	9
Iron (Fe)	300	1/60	<60	3.4	<60	<60	NA
Lead (Pb)	4.9 (MW1) 5.8 (MW3)*	0.005/0.2	<0.20	0.025	<0.20	<0.20	NA
Lithium (Li)	NC	0.5/20	<20	1.6	<20	<20	NA
Magnesium (Mg)	NC	50/200	13000	26700	18000	18000	0
Manganese (Mn)	NC	0.05/4	<4	4.61	<4	<4	NA
Molybdenum (Mo)	73	0.05/0.2	0.42	1.5	0.21	0.23	NA
Nickel (Ni)	123*	0.02/0.5	2.2	1.88	0.61	0.64	NA
Potassium (K)	NC	50/300	1200	2240	760	780	NA
Selenium (Se)	1	0.04/0.2	<0.20	0.482	<0.20	<0.20	NA
Silicon (Si)	NC	100	940	1300	790	790	0
Silver (Ag)	0.1	0.005/0.1	<0.10	<0.0050	<0.10	<0.10	NA
Sodium (Na)	NC	50/500	8800	43200	17000	17000	NA
Strontium (Sr)	NC	0.05/20	48	69	82	82	NA
Sulphur (S)	NC	3000/200	2100	17300	3400	3300	3
Thallium (Tl)	0.8	0.002/0.2	<0.20	0.01	<0.20	<0.20	NA
Tin (Sn)	NC	0.2/1	<1	<0.20	<1	<1	NA
Titanium (Ti)	100	0.5/1	<1	<0.50	<1	<1	NA
Uranium (U)	15	0.002/0.1	0.41	1.5	0.27	0.26	NA
Vanadium (V)	NC	0.2/1	<1	0.34	<1	<1	NA
Zinc (Zn)	10	0.1/3	31	18.8	470	470	0
Zirconium (Zr)	NC	0.1/3	<3	0.33	<3	<3	NA

Notes:

1 = Table 2: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (µg/L), Tier 1, Lowest Guideline for coarse grained soils.

* Guideline is for Surface Water (Protection of Aquatic Life). Note that some guidelines are dependent on water hardness and are calculated for each well.

NA = Not Applicable

NC = No Criteria

RDL= Reportable Detection Limit

RPD= Relative Percent Difference

20 = Exceeds selected guideline.

PARAMETER	CCME FIGQGs[1]	RDL	MW1	MW3			
			24/07/2015	22/08/2013	24/07/2015	24/07/2015 DUP	RPD
PCBs (ug/L)							
Aroclor 1016	NC	0.05/0.000050	<0.000050	<0.000050	<0.000050	<0.000050	NA
Aroclor 1221	NC	0.05/0.000050	<0.000050	<0.000050	<0.000050	<0.000050	NA
Aroclor 1232	NC	0.05/0.000050	<0.000050	<0.000050	<0.000050	<0.000050	NA
Aroclor 1242	NC	0.05/0.000050	<0.000050	<0.000050	<0.000050	<0.000050	NA
Aroclor 1248	NC	0.05/0.000050	<0.000050	<0.000050	<0.000050	<0.000050	NA
Aroclor 1254	NC	0.05/0.000050	<0.000050	<0.000050	<0.000050	<0.000050	NA
Aroclor 1260	NC	0.05/0.000050	<0.000050	<0.000050	<0.000050	<0.000050	NA
Aroclor 1262	NC	0.05/0.000050	<0.000050	<0.000050	<0.000050	<0.000050	NA
Aroclor 1268	NC	0.05/0.000050	<0.000050	<0.000050	<0.000050	<0.000050	NA
Total Aroclors	NC	0.05/0.000050	<0.000050	<0.000050	<0.000050	<0.000050	NA

Notes:

1 = Table 2: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (mg/L), Tier 1, Lowest Guideline for coarse grained soils.

NC = No Criteria

RDL= Reportable Detection Limit

RPD= Relative Percent Difference

PARAMETER		CCME FIGQGs[1]	RDL	MW1	MW3			
				24/07/2015	09/08/2013	24/07/2015	24/07/2015 DUP	RPD
Inorganics								
True Colour	PtCo	NC	20	11	5.0	8.8	9.7	NA
Conductivity	uS/cm	NC	1.0	320	630	390	390	0
Total Dissolved Solids	mg/L	NC	10	190	410	250	270	8
Fluoride (F^-)	mg/L	0.12	0.050	<0.050	0.077	<0.050	<0.050	NA
Orthophosphate (P)	mg/L	NC	0.003	0.003	0.0041	<0.003	0.003	NA
pH	pH	6.5-9	NA	8.00	8.01	7.93	7.96	0
Total Suspended Solids	mg/L	NC	0.40	1.3	2.9	13	13	0
Alkalinity (PP as $CaCO_3$)	mg/L	NC	0.50	<0.50	<0.50	<0.50	<0.50	NA
Alkalinity (Total as $CaCO_3$)	mg/L	NC	0.50	120	120	110	110	0
Bicarbonate (HCO_3)	mg/L	NC	0.50	140	150	130	140	7
Carbonate (CO_3)	mg/L	NC	0.50	<0.50	<0.50	<0.50	<0.50	NA
Hydroxide (OH)	mg/L	NC	0.50	<0.50	<0.50	<0.50	<0.50	NA
Dissolved Sulphate (SO_4)	mg/L	100	1.0	6.3	47	11	11	0
Dissolved Chloride (Cl)	mg/L	120	1.0	10	71	33	33	0
Dissolved Nitrite (N)	mg/L	0.06	0.003	<0.010	0.016	0.011	0.011	0
Dissolved Nitrate (N)	mg/L	13	0.003	7.3	8.2	8.2	8.2	0
Calculated Parameters								
Hardness ($CaCO_3$)	mg/L	NC	0.50	140	210	160	160	0
Ion Balance	NA	NC	0.010	0.98	1.0	1.0	1.0	0
Dissolved Nitrate (NO_3)	mg/L	NC	0.013	32	36	36	36	0
Nitrate plus Nitrite (N)	mg/L	NC	0.0030	7.3	8.2	8.3	8.2	1
Dissolved Nitrite (NO_2)	mg/L	NC	0.0099	<0.033	0.053	0.035	0.035	NA
Total Dissolved Solids	mg/L	NC	10	180	340	220	220	0

