CAM-D Simpson Lake Long-Term Monitoring Report

Year 13

Project number: 60736036

March 31, 2025

Crown-Indigenous Relations and
Northern Affairs Canada
Contaminants and Remediation Division

Delivering a better world

Statement of Qualifications and Limitations

The attached Report (the “Report”) has been prepared by AECOM Canada ULC (“AECOM”) for the benefit of the Client (“Client”) in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the “Agreement”).

The information, data, recommendations and conclusions contained in the Report (collectively, the “Information”):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the “Limitations”);
- represents AECOM’s professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

AECOM shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. AECOM accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

AECOM agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but AECOM makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

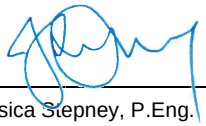
Without in any way limiting the generality of the foregoing, any estimates or opinions regarding probable construction costs or construction schedule provided by AECOM represent AECOM’s professional judgement in light of its experience and the knowledge and information available to it at the time of preparation. Since AECOM has no control over market or economic conditions, prices for construction labour, equipment or materials or bidding procedures, AECOM, its directors, officers and employees are not able to, nor do they, make any representations, warranties or guarantees whatsoever, whether express or implied, with respect to such estimates or opinions, or their variance from actual construction costs or schedules, and accept no responsibility for any loss or damage arising therefrom or in any way related thereto. Persons relying on such estimates or opinions do so at their own risk.

Except (1) as agreed to in writing by AECOM and Client; (2) as required by-law; or (3) to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by Client.

AECOM accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report or any of the Information (“improper use of the Report”), except to the extent those parties have obtained the prior written consent of AECOM to use and rely upon the Report and the Information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

Quality information

Prepared by	Verified by	Approved by
		
Alysha Selinger B.Sc. Environmental Engineering	Barry Fedorak, P.Eng. Senior Civil Engineer	Jessica Stepney, P.Eng. Project Manager

Revision History

Revision	Revision date	Details	Name
Rev 0	Nov. 26, 2024	Draft	Alysha Selinger
Rev 1	Mar. 12, 2025	Draft Rev. 1	Alysha Selinger
Rev 2	Mar. 31, 2025	Final	Alysha Selinger

Distribution List

# Hard Copies	PDF Required	Association / Company Name
1	X	CIRNAC

Prepared for:

Crown-Indigenous Relations and Northern Affairs Canada
Contaminants and Remediation Division

Executive Summary

The CAM-D site is a former intermediate Distant Early Warning (DEW) Line site constructed in 1957 by the Department of National Defence (DND). The site was taken out of service in 1963, and responsibility for the site was assumed by Indigenous and Northern Affairs Canada (INAC) in 1965. Remediation, including construction of the Non-Hazardous Waste Landfill (NHWL), took place between 2010 and 2012. All non-hazardous waste was placed in the NHWL, and four (4) monitoring wells were installed around the landfill perimeter. Between 1992 and 1995, the DND constructed an unmanned Short-Range Radar (SRR) facility approximately 1 km east of the site; this facility is still in operation, and although not part of the long-term monitoring (LTM) activities, notice of upcoming LTM activities was provided to Nasittuq Corporation prior to commencement.

This Year 13 monitoring event is the result of a recommendation for increased monitoring frequency originally made by Arcadis after Year 5 activities, adjusting the *CAM-D (Simpson Lake) Long-Term Monitoring Plan* (INAC, 2010; LTMP) schedule from Year 5, Year 7, Year 10 to Year 5, Year 7, Year 9, and Year 11. The Year 13 monitoring event was added to the schedule after recommendation by AECOM in the Year 11 Report. The field program was conducted September 10, 2024, and included visual monitoring of the NHWL, visual inspection of general site conditions, Natural Environment monitoring, Global Positioning System (GPS) survey data collection, collection and analysis of groundwater samples, and surface water or soil samples, if identified. The visual and environmental monitoring inspection was documented via checklist along with a photographic record.

The site was accessed via Dornier 228 aircraft, with take off and landing on the site airstrip. The Summit Air staff considered the airstrip in good condition with exception of occasional rocks and overall soft conditions. It is recommended that the airstrip condition continue to be assessed during future monitoring events to confirm suitable landing conditions for fixed wing aircraft. The access road from the airstrip to the NHWL was considered in poor condition given development of erosion features, washout, and revegetation throughout the length of the road. Site access via helicopter may be considered as further deterioration of the access road is anticipated, which may significantly impact safe site access, and use of a helicopter could mitigate these access issues.

Active layer groundwater was present during the Year 13 monitoring event; only two of the four monitoring wells, MW01 (upstream) and MW03 (downstream), were sampled during the inspection and grab samples were taken as opposed to low-procedure due to limited time on site. Groundwater samples collected from the landfill did not exhibit Upper Limit of Acceptability (ULA) exceedances, however sample collection was partial due to safety concerns on site, samples were not collected under ideal conditions (i.e., grab samples), and there may have been surface water infiltration due to exposed well screens. Further monitoring is required to determine if trends are present. No seepage or staining was identified on site; therefore, no soil or surface water samples were collected during the Year 13 event.

The overall performance condition of the NHWL is rated as marginal in 2024 based on the severity ratings presented in the Abandoned Military Sites Remediation Protocol Volume II (AMSRP; INAC, 2009); consistent with the previous condition documented in Year 11 (AECOM, 2023). New settlement features were identified throughout the four landfill corners and individual slopes, with new erosion features also appearing on each slope. Despite the progression in observed erosion and settlement features, the landfill remains able to perform as designed and is containing the enclosed waste; the assessed potential for failure remains low or moderate.

The continued degradation of the landfill features and marginal condition rating result in recommendation for continuation of the increased monitoring frequency. In the standard LTM schedule, the next monitoring events for CAM-D would be Year 15 and Year 25, with Year 25 marking the end of Phase II monitoring. Based on the progressive deterioration of site conditions, it is recommended that a Phase II Evaluation is completed within the Year 15 monitoring event. AECOM also recommends continuation of the added GPS survey data collection and an experienced Geotechnical Engineer on site for the Year 15 event in 2026. The current well conditions are not supportive of reliable groundwater data collection, with the added risk of creating groundwater exposure pathways from compromised seals and/or exposed screens; therefore, it is recommended minor Care & Maintenance repairs are made during the Year 15 monitoring event. With the additional specialized site data and subsequent detail available after the Year 15 monitoring activities, future action and further possible Care & Maintenance activities at the CAM-D site may be determined, at which point the monitoring schedule should also be revised.

Table of Contents

Tables

Appendices

Acronyms and Abbreviations

3-D	3-Dimensional
AECOM	AECOM Canada ULC
AMSRP	Abandoned Military Site Remediation Protocol
BV	Bureau Veritas
CALA	Canadian Association for Laboratory Accreditation
CCME	Canadian Council of Ministers of the Environment
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
cm	Centimetre
DEW	Distant Early Warning
DND	Department of National Defense
DO	Dissolved Oxygen
FIGQG	Federal Interim Groundwater Quality Guidelines
GPS	Global Positioning System
HASP	Health and Safety Plan
INAC	Indigenous and Northern Affairs Canada *(subsequently Aboriginal Affairs and Northern Development Canada – AANDC, and now CIRNAC)*
km	Kilometre
km/hr	Kilometres per hour
LDPE	Low Density Polyethylene
LTM	Long Term Monitoring
LTMP	Long Term Monitoring Plan
m	Metres
m^3	Cubic metres
NHWL	Non-Hazardous Waste Landfill
ORP	Oxidative-Reduction Potential
PAHs	Poly-Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PHCs	Petroleum Hydrocarbons
POL	Petroleum, Oil, and Lubricants
ppm	Parts Per Million
QA	Quality Assurance
QC	Quality Control
QA/QC	Quality Assurance/Quality Control
RDL	Reportable Detection Limit
RPD	Relative Percent Difference
SRR	Short-Range Radar
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
ULA	Upper Limit of Acceptability
UTM	Universal Transverse Mercator
%	Percent

1 Introduction

AECOM Canada ULC (AECOM) was retained by Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) to conduct long-term monitoring (LTM) activities at the former CAM-D Simpson Lake Distant Early Warning (DEW) Line site (referred to as "the site"). CAM-D is located at 68° 35' N and 91° 57' W in the Kitikmeot Region of Nunavut, 160 kilometres (km) east of Gjoa Haven and 80 km west of Kugaaruk. This report describes the monitoring activities completed at the site for Year 13 of the monitoring program, an event added to the original Long-Term Monitoring Plan (LTMP) schedule.

1.1 Objectives

The objective of the long-term monitoring event was to complete monitoring activities as described in the *CAM-D Simpson Lake Long-Term Monitoring Plan* (INAC, 2010). This Year 13 monitoring event completed in 2024 was added to the Phase II monitoring schedule of the LTMP based on recommendation to continue a biannual frequency by Arcadis Canada Inc. (Arcadis) in the Year 5 LTM report, by SLR Consulting Ltd. (SLR) in the Year 7 LTM report, and again by AECOM in the Year 11 LTM report. The field program included visual monitoring of the non-hazardous waste landfill (NHWL), visual observation of general site conditions and natural environment, collection of Global Positioning System (GPS) survey data, collection and analysis of groundwater samples, and collection of soil samples, if identified. Analysis of field data and visual observations was completed to satisfy the requirements of the *Abandoned Military Site Remediation Protocol* (AMSRP; INAC, 2009).

1.2 Scope of Work

The scope of work for the Year 13 long-term monitoring activities included the following:

- Prepare and submit a Logistics Plan detailing the work schedule.
- Prepare and submit a Work Plan detailing the work methodologies.
- Prepare and submit a detailed Health and Safety Plan (HASP).
- Mobilization to and from CAM-D Simpson Lake via chartered aircraft with one field day on site.
- Arrangement for a wildlife monitor (with firearm).
- Monitoring of general site conditions (i.e., access roads, airstrip, etc.) and natural environment as outlined in Section 2.1 of the LTMP.
- Visual inspection of the NHWL in accordance with Appendix C of the LTMP. Observations to be documented via a photographic record, visual monitoring checklist, and a site map.
- Collection of survey data for explicit documentation of settlement and erosion features as these areas have continued to increase in size and number at the site.
- Purging of monitoring wells, collection of in-situ field parameters, and collection of groundwater samples from the four (4) monitoring wells around the NHWL.
- Collection of soil samples if seepage or staining is identified during visual inspection. Parameters to be analysed include: polychlorinated biphenyls (PCBs), petroleum hydrocarbons (PHCs), and metals (As, Cd, Co, Cr, Pb, Ni, and Zn).
- Collection and analysis of blind duplicates from at least 20% of samples.
- Submit water samples to a Canadian Association for Laboratory Accreditation (CALA) accredited laboratory for analysis of PHC Fractions F1 and F2, total and dissolved metals, major ions, hardness, total dissolved solids, total suspended solids, pH, conductivity, and PCBs.
- Prepare a field report summarizing LTM activities undertaken within two weeks of fieldwork completion.

- Submit draft and final versions of the *CAM-D Simpson Lake Long-Term Monitoring (Year 13) Report* to CIRNAC.

This report presents the results of the monitoring event completed in September 2024. Sections 2 and 3 provide background information on the site and reference guideline information, respectively. Details regarding the specific methodologies of each monitoring task are included in Section 4, while monitoring results are presented in Section 5. Recommendations and conclusions are available in Section 6.

2 Background Information

The site is located approximately 80 km west of Kugaaruk,120 km southeast of Taloyoak, and 160 km east of Gjoa Haven, Nunavut. Figure 1 in **Appendix A** shows the general site location. CAM-D was an intermediate DEW Line site constructed in 1957 by the Department of National Defence (DND). The site was taken out of service in 1963, and responsibility for the site was assumed by Indigenous and Northern Affairs Canada (INAC) in 1965.

During operations, the site consisted of a module train, warehouse, garage, Inuit house, petroleum, oil, and lubricant (POL) tanks, Quonset huts, storage pads, radar tower, and a 750 m airstrip. At the time of the 1994 assessment, only the garage and a POL pumphouse were still standing, all other buildings had been removed, demolished, or collapsed. Between 1992 and 1995, the DND constructed an unmanned Short-Range Radar (SRR) facility approximately 1 km east of the site (see Figure 1 in **Appendix A**). This facility is still in operation, and although not part of the LTM activities, notice of upcoming LTM activities was provided to Nasittuq Corporation prior to commencement.

Approximately 371 cubic metres (m^3) of soils with concentrations of metals, PCBs, PHCs, and/or polycyclic-aromatic hydrocarbons (PAHs) exceeding AMSRP criteria were identified on site. The contaminated soils classified as Tier I contaminated soil were used as intermediate fill in the NHWL and Tier II contaminated soil was shipped off site for disposal. Approximately 58 m^3 of hazardous materials were identified and shipped off site for disposal.

Remediation, including the construction of the NHWL, took place between 2010 and 2012. A total of 745 m^3 of non-hazardous waste was identified and all disposed of on site in the NHWL.

The NHWL contains the following:

- Tier I contaminated soil (i.e. soil with lead concentration up to 500 parts per million (ppm) and PCB concentrations up to 5 ppm);
- PHC Fractions F3 and F4 contaminated soil;
- Non-hazardous demolition debris such as timbers, plywood, and sheet metal;
- Non-hazardous site debris such as scrap metal and wood;
- Non-hazardous debris/soil excavated from landfills;
- Creosote timbers; and
- Double-bagged asbestos.

2.1 Site Description

The NHWL is approximately 1.4 km northwest of the gravel airstrip. The landfill measures approximately 65 metres (m) by 75 m and is comprised of four (4) perimeter berms constructed of granular material with a slope geometry of three metres of horizontal run for every one metre of vertical rise (3H:1V). The waste was placed in the landfill in 0.5 m lifts and covered by 0.15 m of fill with a total height of approximately 3 metres. The final cover consisted of a minimum 1.0 m of compacted granular fill with a 3% grade sloping to the north. Four (4) monitoring wells were installed around the surrounding perimeter of the landfill. The orientation of the landfill and monitoring wells are shown on Figure 2 of **Appendix A**.

There is an access road from the airstrip to the landfill that is approximately 6 metres wide. Two culverts are located beneath the access road approximately 100 metres from the airstrip.

The surrounding area has a generally flat topography with thick grassy vegetation. Numerous areas of ponded water are present throughout the general site area, with overall wet conditions common during summer months.

2.2 Previous Reports and Monitoring Programs

AECOM reviewed the following reports prior to the field program:

- *CAM-D (Simpson Lake) Long-Term Monitoring Plan* (INAC, 2010)
- *Construction Summary Report* (AECOM, 2013)
- *2012 Long-Term Monitoring Report – Year 1* (Franz, 2013)
- *2014 Long-Term Monitoring Report – Year 3* (Franz, 2015)
- *2016 Long-Term Monitoring Report – Year 5* (Arcadis, 2017)
- *2018 Long-Term Monitoring Report – Year 7* (SLR, 2018)
- *2020 Long-Term Monitoring Report – Year 9* (BluMetric, 2021)
- *2022 Long-Term Monitoring Report – Year 11* (AECOM, 2023)
- *Abandoned Military Site Remediation Protocol (AMSRP)* (INAC, 2009)

A post construction landfill monitoring schedule is proposed in the AMSRP as follows:

- **Phase I**: Years 1, 3, 5
- **Phase II**: Years 7, 10 15 and 25
- **Phase III**: Beyond Year 25, if required

The monitoring plan at CAM-D Simpson Lake began in 2012 and was scheduled every other year for the first 5 years, decreasing frequency to Years 7, 10, 15, and 25. The program will be reviewed at the end of Year 25 to assess the need for continued monitoring.

Additional monitoring at an increased frequency was recommended by Arcadis after Year 5 of the LTMP due to the development of cracking and erosion features at the NHWL. The recommendation based on the Year 5 (2016) LTM report findings was to increase the Phase II monitoring schedule to include Year 9 (2020) and Year 11 (2022) (Arcadis, 2017). Further recommendations were made in the 2022 LTM report to include Year 13 monitoring in 2024 prior to the scheduled Year 15 event in 2026, at which point the schedule should be revisited (AECOM, 2023).

3 Reference Guidelines

Review of the CAM-D LTMP and AMSRP identified the applicable guidelines for use in the LTM program. The following sections describe the reference guidelines selected for each type of sample collected at the site.

3.1 Groundwater

In 2010, four monitoring wells – MW01, MW02, MW03, and MW04 – were installed around the NHWL. No groundwater data is available from the year of installation. Groundwater samples were collected from monitoring wells in 2012, 2014, 2016, 2020, and 2022 which represent Years 1, 3, 5, 9, and 11 of the LTMP. It should be noted that groundwater data was not collected from MW02 in 2016, and all 4 monitoring wells were not sampled in 2018 as they were identified to be frozen at the time of the 2018 site visit.

Due to the absence of appropriate groundwater criteria, the analytical data for groundwater are compared to available historical data from the site. According to the AMSRP, if the analytical results are within the average +/- three standard deviations, the landfill is deemed acceptable and performing as expected. If the analytical results do not meet these criteria, further measures are recommended ranging from increased monitoring frequency to development of a new remedial plan.

As per the AMSRP, Upper Limits of Acceptability (ULAs) were calculated using the average + three (3) standard deviations of all available data from 2012 to 2022. ULAs were only calculated for a limited number of parameters since baseline data is sparse, and as concentrations for many parameters are below the detectable limit. For purposes of the 2016 Year 5 LTM Report, Arcadis considered baseline data to be 2012 and 2014 so that ULA criteria could be calculated for all parameters. There is currently insufficient historical or baseline data to calculate ULAs for the remaining parameters (e.g., PHCs and PCBs). Duplicates were omitted from the calculations as to not over-represent results from one well in the ULA calculation. Tables D-7 to D-9 in **Appendix D** summarize the available historical groundwater data and the calculated ULAs (where available).

3.2 Surface Water

Due to the absence of appropriate surface water criteria, the analytical data for surface water is compared to available historical data from the site. According to the AMSRP, if the analytical results are within +/- three (3) standard deviations, the landfill is deemed acceptable and performing as expected. If the analytical results do not meet these criteria, further measures are recommended ranging from increased monitoring frequency to development of a new remedial plan.

Two samples of ponded water were collected in 2018 at the request of the CIRNAC representative and will be used to compare future surface water samples. Given the absence of appropriate reference guidelines or baseline reference data, the Canadian Council of Ministers of the Environment (CCME) guidelines for Protection of Aquatic Life are used as a point of reference and are not meant to be interpreted as criteria. The CCME guidelines are a conservative reference as the closest permanent body of water is approximately 1,750 m from the NHWL.

3.3 Soil

Soil samples were collected prior to remediation in 2012 by Franz Environmental Inc. and were analyzed for PHCs, PCBs, and metals. The results can be used to calculate ULAs and applied as criteria per the AMSRP as no soil samples were collected during remediation at the site. As a result, the 2012 analytical results are considered to be baseline.

4 2024 Monitoring Program Methodologies

The site investigation for the 2024 CAM-D LTM event was completed September 10, 2024, by AECOM personnel Greg Fremont, Daxton Dion-Hoffman, and Alysha Selinger, accompanied by wildlife monitor Carl Williams (a resident of Yellowknife). The site was accessed by a Dornier 228 aircraft chartered by Summit Air mobilizing from Cambridge Bay, NU. Logistics for the site visit were modified from the original Logistics Plan, provided under a separate cover; a program departure delay in Yellowknife and poor weather conditions on site impacted field activities. Weather conditions prevented the field team from performing all the required field activities. Sustained winds upwards of 55 kilometres per hour (km/hr) and additional gusts prevented drone survey data collection (a manual GPS topographic survey was completed in lieu) and continued deterioration in weather conditions resulted in the decision to abandon low-flow sampling and prioritize sample collection from select monitoring wells. Field conditions became unsafe, and the team returned to the aircraft under advice of the pilots. A summary of the activities and field notes can be found in **Appendix C**.

4.1 Health and Safety Plan

In preparation for the field program, a site-specific HASP was produced and submitted to CIRNAC previously under a separate cover. The HASP identified risks and suspected hazards associated with work on the site. Included in the HASP were emergency contacts and procedures for medical, mechanical, or weather emergencies. Prior to the start of work, a review of the HASP was completed with all personnel involved in the field program.

4.2 Geotechnical Monitoring and Visual Inspection

A geotechnical inspection was completed during the site visit. A visual monitoring checklist was used during the inspection. The landfill was inspected to assess the general condition of the structure and document any:

- Erosion, ponding, frost action, settlement, and lateral movement;
- Animal burrows, vegetation, vegetation stresses; and
- Staining or seepage.

The observations were assessed relative to previous inspections. The observations were marked on a sketch and photos were taken to present the observations. The sketch was used to annotate Figure 2 in **Appendix A**.

As per the recommendations made in the Year 11 (2022) LTM report, the Year 13 inspection was conducted by a trained professional with a master's degree in geotechnical engineering and permafrost training with northern geotechnical experience. A GPS survey was also completed to explicitly document settlement and erosion features.

4.3 Natural Environment Monitoring

Natural environment data was collected during the 2024 LTM event. The specific observations included:

- Wildlife sightings (species, number, gender, juveniles);
- Evidence of recent presence of wildlife (scat, tracks, feathers/fur, carcass remains, etc.);
- Wildlife activity (summering/nesting/denning, migratory/passing through); and
- Qualitative assessment of relative numbers versus previous years (more, same, less).

Additional observations or information could not be collected from local residents due to logistical restraints that required the field team to mobilize from Cambridge Bay and use a Wildlife Monitor from Yellowknife, NT.

4.4 Groundwater Sampling Methodology

The following outlines the methodology prepared for this program; a summary of the field groundwater sampling as completed is included in Section 5.2.2.

Water level and depth to bottom were recorded, and an approximate well volume calculated. Samples were collected from the groundwater wells using a peristaltic pump and dedicated disposable polyethylene tubing to purge and sample using low-flow methodology. The following recordings were taken prior to sampling;

- Water level;
- Total depth of water;
- Stick-up (height of well casing above surface); and
- Presence of hydrocarbons.

Prior to the collection of representative groundwater samples, the monitoring wells were purged until water quality parameters stabilized, including dissolved oxygen (DO), oxidative-reduction potential (ORP), temperature, pH, conductivity, and turbidity. All field parameters were recorded prior to sampling. Parameter readings during the purging process were recorded every 3-5 minutes, aiming for three consecutive readings within 5% prior to sampling. If stabilization could not be achieved before depletion of the water column, purging stopped, and sample collection began. Appropriate laboratory-supplied clean sample containers were filled and placed in insulated coolers (provided by the laboratory) maintained between 0 and 10°C prior to delivery to Bureau Veritas (BV) Laboratories depot in Yellowknife, NT, under a Chain of Custody for processing and analysis.

BV is a CALA accredited laboratory, where samples were analyzed for:

- PHC Fractions F1 – F2;
- PCBs;
- Total and dissolved metals;
- Major ions, hardness, total dissolved solids, total suspended solids; and
- pH, conductivity.

4.5 Surface Water Sampling Methodology

The following outlines the methodology prepared for this program in the event surface water was identified on site; a summary of the field surface water sampling as completed is included in Section 5.2.3.

Following the collection of each water sample, temperature, pH, dissolved oxygen, and conductivity were to be recorded using a Horiba U52-2 probe. Observations such as turbidity, evidence of groundwater indicators (surface sheen, vegetation), presence or evidence of aquatic life, and human and/or animal presence on site were also to be noted.

All collected surface water samples were to be placed in appropriate laboratory-supplied clean sample containers, placed in insulated coolers (provided by BV) to be maintained between 0 and 10ºC, and delivered to the BV depot in Yellowknife, NT, under a Chain of Custody for processing and analysis. GPS Universal Transverse Mercator (UTM) coordinates were to be documented for surface water sampling locations.

Samples were to be analyzed by a CALA accredited laboratory for:

- PHC Fractions F1 and F2 (C6-C16);
- Total and dissolved metals;
- PCBs; and
- Total suspended solids, total dissolved solids, and routine parameters including major ions and hardness.

4.6 Soil Sampling Methodology

The following outlines the methodology prepared for this program in the event soil sampling was required for the site; a summary of the field soil sampling as completed is included in Section 5.2.4.

If a visual inspection identified the need for soil sample collection, samples were to be collected with a small trowel decontaminated with a laboratory-grade biodegradable cleaner (Alconox®) and rinsed between sampling locations. Soil samples were to be collected to a maximum depth of 30 cm and packed in appropriate laboratory-supplied clean sample containers with minimal to no headspace, placed in insulated coolers (provided by BV) to be maintained between 0 and 10ºC, and delivered to the BV depot in Yellowknife, NT, under a Chain of Custody for processing and analysis. GPS UTM coordinates were to be documented for soil sampling locations.

The following parameters were to be analysed by a CALA accredited laboratory:

- PHC Fractions F1-F4;
- PCBs; and
- Metals.

4.7 Quality Assurance and Quality Control

A Quality Assurance/Quality Control (QA/QC) program was followed during the monitoring event to verify sampling and analytical data collected are interpretable, defensible, and comparable. This involved following QA/QC measures in both the collection and analysis of environmental samples.

Quality Control (QC) measures used in the collection, preservation, shipment, and analysis of samples included the following:

- Sampling techniques were performed in accordance with standard written AECOM protocols.
- Thorough field notes taken during the site visit.
- All samples collected in laboratory provided sample containers and kept cool prior to delivery to the laboratory.
- Samples assigned unique sample control numbers and transported under chain of custody procedures.
- The analytical laboratory chosen had proficiency certification issued by CALA.

Field procedures were implemented to minimize the potential of cross contamination between sampling locations. Sample handling protocols were established to track and maintain the integrity of the samples. Field handling of samples was minimized by transferring samples directly into containers, when possible. Where handling was required, disposable nitrile gloves were used at all times and changed between samples. All monitoring equipment was decontaminated prior to initial use and between each sample location. During groundwater sampling, disposable low-density polyethylene (LDPE) and master flex tubing was dedicated to the individual wells and during all sampling activities, a new pair of disposable nitrile gloves was used between each sample. Photographs were taken of all areas of interest; location and directional viewpoint were recorded.

4.7.1 Duplicate Samples

Quality Assurance (QA) measures established for the investigation included collection of field duplicate samples at a rate of at least 20%. A blind duplicate sample consists of a second aliquot of an individual sample that is submitted to the analytical laboratory under a separate label such that the analytical laboratory has no prior knowledge that it is a duplicate. A duplicate sample is a sequential sample taken immediately following the collection of a regular sample. Duplicate samples provide a rough estimate of the overall variability of the field technique and laboratory analysis.

4.7.2 Relative Percent Difference

The relative percent difference (RPD) is the absolute difference between the duplicate analysis values divided by the mean and is used to evaluate the sample result variability. Where the concentration of a parameter is less than five

times the laboratory reportable detection limit (RDL), the results are less precise and the RPD is not calculated. The guidance manual for Environmental Site Characterization in Support of Human Health Risk Assessment, Volume I (CCME, 2016) recommends that RPDs for parameters of duplicate groundwater samples not exceed 40%. The guide also recommends that RPDs for laboratory duplicates not exceed 20%. Should either of these guidelines be exceeded, a potential problem may be indicated such as compromised sample collection, equipment malfunction, or handling errors.

The relative percent difference (RPD) between duplicate results are used to assess overall sampling precision. The RPD is a measure of the variability between two duplicate analyses and is calculated by the following equation:

$$RPD = 100 \times ((2 \times (x_1 - x_2))/(x_1 + x_2))$$

Where x_1 is the primary results and x_2 is the blind duplicate result.

Acceptable RPD values vary on the analytical parameters, the sample matrix, and the concentrations of analytes in the sample. For metals in soils acceptable RPD values are 35%, but 50% for organics in soils (PHCs and PCBs). Only when concentrations are at least 10 times the method detection limit are RPD calculations considered valid.

5 Results

This section presents a summary of the analytical results and observations collected during the 2024 Year 13 monitoring activities. Site figures presenting the inspection observations are available in **Appendix A**. Photographs of the site taken during the site monitoring program are presented in **Appendix B**. The Visual Inspection and Natural Environment Checklists can be found in **Appendix C**. Groundwater monitoring data is available in **Appendix D**.

5.1 Natural Environment

Observations of the natural environment showed numerous goose scat (see Photographs 97, 100 - 102 in **Appendix B**) with some tracks and occasional caribou tracks visually observed at the landfill and across the site by the Wildlife Monitor. Scat and tracks of rabbit and fox were also visually observed by the Wildlife Monitor. Additional animal burrows were identified on the southwest slope of the landfill beyond what was observed in 2022 (see Figure 2 in **Appendix A** and Photographs 104 - 107 in **Appendix B**). There were no wildlife sightings during the assessment. Overall, the extent of revegetation is increasing across the site, likely due to moist conditions. The complete Natural Environment Checklist is available in **Appendix C**.

5.2 Non-Hazardous Waste Landfill

5.2.1 Geotechnical Monitoring and Visual Inspection

The following subsections describe the visual geotechnical monitoring inspection completed for the NHWL and immediate surrounding area. Photographic reference for each subsection is provided in the Visual Inspection Checklist in **Appendix C**. A Photographic Comparison Log was created to visualize the change in site features from 2022 to 2024, available in **Appendix B**.

5.2.1.1 Settlement

Areas of settlement and cracking were noted across all landfill side slopes and corners, as shown in Figure 2 of **Appendix A**. The cracks along the southwest side slope appear to be more severe in 2022 and previous monitoring events compared to the condition observed during the 2024 site visit (see Comparison 8 in **Appendix B**). Site conditions in 2022 were relatively dry, compared to the wet, saturated ground conditions encountered during the 2024 field program. This suggests the establishment of a wet-dry cycle in which the dry, desiccated crack slopes fail upon saturation, where the resulting material movement serves to infill the cracks, creating a self-stabilization effect. This effect does not mitigate the mechanism of slope settlement, but it suggests development of a natural equilibrium in favour of low-moderate failure potential vs. imminent failure characteristic of a “significant” severity rating, as per the AMSRP.

A small zone of sloughing was noted on the southwest slope (see Photographs 52-54 in **Appendix B**) making the slope steeper mid-span (see Photograph 54). The side slope instability continues to advance, however, given the scale of the features (estimated to be less than 30 cm deep) relative to slope width (approx. 14 m at base tapering to approx. 3 m at top), the present landfill condition does not compromise containment. Additionally, it appears a small slump is developing as a permanent pond encroaches on the southwest toe near MW04, cutting back into the sloped material (see Photograph 63 in **Appendix B**). In its current state, this back cutting is minimal with respect to the approx. 14 m width of the berm base but should be observed in future monitoring events.

The general CAM-D area is quite flat and poorly drained, as is evident from the observed topography and the presence of numerous ponded areas throughout the general area. The progression of individual slope cracks into a continuous ring around the landfill may be a result of a bearing failure of underlying native soils in the active layer. Given the size and extent of this feature relative to the berm width and cover thickness, the NHWL containment is currently not compromised; however, continual degradation of the slopes may lead to future failure and increased monitoring is required.

5.2.1.2 Erosion

Erosion channels have increased in number from the previous monitoring event, as shown in Figure 2 of **Appendix A**. The three vertical cracks intersecting the transverse horizontal crack on the southeast slope, identified in 2022,

have developed into erosion channels extending from top to base of the slope (see Photograph 73 in **Appendix B**). Several new erosion channels have also developed into the northwest and northeast landfill side slopes. Overall, the erosion channels show washout of fines leaving predominantly coarse material with the channels appearing to be self-armouring (see Photographs 31 and 41 in **Appendix B**).

The top of the landfill remains in good condition (see Photographs 84 through 92 in **Appendix B**) despite progression of erosion and settlement features on all four side slopes. The surface is relatively flat with no notable undulations, saddling, or sloping (beyond the designed 3% grade promoting drainage to the north). A noticeable increase in revegetation is present on the west corner of the landfill surface (see Photographs 85 and 88 in **Appendix B**), likely due to moisture content as flow moves to the north, and overall site drainage tends to the northwest.

5.2.1.3 Animal Presence

Evidence of wildlife activity was identified along the access road and around the base of the NHWL with numerous goose tracks, associated scat, and occasional caribou tracks. Three (3) additional animal burrows were identified in the 2024 visual inspection (see Photographs 105 through 107 in **Appendix B**). These burrows are grouped together and follow the crack(s) on the southwest slope. Animal burrows may provide a pathway that facilitates water infiltration within the slopes. This process may also be counter productive to the self-stabilizing mechanism of the wet-dry cycling within the cracks. While the size and scale of the burrows remains small relative to the slope dimensions, observation should be continued in future monitoring events.

The Year 11 LTM Report identified a sinkhole on the access road above the culvert crossing near the airstrip (see Photograph 22 in Appendix B of AECOM, 2023). Upon review of the early LTM reports, it appears this feature originated as a siksik burrow and was therefore misidentified as a sinkhole. This feature is still present and has expanded to approx. 40 cm wide (see Photograph 7 in **Appendix B**) and is now more characteristic of a settlement hole.

5.2.1.4 Debris

Several additional items of scrap metal and wire were added to Figure 2 (**Appendix A**) as a result of the 2024 visual inspection. These items appear to be superficial and were not observed to be originating from the NHWL as no breach in containment was identified (see Photographs 93 through 103 in **Appendix B**).

5.2.1.5 Staining

No evidence of staining was observed during the inspection, however, the wet conditions may have obscured these features, if present.

5.2.1.6 Vegetation

A notable increase in revegetation across the site area was observed during the field investigation likely due to the moist site conditions. Several sections of the access road showed occasional to numerous tufts of vegetation, clustered specifically along the road edges (see Photograph 10 in **Appendix B**) and around the culvert crossing near the airstrip (see Photograph 6 in **Appendix B**). A section of the access road has become difficult to delineate from the surrounding area due to increase in revegetation, ponding water, and settlement undulations (see Photograph 12 in **Appendix B**). Ponding water and moist soils surround the NHWL, which has supported revegetation of the overall site area up to and often including the slope toes (see Photographs 19, 23, 38, and 46 in **Appendix B**). Vegetation is present on the NHWL slopes; however, it is limited to an isolated or occasional presence (see Photographs 27, 28, 42, 49, and 84 in **Appendix B**). No signs of stressed vegetation were observed.

5.2.1.7 Seepage and Ponding

Numerous areas of surface ponding were observed across the extent of the CAM-D site. Rainfall continued for the duration of the field activities, therefore the extent of surface water observed may not be representative of “normal” seasonal site conditions; however, this does illustrate the temporary extents during storm events. Several permanent ponds surrounding the NHWL appear to have increased in extent over successive monitoring events. The ponds do not appear to be the result of seepage from the landfill and were therefore not sampled. Previous reports indicated poor drainage around the site, and presence of ephemeral ponded water, which is consistent with the Year 13 observations. This surface water persistence on site suggests the active layer surface is likely relatively close to ground surface and may be contributing to an active layer thaw bearing failure at the landfill. Additionally, a permanent pond is present between MW04 and the southwest slope. This feature has grown in its extent from previous monitoring events, progressing towards the toe of the NHWL slope (see Comparison 15 in **Appendix B**).

5.2.1.8 Monitoring Instruments

All four (4) monitoring wells on site – MW01, MW02, MW03, and MW04 – show significant heave with casements thrusting upwards of 30 centimetres (cm). The well installation records document a 0.65 m stick up for all wells (AECOM, 2013) compared to a measured stick up of 0.98 m at MW01 in 2024. Evidence of frost action was first reported in the Year 7 LTM Report at MW01 and MW04 (SLR, 2018), with signs of heave visible as early as the Year 5 LTM Report photographs (Arcadis, 2017). The heaved well condition observed in 2024 is the first to document exposed bentonite, a sign of progressive frost jacking mechanisms. Further, exposed bentonite is indicative of compromised surface seals, leaving the groundwater wells susceptible to surface water intrusion and/or development of a possible groundwater exposure pathway. Field stick-up and depth-to-water measurements at MW01 and MW03 show the measured water level to be approximately equal to ground surface elevation (see Table D-1 in **Appendix D**), further increasing the likelihood there is surface water infiltration within the heaved groundwater wells. Depth to bottom field measurements across LTM monitoring events is highly variable at each well location; depths are far less than the installation record and fluctuate between monitoring events. These field measurements are presented in Table 5.1. Variation in depth of the active layer thaw could explain this fluctuation, with the measurement equipment hitting ice (not well bottom). This fluctuation could also be suggestive of sediment infiltration collecting within the well casing with a notable sediment volume travelling in and out of the standpipe. Steel standpipes were installed at this site, which decreases the likelihood of large cracks allowing for such sediment movement (as can occur with PVC well installations). Sand within the casement of MW01 has historically been observed at a level near the well opening, and 2024 field observations showed additional heave with sand covering the entirety of the well cap (see Photograph 17 in **Appendix B**).

Table 5.1 Monitoring Well Depth to Bottom Variations

Date	Depth to Bottom (m)	Stick Up (m)
MW01		
Install	4.15	0.65
2018	*Frozen*	*Data Not Available*
2020	2.11	*Data Not Available*
2022	2.13	0.67
2024	2.49	0.98
MW02		
Install	4.15	0.65
2018	*Frozen*	*Data Not Available*
2020	2.22	*Data Not Available*
2022	1.86	0.48
2024	*Not Recorded*	
MW03		
Install	4.15	0.65
2018	*Frozen*	*Data Not Available*
2020	2.49	*Data Not Available*
2022	2.38	0.85
2024	2.59	0.98
MW04		
Install	4.15	0.65
2018	*Frozen*	*Data Not Available*
2020	2.49	*Data Not Available*
2022	2.43	0.88
2024	*Not Recorded*	

Source: Respective LTM Reports

5.2.2 Groundwater Monitoring

During the LTM site visit, groundwater monitoring wells MW01 and MW03 located around the NHWL were inspected. The well locks were still in place and re-locked after sample collection; Guard 111 keys (provided to a CIRNAC representative in 2022) are still current for the site. Active layer groundwater was present during the 2024 monitoring event and as a result monitoring wells could be sampled. Low-flow sampling procedure is considered best practice for groundwater sample collection on site. Due to poor weather conditions and limited time on site, the decision was made to abandon low-flow sampling at MW01 prior to stabilization of field parameters in favor of collecting a sample for laboratory analysis. As field conditions continued to deteriorate, the field team immediately collected a laboratory sample at MW03 (a downstream comparison to MW01) with the remaining time on site as well as a QA/QC blind duplicate to maximize data collection. Monitoring wells MW02 and MW04 were not sampled or inspected as the conditions were becoming unsafe and the field team needed to leave site on advice of the pilots. Well locations are provided in Table 5.2, below, and shown in Figure 2 of **Appendix A**.

Table 5.2 CAM-D Simpson Lake Groundwater Well Locations

Well	UTM83-15 Northing (m)	UTM83-15 Easting (m)
MW01	7609340	541517
MW02 *	7609404	541535
MW03	7609409	541474
MW04	7609348	541454

***** The Year 9 LTM Report noted MW02 was not located as indicated by the LTM Plan or previous reports. This adjusted location was not observed to be reflective of the site layout during the visual inspection, and the coordinates have been returned to the installation records.

Field observations indicated that the monitoring wells have continued to heave, bringing the casings above ground level, exposing the bentonite seal. The sand within the casing of MW01 had become elevated to the point the well plug was buried and the sand had to be removed prior to opening the well for sampling. The exposed bentonite and casements above ground indicate the monitoring wells have likely become compromised and are now susceptible to surface water intrusion. This is further supported by the field observation that the water level in the sampled wells was approximately equal to that of ground surface level (see Table D-0 in **Appendix D**).

Field measured parameters (pH, conductivity, temperature, ORP, turbidity, DO, and water level) for the groundwater monitoring wells are summarized in Table D-1 of **Appendix D**. Analytical results from the Year 13 monitoring event are presented in Tables D-2 through D-6 in **Appendix D**. Tabulation of all historical groundwater results collected up to 2022 are presented in Tables D-7 to D-9 in **Appendix D** for trend evaluation. As low-flow sampling procedure was not feasible due to the deteriorating weather conditions, the collected samples are more aligned with a grab sample approach. Low-flow sampling mitigates the increased turbidity and sediment disruption that may be caused by traditional bailer grab sampling. The grab samples obtained during the field program were collected with the low-flow pump, not a bailer, and therefore created less disruption to the groundwater. It is still possible that the pumping action may have influenced turbidity, albeit to a lesser degree than that of a bailer, or that the stagnant water within the well was not characteristic of the overall stabilized groundwater conditions. In terms of analytical results, it is possible that the data overestimates the representation of dissolved metals, total suspended solids (TSS), and/or turbidity. Sample quality may also have been impacted by surface water infiltration, noted that the monitoring event took place during active rain, and dilution of groundwater may have occurred.

The AMSRP suggests analytical results be compared to previous data, and if groundwater concentrations are within range of the average +/- three standard deviations, the landfill is performing acceptably. The average + three standard deviations of all available historical data form the ULA which is applied to the present data as reference criteria.

No exceedances of calculated ULAs for groundwater samples analyzed at the NHWL were identified during the 2024 long-term monitoring event, with the understanding that the groundwater samples from 2024 were not collected under ideal conditions as discussed above, and there may have been surface water infiltration due to the exposed well screens. This provides provisional support of the assertion that Calcium ULA metals exceedance observed at MW03

in 2022 were anomalous; the exceedance at MW02 cannot be commented on as MW02 was not sampled in 2024 (see Table D-8 in **Appendix D** for historical data). A successive ULA exceedance was identified in Year 9 and Year 11 for nitrate. A nitrate exceedance was not repeated in Year 13; however, this may not be definitive that the trend is no longer successive. All PCB and PHC concentrations were below laboratory detection limits, consistent with previous monitoring years.

As only two of the four groundwater wells were sampled in this monitoring event, samples were not collected under ideal circumstances, and the condition of the monitoring wells is likely compromised, further monitoring is required to determine if trends are present.

5.2.3 Surface Water Monitoring

Tier 1 Federal Interim Groundwater Quality Guidelines (FIGQGs) are based on a water use exposure pathway that assumes surface water supporting aquatic life is within 10 metres of the impacted groundwater. This is not the case at the CAM-D site where the nearest permanent surface water body is approx. 1750 m away. Despite the numerous surface water ponds and flow channels across the general site area, no surface water samples were collected in the 2024 long-term monitoring event as the ponds do not appear to be the result of seepage from the landfill. This is consistent with baseline and previous monitoring events.

5.2.4 Soil Monitoring

No soil samples were collected at the time of the 2024 long-term monitoring event. There was no evidence of seepage or staining observed, however, the wet conditions may have obscured these features, if present.

5.2.5 Landfill Performance

The overall performance condition of the NHWL is rated as marginal in 2024 based on the severity ratings presented in AMSRP Volume II (INAC, 2009). This is consistent with the previous condition documented in Year 11 (AECOM, 2023). New settlement features were identified throughout the four landfill corners and individual slopes, with new erosion features also appearing on each slope since the previous monitoring event. It is difficult to assess the extent and progression of the previously reported features based on the information and photographs presented in the various LTM reports, thus a GPS survey was recommended in the Year 11 LTM Report. The collection of GPS data during the 2024 field program will allow for future quantitative discussion of these settlement and erosion features on site now that a reference has been set. Despite the progression in erosion and settlement features observed on site, the landfill remains able to perform as designed and is containing the enclosed waste; the assessed potential for failure remains low or moderate.

5.2.6 GPS Survey Data

The addition of survey data collection to the scope of LTM activities in 2024 serves to provide a reference point for quantitative documentation and delineation of erosion and settlement features on the NHWL. As this is the first year in which this type of data has been collected, the GPS data was used to generate a 3-dimensional (3-D) surface that is presented in Figures 3 through 5 in **Appendix A**. The software used to generate the 3D surface is optimized for visualization, not reporting, and does not have contour labelling or legend generation functionalities; elevation contours are plotted, with the colour scale to further facilitate visualization. As more data is collected in subsequent monitoring events, the potential for comparison will support the development of any Care & Maintenance decisions. Without quantitative comparison at this time, the data was used to further aid visualization of the landfill condition.

5.3 Site Condition

The 1.4 km access road between the airstrip and the NHWL showed considerable degradation from the condition observed in 2022, with several scarps, washout, holes, and revegetation making sections of the road difficult to identify from the surrounding landscape. Equipment transport with the tundra wagon was also challenging given the conditions. Further, the landfill cannot be seen from the airstrip and vice versa; continued degradation of the road and progressive revegetation will pose a safety risk for transportation between these locations without a visual landmark

of the destination and no clear road to follow. Access road conditions are shown in Photographs 5 through 14 in the Photographic Log in **Appendix B**.

The Summit Air staff considered the airstrip in good condition except for isolated rocks and the surface being overly soft. Inspection observations are presented in the Visual Monitoring Checklist in **Appendix C**.

5.4 QA/QC Discussion

5.4.1 Analytical QA/QC

Duplicate samples were collected for 50 percent (%) of the samples collected as part of the QA/QC sampling program. This equates to one duplicate per two wells sampled. Samples were analyzed by Bureau Veritas (BV) Laboratories which is accredited by CALA for the parameters proposed for analysis and uses recognized methods to conduct laboratory analyses. As conveyed by the laboratory, method blanks, certified reference materials, method spikes, duplicates, surrogates, and laboratory control samples are routinely analyzed as part of their QA/QC programs. Analytical QA/QC was completed by BV by way of analytical method blanks, analytical control spikes and analytical duplicates.

Hold times for pH were exceeded in all water samples. This was anticipated given the CCME method requires pH to be analysed within 15 minutes of sampling, therefore it is standard procedure to collect field pH measurements to represent conditions at the time of sampling (see Table D-1 in **Appendix D**).

The complete analytical quality control report can be found as part of the Certificate of Analyses in **Appendix E**.

6 Conclusion & Recommendations

Based on the results of the 2024 Year 13 activities, geotechnical monitoring and visual inspection rate the NHWL as marginal per the severity ratings presented in the AMSRP Volume II, consistent with the Year 11 results. Several areas of settlement and erosion were newly identified in the 2024 monitoring event with degradation observed on all four side slopes of the landfill. Tension cracks are present on the slopes on all four sides of the landfill and have progressed to form a continuous ring around the landfill. Overall, the observation of cracks in 2024 appeared to be less severe compared to previous monitoring events, suggesting the cracks may be self-infilling to an extent, despite the increase in quantity of instability features. Addition and development of erosion channels on the northwest and northeast slopes indicate fine granular material washout, which may compromise the structural integrity of the cell over time, however the channels appear to be self-armouring. The present landfill condition does not compromise containment given the scale of the observed features (estimated to be less than 30 cm deep) relative to the slope width (approx. 14 m at base tapering to approx. 3 m at top) and cover thickness (minimum 1 m).

Increased monitoring frequency was first recommended in the Year 5 LTM Report, with the proposal for additional monitoring events in Year 7 (2018), Year 9 (2020) and Year 11 (2022) (Arcadis, 2017). This early onset of erosion and settlement features suggests a period of rapid change in site conditions post-construction. Since Year 5, the erosion and settlement features observed on site continue to develop, however they do not collectively contribute to considerable deterioration in overall landfill performance comparing Year 7 (2018) through to Year 13 (2024). This plateau may be indicative of a “natural equilibrium” developing on site. It is recommended that the Year 15 inspection is conducted by a geotechnical engineer with permafrost training and northern geotechnical experience. Utilization of a surveyor for explicit documentation of settlement and erosion features is also recommended to increase the degree of monitoring of the site features. Based on the Year 13 condition, it appears that the features are becoming self-armouring and may be stabilizing in their slumped condition towards a natural equilibrium; this could be confirmed with subsequent collection of survey data and specialized inspection in the following monitoring event.

