Remediation of the Ennadai Lake Former Weather Station, NU

2014/2015 Annual Report

Prepared on behalf of licensee:
Aboriginal Affairs and Northern Development Canada

Prepared for:
Nunavut Water Board, Licence 1BR-ELR1419

Prepared by:
Stantec Consulting Ltd.
400-1331 Clyde Avenue
Ottawa, ON K2C 3G4

DRAFT

March 31, 2016

Sign-off Sheet

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Prepared by _____
(signature)
Alicja Wierzbicka, M.Env.Sc.

Reviewed by _____
(signature)
David Wilson, CD, M.A.Sc., P.Eng.

Format of this Document

The format of this document is as follows:

Part 1- Nunavut Water Board Annual Report, a tabular summary

Part 2 - Nunavut Water Board Annual Report, a written summary

Part 2 is formatted as follows:

Executive Summary – An overview of the remedial project

Section 1 – Project Summary

Section 2 – Reporting requirements as per Water Licence, Part B, Item 1

Appendix A – Executive Summary in Inuktitut

Appendix B – Water Licence #1BR-ELR1419

Appendix C – Figures

Appendix D – Photograph Log

Appendix E – Comments and photos from the inspector

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PART 1- TABULAR SUMMARY

NWB Annual Report **Year being reported:** 2015

License No:	1BR-ELR1419	**Issued Date:**	March 31, 2014
		Expiry Date:	March 30, 2019

Project Name: The Ennadai Lake Remediation Project

Licensee: Indigenous and Northern Affairs Canada (INAC) aka Aboriginal and Northern Development Canada (AANDC)

Mailing Address:
PO Box 220
Iqaluit, NU
X0A 0H0

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):

Stantec Consulting Ltd. (Stantec) was hired by Public Works and Government Services Canada (PWGSC), on behalf of INAC, to provide construction contract supervision, acting as their Departmental Representatives (DRs) on the site. Remedial works occurred over the February, 2014 to March, 2015 timeframe.

General Background Information on the Project (*optional):

The Project is located in Southwestern Nunavut approximately 380km west of the community of Arviat within the Kivalliq Region. The Project was a former weather station at Ennadai Lake (the Site). It operated as either a manned or unmanned station from 1949 to 1979. The Site was abandoned in the late 1980s to early 1990s.

Licence Requirements: the licensee must provide the following information in accordance with

Part B Item 1

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s):	Ennadai Lake	
Water Quantity:	6 per day	Quantity Allowable Domestic (cu.m)
	avg. 2 per day	Actual Quantity Used Domestic (cu.m)
	not applicable	Quantity Allowable Drilling (cu.m)
	not applicable	Total Quantity Used Drilling (cu.m)

Waste Management and/or Disposal

☐ Solid Waste Disposa	
☑ Sewage	
☐ Drill Waste	
☑ Greywater	
☐ Hazardous	
☐ Other:	Additional details below.

Additional Details:

In 2015, only 2 weeks were spent on-Site for demob (late February to early March). Food waste, sewage, and grey water were transported off-site. Non-hazardous and hazardous wastes that were segregated and packaged in 2014 were transported off-site via Cat train, to Arviat.
In 2014, a total of 213,389 L (214 m^3) of water from Ennadai Lake was used for the months of June through September, 2014 (average 2 m^3/day).
Grey water and wastewater from camp activities were pumped into the Bionest treatment system located on the south side of the camp. This water was then placed into two holding ponds (expanded to 4), where it was sampled and sent for laboratory analysis prior to discharge. A total of 418 m^3 of treated wastewater that met the conditions under Part D of the water licence was discharged.
Remedial Project activities in 2014 included the following:
- development of three borrow sources for use as backfill for excavations, building foundations and construction of the landfarm base. A total volume of 1,208 m^3 from Borrow 1, 323 m^3 from Borrow 5; and 4,906 m^3 from Borrow 6 was used. Upon closure, the borrow sources were regraded and shaped to match the surrounding topography.
- excavation of petroleum hydrocarbon (PHC) and metals-impacted soils was completed. Landfarming of PHC-impacted soils was completed on-site.
- demolition of on-site structures was completed between June 14 and August 10, 2014. Laboratory sampling of materials was completed to determine disposal method (haz or non-haz). Unpainted wood was burned on-site, and confirmatory ash samples indicated the need for off-site disposal.
- overland and overhead pipelines, five large ASTs, and two domestic sized ASTs were inspected for liquids, which were emptied into drums and used to fuel the camp incinerator.
- a non-hazardous landfill was constructed on-site, for disposal of excavated soils and debris that met criteria for non-haz disposal. Approximately 506 m^3 of waste was contained within the landfill. Three permanent monitoring wells were installed at the southwest corner, southeast corner and northeast corner (one upgradient and two downgradient).

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: (as reported to the Spill Hot-line)
Date of Spill:
Date of Notification to an Inspector:
Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc)

No spills reported.

Revisions to the Spill Contingency Plan

SCP submitted and approved - no revision required or proposed

Additional Details:

No spills reported in 2014 and 2015.

Revisions to the Abandonment and Restoration Plan

AR plan submitted and approved - no revision required or proposed

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

Mobilization activities occurred 24 hours a day between February and April 2014. The remedial work was completed between June and September 2014, apart from the final demobilization as per the RAP. Demobilization occurred between February to March 2015. No future work is planned.

Results of the Monitoring Program including:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where sources of water are utilized;

61° 07' 52" W 100° 53' 28" W

Additional Details:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the licence are deposited;

61° 08' 11" W 100° 51' 49" W

Additional Details:

Coordinates above refer to treated sewage disposal – no other waste disposal aside fron non-haz landfill. Untreated, unpainted wood was incinerated in 2014 during remediation work. PHC-impacted soils were excavated and treated in an on-site landfarm. Approximately 506 m^3 of non-hazardous waste was placed in the on-site landfill.

Results of any additional sampling and/or analysis that was requested by an Inspector

No additional sampling requested by an Inspector or the Board

Additional Details: (date of request, analysis of results, data attached, etc)

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

No additional sampling requested by an Inspector or the Board

Additional Details: (Attached or provided below)

Any responses or follow-up actions on inspection/compliance reports

Inspection and Compliance Report received by the Licensee (Date):

Additional Details: (Dates of Report, Follow-up by the Licensee)

A land use/water licence post-remediation inspection occurred on July 8, 2015. A response was sent to PWGSC dated September 18, 2015 for furtherance of information to the NWB. No additional work was warranted at that time.

Any additional comments or information for the Board to consider

Regarding the erosion observation concern raised by the inspector, Stantec reviewed a time series of photos of the APEC 12 slope erosion area from June 24, July 8 and September 2, which showed no increased degradation from July to September. It was noted that corrective action was not warranted at that time, as could be seen when comparing July to September, the erosion scarring had softened, and will likely continue to improve as the surface armours in response to rain and wind. However, this area should be visually monitored again in conjunction with any landfill monitoring undertaken, and reassessed at that time.

Date Submitted:	March 31, 2016	
Submitted/Prepared by:	Stantec, David Wilson	
Contact Information:	**Tel:**	613 738-6090
	Fax:	613 722-2799
	email:	david.wilson@stantec.com

GPS Coordinates for water sources utilized

Source Description	Latitude			Longitude		
	Deg °	Min ′	Sec ″	Deg °	Min ′	Sec ″
Ennadai Lake	61	7	51.6	-100	53	26.9

GPS Locations of areas of waste disposal

Location Description (type)	Latitude			Longitude		
	Deg °	Min ′	Sec ″	Deg °	Min ′	Sec ″
Northwest corner of landfill	61	7	57.4	-100	53	3.6
Northeast corner of landfill	61	7	57.5	-100	53	1.9
Southeast corner of landfill	61	7	56.8	-100	53	1.8
Southwest corner of landfill	61	7	56.7	-100	53	3.5

PART 2 – WRITTEN SUMMARY

EXECUTIVE SUMMARY

ES1 Introduction

The water licence issued by the Nunavut Water Board (NWB) for the remedial work at the Ennadai Lake former weather station (the Site) stipulates in Part B, Item 1, the requirement for the submission of an annual report. This document is intended to fulfill the licensure requirements and provide the NWB with an updated to the status of the remediation program at the Site.

The executive summary written in Inuktitut is attached to this document as Appendix A.

ES2 Location

The Ennadai Lake Remediation Project (the Project) was situated on Ennadai Lake located within the Kivalliq region of Nunavut, approximately 380 km west of Arviat on Hudson Bay, 120 km north of Manitoba and 50 km east of the Northwest Territories (see **Appendix C**). The Project was a former weather station at Ennadai Lake (the Site), which operated as either a manned or unmanned station from 1949 to 1979. The Site was abandoned in the late 1980s to early 1990s.

ES3 Water Licence Overview

Water licence #1BR-ELR1419, Type B was issued by the NWB to Aboriginal Affairs and Northern Development Canada (AANDC; currently Indigenous and Northern Affairs Canada (INAC)) on March 31, 2014. The licence permits the use of fresh water from Ennadai Lake at a maximum of 6 m^3 per day. The licence expires on March 30, 2019. The licence stipulates various requirements such as recording the volumes of fresh water collected, adhering to the monitoring program, and filing of an annual report.

The volume of fresh water collected from Ennadai Lake in 2014 as part of remedial operations at the former weather station was 213,389 L (214 m^3); the volume of fresh water collected from Ennadai Lake in 2015 was 0 L.

The water licence is attached as Appendix B.

ES4 Timeline

The Ennadai Lake former weather station was originally the Royal Canadian Signals Station, which was constructed by the Department of National Defence (DND) between July and October 1949. The equipment was transported to the Site from Churchill, MB, by air and Cat train. DND operated the site until September 18, 1954 when the Site was transferred to the

Department of Transport. Environment Canada's Atmospheric Environment Service took over operation on April 1, 1979. In 1980, Environment Canada established a Reserve at the Site. The surplus buildings were eventually purchased by 59549 Manitoba Ltd.

In 1984, Indian and Northern Affairs Canada notified 59549 Manitoba Ltd that the land beneath the buildings would have to be leased as the government could not sell or transfer the Reserve to the public. A 10 year lease was granted to Tundra Adventures Ltd. (formerly 59549 Manitoba Ltd.) on May 1, 1984 which included the main camp and adjacent airstrip. The lands were reportedly removed from the original Environment Canada Reserve Number. The lands were transferred to Nunavut Tunngavik Incorporated (NTI) in June 1992 and administered by the Designated Inuit Organization. The Site is part of the Nunavut Settlement Area and is surrounded by partially designated Inuit Owned Land. The portion of the Site containing the weather station buildings, and the land surrounding and including the airstrip is designated as Inuit Owned Land. The remainder of the Site is crown land. INAC (formerly AANDC) assumed responsibilities of the Site through the Contaminated Sites Program (CSP). As part of the Federal Contaminated Sites Action Plan (FCSAP) the CSP is to clean up federally owned contaminated sites and to address the environmental liabilities associated with those sites.

A combined Phase I and II Environmental Site Assessment (ESA) was conducted in the summer of 2009 by WESA Inc. (WESA). Nunami Stantec Ltd. (Nunami) completed a spill response report in August 2011 following a leak observed in the fuel system pipeline. In the summer of 2012, a Phase III ESA program was the conducted by EBA Engineering Consultants Ltd. (EBA), and an Archaeological Impact Assessment (AIA) was completed by Golder Associates (Golder). These documents, along with an Environmental Screening Report completed by EBA in 2013, were the basis of the Remedial Action Plan (RAP) and remedial specifications completed by EBA in 2013.

The remedial work was completed byKudlik Construction Ltd. (Kudlik), with construction supervision by Stantec under contract with PWGSC, and it began with the mobilization of equipment and material in February to April 2014. Mobilization included an overland Cat train from Arviat to the Site, with an intermediate stop at Henik Lake, to a staging area created to the east of the Arviat airport runway. In addition, equipment and materials were transported from Iqaluit to Arviat via sealift, unloaded at the beach landing area, and transported to the staging area. Remedial activities were completed between June and September of 2014. Demobilization was completed between February-March 2015, and the remedial project concluded in summer/fall 2015 after the substantial completion inspection, Land Use/Water Licence inspection and close-out meeting.

The project management team, consisting of representatives from PWGSC, INAC, Stantec, and Kudlik, conducted a substantial completion inspection on June 24, 2015. An NWB inspection was conducted on July 8, 2015, and an Elder's Tour was carried out by PWGSC on September 2, 2015. Finally, a close-out meeting was held in Quebec City on October 27, 2015.

ES5 Remediation Program Overview

The 2014 remedial work, completed in accordance with the RAP, generally included:

- demolition of existing structures;
- hazardous material abatement, collection, segregation, and containerization for off-site disposal;
- excavation and on-site remediation via landfarming of soils impacted with petroleum hydrocarbons (PHCs);
- excavation and consolidation of metals-impacted soils;
- construction of an on-site non-hazardous landfill, and consolidation of non-hazardous materials at this landfill; and
- backfill, regrading, and compaction of excavated areas to reinstate former grades across the site.

The 2015 remedial work, completed in accordance with the RAP, generally included:

- off-site transport of hazardous wastes; and,
- off-site transport of equipment and materials.

1.0 PROJECT SUMMARY

1.1 BACKGROUND

The Ennadai Lake weather station (the Site) operated as either a manned or unmanned station from 1949 to 1979. The Site was abandoned in the late 1980s to early 1990s. Remedial operations at the Site began in 2014 and were completed March 2015. As part of the remedial works, a water licence was granted by the Nunavut Water Board (NWB). A copy of the water licence is attached as Appendix B.

1.2 LOCATION

The Ennadai Lake Remediation Project (the Project) was situated on Ennadai Lake located within the Kivalliq region of Nunavut, approximately 380 km west of Arviat on Hudson Bay, 120 km north of Manitoba and 50 km east of the Northwest Territories. Figures 1 and 2, attached within **Appendix C**, show the location of the Site.

1.3 OPERATIONAL HISTORY

The Ennadai Lake former weather station was originally the Royal Canadian Signals Station, which was constructed by the Department of National Defence (DND) between July and October 1949. The equipment was transported to the Site from Churchill, MB, by air and Cat train. DND operated the site until September 18, 1954 when the Site was transferred to the Department of Transport. Environment Canada's Atmospheric Environment Service took over operation on April 1, 1979. In 1980, Environment Canada established a Reserve at the Site. The surplus buildings were eventually purchased by 59549 Manitoba Ltd.