Notes:
1 = Table 2: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (mg/L), Tier 1, Lowest
NA = Not Applicable
NC = No Criteria
RDL= Reportable Detection Limit
RPD= Relative Percent Difference

Table 6
Groundwater Chemical Concentrations - PHCs
INAC Nunavut Regional Office
Cape Christian, Nunavut

ARCADIS Design & Consultancy for natural and built assets

PARAMETER	CCME FIGQGs[1]	Upper Limit of Acceptability[2]	RDL	MW-1			MW-2		MW-3	MW-4	
				24/08/2011	09/08/2013	DUP 09/08/2013	24/08/2011	09/08/2013	24/08/2011	24/08/2011	09/08/2013
BTEX & F1 Hydrocarbons (ug/L)											
Benzene	140	NA	0.20	<0.2	<0.20	<0.20	<0.2	<0.20	<0.2	<0.2	<0.20
Toluene	83	NA	0.20	<0.2	0.26	0.27	<0.2	<0.20	<0.2	<0.2	<0.20
Ethylbenzene	1100	NA	0.20	<0.2	<0.20	<0.20	<0.2	<0.20	<0.2	<0.2	<0.20
o-Xylene	NC	NA	0.20	<0.2	<0.20	<0.20	<0.2	<0.20	<0.2	<0.2	<0.20
p+m-Xylene	NC	NA	0.40	<0.4	<0.40	<0.40	<0.4	<0.40	<0.4	<0.4	<0.40
Total Xylenes	3900	NA	0.40	<0.4	<0.40	<0.40	<0.4	<0.40	<0.4	<0.4	<0.40
F1 (C6-C10)	810	NA	25	<25	<25	<25	<25	<25	<25	<25	<25
F1 (C6-C10) - BTEX	NC	NA	25	<25	<25	<25	<25	<25	<25	<25	<25
F2-F4 Hydrocarbons (ug/L)											
F2 (C10-C16 Hydrocarbons)	1300	NA	100	<100	<100	<100	<100	<100	<100	<100	<100
F3 (C16-C34 Hydrocarbons)	NC	NA	100	<100	<200	<200	<100	<200	<100	<100	<200
F4 (C34-C50 Hydrocarbons)	NC	NA	100	<100	<200	<200	<100	<200	<100	<100	<200
Reached Baseline at C50	NA	NA	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:
1 = Table 2: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (µg/L), Tier 1, Lowest Guideline for coarse grained soils.
2 = Upper Limit of Acceptability, calculated using mean of baseline data +3 standard deviations.
NA = Not Applicable
NC = No Criteria

Table 7
Groundwater Chemical Concentrations - Total Metals
INAC Nunvaut Regional Office
Cape Christian, Nunavut

ARCADIS Design & Consultancy for natural and built assets

PARAMETER	CCME FIGQGs[1]	Upper Limit of Acceptability[2]	RDL	MW-1		MW-2		MW-3	MW-4	Average Concentration
				24/08/2011	09/08/2013	24/08/2011	09/08/2013	24/08/2011	24/08/2011	
Metals (µg/L)										
Total Aluminum (Al)	100	NA	3.0	---	1900	---	180	---	---	1040
Total Antimony (Sb)	2000	NA	0.60	---	<0.60	---	<0.60	---	---	<0.60
Total Arsenic (As)	5	17	0.20	1.0	1.8	2.0	0.91	<1.0	<1.0	1.3
Total Barium (Ba)	500	NA	10	---	13	---	45	---	---	29
Total Beryllium (Be)	5.3	NA	1.0	---	<1.0	---	<1.0	---	---	<1.0
Total Boron (B)	5000	NA	20	---	130	---	30	---	---	80
Total Cadmium (Cd)	0.017	4.0	0.005	<0.10	0.037	0.30	0.16	0.10	0.10	0.13
Total Calcium (Ca)	NC	NA	300	---	56000	---	110000	---	---	83000
Total Chromium (Cr)	8.9	1185	1.0	<5.0	36	<5.0	1.7	7.0	<5.0	10
Total Cobalt (Co)	NC	67	0.30	<0.50	0.74	**85**	31	3.4	<0.50	20
Total Copper (Cu)	2	123	0.20	1.0	11	11	8.4	14	3.0	8.1
Total Iron (Fe)	300	NA	60	---	840	---	29000	---	---	14920
Total Lead (Pb)	2	264	0.20	<0.50	38	1.5	0.40	3.5	<0.50	7.4
Total Lithium (Li)	NC	NA	20	---	<20	---	<20	---	---	<20
Total Magnesium (Mg)	NC	NA	200	---	53000	---	60000	---	---	56500
Total Manganese (Mn)	NC	NA	4.0	---	120	---	5900	---	---	3010
Total Molybdenum (Mo)	73	NA	0.20	---	9.5	---	2.1	---	---	5.8
Total Nickel (Ni)	83	1029	0.50	2.0	32	60	47	7.0	3.0	25
Total Phosphorus (P)	NC	NA	100	---	<100	---	<100	---	---	<100
Total Potassium (K)	NC	NA	300	---	15000	---	12000	---	---	13500
Total Selenium (Se)	1	NA	0.20	---	0.31	---	0.35	---	---	0.33
Total Silicon (Si)	NC	NA	100	---	4100	---	5600	---	---	4850
Total Silver (Ag)	0.1	NA	0.10	---	<0.10	---	<0.10	---	---	<0.10
Total Sodium (Na)	NC	NA	500	---	120000	---	90000	---	---	105000
Total Strontium (Sr)	NC	NA	20	---	330	---	540	---	---	435
Total Sulphur (S)	NC	NA	200	---	13000	---	12000	---	---	12500
Total Thallium (Tl)	0.8	NA	0.20	---	<0.20	---	<0.20	---	---	<0.20
Total Tin (Sn)	NC	NA	1.0	---	<1.0	---	<1.0	---	---	<1.0
Total Titanium (Ti)	100	NA	1.0	---	19	---	9.8	---	---	14
Total Uranium (U)	15	NA	0.10	---	5.4	---	0.39	---	---	2.9
Total Vanadium (V)	NC	NA	1.0	---	2.7	---	1.7	---	---	2.2
Total Zinc (Zn)	10	1937	3.0	<5.0	8.6	120	71	38	5.0	41