The continued degradation of the landfill features and marginal condition rating result in recommendation for continuation of the increased monitoring frequency initially recommended in Year 5 by Arcadis (Arcadis, 2017). In the standard LTM schedule, the next monitoring events for CAM-D would be Year 15 and Year 25, with Year 25 marking the end of Phase II monitoring. Based on the progressive deterioration of the landfill side slopes, it is recommended that a Phase II Evaluation is completed within the Year 15 monitoring event. The additional site data and subsequent detail available after the Year 15 monitoring activities will provide basis for future action and possible Care & Maintenance activities at the CAM-D site, at which point the monitoring schedule should also be revised.

Groundwater samples collected from the landfill monitoring wells did not exhibit ULA exceedances, however, only MW01 and MW03 were sampled. These monitoring wells have evidence of exposed screens, suggesting surface water infiltration may have been present in the well, and sample collection was completed via grab sampling rather than low-flow sampling. Previously successive ULA exceedances were not repeated in the 2024 sampling results, but due to concerns with the well integrity and sampling methods in 2024, continued monitoring is still recommended for further trend analysis.

The current well conditions are not supportive of reliable groundwater data collection, with the added risk of creating groundwater exposure pathways if the well seals are compromised and/or the screened sections of the standpipe are exposed; therefore, it is recommended minor Care & Maintenance repairs are made during the next monitoring event – Year 15, in 2026. Closer inspection of the exposed standpipes is recommended to determine if well screen is visible and subsequent mounding of additional bentonite to promote a proper seal is a possible remedial action. This could mitigate the development of an exposure pathway and increase reliability in the meantime while additional site data is collected in Year 15 for a more comprehensive site evaluation and a quantitative comparison of slope conditions with a second GPS monitoring event.

The site was accessed via a Dornier 228 aircraft. Airline charter staff deemed the airstrip to be in good condition but noted the presence of isolated rocks along the runway and the surface to be overly soft. It is recommended that the airstrip condition continue to be assessed during future monitoring events to confirm suitable landing conditions for fixed wing aircraft. Site access via helicopter may be considered as further deterioration of the access road is anticipated, which may significantly impact safe site access, and use of a helicopter could mitigate these access issues. It is noted that several other Nunavut LTM sites (e.g. Roberts Bay) require helicopter access and a single field

program dedicated to sites with access limitations could be developed, depending on timing of individual site LTM schedules. Increasing contingency days and staffing on site is also recommended to address safe site access. The recommendation to increase baseline LTM activities to a 2-day program would accommodate the additional time required to traverse the deteriorating access road safely, particularly while transporting field gear and sampling equipment, and allow for multiple trips back/forth if the access road conditions are such that a tundra wagon cannot be used. Alternatively, the same outcome could be achieved by increased the minimum number of field personnel on site; this could also provide an opportunity to hire a local labourer or job-shadow opportunity as the additional person wouldn't require any specialized training. Further, it is recommended any additional scope should also include additional field personnel and corresponding wildlife monitor(s).

Sampled groundwater wells were re-locked with existing locks keyed to Guard Key 111; additional key sets were left with a CIRNAC representative in 2022. It is recommended keys are provided for the next monitoring event to avoid cutting and replacement of locks on site. In the event locks are found missing or damaged it is recommended additional locks are brought to site during future visits.

7 References

AECOM Canada Ltd. (AECOM). 2013. Construction Summary Report CAM-D DEW Line Site Simpson Lake Nunavut. March 26, 2013.

AECOM. 2023. 2022 Long-Term Monitoring Report – Year 11. March 6, 2023.

Arcadis Canada Inc. (Arcadis). 2017. Long Term Monitoring – 2016. February 3, 2017.

BluMetric Environmental Inc. (BluMetric). 2021. 2020 Long Term Monitoring Report. March 12, 2021.

Canadian Council of Ministers of the Environment (CCME). 2016. Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment – Volume 1 Guidance Manual. 2016.

Franz Environmental Inc. (Franz). 2013. Long-Term Monitoring 2012 CAM-D Simpson Lake Nunavut. January 2013.

Franz. 2015. Long-Term Monitoring 2014 CAM-D Simpson Lake Nunavut. March 13, 2015.

Indigenous and Northern Affairs Canada (INAC). 2009. Abandoned Military Site Remediation Protocol (AMSRP). Contaminated Sites Program. December 2009.

INAC. 2010. CAM-D Simpson Lake LTM Plan. February 22, 2010.

SLR Consulting Ltd. (SLR). 2018. 2018 Long Term Monitoring Report. December 18, 2018.

Appendix A – Figures

NOTES:
1. ALL COORDINATES ARE REFERENCED TO NAD83 UTM ZONE 15.
2. IMAGERY FROM ARCGIS DATAMAP.

Issue Status: FINAL

2024 Nunavut Sites Long-Term Monitoring
CAM-D Simpson Lake (Year 13)
Crown-Indigenous Relations and Northern Affairs Canada
Project No.: 60736036 Date: 2025-02-14

CAM-D SITE PLAN

AECOM

Figure 1

LEGEND

- ANIMAL BURROW
- MW — MONITORING WELL
- EROSION
- SETTLEMENT CRACK
- PONDED WATER
- DEBRIS
- SLOUGHING

NOTES:
1. ALL COORDINATES ARE REFERENCED TO NAD83 UTM ZONE 15.
2. IMAGERY FROM ARCGIS DATAMAP.

0 18.75 37.5 m
1:750

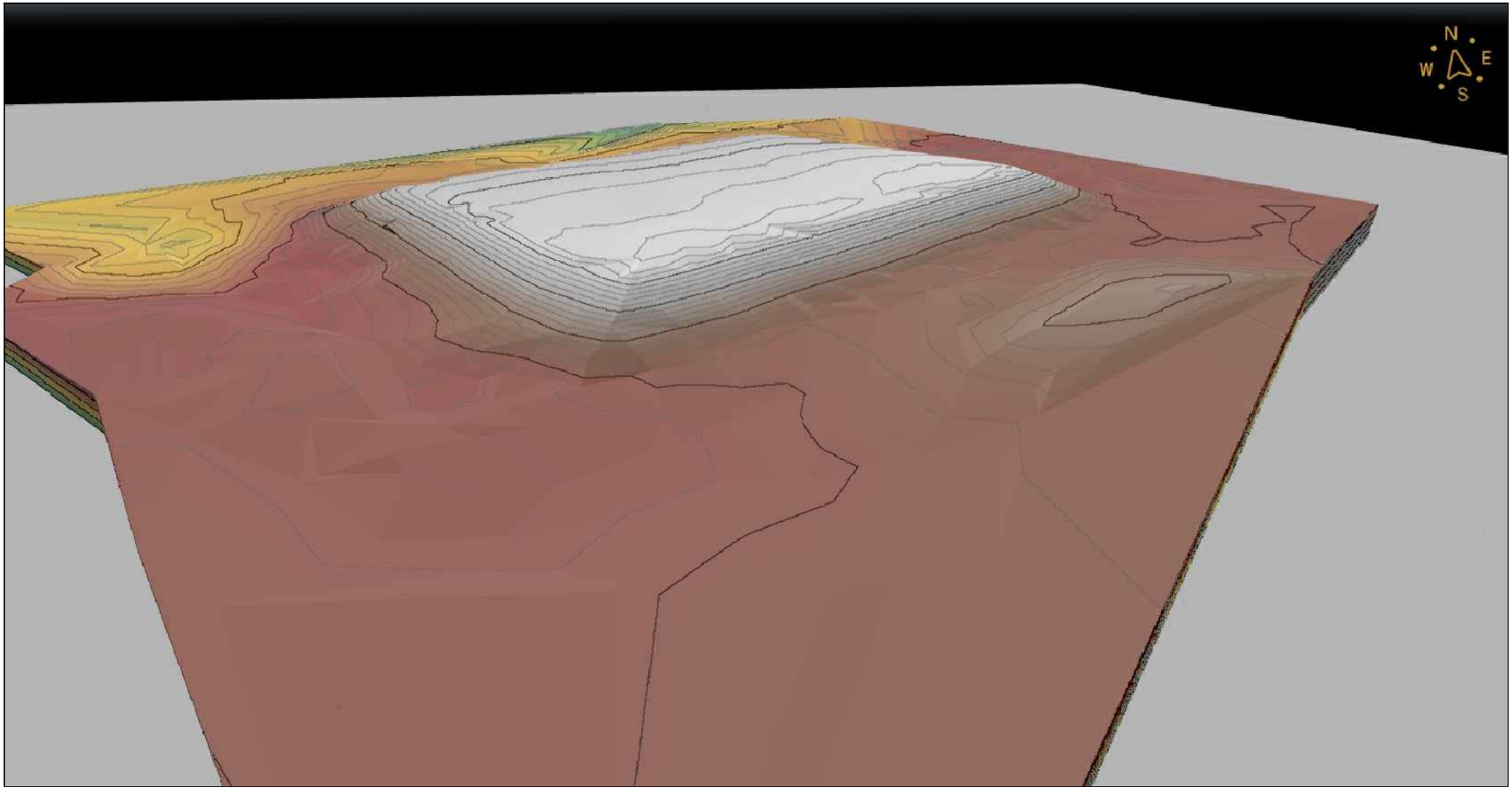
Issue Status: FINAL

2024 Nunavut Sites Long-Term Monitoring
CAM-D Simpson Lake (Year 13)
Crown-Indigenous Relations and Northern Affairs Canada
Project No.: 60736036 Date: 2025-02-14

NON-HAZARDOUS WASTE LANDFILL
VISUAL INSPECTION

AECOM

Figure 2



NOTES:

CONTOUR INTERVAL: 0.2 METERS

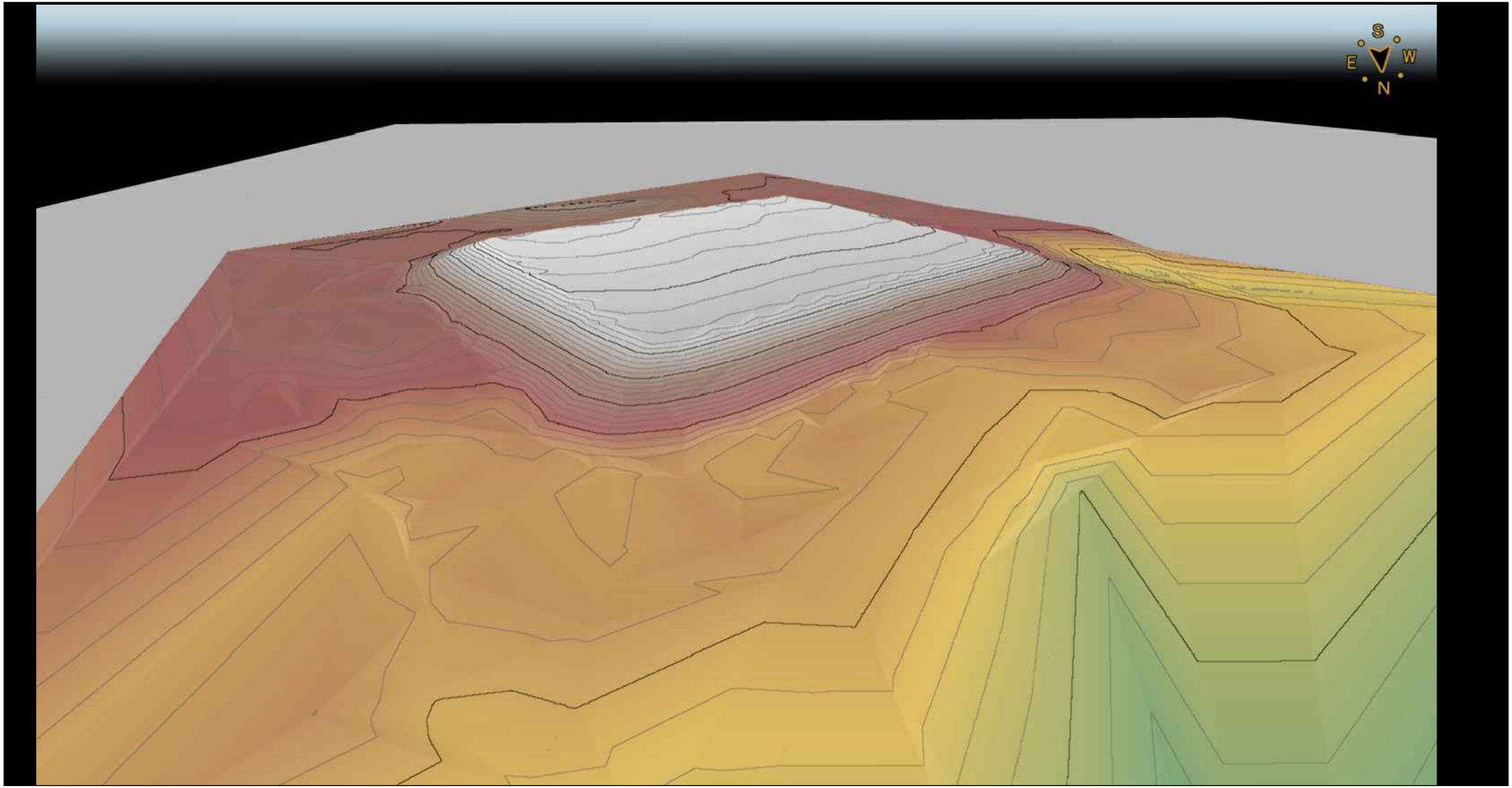
Issue Status: FINAL

2024 Nunavut Sites Long-Term Monitoring
CAM-D Simpson Lake (Year 13)
Crown-Indigenous Relations and Northern Affairs Canada
Project No.: 60736036 Date: 2025-02-14

NON-HAZARDOUS WASTE LANDFILL
LOOKING NORTH

AECOM

Figure 3



NOTES:

CONTOUR INTERVAL: 0.2 METERS

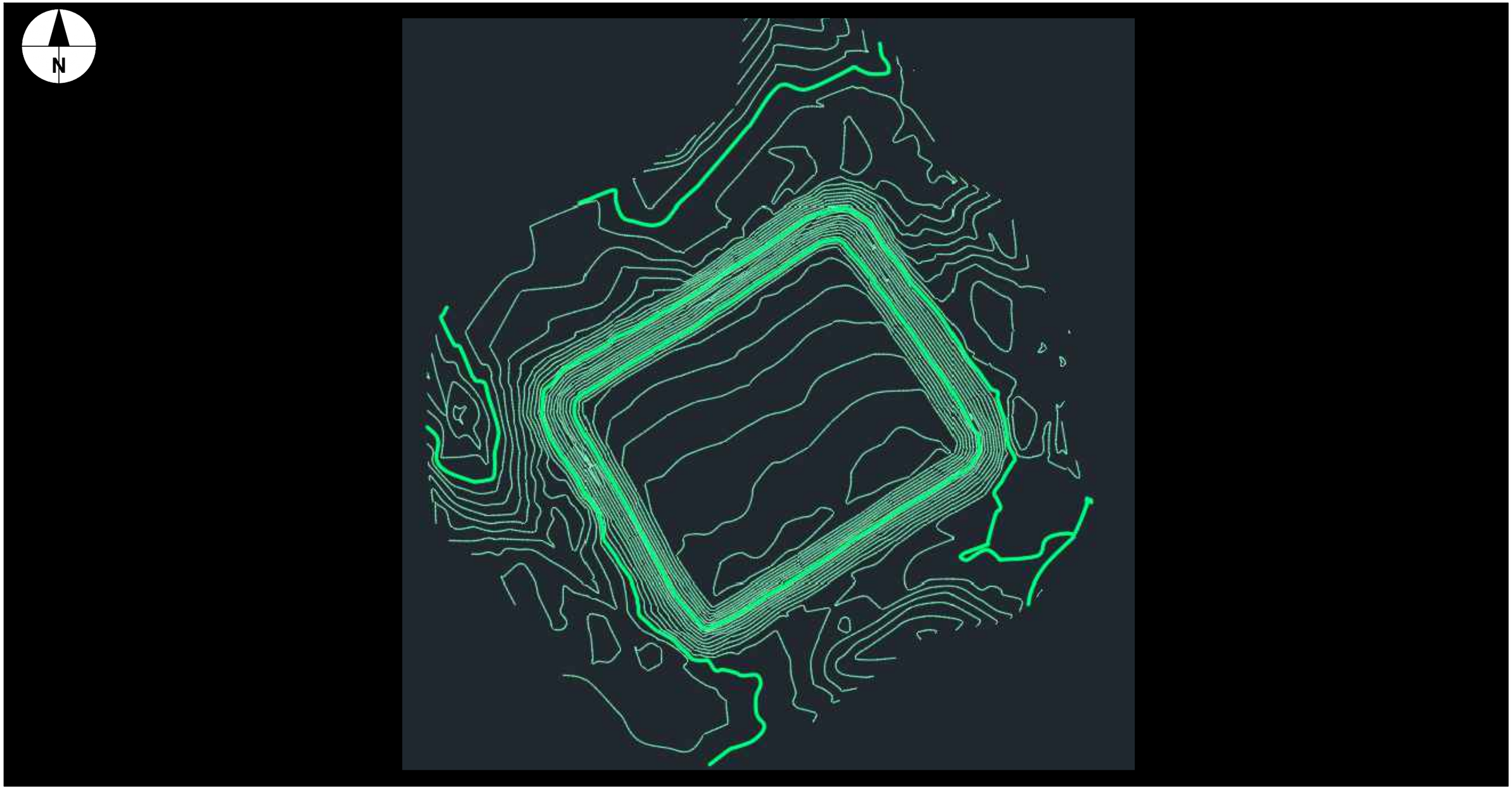
Issue Status: FINAL

2024 Nunavut Sites Long-Term Monitoring
CAM-D Simpson Lake (Year 13)
Crown-Indigenous Relations and Northern Affairs Canada
Project No.: 60736036 Date: 2025-02-14

NON-HAZARDOUS WASTE LANDFILL
LOOKING SOUTH

AECOM

Figure 4



NOTES:

CONTOUR INTERVAL: 0.2 METERS

Issue Status: FINAL

2024 Nunavut Sites Long-Term Monitoring
CAM-D Simpson Lake (Year 13)
Crown-Indigenous Relations and Northern Affairs Canada
Project No.: 60736036 Date: 2025-02-14

NON-HAZARDOUS WASTE LANDFILL
PLAN VIEW

AECOM

Figure 5

Appendix B – Photographic Record

AECOM

PHOTOGRAPHIC LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
1	9/10/2024

Direction Photo Taken

SW

Area

Aerial View

Description

Aerial view of Non-Hazardous Waste Landfill (NHWL).

Ponding and standing water surrounding NHWL.

Erosion channels visible throughout access road.

AECOM

PHOTOGRAPHIC LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
2	9/10/2024

Direction Photo Taken

South

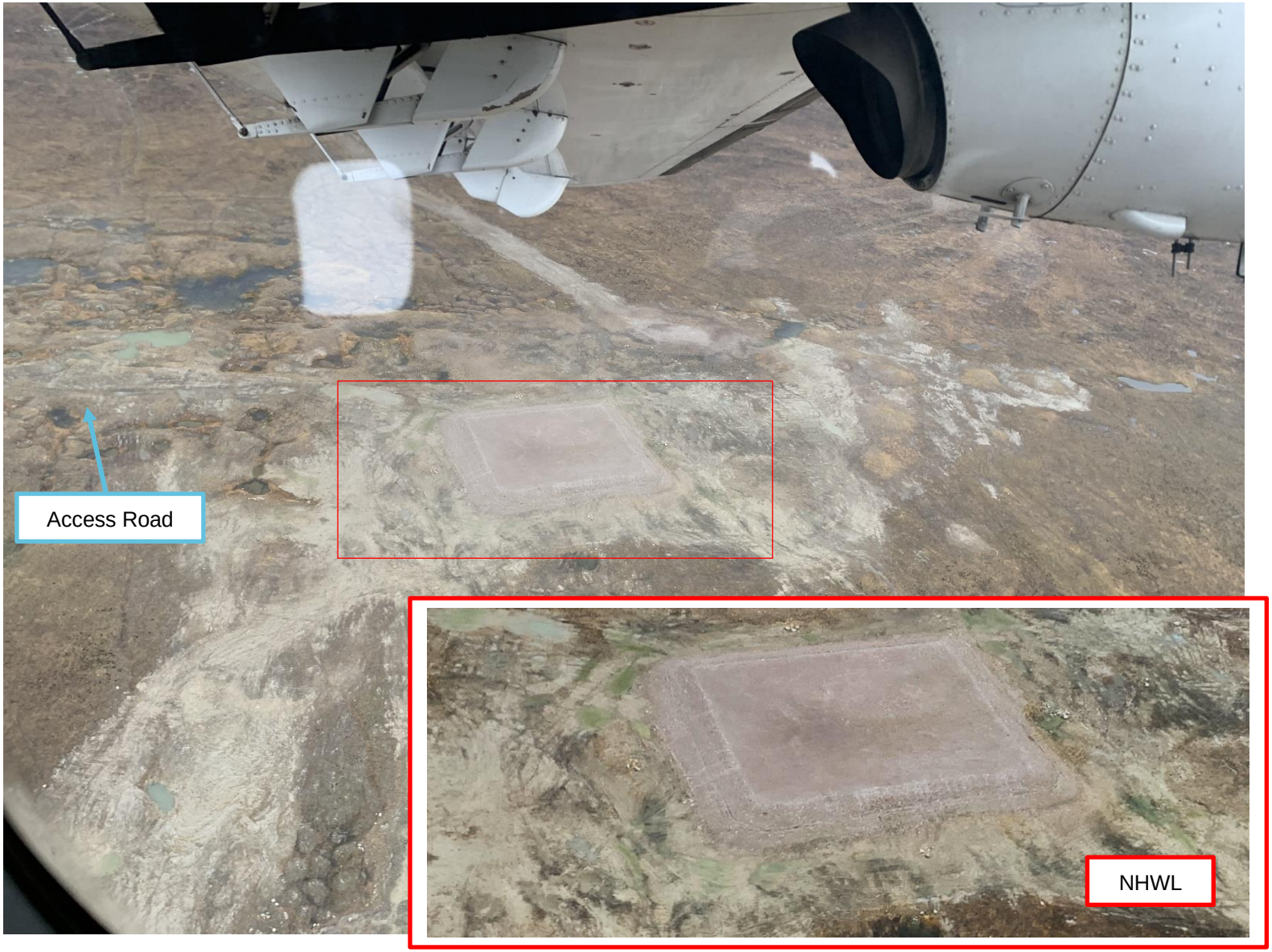
Area

Aerial View

Description

Aerial view of NHWL.

Horizontal slope cracks visible (see call out).



AECOM

PHOTOGRAPHIC LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
3	9/10/2024

Direction Photo Taken: NE

Area: Airstrip

Description:

Airstrip in overall good condition.

Noted by pilots to be fairly soft and there was visible rutting from the tires. A couple of small boulders were also observed partially exposed at grade.

Isolated vegetation present.

Photo No.	Date
4	9/10/2024

Direction Photo Taken: SW

Area: Airstrip

Description:

Airstrip in good condition overall.

Noted by pilots to be fairly soft (see tire tracks). A couple small boulders were also observed partially exposed at grade.

Isolated vegetation present.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
5	9/10/2024

Direction Photo Taken

NW

Area

Access Road

Description

Access road culvert crossing just north of the Airstrip.

Settlement and slumping on both sides of culvert alignment.

Revegetation of the ground surface following the culvert alignment.

Photo No.	Date
6	9/10/2024

Direction Photo Taken

NW

Area

Access Road

Description

Close up of west portion of culvert showing settlement and slumping.

Settlement hole present above culvert (originally a siksik burrow identified in Year 7).

Revegetation of the ground surface following the culvert alignment.

PHOTOGRAPHIC LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
7	9/10/2024

Direction Photo Taken: West

Area: Access Road

Description:

Close up of settlement hole above culvert originating from a siksik burrow (approx. 40 cm wide; misidentified as a sinkhole in Year 7).

Crack parallel to culvert alignment (arrow).

Photo No.	Date
8	9/10/2024

Direction Photo Taken: N-NW

Area: Access Road

Description:

East portion of culvert settlement and slumping.

Numerous tufts of vegetation.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
9	9/10/2024

Direction Photo Taken

North

Area

Access Road

Description

Close up of cracking and slumping on east portion of culvert settlement.

Numerous tufts of vegetation.

Photo No.	Date
10	9/10/2024

Direction Photo Taken

NW

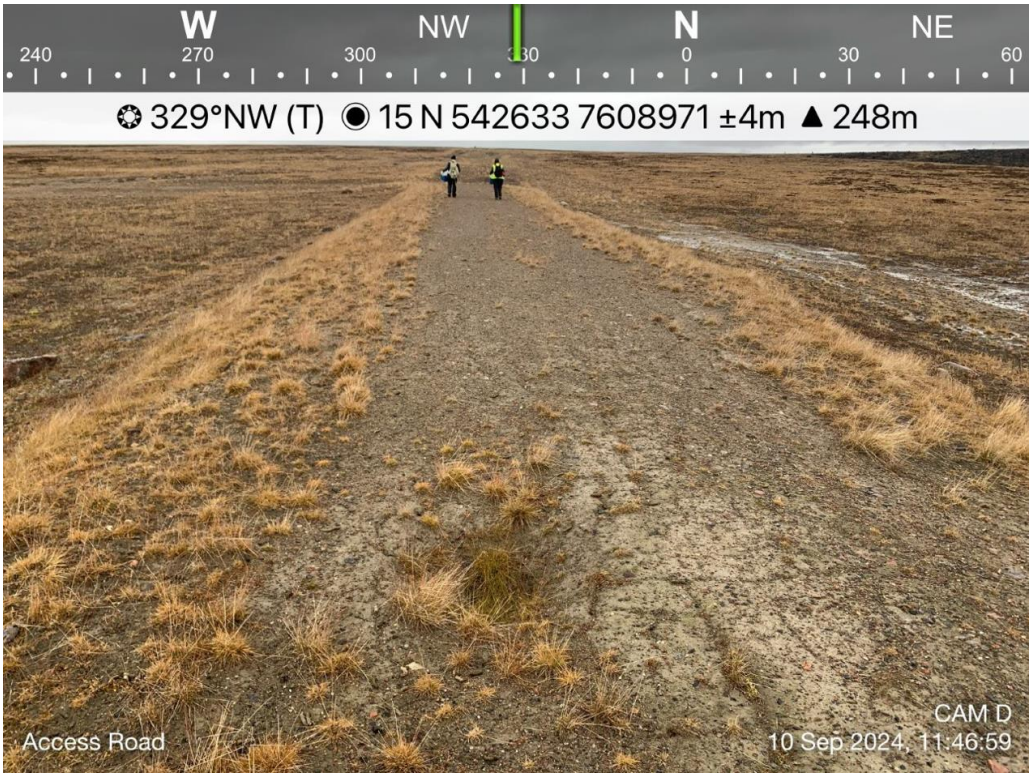
Area

Access Road

Description

Sinkhole in Access Road (see close up in Photo 11).

Extensive revegetation on either side of road.



Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
11	9/10/2024

Direction Photo Taken: W-NW

Area: Access Road

Description:

Close up of sinkhole in Access Road (approx. 30 cm wide).

Revegetation within sinkhole and surrounding area.

Various cracks in road surface.

Photo No.	Date
12	9/10/2024

Direction Photo Taken: SE

Area: Access Road

Description:

Access road difficult to identify from surrounding terrain.

Ponding water on access road with large areas of standing water on either side of road.

Settlement and undulations present along length of road.

Numerous tufts of vegetation.

AECOM

PHOTOGRAPHIC LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
13	9/10/2024

Direction Photo Taken

SE

Area

Access Road

Description

Erosion channels on either side of the road.

Sloughing of the edges of the road.

Flowing water through erosion channels.

Occasional tufts of vegetation.

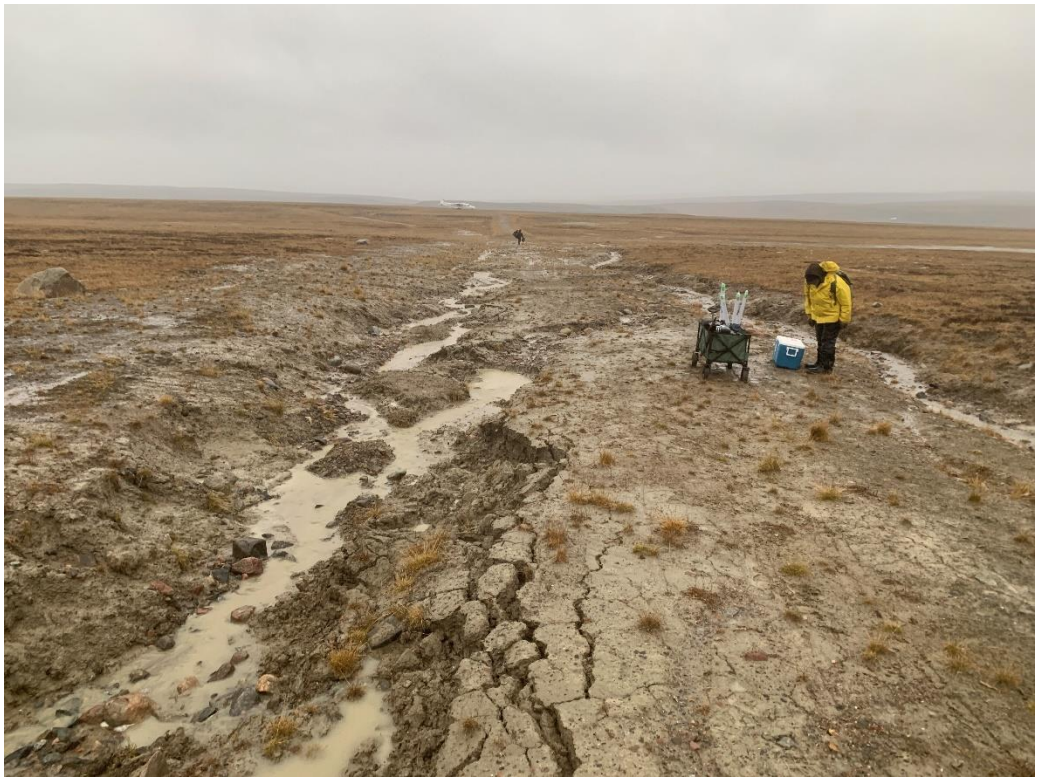


Photo No.	Date
14	9/10/2024

Direction Photo Taken

N/A

Area

Access Road

Description

Close up of erosion channel with scarps and slumped material.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

AECOM

PHOTOGRAPHIC LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
15	9/10/2024

Direction Photo Taken

N/A

Area

Monitoring Instruments

Description

MW01 heaved with exposed bentonite at base.

Standing water surrounding well.

Photo No.	Date
16	9/10/2024

Direction Photo Taken

N/A

Area

Monitoring Instruments

Description

Close up of exposed bentonite at base of MW01.

Standing water surrounding base.

Ground very soft and saturated (see boot print).

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
17	9/10/2024

Direction Photo Taken

N/A

Area

Monitoring Instruments

Description

MW01 heaved.

Sand within casement shifted above well plug.

Photo No.	Date
18	9/10/2024

Direction Photo Taken

N/A

Area

Monitoring Instruments

Description

Low flow sampling equipment set up at MW01.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
19	9/10/2024

Direction Photo Taken

N-NW

Area

Monitoring Instruments

Description

MW02.

No groundwater sample collected.

Numerous tufts of vegetation in surrounding area.

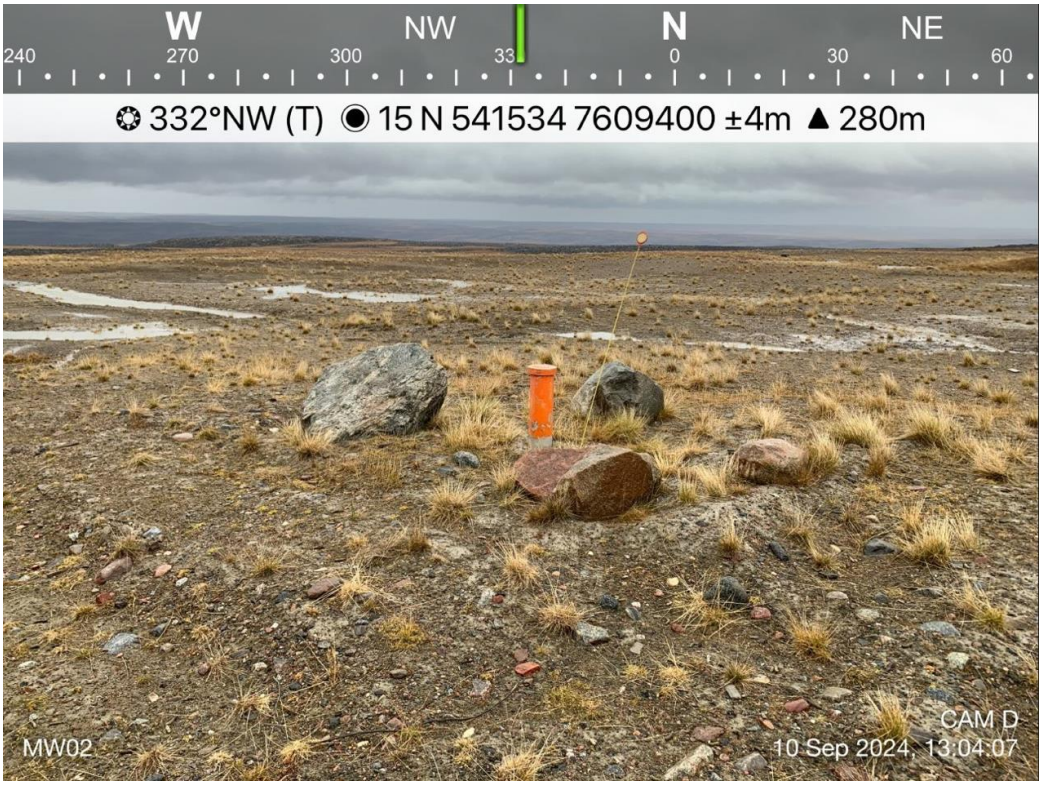


Photo No.	Date
20	9/10/2024

Direction Photo Taken

NW

Area

Monitoring Instruments

Description

MW03 heaved with exposed bentonite at base.

Standing water in vicinity of MW03.

Ground very soft and saturated (see boot print at well base).

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
21	9/10/2024

Direction Photo Taken

NW

Area

Monitoring Instruments

Description

Ground surrounding MW03 very soft and saturated. Boot prints filled with water.

Pump set up for groundwater sample collection.

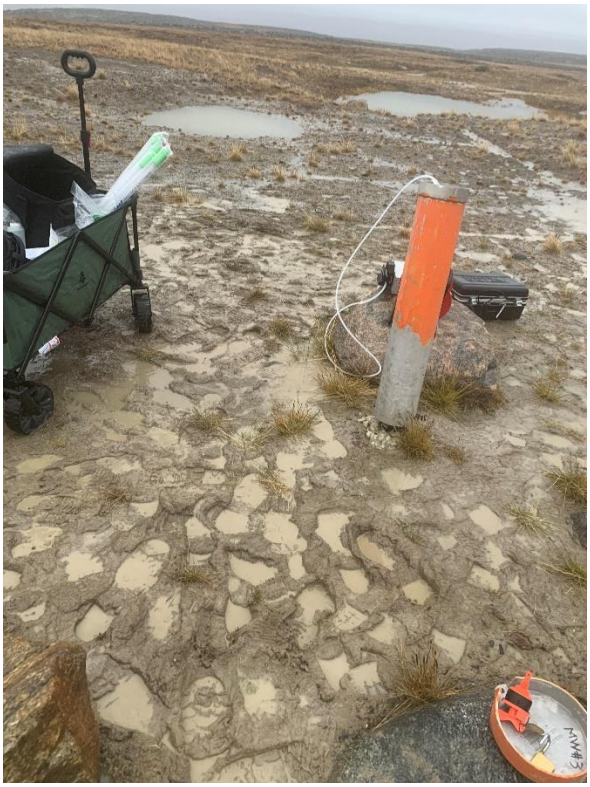


Photo No.	Date
22	9/10/2024

Direction Photo Taken

E

Area

Monitoring Instruments

Description

MW03 heaved with exposed bentonite at base.

Preferential drainage path of water runoff to the left of the photo (draining to the northwest).

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
23	9/10/2024

Direction Photo Taken

S-SW

Area

Monitoring Instruments

Description

MW04 heaved (see Photo 24).

No groundwater sample collected.

Permanent pond noted in previous reporting present and increased in size and depth.

Numerous tufts of vegetation, including at slope toe.

Photo No.	Date
24	9/10/2024

Direction Photo Taken

N/A

Area

Monitoring Instruments

Description

MW04 heaved with exposed bentonite at base.

Standing water in vicinity of MW04.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

AECOM

PHOTOGRAPHIC LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
25	9/10/2024

Direction Photo Taken: SW-W

Area: NHWL

Description:

South portion of northeast slope.

Horizontal tension crack extending the length of slope near the crest (dashed arrow).

Vertical erosion channels from top to toe of slope (see arrows).

Ponding water at base of slope.

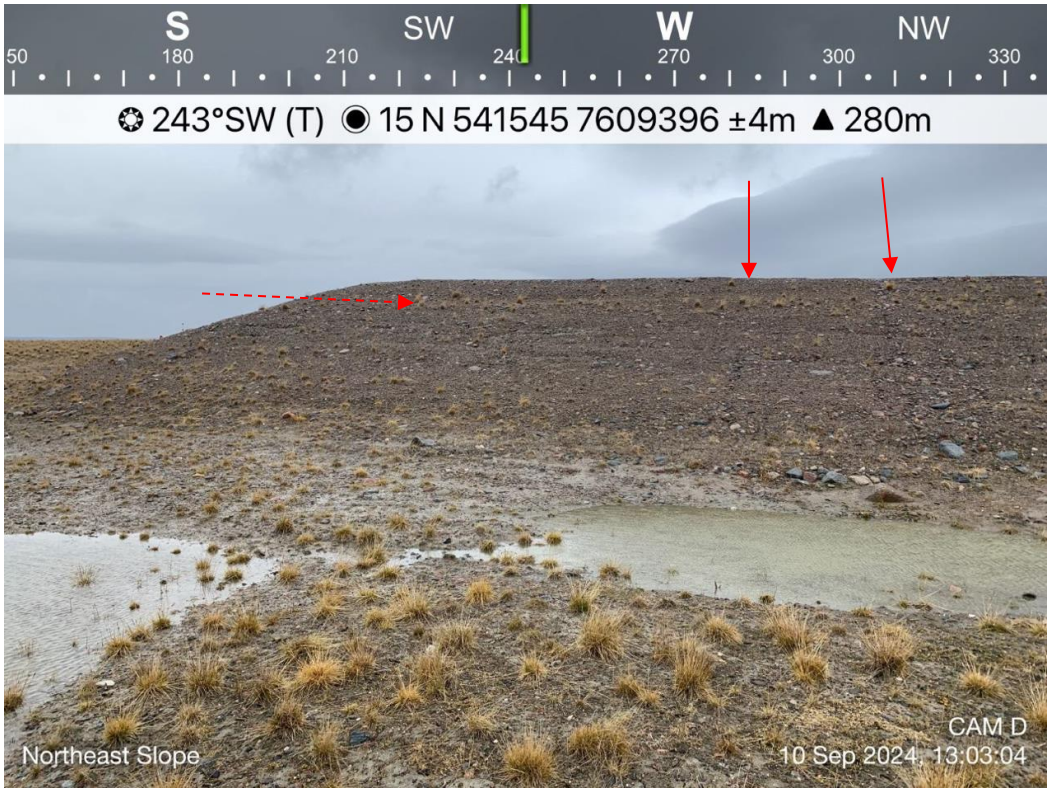


Photo No.	Date
26	9/10/2024

Direction Photo Taken: W

Area: NHWL

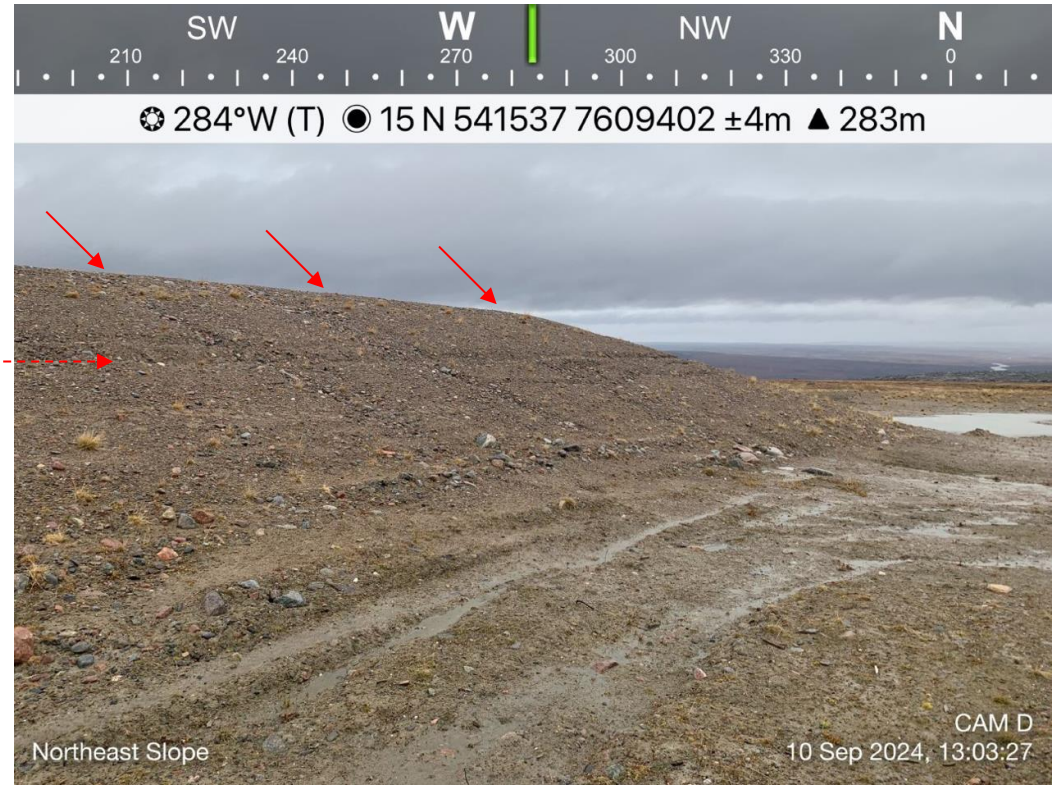
Description:

North portion of northeast slope.

Horizontal tension crack extending length of slope (dashed arrow).

Vertical erosion channels from top to toe of slope (solid arrows).

Ponding water at base of slope.



As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
27	9/10/2024

Direction Photo Taken: NW

Area: NHWL

Description:

Close up of horizontal tension cracks extending length of northeast slope.

Erosion channel extending top to toe intersecting tension cracks (see arrows).

Occasional vegetation along slope.

Ponding water at base of slope.

MW02 in background.

Photo No.	Date
28	9/10/2024

Direction Photo Taken: S-SW

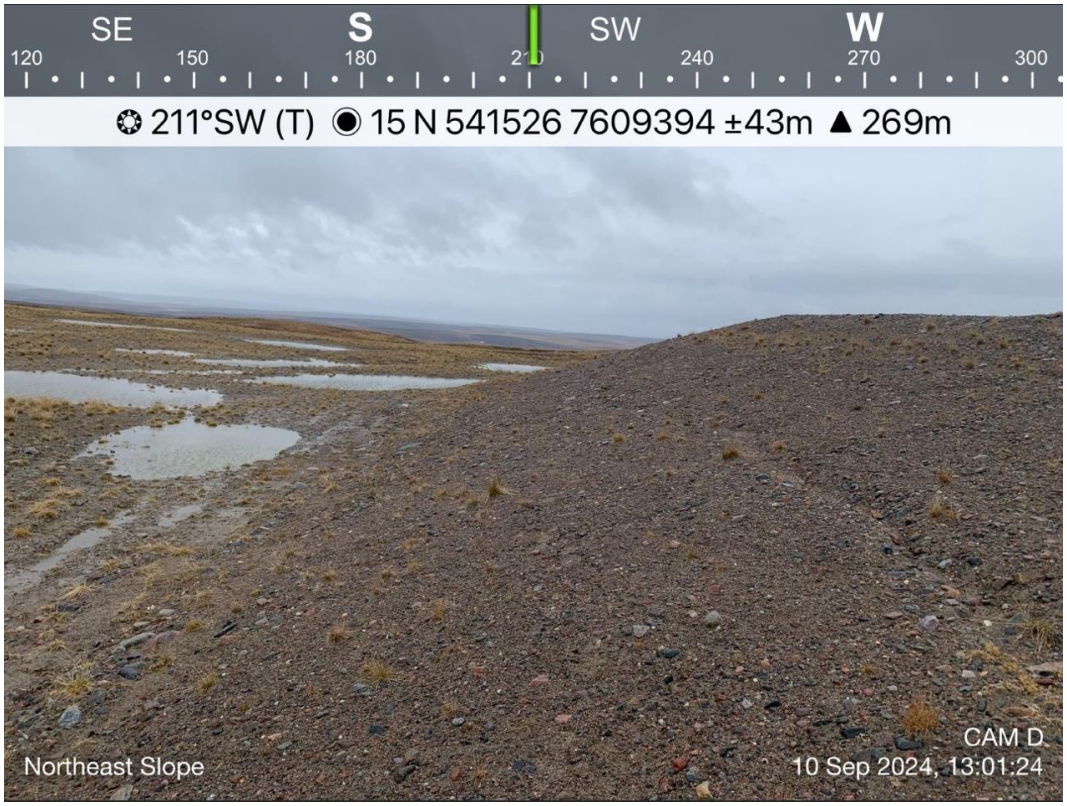
Area: NHWL

Description:

Close up of horizontal tension crack extending length of northeast slope.

Occasional vegetation along slope.

Ponding water at base of slope.



Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
29	9/10/2024

Direction Photo Taken

E

Area

NHWL

Description

Section of tension cracks near toe of northeast slope near the east corner.

Ponding water at base of slope.

Occasional vegetation on slope.

Photo No.	Date
30	9/10/2024

Direction Photo Taken

S

Area

NHWL

Description

Close up of tension cracks on northeast slope near the east corner.

Cracks show evidence of infilling from surrounding material.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
31	9/10/2024

Direction Photo Taken: N

Area: NHWL

Description:

Horizontal tension cracks and vertical erosion channel on north portion of northeast slope. Erosion channel appears to be self-armouring.

Ponding water and flow channels at base of slope.

Channel flow is towards the north.