In 1984, Indian and Northern Affairs Canada notified 59549 Manitoba Ltd that the land beneath the buildings would have to be leased as the government could not sell or transfer the Reserve to the public. A 10 year lease was granted to Tundra Adventures Ltd. (formerly 59549 Manitoba Ltd.) on May 1, 1984 which included the main camp and adjacent airstrip. The lands were reportedly removed from the original Environment Canada Reserve Number. The lands were transferred to Nunavut Tunngavik Incorporated (NTI) in June 1992 and administered by the Designated Inuit Organization. The Site is part of the Nunavut Settlement Area and is surrounded by partially designated Inuit Owned Land. The portion of the Site containing the weather station buildings, and the land surrounding and including the airstrip is designated as Inuit Owned Land. The remainder of the Site is crown land. INAC (formerly AANDC) assumed responsibilities of the Site through the Contaminated Sites Program (CSP). As part of the Federal Contaminated Sites Action Plan (FCSAP) the CSP is to clean up federally owned contaminated sites and to address the environmental liabilities associated with those sites.

1.4 REMEDIAL HISTORY

A combined Phase I and II Environmental Site Assessment (ESA) was conducted in the summer of 2009 by WESA Inc. (WESA). Nunami Stantec Ltd. (Nunami) completed a spill reponse report in August 2011 following a leak observed in the fuel system pipeline. In the summer of 2012, a Phase III ESA program was the conducted by EBA Engineering Consultants Ltd. (EBA), and an Archaeological Impact Assessment (AIA) was completed by Golder Associates (Golder). These documents, along with an Environmental Screening Report completed by EBA in 2013, were the basis of the Remedial Action Plan (RAP) and remedial specifications completed by EBA in 2013. A list of these document titles is included within the reference list (see Section 3.0).

The remedial work was completed by Stantec, and it began with the mobilization of equipment and material in February to April 2014. Mobilization included an overland Cat train from Arviat to the Site, with an intermediate stop at Henik Lake, to a staging area created to the east of the Arviat airport runway. In addition, equipment and materials were transported from Iqaluit to Arviat via sealift, unloaded at the beach landing area, and transported to the staging area. Remedial activities were completed between June and September of 2014. Demobilization was completed between February-March 2015.

The project management team, consisting of representatives from PWGSC, AANDC, Stantec, and Kudlik, conducted a substantial completion inspection on June 24, 2015. An NWB inspection was conducted on July 8, 2015, and an Elder's Tour was carried out by PWGSC on September 2, 2015. Finally, a close-out meeting was held in Quebec City on October 27, 2015.

1.5 SUMMARY OF REMEDIAL ACTIVITIES

The 2014 remedial work, completed in accordance with the RAP, generally included:

- demolition of existing structures;
- development of borrow sources for use as backfill for excavations, backfill for building foundations, and construction of a landfarm base;
- collection, containerization, and packaging of hazardous waste such as batteries, old propane cylinders, paint cans, and building materials such as PCB-amended paints;
- collection and consolidation of non-hazardous demolition debris and non-hazardous waste debris including drums;
- collection, consolidation and incineration of fuel waste in drums and ASTs on-site, as well wood waste;
- excavation and on-site remediation via landfarming of soils impacted with petroleum hydrocarbons (PHCs);
- excavation and consolidation of metals-impacted soils;
- construction of an on-site non-hazardous landfill, and consolidation of non-hazardous materials at this landfill; and

- backfill, regrading, and compaction of excavated areas to reinstate former grades across the site.

The 2015 remedial work, completed in accordance with the RAP, generally included:

- off-site transport of hazardous wastes; and,
- off-site transport of equipment and materials.

Figures and photographs showing the remediation activities are attached as **Appendix C** and **D**, respectively. For further details on the program, references are included in Section 3.0.

1.6 THE PROJECT TEAM

Table 1 presents the project team for the remediation program.

Table 1: Project Team

Element	Company/Group	Responsible Person
Site Custodian	INAC	Erika Solski/Dele Morakinyo
Owner's Representative	PWGSC	Michael Bernardin
Remediation Contractor	Kudlik	Francois Bourassa (Project Manager) John Fraser (Site Supervisor) Daniel Fauteux (Hazardous Material Specialist)
Site Quality Assurance/ Departmental Representatives	Stantec	David Wilson (Project Manager) Chris Bowie (Asst. Project Manager) Carlos Philipovsky (Senior Supervisor) Andre Habel (Senior Supervisor) Brenda Thom (Junior/Senior Supervisor) Kassandra DeFrancis (Junior Supervisor) Valerie Gerard (Junior Supervisor) Allison Waldick (Junior Supervisor)

1.7 COMPARISON CRITERIA

Comparison criteria were utilized during assessment and remedial phases.

The INAC Abandoned Military Sites Remediation Protocol (AMSRP) was the main guideline followed during the Site remediation. For parameters not listed in the INAC AMSRP, the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines were used.

2.0 ANNUAL REPORT REQUIREMENTS

This section follows the requirements listed in Part B, Item 1, subsection a) through n).

A) FRESH WATER OBTAINED FROM ENNADAI LAKE

A summary of the monthly and annual quantities of fresh water obtained from all sources, as specified in the water licence, is presented in Table 2, below.

Table 2: Fresh Water Obtained from Ennadai Lake

Month	Volume Usage (m^3)
June 2014	40.756
July 2014	75.854
August 2014	49.644
September 2014	47.135
TOTAL in 2014	213.389
TOTAL in 2015	0

Although limited amounts of fresh water were initially obtained from a small lake just north of the Site, as the water licence specified Ennadai Lake as the water source, as of June 20, 2014, all fresh water was only obtained from Ennadai Lake. The UTM coordinates of the freshwater intake location are 398165.85 Easting and 6778851.11 Northing.

B) EFFLUENT DISCHARGED FROM SEWAGE TREATMENT UNIT

A summary of the camp waste water ponds, including when they were constructed and decommissioned, and their approximate volume, is presented in Table 3. A list of all discharges from the Bionest treatment system, including sampling and discharge dates, is presented in Table 4. A summary of the monthly and annual quantities of effluent discharge from the Bionest treatment system, as specified in the water licence, is presented in Table 5.

Table 3: Camp Wastewater Ponds

Pond	Construction Date	Decommissioning Date	Approximate Volume (m^3)	Comment
1	June 10, 2014	September 29, 2014	12	Inflatable Pool
2	June 10, 2014	September 29, 2014	12	Inflatable Pool
3	June 21, 2014	September 29, 2014	50	Excavated and lined pond
4	June 21, 2014	September 29, 2014	60	Excavated and lined pond

5	August 6, 2014	September 30, 2014	75	Excavated and lined pond

Table 4: Full List of Effluent Discharge from Bionest Treatment System

Ponds	Sampling Date	Discharge Date	Met Discharge Criteria?	Approximate Volume (m^3)
1,2	June 5, 2014[1]	N/A	No	0
1, 2, 3	July 1, 2014	July 12, 2014	Yes	74
4	July 9, 2014	July 12, 2014 [2]	Yes [2]	60
1, 2	August 13, 2014	August 19, 2014	Yes	24
3, 5	September 10, 2014	September 20, 2014	Yes	125
4	September 17, 2014	September 27, 2014	Yes	60
5	N/A [3]	September 30, 2014	N/A [3]	75
TOTAL				**418**

Notes:

1. Effluent from the Bionest was sampled on June 5, 2014 and did not meet applicable guidelines. The UV filter was replaced and the stored effluent was treated with chlorine. The treated effluent in Ponds 1 and 2 was resampled on July 1, 2014.
2. Pond 4 was discharged on July 12 before analytical results had been received. The nonconformance was documented and the subsequent analytical results indicated that the effluent met discharge guidelines.
3. Residual effluent from the Bionest was pumped into Pond 5 for further treatment during decommissioning. The effluent was treated with alum and lime but was not sampled prior to discharge, as discussed with and approved by Stantec.

Table 5: Summary of Monthly Effluent Discharges

Month	Volume Usage (m^3)
July 2014	134
August 2014	24
September 2014	246
TOTAL in 2014	418
TOTAL in 2015	0

C) SUMMARY OF WASTE HANDLING FACILITIES

As per the requirements of the RAP, an on-Site non-hazardous waste landfill was constructed. The non-hazardous landfill was constructed at a location approximately 200 m west of the main Site. The cell was approximately 15 m by 11.4 m (base interior)/22 m by 18.4 m (interior top of berm). Approximately 506 m^3 of waste was contained within the landfill, and three permanent monitoring wells were installed at the southwest corner, southeast corner and northeast corner (one upgradient and two downgradient). The installation of the monitoring wells followed an approved alternative methodology to specification based on the equipment available at the

Site. The alternative to the specification was discussed and approved by Stantec on June 11, 2014. A final as-built drawing of the landfill is presented as Figure 7, in **Appendix C**.

D) REVIEW AND RECOMMENDATIONS TO THE MONITORING PROGRAM

No recommendations to the monitoring program at the Site have been received.

E) SUMMARY OF RESTORATION WORK AND FUTURE WORK PLANNED

No abandonment and restoration work was undertaken at the Site during either 2014 or 2015. All work completed at the site was remedial work, further outline in Section (L) below.

F) (I) TRENCH AND SUMPS

Trench and sumps were not constructed as part of the remedial works at the Site.

G)(F) UNAUTHORIZED DISCHARGES

Pond 4 was discharged on July 12, 2014, before analytical results had been received. The non-conformance was documented and the subsequent analytical results indicated that the effluent met discharge guidelines. This is the only instance of unauthorized discharge during the 2014/2015 remedial works.

H) (G)REVISIONS TO SPILL CONTINGENCY PLAN

No changes were made to the spill contingency plan submitted and approved by the NWB.

I) (H)INSPECTION REPORTS – DEFICIENCIES AND CORRECTIVE ACTION

A Land Use/Water Licence post-remediation inspection was conducted on July 8, 2015. The inspector had the following concerns:

- Erosion to hill side near old fuel tank locations (61° 7' 52.82"N, 100° 53' 20.8"W)
- 20 fuel drums, unlabeled, suspected owner GN-DOE (61° 8' 1.78"N, 100° 52' 26"W)
- 7 drums of fuel with public works labels and 20 unknown drums at airstrip (61° 8' 1.78"N, 100° 52' 26"W)
- A number of locations had little pieces of garbage near old main building area (61° 7' 53.89"N, 100° 53' 25.68"W)

Stantec reviewed the erosion observation concern and provided a recommendation to PWGSC/AANDC on September 18, 2015, as follows: the time series of photos of the APEC 12

slope erosion area from June 24, July 8 and September 2, shows no increased degradation from July to September – corrective action is not warranted at this time, as there will likely be consolidation of backfill materials over the next couple of years, particularly after each freeze/thaw cycle, which could potentially further degrade this location, or initiate others. Conversely, as can be seen when comparing July to September, the erosion scarring has softened, and will likely continue to improve as the surface armours in response to rain and wind. It should be visually monitored again next year, in conjunction with any landfill monitoring undertaken, and reassessed at that time.

Comments and photos from the inspector are included in **Appendix E**.

J) (I) EXECUTIVE SUMMARY

An executive summary in both English and Inuktitut is a requirement under Part B, Item 1, subsection I of the licence. The licence stipulates that all plans, reports, or studies conducted under this licence contain an executive summary in both languages.

The Inuktitut executive summary of this report is attached in Appendix A. The English executive summary appears at the front of this document.

K) (J) SUMMARY OF MONITORING PROGRAM RESULTS

The monitoring program as stipulated in Park K, Item 2, is summarized below in Table 6.

Table 6: Overview of the Monitoring Program

Proposed Monitoring Program Station Number	Actual Station Number	Description	Parameters
ELR-1	none	Monitoring Station installed at the freshwater intake location	As per Part D
ELR-2a		Monitoring Station installed at the Sewage Treatment Unit – Lagoon No. 1 discharge point	
ELR-2b		Monitoring Station installed at the Sewage Treatment Unit – Lagoon No. 2 discharge point	
ELR-3	none	Monitoring Station installed at the discharge point of the surface water collection system for the Landfarm Facility	No water was discharged from the Landfarm Facility.
ELR-4	MW13-1	Monitoring well installed down-gradient of the Landfarm Facility	As per Part K
ELR-5	MW13-2	Monitoring well installed down-gradient of the Landfarm Facility	
ELR-6	MW13-3	Monitoring well installed up-gradient of the Landfarm Facility	
ELR-7	MWLF-1	Monitoring well installed down-	As per Part K

Proposed Monitoring Program Station Number	Actual Station Number	Description	Parameters
		gradient of the Non-Hazardous Waste Landfill Facility	
ELR-8	MWLF-2	Monitoring well installed down-gradient of the Non-Hazardous Waste Landfill Facility	
ELR-9	MWLF-3	Monitoring well installed up-gradient of the Non-Hazardous Waste Landfill Facility	As per Part K
ELR-10	none	Monitoring Station installed at discharge point of the surface water collection system for the Non-Hazardous Waste Landfill Facility	No water was discharged from the Non-Hazardous Waste Landfill Facility.
ELR-11		Monitoring Station installed at the discharge point of demolition waste rinse water collection area	

Additional details regarding each of the monitoring programs is provided below..

Landfarm

Three temporary monitoring wells were installed, one at each of the northwest corner, southwest corner and east of the landfarm on June 21, 2014. The monitoring wells were installed using an excavator to complete a test pit as far into the permafrost as possible. This constituted an alternative to the specifications; it was discussed and approved by Stantec on June 11, 2014. A section of 5 cm stainless steel riser was installed below the screen, in MW13-1 and MW13-3, to collect any water passing through the 5 cm diameter, 0.5 mm slot screen. No collection riser was installed in MW13-2 due to the shallow depth of permafrost. Screen lengths varied based on the depth of the available test pit, and a filter cloth was secured around the screen. Native material was used as backfill around the collection riser, and then screened Type II material from Borrow 6 was used as filter pack around the screen and extending approximately 20 cm above the screen. A hydrated bentonite seal, ranging between 6 and 8 cm in thickness, was placed around the well casing on top of the filter pack. Native material was used as backfill to surface and mounded around the protective casing. A 20 cm aluminum protective casing was installed around the well at each location. Large boulders were also placed around the wells to prevent damage from vehicles. The monitoring well construction details are summarized in Table 7.

Table 7: Landfarm Monitoring Well Construction Details

Monitoring Well ID	Location	GPS Coordinates	Total Depth (m bgs)	Collection Riser Depths (m bgs)	Screen depths (m bgs)	Filter Pack Thickness	Bentonite Seal Depth	Riser Length Above Screen (m)	Backfill Depths (m bgs)	Stick – up (m)
MW13-1	NW of	398789.2 E	2.55	2.55-1.55	1.55 -	1.70 – 0.4	0.40 - 0.30	0.55	0.30 - 0	1.0

	Landfarm	6779135 N			0.55					
MW13-2	SW of Landfarm	398801.3 E 6779071 N	1.00	n/a	1.00 - 0.40	1.00 - 0.20	0.20 - 0.12	0.4	0.12 - 0	0.40
MW13-3	East of Landfarm	398999.2 E 6779108 N	1.80	1.80 - 1.40	1.40 - 0.40	1.50 – 0.20	0.20 - 0.14	0.4	0.14 - 0	0.6

Notes:
m bgs - meters below ground surface
m - meter
n/a - not applicable

During landfarm operation, the monitoring wells were monitored regularly for water levels. If there was sufficient water present in the well, a water sample was collected and submitted for laboratory analysis of general inorganics, benzene, toluene, ethylbenzene and xylenes (BTEX), PHCs, total metals, and select dissolved metals. A summary of the water levels present in the landfarm monitoring wells is presented in Table 8.