Notes:
1 = Table 2: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (µg/L), Tier 1, Lowest Guideline for coarse grained soils.
2 = Upper Limit of Acceptability, calculated using mean of baseline data +3 standard deviations.
NA = Not Available
NC = No Criteria
RDL= Reportable Detection Limit
20 = Result exceeds FIGQGs.
67 = Result exceeds Upper Limit of Acceptability
Note that when results were less than the RDL, the RDL was used in average calculations.

Table 8
Groundwater Chemical Concentrations - Dissolved Metals
INAC Nunvaut Regional Office
Cape Christian, Nunavut

ARCADIS Design & Consultancy for natural and built assets

PARAMETER	CCME FIGQGs[1]	Upper Limit of Acceptability[2]	RDL	MW-1		MW-2		MW-3	MW-4	Average Concentration
				24/08/2011	09/08/2013	24/08/2011	09/08/2013	24/08/2011	24/08/2011	
Metals (µg/L)										
Dissolved Aluminum (Al)	100	NA	3.0	---	28	---	32	---	---	30
Dissolved Antimony (Sb)	2000	NA	0.60	---	<0.60	---	<0.60	---	---	<0.60
Dissolved Arsenic (As)	5	7.3	0.20	1.0	1.4	1.0	0.72	<1.0	<1.0	1.0
Dissolved Barium (Ba)	500	NA	10	---	12	---	47	---	---	30
Dissolved Beryllium (Be)	5.3	NA	1.0	---	<1.0	---	<1.0	---	---	<1.0
Dissolved Boron (B)	5000	NA	20	---	95	---	<20	---	---	58
Dissolved Cadmium (Cd)	0.017	NA	0.005	<0.10	0.031	0.30	0.21	0.60	0.70	0.32
Dissolved Calcium (Ca)	NC	NA	300	---	54000	---	110000	---	---	82000
Dissolved Chromium (Cr)	8.9	16	1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<1.0
Dissolved Cobalt (Co)	NC	62	0.30	<0.50	<0.30	**72**	32	0.50	<0.50	18
Dissolved Copper (Cu)	2	23	0.20	1.0	1.3	5.0	6.1	4.0	2.0	3.2
Dissolved Iron (Fe)	300	NA	60	---	190	---	28000	---	---	14095
Dissolved Lead (Pb)	2	NA	0.20	<0.50	<0.20	<0.50	<0.20	<0.50	<0.50	<0.20
Dissolved Lithium (Li)	NC	NA	20	---	<20	---	<20	---	---	<20
Dissolved Magnesium (Mg)	NC	NA	200	---	53000	---	63000	---	---	58000
Dissolved Manganese (Mn)	NC	NA	4.0	---	81	---	6100	---	---	3090.5
Dissolved Molybdenum (Mo)	73	NA	0.20	---	8.7	---	2.0	---	---	5.4
Dissolved Nickel (Ni)	83	160	0.50	3.0	2.0	56	44	3.0	2.0	18
Dissolved Phosphorus (P)	NC	NA	100	---	<100	---	<100	---	---	<100
Dissolved Potassium (K)	NC	NA	300	---	15000	---	12000	---	---	13500
Dissolved Selenium (Se)	1	NA	0.20	---	0.31	---	0.33	---	---	0.32
Dissolved Silicon (Si)	NC	NA	100	---	3400	---	5700	---	---	4550
Dissolved Silver (Ag)	0.1	NA	0.10	---	<0.10	---	<0.10	---	---	<0.10
Dissolved Sodium (Na)	NC	NA	500	---	120000	---	94000	---	---	107000
Dissolved Strontium (Sr)	NC	NA	20	---	320	---	570	---	---	445
Dissolved Sulphur (S)	NC	NA	200	---	13000	---	12000	---	---	12500
Dissolved Thallium (Tl)	0.8	NA	0.20	---	<0.20	---	<0.20	---	---	<0.20
Dissolved Tin (Sn)	NC	NA	1.0	---	<1.0	---	<1.0	---	---	<1.0
Dissolved Titanium (Ti)	100	NA	1.0	---	<1.0	---	<1.0	---	---	<1.0
Dissolved Uranium (U)	15	NA	0.10	---	2.7	---	0.38	---	---	1.5
Dissolved Vanadium (V)	NC	NA	1.0	---	<1.0	---	<1.0	---	---	<1.0
Dissolved Zinc (Zn)	10	991	3.0	<5.0	<3.0	130	84	10	8.0	40

Notes:

1 = Table 2: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (µg/L), Tier 1, Lowest Guideline for coarse grained soils.