Occasional tufts of vegetation on northeast

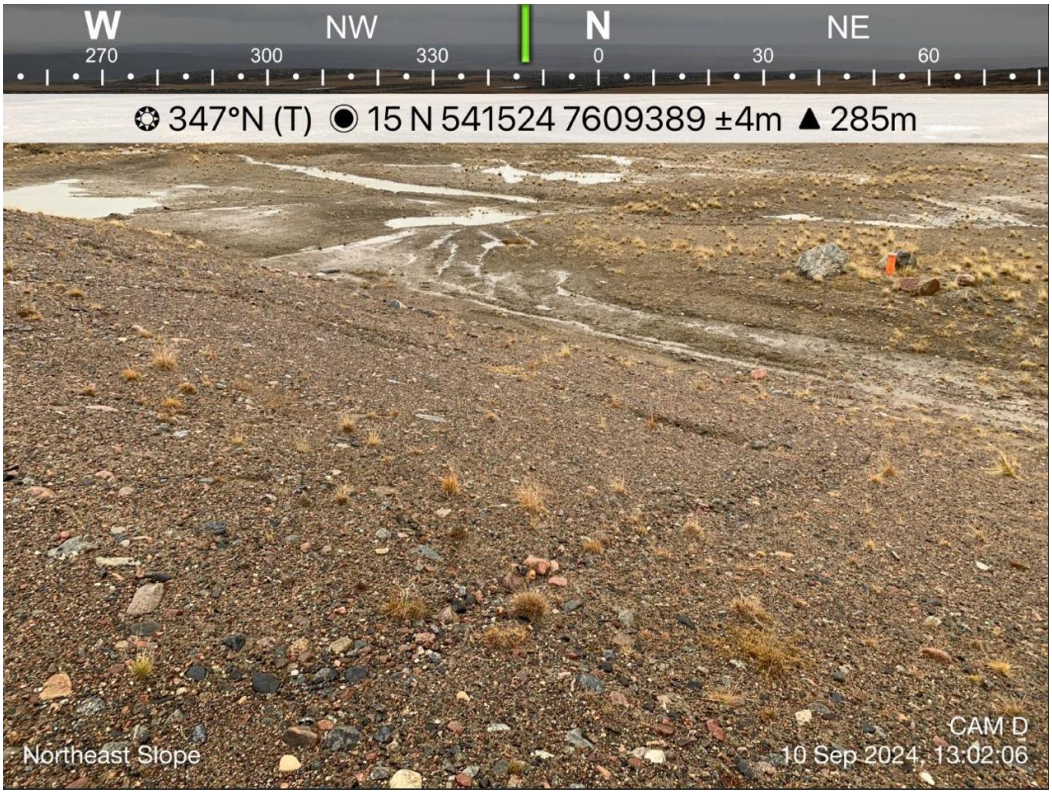


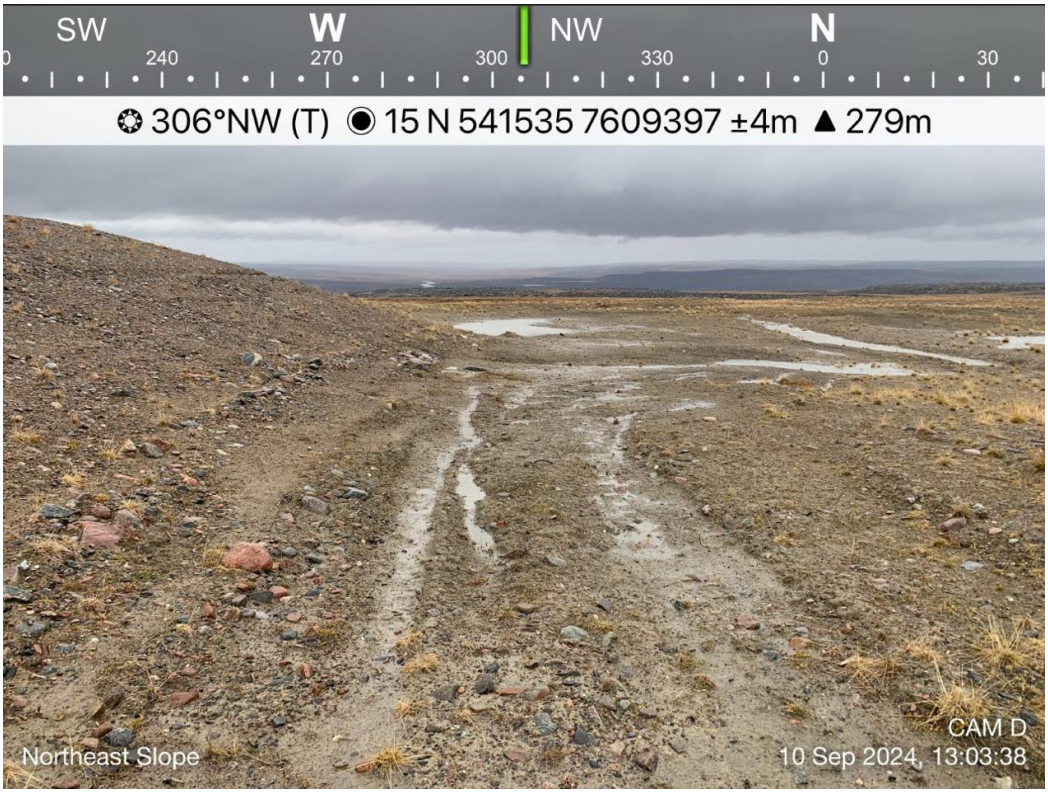
Photo No.	Date
32	9/10/2024

Direction Photo Taken: NW

Area: NHWL

Description:

Flow channels parallel to toe of northeast slope.



Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
33	9/10/2024

Direction Photo Taken

S-SE

Area

NHWL

Description

North corner looking down northeast slope to the left.

Horizontal tension cracks continue from northeast slope around north corner to northwest slope (dashed arrows).

MW02 boulders on the left.

Ponding water at base of corner.

Note: compass header error, direction is S-SE.

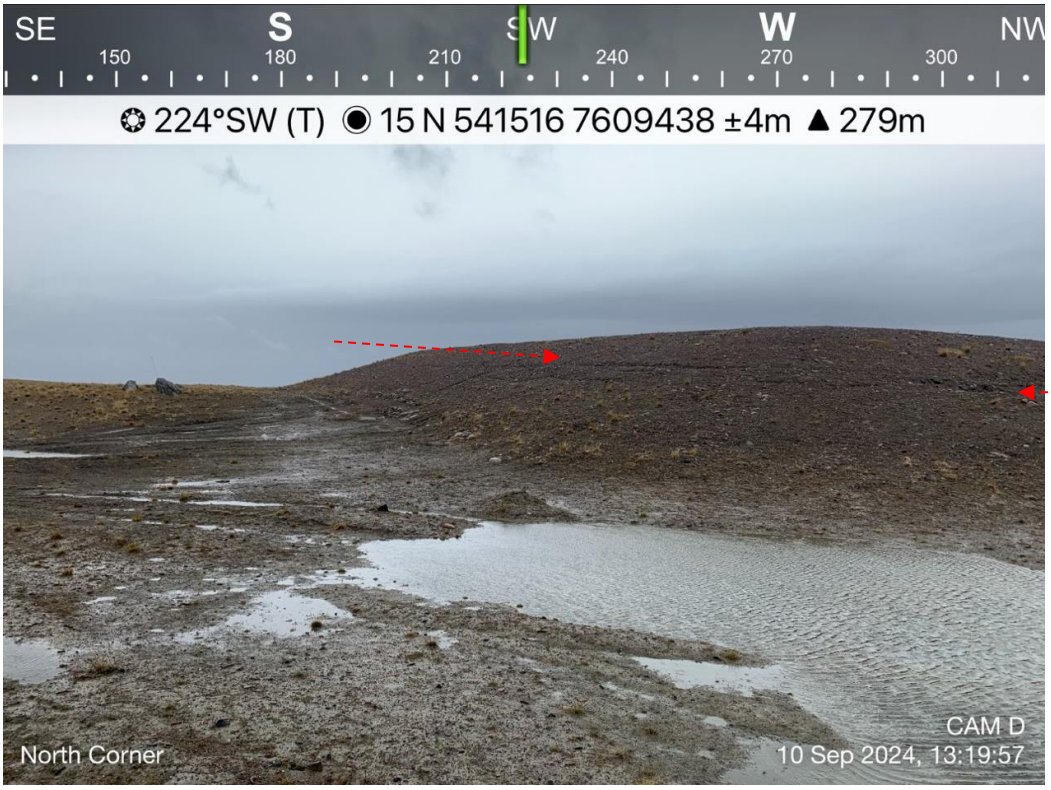


Photo No.	Date
34	9/10/2024

Direction Photo Taken

SW

Area

NHWL

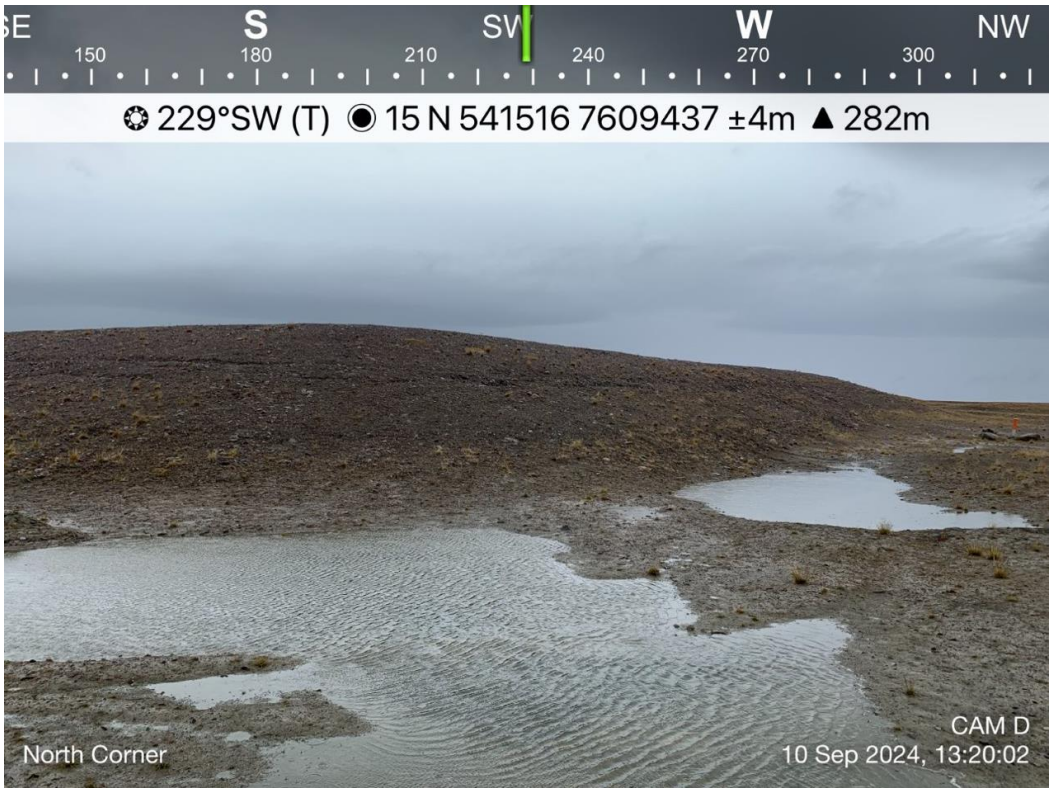
Description

North corner looking down northwest slope to the right.

Horizontal tension cracks continue from northeast slope around north corner to northwest slope.

MW03 on the right.

Ponding water at base of north corner and northwest slope toe.



As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
35	9/10/2024

Direction Photo Taken

South

Area

NHWL

Description

North corner of NHWL.

Horizontal tension cracks continue from northeast slope around north corner to northwest slope.

Wood debris on corner toe.

Ponding water at corner base.

MW02 to the left.

Photo No.	Date
36	9/10/2024

Direction Photo Taken

SE

Area

NHWL

Description

Close up of tension cracks continuing clockwise around north corner.

Tension cracks show evidence of infilling from surrounding material.

MW02 to the left.

Note: compass header error, direction is SE.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
37	9/10/2024

Direction Photo Taken: NE

Area: NHWL

Description:

Looking down north corner.

Tension cracks continue around corner.

Ponding water around landfill base.

Note: compass header error, direction is NE.

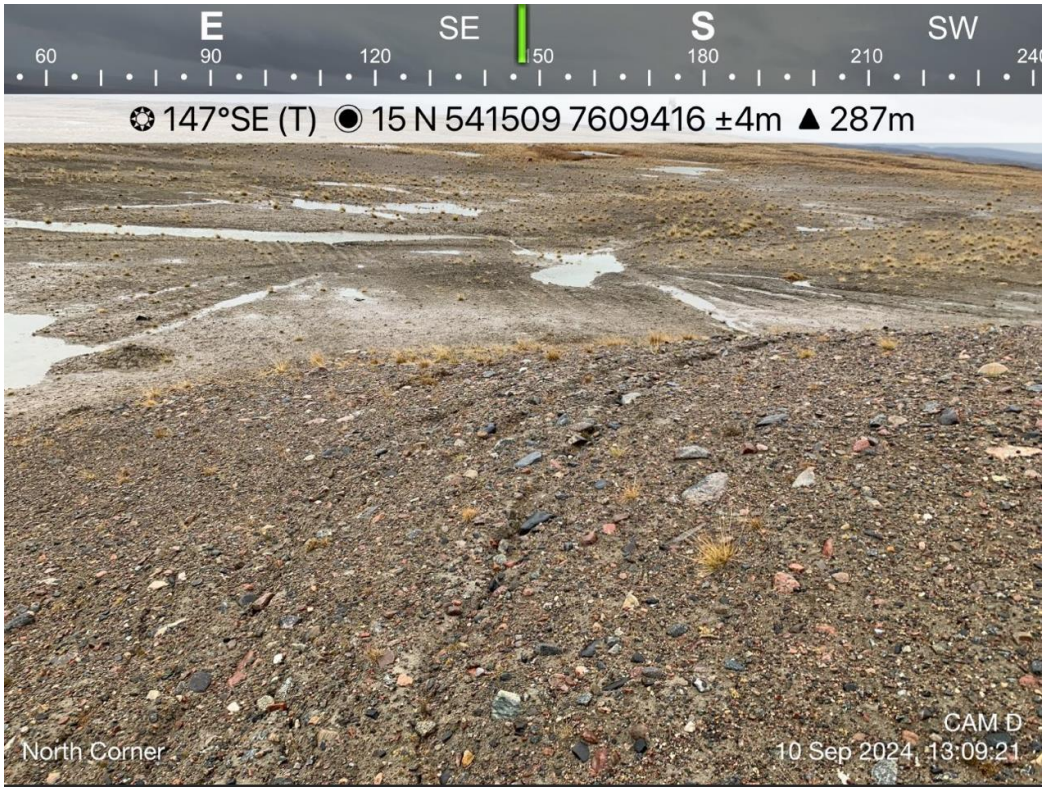


Photo No.	Date
38	9/10/2024

Direction Photo Taken: N-NE

Area: NHWL

Description:

North corner (left) transitioning into northeast slope.

Horizontal tension crack along length of slope.

Ponding water at slope base.

Occasional vegetation.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
39	9/10/2024

Direction Photo Taken

N-NW

Area

NHWL

Description

Looking down north corner of NHWL.

Horizontal tension cracks continue clockwise around corner.

Ponding water at base of north corner.

Occasional vegetation on corner slopes.

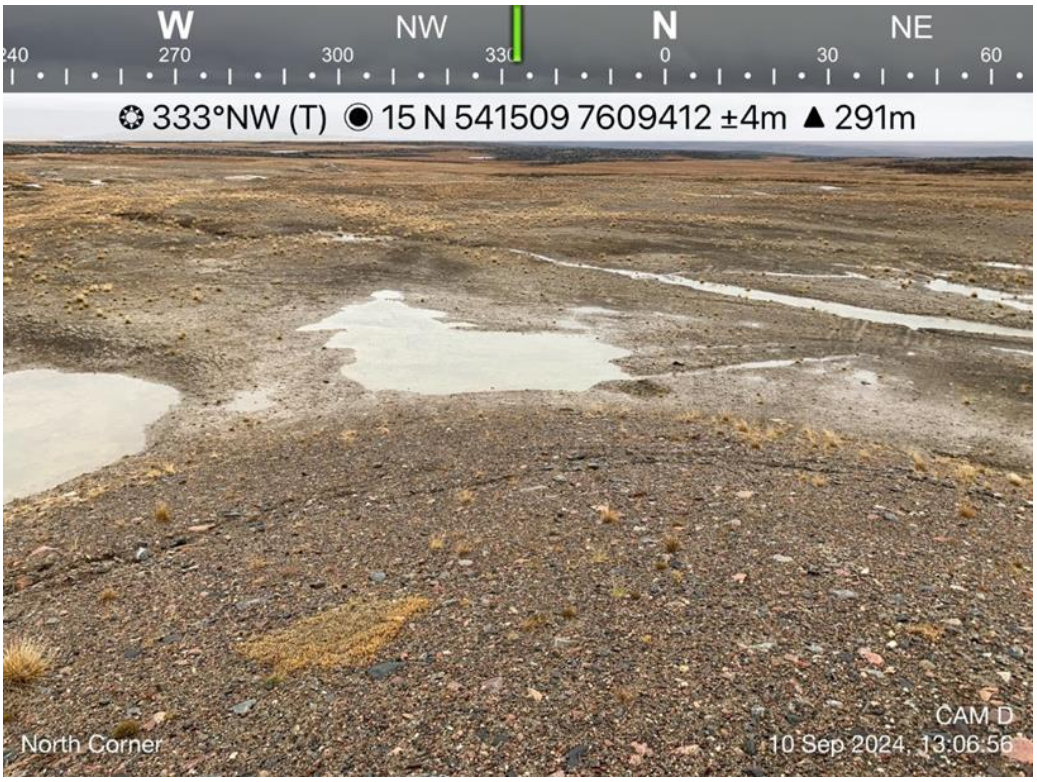


Photo No.	Date
40	9/10/2024

Direction Photo Taken

NW

Area

NHWL

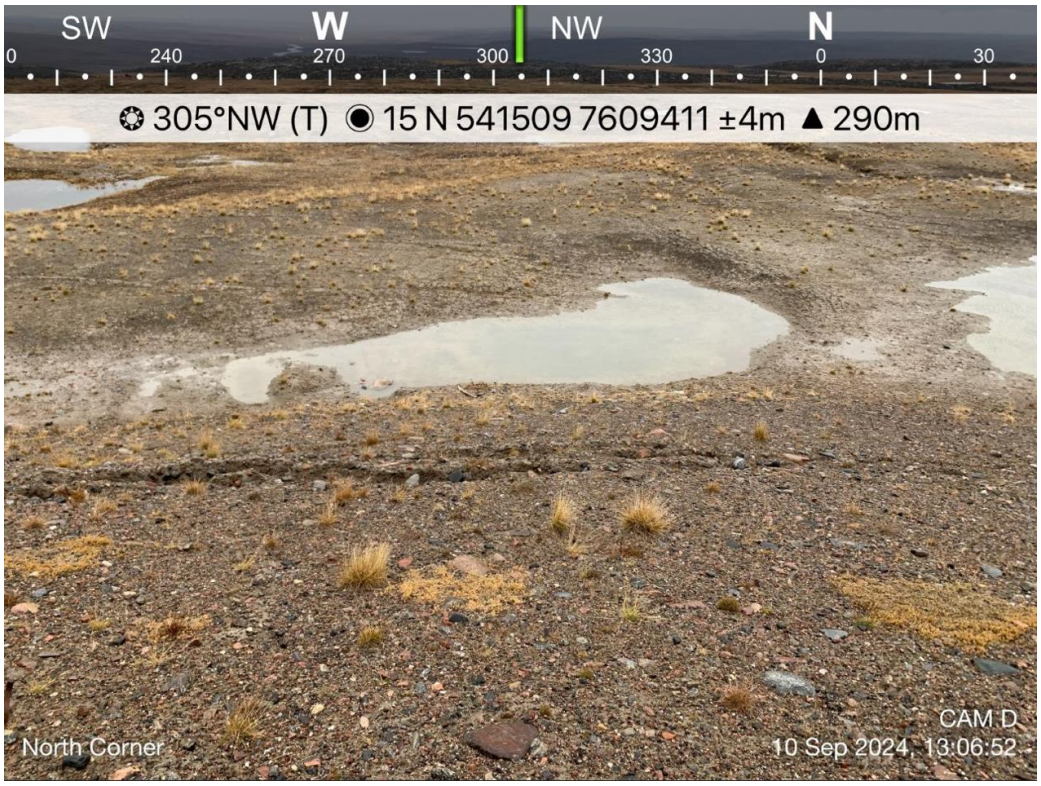
Description

North portion of northwest slope near north corner.

Horizontal tension crack along slope. Crack is approx. 30 cm deep and 30 cm wide.

Occasional vegetation.

Ponding water at base of slope.



Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
41	9/10/2024

Direction Photo Taken

S-SE

Area

NHWL

Description

Northwest slope, north corner to the left.

Numerous erosion channels along extent of the slope appear to be self-armouring.

MW03 in foreground.

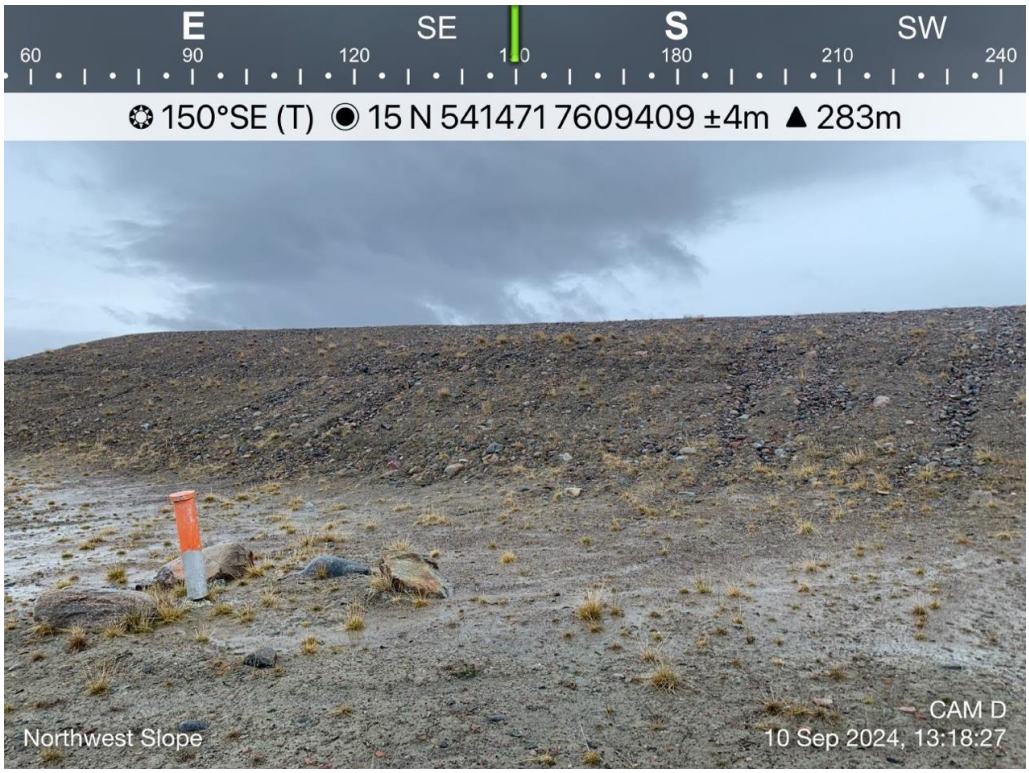


Photo No.	Date
42	9/10/2024

Direction Photo Taken

SW

Area

NHWL

Description

South portion of northwest slope. MW03 to the right.

Horizontal tension crack extends length of slope.

Several vertical erosion channels along slope extents.

Numerous tufts of vegetation.

Ponding water at toe of slope.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
43	9/10/2024

Direction Photo Taken: SW

Area: NHWL

Description:

At north corner looking down northwest slope.

Vertical erosion channel (arrow) intersecting horizontal tension crack extending length of slope (circled).

Erosion channel appears to be self-armouring.

Occasional vegetation along slope.

MW03 to the right.

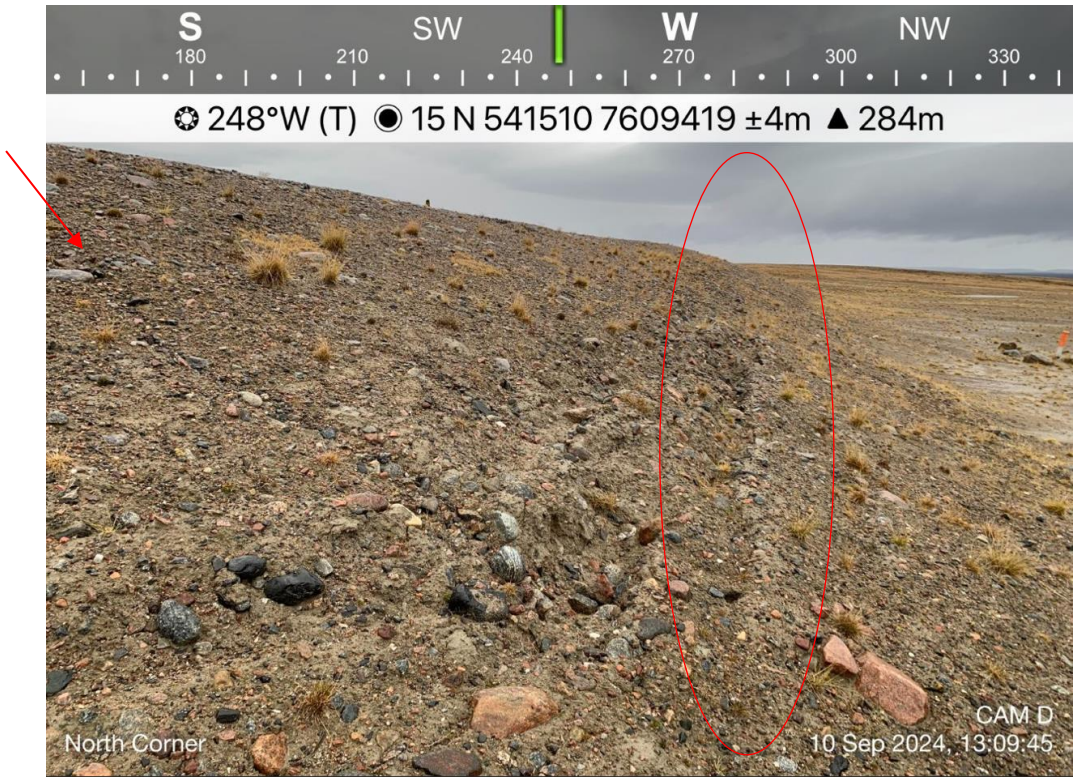


Photo No.	Date
44	9/10/2024

Direction Photo Taken: W

Area: NHWL

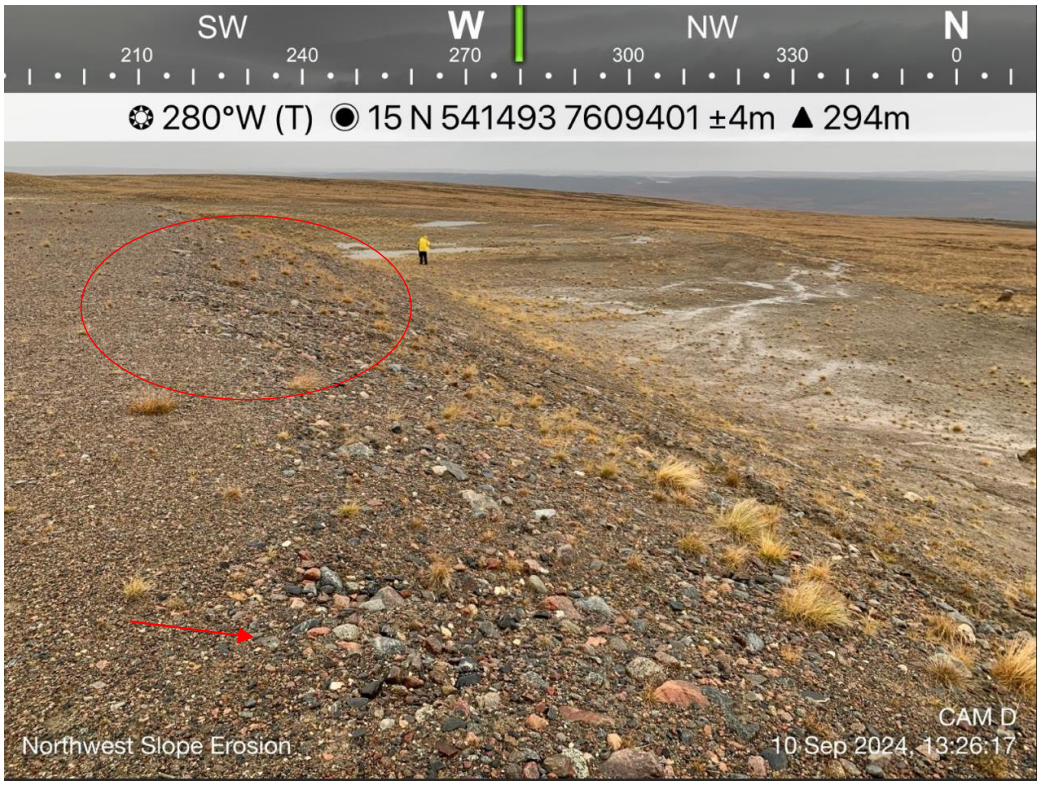
Description:

On top of landfill looking down northwest slope.

Erosion channels cutting back into the top of the landfill (circled).

Washout of fines, coarse material remains (arrow).

Ponding water and flow channels visible at the base of the slope. Surface flow moving northwest-west.



As per Abandoned Military Sites Remediation Protocol (AMSRP):
Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
45	9/10/2024

Direction Photo Taken

N

Area

NHWL

Description

Looking north down northwest slope.

Many erosion channels along length of slope. Channels cutting back into top of landfill.

Horizontal tension cracks extending length of slope.

Numerous tufts of vegetation.

MW03 to the left.

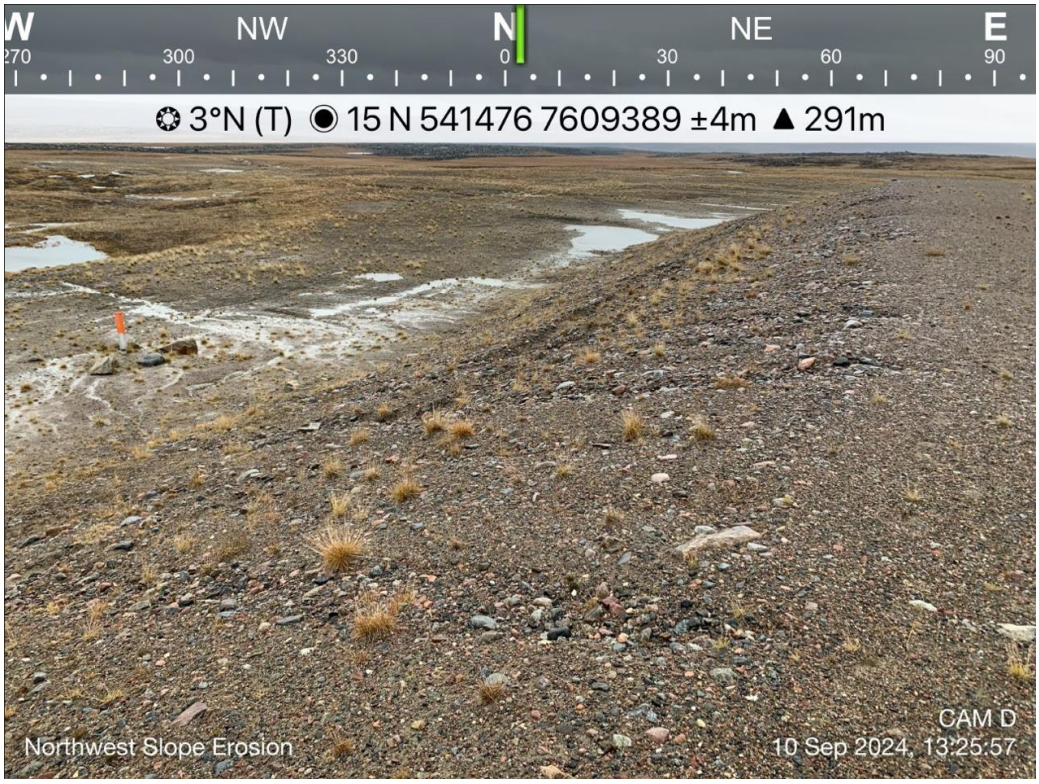


Photo No.	Date
46	9/10/2024

Direction Photo Taken

N

Area

NHWL

Description

Drainage pathways off northwest slope (see Photo 47).

Revegetation seen at toe of the slope where water has accumulated.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
47	9/10/2024

Direction Photo Taken: NW

Area: NHWL

Description:

Drainage pathways off northwest slope. Flowing north/northwest.

Revegetation seen at toe of the slope where moisture has accumulated.

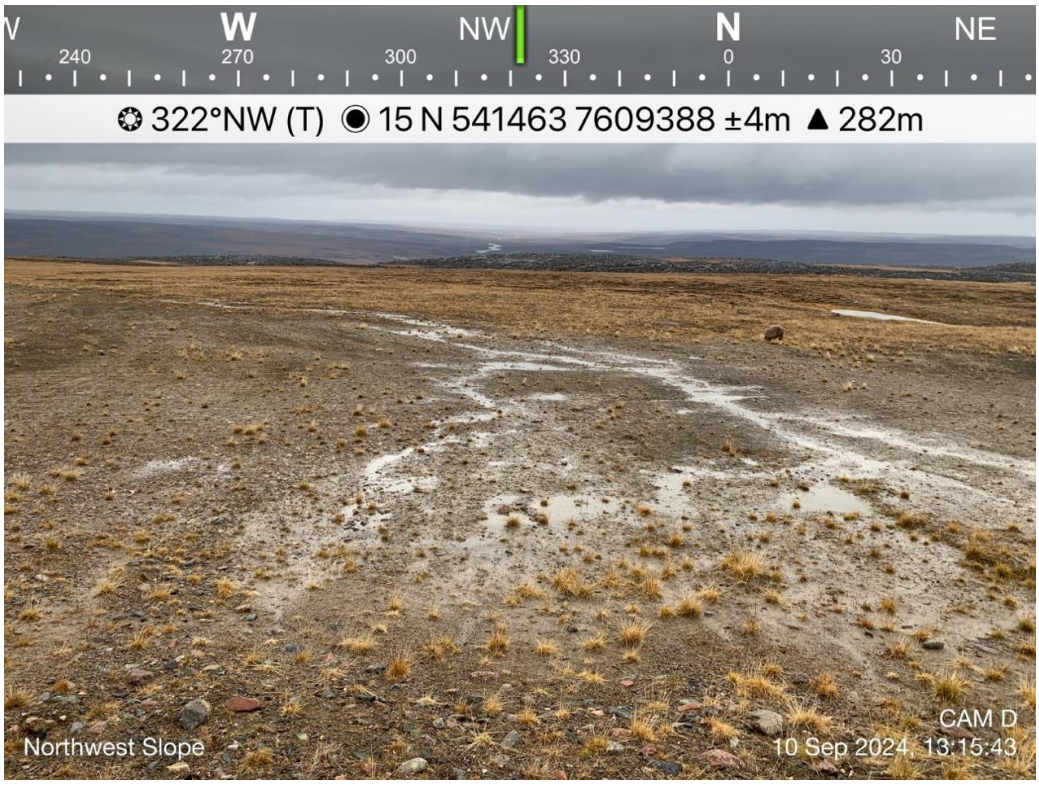


Photo No.	Date
48	9/10/2024

Direction Photo Taken: W

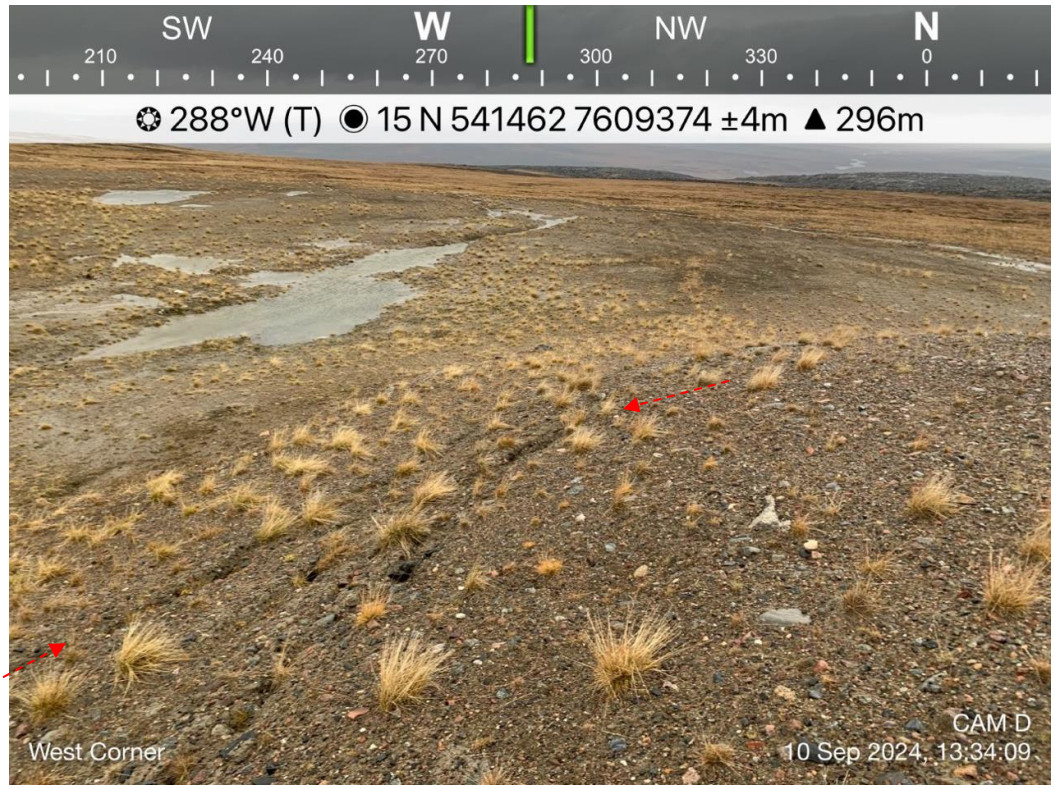
Area: NHWL

Description:

Looking down west corner.

Tension cracks visible traversing from the northwest slope, around the west corner and along the southwest slope (dashed arrows).

Revegetation throughout.



As per Abandoned Military Sites Remediation Protocol (AMSRP):
Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
49	9/10/2024

Direction Photo Taken: S

Area: NHWL

Description:

South portion of northwest slope approaching west corner.

Tension cracks visible traversing from the northwest slope and around the west corner (dashed arrow).

Numerous tufts of vegetation.

Photo No.	Date
50	9/10/2024

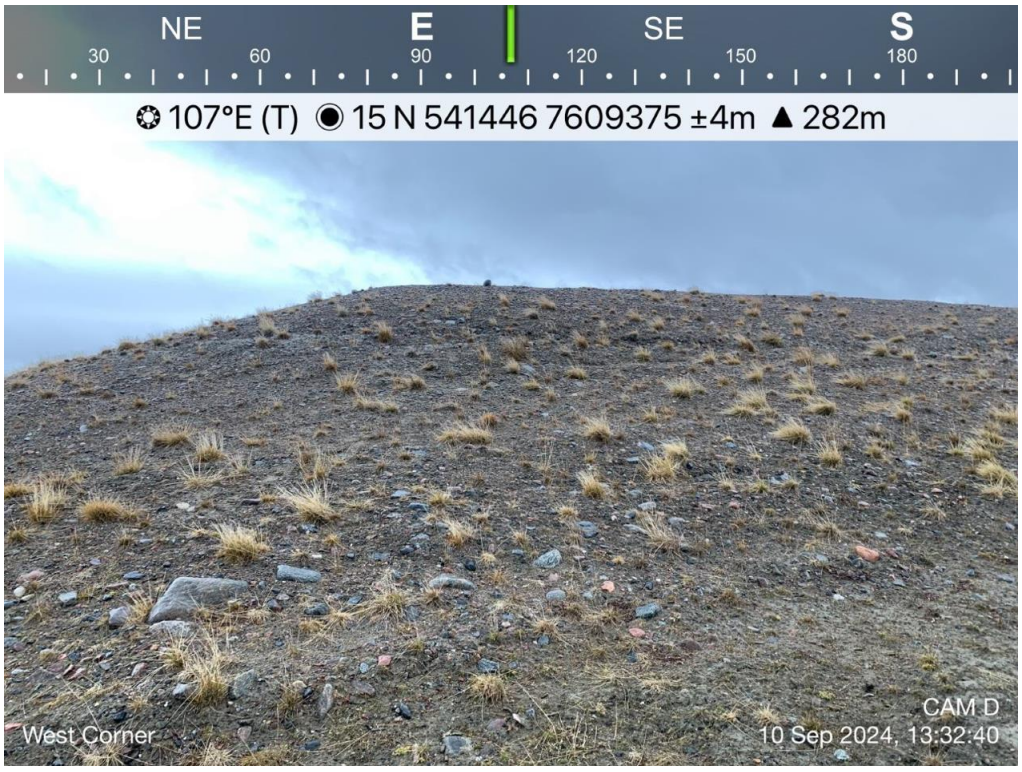
Direction Photo Taken: E

Area: NHWL

Description:

North portion of southwest slope, west corner to the left.

Some boulders exposed at the toe of the west corner.



As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
51	9/10/2024

Direction Photo Taken

N

Area

NHWL

Description

Close up of tension cracks wrapping around southwest slope into west corner.

Tension cracks show evidence of infilling from surrounding material.

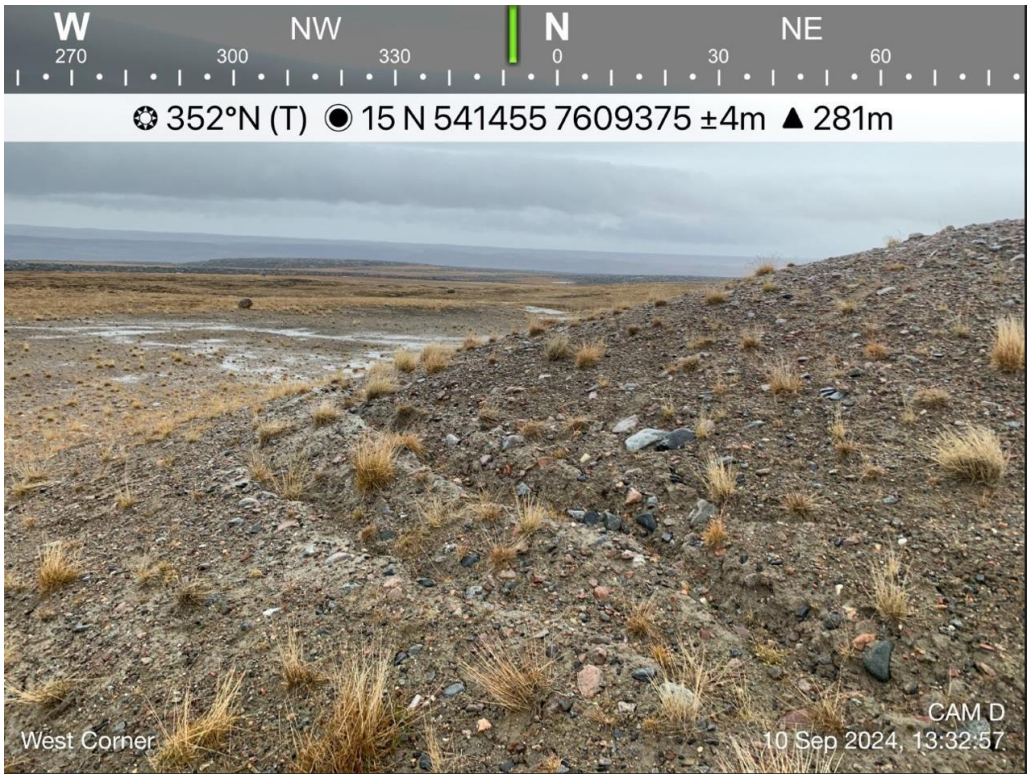


Photo No.	Date
52	9/10/2024

Direction Photo Taken

W-NW

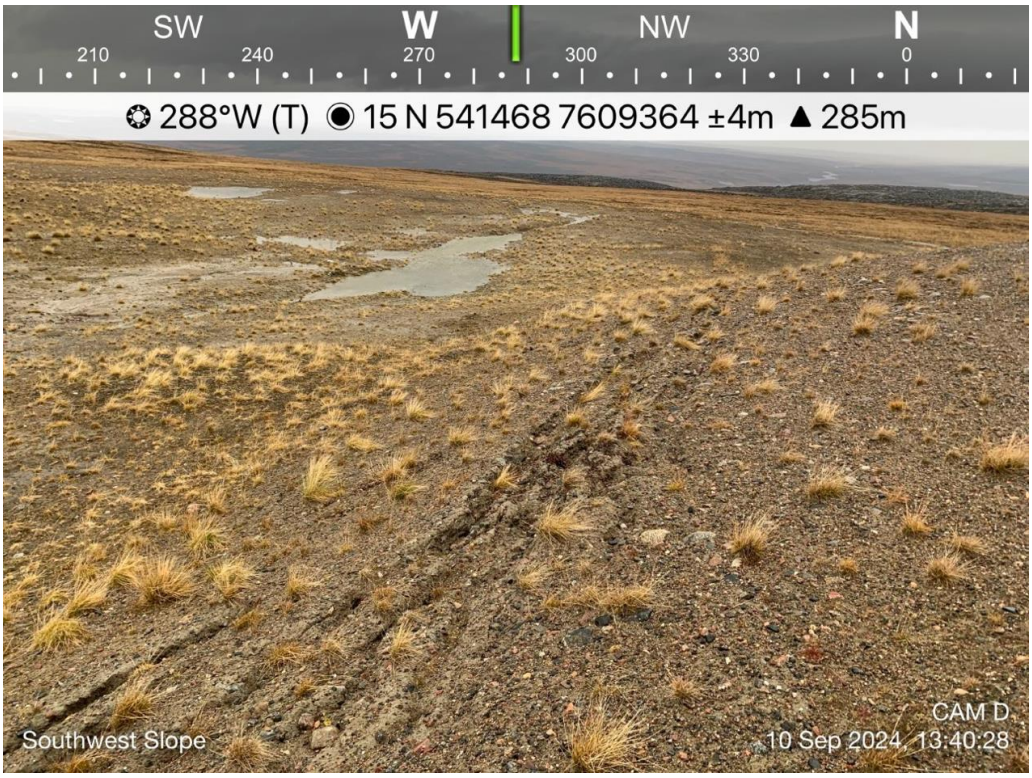
Area

NHWL

Description

Southwest slope sloughing zone shows progressed condition relative to 2022 condition.

Extensive revegetation at the toe of the slope where water has accumulated.



As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
53	9/10/2024

Direction Photo Taken

NW

Area

NHWL

Description

Southwest sloughing zone extending from the top tension crack to the toe of the slope.