Table 8: Landfarm Monitoring Well Water Levels

Well ID	MW13-1			MW13-2			MW13-3		
	NW of Landfarm			SW of Landfarm			East of Landfarm		
Monitoring date	Depth to water (m bTOC)	Well Depth (m bTOC)	Water Thickness (m)	Depth to water (m bTOC)	Well Depth (m bTOC)	Water Thickness (m)	Depth to water (m bTOC)	Well Depth (m bTOC)	Water Thickness (m)
07/03/2014	Dry	3.63	Dry	1.34	1.49	0.15	2.35	2.36	0.01
07/05/2014	Dry	Nm	Dry	1.38	1.491	0.11	NM	NM	NM
07/06/2014	Dry	3.63	Dry	1.39	1.49	0.09	2.35	2.36	0.01
07/10/2014	Dry	3.63	Dry	1.40	1.49	0.09	Dry	2.36	Dry
07/12/2014	Dry	3.63	Dry	1.20	1.49	0.29	2.35	2.36	0.01
07/13/2014	Dry	3.63	Dry	1.19	1.49	0.30	Dry	2.36	Dry
07/17/2014	Dry	3.63	Dry	1.33	1.49	0.16	2.36	2.36	0.0
07/21/2014	Dry	3.63	Dry	1.23	1.49	0.26	2.36	2.36	0.0
07/28/2014	Dry	3.63	Dry	1.38	1.49	0.10	2.36	2.36	0.0
08/02/2014	Dry	3.63	Dry	1.37	1.48	0.11	2.35	2.36	0.01
08/09/2014	Dry	3.63	Dry	1.32	1.49	0.18	2.36	2.36	0.0
08/17/2014	Dry	NM	Dry	1.41	1.49	0.08	NM	NM	NM
08/29/2014	Dry	3.63	Dry	1.31	1.49	0.18	2.36	2.36	0.0
09/01/2014	Dry	NM	Dry	NM	NM	NM	NM	NM	NM
09/08/2014	Dry	3.63	Dry	1.30	1.49	0.19	Dry	2.36	Dry
09/16/2014	Dry	3.63	Dry	1.31	1.49	0.18	Dry	2.36	Dry
09/23/2014	Dry	3.63	Dry	1.30	1.49	0.19	Dry	2.36	Dry

Notes:
m bTOC - meters below top of casing
m - meter
Nm - not monitored

Dry - No water collected in the monitoring well.

On September 26, 2014, once the landfarm soil remediation was complete, the monitoring wells were decommissioned by removing the monitoring well and backfilling with native material.

Landfill

Three permanent monitoring wells were installed, one at each of the southwest corner on August 18, 2014, southeast corner and northeast corner of the landfill on August 1, 2014. The monitoring wells were installed using an excavator to complete a test pit as far into the permafrost as possible. This constituted an alternative to the specifications; it was discussed and approved by Stantec on June 11, 2014. The wells had the same general construction details as the landfarm monitoring wells discussed above for the landfarm. One difference was native material was used as backfill around the collection riser and screen in MWLF-1 and MWLF-2, and around the collection riser in MWLF-3. Screened Type II material from Borrow 1 was used as filter pack around the screen and extending approximately 20 cm above and below the screen in MWLF-3. The monitoring well construction details are summarized in Table 9.

Table 9: Landfill Monitoring Well Construction Details

Monitoring Well ID	Location	GPS Coordinates	Total Depth (m bgs)	Collection Riser Depths (m bgs)	Screen depths (m bgs)	Filter Pack Thickness	Bentonite Seal Depth	Riser Length Above Screen (m)	Backfill Depths (m bgs)	Stick – up (m)
MWLF-1	SE of Landfill	398562.9 E 6778995 N	3.60	3.60-2.60	1.60-2.60	2.60-1.60	0.50-0.30	0.30	0.30-0	0.40
MWLF-2	SW of Landfill	398504.3 E 6778998 N	3.40	3.40-2.40	2.40-1.40	2.40-1.40	0.70-0.50	0.5	0.5-0	0.60
MWLF-3	NE of Landfill	398557.4 E 6779038 N	2.10	2.10-1.45	1.45-0.45	1.55-0.35	0.35-0.15	0.45	0.15-0	0.80

Regularly during the filling of the landfill, the monitoring wells were monitored for water levels. If there was sufficient water present in the well, a water sample was collected and submitted for laboratory analysis of general inorganics, BTEX, PHCs, total metals, and select dissolved metals. A summary of the water levels present in the landfill monitoring wells is presented in Table 10.

Table 10: Landfill Monitoring Well Water Levels

Well ID	MWLF-1			MWLF-2			MWLF-3		
	SE of Landfill			SW of Landfill			NE of Landfill		
Monitoring date	Depth to water (m bTOC)	Well Depth (m bTOC)	Water Thickness (m)	Depth to water (m bTOC)	Well Depth (m bTOC)	Water Thickness (m)	Depth to water (m bTOC)	Well Depth (m bTOC)	Water Thickness (m)
08/09/2014	Dry	3.64	Dry	Dry	3.68	Dry	NC	NC	NC

Well ID	MWLF-1			MWLF-2			MWLF-3		
	SE of Landfill			SW of Landfill			NE of Landfill		
Monitoring date	Depth to water (m bTOC)	Well Depth (m bTOC)	Water Thickness (m)	Depth to water (m bTOC)	Well Depth (m bTOC)	Water Thickness (m)	Depth to water (m bTOC)	Well Depth (m bTOC)	Water Thickness (m)
08/29/2014	Dry	3.65	Dry	Dry	3.68	Dry	1.367	2.41	1.043
09/01/2014	Dry	NM	Dry	Dry	NM	Dry	1.315	2.41	1.095
09/08/2014	Dry	3.64	Dry	Dry	3.68	Dry	1.29	2.41	1.12
09/16/2014	Dry	3.64	Dry	Dry	3.68	Dry	1.46	2.41	0.95
09/23/2014	Dry	3.65	Dry	Dry	3.68	Dry	1.508	2.409	0.901
09/30/2014	Dry	6.64	Dry	Dry	3.68	Dry	1.217	2.409	1.192

Notes:
m bTOC - meters below top of casing
m - meter
Nm - not monitored
Dry - No water collected in the monitoring well.
NC - Well not yet constructed.

L) (K) ANALYSIS OF DATA COLLECTED DURING MONITORING PROGRAM

The monitoring program of surface water and groundwater, pursuant to the conditions outlined in the water licence, includes the following tasks:

b) sampling of effluent discharge
k) i) water monitoring at landfarm
ii) water monitoring at landfill

Each of the monitoring programs included laboratory analysis of water samples collected from holding ponds or monitoring wells. Prior to discharge, effluent from ponds was sampled and compared to the applicable criteria, to ensure that it met the conditions under Part D of the water licence. Similarly, water from the monitoring wells collected at the landfarm and landfill were submitted for laboratory analysis to confirm that they met the conditions under Part K of the water licence.

As noted in Section B) above, grey water and waste water were treated and collected in ponds. The water in these ponds was submitted for laboratory analysis to confirm that it met the criteria set out under Part D, prior to discharge.

In the landfarm and landfill, all monitoring wells contained insufficient volume and effluent was not discharged from the treatment cell. Where any water was collected, the sample was submitted for laboratory analysis to confirm that it met the criteria set out under Part K.

The analytical results of the landfarm monitoring program indicated that water within this feature did not exceed criteria as outlined in the water licence. Therefore, following completion of landfarming, the temporary monitoring wells were decommissioned.

The analytical results of the landfill monitoring program indicated that water within this feature did not exceed criteria as outlined in the water licence – some parameters exceeded CCME freshwater aquatic life criteria (aluminum, copper, iron, lead, mercury, silver and zinc). Parameters that are indicative of anthropogenic inputs such as PHCs and PAHs all showed results below reportable detection limits. The monitoring wells located at the landfill should continue to be monitored until trends are established. There is no groundwater-to-surface water pathway present at the landfill location, and groundwater extent is minimal (short season where an active layer is present).

M)(L)SUMMARY OF REMEDIATION WORK AND FUTURE WORK PLANNED

A summary of the remediation work completed to date, along with future work planned for the remedial project, is shown below in Table 11.

Table 11: Summary of Work Completed and Future Work Planned

Item	Description	Completed	Future Work Planned
Demolition Waste	Demolish all on-Site structures, and submit samples for analysis of PCBs, lead or asbestos. Direct disposal method using lab data, and either place in the on-site non-hazardous landfill, or containerize for off-site disposal. Unpainted wood was burned at the Site, and confirmatory samples of the ash indicated the need for off-site disposal.	Incinerated or landfilled in 2014. Transported off-site in 2015.	None
Pipelines, ASTs and Drums	Inspect all for liquids, and consolidate any remaining fuels; use to fuel camp incinerator. Rinse emptied drums, and either crush and place them in landfill, or containerize for off-site disposal.	Landfilled in 2014, or transported off-site in 2015.	None
Hazardous Waste	Consolidate and containerize for off-site disposal.	Transported off-site in 2015.	None
PHC-impacted Soils	Excavate and treat on-site in landfarm. If any exceedances noted, either place in on-site landfill, or containerize for off-site disposal.	Landfilled in 2014, or transported off-site in 2015.	None
Metals-impacted soils	Excavate and either place in on-site landfill, or containerize for off-site disposal.	Landfilled in 2014, or transported off-site in 2015.	None

N) (M) EFFLUENT DISCHARGE FROM LANDFARM FACILITY

No effluent was discharged from the Landfarm Facility.

O)(N) OTHER DETAILS

No other details were requested by the Nunavut Water Board as of October 27, 2015.

3.0 REFERENCES

EBA Engineering Consultants Ltd. (EBA). 2013. Phase III Environmental Site Assessment Hazardous and Non-Hazardous Materials Audit and Geotechnical Evaluation, Ennadai Lake, Nunavut. January 2013.

EBA Engineering Consultants Ltd. (EBA). 2013. Remedial Action Plan former Weather Station, Ennadai Lake, Nunavut. February 2013.

Golder Associates (Golder). 2012. Archaeological Impact Assessment. Ennadai Lake Weather Station. November 2012.

Nunami Stantec. 2011. Ennadai Lake Site KW007 – Spill Response, Final Report, August 2011.

Stantec Consulting Ltd. 2015. Site Supervision at Ennadai Lake Former Weather Station, NU. Final Remediation Report. July 24, 2015.

Stantec Consulting Ltd. 2016. Ennadai Lake Remediation Report Addendum: Substantial Completion Inspection, Non-hazardous Solid Waste Landfill Monitoring and Close-out Meeting. Final Report. March 30, 2016.

WESA Inc. (WESA). 2010. Integrated Phase I and Phase II Environmental Site Assessment, KW007 – Ennadai Lake, WESA, March 2010, File: KB7881-07.

Appendix A INUKTITUT EXECUTIVE SUMMARY

Appendix B WATER LICENCE

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

File No.: 1BR-ELR1419

March 31, 2014

Natalie Plato
Director, Contaminated Sites
Aboriginal Affairs and Northern Development Canada
PO Box 2200
Iqaluit, NU X0A 0H0

Email: natalie.plato@aandc-aadnc.gc.ca

RE: NWB Licence No. 1BR-ELR1419

Dear Ms. Plato:

Please find attached Licence No. 1BR-ELR1419 issued to Aboriginal Affairs and Northern Development Canada (AANDC) by the Nunavut Water Board (NWB) pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada*. The terms and conditions of the attached Licence related to water use and waste disposal are an integral part of this approval.

If the Licensee contemplates the renewal of this Licence, it is the responsibility of the Licensee to apply to the NWB for its renewal. The past performance of the Licensee, new documentation and information, and issues raised during a public hearing, if the NWB is required to hold one, will be used to determine the terms and conditions of the Licence renewal. Note that if the Licence expires before the NWB issues a new one, then water use and waste disposal must cease, or the Licensee will be in contravention of the *Nunavut Land Claims Agreement* (NLCA) and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (NWNSRTA). However, the expiry or cancellation of a licence does not relieve the holder from any obligations imposed by the licence. The NWB recommends that an application for the renewal of this Licence be filed at least three (3) months prior to the Licence expiry date.

If the Licensee contemplates or requires an amendment to this licence, the NWB may decide, in the public interest, to hold a public hearing. The Licensee should submit applications for amendment as soon as possible to give the NWB sufficient time to go through the amendment process. The process and timing may vary depending on the scope of the amendment. However, a minimum of sixty (60) days is required from time of acceptance by the NWB. It is the responsibility of the Licensee to ensure that all application materials have been received and acknowledged by the Manager of Licensing.

The NWB strongly recommends that the Licensee consult the comments received by interested

persons on issues identified. This information is attached for your consideration.[1]

Sincerely,

Thomas Kabloona
Nunavut Water Board
Chair

TK/es/ri

Enclosure:

Licence No. **1BR-ELR1419**
Comments – AANDC, DFO

cc: Distribution – Kivalliq

1 Aboriginal Affairs and Northern Development Canada (AANDC), December 13, 2013; Fisheries and Oceans Canada (DFO), November 19, 2013.

DECISION

LICENCE NUMBER: 1BR-ELR1419

This is the decision of the Nunavut Water Board (NWB) with respect to an application dated September 09, 2013 for a new Water Licence made by:

ABORIGINAL AFFAIRS AND NORTHERN DEVELOPMENT CANADA – CONTAMINATED SITES

to allow for the use of water and disposal of waste to support remediation activities at the Ennadai Lake, former Weather Station Remediation Project Site located within the Kivalliq Region, Nunavut, generally at the following geographical coordinates:

Latitude: 61° 08’ 07” N	Longitude: 100° 53’ 51” W
Latitude: 61° 08’ 07” N	Longitude: 100° 51’ 46” W
Latitude: 61° 07’ 37” N	Longitude: 100° 51’ 46” W
Latitude: 67° 07’ 37” N	Longitude: 100° 53’ 51” W **(**Project Extents)
Latitude: 61° 08’ 03.8” N	Longitude: 100° 51’ 59.11” W **(**Camp Location)

DECISION

After having been satisfied that the application was subject to a 12.4.4(a) Screening Decision by the Nunavut Impact Review Board[2] in accordance with Article 12 of the *Nunavut Land Claim Agreement* (*NLCA*), the NWB decided that the application could proceed through the regulatory process. In accordance with S.55.1 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (*Act*) and Article 13 of the *NLCA*, public notice of the application was given and interested persons were invited to make representations to the NWB.

After reviewing the submission of the Applicant and considering the representations made by interested persons, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the *NLCA* and of the *Act*, waived the requirement to hold a public hearing, and determined that:

Licence No. 1BR-ELR1419 be issued subject to the terms and conditions contained therein. (Motion #: 2013-B1-053)

[2] NIRB Screening Decision dated February 24, 2014.