2 = Upper Limit of Acceptability, calculated using mean of baseline data +3 standard deviations.

NA = Not Available

NC = No Criteria

RDL= Reportable Detection Limit

20 = Exceeds FIGQGs.

67 = Result exceeds Upper Limit of Acceptability

Note that when results were less than the RDL, the RDL was used in average calculations.

Table 9
Groundwater Chemical Concentrations - PCBs
INAC Nunvaut Regional Office
Cape Christian, Nunavut

ARCADIS Design & Consultancy for natural and built assets

PARAMETER	CCME FIGQGs[1]	Upper Limit of Acceptability[2]	RDL	MW-1		MW-2		MW-3	MW-4
				24/08/2011	09/08/2013	24/08/2011	09/08/2013	24/08/2011	24/08/2011
PCBs (ug/L)									
Aroclor 1016	NC	NA	0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.050
Aroclor 1221	NC	NA	0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.050
Aroclor 1232	NC	NA	0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.050
Aroclor 1242	NC	NA	0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.050
Aroclor 1248	NC	NA	0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.050
Aroclor 1254	NC	NA	0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.050
Aroclor 1260	NC	NA	0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.050
Aroclor 1262	NC	NA	0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.050
Aroclor 1268	NC	NA	0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.050
Total PCB	NC	NA	0.010	<0.050	<0.010	<0.050	<0.010	<0.050	<0.050

Notes:

1 = Table 2: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use (µg/L), Tier 1, Lowest Guideline for coarse grained soils.
2 = Upper Limit of Acceptability, calculated using mean of baseline data +3 standard
NA = Not Available
NC = No Criteria
RDL= Reportable Detection Limit

Table 10
Groundwater Chemical Concentrations - Inorganics
INAC Nunvaut Regional Office
Cape Christian, Nunavut

ARCADIS Design & Consultancy for natural and built assets

PARAMETER		CCME FIGQGs[1]	Upper Limit of Acceptability[2]	RDL	MW-1		MW-2		MW-3	MW-4	Average Concentration
					24/08/2011	09/08/2013	24/08/2011	09/08/2013	24/08/2011	24/08/2011	
Inorganics	**Units**										
Colour	TCU	NC	NA	20	6.0	5.0	350	610	7.0	6.0	164
Conductivity	umho/cm	NC	NA	1.0	1500	1300	1890	1600	179	703	1195
Total Dissolved Solids	mg/L	3000	NA	10	1070	780	1440	1520	128	802	957
Fluoride (F-)	mg/L	0.12	NA	0.10	0.30	0.34	<0.10	0.22	0.10	0.20	0.23
Orthophosphate (P)	mg/L	NC	NA	0.010	<0.010	<0.010	<0.010	<0.050	<0.010	<0.010	<0.010
pH	pH	6.5-9	NA	NC	7.82	8.08	6.50	5.26	7.30	7.54	7.08
Total Suspended Solids	mg/L	NC	NA	3.0	6.0	10	14	81	9.0	3.0	21
Dissolved Sulphate (SO_4)	mg/L	100	296	1.0	50	37	20	28	11	63	35
Dissolved Chloride (Cl)	mg/L	NC	1505	6.0	300	250	490	450	23	120	272
Nitrite (N)	mg/L	0.060	NA	0.010	<0.010	<0.010	0.010	0.035	<0.010	<0.010	0.014
Nitrate (N)	mg/L	13.0	1636	0.10	0.20	<0.10	<0.10	0.30	1.0	<0.10	0.30
Nitrate + Nitrite	mg/L	NC	NA	0.10	0.20	<0.10	<0.10	0.34	1.0	<0.10	0.31
Hardness ($CaCO_3$)	mg/L	NC	908	0.50	---	350	---	540	---	---	445

Notes:
1 = Table 2: Federal Interim Groundwater Quality Guidelines, Generic Guidelines for Residential/Parkland Land Use, Tier 1, Lowest Guideline for coarse grained soils.
2 = Upper Limit of Acceptability, calculated using mean of baseline data +3 standard deviations.
NA = Not Available
NC = No Criteria
RDL= Reportable Detection Limit
20 = Exceeds FIGQGs.
RPD = Relative Percent Difference

Table 11
Soil Chemical Concentrations - PHCs
INAC Nunvaut Regional Office
Cape Christian, Nunavut