Ponding water and revegetation observed at the toe of the slope.

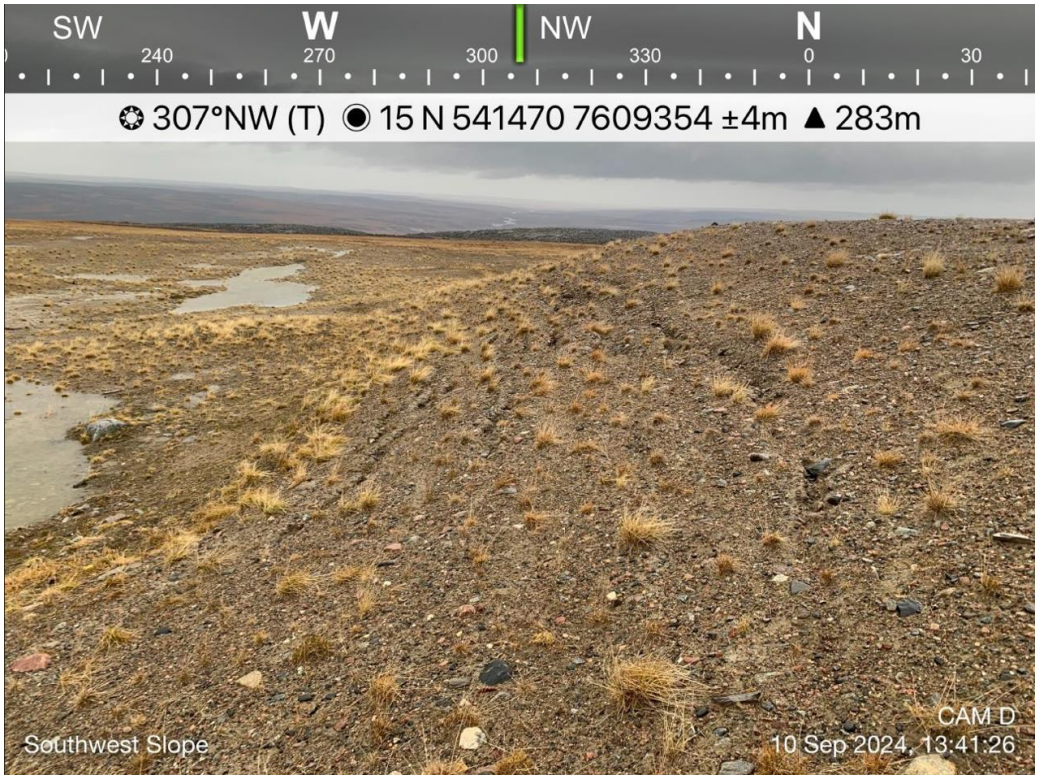


Photo No.	Date
54	9/10/2024

Direction Photo Taken

NW

Area

NHWL

Description

Slough on southwest slope (arrow) making slope steeper mid-span.

See close up of circled area in Photo 53.

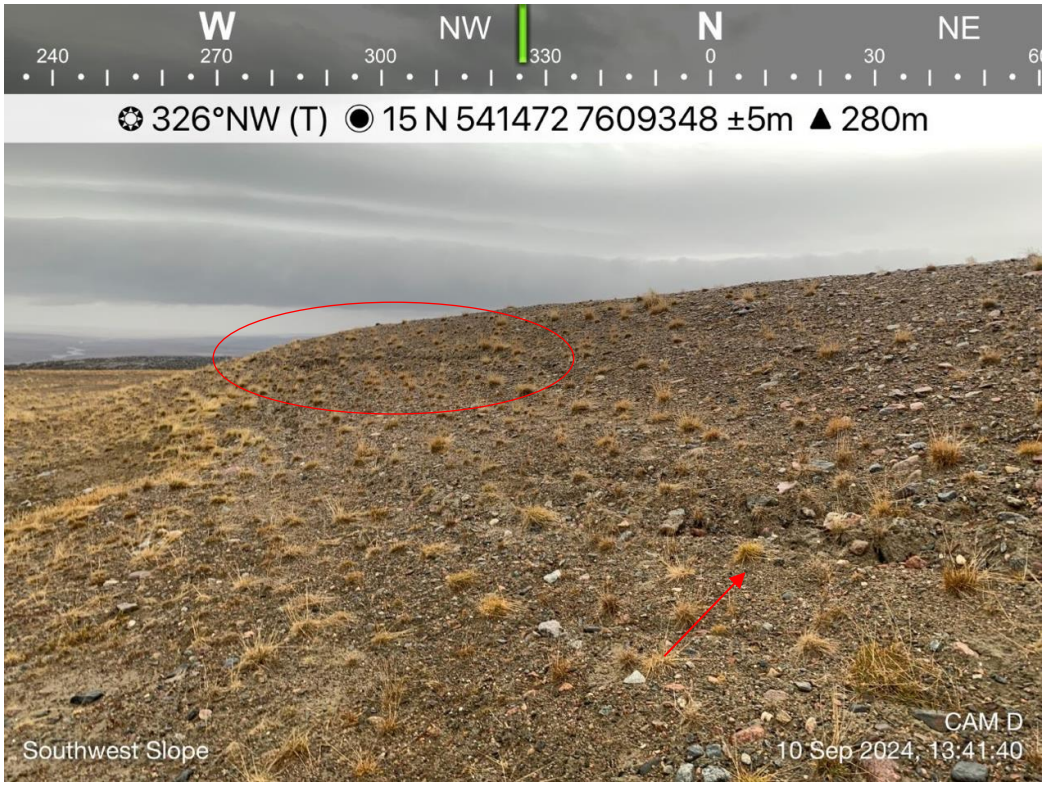


Photo No.	Date
55	9/10/2024

Direction Photo Taken: NW-N

Area: NHWL

Description:

North portion of southwest slope.

Ponding water at the toe of the southwest sloughing zone.

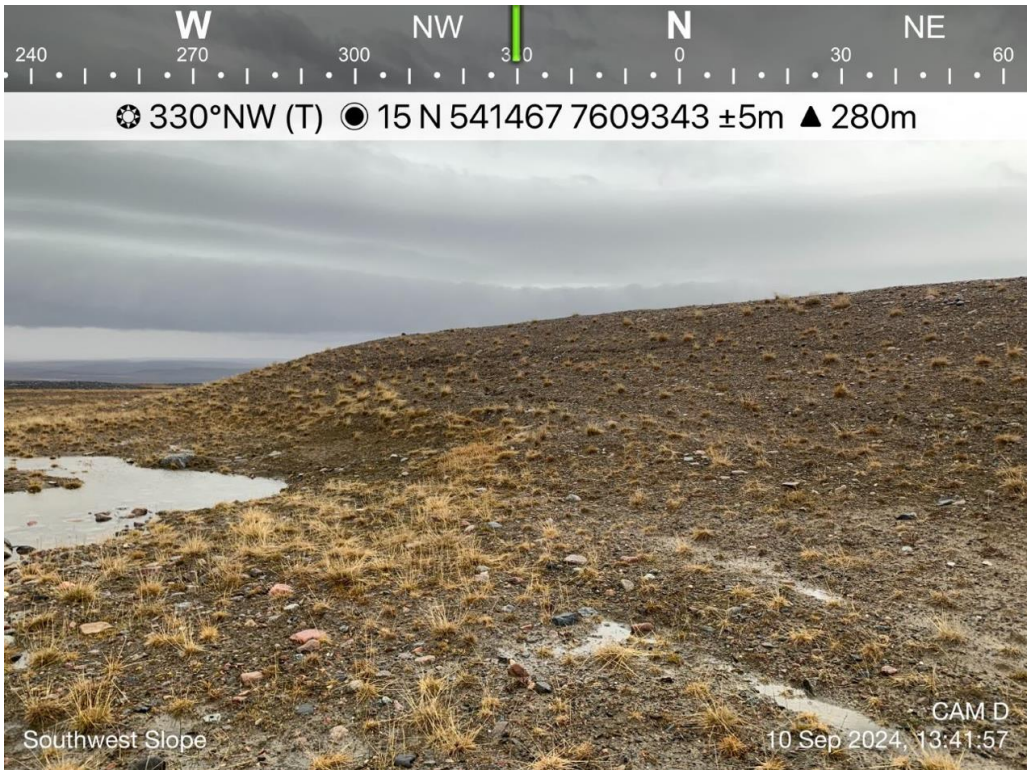


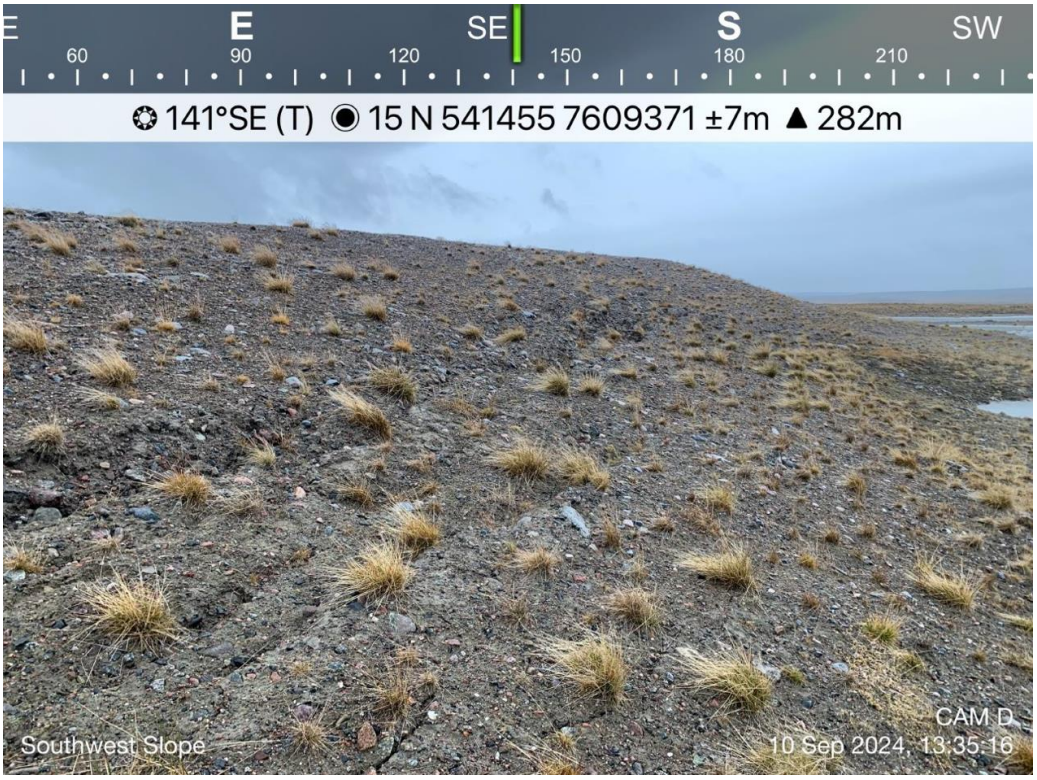
Photo No.	Date
56	9/10/2024

Direction Photo Taken: SE

Area: NHWL

Description:

Looking southeast down length of southwest slope.



Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
57	9/10/2024

Direction Photo Taken

SE

Area

NHWL

Description

Looking southeast down length of southwest slope.

MW04 just out of frame to the right (see arrow).

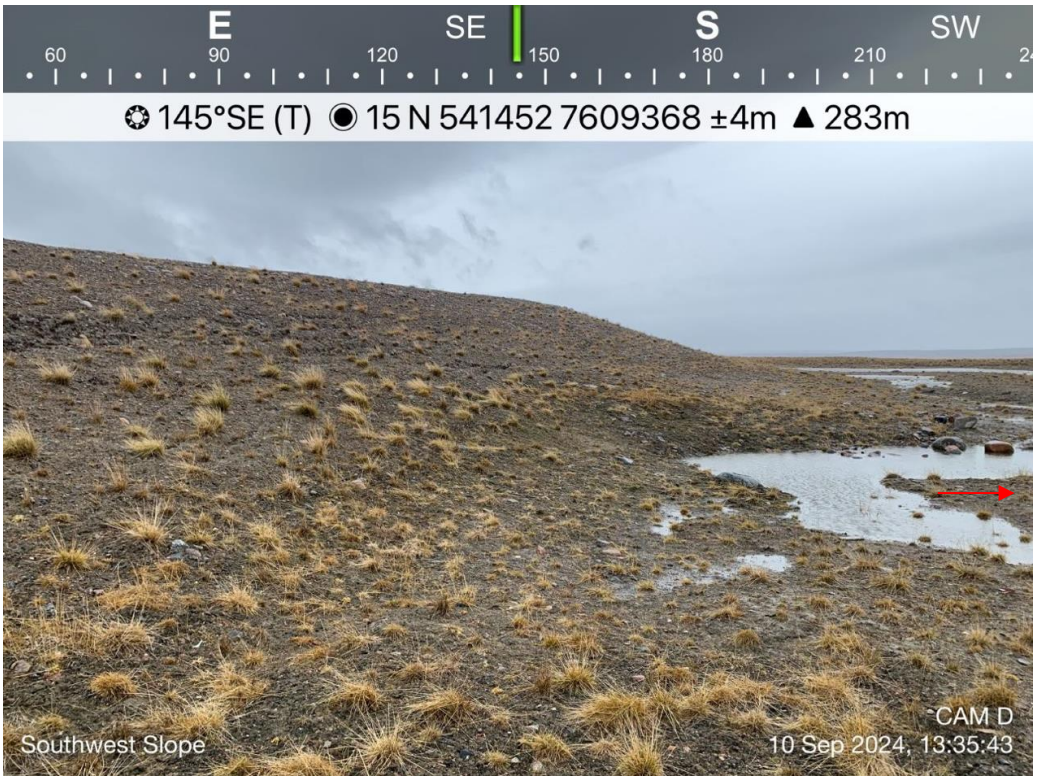


Photo No.	Date
58	9/10/2024

Direction Photo Taken

E-SE

Area

NHWL

Description

South portion of southwest slope approaching south corner.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
59	9/10/2024

Direction Photo Taken: N-NE

Area: NHWL

Description: Looking up erosion channel down southwest slope (arrow; see Photo 60).

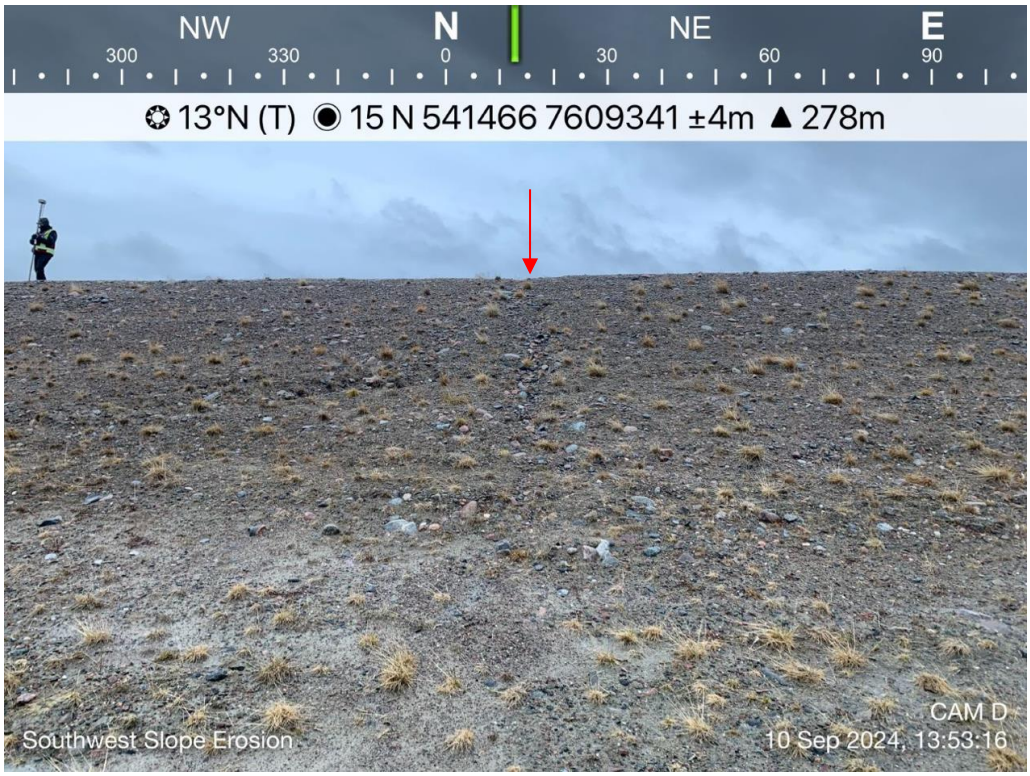


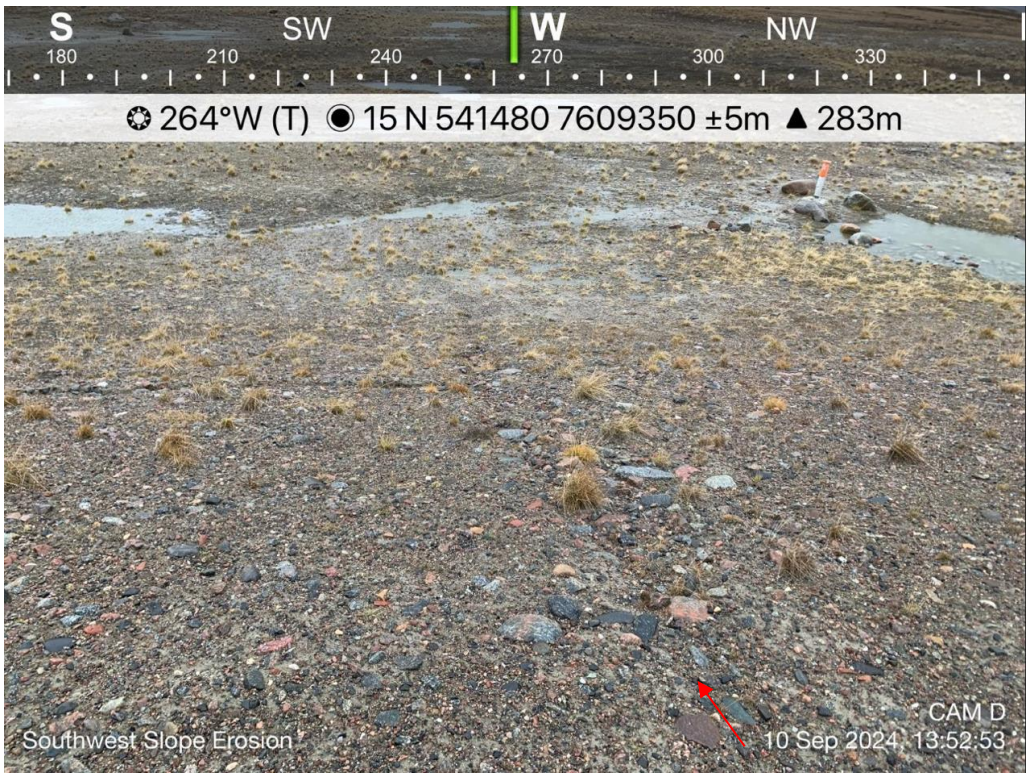
Photo No.	Date
60	9/10/2024

Direction Photo Taken: W

Area: NHWL

Description: Looking down erosion channel down southwest slope (arrow; see Photo 59).

MW04 in background.



As per Abandoned Military Sites Remediation Protocol (AMSRP):
Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
61	9/10/2024

Direction Photo Taken: NW

Area: NHWL

Description:

Cross view of erosion channel down southwest slope (arrow).

Washout of fines observed within the erosion channel.

Horizontal tension cracks intersecting erosion channel (circled).

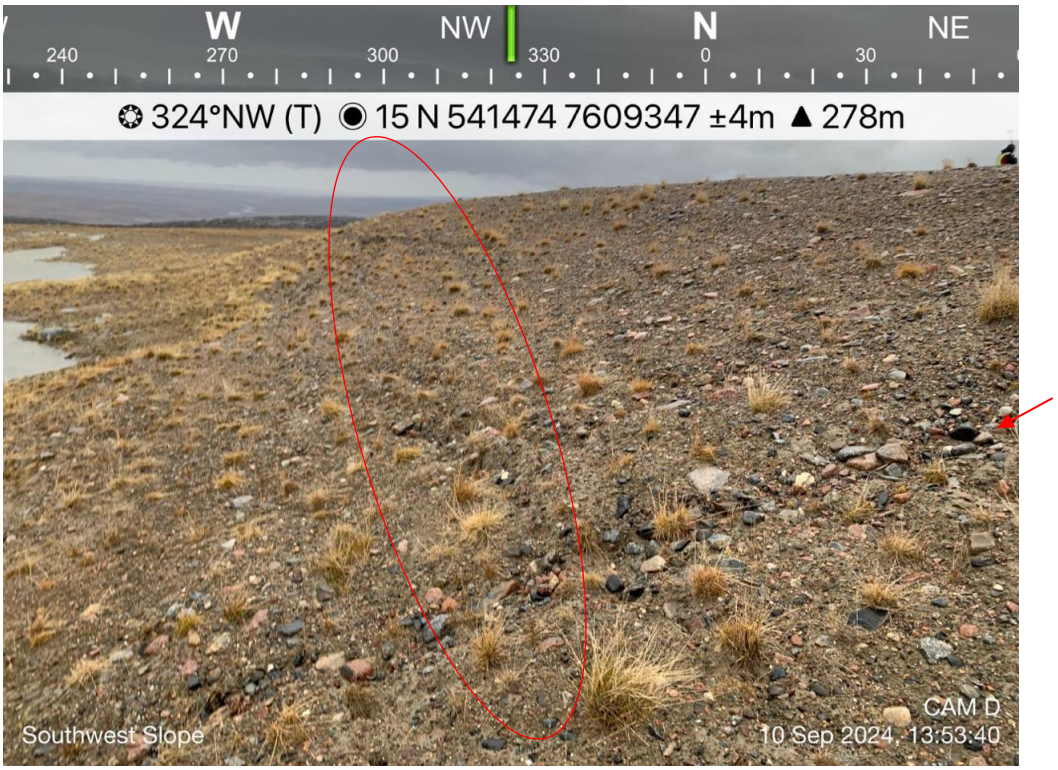


Photo No.	Date
62	9/10/2024

Direction Photo Taken: S

Area: NHWL

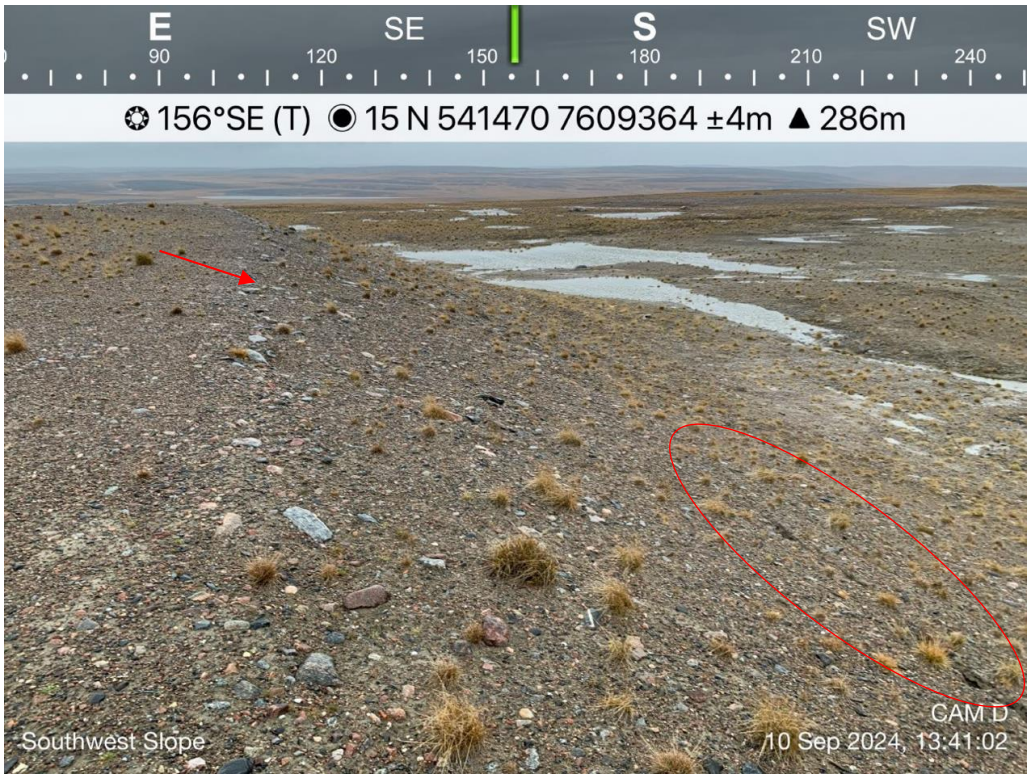
Description:

Top of landfill looking down southwest slope.

Erosion channel (arrow).

Tension crack (circled).

Ponding water at base of slope and toward south corner.



As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
63	9/10/2024

Direction Photo Taken

S

Area

NHWL

Description

Top of landfill looking down southwest slope towards MW04.

Grouping of tension cracks mid-slope producing small slump (circled).

Portion of slope toe slumping into permanent pond around MW04 (arrow).

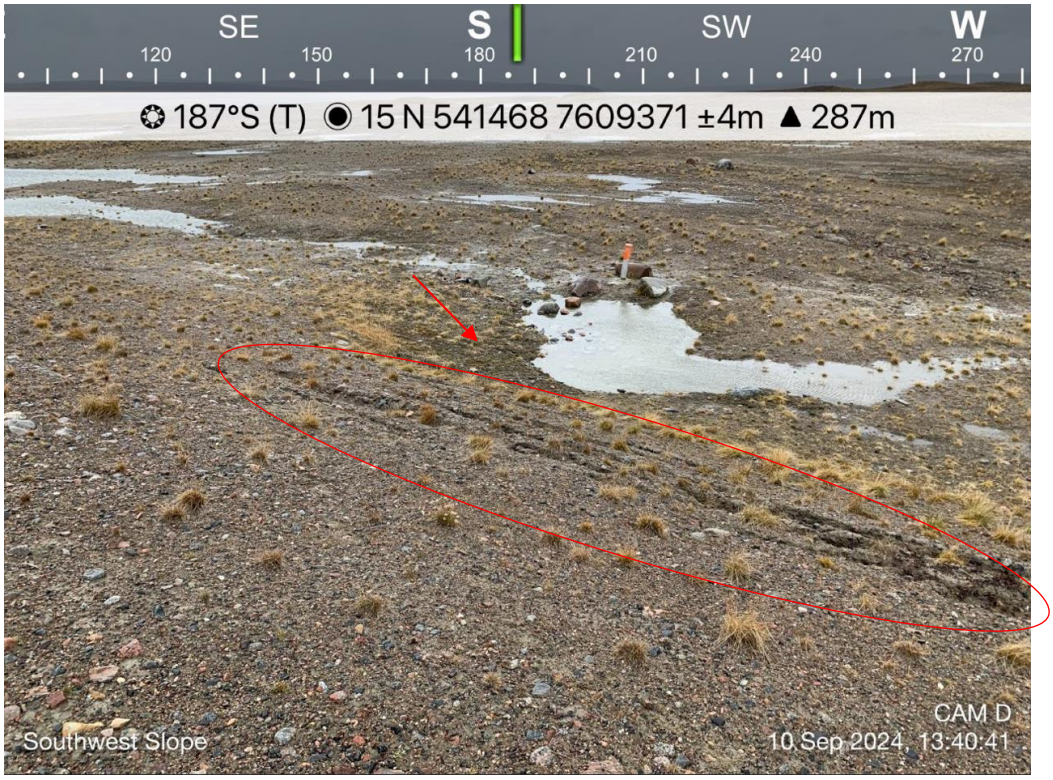


Photo No.	Date
64	9/10/2024

Direction Photo Taken

W-NW

Area

NHWL

Description

Permanent ponds off toe of southwest slope.

Preferential drainage path is to the northwest. Flow path continued in Photo 65.

MW04 just out of frame (see arrow).

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
65	9/10/2024

Direction Photo Taken

W

Area

NHWL

Description

Permanent ponds off toe of southwest slope.

Drainage flow moving northwest.

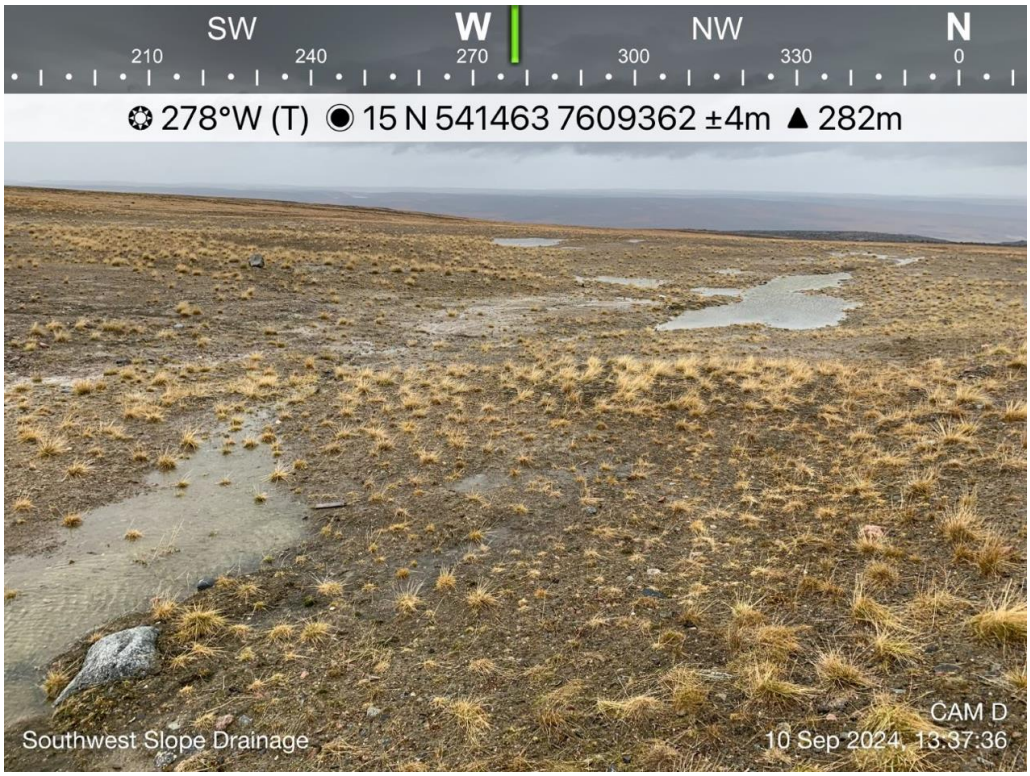


Photo No.	Date
66	9/10/2024

Direction Photo Taken

N-NW

Area

NHWL

Description

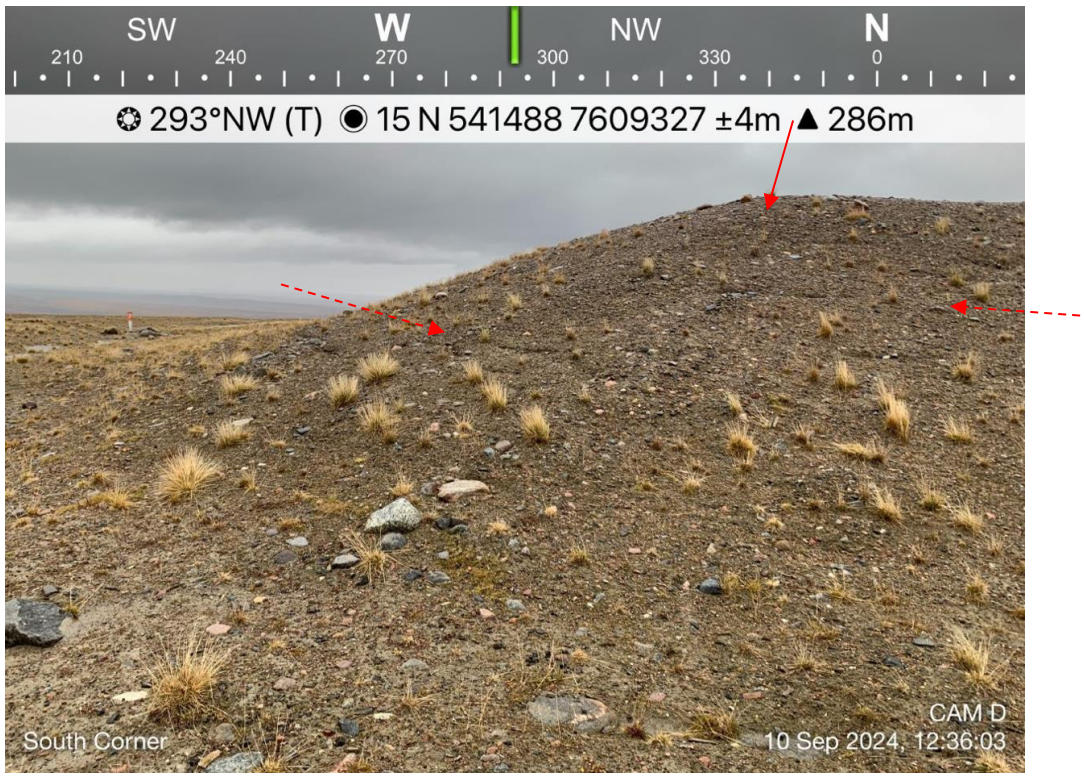
Looking up south corner of NHWL.

Various horizontal tension cracks (dashed arrows) and a vertical erosion channel down corner (solid arrow).

Occasional tufts of vegetation.

MW04 to the left.

Note: compass header error, direction is N-NW.



Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
67	9/10/2024

Direction Photo Taken

SW

Area

NHWL

Description

Looking down south corner, southeast slope to the left.

Horizontal tension cracks continuing around corner to the southeast. Tension cracks show evidence of infilling from surrounding material.

Occasional vegetation.

Ponding water at base of landfill corner.

Photo No.	Date
68	9/10/2024

Direction Photo Taken

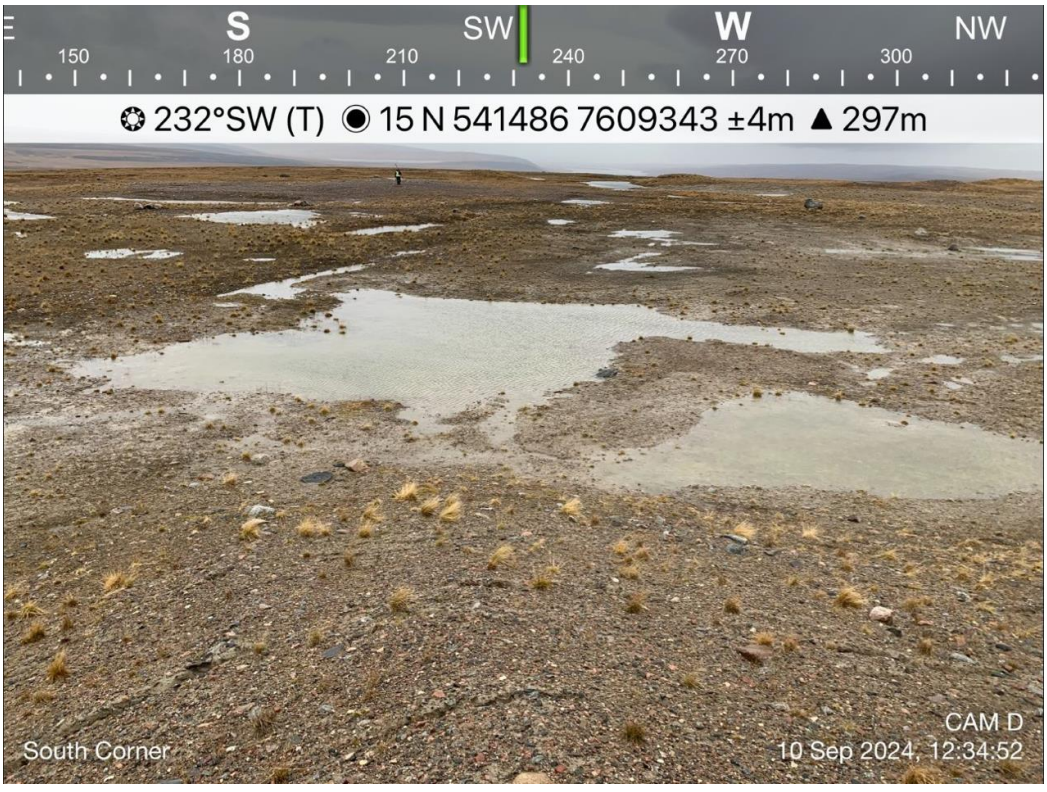
SW

Area

NHWL

Description

Ponding water off toe of the south corner.



Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
69	9/10/2024

Direction Photo Taken: SW-W

Area: NHWL

Description: Ponding water off south corner and drainage paths along southeast slope.

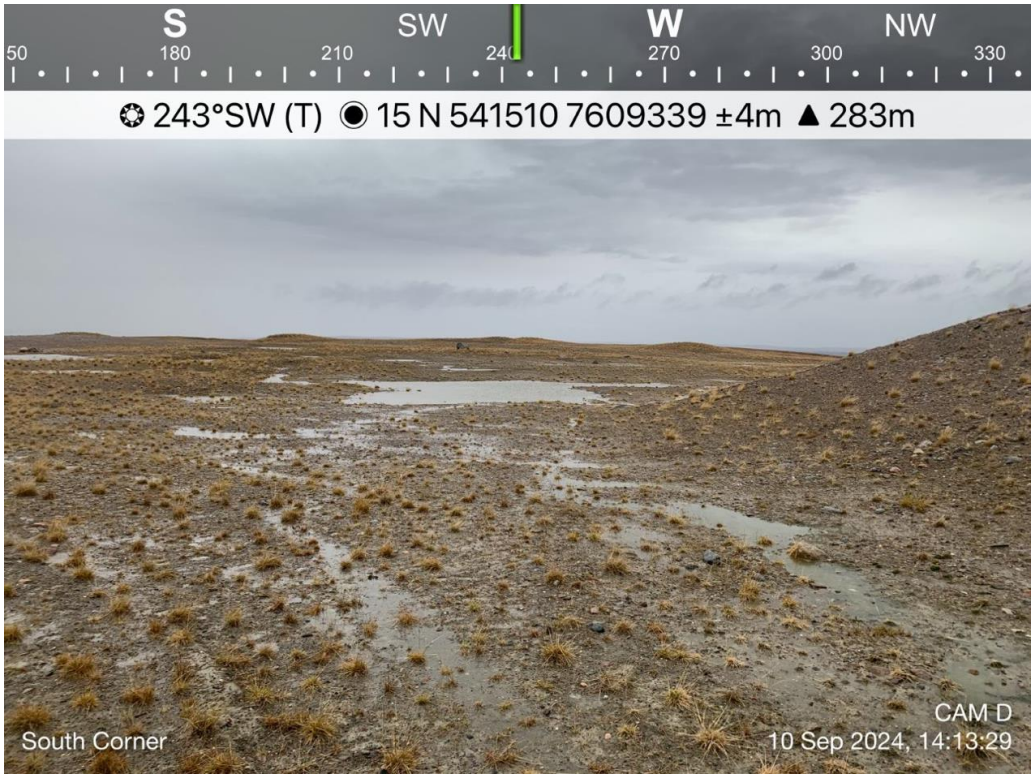


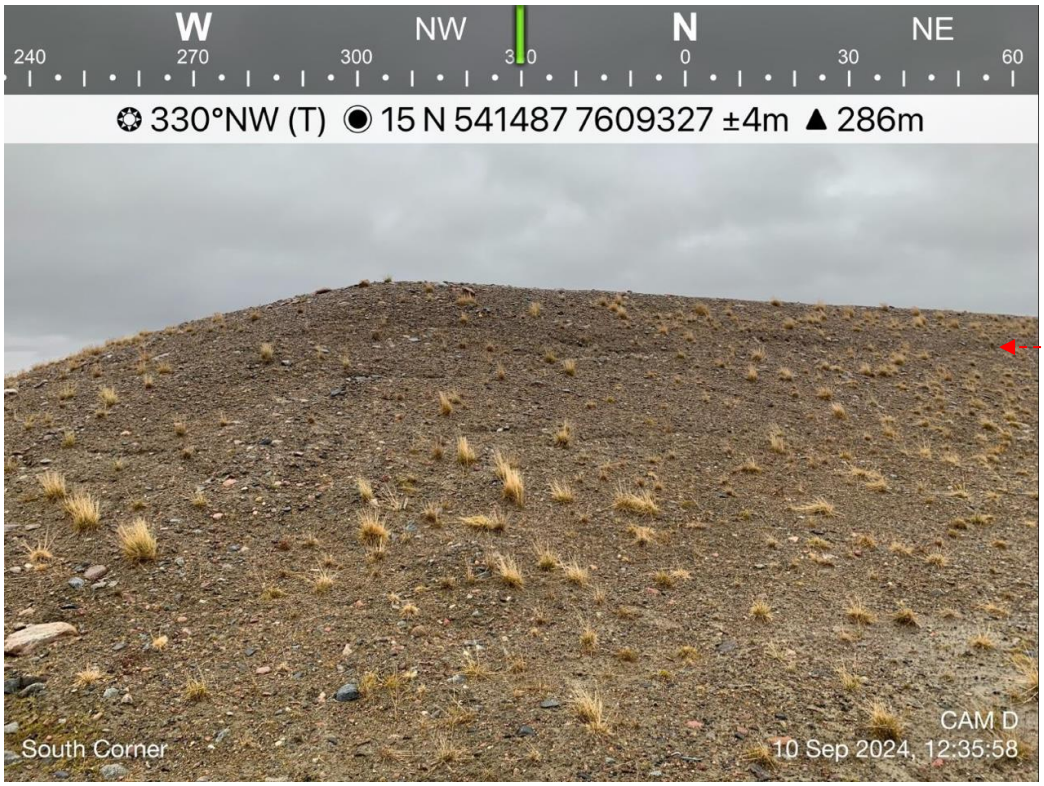
Photo No.	Date
70	9/10/2024

Direction Photo Taken: N

Area: NHWL

Description: South corner extending into southeast slope.

Tension cracks observed paralleling the crest of the slope (dashed arrow).



As per Abandoned Military Sites Remediation Protocol (AMSRP):
Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
71	9/10/2024

Direction Photo Taken: SW

Area: NHWL

Description:

Looking southwest down length of southeast slope.

Horizontal tension cracks extending length of the slope. Tension cracks are less developed than those seen on the other slopes.

Ponding water off base of slope.
Note: compass header error, direction is SW.

Photo No.	Date
72	9/10/2024

Direction Photo Taken: NE

Area: NHWL

Description:

Looking northeast down length of southeast slope.

Horizontal tension cracks extending length of the slope.

Numerous tufts of vegetation.

Ponding water off base of slope.

Short Range Radar Station in background.

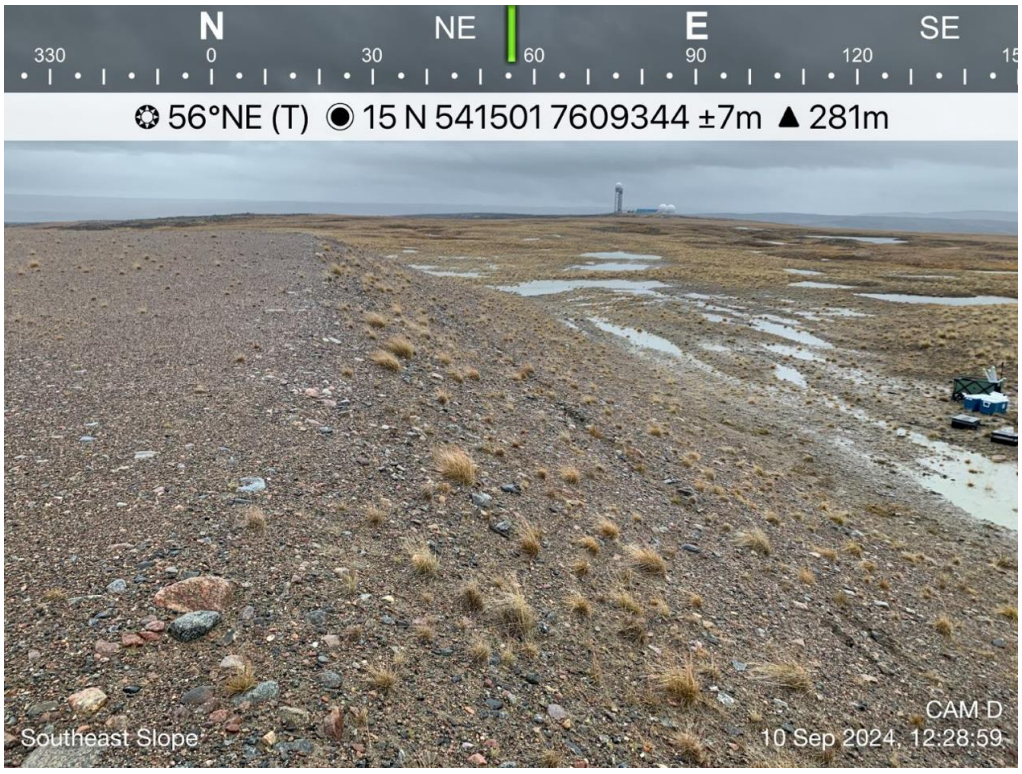


Photo No.	Date
73	9/10/2024

Direction Photo Taken: SW

Area: NHWL

Description:

Looking down south portion of southeast slope. South corner of landfill top right.

Tension cracks located approx. 4 to 5 m from the crest of the slope. Erosion channels (arrows) intersecting the tension cracks.

Vertical tension crack observed in 2022 developed into erosion channel.

Photo No.	Date
74	9/10/2024

Direction Photo Taken: S

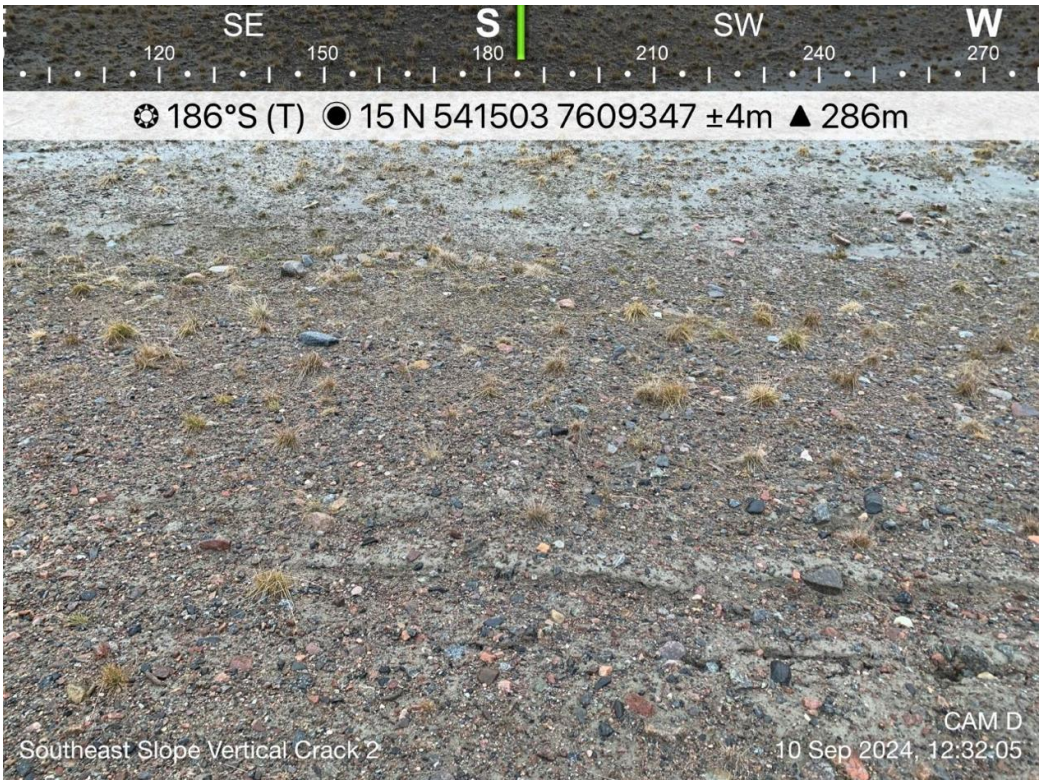
Area: NHWL

Description:

Looking down the southeast slope.