SIGNED this 7th day of March, 2014 at Gjoa Haven, NU.

Thomas Kabloona
Nunavut Water Board
Chair

TK/es/ri

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NWB LICENCE No. 1BR-ELR1419

I. BACKGROUND

The Ennadai Lake Remediation Project (the Project) is located in Southwestern Nunavut approximately 380km west of the community of Arviat within the Kivalliq Region. The Project was a former weather station at Ennadai Lake (the Site). It operated as either a manned or unmanned station from 1949 to 1979. The Site was abandoned in the late 1980s to early 1990s. Aboriginal Affairs and Northern Development Canada (AANDC) has assumed responsibilities of the site through the Contaminated Sites Program (CSP) As part of the Federal Contaminated Sites Action Plan (FCSAP) the CSP is to clean up federally owned contaminated sites and to address the environmental liabilities associated with those sites.

EBA Engineering Consultants Ltd. (EBA) was retained by Public Works and Government Services Canada (PWGSC) on behalf of AANDC to complete a Remedial Action Plan (RAP), and an Environmental Screening Report (ESR) for the Ennadai Lake remediation project. Activities planned as part of the site remediation phase of the project include the followings:

- Access to site;
- Roads and the airstrip will be re-constructed and repaired as required;
- A camp to support site operations will be established;
- Existing site infrastructure will be demolished waste will be segregated into hazardous and non-hazardous materials and disposed of properly;
- Non-hazardous wastes including scattered debris and partially buried debris will be put in the non-hazardous landfill to be constructed;
- All Hazardous wastes will be disposed of, at an off-site licensed disposal facility;
- Contaminated soils will be handled as described in the RAP; and
- Several borrow sources will be developed and the material will be used during the remediation work.

II. PROCEDURAL HISTORY

On September 09, 2013, the NWB received the following documents as part of the Water Licence Application (Application) submitted by the AANDC in support of the Ennadai Lake Remediation Project:

- Application Cover letter;
- Application for new water licence;
- Archaeological Impact Assessment;
- Environmental Screening Report;
- Kudlik Construction Ltd. Mobilization Plan;

- List of additional documents;
- Maps and Drawings;
- NIRB Part 1 and 2 Forums;
- NPC Conformity
- Project schedule;
- Project Summaries, English, Inuktitut;
- Remedial Action Plan;
- Site Specific Health plan;
- Spill Contingency Plan;
- Landfarm Questionnaire; and
- Exploration/ Remote Camp Questionnaire.

Following the review of the application and the Applicant's submission of outstanding information, the NWB acknowledged receipt and originally distributed the application, on October 11, 2013. Due to a technical issue with the internet/e-mail all parties did not receive a notice regarding the application, and on November 14, 2013, the application was re-distributed to the public for another thirty (30) day comment and review period, with a deadline for comments being set for December 14, 2013. Submissions were received from AANDC, and Fisheries and Oceans Canada (DFO). None of the intervening parties objected, in principle, and no public concern was expressed during the notice period. Therefore, the NWB waived the requirement to hold a public hearing and proceeded with the application process.

On February 24, 2014, the Nunavut Impact Review Board (NIRB) informed that the application was subject to 12.4.4(a) Screening Decision by in accordance with Article 12 of the *Nunavut Land Claim Agreement* (*NLCA*).

Based upon the results of the detailed assessment of the Application, including consideration of any potential accidents, malfunctions, or impacts to water that the overall project might have in the area, the Board has approved the Application and has issued the Water Licence 1BR-ELR1419.

III. GENERAL CONSIDERATIONS

Term of Licence

In accordance with the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* s. 45, the NWB may issue a licence for a term not exceeding twenty-five years. The applicant requested a five-year term for this licence, which the NWB believes is consistent with and appropriate for the type of activities proposed in the application. The Board has therefore granted the five-year term requested by the applicant.

Annual Report

Under the reporting section in the Licence, Part B, Item 1, the Licensee is required to submit, on an annual basis, a report that pertains to water use and waste deposit. This information is kept in the NWB's public registry and made available to interested persons upon request. In

addition, the NWB maintains annual reporting information on its FTP site, which can be accessed using the following link (username: ***public*** and password: ***registry***): http://nunavutwaterboard.org/en/public_registry.

Water Use

The proponent has requested the use of six (6) cubic metres per day of water for domestic and miscellaneous purposes including construction activities, as identified in the Application. Water for the purposes described will be obtained from Ennadai Lake directly and pumped into a mobile tank and transferred into a tank at the proposed camp location where three (3) cubic metres per day of the water quantity requested will be used for domestic purposes while the remaining three (3) cubic metres per day will be used for miscellaneous purposes including construction activities. The NWB has determined that the quantity of water requested is appropriate for the type of undertaking and has set a maximum water use for all purposes under this Licence at six (6) cubic metres per day in Part C, Item 1.

Disposal of Waste

Aggregate or Borrow Sources
The Licensee has indicated that borrow sources will be developed for the purposes of the supplying granular material required for project-related construction activities including upgrading the trail network and potentially the airstrip, the construction of Landfill Facility and a Landfarm for the treatment of hydrocarbon contaminated soil. As part of the geotechnical investigation conducted in 2012, seven (7) borrow areas were investigated within the vicinity of the Project area. The information provided in the Application does not indicate whether any of the sources identified contains material that might possess acid-generating and/or metal leaching properties. Therefore NWB has included requirements under Part E in the Licence that aggregates for use by the project must be obtained from approved sources only. Further, the Licensee is required to implement adequate drainage control measures at sites associated with aggregate sources to prevent or minimize sediment loading into nearby freshwater bodies.

Sewage
The Licensee has stated that camp sewage and greywater will be treated using a Sewage Treatment Unit in conjunction with two independently operated temporary lagoons. Each lagoon will have a capacity of approximately 35 cubic metres, excluding freeboard. Effluent from the lagoons will be monitored to ensure that the characteristics of the effluent are consistent with that of Effluent quality limits stipulated in the Licence, prior to discharging into the environment. The Board has set criteria to govern the lagoons' effluent quality under Part D, Item 6 of the Licence.

Non-Hazardous waste
The Licensee has stated that solid combustible camp waste (paper, packaging, food etc.) will be incinerated. It is recommended that burning should only be considered after all other alternatives for waste disposal have been explored and the devices used for incineration should

meet the emission limits established under CCME Canada-wide Standards (CWS) for Dioxins and Furans and the CWS for Mercury Emissions, available at: http://www.ccme.ca/ourwork/environment.html?category_id=108

The Licensee has proposed to construct a Non – Hazardous waste landfill to treat Solid Wastes, Residues from incinerated combustible wastes; double bagged asbestos materials, Tier I/ Type A soils and Non-Hazardous wastes originating from the Ennadai Lake Remediation Project. The board has included conditions relating to the disposal of Non-Hazardous Waste under Part D, Item 4 in the license.

Hazardous waste
The Licensee has proposed to package and ship to approved facilities in the south, all hazardous wastes including waste oil, creosote treated wood, metal impacted soil, items contaminated with PCBs and lead. It should be noted that all hazardous wastes must be handled in accordance with applicable regulations including the *Transportation of Dangerous Goods Act*. The Licensee is required, under Part D to dispose of all hazardous substances and/or materials at approved facilities.

Landfarm
A Hydrocarbon Impacted Soil Facility (Landfarm Facility) is to treat Type B hydrocarbon contaminated soil. It is anticipated that soil in excess of the criteria specified in Abandoned Military Site Remediation Protocol (AMSRP) *(*INAC, 2008) and soil impacted with Petroleum Hydrocarbons (PHCs) fractions F1 to F2 as defined in the Canada-Wide Standard (CWS) for *Petroleum Hydrocarbons in Soil* (CCME 2008) will be treated in the Landfarm. There are impacted areas with F3 contaminated Soils identified that may be treated in a separate Land Treatment Area or removed off site. *The CCME CSQGs* Requirements for the Landfarm Facility have been included under Part D in the Licence. The Landfarm Design Drawings for Tender were included with the application. The Licensee will be required to provide to the Board, within 90 days of the completion of construction a Construction Summary Report with as-built drawings stamped by an Engineer.

In addition, the Licensee is required to submit to the Board for approval, at least sixty (60) days prior to commissioning, an Operation and Maintenance Manual for the Waste Disposal Facilities as indicated under Part E, Item 3. In addition to operation and maintenance procedures, the manual shall also include as-built design drawings for the Facility approved under the Licence.

Monitoring

Conditions have been included in the Licence, under Part K, requiring the Licensee to install Monitoring Stations at the Water Supply intake, Sewage Treatment Facilities, Non-Hazardous Waste Landfill Facility, and the Landfarm Facility. The Licensee is required to submit to the Board for review, a Quality Assurance/ Quality Control (QA/QC) Plan. The Plan must be approved by an accredited laboratory confirming that the plan is acceptable. All of the monitoring results are to be provided to the NWB as part of the annual report. This requirement is included in Part K, Item 13 of the Licence.

Spill Contingency Planning

The Board has approved under Part I, Item 1 of the License the Spill Contingency Plan (SCP) submitted by the Licensee with the application.

Abandonment and Restoration

The Board has approved, under Part J Item 1 of the Licence, the Remedial Action Plan that was submitted as additional information with the application. The Licensee is required to submit to the Board for review, any revisions carried out under the Plan at any stage of the project.

NUNAVUT WATER BOARD
WATER LICENCE

Pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*, the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVEVELOPMENT
(Licensee)

PO BOX 2200, IQALUIT, NUNAVUT X0A 0H0
(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water or dispose of waste for a period subject to restrictions and conditions contained within this Licence:

Licence Number/Type:	1BR-ELR1419 TYPE "B"
Water Management Area:	UPPER KAZAN - ENNADAI LAKE (07)
Location:	ENNADAI LAKE (FORMER WEATHER STATION) REMEDIATION SITE, KIVALLIQ REGION, NUNAVUT
Classification:	INDUSTRIAL UNDERTAKING
Purpose:	DIRECT WATER USE AND DEPOSIT OF WASTE
Quantity of Water use not to Exceed:	SIX (6) CUBIC METRES PER DAY
Date of Licence Issuance:	MARCH 31, 2014
Expiry of Licence:	MARCH 30, 2019

This Licence, issued and recorded at Gjoa Haven, Nunavut, includes and is subject to the annexed conditions.

Thomas Kabloona,
Nunavut Water Board
Chair

PART A: SCOPE, DEFINITIONS AND ENFORCEMENT

1. Scope

This Licence allows for the use of water and the disposal of waste for an undertaking classified as Industrial as per Schedule I of the *Regulations* at the Ennadai Lake, Former Weather Station Remediation Project, located approximately 380km West of the community of Arviat within the Kivalliq Region, Nunavut.

a. This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any waters. Whenever new Regulations are made or existing *Regulations* are amended by the Governor in Council under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited, this Licence shall be deemed, upon promulgation of such Regulations, to be subject to such requirements; and

b. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2. Definitions

"**Act**" means the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"**Addendum**" means the supplemental text that is added to a full plan or report usually included at the end of the document and is not intended to require a full resubmission of the revised report;

"**Aggregate Sources**" mean sources of granular materials such as bedrock, gravel, and sand, used for the development of landfill, land farm and/or general grading purposes as described in the "Abandoned Military Site Remediation Protocol" (INAC 2008).

"**Amendment**" means a change to original terms and conditions of this Licence requiring correction, addition or deletion of specific terms and conditions of the Licence; modifications inconsistent with the terms of the set terms and conditions of the Licence;

"**Application**" means the actual water licence application and all supporting documents received for Ennadai Lake, Former Weather Station Site Remediation Project.

''**Appurtenant Undertaking**'' means an undertaking in relation to which a use of water or a deposit of waste is permitted by a licence issued by the Board;

"Board" means the Nunavut Water Board established under the *Nunavut Land Claims Agreement* and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"Effluent" means treated or untreated liquid waste material that is discharged into the environment from a structure such as a settling pond or a treatment facility;

"Engineer" means a professional engineer registered to practice in Nunavut in accordance with the *Consolidation of Engineers and Geoscientists Act S. Nu 2008, c.2* and the *Engineering and Geoscience Professions Act S.N.W.T. 2006, c.16 Amended by S.N.W.T. 2009, c.12*;

"Grab Sample" means a single water or wastewater sample taken at a time and place representative of the total discharge;

"**Hazardous Waste**" means waste classified as "hazardous" by Nunavut Territorial or Federal Legislation, or as "dangerous goods" under the *Transportation of Dangerous Goods Act* at the time of clean-up;

"**High Water Mark**" means the usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land (ref. Department of Fisheries and Oceans Canada, Operational Statement: Mineral Exploration Activities);

"Inspector" means an Inspector designated by the Minister under Section 85 (1) of the *Act*;

"Landfarm Facility" means an area designed to biologically treat Hydrocarbon Contaminated Soils, as described in the Application for Water License filed by the Applicant on August 27, 2013 and illustrated in Drawings MM CC/EG 0;

"Landfill Facility" means the Non-Hazardous Waste Landfill to be constructed at the Ennadai Lake remediation project site as described in the Application for Water License filed by the Applicant on August 27, 2013 and illustrated in Drawings EL KK 0;

"Licensee" means the holder of this Licence;

"Modification" means an alteration to a physical work that introduces a new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion;

"Monitoring Program" means a program established to collect data on surface water and groundwater quality to assess impacts to the environment of an appurtenant undertaking, to be undertaken as described in the documents entitled Remedial Action Plan Former Weather Station Ennadai Lake, Nunavut", dated November 2012.

"Nunavut Land Claims Agreement (NLCA)" means the "*Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*", including its preamble and schedules, and any amendments to that agreement made pursuant to it;

"Regulations" means the *Northwest Territories Water Regulations SOR 2013/69 18th April, 2013;*

"Sewage" means all toilet wastes and greywater;

"Solid Waste" means non-hazardous waste, Type A soil, Tier I soil and Tier II soil;

"Solid Waste Disposal Facility" comprises the area and associated structures designed to contain solid waste and to permanently isolate the contents of the disposal facility from the environment, as described in the Application for Water Licence filed by the Applicant on August 27, 2013 and illustrated in Drawings H-B264/1-9101/101-122.