PARAMETER	Federal		Upper Limit of Acceptability[3]	RDL	CC1 24/08/2011	CC-SS1 09/08/2013	CC2 24/08/2011	CC-SS2 09/08/2013	CC-DUP1 09/08/2013	Duplicate Evaluation	CC3 24/08/2011	CC-SS3 09/08/2013
Depth (m)	CCME [1] Residential/ Parkland	CWS for PHC in Soil (<1.5m)[2]			0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	RPD (%)	0 - 0.15	0 - 0.15
BTEX & F1 Hydrocarbons (ug/g)												
Benzene	0.03	NC	NC	0.005	<0.02	<0.005	<0.02	<0.005	<0.005	N/A	<0.02	<0.005
Toluene	0.37	NC	NC	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	N/A	<0.02	<0.02
Ethylbenzene	0.082	NC	NC	0.01	<0.02	<0.01	<0.02	<0.01	<0.01	N/A	<0.02	<0.01
o-Xylene	NC	NC	NC	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	N/A	<0.02	<0.02
p+m-Xylene	NC	NC	NC	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	N/A	<0.04	<0.04
Total Xylenes	11	NC	NC	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	N/A	<0.04	<0.04
F1 (C6-C10)	NC	NC	NC	10	<10	<10	<10	<10	<10	N/A	<10	<10
F1 (C6-C10) - BTEX	NC	30	NC	10	<10	<10	<10	<10	<10	N/A	<10	<10
F2-F4 Hydrocarbons (ug/g)												
F2 (C10-C16 Hydrocarbons)	NC	150	560	10	30	<10	12	<10	<10	N/A	<10	86
F3 (C16-C34 Hydrocarbons)	NC	300	795	50	19	<50	21	<50	<50	N/A	21	68
F4 (C34-C50 Hydrocarbons)	NC	2800	461	50	<10	<50	<10	<50	<50	N/A	<10	<50
Reached Baseline at C50	N/A	N/A	N/A	N/A	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes

Notes:
1 = CCME, Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.
2 = CCME (2008) Canadian-Wide Standards for Petroleum Hydrocarbons in Soil - Table 1, Tier 1 levels for PHCs, Residential / Parkland Use in coarse-grained surface soils. Protection of Eco Soil Contact from
3 = Upper Limit of Acceptability, calculated using mean of baseline data +3 standard deviations.
N/A = Not applicable
NC = No Criteria
RDL= Reportable Detection Limit
20 = Exceeds selected guideline.

Table 11
Soil Chemical Concentrations - PHCs
INAC Nunvaut Regional Office
Cape Christian, Nunavut

PARAMETER	Federal		Upper Limit of Acceptability[3]	RDL	CC4 24/08/2011	CC-BK 09/08/2013
Depth (m)	CCME [1] Residential/ Parkland	CWS for PHC in Soil (<1.5m)[2]			0 - 0.15	0 - 0.15
BTEX & F1 Hydrocarbons (ug/g)						
Benzene	0.03	NC	NC	0.005	<0.02	<0.005
Toluene	0.37	NC	NC	0.02	<0.02	<0.02
Ethylbenzene	0.082	NC	NC	0.01	<0.02	<0.01
o-Xylene	NC	NC	NC	0.02	<0.02	<0.02
p+m-Xylene	NC	NC	NC	0.04	<0.04	<0.04
Total Xylenes	11	NC	NC	0.04	<0.04	<0.04
F1 (C6-C10)	NC	NC	NC	10	<10	<10
F1 (C6-C10) - BTEX	NC	30	NC	10	<10	<10
F2-F4 Hydrocarbons (ug/g)						
F2 (C10-C16 Hydrocarbons)	NC	150	560	10	<10	<10
F3 (C16-C34 Hydrocarbons)	NC	300	795	50	<10	<50
F4 (C34-C50 Hydrocarbons)	NC	2800	461	50	<10	<50
Reached Baseline at C50	N/A	N/A	N/A	N/A	Yes	Yes

Notes:
1 = CCME, Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.
2 = CCME (2008) Canadian-Wide Standards for Petroleum Hydrocarbons in Soil - Table 1, Tier 1 levels for PH
3 = Upper Limit of Acceptability, calculated using mean of baseline data +3 standard deviations.
N/A = Not applicable
NC = No Criteria
RDL= Reportable Detection Limit
20 = Exceeds selected guideline.

Table 12
Soil Chemical Concentrations - Metals
INAC Nunvaut Regional Office
Cape Christian, Nunavut

PARAMETER	CCME[1] Residential/ Parkland	CCME[2] Human Health Ingestion (H) / Eco Soil Contact (E)	INAC DEW Line Cleanup Criteria, Tier II	Upper Limit of Acceptability[3]	RDL	CC1 24/08/2011 0 - 0.15	CC-SS1 09/08/2013 0 - 0.15	CC2 24/08/2011 0 - 0.15	CC-SS2 09/08/2013 0 - 0.15	CC-DUP1 09/08/2013 0 - 0.15	Duplicate Evaluation RPD (%)	CC3 24/08/2011 0 - 0.15	CC-SS3 09/08/2013 0 - 0.15
Metals (ug/g)													
Sulphur (S)	NC	NC	NC	NA	50	---	74	---	150	81	60	---	<50
Antimony (Sb)	20	NC	NC	NA	0.20	---	<0.20	---	<0.20	<0.20	N/A	---	<0.20
Arsenic (As)	12	12H 17E	30	1.4	1.0	<1.0	<1.0	<1.0	2.3	1.4	47	<1.0	<1.0
Barium (Ba)	500	6800H	NC	NA	0.50	---	9.5	---	44	29	40	---	6.2
Beryllium (Be)	4.0	NC	NC	NA	0.20	---	<0.20	---	0.21	<0.20	0.05	---	<0.20
Boron (B)	NC	NC	NC	NA	5.0	---	<5.0	---	<5.0	<5.0	N/A	---	<5.0
Cadmium (Cd)	10	14H 10 E	**5.0**	3.9	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	N/A	<0.10	<0.10
Chromium (Cr)	64	220H 64E	250	952	1.0	24	7.4	35	16	13	20	10	36
Cobalt (Co)	50	NC	**50**	23	0.10	3.1	1.4	4.1	5.6	3.9	33	1.8	3.3
Copper (Cu)	63	1100H 63E	100	80	0.50	3.8	2.0	4.3	11	6.7	48	3.2	1.5
Lead (Pb)	140	140H 300E	500	126	1.0	3.0	1.8	3.0	4.9	3.7	18.0	2.0	2.6
Molybdenum (Mo)	10	NC	NC	NA	0.50	---	<0.50	---	<0.50	<0.50	N/A	---	<0.50
Nickel (Ni)	45	200H 45E	100	21	0.50	4.2	2.4	5.2	9.0	6.2	36.0	2.5	4.7
Selenium (Se)	1.0	80H 1E	NC	NA	0.50	---	<0.50	---	<0.50	<0.50	N/A	---	<0.50
Silver (Ag)	20	NC	NC	NA	0.20	---	<0.20	---	<0.20	<0.20	N/A	---	<0.20
Thallium (Tl)	1.0	1.0H 1.4E	NC	NA	0.05	---	<0.050	---	0.26	0.16	43	---	<0.050
Tin (Sn)	50	NC	NC	NA	5.0	---	<5.0	---	<5.0	<5.0	N/A	---	<5.0
Uranium (U)	23	23H 500E	NC	NA	0.05	---	0.33	---	0.86	0.62	28	---	0.29
Vanadium (V)	130	130E	NC	NA	5.0	---	19	---	34	31	9	---	100
Zinc (Zn)	200	200E	500	415	5.0	15	7.7	17	34	26	26.0	9.0	11
Mercury (Hg)	6.6	6.6H 12E	**2.0**	0.4	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	N/A	<0.050	<0.050
Physical Properties													
Moisture (%)	NC	NC	NC		1.0	17	16	15	12	10	N/A	17	13