Horizontal tension cracks show evidence of infilling from surrounding material.

Vertical tension crack observed in 2022 not visible during 2024 inspection.



Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
75	9/10/2024

Direction Photo Taken

E

Area

NHWL

Description

Looking down north portion of southeast slope. East corner of landfill at the top.

Tension cracks located approx. 4 to 5 m from the crest of the slope.

Ponded water and drainage channels parallel to base of landfill.

Photo No.	Date
76	9/10/2024

Direction Photo Taken

E

Area

NHWL

Description

Southeast slope approaching east corner.

Horizontal tension cracks traversing corner.

Vertical erosion channel developing above tension crack (arrow).

Ponded water off corner of landfill.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
77	9/10/2024

Direction Photo Taken: N-NE

Area: NHWL

Description:

Looking along southeast slope toward east corner of landfill (top).

Tension cracks located approx. 4 to 5 m from the crest of the slope. Erosion channel (arrow) intersecting tension crack.

Numerous tufts of vegetation.

Ponded water at base of landfill.

Photo No.	Date
78	9/10/2024

Direction Photo Taken: E

Area: NHWL

Description:

Ponding water and flow channels off east portion of southeast slope approaching east corner (left).

Flow channels both parallel to slope and perpendicular off corner, converging at larger pond.

Short Range Radar station in background (top left).

As per Abandoned Military Sites Remediation Protocol (AMSRP):
Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
79	9/10/2024

Direction Photo Taken

W-NW

Area

NHWL

Description

Looking up east corner.

Horizontal tension crack traversing corner (see Photo 80).

Occasional tufts of vegetation.

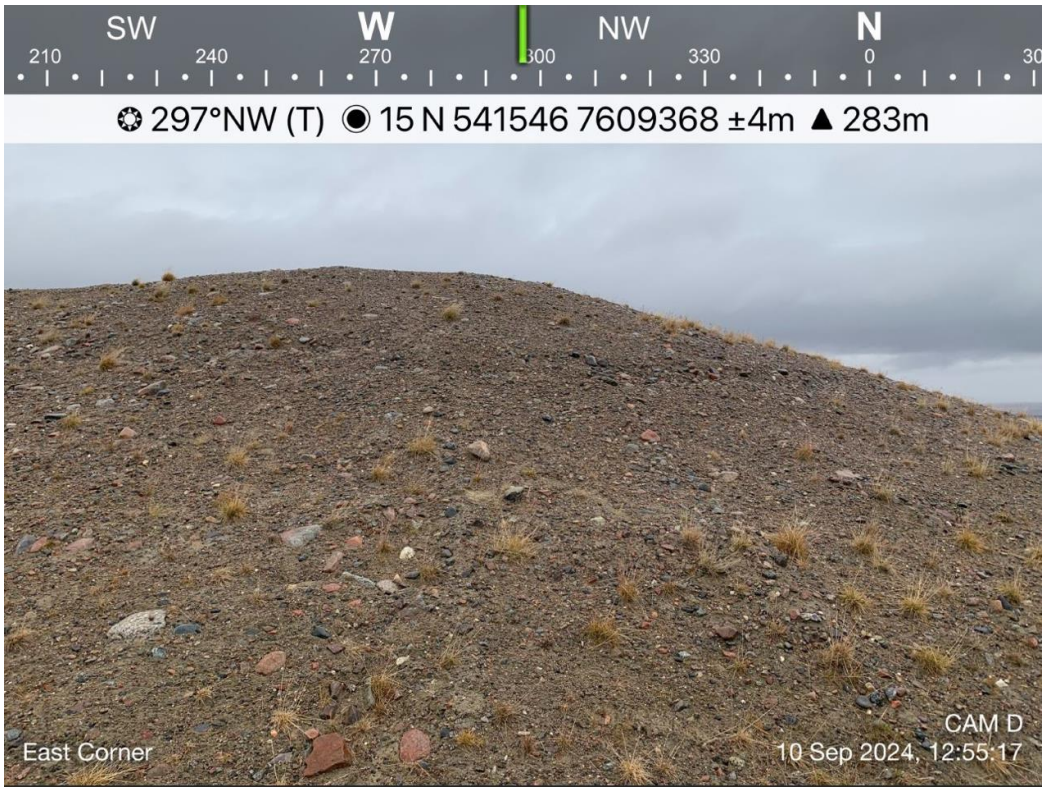


Photo No.	Date
80	9/10/2024

Direction Photo Taken

NW

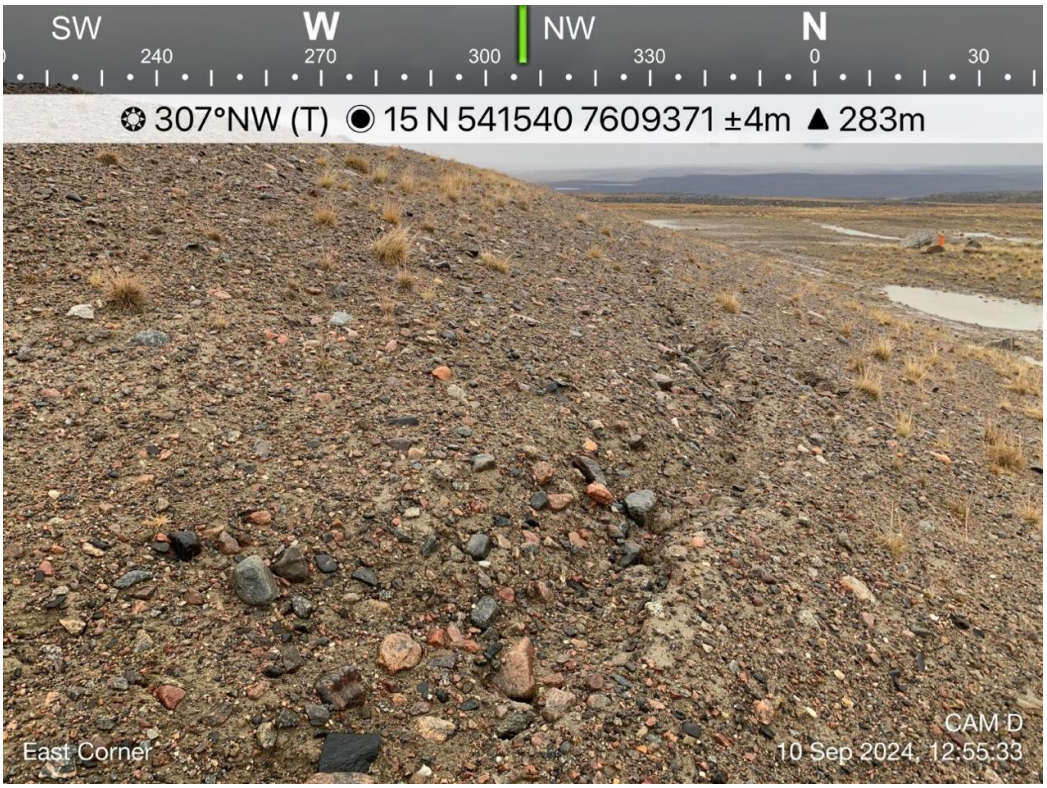
Area

NHWL

Description

Close up of tension crack rounding east corner.

MW02 in background to the right.



As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Photo No.	Date
81	9/10/2024

Direction Photo Taken: SW-W

Area: NHWL

Description:

East corner looking towards southeast slope.

MW01 in background.

Photo No.	Date
82	9/10/2024

Direction Photo Taken: SE

Area: NHWL

Description:

Looking down east corner.

Tension crack traversing corner.

Ponded water at corner base.

Occasional tufts of vegetation on slope, increasing in number at toe where moisture is present.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
83	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Close up of east corner tension cracks.

Fresh crack (right) forming above infilled crack (left).

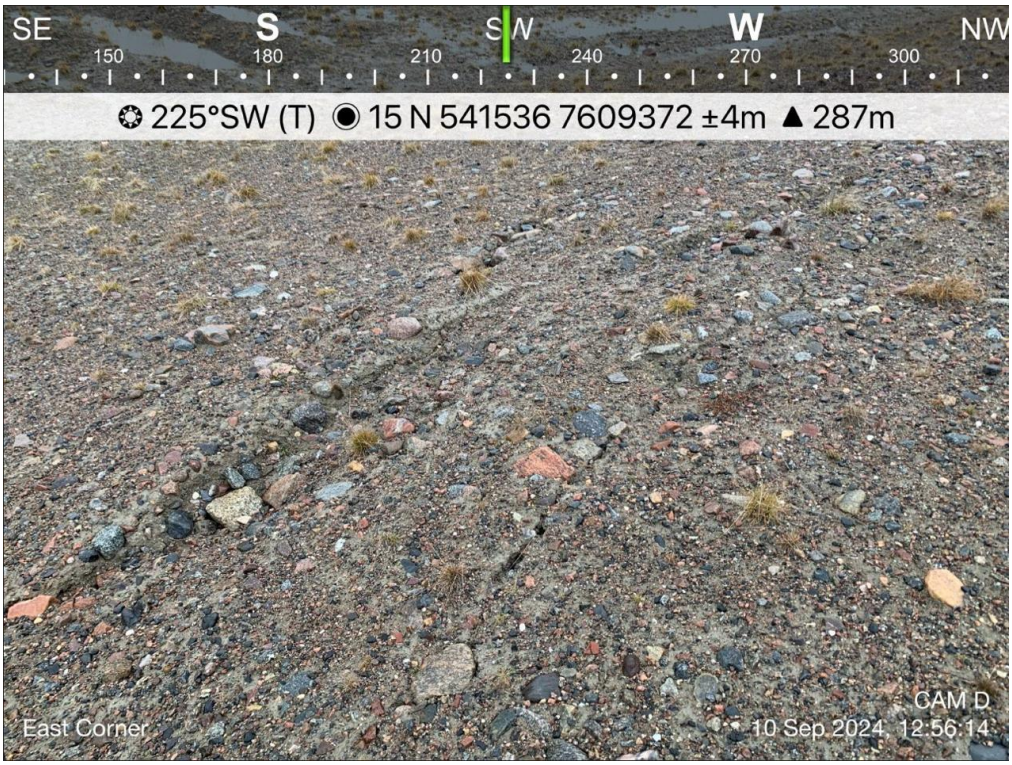


Photo No.	Date
84	9/10/2024

Direction Photo Taken

W

Area

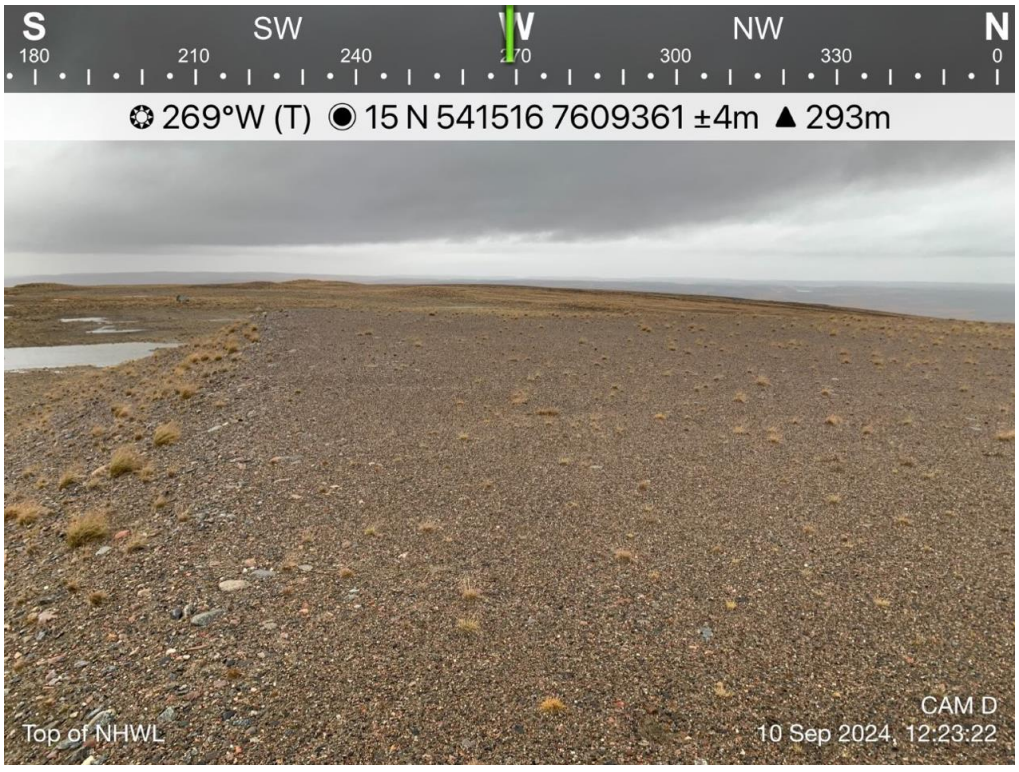
NHWL

Description

Top of landfill taken from east corner looking towards south corner.

Surface in good condition. Relatively flat and no subsidence observed.

Occasional tufts of vegetation.



As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
85	9/10/2024

Direction Photo Taken

NW

Area

NHWL

Description

Top of landfill taken from east corner looking to west corner.

Surface in good condition. Relatively flat and no subsidence observed.

Occasional tufts of vegetation.

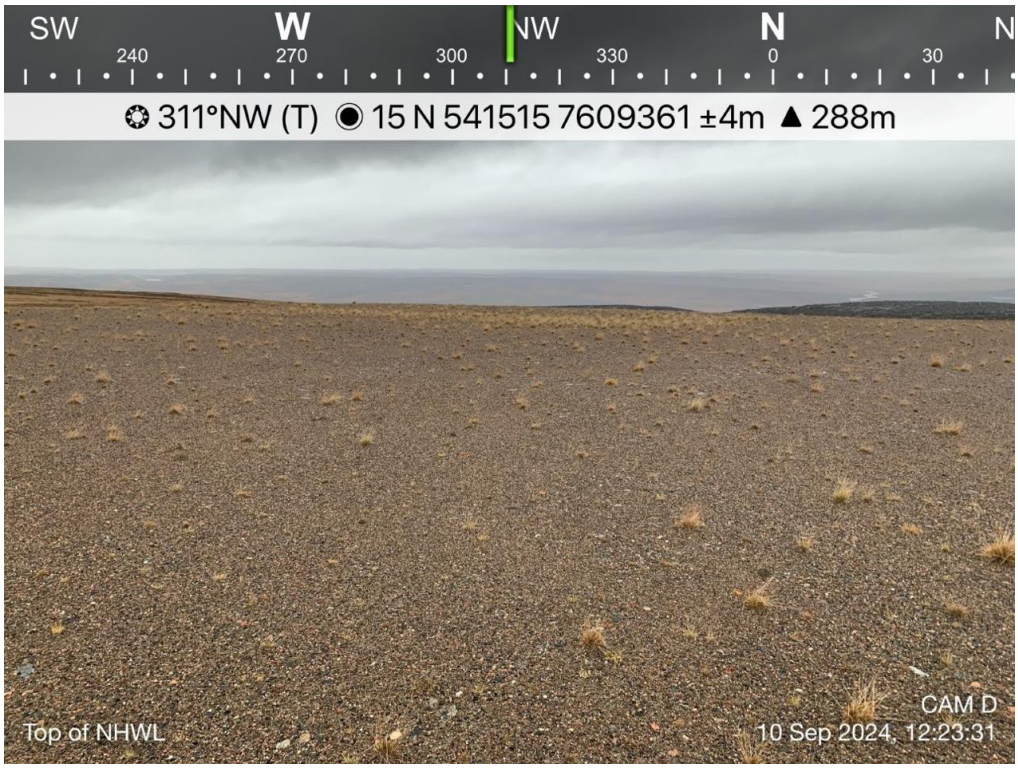


Photo No.	Date
86	9/10/2024

Direction Photo Taken

N-NE

Area

NHWL

Description

Top of landfill taken from east corner looking towards north corner.

Surface in good condition. Relatively flat and no subsidence observed.

Occasional tufts of vegetation.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Photo No.	Date
87	9/10/2024

Direction Photo Taken: SE

Area: NHWL

Description:

Top of landfill looking towards east corner.

Surface in good condition. Relatively flat and no subsidence observed.

Occasional tufts of vegetation.

Short Range Radar Station in background.

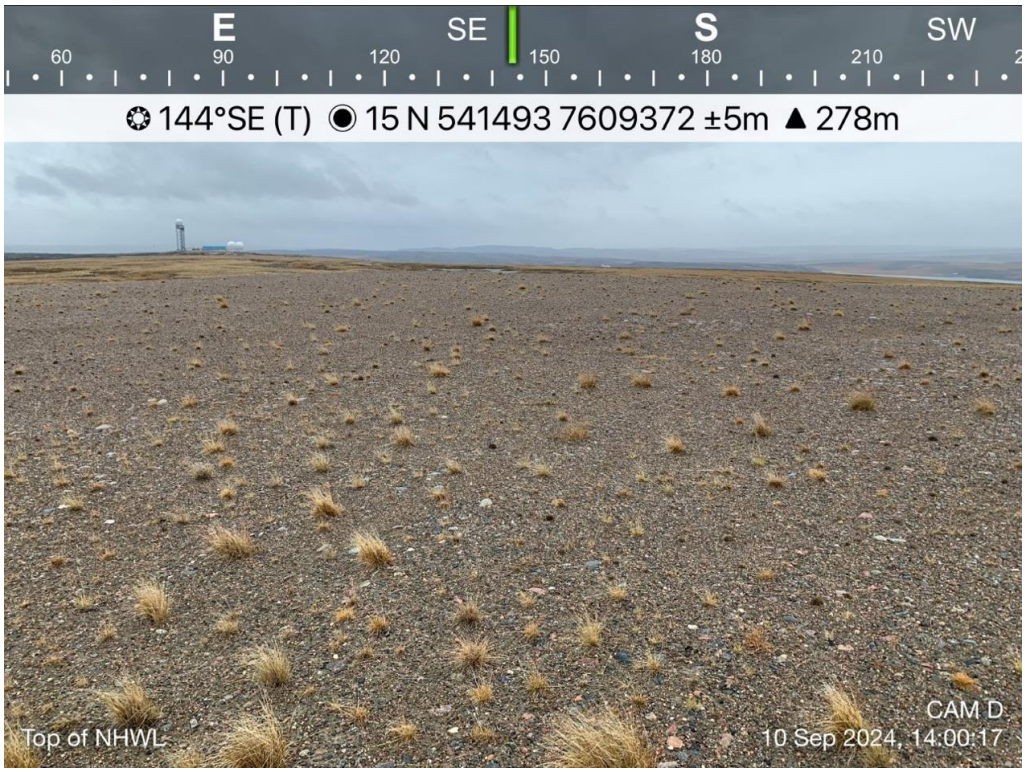


Photo No.	Date
88	9/10/2024

Direction Photo Taken: W

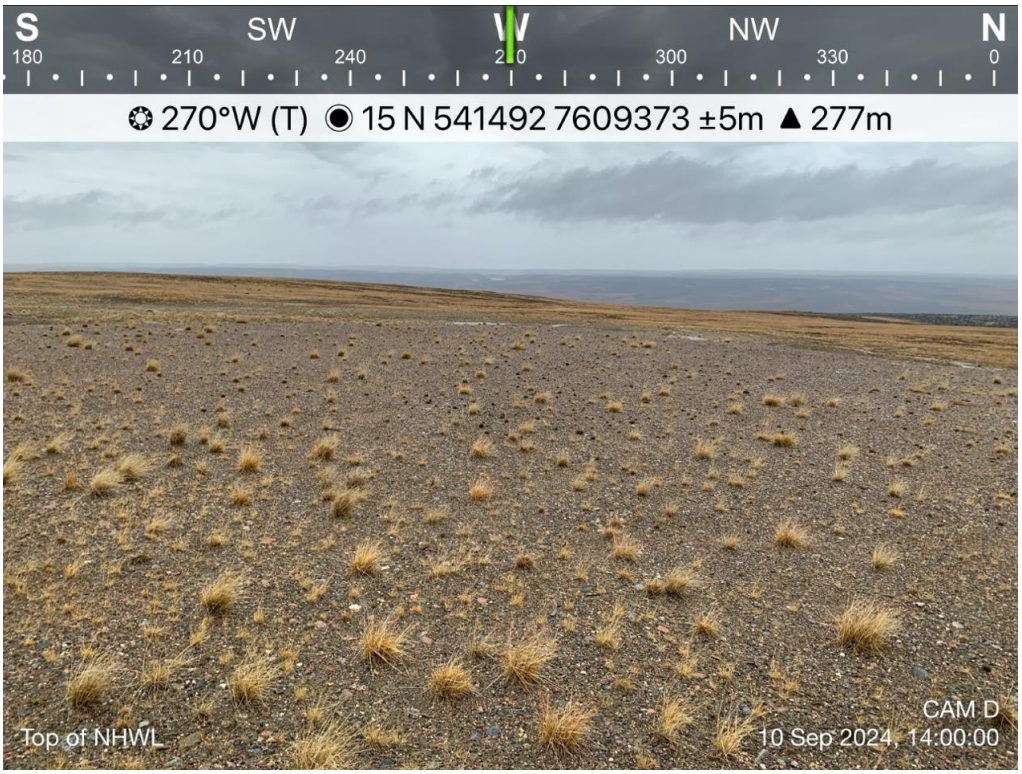
Area: NHWL

Description:

Close up of top of landfill near west corner.

Numerous tufts of vegetation, more abundant in this area compared to the rest of the landfill surface.

Relatively flat and no subsidence observed.



As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
89	9/10/2024

Direction Photo Taken

S

Area

NHWL

Description

Top of landfill along northeast slope.

Top of vertical erosion channels visible (arrows).

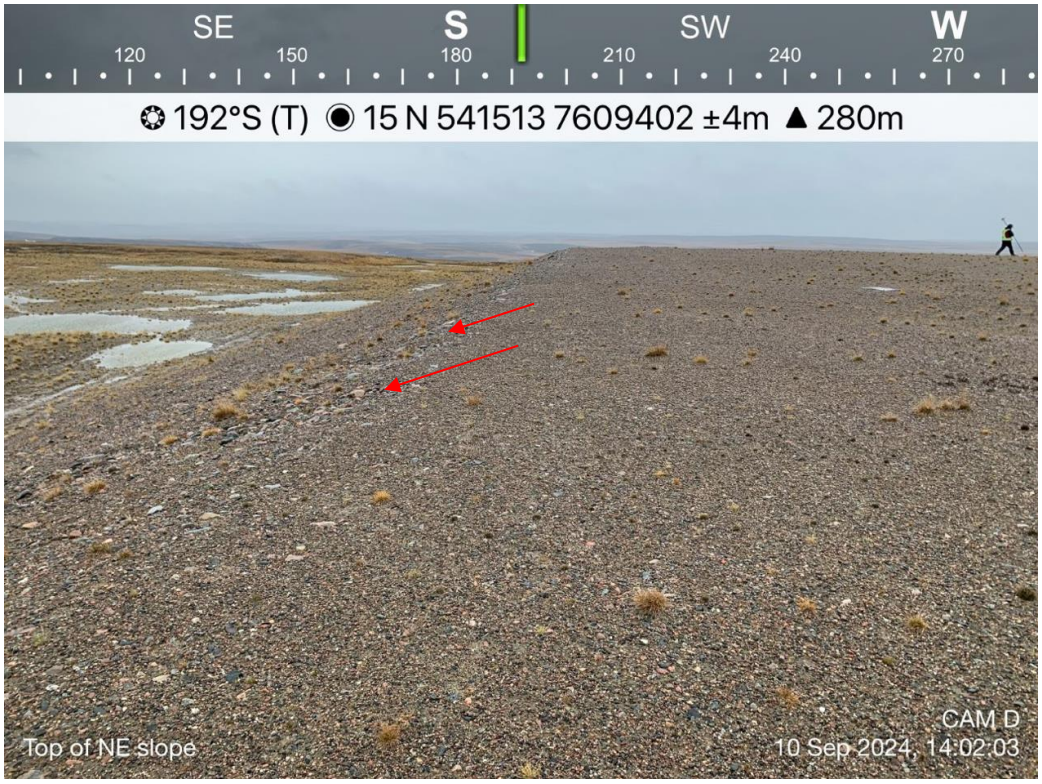


Photo No.	Date
90	9/10/2024

Direction Photo Taken

W

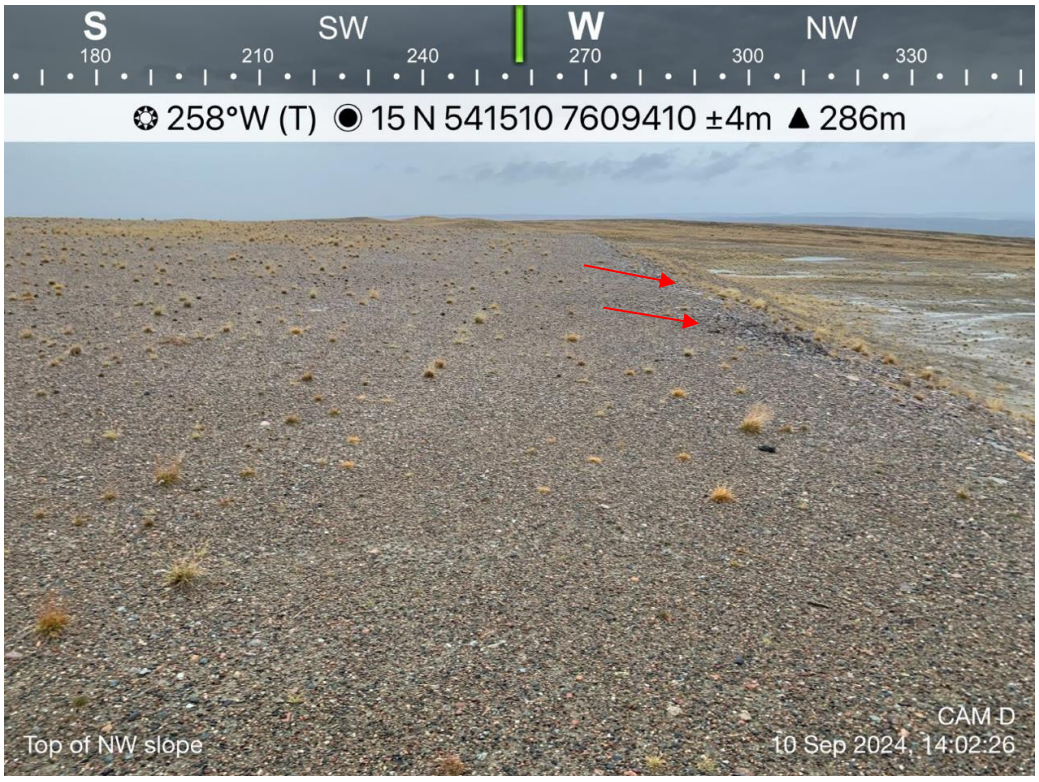
Area

NHWL

Description

Top of landfill along northwest slope.

Top of erosion channels visible (arrows).



As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
91	9/10/2024

Direction Photo Taken

SE

Area

NHWL

Description

Top of landfill along southwest slope.

Note: compass header error, direction is SE.

Photo No.	Date
92	9/10/2024

Direction Photo Taken

N-NE

Area

NHWL

Description

Top of landfill along southeast slope.

Short Range Radar Station in background.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
93	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Exposed metal debris (circled) along transition from top of landfill down into northwest slope near north corner.

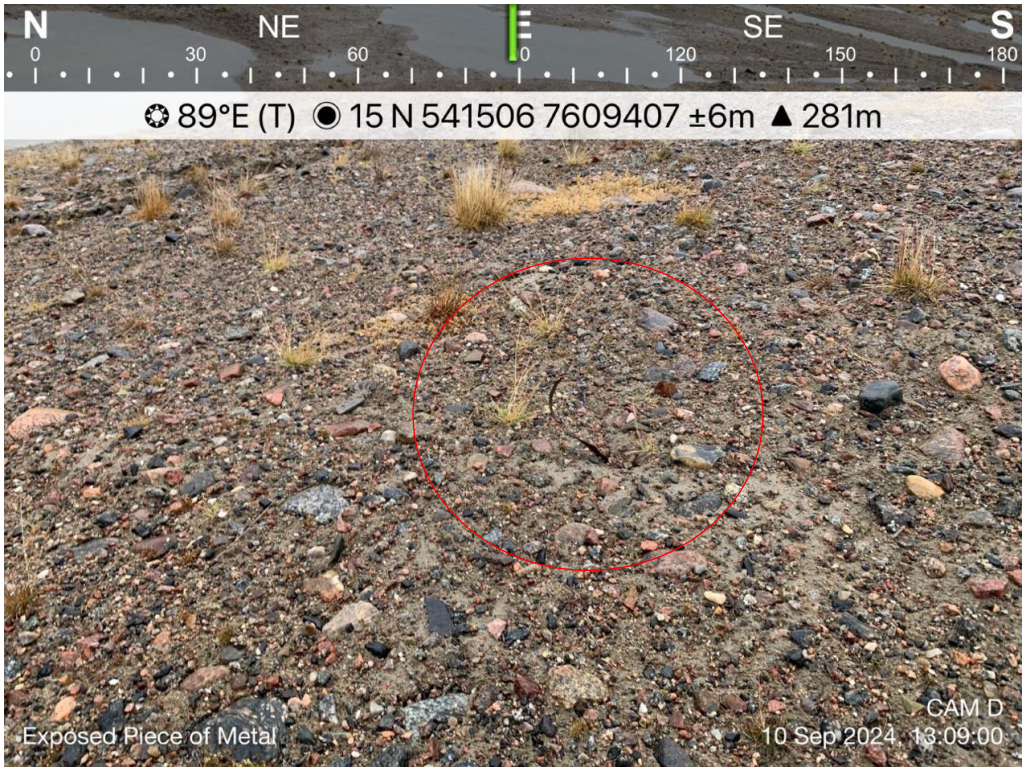


Photo No.	Date
94	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Exposed metal debris (circled) mid northwest slope near tension crack (arrow).

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
95	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Exposed metal debris (circled) mid northwest slope near tension crack (solid arrow) and erosion channel (dashed arrow).

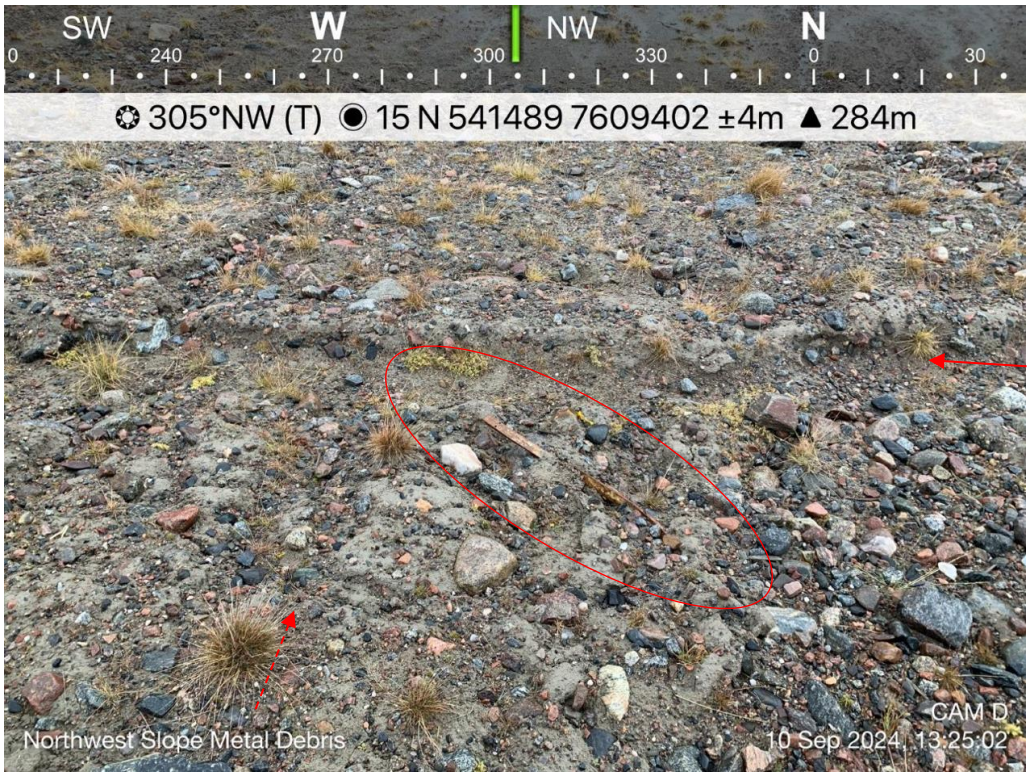


Photo No.	Date
96	9/10/2024

Direction Photo Taken

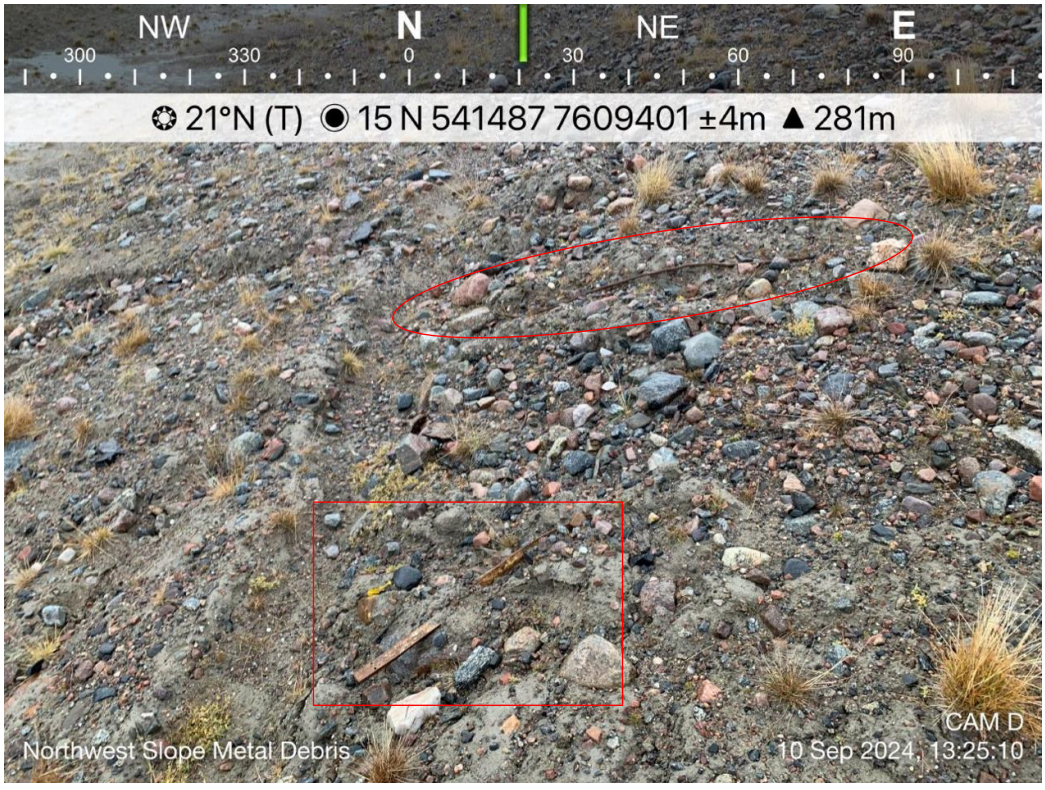
N/A

Area

NHWL

Description

Exposed metal debris from Photo 94 (circled) and Photo 95 (boxed) on northwest slope, previously observed.



As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
97	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Exposed wire debris on southwest slope (circled).

Goose scat (boxed).

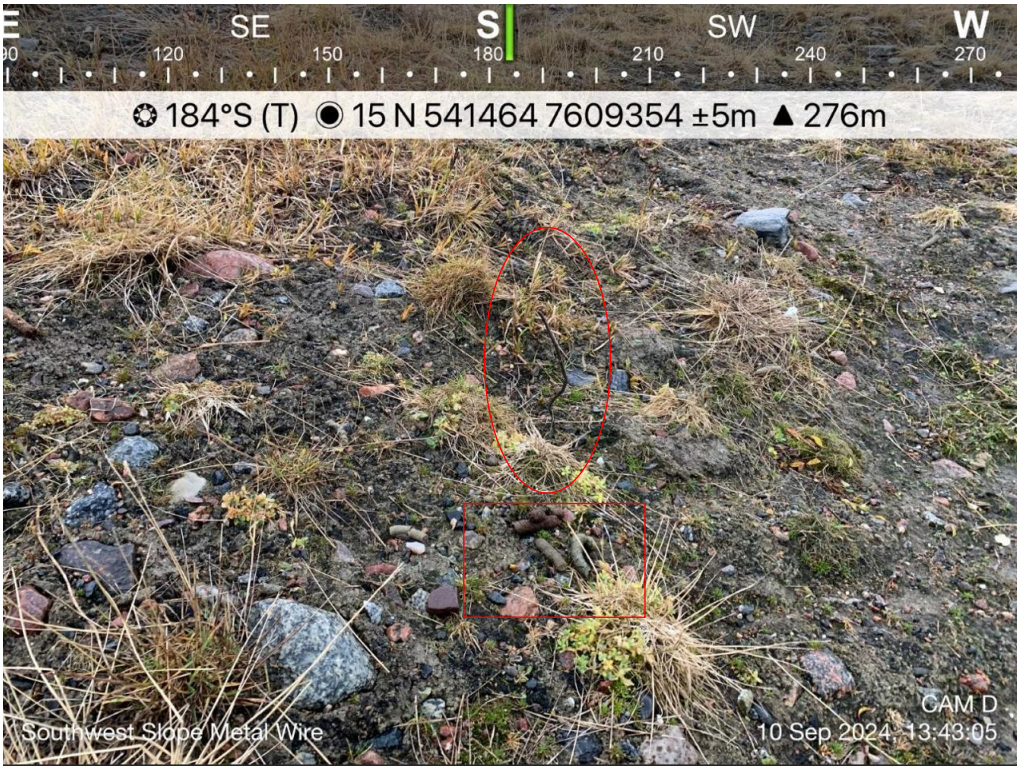


Photo No.	Date
98	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Exposed metal debris at base of northwest slope.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
99	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Exposed metal wire debris at base of northwest slope.

Photo No.	Date
100	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Exposed metal debris at base of northwest slope (circled).

Goose scat (boxed).

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
101	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Exposed metal debris at base of northwest slope (circled).

Goose scat (boxed).

Photo No.	Date
102	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Exposed plastic wire at base of northwest slope (circled).

Goose scat throughout (some boxed).

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
103	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Exposed plastic wire and wood debris at base of northwest slope (circled).

Photo No.	Date
104	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Animal burrow in west corner of landfill, previously observed in 2022.

As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
105	9/10/2024

Direction Photo Taken

N/A

Area

NHWL

Description

Animal burrow in tension crack along southwest landfill slope.

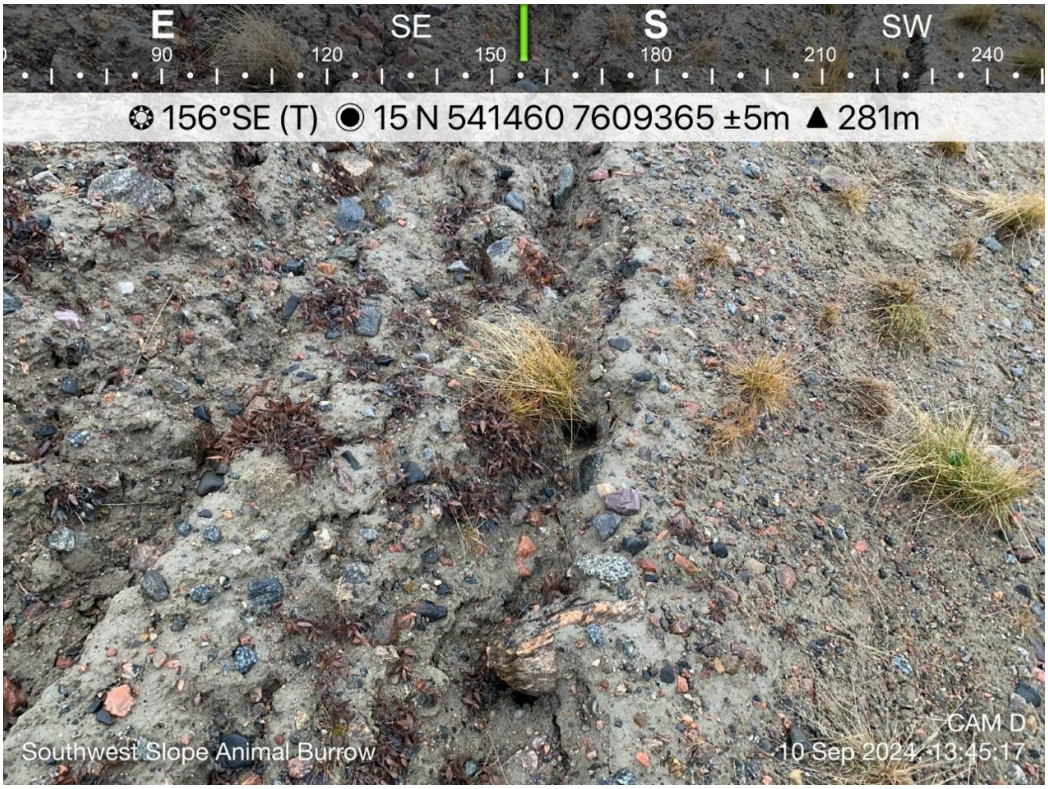


Photo No.	Date
106	9/10/2024

Direction Photo Taken

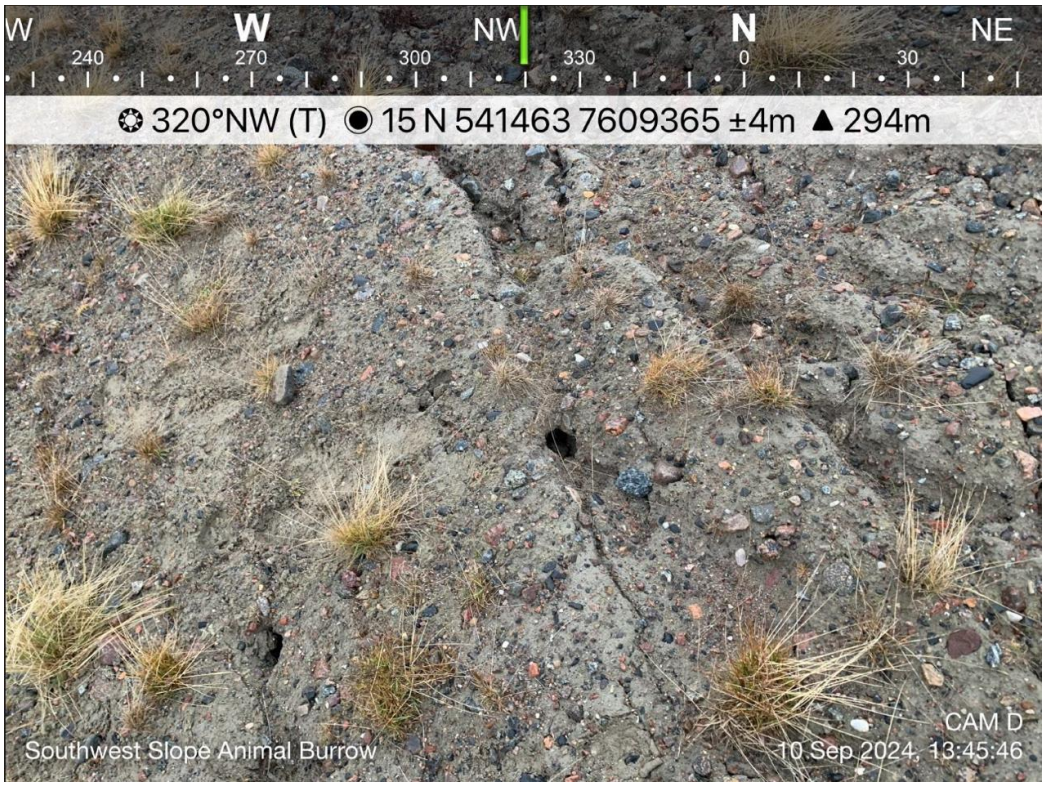
N/A

Area

NHWL

Description

Animal burrow in tension crack along southwest landfill slope.



PHOTOGRAPHIC LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Photo No.	Date
107	9/10/2024

Direction Photo Taken

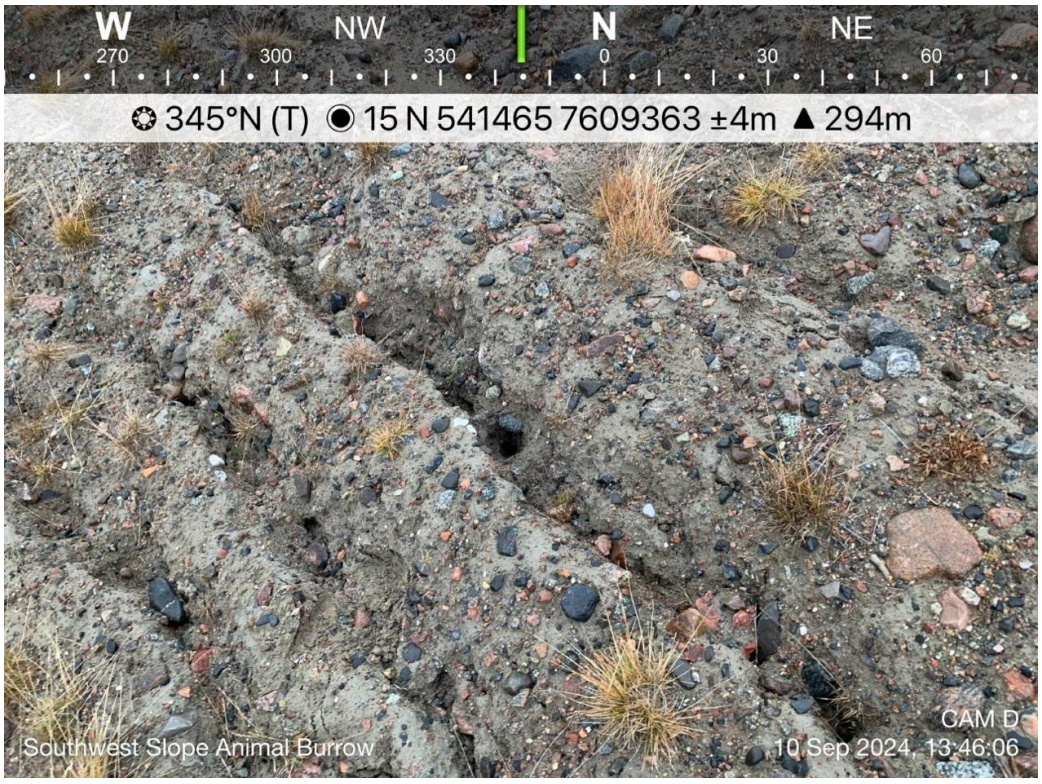
N/A

Area

NHWL

Description

Animal burrow in tension crack along southwest landfill slope.