"Spill Contingency Plan" means a Plan developed to deal with unforeseen petroleum and hazardous materials events that may occur during the operations conducted under the Licence;

"Sump" is a structure or depression that collects, controls, and filters liquid waste before it is released to the environment. This structure should be designed to prevent erosion while allowing percolation of liquid waste;

"Tier I Soil" means soil containing contaminant concentrations within the types and ranges defined as DCC Tier I in Appendix E of the NTI Agreement, including its preamble and schedules, and any amendments to that agreement made pursuant to it (see Table I);

"Tier II Soil" means soil containing contaminant concentrations within the types and ranges defined as DCC Tier II in Appendix E of the NTI Agreement including its preamble and schedules, and any amendments to that agreement made pursuant to it (see Table I);

"**Type A Soil**" means soil contaminated with hydrocarbons in which the primary petroleum product present in the soil as determined by laboratory analysis consists of lubricating oil and grease (F3 – F4 Fractions);

"**Type B Soil**" means soil contaminated with hydrocarbons in which the primary petroleum product present in the soil as determined by laboratory analysis consists of fuel oil and/or diesel fuel and /or gasoline (F1 – F2 Fractions);

"Toilet Wastes" means all human excreta and associated products, but does not include greywater;

"Waste" means waste as defined in Section 85 (1) of the *Act*;

"**Waste Disposal Facilities**" means all onsite facilities designated for the disposal and/or treatment of Waste generated by the Ennadai Lake Remediation Project including the Solid Waste Disposal Facility, the Sewage Treatment Facilitis, Landfarm Facility and any other facility described in the Application received on August 27, 2013

"Wastewater Treatment Unit" comprises the area and engineered structures designed to contain and/or treat sewage and grey water generated from the camp facilities at the Ennadai Lake Remediation Project site as described in the application dated August 27, 2013.

"Water" or "Waters" means waters as defined in section 4 of the Act.

3. **Enforcement**

a. Failure to comply with this Licence will be a violation of the *Act*, subjecting the Licensee to the enforcement measures and the penalties provided for in the *Act*;

b. All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the *Act*; and

c. For the purpose of enforcing this Licence and with respect to the use of water and deposit or discharge of waste by the Licensee, Inspectors appointed under the *Act*, hold all powers, privileges and protections that are conferred upon them by the *Act* or by other applicable law.

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report on the appurtenant undertaking with the Board no later than March 31st of the year following the calendar year being reported, containing the following information:

a. The monthly and annual quantities (in cubic metres) of fresh water obtained from all sources;
b. The monthly and annual quantities (in cubic metres) of any effluent discharged for the Sewage Treatment Unit;
c. A summary of any construction work, modification and major maintenance work (including as-built diagrams) carried out on all new and existing waste handling facilities associated with this Licence;
d. The results of a review conducted and recommendations regarding any changes to the Monitoring Program;
e. A summary of any abandonment and restoration work undertaken during the year and an outline of any work anticipated for the next year;
i. If applicable, a description of any trenches and sumps excavated, including but

not limited to the following: GPS coordinates, dimensions, depth below active layer, and secondary containment features;

f. A list of unauthorized discharges and a summary of follow-up actions taken;
g. Any revisions to the Spill Contingency Plan;
h. A brief summary of work done to address concerns or deficiencies listed in the inspection reports and/or compliance reports prepared by an Inspector;
i. An executive summary in English and Inuktitut of all plans, reports, or studies conducted under this Licence;
j. A summary of all information requested and results of the Monitoring Program, an analysis and interpretation of the results, and any follow-up measures that may be required;
k. An analysis of data collected during the "Monitoring Program" and a brief description of any future studies planned by the Licensee;
l. A summary of remediation work undertaken during the year and an outline of work anticipated for the following year;
m. The monthly and annual quantities (in cubic metres) of any effluent discharge from the Landfarm Facility;
n. Any other details on Waste disposal requested by the Board by November 1 of the year being reported.

2. The Licensee shall notify the NWB of any changes in operating plans or conditions associated with this project at least thirty (30) days prior to any such change.

3. The Licensee shall install flow meters or other such devices, or implement suitable methods required for the measuring of water volumes as required under Part K, Item 3.

4. The Licensee shall comply with the Monitoring Program described in this Licence, and any amendments to the Monitoring Program as may be made from time to time, pursuant to the conditions of this Licence.

5. The Monitoring Program and compliance dates specified in the Licence may be modified at the discretion of the Board.

6. The Licensee shall post signs in the appropriate areas to identify the stations of the Monitoring Program and to inform the public of the location of all Waste Disposal / Treatment Facilities. All signage postings shall be in the Official Languages of Nunavut.

7. The Licensee shall, for all Plans submitted under this Licence, include a proposed timetable for implementation. Plans submitted, cannot be undertaken without subsequent written Board approval and direction. The Board may alter or modify a Plan if necessary to achieve the legislative objectives and will notify the Licensee in writing of acceptance, rejection or alteration of the Plan.

8. The Licensee shall, for all Plans submitted under this Licence, implement the Plan as approved by the Board in writing.

9. The Licensee shall review the Plans referred to in this Licence as required by changes in operation and/or technology and modify the Plans accordingly. Revisions to the Plans are to be submitted in the form of an Addendum to be included with the Annual Report complete with a revisions record detailing where significant content changes are made.

10. Every Plan to be carried out pursuant to the terms and conditions of this Licence shall become a part of this Licence, and any additional terms and conditions imposed upon approval of a Plan by the Board become part of this Licence. All terms and conditions of the Licence should be contemplated in the development of a Plan where appropriate.

11. The Licensee shall ensure a copy of this Licence is maintained at the site of operations at all times. Any communication with respect to this Licence shall be made in writing to the attention of:

(a) Manager of Licensing:
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369
Email: licensing@nunavutwaterboard.org

(b) Inspector Contact:
Manager of Field Operations, AANDC
Nunavut District, Nunavut Region
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4295
Fax: (867) 979-6445

12. The Licensee shall submit one (1) paper copy and one (1) electronic copy of all reports, studies, and plans to the Board. Reports or studies submitted to the Board by the Licensee shall include a detailed executive summary in Inuktitut.

13. The Licensee shall ensure that any document(s) or correspondence submitted by the Licensee to the Board is received and acknowledged by the Manager of Licensing.

14. This Licence is assignable as provided for in Section 44 of the *Act*.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all water from Ennadai Lake. The total water use for domestic purposes shall not exceed (3) cubic metres per day. Water for miscellaneous purposes shall not exceed (3) cubic metres per day. The Total Volume of water for the

purpose of this license shall not exceed six (6) cubic metres per day.

2. The Licensee shall not remove any material from below the ordinary High Water Mark of any water body.

3. The Licensee shall not conduct any activity that will cause erosion to the banks of any body of water and shall provide necessary controls to prevent such erosion.

4. The Licensee shall implement and maintain sediment and erosion control measures prior to and during the operation to prevent entry of sediment and/or dust into Water.

5. Equipment used should be well cleaned and free of oil and grease and maintained free of fluid leaks. The Licensee shall ensure that pollutants from machinery used during construction do not enter water.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall locate areas designated for waste disposal at a minimum distance of thirty one (31) metres from the ordinary High Water Mark of any water body, such that the quality, quantity or flow of water is not impaired, unless otherwise approved by the Board in writing.

2. The Licensee shall not open burn plastics, wood treated with preservatives, electric wire, Styrofoam, asbestos or painted wood to prevent the deposition of waste materials of incomplete combustion and/or leachate from contaminated ash residual, from impacting any surrounding waters, unless otherwise approved by the Board in writing.

3. The Licensee shall provide to the Board documented authorization from all communities in Nunavut receiving wastes from the Ennadai Lake Remediation Project prior to any backhauling and disposal of wastes to those communities.

4. The Licensee shall maintain records of all waste backhauled and records of confirmation of proper disposal of backhauled waste. These records shall be made available to an Inspector upon request.

5. The Licensee shall direct all sewage including greywater generated by the camp personnel into the Wastewater Treatment Unit prior to discharge and containment in a lagoon located at a distance of at least thirty one (31) metres above the ordinary High Water Mark of any water body, at a site where direct flow into a water body is not possible and no additional impacts are created, unless otherwise approved by the Board in writing.

6. All Effluent discharged from the Sewage Treatment Facility at Monitoring Stations ELR-2a and ELR- 2b shall not exceed the following discharge criteria prior to releasing at least thirty-one (31) metres away into any receiving freshwater environment.

Parameter	Maximum Allowable Concentration
pH	6 to 9 (pH units)
Oil and Grease	No visible sheen
TSS	100 mg/kg
BOD	80 mg/kg
Fecal Coliform	1 x 104 CFU/100ml

7. The Licensee shall direct the Tier I contaminated soil and Asbestos described in the application to the Landfill Facility for treatment or as otherwise approved by the Board in writing.

8. The Licensee shall backhaul and dispose of all hazardous wastes, waste oil and non-combustible waste generated through the course of the operation at a licensed waste disposal site.

9. Surface contact water and seepage collected from the perimeter of the Landfarm Facility shall not exceed the following Effluent discharge criteria at Monitoring Station ELR-3 prior to being released at least thirty-one (31) metres away into the receiving freshwater environment:

Parameter	Maximum Allowable Concentration (mg/L)
pH	6 to 9 (pH units)
TSS	15
Oil and Grease	15 and no visible sheen
Total Lead	0.001
Benzene	0.370
Toluene	0.002
Ethylbenzene	0.090

10. The Licensee shall treat Type B Soil generated by the project to meet the relevant remediation objectives at the Landfarm Facility authorized under the Licence and F3 Contaminated Soil as described in the "Remedial Action Plan, former Weather Station Ennadai Lake, Nunavut" dated November 2012 or as otherwise approved by the Board in writing.

11. Contact water including demolition rinse water, associated with the storage and cleaning of contaminated areas and equipment at Monitoring Station ELR-11 and Surface contact water and seepage collected from the perimeter of the Landfill Facility shall not exceed the following Effluent discharge criteria at Monitoring Station ELR-10 prior to being released at least thirty-one (31) metres away into the receiving freshwater environment:

Parameter	Maximum Allowable Concentration (µg/L)
pH	6 to 9 (pH units)
Oil and Grease	5000
Arsenic (total)	100
Cadmium (dissolved)	10
Chromium (dissolved)	100
Cobalt (dissolved)	50
Copper (dissolved)	200
Lead (dissolved)	50
Mercury (total)	0.6
Nickel (dissolved)	200
PCB (total)	1000
Zinc (total)	500
Benzene	370
Toluene	2
Ethylbenzene	90

12. The Licence shall direct the Tire I contaminated soil described in the application to the Non-Hazardous Waste Landfill Facility for treatment or as otherwise approved by the Board in writing.

13. The Licensee shall for the purposes of monitoring install ground water monitoring wells, at least one up-gradient and two down-gradient of the Non-Hazardous Waste Landfill, the Landfarm Facility and any other areas of the Project site requiring monitoring.

14. If the Effluent associated with Part D, Items 6, 9, and 12 exceeds relevant discharge limits, they shall be considered hazardous waste and be disposed off-site at a licensed facility or as otherwise approved by the Board in writing.

15. The Licensee shall not mix or blend soils that exceed the maximum levels of Tier II criteria for the expressed purpose of attaining the specific limits of Tier I as listed under Table No.1.

16. The Licensee shall provide for the proper storage, transportation, and treatment off site at an Licensed facility or as otherwise approved by the Board in writing, all Solid Waste Materials identified in the Application, Contaminated Soil Tier II, Hazardous Waste - PCBs and Heavy Metals and Waste Oil generated through construction and remediation activities

PART E: CONDITIONS APPLYING TO UNDERTAKING

1. The Licensee may use aggregates for the purposes specified in the “Remedial Action Plan, former Weather Station Ennadai Lake, Nunavut” dated November 2012 provided

that the aggregate sources are approved by an Inspector, free of contaminants and satisfies the requirement of Part E, Item 2 of this Licence.

2. The Licensee shall use aggregates for construction from approved sources that have been demonstrated to not possess acid generating and metal leaching properties.

3. The Licensee shall submit to the Board for approval, within sixty (60) days prior to commissioning any facility designed to contain, withhold, divert or retain Water or Wastes, at the Ennadai Lake, former Weather Station Remediation Project, an Operation and Maintenance Manual. The manual shall be prepared in accordance with the *"Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories* (1996).

4. The Operations and Maintenance Manual referred to in Part E, Item 3 shall address the following items:

    i. As-built, engineered design drawings of the facilities approved under the licence (stamped by a professional engineer registered in Nunavut);
    ii. Feasibility of alternative disposal methods and sites;
    iii. Operation and maintenance procedures for each facility;
    iv. Runoff diversion and management;
    v. Soil Quality Remediation Objectives (SQRO's) where applicable; and
    vi. Monitoring program for both water and soil.

5. The Licensee shall review the Plan referred to in this Part as required by changes in operation and/or technology and modify the Plan accordingly. Revisions to the Plan are to be submitted in the form of an Addendum to be included with the Annual Report.

6. The Licensee shall, upon the failure of any constructed facilities, repair such facilities immediately to the appropriate standards as recommended by an Engineer and to the satisfaction of an Inspector.

7. The Licensee shall implement proper handling, storage and transportation procedures for hazardous materials during clean-up activities.

8. The Licensee shall conduct all activities in such a way as to minimize impacts on surface drainage and the Licensee shall immediately undertake corrective measures in the event of any impacts on surface drainage.

9. The Licensee shall minimize disturbance to terrain, permafrost and drainage during movement of contractor's equipment and personnel around the site during post-closure monitoring activities.

10. Granular materials and rock rip-rap used for any temporary stream crossings, approaches or required for bank stabilization must be obtained from a source satisfying the requirements of Part E, Item 2, is approved by an Inspector, and is clean and free of contaminants. Such material must not be removed or gathered from below the ordinary

high water mark of any water body.

11. All sites affected by construction or removal activities shall be stabilized, landscaped as necessary, and suitable erosion control measures implemented to minimize sediment deposition into watercourses located on or adjacent to the site.

12. The Licensee shall restore and stabilize all areas affected by the undertaking upon completion of work.

PART F: CONDITIONS FOR CAMPS, ACCESS INFRASTRUCTURES AND OPERATIONS

1. The Licensee shall not erect camps or store material on the surface of frozen streams or lakes except what is for immediate use. Camps shall be located such as to minimize impacts on surface drainage.

2. The Licensee shall conduct all activities in such a way as to minimize impacts on surface drainage and the Licensee shall immediately undertake corrective measures in the event of any impacts on surface drainage.

3. Licensee shall not mobilize heavy equipment or vehicles unless the ground surface is capable of fully supporting the equipment or vehicles without rutting or gouging. Overland travel of equipment or vehicles shall be suspended if rutting occurs.

4. With respect to access road, pad construction or other earthworks, the deposition of debris or sediment into any water body is prohibited. These materials shall be disposed at a distance of at least thirty-one (31) metres from the ordinary High Water Mark in such a fashion that they do not enter the Water.

PART G: CONDITIONS APPYING TO DRILLING OPERATIONS

1. No drilling is allowed except for the purposes of installing monitoring wells and/or instrumentation required for monitoring the Waste Disposal Facilities.

PART H: CONDITIONS APPLYING TO CONSTRUCTION AND MODIFICATIONS

1. The Licensee Shall provide to the Board, within ninety (90) days of completion of construction, as built plans and drawings of the facilities referred to in this Licence. These plans and drawings shall be stamped by an Engineer.