Notes:
1 = CCME Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.
2 = CCME (2007), Canadian Soil Quality Guidelines, Update 7.0, Table 2. Human health soil ingestion and Eco Soil Contact.
3 = Upper Limit of Acceptability is determined as described in Report Section 3.2. Upper limits of acceptability are
NA = Not applicable
NC = No Criteria
RPD= Relative Percent Difference
RDL= Reportable Detection Limit
20 = Exceeds selected guideline.

Table 12
Soil Chemical Concentrations - Metals
INAC Nunvaut Regional Office
Cape Christian, Nunavut

PARAMETER	CCME[1] Residential/ Parkland	CCME[2] Human Health Ingestion (H) / Eco Soil Contact (E)	INAC DEW Line Cleanup Criteria, Tier II	Upper Limit of Acceptability[3]	CC4 24/08/2011 0 - 0.15	CC-BK 09/08/2013 0 - 0.15
Metals (ug/g)						
Sulphur (S)	NC	NC	NC	NA	---	150
Antimony (Sb)	20	NC	NC	NA	---	<0.20
Arsenic (As)	12	12H 17E	30	1.4	<1.0	1.3
Barium (Ba)	500	6800H	NC	NA	---	29
Beryllium (Be)	4.0	NC	NC	NA	---	<0.20
Boron (B)	NC	NC	NC	NA	---	<5.0
Cadmium (Cd)	10	14H 10 E	**5.0**	3.9	<0.10	<0.10
Chromium (Cr)	64	220H 64E	250	952	38	11
Cobalt (Co)	50	NC	**50**	23	3.0	3.6
Copper (Cu)	63	1100H 63E	100	80	1.1	4.7
Lead (Pb)	140	140H 300E	500	126	2.0	3.2
Molybdenum (Mo)	10	NC	NC	NA	---	<0.50
Nickel (Ni)	45	200H 45E	100	21	4.0	5.6
Selenium (Se)	1.0	80H 1E	NC	NA	---	<0.50
Silver (Ag)	20	NC	NC	NA	---	<0.20
Thallium (Tl)	1.0	1.0H 1.4E	NC	NA	---	0.15
Tin (Sn)	50	NC	NC	NA	---	<5.0
Uranium (U)	23	23H 500E	NC	NA	---	0.53
Vanadium (V)	130	130E	NC	NA	---	24
Zinc (Zn)	200	200E	500	415	7.0	27
Mercury (Hg)	6.6	6.6H 12E	**2.0**	0.4	<0.050	<0.050
Physical Properties						
Moisture (%)	NC	NC	NC		17	14

Notes:
1 = CCME Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.
2 = CCME (2007), Canadian Soil Quality Guidelines, Update 7.0, Table 2. Human health soil ingestion and E
3 = Upper Limit of Acceptability is determined as described in Report Section 3.2. Upper limits of acceptabili
NA = Not applicable
NC = No Criteria
RPD= Relative Percent Difference
RDL= Reportable Detection Limit
20 = Exceeds selected guideline.

Table 13
Soil Chemical Concentrations - PCBs
INAC Nunvaut Regional Office
Cape Christian, Nunavut

ARCADIS Design & Consultancy for natural and built assets

PARAMETER	Federal CCME[1] Residential/ Parkland	INAC DEW Line Cleanup Criteria, Tier II	Upper Limit of Acceptability[2]	RDL	CC1 24/08/2011 0 - 0.15	CC-SS1 09/08/2013 0 - 0.15	CC2 24/08/2011 0 - 0.15	CC-SS2 09/08/2013 0 - 0.15	CC-DUP1 09/08/2013 0 - 0.15	Duplicate Evaluation RPD (%)	CC3 24/08/2011 0 - 0.15	CC-SS3 09/08/2013 0 - 0.15
Polychlorinated Biphenyls (ug/g)												
Aroclor 1262	NC	NC	NC	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A	<0.01	<0.01
Aroclor 1016	NC	NC	NC	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A	<0.01	<0.01
Aroclor 1221	NC	NC	NC	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A	<0.01	<0.01
Aroclor 1232	NC	NC	NC	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A	<0.01	<0.01
Aroclor 1242	NC	NC	NC	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A	<0.01	<0.01
Aroclor 1248	NC	NC	NC	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A	<0.01	<0.01
Aroclor 1254	NC	NC	NC	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A	<0.01	<0.01
Aroclor 1260	NC	NC	NC	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A	<0.01	<0.01
Aroclor 1268	NC	NC	NC	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A	<0.01	<0.01
Total PCB	1.3	50	NC	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A	<0.01	<0.01

Notes:

1 = CCME, Canadian Soil Quality Guidelines, Residential / Parkland Use, coarse-grained soils.