As per Abandoned Military Sites Remediation Protocol (AMSRP):

Isolated – Singular feature. **Occasional** – Features of note occurring at irregular intervals or locations. **Numerous** – many features of note, impacting less than 50% of surface area. **Extensive** – Impacting greater than 50% of surface area.

AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

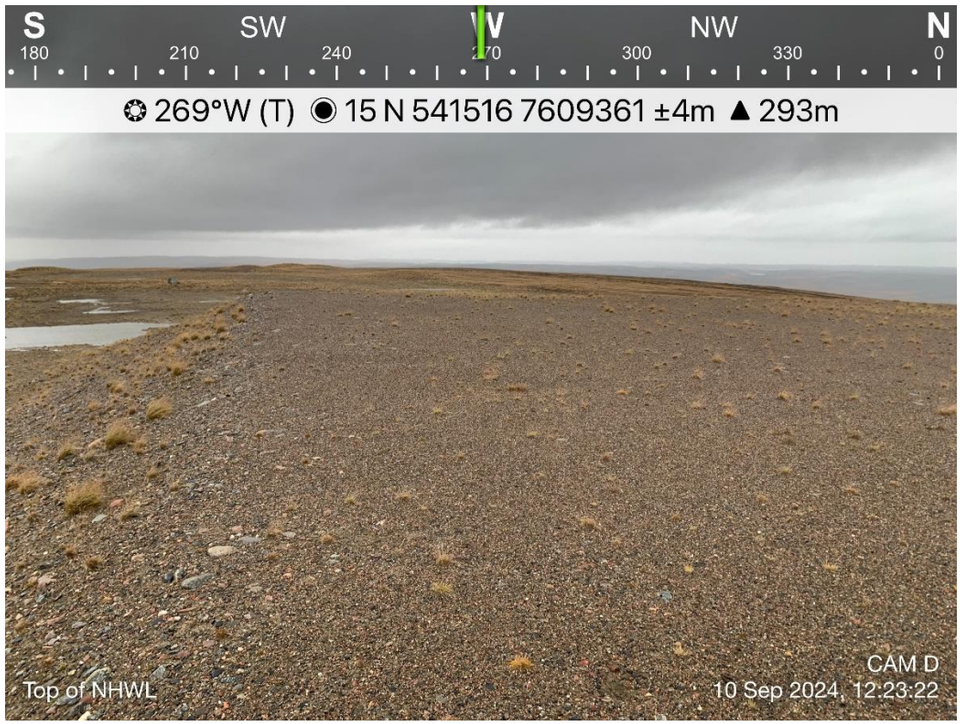
Comparison No.	Previous Condition	Date	Current Condition	Date
1		8/6/2022		9/10/2024
		Direction Photo Taken: West		Direction Photo Taken: (see photo header)

Description

Top of NHWL.

Slight increase in vegetation across landfill cover.

Surface still in good condition. Relatively flat, no significant undulations.



AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

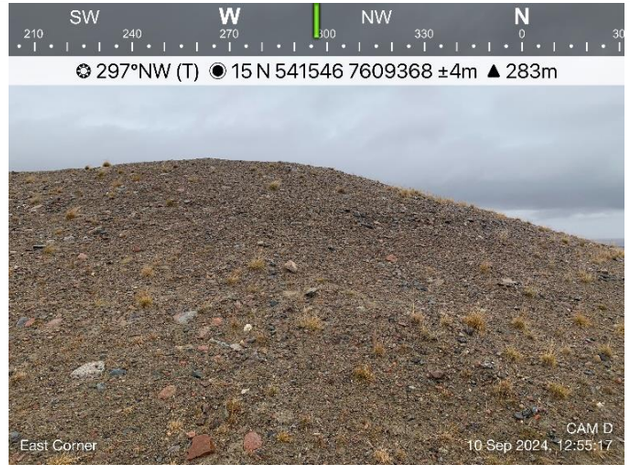
Comparison No.	Previous Condition	Date	Current Condition	Date
2		8/6/2022		9/10/2024
		Direction Photo Taken: West		Direction Photo Taken: (see photo header)

Description

East corner of NHWL.

Large horizontal settlement crack still present around the east corner. Similar to slightly progressed condition relative to previous visit in 2022.

Water continues to pool at base of landfill.



AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
3		8/6/2022		9/10/2024
		Direction Photo Taken: Northeast		Direction Photo Taken: (see photo header)

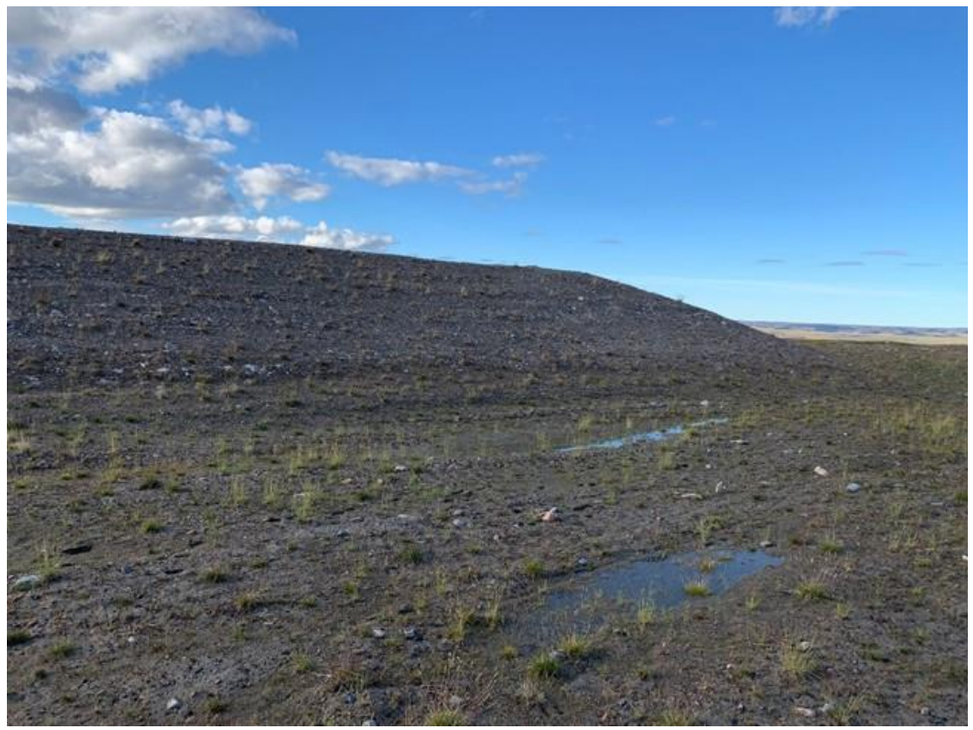
Description

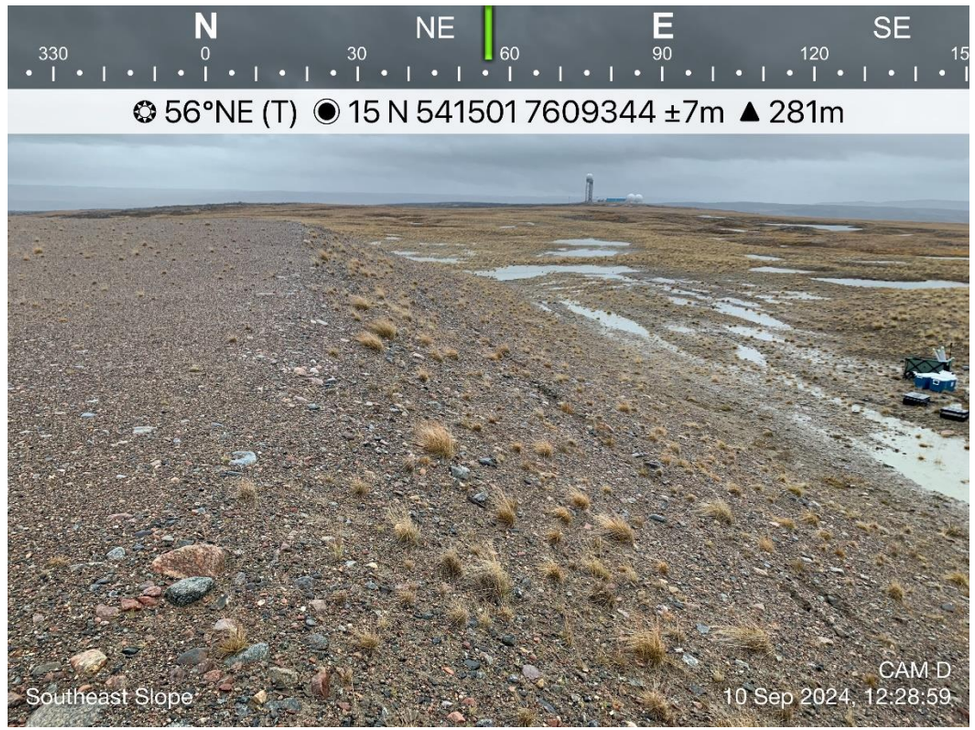
Southeast slope of NHWL.

Settlement cracks of varying width present near crest of the southeast slope. Similar to slightly progressed condition relative to 2022 condition.

Water continues to pond at base of landfill.

Increasing revegetation of slope.





AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
4		8/6/2022		9/10/2024
		Direction Photo Taken: West		Direction Photo Taken: (see photo header)

Description

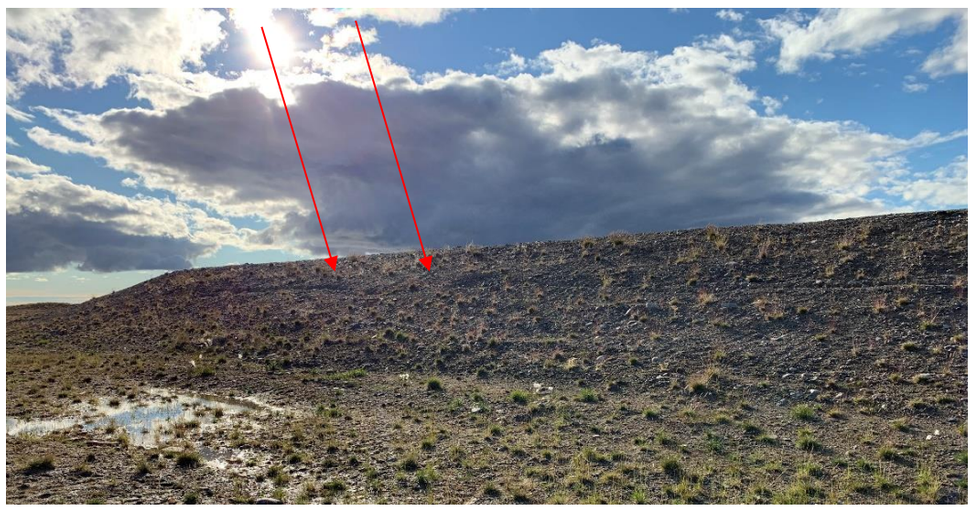
Southeast slope of NHWL.

Settlement cracks of varying width present near crest of the southeast slope. Similar to slightly progressed condition relative to 2022 condition.

Water continues to pond at base of landfill.

Increasing revegetation of slope.

Vertical cracks observed in 2022 were not found in 2024 visit. Erosional channels were found in the approximate locations of the 2022 vertical cracks.



AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
5		8/6/2022		9/10/2024
		Direction Photo Taken: North		Direction Photo Taken: (see photo header)

Description

South corner of NHWL.

Erosion channel appears to be self-armouring. No significant increase in channel depth observed.

Increasing revegetation of slopes.

Settlement cracks of varying width present near crest of the south corner.

AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
6		8/6/2022		9/10/2024
		Direction Photo Taken: Northwest		Direction Photo Taken: (see photo header)

Description

MW04 off southwest side of landfill.

Water continues to pond at base of landfill and around MW04. Extent of larger ponds has increased.

Increased revegetation throughout surrounding area.

MW04 casing has heaved and bentonite seal is now exposed at the ground surface.

AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

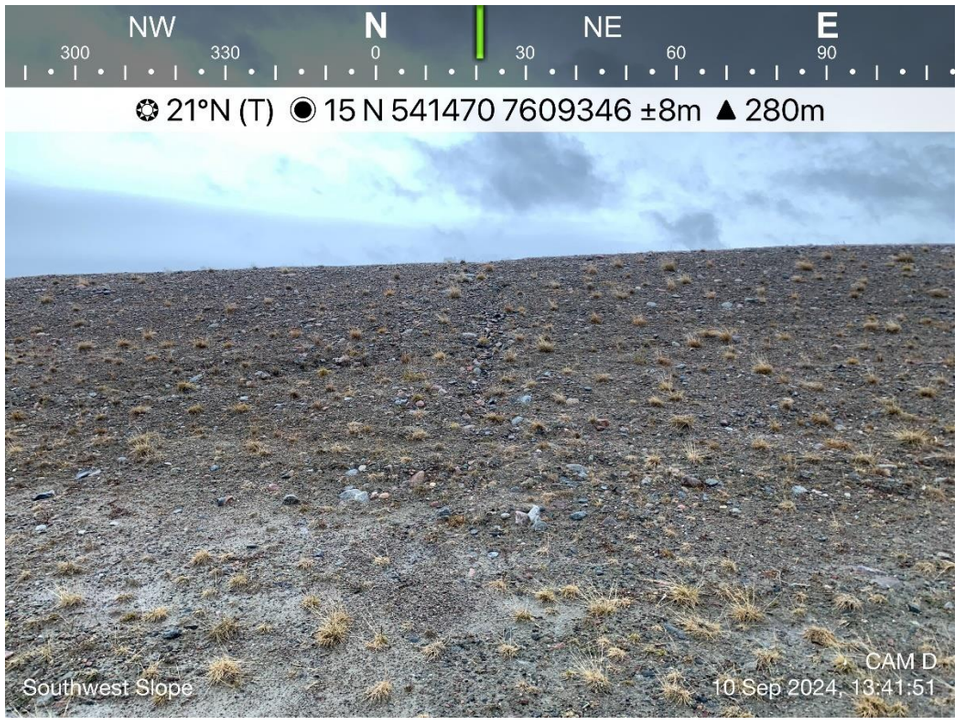
Comparison No.	Previous Condition	Date	Current Condition	Date
7		8/6/2022		9/10/2024
		Direction Photo Taken: Northeast		Direction Photo Taken: (see photo header)

Description

Southwest slope of landfill.

Erosion channel appears to be self-armouring. No significant increase in channel depth was observed.

Increasing revegetation of slope.



AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
8		8/6/2022		9/10/2024
		Direction Photo Taken: Northwest		Direction Photo Taken: (see photo header)

Description

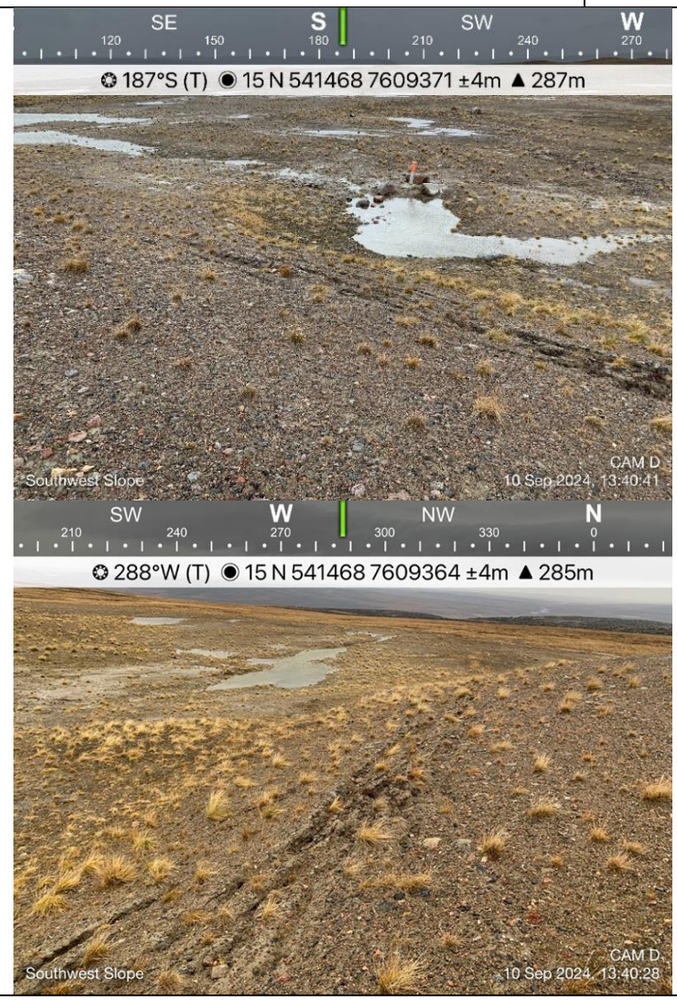
Southwest slope of landfill.

Shallow slough on southwest slope has progressed.

Tension cracks appear to be more severe in 2022 compared to the condition observed during 2024. Site conditions in 2022 were relatively dry, compared to the wet, saturated ground conditions encountered in 2024 and suggests the establishment of a wet-dry cycle serving to infill the cracks (see Report Section 5.2.1.1).

Slight increase in revegetation of the slope.

Water continues to pond at base of landfill.



AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
9		8/6/2022		9/10/2024
		Direction Photo Taken: West		Direction Photo Taken: (see photo header)

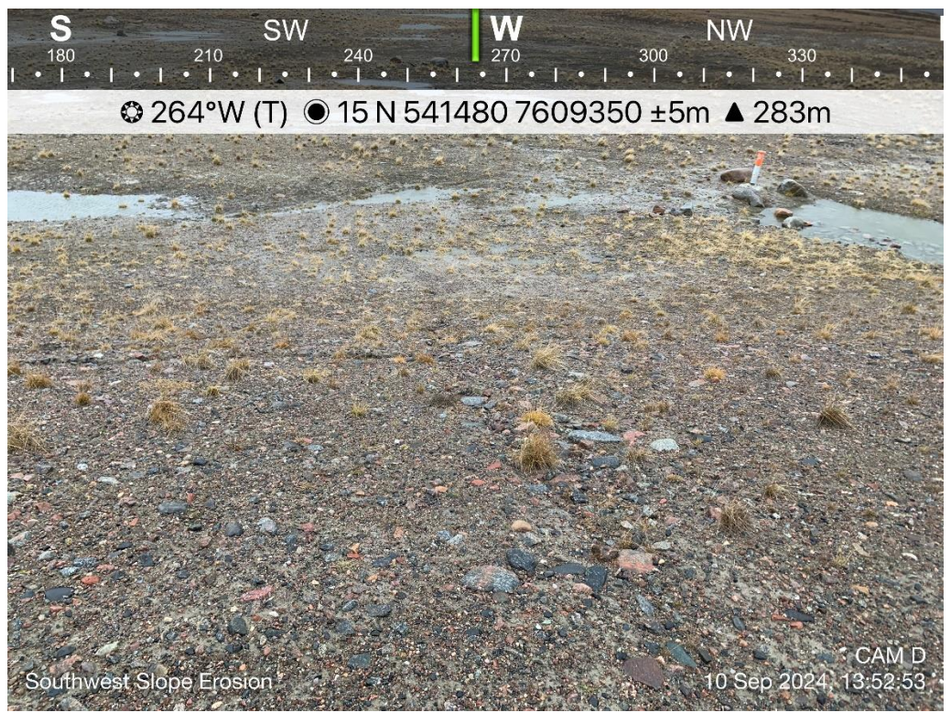
Description

Southwest slope near MW04.

Erosion channel appears to be self-armouring. No significant increase in channel depth observed.

Increasing revegetation of the slope and landfill toe.

Water continues to pond at base of landfill.



AECOM

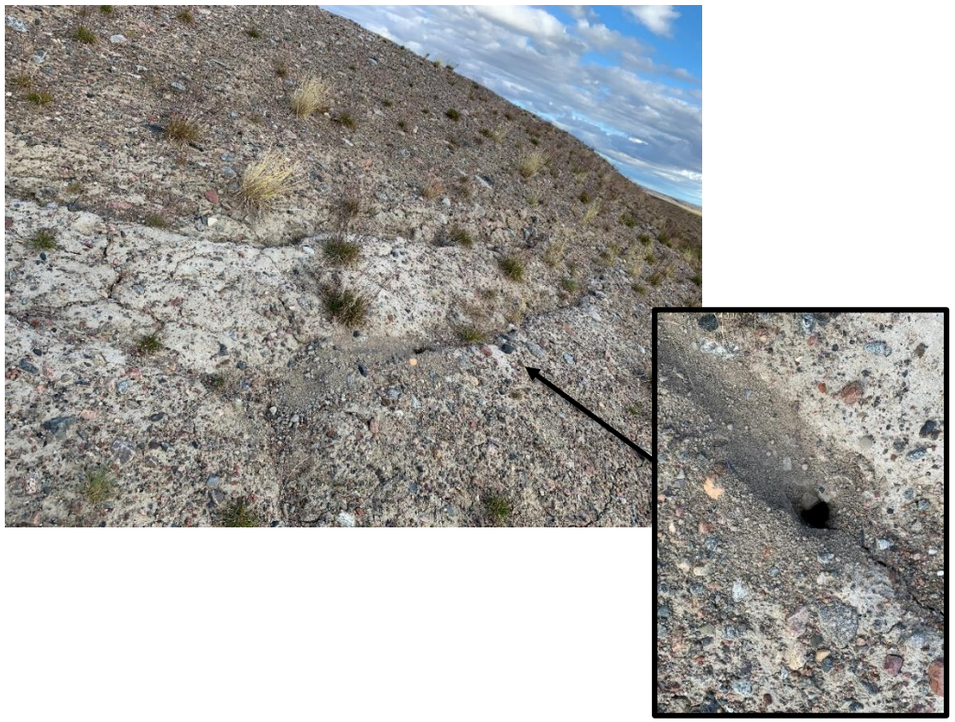
PHOTOGRAPHIC COMPARISON LOG

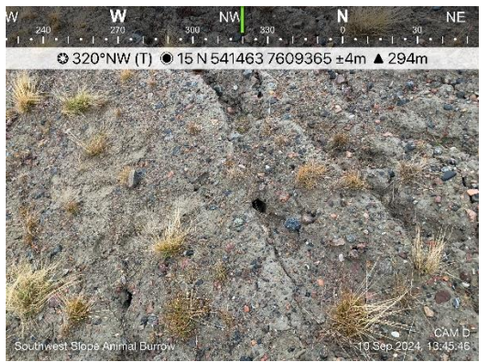
Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
10		8/6/2022		9/10/2024
		Direction Photo Taken: Southeast		Direction Photo Taken: (see photo header)

Description

Increase in animal burrows: one (1) animal burrow noted on west landfill corner in 2022, four (4) animal burrows noted on southwest slope in 2024.





AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
11		8/6/2022		9/10/2024
		Direction Photo Taken: Northeast		Direction Photo Taken: (see photo header)

Description

Northwest slope of landfill.

Erosion channels continue to develop along northwest slope, increasing in size and frequency from 2022.

Increase in ponded water at base of landfill.

Settlement cracks of varying width present near crest of the northwest slope.

AECOM

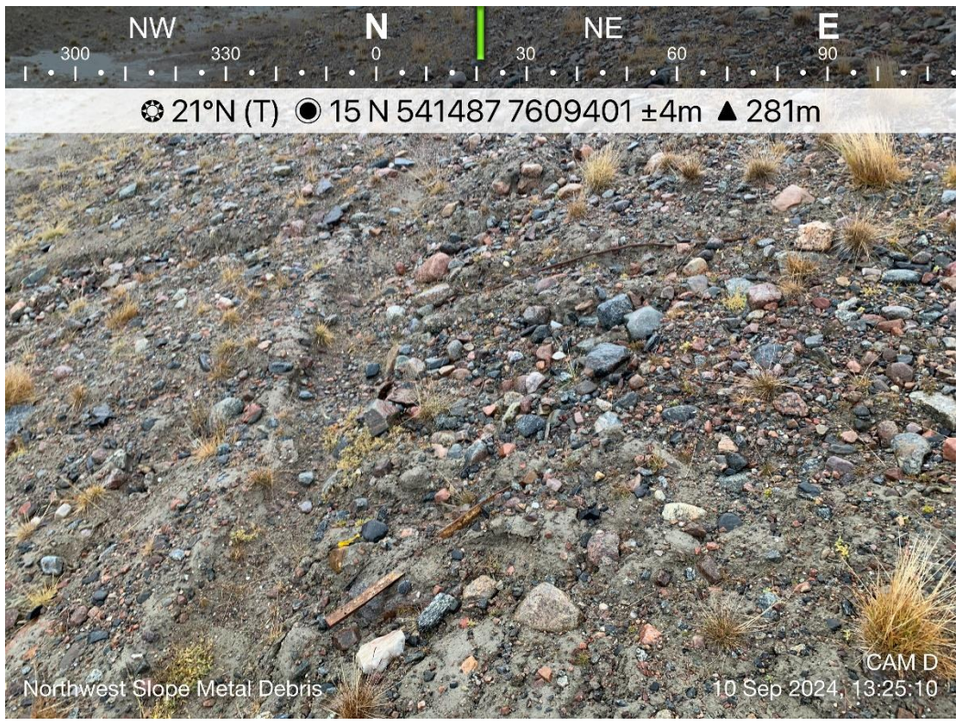
PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
12		8/6/2022		9/10/2024
		Direction Photo Taken: N/A		Direction Photo Taken: (see photo header)

Description

Debris on northwest slope near MW03. Similar extents to those observed in 2022. Debris items appear to be superficial and were not observed to be originating from the NHWL.



AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

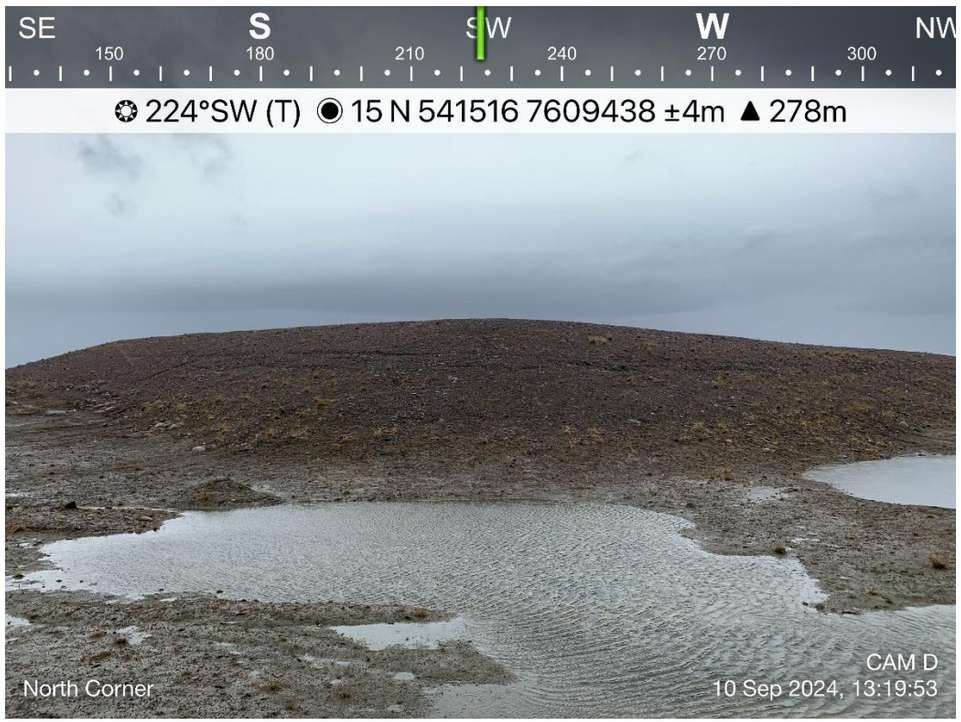
Comparison No.	Previous Condition	Date	Current Condition	Date
13		8/6/2022		9/10/2024
		Direction Photo Taken: South		Direction Photo Taken: (see photo header)

Description

North corner of NHWL.

Tension cracks have progressed around north corner. Tension crack development is higher from middle of northwest slope, clockwise around north corner, to middle of northeast slope (maximum 30 cm deep, 30 cm wide).

Significant water pooling below the toe of the north corner slope.



AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
14		8/6/2022		9/10/2024
		Direction Photo Taken: South		Direction Photo Taken: (see photo header)

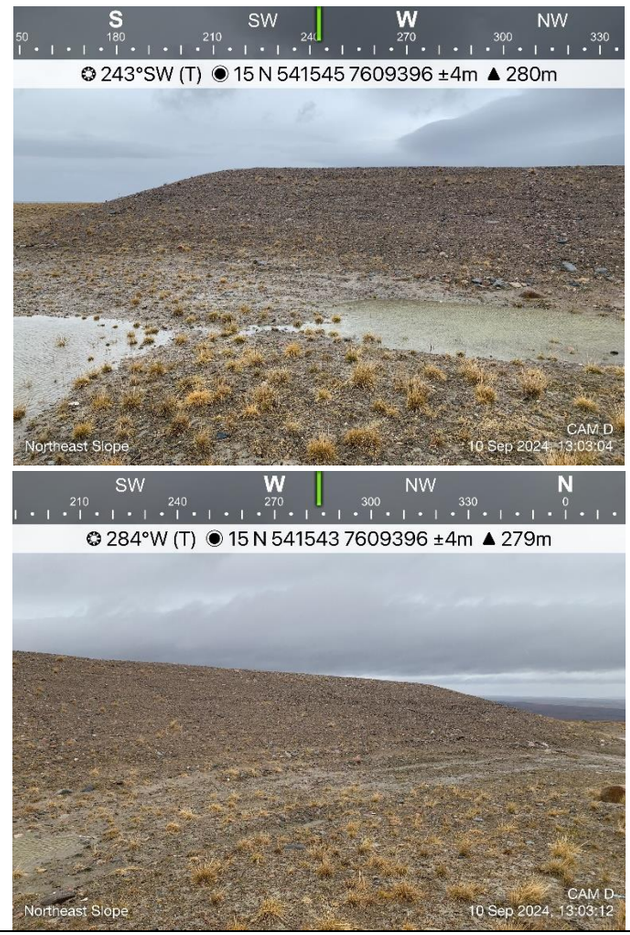
Description

Northeast slope of NHWL.

Erosion channels appear to be self-armouring. No significant increase in channel depths observed.

Preferential drainage path found paralleling the toe to the north. All runoff from northeast slope is draining to several pools of water downslope of NHWL.

Settlement cracks of varying width present near crest of the northeast slope.



AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
15		8/6/2022		9/10/2024
		Direction Photo Taken: South		Direction Photo Taken: (see photo header)

Description

Permanent pond between MW04 and the southwest slope.

Feature has grown in its extent compared to the 2022 condition and is progressing towards the toe of the NHWL slope.

AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
16		8/6/2022		9/10/2024
		Direction Photo Taken: Southeast		Direction Photo Taken: Southeast

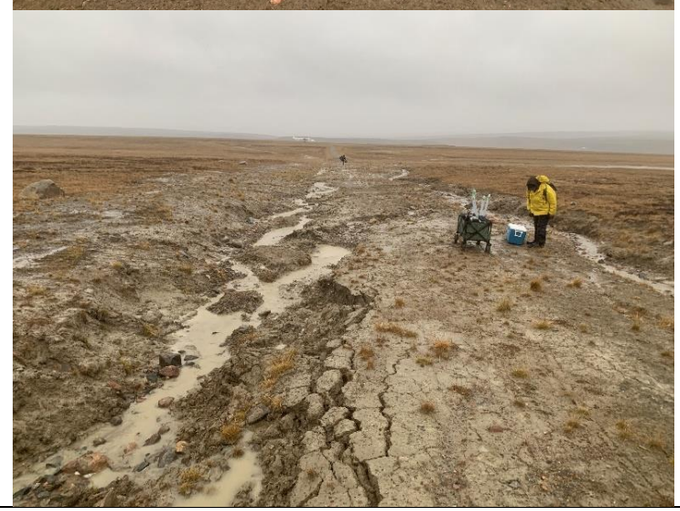
Description

Access road between NHWL and Airstrip.

Washout and erosion channels show considerable development since 2022.

Water was actively flowing in previously shallow and dry channels observed in 2022.

Increased revegetation of road surface.



AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
17		8/6/2022		9/10/2024
		Direction Photo Taken: N/A		Direction Photo Taken: N/A

Description

Access road sink hole.

Sinkhole size is comparable to 2022 conditions (approximately 30 cm wide).

Slight increase in revegetation.

AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
18		8/6/2022		9/10/2024
		Direction Photo Taken: West		Direction Photo Taken: (see photo header)

Description

Settlement hole above culvert (Note: previously misidentified as a sinkhole in Year 11 LTM Report, originated as a siksik burrow and has progressed into a settlement hole).

Settlement hole is expanding and collapsing in on itself (approximately 40 cm wide).

Headslope of outlet is sloughing onto the top of the twin culverts.

Slight increase in revegetation.

AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
19		8/6/2022		9/10/2024
		Direction Photo Taken: North		Direction Photo Taken: (see photo header)

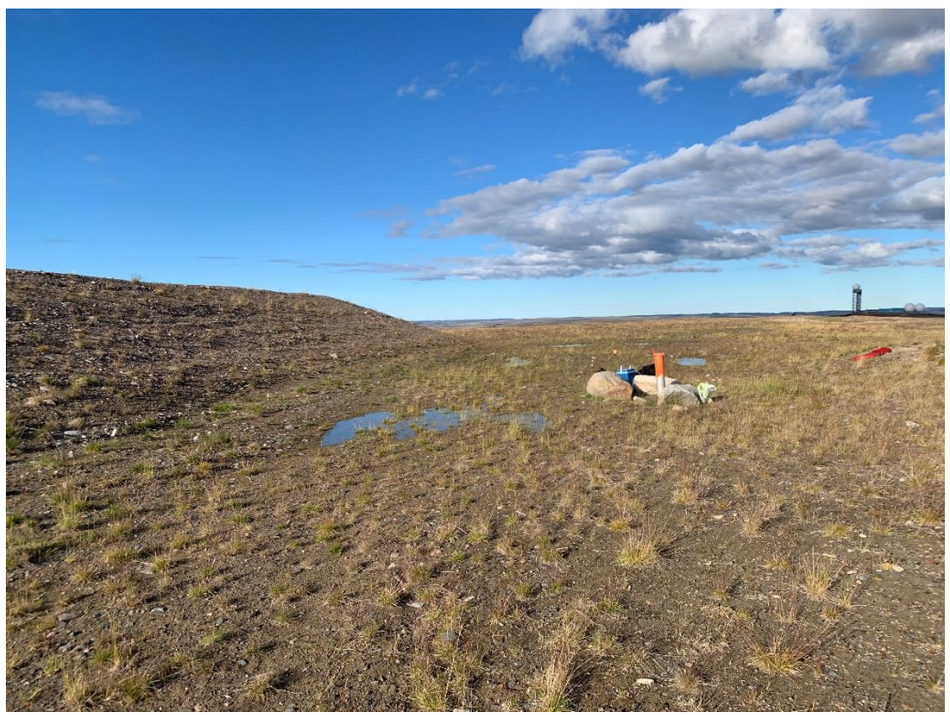
Description

MW01.

MW01 casing has heaved and bentonite seal is now exposed at the ground surface.

Pooling water observed surrounding the MW01 installation and surrounding area.

It was noted on-site that sand within casing had heaved and covered the internal well cap.



AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
20		8/6/2022		9/10/2024
		Direction Photo Taken: N/A		Direction Photo Taken: (see photo header)

Description

MW04.

Casing has heaved. Previously noted cracking covered by exposed and saturated bentonite.

AECOM

PHOTOGRAPHIC COMPARISON LOG

Site Name:	Site Location	Project No.
CAM-D Long-Term Monitoring – Year 13	Simpson Lake, NU	60736036

Comparison No.	Previous Condition	Date	Current Condition	Date
21		8/6/2022		9/10/2024
		Direction Photo Taken: N/A		Direction Photo Taken: (see photo header)

Description

MW03.

Casing has heaved. In 2022 no exposed bentonite was observed at the ground surface. Bentonite seal is now exposed at the ground surface which suggests ongoing frost heave is pushing the bentonite seal out of the hole.

Slight increase in revegetation of surrounding area.

Appendix C – Monitoring Checklist and Daily Field Report

VISUAL MONITORING CHECKLIST

ITEM	PRESENCE / ABSENCE	EXTENT	DESCRIPTION / PHOTOGRAPHIC REFERENCE
Settlement	Yes	• Tension crack development is higher from second half of northeast slope, around north corner, and along first half of northwest slope • Evidence of shallow slough on southwest slope (many condensed tension cracks, 10-20 cm wide) • No cracks on top of landfill • Tension cracks developed into a continuous ring; ring is between 4-5 m from top/crest of NHWL	Photographs available in **Appendix B**: • Photographs 26, 27, 33 – 41 • Photographs 52 – 56 • Photographs 84 – 92 • Photographs 26, 33, 34, 42, 49, 55, 56, 70, 71, and 79
Erosion	Yes	• Northeast slope has many small to medium sized erosion channels all draining to the north • Northwest slope has many medium sized erosion channels all draining to the northwest	Photographs available in **Appendix B**: • Photographs 26 and 27 • Photographs 41 – 45
Frost Action	Yes	• Signs of heave at monitoring wells	Photographs available in **Appendix B**: • Photographs 15 – 24
Animal Burrows	Yes	• Four (4) burrows in southwest slope	Photographs available in **Appendix B**: • Photographs 104 – 107
Vegetation	Yes	• Some light vegetation on top of landfill • Patches of vegetation throughout access road • Vegetation in general site area surrounding landfill • Sparse vegetation on slopes	Photographs available in **Appendix B**: • Photographs 84 – 92 • Photographs 6, 10, 12 • Photographs 19, 23, 38, and 46 • Photographs 27, 28, 41, 49, and 85
Staining	No	-	-
Vegetation Stress	No	-	-
Seepage Points	No	-	-
Exposed Debris	Yes	• Scrap metal, plastic wire	Photographs available in **Appendix B**: • Photographs 93 – 103
Condition of Monitoring Instruments	-	• MW01, MW03, and MW04 shows signs of heave (~10cm) with exposed bentonite	Photographs available in **Appendix B**: • Photographs 15 - 24
Other Features of Note	-	• Washout, sloughing, erosion flow channels throughout access road – poor condition • Airstrip soft, isolated larger rocks noted	Photographs available in **Appendix B**: • Photographs 5 - 14 • Photographs 3 and 4

Natural Environment Monitoring Checklist

Date: September 10, 2024		**Site:** CAM-D Simpson Lake (Year 13)	
ITEM	**PRESENCE / ABSENCE**	**EXTENT**	**DESCRIPTION / PHOTOGRAPHIC REFERENCE**
Instructions	*Yes or No*	*Provide dimensions as applicable; Length, Width, Depth*	*Features of note, photographic reference with scale, point of view and direction*
Wildlife sightings *(species, number, gender, juveniles)*	No	N/A	N/A
Other evidence of recent presence of wildlife *(droppings, tracks, feathers/fur, carcass remains, etc.)*	Yes	• Snow geese scat all over access road and around NHWL • One (1) caribou track on access road visually observed by the Wildlife Monitor • Rabbit scat visually observed by the Wildlife Monitor • Quite a bit of mostly old caribou tracks and scat as well as caribou tracks at MW03 visually observed by the Wildlife Monitor • Some fox tracks in muddy areas and occasional scat visually observed by the Wildlife Monitor • Scat on top of landfill	Photographic Record in **Appendix B**: • Photographs 97, 100 through 102 • No photographic reference as this is based on visual observations made by the Wildlife Monitor • No photographic reference as this is based on visual observations made by the Wildlife Monitor • No photographic reference as this is based on visual observations made by the Wildlife Monitor • No photographic reference as this is based on visual observations made by the Wildlife Monitor • No photographic reference as this is based on visual observations made by the Wildlife Monitor
Wildlife activity *(summering/nesting/denning, migratory/passing through)*	Unknown	N/A	N/A
Qualitative assessment of relative numbers versus previous years *(more, same, less)*	Yes	• Animal burrows: one animal burrow noted in 2022, more observed in 2024 • Caribou tracks: observed in both 2022 and 2024, more noted in 2022 • Snow geese tracks: observed in both 2022 and 2024, more noted in 2024	Photographic Record in **Appendix B**: • Photographs 104 through 107 • No photographic reference as this is based on visual observations made by the Wildlife Monitor • No photographic reference as this is based on visual observations made by the Wildlife Monitor
Revegetation of disturbed areas versus previous years *(more, same, less)*	Yes	• Access road is continuing to revegetate • Sparse vegetation on NHWL (also noted in 2022)	Photographic Record in **Appendix B**: • Photographs 6, 10, 12 • Photographs 19, 23, 27-28, 38, 42, 46, 49, 85

Local Community Consultation			
ITEM	**PRESENCE / ABSENCE**	**EXTENT**	**DESCRIPTION / PHOTOGRAPHIC REFERENCE**
Instructions	*Yes or No*	*Provide dimensions as applicable; Length, Width, Depth*	*Features of note, photographic reference with scale, point of view and direction*
Use by people for traditional activities	→ Unable to secure a wildlife monitor from the local community, and field team accommodations were in Cambridge Bay, therefore unable to consult with local community members		
Activities *(hunting, fishing, trapping, camping, other harvesting)*			
Relative frequency versus previous years *(more, same, less)*			
Wildlife species present *(sightings or evidence)*			
Wildlife presence versus previous years *(more, same, less)*			
Health of wildlife observed or harvested *(good, average, poor)*			
Relative health of wildlife versus previous years *(better, same, worse)*			

AECOM

Project Daily Report

Client:	CIRNAC	**Date:**	Sept. 10, 2024
Project:	Nunavut Sites LTM	**Weather:**	Windy, Rain, 4°C
Project No.:	60736036		
Location:	CAM-D	**Number of Personnel On-Site :**	6
Departure Time:	8:30am	**Return Time:**	7:15pm

Company			**Total # Workers**
AECOM	Alysha Selinger	Daxton Dion-Hoffman	3
	Greg Fremont		
Wildlife Monitor(s)	Carl Williams		1
Pilot(s)	Cody Labreche	Jean Domonic Laflamme	2
Total			**6**

Health and Safety

Observations/Near Misses/Incidents/H&S Issues

Weather conditions on site made field activities extremely challenging (40-55km/hr sustained winds with gusts well over 60km/hr, continual rain), and rapid deterioration (temperature drop of 6°C while on site, rain became sleet/snow) caused the pilots to call the field team in for immediate departure.

Daily Hazard Identification & Near Miss Focus

Wildlife - Goose droppings covered most of the site including the access road, and caribou tracks were also observed on the access road alongside droppings. The Wildlife Monitor stayed with the field team, team members also remained vigilant for wildlife sightings, and the Wildlife Monitor was equipped with a rifle and various deterrents.

Technical Scope

Geotechnical Inspection

The geotechnical inspection indicated continued advancement in degradation of the landfill condition. Settlement, cracking, and erosion rills previously noted in 2022 had noticeably progressed with the addition of new features. The northwest and southwest slopes appear to be the most impacted.

The weather conditions did not allow for flight of the drone. A GPS survey of the landfill was successfully completed.

The access road between the airstrip and site has significantly deteriorated, with several scarps, wash out, sink holes, a portion crossing the culvert caving in, and revegetation making sections of the road hard to identify from the surrounding landscape. The rain, puddles/channels, soft ground, and deterioration of the road also made equipment transport with the tundra wagon quite challenging. The landfill cannot be seen from the airstrip; further degradation or the road and revegetation will significantly limit site access.

Aquatic Monitoring

Low flow sampling was attempted at MW#1, however the field conditions did not support the time required for that sampling procedure and a sample was collected prior to parameter stabilization. A sample plus duplicate were also collected at MW#3 with the pump. The rapid deterioration of weather conditions and notice to leave from the pilots did not allow for samples to be collected at the other two monitoring wells. MW#1 and MW#3 were prioritized as they are upstream/downstream of the landfill. It was noted that the well casings had heaved, exposing bentonite at the base, likely compromising the wells as they are susceptible to surface water intrusion.

Temperature Monitoring

N/A

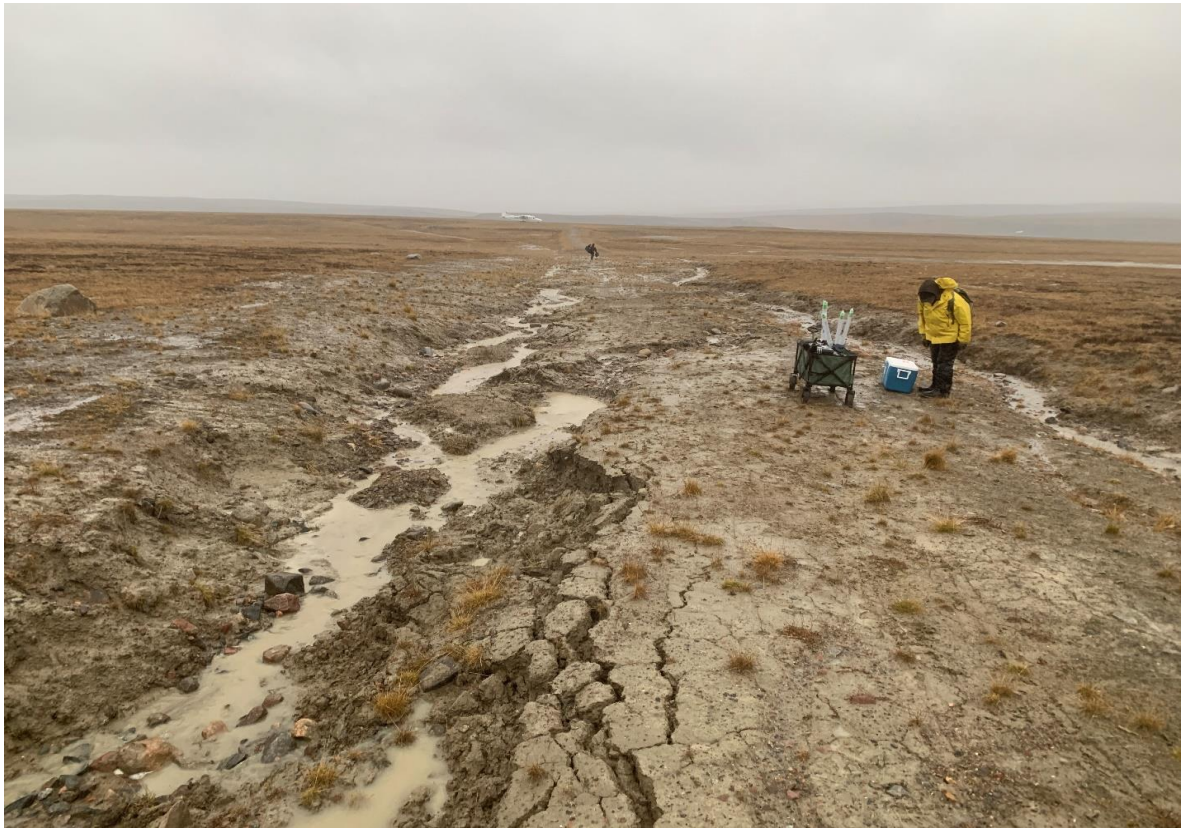
Communications or Deviation from Work Plan

The field team will attempt to fly to CAM-E on the way back to Yellowknife: Cambridge Bay > CAM-E > fuel stop > Yellowknife. The pilots' forecasts indicate weather comparable to what was experienced on site at CAM-D today. If the team is able to land on site, field activities may be modified to accommodate for the weather conditions and shortened time on site.