2. The Licensee may, without written consent from the Board, carry out Modifications to the Water Supply Facilities and Waste Disposal Facilities provided that such

Modifications are consistent with the terms of this Licence and the following requirements are met:

a. the Licensee has notified the Board in writing of such proposed Modifications at least sixty (60) days prior to beginning the Modifications;
b. such Modifications do not place the Licensee in contravention of the Licence or the *Act*;
c. such Modifications are consistent with the NIRB Screening Decision
d. the Board has not, during the sixty (60) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
e. the Board has not rejected the proposed Modifications.

3. Modifications for which all of the conditions referred to in Part G, Item 1 have not been met can be carried out only with written approval from the Board.

4. The Licensee shall provide as-built plans and drawings of the Modifications referred to in this Licence within ninety (90) days of completion of the Modification. These plans and drawings shall be stamped by an Engineer.

PART I: CONDITIONS APPLYING TO SPILL CONTINGENCY PLANNING

1. The Board has approved the Plan entitled "Spill Contingency Plan, Ennadai Lake Weather Station Environmental Remediation Project. Ennadai Lake, Nunavut." dated August 2013 that was submitted as additional information with the application.

2. The Licensee shall prevent any chemicals, petroleum products or wastes associated with the project from entering water. All sumps and fuel caches shall be located at a distance of at least thirty one (31) metres from the ordinary High Water Mark of any adjacent water body and inspected on a regular basis.

3. The Licensee shall ensure that any equipment maintenance and servicing be conducted only in designated areas and shall implement special procedures (such as the use of drip pans) to manage motor fluids and other waste and contain potential spills.

4. If during the term of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:

a. Employ the Spill Contingency Plan;
b. Report the spill immediately to the 24-Hour Spill Line at (867) 920-8130 and to the AANDC Manager of Field Operations at (867) 975-4295; and
c. For each spill occurrence, submit to the Inspector, no later than thirty (30) days after initially reporting the event, a detailed report that will include the amount and type of spilled product, the GPS location of the spill, and the measures taken to contain and clean up the spill site.

PART J: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION OR TEMPORARY CLOSING

1. The Board has approved the Plan entitled "**Remedial Action Plan Former Weather Station Ennadai Lake, Nunavut**" dated November 2012 that was submitted as additional information with the application.

2. The Licensee shall backfill and restore all sumps to the pre-existing natural contours of the land.

3. The Licensee shall remove from the site, all infrastructure and site materials, including all fuel caches, drums, barrels, buildings and contents, docks, Water pumps and lines, material and equipment prior to the expiry of this Licence.

4. All roads and airstrip, if any, shall be re-graded to match natural contour to reduce erosion.

5. In order to promote growth of vegetation and the needed microclimate for seed deposition, all disturbed surfaces shall be prepared by ripping, grading, or scarifying the surface to conform to the natural topography

6. The Licensee shall carry out progressive reclamation of any components of the project no longer required for the Licensee's operations.

7. The Licensee shall remove from the site, all infrastructure and site materials, including all fuel caches, drums, barrels, material and equipment prior to the expiry of this Licence.

8. Areas that have been contaminated by hydrocarbons from normal fuel transfer procedures shall be reclaimed to meet objectives as outlined in the Government of Nunavut's Environmental Guideline for Site Remediation, January 2009. The use of reclaimed soils for the purpose of back fill or general site grading may be carried out only upon consultation and approval by the Government of Nunavut, Department of Environment and an Inspector.

9. All disturbed areas shall be contoured and stabilized upon completion of work and restored to a pre-disturbed state.

10. The Licensee shall complete all restoration work prior to the expiry of this Licence.

PART K: CONDITIONS APPLYING TO THE MONITORING PROGRAM

1. If there is a need for long-term monitoring, The Licensee shall submit to the Board for approval, at least sixty (60) days prior to initiating any long-term monitoring activities, a Post-Closure Monitoring Plan for the Site that includes information on Long-term monitoring of the Waste Disposal Facilities, and that addresses water quality monitoring, stability of the site and the need for thermal and ground water monitoring.

2. The Licensee shall maintain Monitoring Program Stations at the following locations:

Monitoring Program Station Number	Description	Status
ELR-1	Monitoring Station installed at the freshwater intake location	Active (Volume)
ELR-2a	Monitoring Station installed at the Sewage Treatment Unit – Lagoon No. 1 discharge point	Active (Volume) (Water Quality)
ELR-2b	Monitoring Station installed at the Sewage Treatment Unit – Lagoon No. 2 discharge point	Active (Volume) (Water Quality
ELR-3	Monitoring Station installed at the discharge point of the surface water collection system for the Landfarm Facility	Active Volume (Water Quality
ELR-4	Monitoring well installed down-gradient of the Landfarm Facility	Active (Water Quality)
ELR-5	Monitoring well installed down-gradient of the Landfarm Facility	Active (Water Quality)
ELR-6	Monitoring well installed up-gradient of the Landfarm Facility	Active (Water Quality)
ELR-7	Monitoring well installed down-gradient of the Non-Hazardous Waste Landfill Facility	Active (Water Quality
ELR-8	Monitoring well installed down-gradient of the Non-Hazardous Waste Landfill Facility	Active (Water Quality
ELR-9	Monitoring well installed up-gradient of the Non-Hazardous Waste Landfill Facility	Active (Water Quality
ELR-10	Monitoring Station installed at discharge point of the surface water collection system for the Non-Hazardous Waste Landfill Facility	Active (Volume) (Water Quality
ELR-11	Monitoring Station installed at the discharge point of demolition waste rinse water collection area	Active (Volume) (Water Quality

3. TheLicensee shall measure and record, in cubic metres, the daily quantities of freshwater withdrawn at Monitoring Station ELR-1 and effluent discharged from the Waste Disposal Facilities at Monitoring Program Stations ELR-2a and ELR-2b.

4. The Licensee shall sample prior to discharge at Monitoring Program Stations ELR-4, ELR- 5, ELR-6, ELR-7, ELR-8, and ELR-9 Samples shall be analyzed for the following parameters:

pH	Conductivity
Total Suspended Solids	Ammonia Nitrogen
Nitrate – Nitrite	Oil and Grease (visual)
Total Phenols	Sulphate
Total Hardness	Total Alkalinity
Sodium	Potassium
Magnesium	Calcium
Chloride	Total Cadmium
Total Copper	Total Chromium
Total Iron	Total Lead
Total Mercury	Total Nickel
Total Zinc	Total Phosphorous
Total Aluminum	Total Arsenic
Total Manganese	Total Cobalt
Total Petroleum Hydrocarbons (TPH)	
Polycyclic Aromatic Hydrocarbons (PAH)	
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)	

5. The Licensee shall monitor compliance with respect to Part D, Items 6, 9, and 12, accordingly, by collecting a representative composite sample once at the beginning of discharge upon initial release and prior to the end of discharge, from the Discharge Points of the Waste Disposal Facilities at Monitoring Program Stations ELR-2a, ELR-2b, ELR-3, ELR-10 and ELR-11.

6. The Licensee shall monitor groundwater quality proximal to the Waste Disposal Facilities by collecting representative samples from all monitoring wells installed under Part K, Item 2. Samples shall be analyzed for parameters listed under Part K, Item 4.

7. The Licensee shall conduct all sampling, sample preservation and analyses in accordance with methods prescribed in the current edition of *Standard Methods for the Examination of Water and Wastewater*, or by such other methods approved by the Board.

8. All analyses shall be performed in a laboratory accredited according to ISO/IEC Standard 17025. The accreditation shall be current and in good standing.

9. The Licensee shall ensure that tabular summaries for all data and information generated under the "Monitoring Program", as well as an analysis of data collected during the "Monitoring Program," are provided to the Board in the Annual Report, in accordance with Part B, Item 1.

10. Additional monitoring requirements may be imposed by the Inspector.

11. The Licensee shall submit to the Board for review, at least thirty (30) days prior to first release any effluent, a Quality Assurance/Quality Control Plan that conforms to the guidance document *"Quality Assurance (QA) and Quality Control (QC) Guidelines For Use by Class "B" Licensees in Collecting Representative Water Samples in the Field and for Submission of a QAQC Plan"* INAC (1996). The Plan shall be acceptable to an accredited laboratory and include a covering letter from the accredited laboratory confirming acceptance of the Plan for analyses to be performed under the Licence.

Table 1: DEW Line Clean-up Criteria

Table No.1
(From INAC Abandoned Military Site Remediation Protocol)
DEW Line Clean-up Criteria (DCC)[a]

Substance	Units	DCC Tier I[bc]	DCC Tier II[d]
Antimony	ppm	20[e]	
Arsenic	ppm	-	30
Cadmium	ppm	-	5.0
Chromium	ppm	-	250
Cobalt	ppm	-	50
Copper	ppm		100
Lead	ppm	200	500
Mercury	ppm	-	2.0
Nickel	ppm	-	100
Zinc	ppm	-	500
PCB's	ppm	1.0	5.0

a. These criteria were adopted specifically for the cleanup of Arctic DEW Line Sites from the 1991 versions of the Quebec Soil Contamination Indicators and the Canadian Council of Ministers of the Environment Interim Canadian Environmental Criteria for Contaminated Sites.

b. Soil criteria are given in parts per million, ppm.

c. Soils containing lead and/or PCBs at concentrations in excess of DCC I, but less than DCC II, may be landfilled,

d. Soils containing one or more substrates in excess of DCC II must be containerized - i.e. removed in a manner which precludes contact with the Arctic ecosystem.

e CCME A/W Tier 1: Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (PEHH) by Canadian Council of Ministers of the Environment (CCME), 2007 – Agricultural/Wild land coarse-grained soils.

Appendix C FIGURES

Figure 1. Key Plan

Figure 2. Site Plan

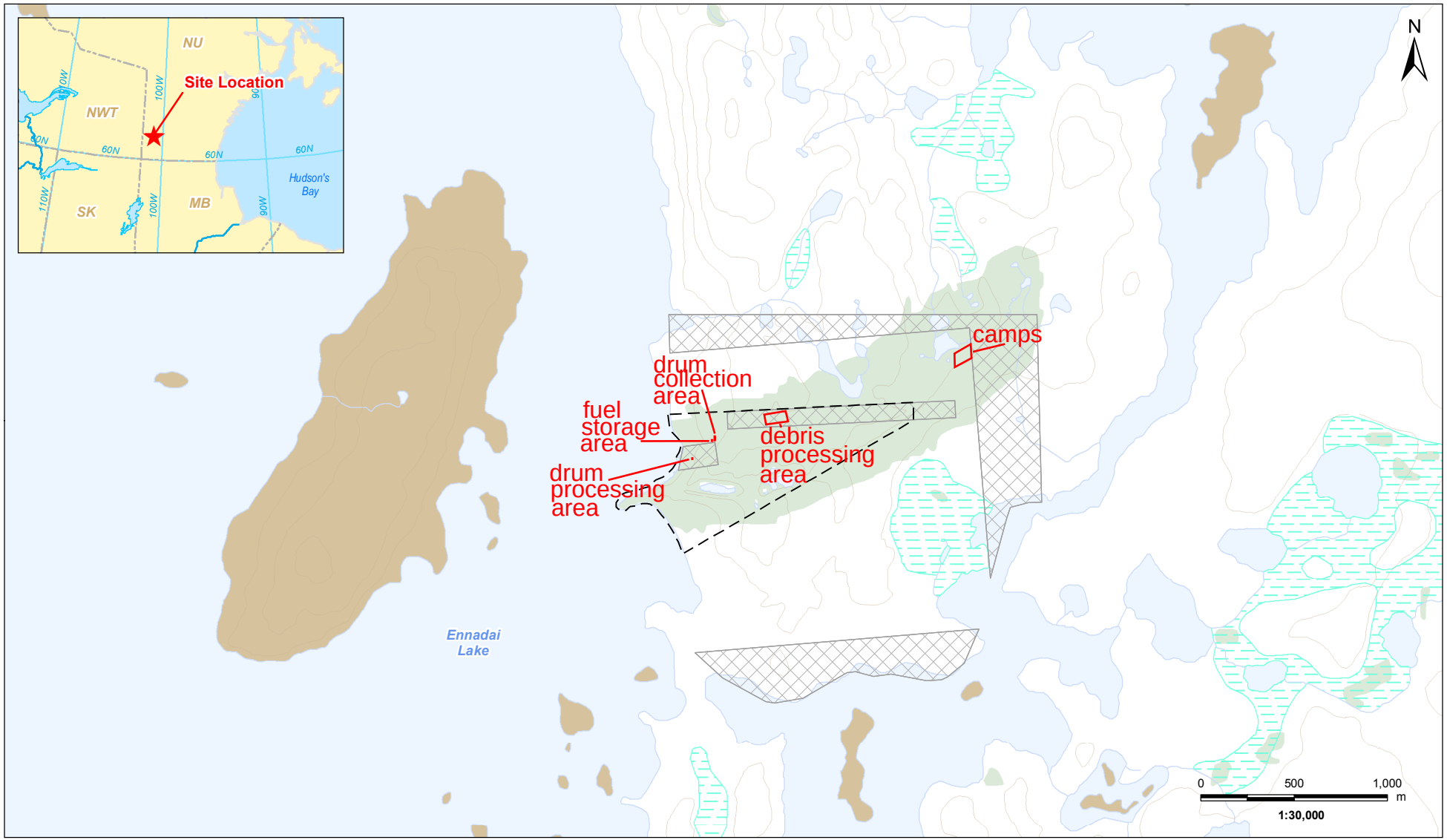
Figure 3. Remediation Areas – Main

Figure 4. Remediation Areas - West

Figure 5. Excavations

Figure 6. Final Survey

Figure 7. Landfill – As-built



V:\01225\active\122511006\GIS\MXD\122511006_Fig01_KeyPlan.mxd
Revised: 2015-07-22 By: ncukshank

July 2015
Project No.: 122511006

Stantec

Legend

- Site Limits
- Inuit-Owned Land
- Watercourse
- Island
- Waterbody
- Wetland
- Wooded Area

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. © Department of Natural Resources Canada. All rights reserved.
3. Inset map features provided by Esri.