2 = Upper Limit of Acceptability, calculated using mean of baseline data +3 standard deviations.

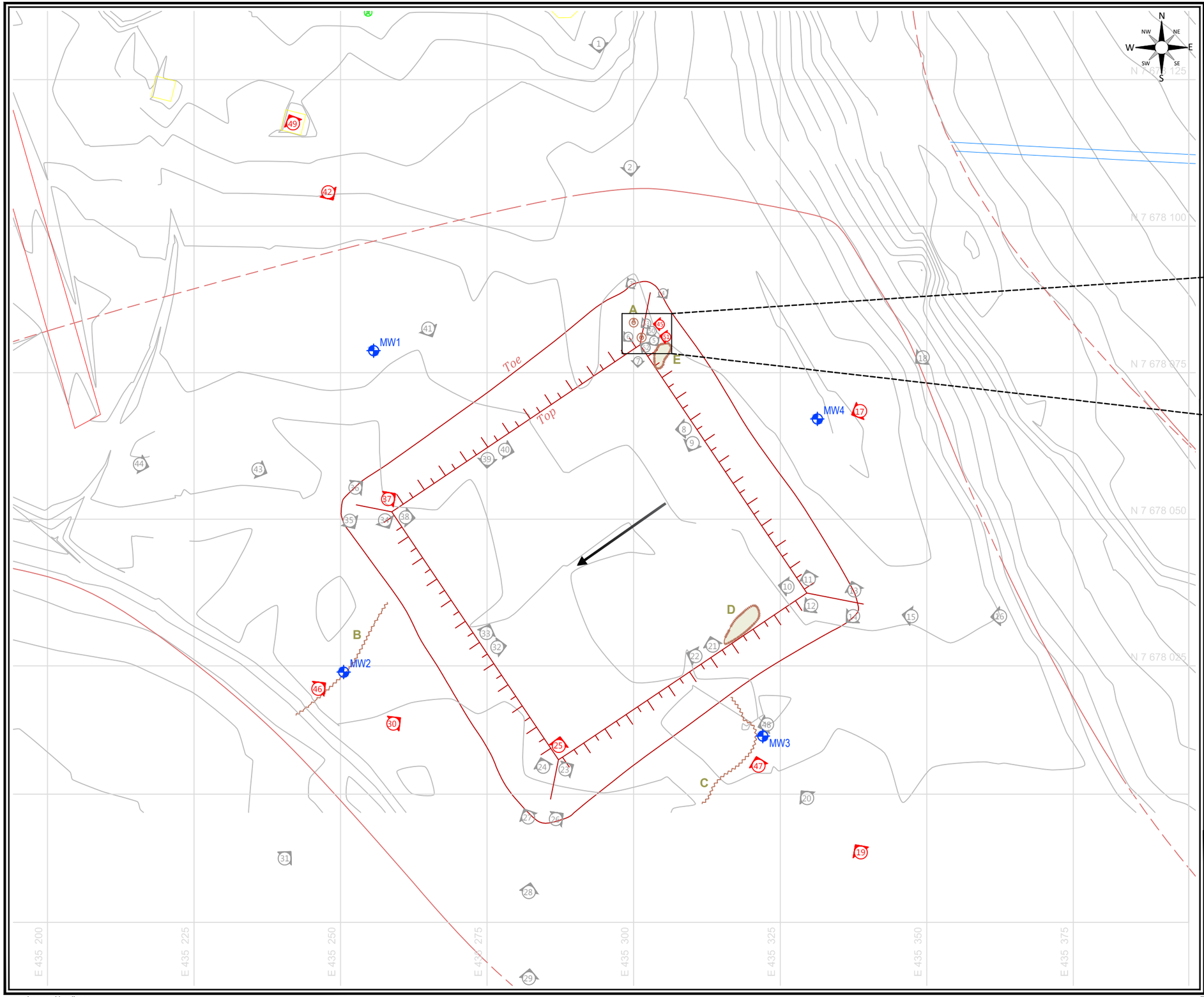
NC = No Criteria

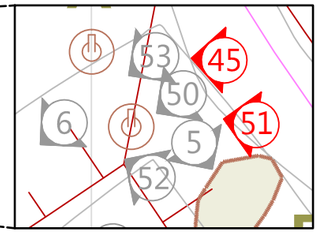
RPD= Relative Percent Difference

RDL= Reportable Detection Limit

20 = Exceeds selected guideline.

FIGURES





Legend

- MW — Monitoring Well Locations
- 25 — Picture Viewpoint Number
- 25 — Viewpoint Photograph Included in Appendix A
- Erosion/Drainage
- Animal Burrow
- A — Feature Letter
- Settlement/Depression
- Slope Direction

Note:
Picture numbers refer to photograph names as they appear on the attached cd-rom.