Other:

The weather conditions rapidly declined while on site; the pilots noted the temperature dropped 6°C while the field team was on site (down to 2°C at time of departure), with the initial misty conditions developing into significant rain and sleet/snow at time of departure. Sustained winds upwards of 55km/hr were measured on site with gusts much exceeding 55km/hr. These weather conditions significantly impacted the field teams ability to perform the required field activities. The pilots were monitoring a low pressure system nearby, compounded by the transition of rain into sleet/snow which would reduce visibility and impede safe takeoff, which resulted in radioing the field team to return to the aircraft for immediate departure. Landing in Cambridge Bay was also met with significant cross winds.

Project Daily Photo Record



Photograph 1: Access road condition.

Photograph 2: Heaving at MW#3, exposed bentonite at base, casing on angle.

Project Daily Photo Record

Photograph 3: Northwest landfill slope.

Photograph 4: On-site windspeed and temperature measurement as weather conditions continued to deteriorate.

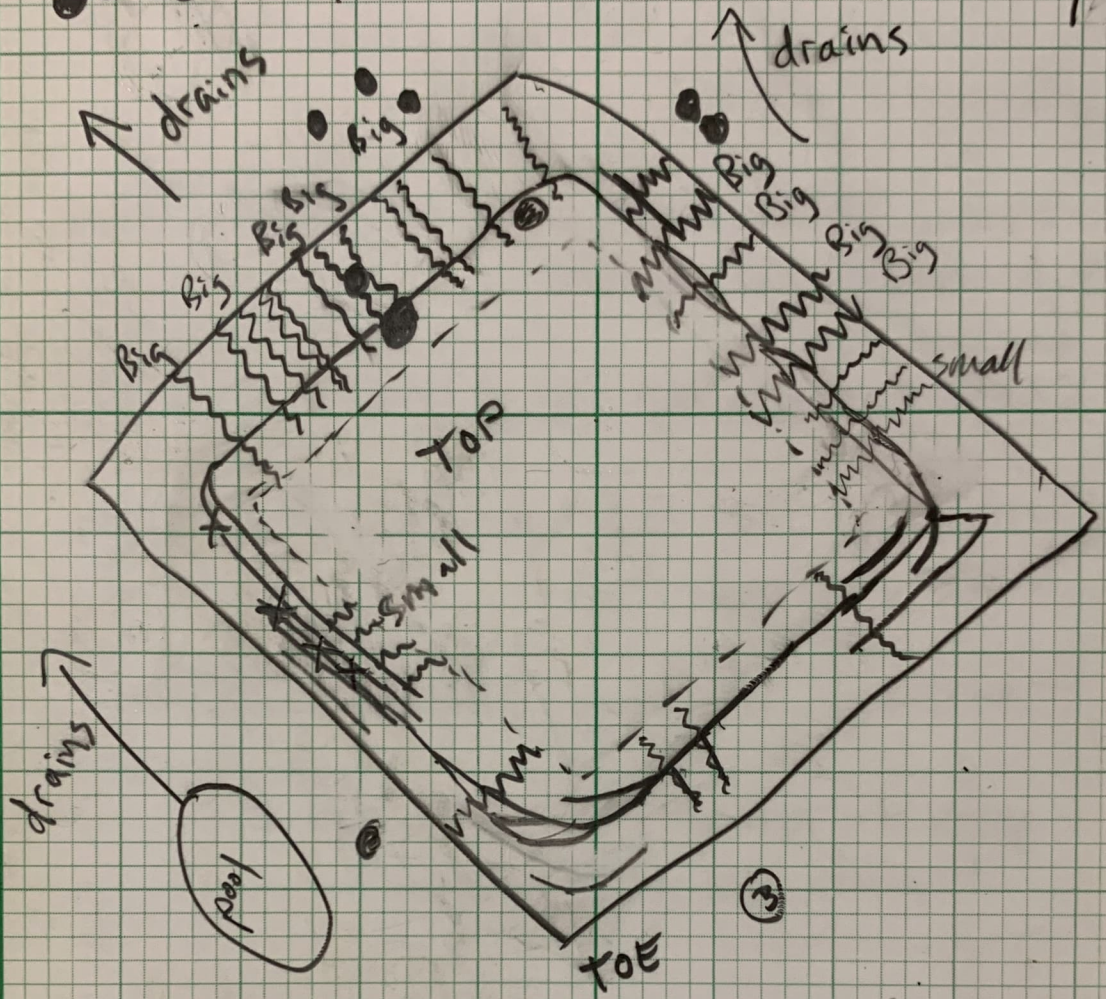
Project Daily Photo Record

Photograph 5: Ground very soft and muddy, field team sunk deeper as work continued around MW#3, boots often stuck.

Photograph 6: GPS survey of the landfill.

CAM D SEPT 10, 2024 rainy, windy

● - debris X - burrow



- NE slope has many small to medium sized erosion channels all draining to the North
- NW slope has many medium sized erosion channels all draining to the NW
- tension crack development is higher from 2nd half of NE slope, around N corner and along 1st half of NW slope (↱ ccw ↰)
  - ↳ max 30 cm deep, 30 cm wide
- 4 burrow in SW slope, evidence of shallow slough (many condensed tension cracks 10 - 20 cm wide)
- top has no debris, no cracks, some light veg and animal droppings

- MW01 shows signs of heave (10cm)
  ↳ bentonite seal was exposed

- ring tension crack is between 4-5m from top/crest of NHWL

- MW04 and MW03 show signs of heave (10cm)
  ↳ bentonite seal exposed

- caribou tracks @ MW03

- wind up to 55+ kmh after 3pm
  ↳ very rainy

- onsite 11:30am / offsite 5:45pm

- gusts to 70 kmh, 8°C down to 2°C
  ↳ pilots said after shift

CAM-D

SEPT. 10, 2024

MW #1

→ CASING HAS HEAVED, BENTONITE EXPOSED AT BASE, SAND IN CASING COVERING WELL PLUG, DUG OUT PRIOR TO OPENING PLUG, PUDDLES SURROUNDING BASE OF CASING

→ GROUND TO TOC: 38.5 IN

→ TOC DOWN TO PLUG: 9 IN

→ DEPTH TO WATER: 0.95m

→ DEPTH TO BOTTOM: 2.49m (measured from TOC)

MW#1

INITIAL WATER LEVEL: 0.95m

WATER LEVEL (m)	TEMP (°C)	pH	ORP (mV)	(mS/cm)	NTU
~~0.65~~	~~7.96~~	~~150~~			
1.11	6.63	7.96	151	0.466	24.4
1.23	6.40	7.96	145	1.08	25
1.30	5.64	7.99	141	1.53	23.3
1.42	6.07	7.65	149	0.889	23.0

DO %	TIME
10.5	14:02
0.0	14:08
0.0	14:16
0.0	14:20

MW#3

→ DEPTH TO WATER: 0.99m

→ DEPTH TO BOTTOM: 2.59m

→ STICK UP: 38.5 IN

→ TOC TO PLUG: 4 IN

→ CASING HEAVED, BENTONITE EXPOSED

Appendix D – Groundwater Tables

TABLE D-0

Groundwater Sampling Field Data

CAM-D
Year 13 2024

Aquatics Monitoring							
Time	**Temperature (°C)**	**pH**	**ORP (mV)**	**Conductivity (mS/cm)**	**NTU**	**DO (%)**	**Water Level (m)**
MW01							
14:02	6.63	7.96	151	0.466	24.4	10.5	1.11
14:08	6.4	7.96	145	1.08	25.0	0.0 *	1.13
14:16	5.64	7.99	141	1.53	23.3	0.0 *	1.30
14:20	6.07	7.65	149	0.889	23.0	0.0 *	1.42
Low-flow sampling terminated due to deteriorating weather conditions limiting time on site.							
MW02							
Not sampled; limited time on site due to weather.							
MW03							
Low-flow sampling not performed due to weather conditions limiting time on site.							
MW04							
Not sampled; limited time on site due to weather.							

Depth to Water (m)	**Depth to Bottom (m)**	**Stick Up (m)**
MW01		
0.95	2.49	0.98
MW02		
-	-	-
MW03		
0.99	2.59	0.98
MW04		
-	-	-

Notes:
Depth to Water - Depth from top of casing to top of water surface
Depth to Bottom - Depth from top of casing to bottom of well
Stick Up - Height of well casing from ground surface to top of casing
ORP - Oxidative-Reduction Potential
NTU - Nephelometric Turbidity Units
ODO - Optical Dissolved Oxygen
mTOC - Distance (metres) from top of casing (TOC) down into well
* - erronious reading, likely instrumentation malfunction

TABLE D-1

CAM-D
Year 13 2024

In-situ Field Parameters from Groundwater Monitoring Wells

Parameter	Units	MW01	MW02	MW03	MW04
		10-Sep-24	10-Sep-24	10-Sep-24	10-Sep-24
Field Parameters		Year 13	Year 13	Year 13	Year 13
Depth to Water	mTOC	0.95	-	0.99	-
Depth to Bottom	mTOC	2.49	-	2.59	-
Stick Up	mTOC	0.98	-	0.98	-
Temperature	ºC	6.19	-	-	-
Conductivity	µS/cm	0.991	-	-	-
pH	-	7.89	-	-	-
ORP	mV	147	-	-	-
NTU	NTU	23.9	-	-	-
Dissolved Oxygen	%	10.5	-	-	-
Water Level	mTOC	1.24	-	-	-

Notes:
Depth to Water - Depth from top of casing to top of water surface
Depth to Bottom - Depth from top of casing to bottom of well
Stick Up - Height of well casing from ground surface to top of casing
ORP - Oxidative-Reduction Potential
NTU - Nephelometric Turbidity Units
ODO - Optical Dissolved Oxygen
mTOC - Distance (metres) from top of casing (TOC) down into well

Comments:
MW01 - Low-flow sampling terminated due to deteriorating weather conditions limiting time on site.
MW02 - Not sampled; limited time on site due to weather.
MW03 - Low-flow sampling not performed due to weather conditions limiting time on site.
MW04 - Not sampled; limited time on site due to weather.

TABLE D-2

CAM-D

Year 13 2024

General Chemistry of Groundwater Monitoring Wells

Parameter	Units	RDL	Reference Criteria (ULA)	MW01	MW02	MW03	MW03 - DUP	MW04
				10-Sep-24	10-Sep-24	10-Sep-24	10-Sep-24	10-Sep-24
General Chemistry				Year 13	Year 13	Year 13	Year 13	Year 13
Physical Tests								
Conductivity	µS/cm	2	5142	1800	-	1400	1400	-
Hardness (as CaCO3), dissolved	mg/L	0.5	976	330	-	420	400	-
pH	pH units	0.1	8.67	8.25	-	8.15	8.1	-
Total Suspended Solids (TSS)	mg/L	1	64.8	8.7	-	15	18	-
Total Dissolved Solids (TDS), calculated	mg/L	10	3755	1100	-	880	880	-
Anions and Nutrients								
Chloride	mg/L	1.0	262	120	-	110	110	-
Fluoride	-	-	1.69		-			-
Nitrate (as N)	mg/L	0.01	2.92	0.33	-	0.73	0.69	-
Nitrate + Nitrite (as N)	mg/L	0.01	-	0.33	-	0.73 (1)	0.69 (1)	-
Nitrite (as N)	mg/L	0.01	11.78	<0.010	-	<0.020 (1)	<0.020 (1)	-
Sulphate (as SO4)	mg/L	5.0	2085	400	-	260	260	-
Alkalinity								
Bicarbonate (as HCO3)	mg/L	1.0	-	330	-	380	380	-
Carbonate (as CO3)	mg/L	1.0	-	<1.0	-	<1.0	<1.0	-
Hydroxide (as OH)	mg/L	1.0	-	<1.0	-	<1.0	<1.0	-
Total (as CaCO3)	mg/L	1.0	-	270	-	310	310	-
Ion Balance								
Anion Sum	meq/L	-	-	17	-	15	15	-
Cation Sum	meq/L	-	-	19	-	16	16	-
Ion Balance (% Difference)	%	-	-	6	-	4.6	4.1	-

Notes:

MW02 and MW04 were not sampled; limited time on site due to poor weather conditions.

(1) Detection limits raised due to matrix interference.

Reference Criteria - Site-specific Upper Limit of Acceptability (ULA)

ULA - Upper Limit of Acceptability; calculated using the average + three times (x3) standard deviations of all available data & only calculated for parameters that had three or more data points with detectable concentrations.

RDL - Reported Detection Limit, which may vary between sample locations and events

Exceeds Reference Criteria
Detection Limit Exceeds Reference Criteria

TABLE D-3

CAM-D

Year 13 2024

Total and Dissolved Metals of Groundwater Wells

Parameter	Units	RDL	Reference Criteria (ULA)	MW01	MW02	MW03	MW03 - DUP	MW04
				10-Sep-2024	10-Sep-2024	10-Sep-2024	10-Sep-2024	10-Sep-2024
Metals				Year 13	Year 13	Year 13	Year 13	Year 13
Total Metals								
Aluminum, total	mg/L	0.0030	5.88	0.7	-	0.48	0.6	-
Antimony, total	mg/L	0.00060	0.0020	0.00071	-	0.00099	0.0011	-
Arsenic, total	mg/L	0.00020	0.0047	0.0016	-	0.0011	0.0013	-
Barium, total	mg/L	0.010	0.0631	0.017	-	0.035	0.033	-
Beryllium, total	mg/L	0.0010	0.0001	<0.0010	-	<0.0010	<0.0010	-
Boron, total	mg/L	0.020	0.104	0.071	-	0.064	0.063	-
Cadmium, total	mg/L	0.000005	0.0009	0.0000247	-	-	-	-
Calcium, total	mg/L	0.30	172	58	-	59	52	-
Chromium, total	mg/L	0.0010	0.00640	<0.0010	-	0.0045	0.005	-
Cobalt, total	mg/L	0.00030	0.0017	0.00031	-	<0.00030	<0.00030	-
Copper, total	mg/L	0.0010	0.0499	0.0091	-	0.0087	0.0082	-
Iron, total	mg/L	0.060	4.52	0.47	-	0.36	0.3	-
Lead, total	mg/L	0.00020	0.00385	0.00041	-	0.001	0.0014	-
Lithium, total	mg/L	0.020	0.190	0.06	-	0.061	0.052	-
Magnesium, total	mg/L	0.20	141.3	51	-	55	55	-
Manganese, total	mg/L	0.0040	1.011	0.056	-	0.023	0.024	-
Molybdenum, total	mg/L	0.00020	0.094	0.038	-	0.013	0.015	-
Nickel, total	mg/L	0.00050	0.0434	0.01	-	0.0054	0.0057	-
Phosphorus, total	mg/L	0.10	-	<0.10	-	<0.10	<0.10	-
Potassium, total	mg/L	0.30	41.1	21	-	22	19	-
Selenium, total	mg/L	0.00020	0.0051	0.00096	-	0.00038	0.00055	-
Silicon, total	mg/L	0.50	8.55	5.7	-	4.4	3.9	-
Silver, total	mg/L	0.00010	0.000012	<0.00010	-	<0.00010	<0.00010	-
Sodium, total	mg/L	0.50	1005	300	-	170	160	-
Strontium, total	mg/L	0.020	0.844	0.38	-	0.31	0.31	-
Sulfur, total	mg/L	0.20	677	150	-	82	81	-
Thallium, total	mg/L	0.00020	0.0001	<0.00020	-	<0.00020	<0.00020	-
Tin, total	mg/L	0.0010	0.0003	<0.0010	-	<0.0010	<0.0010	-
Titanium, total	mg/L	0.0010	0.290	0.019	-	0.015	0.016	-
Uranium, total	mg/L	0.00010	0.3560	0.13	-	0.04	0.04	-
Vanadium, total	mg/L	0.0010	0.01016	<0.0010	-	0.001	0.001	-
Zinc, total	mg/L	0.0030	0.0171	0.0055	-	0.0078	0.011	-

TABLE D-3

CAM-D

Year 13 2024

Total and Dissolved Metals of Groundwater Wells

Parameter	Units	RDL	Reference Criteria (ULA)	MW01	MW02	MW03	MW03 - DUP	MW04
				10-Sep-2024	10-Sep-2024	10-Sep-2024	10-Sep-2024	10-Sep-2024
Metals				Year 13	Year 13	Year 13	Year 13	Year 13
Dissolved Metals								
Aluminum, Dissolved	mg/L	0.0030	2.46	0.0093	-	0.0061	0.0064	-
Antimony, Dissolved	mg/L	0.00060	0.00195	<0.00060	-	<0.00060	<0.00060	-
Arsenic, Dissolved	mg/L	0.00020	0.00423	0.0012	-	0.00096	0.0011	-
Barium, Dissolved	mg/L	0.010	0.0579	0.014	-	0.036	0.035	-
Beryllium, Dissolved	mg/L	0.0010	-	<0.0010	-	<0.0010	<0.0010	-
Boron, Dissolved	mg/L	0.020	0.105	0.055	-	0.052	0.055	-
Cadmium, Dissolved	mg/L	0.000005	0.000210	0.0000258	-	-	-	-
Calcium, Dissolved	mg/L	0.30	168.6	55	-	71	73	-
Chromium, Dissolved	mg/L	0.0010	0.00445	<0.0010	-	<0.0010	<0.0010	-
Cobalt, Dissolved	mg/L	0.00030	0.00111	<0.00030	-	<0.00030	<0.00030	-
Copper, Dissolved	mg/L	0.0010	0.04036	0.009	-	0.0067	0.0069	-
Iron, Dissolved	mg/L	0.060	2.24	<0.060	-	<0.060	<0.060	-
Lead, Dissolved	mg/L	0.00020	0.0036	<0.00020	-	<0.00020	<0.00020	-
Lithium, Dissolved	mg/L	0.020	0.1868	0.059	-	0.054	0.056	-
Magnesium, Dissolved	mg/L	0.20	142.2	48	-	58	53	-
Manganese, Dissolved	mg/L	0.0040	0.939	0.027	-	<0.0040	<0.0040	-
Molybdenum, Dissolved	mg/L	0.00020	0.0935	0.036	-	0.011	0.011	-
Nickel, Dissolved	mg/L	0.00050	0.03541	0.0096	-	0.0032	0.0032	-
Phosphorus, Dissolved	mg/L	0.10	-	<0.10	-	<0.10	<0.10	-
Potassium, Dissolved	mg/L	0.30	41.6	20	-	20	21	-
Selenium, Dissolved	mg/L	0.00020	0.00596	0.00093	-	0.00034	0.00033	-
Silicon, Dissolved	mg/L	0.50	7.60	3.2	-	3.1	3.2	-
Silver, Dissolved	mg/L	0.00010	-	<0.00010	-	<0.00010	<0.00010	-
Sodium, Dissolved	mg/L	0.50	1023	280	-	170	170	-
Strontium, Dissolved	mg/L	0.020	0.884	0.35	-	0.34	0.34	-
Sulfur, Dissolved	mg/L	0.20	678.2	150	-	81	99	-
Thallium, Dissolved	mg/L	0.00020	0.00013	<0.00020	-	<0.00020	<0.00020	-
Tin, Dissolved	mg/L	0.0010	-	<0.0010	-	<0.0010	<0.0010	-
Titanium, Dissolved	mg/L	0.0010	0.1318	<0.0010	-	<0.0010	<0.0010	-
Uranium, Dissolved	mg/L	0.00010	0.3459	0.13	-	0.043	0.043	-
Vanadium, Dissolved	mg/L	0.0010	0.0044	<0.0010	-	<0.0010	<0.0010	-
Zinc, Dissolved	mg/L	0.0030	0.0151	0.0033	-	<0.0030	<0.0030	-

Notes:

MW02 and MW04 were not sampled; limited time on site due to poor weather conditions.

Reference Criteria - Site-specific Upper Limit of Acceptability (ULA)

ULA - Upper Limit of Acceptability; calculated using the average + three times (x3) standard deviations of all available data & only calculated for parameters that had three or more data points with detectable concentrations.

RDL - Reported Detection Limit, which may vary between sample locations and events

Exceeds Reference Criteria
Detection Limit Exceeds Reference Criteria

TABLE D-4

CAM-D

Year 13 2024

Petroleum Hydrocarbons of Groundwater Wells

Parameter	Units	RDL	Reference Criteria (ULA)	MW01	MW02	MW03	MW03 - DUP	MW04
				10-Sep-2024	10-Sep-2024	10-Sep-2024	10-Sep-2024	10-Sep-2024
Petroleum Hydrocarbons (PHCs)				Year 13	Year 13	Year 13	Year 13	Year 13
Volatile Organic Compounds (VOCs) - BTEX								
Benzene	µg/L	0.40	All < RDL	<0.40	-	<0.40	<0.40	-
Toluene	µg/L	0.40	All < RDL	<0.40	-	<0.40	<0.40	-
Ethylbenzene	µg/L	0.40	All < RDL	<0.40	-	<0.40	<0.40	-
Xylene, m+p-	µg/L	0.80	All < RDL	<0.80	-	<0.80	<0.80	-
Xylene, o-	µg/L	0.40	All < RDL	<0.40	-	<0.40	<0.40	-
Xylenes, total	µg/L	0.89	All < RDL	<0.89	-	<0.89	<0.89	-
Hydrocarbons								
F1-BTEX	µg/L	100	All < RDL	<100	-	<100	<100	-
F1 (C6-C10)	µg/L	100	All < RDL	<100	-	<100	<100	-
F2 (C10-C16)	mg/L	0.10	All < RDL	<0.10	-	<0.10	<0.10	-

Notes:

MW02 and MW04 were not sampled; limited time on site due to poor weather conditions.

Reference criteria - Site-specific Upper Limit of Acceptability (ULA)

ULA - Upper Limit of Acceptability; calculated using the average + three times (x3) standard deviations of all available data & only calculated for parameters that had three or more data points with detectable concentrations.

RDL - Reported Detection Limit, which may vary between sample locations and events

TABLE D-5

CAM-D

Year 13 2024

Polychlorinated Biphenyls of Groundwater Wells

Parameter	Units	RDL	Reference Criteria (ULA)	MW01	MW02	MW03	MW03 - DUP	MW04
				10-Sep-2024	10-Sep-2024	10-Sep-2024	10-Sep-2024	10-Sep-2024
Polychlorinated Biphenyls (PCBs)				Year 13	Year 13	Year 13	Year 13	Year 13
PCBs								
Aroclor 1016	mg/L	0.000050	all < RDL	<0.000050	-	<0.000050	<0.000050	-
Aroclor 1221	mg/L	0.000050	all < RDL	<0.000050	-	<0.000050	<0.000050	-
Aroclor 1232	mg/L	0.000050	all < RDL	<0.000050	-	<0.000050	<0.000050	-
Aroclor 1242	mg/L	0.000050	all < RDL	<0.000050	-	<0.000050	<0.000050	-
Aroclor 1248	mg/L	0.000050	all < RDL	<0.000050	-	<0.000050	<0.000050	-
Aroclor 1254	mg/L	0.000050	all < RDL	<0.000050	-	<0.000050	<0.000050	-
Aroclor 1260	mg/L	0.000050	all < RDL	<0.000050	-	<0.000050	<0.000050	-
Aroclor 1262	mg/L	0.000050	all < RDL	<0.000050	-	<0.000050	<0.000050	-
Aroclor 1268	mg/L	0.000050	all < RDL	<0.000050	-	<0.000050	<0.000050	-
Total PCBs	mg/L	0.000050	all < RDL	<0.000050	-	<0.000050	<0.000050	-

Notes:

MW02 and MW04 were not sampled; limited time on site due to poor weather conditions.

Reference criteria - Site-specific Upper Limit of Acceptability (ULA)

ULA - Upper Limit of Acceptability; calculated using the average + three times (x3) standard deviations of all available data & only calculated for parameters that had three or more data points with detectable concentrations.

RDL - Reported Detection Limit, which may vary between sample locations and events

TABLE D-6

CAM-D

Year 13 2024

QA/QC of Groundwater Wells

Parameter	Units	RDL	MW03	MW03-DUP	RPD	Trip Blank
			10-Sep-2024	10-Sep-2024		10-Sep-2024
QA/QC			Year 13	Year 13		Year 13
General Chemistry						
Physical Tests						
Conductivity	µS/cm	2.0	1400	1400	0.00%	<2.0
Hardness (as CaCO3), dissolved	mg/L	0.50	420	400	4.88%	<0.50
pH	pH units	N/A	8.15	8.1	0.62%	5.01
Total Suspended Solids (TSS)	mg/L	1.0	15	18	18.18%	<1.0
Total Dissolved Solids (TDS), calculated	mg/L	10	880	880	0.00%	<10
Anions and Nutrients						
Chloride	mg/L	0.50	110	110	0.00%	<1.0
Nitrate (as N)	mg/L	0.020	0.73	0.69	5.63%	<0.010
Nitrate + Nitrite (as N)	mg/L	0.0500	0.73 (1)	0.69 (1)	5.63%	<0.010
Nitrite (as N)	mg/L	0.010	<0.020 (1)	<0.020 (1)	N/A	<0.010
Sulfate (as SO4)	mg/L	0.30	260	260	0.00%	<1.0
Alkalinity						
Bicarbonate (as HCO3)	mg/L	1.0	380	380	0.00%	<1.0
Carbonate (as CO3)	mg/L	1.0	<1.0	<1.0	N/A	<1.0
Hydroxide (as OH)	mg/L	1.0	<1.0	<1.0	N/A	<1.0
Total (as CaCO3)	mg/L	2.0	310	310	0.00%	<1.0
Ion Balance						
Anion sum	meq/L	0.10	15	15	0.00%	0.0000
Cation sum	meq/L	0.10	16	16	0.00%	0.010
Ion Balance (% Difference)	%	-	4.6	4.1	11.49%	NC

TABLE D-6

CAM-D

Year 13 2024

QA/QC of Groundwater Wells

Parameter	Units	RDL	MW03	MW03-DUP	RPD	Trip Blank
			10-Sep-2024	10-Sep-2024		10-Sep-2024
QA/QC			Year 13	Year 13		Year 13
Metals						
Total Metals						
Aluminum, total	mg/L	0.0030	0.48	0.6	22.22%	0.0031
Antimony, total	mg/L	0.00060	0.00099	0.0011	10.53%	<0.00060
Arsenic, total	mg/L	0.00020	0.0011	0.0013	16.67%	<0.00020
Barium, total	mg/L	0.010	0.035	0.033	5.88%	<0.010
Beryllium, total	mg/L	0.0010	<0.0010	<0.0010	N/A	<0.0010
Boron, total	mg/L	0.020	0.064	0.063	1.57%	<0.020
Cadmium, total	mg/L	0.000005	-	-	N/A	<0.000005
Calcium, total	mg/L	0.30	59	52	12.61%	<0.30
Chromium, total	mg/L	0.0010	0.0045	0.005	10.53%	<0.0010
Cobalt, total	mg/L	0.00030	<0.00030	<0.00030	N/A	<0.00030
Copper, total	mg/L	0.0010	0.0087	0.0082	5.92%	<0.0010
Iron, total	mg/L	0.060	0.36	0.3	18.18%	<0.060
Lead, total	mg/L	0.00020	0.001	0.0014	33.33%	<0.00020
Lithium, total	mg/L	0.020	0.061	0.052	15.93%	<0.020
Magnesium, total	mg/L	0.20	55	55	0.00%	<0.20
Manganese, total	mg/L	0.0040	0.023	0.024	4.26%	<0.0040
Molybdenum, total	mg/L	0.00020	0.013	0.015	14.29%	<0.00020
Nickel, total	mg/L	0.00050	0.0054	0.0057	5.41%	<0.00050
Phosphorus, total	mg/L	0.10	<0.10	<0.10	N/A	<0.10
Potassium, total	mg/L	0.30	22	19	14.63%	<0.30
Selenium, total	mg/L	0.00020	0.00038	0.00055	36.56%	<0.00020
Silicon, total	mg/L	0.50	4.4	3.9	12.05%	<0.50
Silver, total	mg/L	0.00010	<0.00010	<0.00010	N/A	<0.00010
Sodium, total	mg/L	0.50	170	160	6.06%	<0.50
Strontium, total	mg/L	0.020	0.31	0.31	0.00%	<0.020
Sulfur, total	mg/L	0.20	82	81	1.23%	<0.20
Thallium, total	mg/L	0.00020	<0.00020	<0.00020	N/A	<0.00020
Tin, total	mg/L	0.0010	<0.0010	<0.0010	N/A	<0.0010
Titanium, total	mg/L	0.0010	0.015	0.016	6.45%	<0.0010
Uranium, total	mg/L	0.00010	0.04	0.04	0.00%	<0.00010
Vanadium, total	mg/L	0.0010	0.001	0.001	0.00%	<0.0010
Zinc, total	mg/L	0.0030	0.0078	0.011	34.04%	<0.0030

TABLE D-6

CAM-D

Year 13 2024

QA/QC of Groundwater Wells

Parameter	Units	RDL	MW03	MW03-DUP	RPD	Trip Blank
			10-Sep-2024	10-Sep-2024		10-Sep-2024
QA/QC			Year 13	Year 13		Year 13
Dissolved Metals						
Aluminum, total	mg/L	0.0030	0.0061	0.0064	4.80%	N/A
Antimony, total	mg/L	0.00060	<0.00060	<0.00060	N/A	N/A
Arsenic, total	mg/L	0.00020	0.00096	0.0011	13.59%	N/A
Barium, total	mg/L	0.010	0.036	0.035	2.82%	N/A
Beryllium, total	mg/L	0.0010	<0.0010	<0.0010	N/A	N/A
Boron, total	mg/L	0.020	0.052	0.055	5.61%	N/A
Cadmium, total	mg/L	0.000005	-	-	N/A	<0.000005
Calcium, total	mg/L	0.30	71	73	2.78%	N/A
Chromium, total	mg/L	0.0010	<0.0010	<0.0010	N/A	N/A
Cobalt, total	mg/L	0.00030	<0.00030	<0.00030	N/A	N/A
Copper, total	mg/L	0.0010	0.0067	0.0069	2.94%	N/A
Iron, total	mg/L	0.060	<0.060	<0.060	N/A	N/A
Lead, total	mg/L	0.00020	<0.00020	<0.00020	N/A	N/A
Lithium, total	mg/L	0.020	0.054	0.056	3.64%	N/A
Magnesium, total	mg/L	0.20	58	53	9.01%	N/A
Manganese, total	mg/L	0.0040	<0.0040	<0.0040	N/A	N/A
Molybdenum, total	mg/L	0.00020	0.011	0.011	0.00%	N/A
Nickel, total	mg/L	0.00050	0.0032	0.0032	0.00%	N/A
Phosphorus, total	mg/L	0.10	<0.10	<0.10	N/A	N/A
Potassium, total	mg/L	0.30	20	21	4.88%	N/A
Selenium, total	mg/L	0.00020	0.00034	0.00033	2.99%	N/A
Silicon, total	mg/L	0.50	3.1	3.2	3.17%	N/A
Silver, total	mg/L	0.00010	<0.00010	<0.00010	N/A	N/A
Sodium, total	mg/L	0.50	170	170	0.00%	N/A
Strontium, total	mg/L	0.020	0.34	0.34	0.00%	N/A
Sulfur, total	mg/L	0.20	81	99	20.00%	N/A
Thallium, total	mg/L	0.00020	<0.00020	<0.00020	N/A	N/A
Tin, total	mg/L	0.0010	<0.0010	<0.0010	N/A	N/A
Titanium, total	mg/L	0.0010	<0.0010	<0.0010	N/A	N/A
Uranium, total	mg/L	0.00010	0.043	0.043	0.00%	N/A
Vanadium, total	mg/L	0.0010	<0.0010	<0.0010	N/A	N/A
Zinc, total	mg/L	0.0030	<0.0030	<0.0030	N/A	N/A

TABLE D-6

CAM-D

Year 13 2024

QA/QC of Groundwater Wells

Parameter	Units	RDL	MW03	MW03-DUP	RPD	Trip Blank
			10-Sep-2024	10-Sep-2024		10-Sep-2024
QA/QC			Year 13	Year 13		Year 13
PHCs						
Volatile Organic Compounds (VOCs) - BTEX						
Benzene	µg/L	0.40	<0.40	<0.40	N/A	<0.40
Toluene	µg/L	0.40	<0.40	<0.40	N/A	<0.40
Ethylbenzene	µg/L	0.40	<0.40	<0.40	N/A	<0.40
Xylene, m+p-	µg/L	0.80	<0.80	<0.80	N/A	<0.80
Xylene, o-	µg/L	0.40	<0.40	<0.40	N/A	<0.40
Xylenes, total	µg/L	0.89	<0.89	<0.89	N/A	<0.89
Hydrocarbons						
F1-BTEX	µg/L	100	<100	<100	N/A	<100
F1 (C6-C10)	µg/L	100	<100	<100	N/A	<100
F2 (C10-C16)	mg/L	0.10	<0.10	<0.10	N/A	<0.10
PCBs						
Aroclor 1016	mg/L	0.000050	<0.000050	<0.000050	N/A	<0.000050
Aroclor 1221	mg/L	0.000050	<0.000050	<0.000050	N/A	<0.000050
Aroclor 1232	mg/L	0.000050	<0.000050	<0.000050	N/A	<0.000050
Aroclor 1242	mg/L	0.000050	<0.000050	<0.000050	N/A	<0.000050
Aroclor 1248	mg/L	0.000050	<0.000050	<0.000050	N/A	<0.000050
Aroclor 1254	mg/L	0.000050	<0.000050	<0.000050	N/A	<0.000050
Aroclor 1260	mg/L	0.000050	<0.000050	<0.000050	N/A	<0.000050
Aroclor 1262	mg/L	0.000050	<0.000050	<0.000050	N/A	<0.000050
Aroclor 1268	mg/L	0.000050	<0.000050	<0.000050	N/A	<0.000050
Polychlorinated Biphenyls (PCBs), total	mg/L	0.000050	<0.000050	<0.000050	N/A	<0.000050

Notes:

(1) Detection limits raised due to matrix interference.

RDL - Reported Detection Limit

RPD - Relative Percent Difference

NC - Not Calculated

N/A - Not Applicable

RPD > 50%

TABLE D-7

Historical General Chemistry of Groundwater Wells

CAM-D
Year 13 2024

AECOM

Parameter	Units	RDL	Criteria 1 FCSAP-TI-Coarse-RP	MW01 - 2012	MW01 - 2014	MW01 - 2016	MW01 - 2020	MW01 - 2022	MW02 - 2014	MW02 - 2016	MW02 - 2020	MW02 - 2022	MW03 - 2012	MW03 - 2014	MW03 - 2016	MW03 - 2020	MW03 - 2022	MW04 - 2012	MW04 - 2014	MW04 - 2016	MW04 - 2020	MW04 - 2022	Average	Standard Deviation	ULA
				Franz	Franz	Arcadis	BluMetric	AECOM	Franz	Arcadis	BluMetric	AECOM	Franz	Franz	Arcadis	BluMetric	AECOM	Franz	Franz	Arcadis	BluMetric	AECOM			
				8-Jul-12	23-Aug-14	20-Aug-16	28-Aug-20	6-Aug-22	23-Aug-14	19- Aug-16	28-Aug-20	6-Aug-22	7-Aug-12	23-Aug-14	19-Aug-16	28-Aug-20	6-Aug-22	7-Aug-12	23-Aug-14	19-Aug-16	28-Aug-20	6-Aug-22			
Historical General Chemistry																									
Conductivity	uS/cm	2	-	3000	4600	4400	2830	2300	1200	1400	1110	1310	2100	2000	1800	1930	1660	1300	1500	990	1170	1150	1987	1052	5142
Hardness (as CaCO3)	mg/L	0.5	-	630		430	408	406		640	523	736	560		410	608	553	380		110	243	238	458	172	976
pH	-	0.1	6.5-9	7.98	8.16	7.96	8.1	7.91	7.91	7.6	7.59	7.27	7.85	7.93	7.86	7.83	7.49	7.43	7.9	8.47	7.87	7.88	8	0	8.67
Total Suspended Solids	mg/L	3	-	<10	14	8	6.9	22.8	<10	4	<3.0	<3.0	15	<10	21	13.1	3.4	<10	<10	61	16.5	<3.0	17	16	64.8
Total Dissolved Solids	mg/L	13	-	2210	3420	3100	1980	1620	802	870	743	960	1410	1350	1200	1230	1110	888	956	590	719	710	1361	798	3755
Bromide (Br)	mg/L	0.05	-				<1.0				<0.25					0.75					0.3		-	0	-
Chloride (Cl)	mg/L	0.5	120	160	140	110	119	114	44	65	52.5	110	170	180	190	200	147	59	120	130	90.9	135	123	46	262
Fluoride (F)	mg/L	0.02	0.12	1.07	0.7	0.64	0.86	0.599	0.41	0.93	0.72	0.341	1.29	0.67	1.4	0.79	0.524	0.31	0.34	1.1	0.5	0.835	1	0	1.69
Nitrate (as N)	mg/L	0.005	13	0.1	0.021	<0.010	0.44	0.223	<0.010	<0.010	1.31	2.48	0.054	0.036	0.054	0.221	2.14	<0.010	0.014	0.077	0.455	0.023	1	1	2.92
Nitrite (as N)	mg/L	0.001	0.06	0.48	0.31	1.3	<0.020	<0.010	11.9	0.24	<0.0050	0.03	0.57	3.13	0.31	<0.010	<0.010	0.44	2.51	0.33	<0.0050	<0.010	2	3	11.78
Sulfate (SO4)	mg/L	0.3	100	1100	1700	1900	1020	679	190	310	248	178	550	430	420	422	351	390	380	190	275	204	576	503	2085

Notes:
RDL - Refers to laboratory detection limit.
ULA - Upper Limit of Acceptability; calculated using the average + three (3) standard deviations of all available data. Only calculated for parameters with three or more data points of detectable concentrations.
No groundwater data is available for 2018, all monitoring wells were frozen.

Exceeds Reference Criteria
Detection Limit Exceeds Reference Criteria

TABLE D-8

Historical Metals Concentrations of Groundwater Wells

CAM-D
Year 13 2024

AECOM

Parameter	Units	RDL	Criteria 1 FCSAP-TI-Coarse-RP	MW01 - 2012	MW01 - 2014	MW01 - 2016	MW01 - 2020	MW01 - 2022	MW02 - 2014	MW02-2016	MW02 - 2020	MW02 - 2022	MW03-2012	MW03-2014	MW03-2016	MW03 - 2020	MW03 - 2022	MW04-2012	MW04-2014	MW04-2016	MW04 - 2020	MW04 - 2022	Average	Standard Deviation	ULA
				Franz	Franz	Arcadis	BluMetric	AECOM	Franz	Arcadis	BluMetric	AECOM	Franz	Franz	Arcadis	BluMetric	AECOM	Franz	Franz	Arcadis	BluMetric	AECOM			
Metals				8-Jul-12	23-Aug-14	20-Aug-16	28-Aug-20	6-Aug-22	23-Aug-14	19-Aug-16	28-Aug-20	6-Aug-22	7-Aug-12	23-Aug-14	19-Aug-16	28-Aug-20	6-Aug-22	7-Aug-12	23-Aug-14	19-Aug-16	28-Aug-20	6-Aug-22			
Total Metals																									
Aluminum, total	mg/L	0.003	0.1			0.022	0.155	0.35		0.063	0.0183	0.0214			1.2	0.187	0.0998			5.9	1.73	0.392	0.845	1.68	5.88
Antimony, total	mg/L	0.0001	2			0.0016	0.00106	0.00079		<0.00060	0.00031	0.00043			<0.00060	0.00026	0.00034			<0.00060	0.0004	0.00025	0.0006	0.0005	0.0020
Arsenic, total	mg/L	0.0001	0.005	0.0037	0.0042	0.0026	0.00202	0.00141	0.00052	0.00041	0.00041	0.00046	0.0016	0.0011	0.0017	0.00094	0.00087	0.00044	0.00072	0.0016	0.00073	0.00159	0.0014	0.0011	0.0047
Barium, total	mg/L	0.0001	0.5			0.011	0.013	0.0119		0.011	0.0263	0.038			0.039	0.0288	0.034			0.039	0.0421	0.0257	0.0267	0.0122	0.0631
Beryllium, total	mg/L	0.0001	0.0053			<0.0010	<0.00010	0.00005		<0.0010	<0.00010	0.00003			<0.0010	<0.00010	0.000043			<0.0010	<0.00010	0.000036	0.000040	0.000009	0.000066
Bismuth, total	mg/L	0.00005					0.000299	0.000158			<0.000050	<0.000050				<0.000050	<0.000050				<0.000050	<0.000050	-	-	-
Boron, total	mg/L	0.01	1.5			0.073	0.06	0.065		0.049	0.036	0.034			0.067	0.071	0.052			0.063	0.084	0.06	0.060	0.015	0.104
Cadmium, total	mg/L	0.000005	0.00009	0.00018	0.00023	0.000043	0.000126	0.0000504	0.00003	0.000026	0.0000284	0.0000511	0.0011	0.000053	<0.000020	0.000151	0.0000582	0.000075	0.000024	<0.000020	0.0000549	0.0000582	0.0001	0.0003	0.0009
Calcium, total	mg/L	0.05				67	58.6	64.5		96	83	151			60	90.9	96.6			26	52.6	41.5	74.0	32.6	172
Cesium, total	mg/L	0.00001					0.000061	0.000065			<0.000010	0.000011				0.000023	0.000019				0.000118	0.000052	0.000050	0.000037	0.000161
Chromium, total	mg/L	0.0001	0.0089	0.0018	0.0029	0.0011	0.00221	0.00231	0.0011	<0.0010	0.00035	<0.00050	<0.001	0.0012	0.0029	0.00163	0.00056	<0.001	0.0011	0.0065	0.00216	0.00082	0.00191	0.00150	0.00640
Cobalt, total	mg/L	0.0001		0.00044	0.0012	0.00063	0.00039	0.00024	0.00044	0.00089	0.00027	0.0008	0.00044	0.00052	0.001	0.0003	0.00012	0.0005	<0.00030	0.0015	0.00034	0.00019	0.0006	0.0004	0.0017
Copper, total	mg/L	0.0005	hardness depend.	0.012	0.038	0.02	0.0107	0.00923	0.032	0.008	0.0103	0.0095	0.046	0.017	0.0071	0.0112	0.0102	0.024	0.013	0.013	0.00819	0.00462	0.0160	0.0113	0.0499
Iron, total	mg/L	0.01	0.3			<0.060	0.117	0.259		0.1	0.014	0.039	NA	NA	2	0.123	0.06			4.1	0.853	0.266	0.72	1.26	4.52
Lead, total	mg/L	0.00005	hardness depend.	0.0031	0.0029	0.00076	0.000357	0.000364	0.00073	0.0027	0.000337	0.000319	0.001	0.0004	0.00083	0.000366	0.000282	<0.0002	<0.00020	0.00092	0.000424	0.00018	0.00094	0.00097	0.00385
Lithium, total	mg/L	0.001				0.15	0.107	0.104		0.051	0.0352	0.0175			0.078	0.083	0.0484			0.029	0.0141	0.0218	0.062	0.043	0.190
Magnesium, total	mg/L	0.005				65	53.9	61.6		99	71.4	95			72	86	79.3			15	33.6	34.6	63.9	25.8	141.3
Manganese, total	mg/L	0.0001				0.078	0.0872	0.0178		0.73	0.117	0.806			0.11	0.084	0.0093			0.075	0.0205	0.0502	0.182	0.276	1.011
Mercury, total	mg/L	0.000005	0.000026			0.0000029	<0.0000050			0.0000028	<0.0000050				0.0000024	<0.0000050				<0.0000020	<0.0000050		0.0000027	0.0000003	0.0000035
Molybdenum, total	mg/L	0.00005	0.073			0.085	0.0451	0.0348		0.0093	0.00698	0.00591			0.036	0.0222	0.00961			0.0082	0.0162	0.0291	0.026	0.023	0.094
Nickel, total	mg/L	0.0005	hardness depend.	0.001	0.045	0.03	0.0159	0.0142	0.0058	0.0031	0.00449	0.0034	0.0036	0.018	0.012	0.00461	0.00337	0.0075	0.0038	0.0037	0.00353	0.00176	0.0097	0.0112	0.0434
Phosphorus, total	mg/L	0.05				<0.10	<0.050	<0.050		<0.10	<0.050	<0.050			<0.10	<0.050	<0.050			<0.10	<0.050	<0.050	-	-	-
Potassium, total	mg/L	0.05				18	20.6	21.4		9.5	9.14	9.45			29	30.6	22.5			23	20.2	22.8	19.7	7.1	41.1
Rubidium, total	mg/L	0.0002					0.00502	0.00515			0.00136	0.00116				0.00344	0.00196				0.0055	0.00422	0.0035	0.0018	0.0088
Selenium, total	mg/L	0.00005	0.001			0.0049	0.00156	0.00104		<0.00020	0.000216	0.000248			0.00039	0.00021	0.000261			0.00036	0.000145	0.000335	0.0009	0.0014	0.0051
Silicon, total	mg/L	0.1				4.9	4.84	4.98		2.8	3.71	3.36			4.5	3.51	3.93			7.6	5.68	2.46	4.36	1.40	8.55
Silver, total	mg/L	0.00001	0.00025			<0.00010	<0.000010	0.00001		<0.00010	<0.000010	0.00001			<0.00010	<0.000010	<0.000010			<0.00010	0.000011	<0.000010	0.000010	0.000001	0.000012
Sodium, total	mg/L	0.05				910	511	414		51	66.6	28.1			230	205	189			140	168	159	256.0	249.7	1005
Strontium, total	mg/L	0.0002				0.71	0.494	0.477		0.41	0.328	0.448			0.41	0.536	0.471			0.18	0.265	0.267	0.416	0.142	0.844
Sulfur, total	mg/L	0.5				620	350	300		110	92.4	69.1			150	161	139			61	106	77.4	186	164	677
Tellurium, total	mg/L	0.0002					<0.00020	<0.00020			<0.00020	<0.00020				<0.00020	<0.00020				<0.00020	<0.00020	-	-	-
Thallium, total	mg/L	0.00001	0.0008			<0.00020	0.000068	0.00007		<0.00020	0.000013	<0.000010			<0.00020	0.000081	0.000045			<0.00020	0.000061	0.00071	0.0001	0.0000	0.0001
Thorium, total	mg/L	0.0001					0.0001	0.00029			<0.00010	<0.00010				0.00012	<0.00010				0.0006	0.00022	0.0003	0.0002	0.0009
Tin, total	mg/L	0.0001				<0.0010	0.00019	0.00011		<0.0010	<0.00010	<0.00010			<0.0010	<0.00010	<0.00010			<0.0010	0.00011	<0.00010	0.00014	0.00005	0.00028
Titanium, total	mg/L	0.0003	0.1			0.0014	0.00609	0.0134		0.0052	0.00067	0.00115			0.11	<0.0054	0.0028			0.27	0.0524	0.0164	0.044	0.082	0.290
Tungsten, total	mg/L	0.0001					0.00188	0.00092			<0.00010	<0.00010				0.00035	0.00018				0.00071	0.00083	0.0008	0.0006	0.0026
Uranium, total	mg/L	0.00001	0.015			0.27	0.214	0.161		0.19	0.0959	0.108			0.074	0.0756	0.0706			0.0048	0.0155	0.047	0.1105	0.0818	0.3560
Vanadium, total	mg/L	0.0005				0.001	0.00082	0.00112		<0.0010	<0.00050	0.00065			0.0047	0.00097	0.00079			0.0089	0.00237	0.00139	0.00227	0.00263	0.01016
Zinc, total	mg/L	0.003	0.01	0.012	0.014	0.0052	0.0062	0.0033	0.0059	<0.0030	<0.0030	<0.0030	0.011	0.007	0.0069	0.0085	0.004	0.0056	0.0039	0.011	0.0071	<0.0030	0.0074	0.0032	0.0171
Zirconium, total	mg/L	0.0002					0.00047	0.00077			0.00061	0.00111				0.00061	0.00062				0.00177	0.00048	0.00081	0.00044	0.00212