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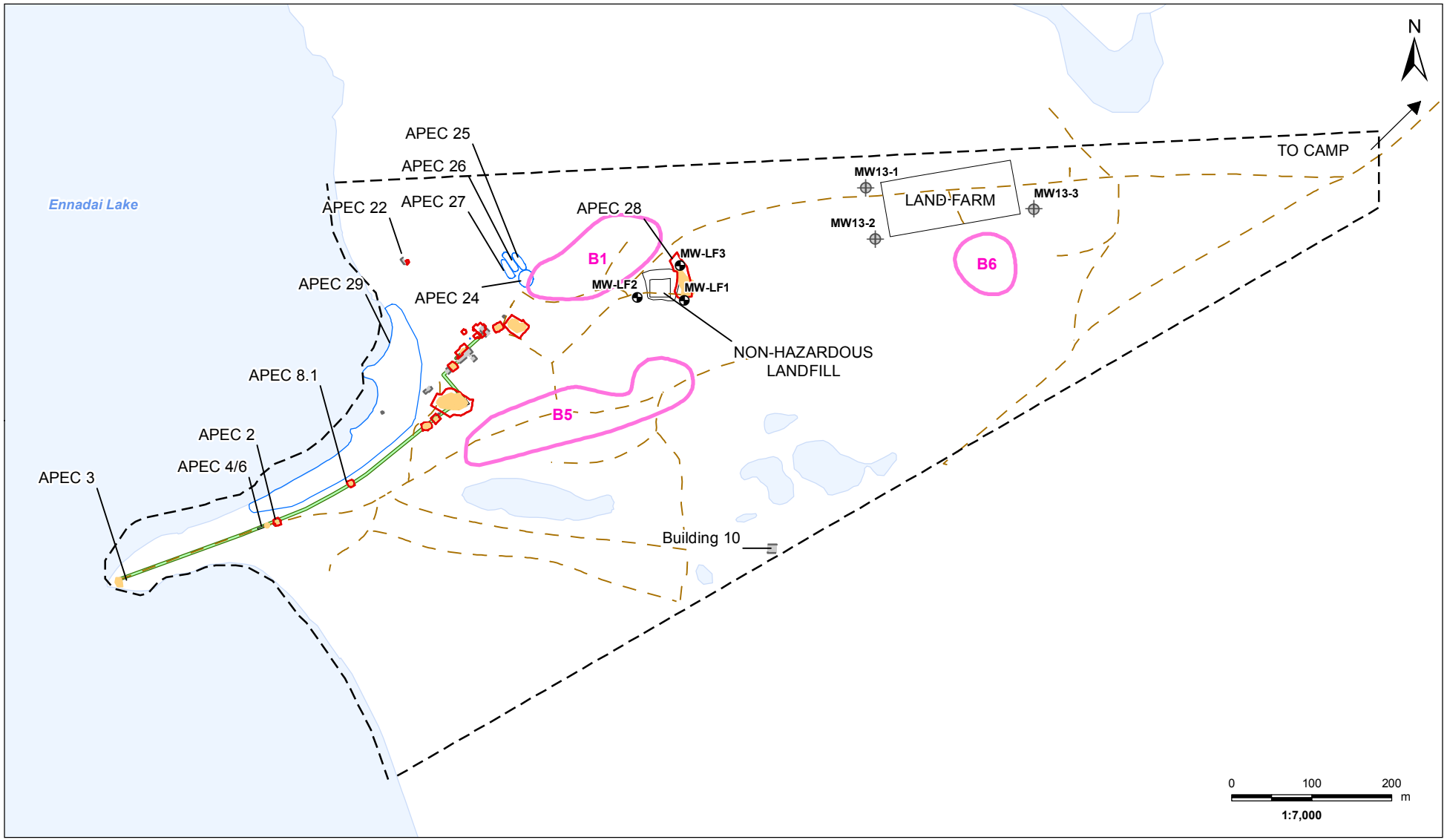
Ennadai Lake Former Weather Station
Site Supervision
Impacted Soil Excavations

Figure No.

1

Title

Key Plan



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Revised: 2015-07-22 By: ncrukshank

July 2015
Project No.: 122511006

Stantec

Legend

- Monitoring Well
- Monitoring Well (Temporary)
- Pipeline
- Road/Trail
- Inuit-Owned Land
- Site Limits
- APEC Location - Other
- Building (Former)
- Location of Borrow Areas
- Site Feature
- Surveyed Excavation Extent
- Predicted Excavation Extent
- Watercourse
- Waterbody

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2.

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Site Supervision
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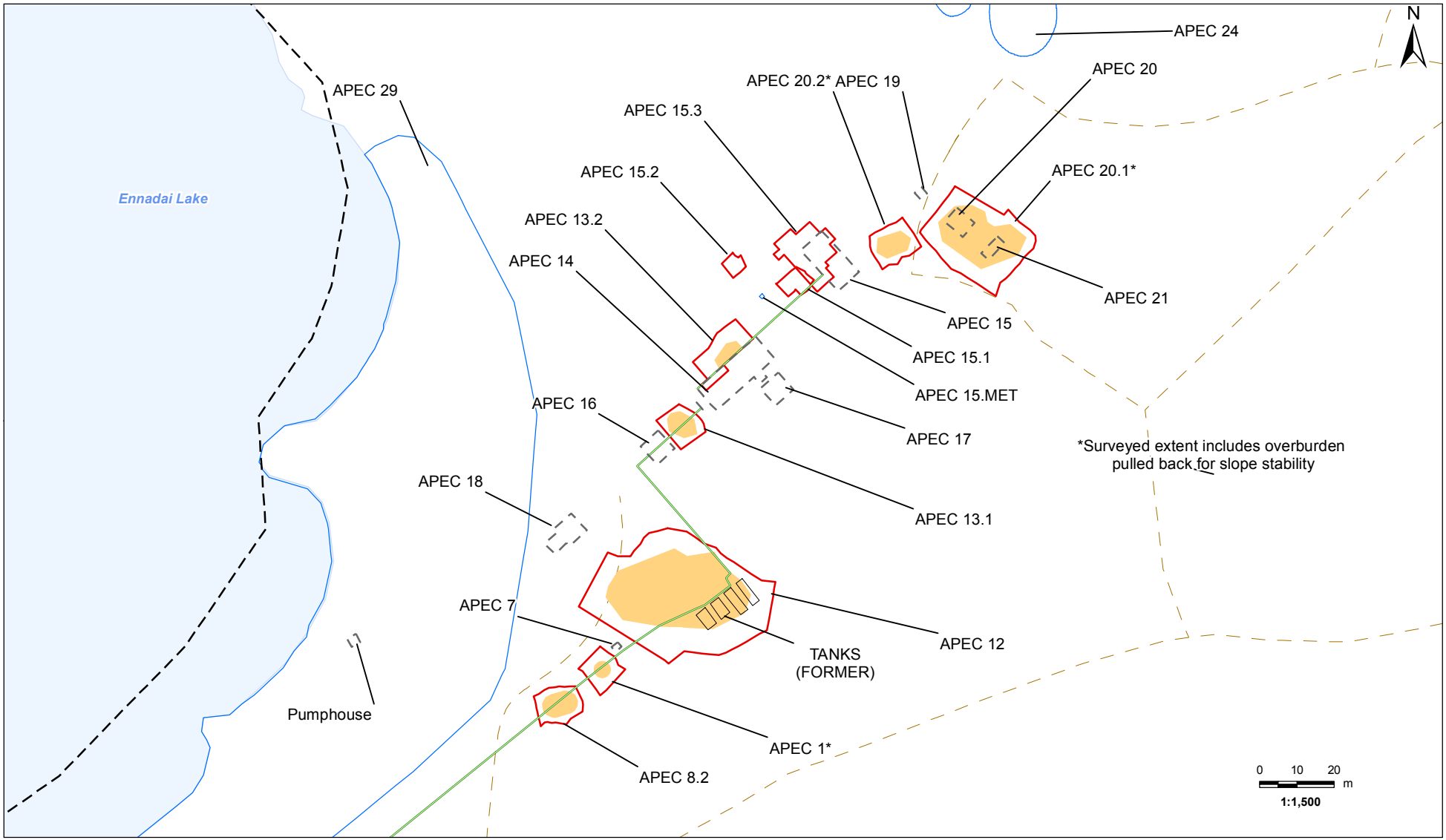
Figure No.

2

Title

Site Plan



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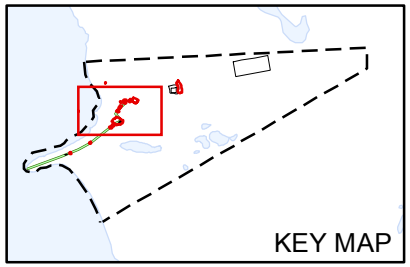
Revised: 2015-07-22 By: nculkshank

July 2015
Project No.: 122511006

Stantec

Legend

- Pipeline
- Road/Trail
- Site Limits
- APEC Location - Other
- Building (Former)
- Site Feature
- Surveyed Excavation Extent
- Predicted Excavation Extent
- Watercourse
- Waterbody



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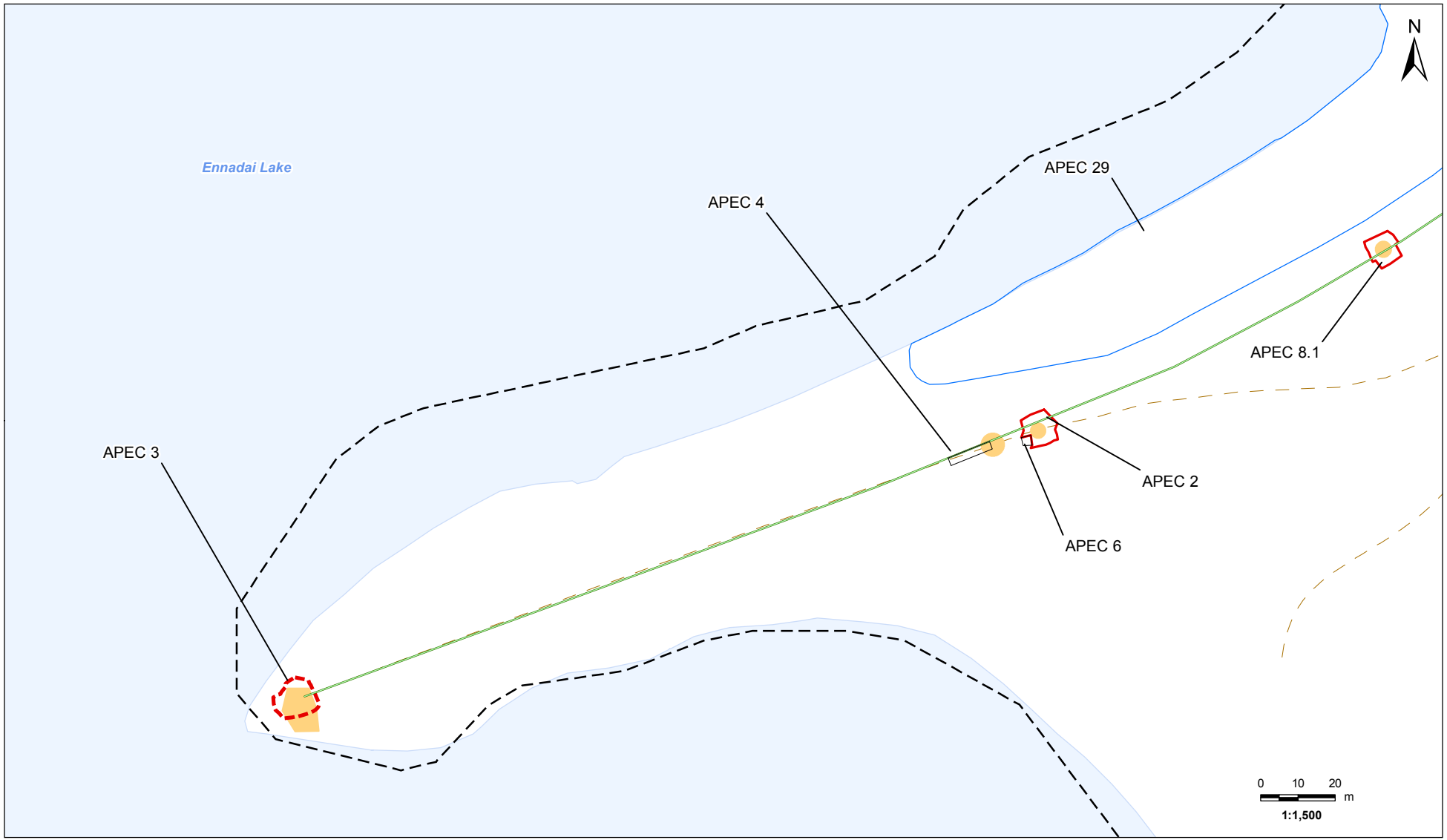
Site Supervision
Impacted Soil Excavations

Figure No.
3

Title
Site Detail

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2.



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Revised: 2015-07-22 By: ncrukshank

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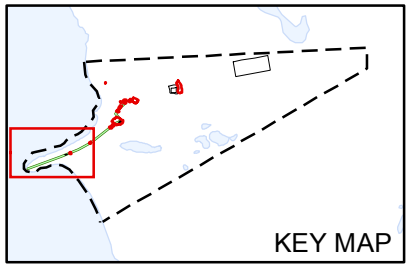
Project No.: 122511006

Stantec

Legend

- Pipeline
- Road/Trail
- Site Limits
- APEC Location - Other
- Building (Former)
- Site Feature
- Approximate Excavation Extent
- Surveyed Excavation Extent
- Predicted Excavation Extent
- Watercourse
- Waterbody



Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2.