Reference:
Figure adopted from SENES Consultants drawing C08, dated February 2011

Title: Non-Hazardous Waste Landfill

ARCADIS

Project: PIN-B Clifton Point 1697-1501

Date: October 2015

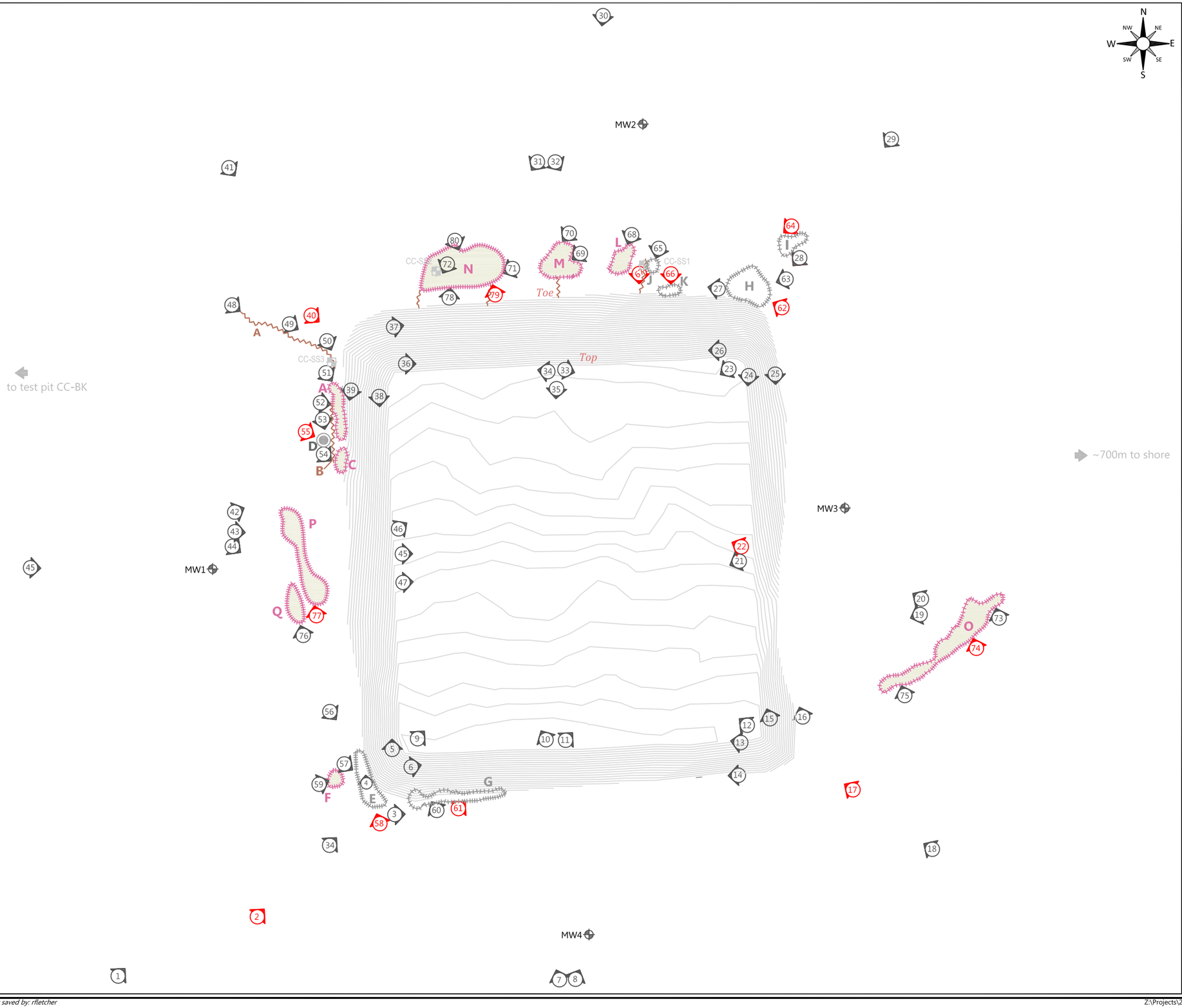
Client: Aboriginal Affairs and Northern Development Canada

Metres 7.5 0 7.5 15
1:650

Figure 1

last saved by: dlogan

Z:\Projects\2015\1697-1501 AANDC DEW Lines\Individual Sites\PIN-B\Figures\1-CAD\PIN-B-2015_Monitoring.dwg(layout)



Legend

- MW — Monitoring Well Locations
- TP — Historical Test Pit Locations
- 25 — Picture Viewpoint Number
- 8 — Viewpoint Photograph Included in Appendices of Report
- A — Staining or Seepage
- Sinkhole
- Settlement
- A — Feature Reference Letter
- (Greyed Out) Feature is no Longer Present

Note:
Picture numbers refer to photograph names as they appear on the attached cd-rom.

Title: Non-Hazardous Waste Landfill

ARCADIS

Project: Cape Christian 1697-1501

Date: November 2015

Client: Aboriginal Affairs and Northern Development Canada

Scale 1:750

20 15 10 5 0 20
metres

Figure 2

last saved by: rfletcher

Z:\Projects\2015\1697-1501 AANDC DEW Lines\Individual Sites\Cape Christian\Figures\1 - CAD\1697-1501_Cape Christian.dwg(layout)

Arcadis Canada Inc.

329 Churchill Avenue North

Suite 200

Ottawa, Ontario K1Z 5B8

Tel 613 721 0555

Fax 613 721 0029

www.arcadis-canada.com