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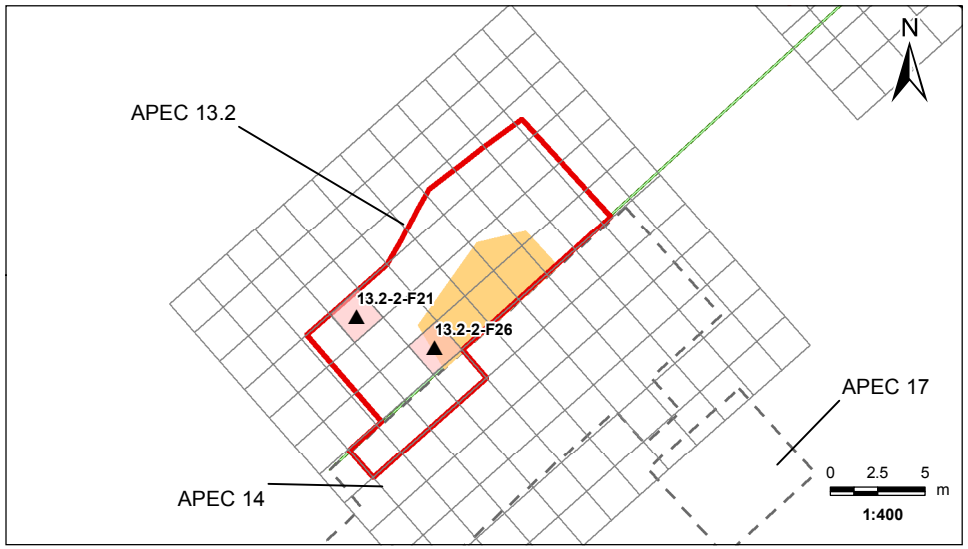
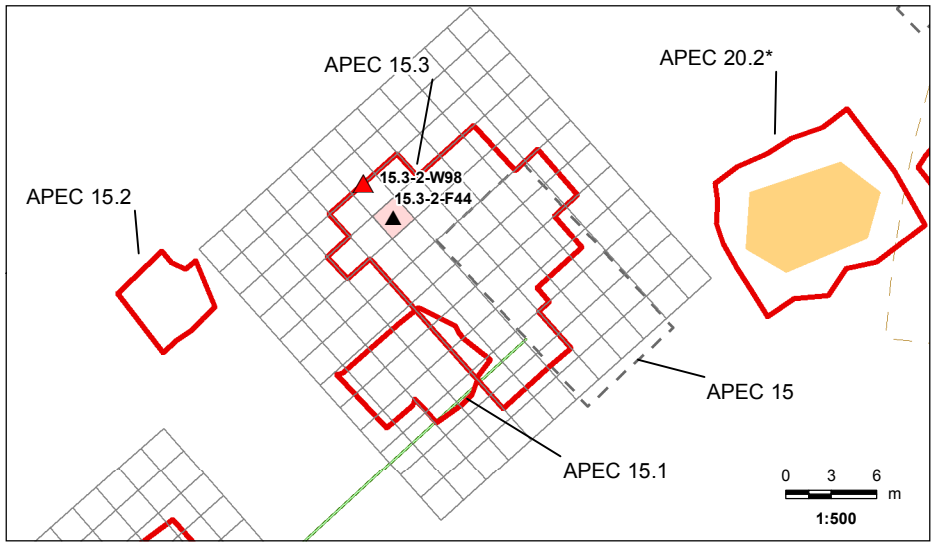
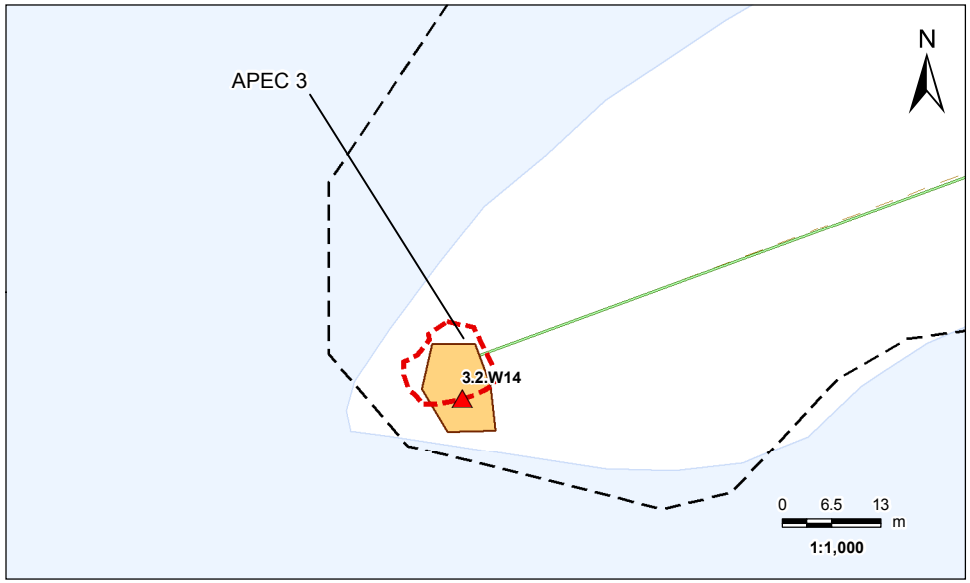
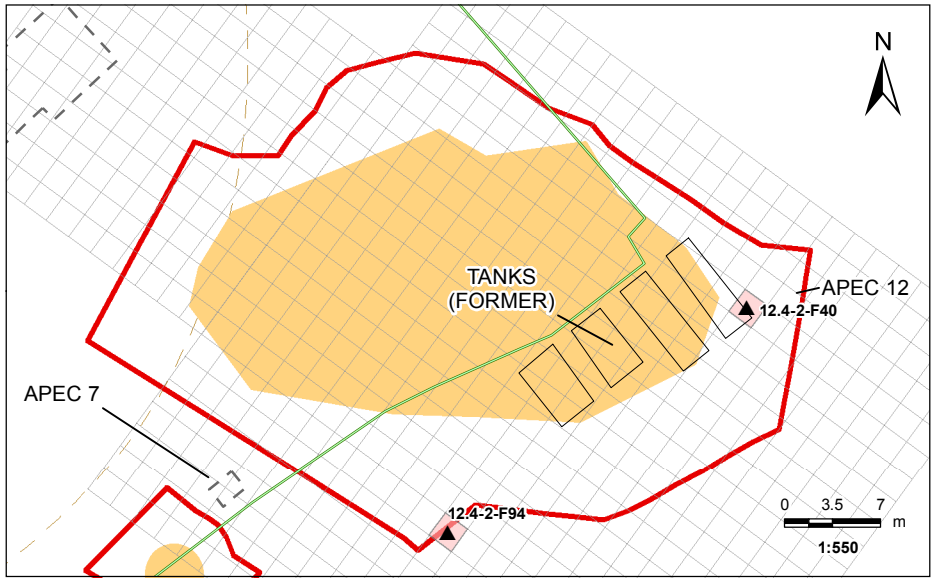
Figure No.
4

Title
Site Detail - West Area of Site









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Revised: 2015-07-22 By: nculkshank

July 2015
Project No.: 122511006

Stantec

Legend

- Soil Sample Less Than AMSRP Criteria
- Soil Sample Exceeds AMSRP Criteria
- Pipeline
- Road/Trail
- Site Limits
- Building (Former)
- Site Feature
- Appoximate Excavation Extent
- Surveyed Excavation Extent
- Predicted Excavation Extent
- Watercourse
- Waterbody

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2.

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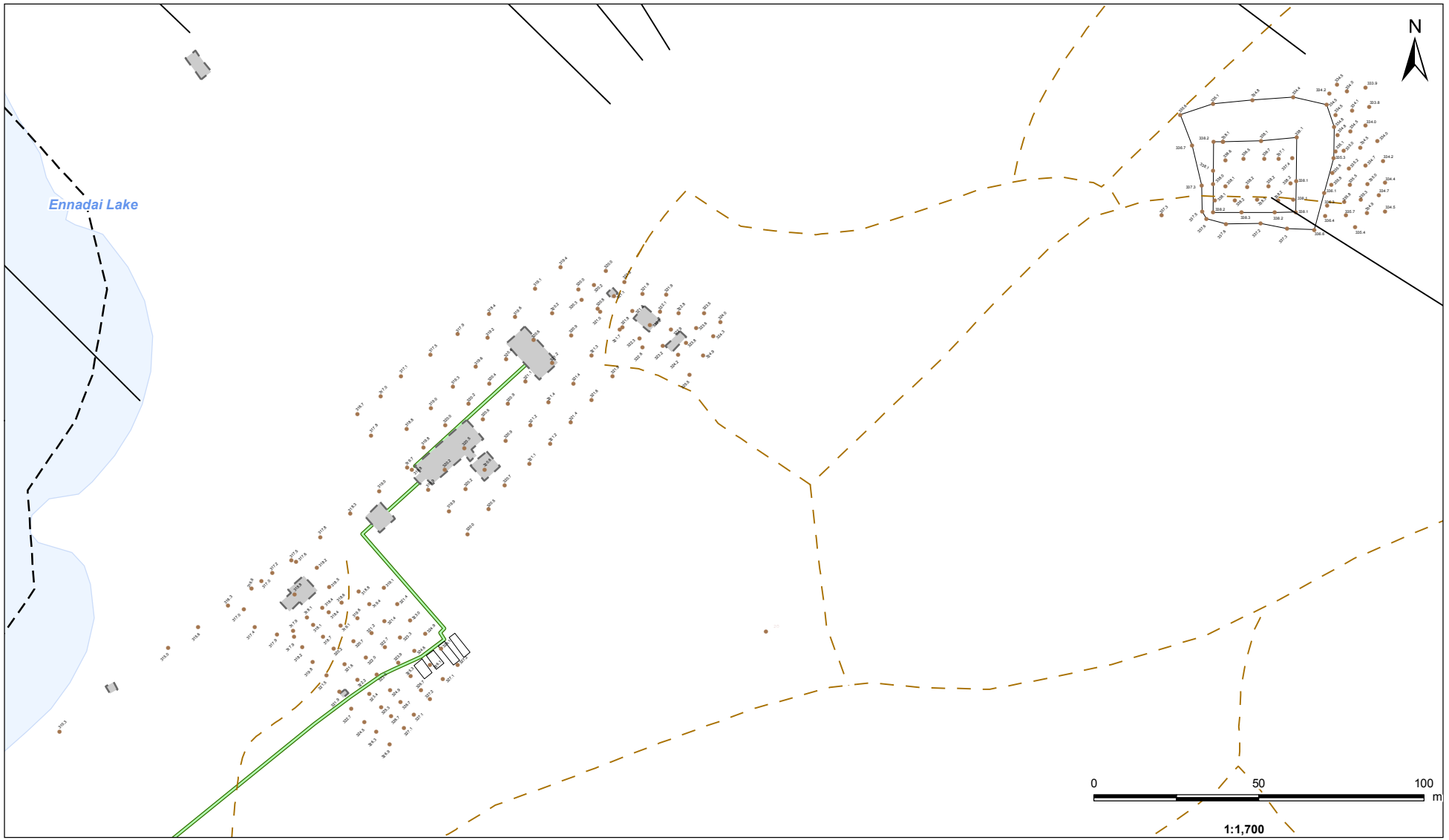
Impacted Soil Excavations

Figure No.
5

Title
Excavation Details



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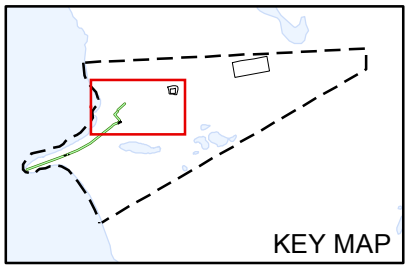
Revised: 2015-07-22 By: ncrukshank

July 2015
Project No.: 122511006

Stantec

Legend

- Elevation Survey Point
- Pipeline
- Road/Trail
- Building (Former)
- Site Feature
- Waterbody



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Site Supervision
Impacted Soil Excavations

Figure No.

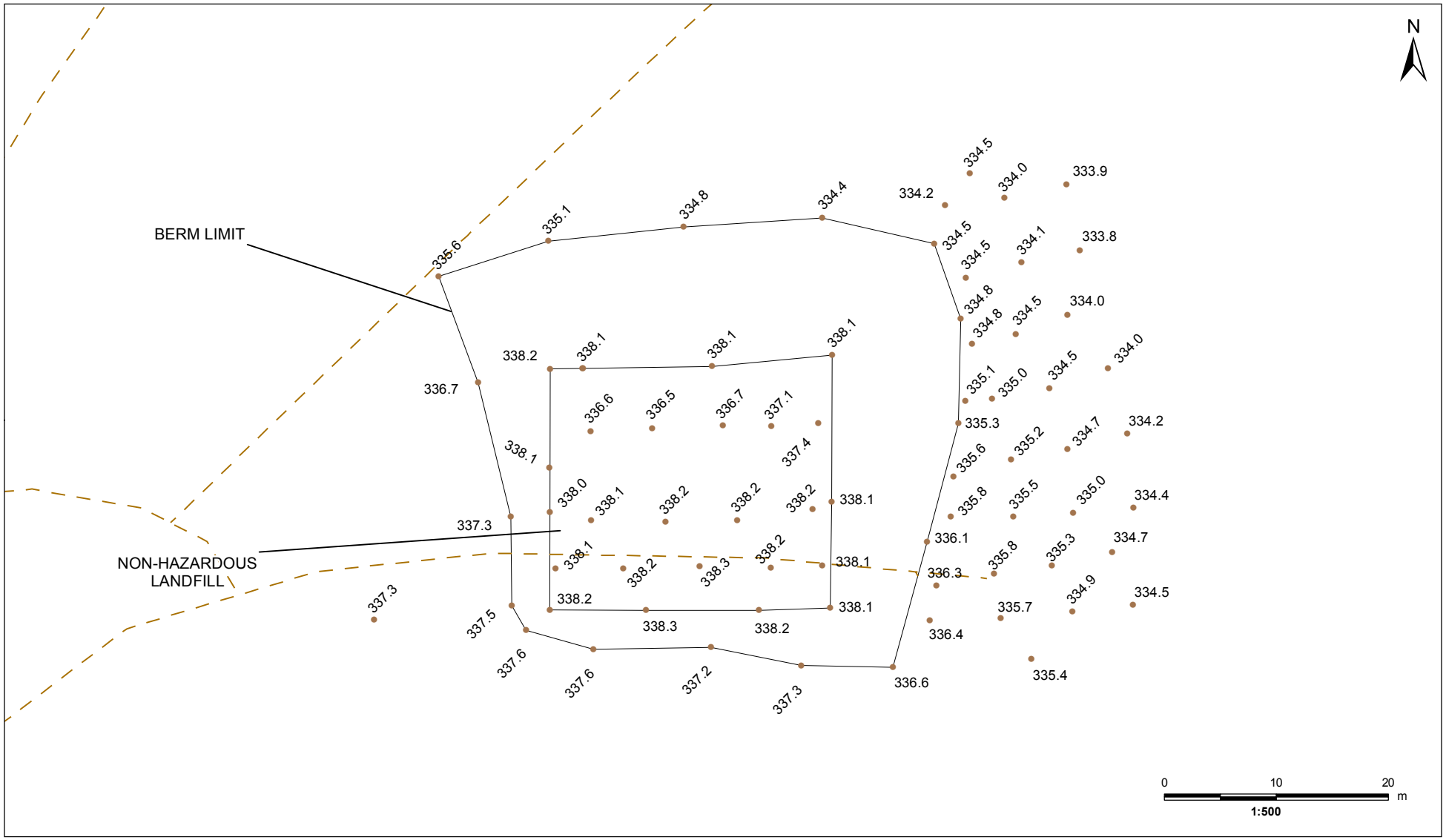
6

Title

Final Survey

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2.



V:\01225\active\122511006\GIS\MXD\122511006_Fig07_LandFillASBUILT.mxd
Revised: 2015-07-22 By: ncruikshank

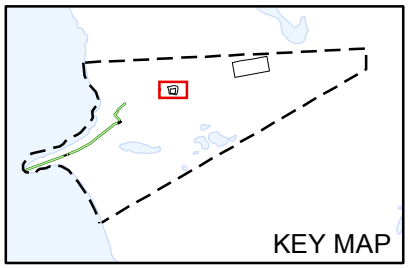
July 2015
Project No.: 122511006

Stantec

Legend

- Elevation Survey Point
- Road/Trail
- Site Feature

320.8 Elevation in m asl



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Ennadai Lake Former Weather Station
Site Supervision
Impacted Soil Excavations

Figure No.

7

Title

Landfill As-Built

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2.

Appendix D PHOTOS

Photo 1: Looking northeast over APEC 1, stained soil beneath the pipeline. APEC 7, small cabin, is visible in the back left, and APEC 9 (Tank 1), APEC 10 (Tank 2), APEC 11 (Tank 3) and APEC 12 (Tank 4) can be seen on the hill in the background.

Photo 2: Looking north over APEC 1 excavated to survey limits (July 1, 2014).