TABLE D-8

Historical Metals Concentrations of Groundwater Wells

CAM-D
Year 13 2024

AECOM

Parameter	Units	RDL	Criteria 1 FCSAP-TI-Coarse-RP	MW01 - 2012	MW01 - 2014	MW01 - 2016	MW01 - 2020	MW01 - 2022	MW02 - 2014	MW02-2016	MW02 - 2020	MW02 - 2022	MW03-2012	MW03-2014	MW03-2016	MW03 - 2020	MW03 - 2022	MW04-2012	MW04-2014	MW04-2016	MW04 - 2020	MW04 - 2022	Average	Standard Deviation	ULA
				Franz	Franz	Arcadis	BluMetric	AECOM	Franz	Arcadis	BluMetric	AECOM	Franz	Franz	Arcadis	BluMetric	AECOM	Franz	Franz	Arcadis	BluMetric	AECOM			
Metals				8-Jul-12	23-Aug-14	20-Aug-16	28-Aug-20	6-Aug-22	23-Aug-14	19-Aug-16	28-Aug-20	6-Aug-22	7-Aug-12	23-Aug-14	19-Aug-16	28-Aug-20	6-Aug-22	7-Aug-12	23-Aug-14	19-Aug-16	28-Aug-20	6-Aug-22			
Dissolved Metals																									
Aluminum, total	mg/L	0.001	0.1			0.0079	0.0903	0.0086		0.0061	0.0238	0.0075			0.023	0.176	0.0067			0.83	2.46	0.023	0.31	0.72	2.46
Antimony, total	mg/L	0.0001	2			0.0014	0.00124	0.00089		<0.00060	0.00034	0.00043			<0.00060	0.00028	0.00034			<0.00060	0.00037	0.00022	0.00061	0.00045	0.00195
Arsenic, total	mg/L	0.0001	0.005	0.0039	0.0031	0.0026	0.00158	0.00143	0.00035	0.00029	0.00045	0.00049	0.0016	0.00082	0.0013	0.00091	0.00092	0.00045	0.00055	0.0013	0.00075	0.00157	0.00128	0.00098	0.00423
Barium, total	mg/L	0.0001	0.5			<0.010	0.0119	0.0118		<0.010	0.0257	0.0402			0.029	0.0268	0.0347			0.014	0.0398	0.0247	0.0259	0.0107	0.0579
Beryllium, total	mg/L	0.0001	0.0053			<0.0010	<0.00020	<0.000020		<0.0010	<0.00010	<0.000020			<0.0010	<0.00010	<0.000020			<0.0010	<0.00010	<0.000020	-	-	-
Bismuth, total	mg/L	0.00005					0.00031	0.000189			<0.000050	<0.000050				<0.000050	<0.000050				<0.000050	<0.000050	-	-	-
Boron, total	mg/L	0.01	1.5			0.073	0.068	0.074		0.047	0.033	0.034			0.063	0.071	0.057			0.058	0.078	0.062	0.060	0.015	0.105
Cadmium, total	mg/L	0.000005	0.00009	0.00013	0.00017	0.000051	<0.000075	0.0000364	0.000026	<0.000020	0.0000268	0.0000421	0.000061	0.000046	<0.000020	0.000153	0.0000332	0.000042	0.00000055	<0.000020	0.0000706	0.0000432	0.000062	0.000049	0.000210
Calcium, total	mg/L	0.05				66	70.3	63.1		93	85.5	144			55	94	96.5			24	49.2	41.1	73.5	31.7	168.6
Cesium, total	mg/L	0.00001					0.000061	0.000037			0.000012	<0.000010				0.000027	0.00001				0.000186	<0.000010	0.000056	0.000067	0.000255
Chromium, total	mg/L	0.0001	0.0089	0.0016	<0.001	<0.0010	0.00103	0.00055	<0.0010	<0.0010	0.00035	<0.00050	<0.001	<0.0010	<0.0010	0.00123	<0.00050	<0.001	<0.0010	<0.0010	0.00324	<0.00050	0.00133	0.00104	0.00445
Cobalt, total	mg/L	0.0001		0.00042	0.0008	0.00059	0.00041	0.00018	0.00031	0.00085	0.00026	0.00076	<0.0003	0.00042	0.00031	0.00024	<0.00010	0.00041	<0.00030	<0.00030	0.00057	<0.00010	0.00047	0.00022	0.00111
Copper, total	mg/L	0.0002	hardness depend.	0.011	0.027	0.012	0.0168	0.00835	0.02	0.0076	0.0107	0.00947	0.041	0.01	0.004	0.0118	0.0102	0.021	0.0069	0.0029	0.00983	0.00388	0.01286	0.00917	0.04036
Iron, total	mg/L	0.01	0.3			<0.060	0.097	<0.030		<0.060	0.017	<0.030			0.12	0.113	<0.030			<0.060	1.48	<0.030	0.365	0.624	2.24
Lead, total	mg/L	0.00005	hardness depend.	0.0029	0.002	0.00078	0.00066	0.00008	<0.00020	<0.00020	0.000329	0.000085	0.00055	<0.00020	<0.00020	0.000493	0.000156	<0.0002	<0.00020	<0.00020	<0.00020	<0.000050	0.0008	0.0009	0.0036
Lithium, total	mg/L	0.001				0.14	0.108	0.1		0.047	0.0379	0.0172			0.068	0.0858	0.0473			<0.020	0.0147	0.0214	0.0625	0.0414	0.1868
Magnesium, total	mg/L	0.005				64	56.4	60.4		98	75.1	91.4			66	90.6	75.7			13	29.1	32.9	62.7	26.5	142.2
Manganese, total	mg/L	0.0001				0.072	0.0537	0.0295		0.7	0.117	0.725			0.075	0.0866	0.00868			0.015	0.0313	0.0311	0.162	0.259	0.939
Mercury, total	mg/L	0.000005	0.000026			<0.0000020	<0.0000050			<0.0000020	<0.0000050				<0.0000020	<0.0000050				<0.0000020	<0.0000050		-	-	-
Molybdenum, total	mg/L	0.00005	0.073			0.083	0.0485	0.0356		0.0093	0.00637	0.0055			0.033	0.022	0.00922			0.0083	0.0157	0.0271	0.0253	0.0227	0.0935
Nickel, total	mg/L	0.0005	hardness depend.	0.0094	0.033	0.026	0.0203	0.0131	0.0039	0.0028	0.0046	0.00355	0.0031	0.014	0.0088	0.00491	0.00372	0.0066	0.0025	0.00055	0.00519	0.00185	0.00884	0.00886	0.03541
Phosphorus, total	mg/L	0.05				<0.10	<0.10	<0.050		<0.10	<0.050	<0.050			<0.10	<0.050	<0.050			<0.10	<0.050	<0.050	-	-	-
Potassium, total	mg/L	0.05				18	20.2	23.1		9	10.2	9.25			26	33.8	23.4			19	19	23.5	19.5	7.4	41.6
Rubidium, total	mg/L	0.0002					0.00582	0.00515			0.0016	0.00122				0.00384	0.00192				0.00708	0.00347	0.00376	0.00213	0.01016
Selenium, total	mg/L	0.00005	0.001			0.006	0.00183	0.00121		0.0003	0.000197	0.000268			0.00051	0.000219	0.000233			0.0004	0.00012	0.000312	0.00097	0.00166	0.00596
Silicon, total	mg/L	0.05				4.6	4.78	3.99		2.6	3.74	3.19			2.4	3.5	3.52			0.83	5.95	1.69	3.40	1.40	7.60
Silver, total	mg/L	0.00001	0.00025			<0.00010	<0.000020	<0.000010		<0.00010	<0.000010	<0.000010			<0.00010	0.00001	<0.000010			<0.00010	<0.000010	<0.000010	-	-	-
Sodium, total	mg/L	0.05				860	625	448		48	77.3	29.3			210	222	190			130	160	157	263	253	1023
Strontium, total	mg/L	0.0002				0.68	0.574	0.458		0.39	0.356	0.41			0.37	0.622	0.445			0.16	0.238	0.248	0.413	0.157	0.884
Sulfur, total	mg/L	0.5				590	428	260		100	88.7	66			130	157	133			61	97.7	76.3	182.3	165.3	678.2
Tellurium, total	mg/L	0.0002					<0.00040	<0.00020			<0.00020	<0.00020				<0.00020	<0.00020				<0.00020	<0.00020	-	-	-
Thallium, total	mg/L	0.00001	0.0008			<0.00020	0.000056	0.000063		<0.00020	0.000011	<0.000010			<0.00020	0.000094	0.000034			<0.00020	0.000071	0.000055	0.00005	0.00003	0.00013
Thorium, total	mg/L	0.0001					<0.00020	<0.00010			<0.00010	<0.00010				<0.00010	<0.00010				0.00066	<0.00010	-	-	-
Tin, total	mg/L	0.0001				<0.0010	<0.00020	<0.00010		<0.0010	<0.00010	<0.00010			<0.0010	<0.00010	<0.00010			<0.0010	0.0001	<0.00010	-	-	-
Titanium, total	mg/L	0.0003	0.1			<0.0010	0.00464	<0.00030		<0.0010	0.00106	0.00061			<0.0010	0.00586	<0.00030			<0.0010	0.0864	<0.00030	0.0197	0.0373	0.1318
Tungsten, total	mg/L	0.0001					0.00509	0.00108			<0.00010	<0.00010				0.00039	0.00018				0.00068	0.00076	0.00136	0.00185	0.00692
Uranium, total	mg/L	0.00001	0.015			0.27	0.186	0.158		0.19	0.103	0.0982			0.064	0.0865	0.0625			0.0047	0.0141	0.0417	0.1066	0.0798	0.3459
Vanadium, total	mg/L	0.0005				<0.0010	<0.0010	0.00072		<0.0010	<0.00050	<0.00050			<0.0010	0.00087	0.0005			<0.0010	0.0031	0.00068	0.00117	0.00108	0.00443
Zinc, total	mg/L	0.001	0.01	0.0097	0.0092	0.0034	0.0035	<0.0010	0.0065	<0.0030	0.0039	<0.0010	0.008	0.0008	0.0034	0.0103	0.0023	0.0033	0.0046	<0.0030	0.0095	<0.0010	0.0056	0.0032	0.0151
Zirconium, total	mg/L	0.0002					<0.00040	0.00037			0.00059	0.00104				0.00056	0.00059				0.00181	<0.00020	0.00083	0.00053	0.00242

Notes:
RDL - Refers to laboratory detection limit.
ULA - Upper Limit of Acceptability; calculated using the average + three (3) standard deviations of all available data. Only calculated for parameters with three or more data points of detectable concentrations.
No groundwater data is available for 2018, all monitoring wells were frozen.

Exceeds Reference Criteria

Detection Limit Exceeds Reference Criteria

TABLE D-9

Historical PHC Concentrations of Groundwater Wells

CAM-D
Year 13 2024

AECOM

Parameter	Units	RDL	Criteria 1 FCSAP-TI-Coarse-RP	MW01 - 2012	MW01 - 2014	MW01 - 2016	MW01 - 2020	MW01 - 2022	MW02 - 2014	MW02 - 2016	MW02 - 2020	MW02 - 2022	MW03 - 2012	MW03 - 2014	MW03 - 2016	MW03 - 2020	MW03 - 2022	MW04 - 2012	MW04 - 2014	MW04 - 2016	MW04 - 2020	MW04 - 2022	ULA
				Franz	Franz	Arcadis	BluMetric	AECOM	Franz	Arcadis	BluMetric	AECOM	Franz	Franz	Arcadis	BluMetric	AECOM	Franz	Franz	Arcadis	BluMetric	AECOM	
				8-Jul-12	23-Aug-14	20-Aug-16	28-Aug-20	6-Aug-22	23-Aug-14	19- Aug-16	28-Aug-20	6-Aug-22	7-Aug-12	23-Aug-14	19-Aug-16	28-Aug-20	6-Aug-22	7-Aug-12	23-Aug-14	19-Aug-16	28-Aug-20	6-Aug-22	
Historical PHCs and VOCs																							
F1-BTEX	mg/L	0.1	0.81	<0.025	<0.025	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10	<0.025	<0.025	<0.10	<0.10	<0.10	<0.025	<0.025	<0.10	<0.10	<0.10	All < RDL
F1 (C6-C10)	mg/L	0.1	0.81	<0.025	<0.025	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10	<0.025	<0.025	<0.10	<0.10	<0.10	<0.025	<0.025	<0.10	<0.10	<0.10	All < RDL
F2 (C10-C16)	mg/L	0.3		<100	<100	<0.10	<0.30	<0.10	-	<0.10	<0.30	<0.10	<100	<100	<0.10	<0.30	<0.10	<100	<100	<0.10	<0.30	<0.10	All < RDL
F3 (C16-C34)	mg/L	0.3	-	<100	<200	<0.20	<0.30	<0.25	-	<0.20	<0.30	<0.25	<100	<200	<0.20	<0.30	<0.25	<100	<200	<0.20	<0.30	<0.25	All < RDL
F4 (C34-C50)	mg/L	0.3	-	<100	<200	<0.20	<0.30	<0.25	-	<0.20	<0.30	<0.25	<100	<200	<0.20	<0.30	<0.25	<100	<200	<0.20	<0.30	<0.25	All < RDL
Benzene	mg/L	0.0005	0.14	<0.00020	<0.00020	<0.00040	<0.00050	<0.00050	<0.00020	<0.00040	<0.00050	<0.00050	<0.00020	<0.00020	<0.00040	<0.00050	<0.00050	<0.00020	<0.00020	<0.00040	<0.00050	<0.00050	All < RDL
Toluene	mg/L	0.00045	0.083	<0.00020	<0.00020	<0.00040	<0.00045	<0.00050	<0.00020	<0.00040	<0.00045	<0.00050	<0.00020	<0.00020	<0.00040	<0.00045	<0.00050	<0.00020	<0.00020	<0.00040	<0.00045	<0.00050	All < RDL
Ethylbenzene	mg/L	0.0005		<0.00020	<0.00020	<0.00040	<0.00050	<0.00050	<0.00020	<0.00040	<0.00050	<0.00050	<0.00020	<0.00020	<0.00040	<0.00050	<0.00050	<0.00020	<0.00020	<0.00040	<0.00050	<0.00050	All < RDL
Xylene, meta- & para-	mg/L	0.0005	-	<0.00040	<0.00040	<0.00080	<0.00050	<0.00050	<0.00040	<0.00080	<0.00050	<0.00050	<0.00040	<0.00040	<0.00080	<0.00050	<0.00050	<0.00040	<0.00040	<0.00080	<0.00050	<0.00050	All < RDL
Xylene, ortho-	mg/L	0.0005	-	<0.00020	<0.00020	<0.00040	<0.00050	<0.00050	<0.00020	<0.00040	<0.00050	<0.00050	<0.00020	<0.00020	<0.00040	<0.00050	<0.00050	<0.00020	<0.00020	<0.00040	<0.00050	<0.00050	All < RDL
Xylenes	mg/L	0.00075		<0.00040	<0.00040	<0.00080	<0.00075	<0.0075	<0.00040	<0.00080	<0.00075	<0.0075	<0.00040	<0.00040	<0.00080	<0.00075	<0.0075	<0.00040	<0.00040	<0.00080	<0.00075	<0.0075	All < RDL
Methyl t-butyl ether (MTBE)	mg/L	0.0005	0.34	-	-	-	<0.00050	-	-	-	<0.00050	-	-	-	-	<0.00050	-	-	-	-	<0.00050	-	All < RDL
Styrene	mg/L	0.0005	0.072	-	-	-	<0.00050	-	-	-	<0.00050	-	-	-	-	<0.00050	-	-	-	-	<0.00050	-	All < RDL

Notes:
RDL - Refers to laboratory detection limit.
ULA - Upper Limit of Acceptability; calculated using the average + three (3) standard deviations of all available data. Only calculated for parameters with three or more data points of detectable concentrations.
No groundwater data is available for 2018, all monitoring wells were frozen.

Exceeds Reference Criteria
Detection Limit Exceeds Reference Criteria

Appendix E – Laboratory Certificates of Analysis

Notes: MW02 data corresponds to MW03 (bottles were pre-labelled and the wrong bag was used in the field). MW08 is a duplicate of MW03.

Your Project #: 60736036
Site#: CAM-D
Your C.O.C. #: C#734367-01-01

Attention: Jessica Stepney

AECOM CANADA LTD.
18817 Stony Plain Road NW
EDMONTON, AB
CANADA T5S 0C2

Report Date: 2024/09/24
Report #: R3561210
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C472317
Received: 2024/09/12, 10:00

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	3	N/A	2024/09/18	AB SOP-00005	SM 24 2320 B m
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	1	N/A	2024/09/19	AB SOP-00005	SM 24 2320 B m
BTEX/F1 in Water by HS GC/MS/FID (1)	4	N/A	2024/09/17	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX (1)	4	N/A	2024/09/19		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	4	N/A	2024/09/16	AB SOP-00020	SM24-4500-Cl/SO4-E m
Conductivity @25C (1)	3	N/A	2024/09/18	AB SOP-00005	SM 24 2510 B m
Conductivity @25C (1)	1	N/A	2024/09/19	AB SOP-00005	SM 24 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 2)	1	2024/09/16	2024/09/16	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
CCME Hydrocarbons in Water (F2; C10-C16) (1, 2)	3	2024/09/19	2024/09/19	AB SOP-00037 AB SOP-00040	CCME PHC-CWS m
Hardness (1)	1	N/A	2024/09/18		Auto Calc
Hardness (1)	2	N/A	2024/09/19		Auto Calc
Hardness (1)	1	N/A	2024/09/20		Auto Calc
Elements by ICP - Dissolved (1, 3)	1	N/A	2024/09/20	AB SOP-00042	EPA 6010d R5 m
Elements by ICP-Dissolved-Lab Filtered (1, 3)	1	N/A	2024/09/17	AB SOP-00042	EPA 6010d R5 m
Elements by ICP-Dissolved-Lab Filtered (1, 3)	2	N/A	2024/09/19	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	2	2024/09/20	2024/09/20	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	1	2024/09/20	2024/09/21	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	1	2024/09/24	2024/09/24	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS - Dissolved (1, 3)	1	N/A	2024/09/16	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS-Dissolved-Lab Filtered (1, 4)	3	N/A	2024/09/16	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total (1)	2	2024/09/20	2024/09/20	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total (1)	1	2024/09/20	2024/09/21	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total (1)	1	2024/09/24	2024/09/24	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance (1)	3	N/A	2024/09/19		Auto Calc
Ion Balance (1)	1	N/A	2024/09/20		Auto Calc

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

Your Project #: 60736036
Site#: CAM-D
Your C.O.C. #: C#734367-01-01

Attention: Jessica Stepney

AECOM CANADA LTD.
18817 Stony Plain Road NW
EDMONTON, AB
CANADA T5S 0C2

Report Date: 2024/09/24
Report #: R3561210
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C472317
Received: 2024/09/12, 10:00

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sum of cations, anions (1)	1	N/A	2024/09/18		Auto Calc
Sum of cations, anions (1)	2	N/A	2024/09/19		Auto Calc
Sum of cations, anions (1)	1	N/A	2024/09/20		Auto Calc
Elements by ICPMS Low Level (dissolved) (1, 3)	1	N/A	2024/09/17	CAL SOP-00265	EPA 6020 m
Elements by ICPMS Low Level (dissolved) (1, 3)	1	N/A	2024/09/19	CAL SOP-00265	EPA 6020 m
Elements by ICPMS Low Level (total) (1)	2	N/A	2024/09/19	CAL SOP-00265	EPA 6020 m
Nitrate and Nitrite (1)	4	N/A	2024/09/16		Auto Calc
NO2 (N); NO2 (N) + NO3 (N) in Water (1)	4	N/A	2024/09/15	AB SOP-00091	SM 24 4500 NO3m
Nitrate (as N) (1)	3	2024/09/13	2024/09/16		Auto Calc
Nitrate (as N) (1)	1	2024/09/14	2024/09/16		Auto Calc
Polychlorinated Biphenyls in Water (1)	4	2024/09/15	2024/09/16	CAL SOP-00149	EPA 8082A R1 m
Total PCBs in Water (1)	4	N/A	2024/09/16		Auto Calc
pH @25°C (1, 5)	3	N/A	2024/09/18	AB SOP-00005	SM 24 4500-H+B m
pH @25°C (1, 5)	1	N/A	2024/09/19	AB SOP-00005	SM 24 4500-H+B m
Total Dissolved Solids (Calculated) (1)	3	N/A	2024/09/19		Auto Calc
Total Dissolved Solids (Calculated) (1)	1	N/A	2024/09/20		Auto Calc
Total Suspended Solids (NFR) (1)	4	2024/09/16	2024/09/17	AB SOP-00061	SM 24 2540 D m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025:2017 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as ASTM, CGSB, EN, GPA and/or SM. If not provided with the results, identification of the reference method or Bureau Veritas SOP is available upon request.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of the samples provided by the Client using the testing methodology referenced in this report.

Measurement Uncertainty has not been accounted for when stating conformity to any referenced standard. Interpretation and use of the test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. When sampling is not conducted by Bureau Veritas, results apply only to the sample(s) as received. Bureau Veritas is not responsible for the accuracy or any data impacts that result from the information provided by the customer or on the clients behalf by their agent.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your Project #: 60736036
Site#: CAM-D
Your C.O.C. #: C#734367-01-01

Attention: Jessica Stepney

AECOM CANADA LTD.
18817 Stony Plain Road NW
EDMONTON, AB
CANADA T5S 0C2

Report Date: 2024/09/24
Report #: R3561210
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C472317

Received: 2024/09/12, 10:00

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8
(2) Silica gel clean up employed.
(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(4) Samples were filtered and preserved at the lab. Values may not reflect concentrations at the time of sampling. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
(5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas endeavours to analyze samples as soon as possible after receipt.

Encryption Key

Bureau Veritas
24 Sep 2024 15:54:27

Please direct all questions regarding this Certificate of Analysis to:
Parminder Virk, Key Account Specialist
Email: Parminder.Virk@bureauveritas.com
Phone# (403)735-2235

==========

This report has been generated and distributed using a secure automated process.
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		CVK344	CVK344			CVK345		
Sampling Date		2024/09/10 01:00	2024/09/10 01:00			2024/09/10 03:00		
COC Number		C#734367-01-01	C#734367-01-01			C#734367-01-01		
	UNITS	MW01	MW01 Lab-Dup	RDL	QC Batch	MW02	RDL	QC Batch
Calculated Parameters								
Anion Sum	meq/L	17	N/A	N/A	B516841	15	N/A	B516841
Cation Sum	meq/L	19	N/A	N/A	B516841	16	N/A	B516841
Hardness (CaCO3)	mg/L	330	N/A	0.50	B516855	420	0.50	B516855
Ion Balance (% Difference)	%	6.0	N/A	N/A	B516853	4.6	N/A	B516853
Nitrate (N)	mg/L	0.33	N/A	0.010	B516854	0.73	0.020	B516854
Nitrate (NO3)	mg/L	1.5	N/A	0.044	B516842	3.3	0.089	B516842
Nitrite (NO2)	mg/L	<0.033	N/A	0.033	B516842	<0.066	0.066	B516842
Calculated Total Dissolved Solids	mg/L	1100	N/A	10	B516758	880	10	B516758
Misc. Inorganics								
Conductivity	uS/cm	1800	N/A	2.0	B525691	1400	2.0	B525691
pH	pH	8.25	N/A	N/A	B525689	8.15	N/A	B525689
Total Suspended Solids	mg/L	8.7	9.3	1.0	B517846	15	1.0	B517846
Anions								
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	B525684	<1.0	1.0	B525684
Alkalinity (Total as CaCO3)	mg/L	270	N/A	1.0	B525684	310	1.0	B525684
Bicarbonate (HCO3)	mg/L	330	N/A	1.0	B525684	380	1.0	B525684
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	B525684	<1.0	1.0	B525684
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	B525684	<1.0	1.0	B525684
Chloride (Cl)	mg/L	120	N/A	1.0	B518051	110	1.0	B518051
Sulphate (SO4)	mg/L	400	N/A	5.0	B518051	260	5.0	B518051
Nutrients								
Nitrite (N)	mg/L	<0.010	N/A	0.010	B517637	<0.020 (1)	0.020	B517698
Nitrate plus Nitrite (N)	mg/L	0.33	N/A	0.010	B517637	0.73 (1)	0.020	B517698

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Detection limits raised due to matrix interference.

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		CVK346			CVK347		
Sampling Date		2024/09/10 03:30			2024/09/10		
COC Number		C#734367-01-01			C#734367-01-01		
	UNITS	MW08	RDL	QC Batch	TRIP BLANK	RDL	QC Batch
Calculated Parameters							
Anion Sum	meq/L	15	N/A	B516841	0.0000	N/A	B516972
Cation Sum	meq/L	16	N/A	B516841	0.010	N/A	B516972
Hardness (CaCO3)	mg/L	400	0.50	B516855	<0.50	0.50	B516961
Ion Balance (% Difference)	%	4.1	N/A	B516853	NC	N/A	B516965
Nitrate (N)	mg/L	0.69	0.020	B516854	<0.010	0.010	B516975
Nitrate (NO3)	mg/L	3.1	0.089	B516842	<0.044	0.044	B516929
Nitrite (NO2)	mg/L	<0.066	0.066	B516842	<0.033	0.033	B516929
Calculated Total Dissolved Solids	mg/L	880	10	B516758	<10	10	B516982
Misc. Inorganics							
Conductivity	uS/cm	1400	2.0	B525691	<2.0	2.0	B525691
pH	pH	8.10	N/A	B525689	5.01	N/A	B525689
Total Suspended Solids	mg/L	18	1.0	B518594	<1.0	1.0	B517846
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	B525684	<1.0	1.0	B525684
Alkalinity (Total as CaCO3)	mg/L	310	1.0	B525684	<1.0	1.0	B525684
Bicarbonate (HCO3)	mg/L	380	1.0	B525684	<1.0	1.0	B525684
Carbonate (CO3)	mg/L	<1.0	1.0	B525684	<1.0	1.0	B525684
Hydroxide (OH)	mg/L	<1.0	1.0	B525684	<1.0	1.0	B525684
Chloride (Cl)	mg/L	110	1.0	B518051	<1.0	1.0	B518051
Sulphate (SO4)	mg/L	260	5.0	B518051	<1.0	1.0	B518051
Nutrients							
Nitrite (N)	mg/L	<0.020 (1)	0.020	B517698	<0.010	0.010	B517637
Nitrate plus Nitrite (N)	mg/L	0.69 (1)	0.020	B517698	<0.010	0.010	B517637

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to matrix interference.

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

PETROLEUM HYDROCARBONS (CCME)

Bureau Veritas ID		CVK344	CVK345		CVK346		CVK347		
Sampling Date		2024/09/10 01:00	2024/09/10 03:00		2024/09/10 03:30		2024/09/10		
COC Number		C#734367-01-01	C#734367-01-01		C#734367-01-01		C#734367-01-01		
	UNITS	MW01	MW02	QC Batch	MW08	QC Batch	TRIP BLANK	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	B517667	<0.10	B517662	<0.10	0.10	B517667
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	101	102	B517667	96	B517662	100	N/A	B517667

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Bureau Veritas ID		CVK344	CVK345	CVK346	CVK347		
Sampling Date		2024/09/10 01:00	2024/09/10 03:00	2024/09/10 03:30	2024/09/10		
COC Number		C#734367-01-01	C#734367-01-01	C#734367-01-01	C#734367-01-01		
	UNITS	MW01	MW02	MW08	TRIP BLANK	RDL	QC Batch
Polychlorinated Biphenyls							
Aroclor 1016	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	B517012
Aroclor 1221	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	B517012
Aroclor 1232	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	B517012
Aroclor 1242	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	B517012
Aroclor 1248	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	B517012
Aroclor 1254	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	B517012
Aroclor 1260	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	B517012
Aroclor 1262	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	B517012
Aroclor 1268	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	B517012
Total PCB	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	B515625
Surrogate Recovery (%)							
NONACHLOROBIPHENYL (sur.)	%	67	74	66	71	N/A	B517012

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		CVK344			CVK345			CVK346		
Sampling Date		2024/09/10 01:00			2024/09/10 03:00			2024/09/10 03:30		
COC Number		C#734367-01-01			C#734367-01-01			C#734367-01-01		
	UNITS	MW01	RDL	QC Batch	MW02	RDL	QC Batch	MW08	RDL	QC Batch
Elements										
Total Aluminum (Al)	mg/L	0.70	0.0030	B529587	0.48	0.0030	B533784	0.60	0.0030	B529912
Total Antimony (Sb)	mg/L	0.00071	0.00060	B529587	0.00099	0.00060	B533784	0.0011	0.00060	B529912
Total Arsenic (As)	mg/L	0.0016	0.00020	B529587	0.0011	0.00020	B533784	0.0013	0.00020	B529912
Total Barium (Ba)	mg/L	0.017	0.010	B529590	0.035	0.010	B533786	0.033	0.010	B529921
Total Beryllium (Be)	mg/L	<0.0010	0.0010	B529587	<0.0010	0.0010	B533784	<0.0010	0.0010	B529912
Total Boron (B)	mg/L	0.071	0.020	B529590	0.064	0.020	B533786	0.063	0.020	B529921
Total Calcium (Ca)	mg/L	58	0.30	B529590	59	0.30	B533786	52	0.30	B529921
Total Chromium (Cr)	mg/L	<0.0010	0.0010	B529587	0.0045	0.0010	B533784	0.0050	0.0010	B529912
Total Cobalt (Co)	mg/L	0.00031	0.00030	B529587	<0.00030	0.00030	B533784	<0.00030	0.00030	B529912
Total Copper (Cu)	mg/L	0.0091	0.0010	B529587	0.0087	0.0010	B533784	0.0082	0.0010	B529912
Total Iron (Fe)	mg/L	0.47	0.060	B529590	0.36	0.070	B533786	0.30	0.060	B529921
Total Lead (Pb)	mg/L	0.00041	0.00020	B529587	0.0010	0.00020	B533784	0.0014	0.00020	B529912
Total Lithium (Li)	mg/L	0.060	0.020	B529590	0.061	0.020	B533786	0.052	0.020	B529921
Total Magnesium (Mg)	mg/L	51	0.20	B529590	55	0.20	B533786	55	0.20	B529921
Total Manganese (Mn)	mg/L	0.056	0.0040	B529590	0.023	0.0040	B533786	0.024	0.0040	B529921
Total Molybdenum (Mo)	mg/L	0.038	0.00020	B529587	0.013	0.00020	B533784	0.015	0.00020	B529912
Total Nickel (Ni)	mg/L	0.010	0.00050	B529587	0.0054	0.00050	B533784	0.0057	0.00050	B529912
Total Phosphorus (P)	mg/L	<0.10	0.10	B529590	<0.10	0.10	B533786	<0.10	0.10	B529921
Total Potassium (K)	mg/L	21	0.30	B529590	22	0.30	B533786	19	0.30	B529921
Total Selenium (Se)	mg/L	0.00096	0.00020	B529587	0.00038	0.00020	B533784	0.00055	0.00020	B529912
Total Silicon (Si)	mg/L	5.7	0.50	B529590	4.4	0.50	B533786	3.9	0.50	B529921
Total Silver (Ag)	mg/L	<0.00010	0.00010	B529587	<0.00010	0.00010	B533784	<0.00010	0.00010	B529912
Total Sodium (Na)	mg/L	300	0.50	B529590	170	0.50	B533786	160	0.50	B529921
Total Strontium (Sr)	mg/L	0.38	0.020	B529590	0.31	0.020	B533786	0.31	0.020	B529921
Total Sulphur (S)	mg/L	150	0.20	B529590	82	0.20	B533786	81	0.20	B529921
Total Thallium (Tl)	mg/L	<0.00020	0.00020	B529587	<0.00020	0.00020	B533784	<0.00020	0.00020	B529912
Total Tin (Sn)	mg/L	<0.0010	0.0010	B529587	<0.0010	0.0010	B533784	<0.0010	0.0010	B529912
Total Titanium (Ti)	mg/L	0.019	0.0010	B529587	0.015	0.0010	B533784	0.016	0.0010	B529912
Total Uranium (U)	mg/L	0.13	0.00010	B529587	0.040	0.00010	B533784	0.040	0.00010	B529912
Total Vanadium (V)	mg/L	<0.0010	0.0010	B529587	0.0010	0.0010	B533784	0.0010	0.0010	B529912
Total Zinc (Zn)	mg/L	0.0055	0.0030	B529587	0.0078	0.0030	B533784	0.011	0.0030	B529912
Lab Filtered Elements										
Dissolved Aluminum (Al)	mg/L	0.0093	0.0030	B518014	0.0061	0.0030	B518014	0.0064	0.0030	B518014
RDL = Reportable Detection Limit										

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		CVK344			CVK345			CVK346		
Sampling Date		2024/09/10 01:00			2024/09/10 03:00			2024/09/10 03:30		
COC Number		C#734367-01-01			C#734367-01-01			C#734367-01-01		
	UNITS	MW01	RDL	QC Batch	MW02	RDL	QC Batch	MW08	RDL	QC Batch
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	B518014	<0.00060	0.00060	B518014	<0.00060	0.00060	B518014
Dissolved Arsenic (As)	mg/L	0.0012	0.00020	B518014	0.00096	0.00020	B518014	0.0011	0.00020	B518014
Dissolved Barium (Ba)	mg/L	0.014	0.010	B518347	0.036	0.010	B518328	0.035	0.010	B522732
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	B518014	<0.0010	0.0010	B518014	<0.0010	0.0010	B518014
Dissolved Boron (B)	mg/L	0.055	0.020	B518347	0.052	0.020	B518328	0.055	0.020	B522732
Dissolved Calcium (Ca)	mg/L	55	0.30	B518347	71	0.30	B518328	73	0.30	B522732
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	B518014	<0.0010	0.0010	B518014	<0.0010	0.0010	B518014
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	B518014	<0.00030	0.00030	B518014	<0.00030	0.00030	B518014
Dissolved Copper (Cu)	mg/L	0.0090	0.0010	B518014	0.0067	0.0010	B518014	0.0069	0.0010	B518014
Dissolved Iron (Fe)	mg/L	<0.060	0.060	B518347	<0.060	0.060	B518328	<0.060	0.060	B522732
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	B518014	<0.00020	0.00020	B518014	<0.00020	0.00020	B518014
Dissolved Lithium (Li)	mg/L	0.059	0.020	B518347	0.054	0.020	B518328	0.056	0.020	B522732
Dissolved Magnesium (Mg)	mg/L	48	0.20	B518347	58	0.20	B518328	53	0.20	B522732
Dissolved Manganese (Mn)	mg/L	0.027	0.0040	B518347	<0.0040	0.0040	B518328	<0.0040	0.0040	B522732
Dissolved Molybdenum (Mo)	mg/L	0.036	0.00020	B518014	0.011	0.00020	B518014	0.011	0.00020	B518014
Dissolved Nickel (Ni)	mg/L	0.0096	0.00050	B518014	0.0032	0.00050	B518014	0.0032	0.00050	B518014
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	B518347	<0.10	0.10	B518328	<0.10	0.10	B522732
Dissolved Potassium (K)	mg/L	20	0.30	B518347	20	0.30	B518328	21	0.30	B522732
Dissolved Selenium (Se)	mg/L	0.00093	0.00020	B518014	0.00034	0.00020	B518014	0.00033	0.00020	B518014
Dissolved Silicon (Si)	mg/L	3.2	0.50	B518347	3.1	0.50	B518328	3.2	0.50	B522732
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	B518014	<0.00010	0.00010	B518014	<0.00010	0.00010	B518014
Dissolved Sodium (Na)	mg/L	280	0.50	B518347	170	0.50	B518328	170	0.50	B522732
Dissolved Strontium (Sr)	mg/L	0.35	0.020	B518347	0.34	0.020	B518328	0.34	0.020	B522732
Dissolved Sulphur (S)	mg/L	150	0.20	B518347	81	0.20	B518328	99	0.20	B522732
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	B518014	<0.00020	0.00020	B518014	<0.00020	0.00020	B518014
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	B518014	<0.0010	0.0010	B518014	<0.0010	0.0010	B518014
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	B518014	<0.0010	0.0010	B518014	<0.0010	0.0010	B518014
Dissolved Uranium (U)	mg/L	0.13	0.00010	B518014	0.043	0.00010	B518014	0.043	0.00010	B518014
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	B518014	<0.0010	0.0010	B518014	<0.0010	0.0010	B518014
Dissolved Zinc (Zn)	mg/L	0.0033	0.0030	B518014	<0.0030	0.0030	B518014	<0.0030	0.0030	B518014
Dissolved Metals by ICPMS										
Dissolved Cadmium (Cd)	ug/L	0.0258	0.0050	B519908	N/A	N/A	N/A	N/A	0.0050	N/A

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		CVK344			CVK345			CVK346		
Sampling Date		2024/09/10 01:00			2024/09/10 03:00			2024/09/10 03:30		
COC Number		C#734367-01-01			C#734367-01-01			C#734367-01-01		
	UNITS	**MW01**	**RDL**	**QC Batch**	**MW02**	**RDL**	**QC Batch**	**MW08**	**RDL**	**QC Batch**
Total Metals by ICPMS										
Total Cadmium (Cd)	ug/L	0.0247	0.0050	B526019	N/A	N/A	N/A	N/A	0.0050	N/A

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		CVK347		
Sampling Date		2024/09/10		
COC Number		C#734367-01-01		
	UNITS	TRIP BLANK	RDL	QC Batch
Elements				
Dissolved Aluminum (Al)	mg/L	<0.0030	0.0030	B519186
Total Aluminum (Al)	mg/L	0.0031	0.0030	B529587
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	B519186
Total Antimony (Sb)	mg/L	<0.00060	0.00060	B529587
Dissolved Arsenic (As)	mg/L	<0.00020	0.00020	B519186
Total Arsenic (As)	mg/L	<0.00020	0.00020	B529587
Dissolved Barium (Ba)	mg/L	<0.010	0.010	B519322
Total Barium (Ba)	mg/L	<0.010	0.010	B529590
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	B519186
Total Beryllium (Be)	mg/L	<0.0010	0.0010	B529587
Dissolved Boron (B)	mg/L	<0.020	0.020	B519322
Total Boron (B)	mg/L	<0.020	0.020	B529590
Dissolved Calcium (Ca)	mg/L	<0.30	0.30	B519322
Total Calcium (Ca)	mg/L	<0.30	0.30	B529590
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	B519186
Total Chromium (Cr)	mg/L	<0.0010	0.0010	B529587
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	B519186
Total Cobalt (Co)	mg/L	<0.00030	0.00030	B529587
Dissolved Copper (Cu)	mg/L	<0.0010	0.0010	B519186
Total Copper (Cu)	mg/L	<0.0010	0.0010	B529587
Dissolved Iron (Fe)	mg/L	<0.060	0.060	B519322
Total Iron (Fe)	mg/L	<0.060	0.060	B529590
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	B519186
Total Lead (Pb)	mg/L	<0.00020	0.00020	B532243
Dissolved Lithium (Li)	mg/L	<0.020	0.020	B519322
Total Lithium (Li)	mg/L	<0.020	0.020	B529590
Dissolved Magnesium (Mg)	mg/L	<0.20	0.20	B519322
Total Magnesium (Mg)	mg/L	<0.20	0.20	B529590
Dissolved Manganese (Mn)	mg/L	<0.0040	0.0040	B519322
Total Manganese (Mn)	mg/L	<0.0040	0.0040	B529590
Dissolved Molybdenum (Mo)	mg/L	<0.00020	0.00020	B519186
Total Molybdenum (Mo)	mg/L	<0.00020	0.00020	B529587
Dissolved Nickel (Ni)	mg/L	<0.00050	0.00050	B519186
RDL = Reportable Detection Limit				

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		CVK347		
Sampling Date		2024/09/10		
COC Number		C#734367-01-01		
	UNITS	TRIP BLANK	RDL	QC Batch
Total Nickel (Ni)	mg/L	<0.00050	0.00050	B529587
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	B519322
Total Phosphorus (P)	mg/L	<0.10	0.10	B529590
Dissolved Potassium (K)	mg/L	<0.30	0.30	B519322
Total Potassium (K)	mg/L	<0.30	0.30	B529590
Dissolved Selenium (Se)	mg/L	<0.00020	0.00020	B519186
Total Selenium (Se)	mg/L	<0.00020	0.00020	B529587
Dissolved Silicon (Si)	mg/L	<0.50	0.50	B519322
Total Silicon (Si)	mg/L	<0.50	0.50	B529590
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	B519186
Total Silver (Ag)	mg/L	<0.00010	0.00010	B529587
Dissolved Sodium (Na)	mg/L	<0.50	0.50	B519322
Total Sodium (Na)	mg/L	<0.50	0.50	B529590
Dissolved Strontium (Sr)	mg/L	<0.020	0.020	B519322
Total Strontium (Sr)	mg/L	<0.020	0.020	B529590
Dissolved Sulphur (S)	mg/L	<0.20	0.20	B519322
Total Sulphur (S)	mg/L	<0.20	0.20	B529590
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	B519186
Total Thallium (Tl)	mg/L	<0.00020	0.00020	B529587
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	B519186
Total Tin (Sn)	mg/L	<0.0010	0.0010	B529587
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	B519186
Total Titanium (Ti)	mg/L	<0.0010	0.0010	B529587
Dissolved Uranium (U)	mg/L	<0.00010	0.00010	B519186
Total Uranium (U)	mg/L	<0.00010	0.00010	B529587
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	B519186
Total Vanadium (V)	mg/L	<0.0010	0.0010	B529587
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	B519186
Total Zinc (Zn)	mg/L	<0.0030	0.0030	B529587
Dissolved Metals by ICPMS				
Dissolved Cadmium (Cd)	ug/L	<0.0050	0.0050	B519908
Total Metals by ICPMS				
Total Cadmium (Cd)	ug/L	<0.0050	0.0050	B526019
RDL = Reportable Detection Limit				

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

VOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		CVK344	CVK345	CVK346	CVK347		
Sampling Date		2024/09/10 01:00	2024/09/10 03:00	2024/09/10 03:30	2024/09/10		
COC Number		C#734367-01-01	C#734367-01-01	C#734367-01-01	C#734367-01-01		
	UNITS	MW01	MW02	MW08	TRIP BLANK	RDL	QC Batch
Volatiles							
Benzene	ug/L	<0.40	<0.40	<0.40	<0.40	0.40	B517529
Toluene	ug/L	<0.40	<0.40	<0.40	<0.40	0.40	B517529
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	<0.40	0.40	B517529
m & p-Xylene	ug/L	<0.80	<0.80	<0.80	<0.80	0.80	B517529
o-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	0.40	B517529
Xylenes (Total)	ug/L	<0.89	<0.89	<0.89	<0.89	0.89	B516657
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	<100	100	B516657
F1 (C6-C10)	ug/L	<100	<100	<100	<100	100	B517529
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	97	98	98	98	N/A	B517529
4-Bromofluorobenzene (sur.)	%	107	108	107	107	N/A	B517529
D4-1,2-Dichloroethane (sur.)	%	98	98	97	98	N/A	B517529

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.0°C
Package 2	4.7°C

Sample CVK344 [MW01] : NO2 (N); NO2 (N) + NO3 (N) in Water completed within five days of sampling. Data is satisfactory for compliance purposes.

Sample CVK345 [MW02] : NO2 (N); NO2 (N) + NO3 (N) in Water completed within five days of sampling. Data is satisfactory for compliance purposes.

Sample CVK346 [MW08] : NO2 (N); NO2 (N) + NO3 (N) in Water completed within five days of sampling. Data is satisfactory for compliance purposes.

Sample CVK347 [TRIP BLANK] : NO2 (N); NO2 (N) + NO3 (N) in Water completed within five days of sampling. Data is satisfactory for compliance purposes.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample CVK344 [MW01] Elements by ICPMS Low Level (total): Sample was not submitted in an appropriate container for this analysis.

Sample CVK347, Elements by ICPMS - Total: Test repeated.

Results relate only to the items tested.

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B517012	JU2	Spiked Blank	Aroclor 1260	2024/09/14		85	%	50 - 130
			NONACHLOROBIPHENYL (sur.)	2024/09/14		74	%	50 - 130
B517012	JU2	Method Blank	Aroclor 1016	2024/09/14	<0.000050		mg/L	
			Aroclor 1221	2024/09/14	<0.000050		mg/L	
			Aroclor 1232	2024/09/14	<0.000050		mg/L	
			Aroclor 1242	2024/09/14	<0.000050		mg/L	
			Aroclor 1248	2024/09/14	<0.000050		mg/L	
			Aroclor 1254	2024/09/14	<0.000050		mg/L	
			Aroclor 1260	2024/09/14	<0.000050		mg/L	
			Aroclor 1262	2024/09/14	<0.000050		mg/L	
			Aroclor 1268	2024/09/14	<0.000050		mg/L	
			NONACHLOROBIPHENYL (sur.)	2024/09/14		73	%	50 - 130
B517529	DO1	Matrix Spike	1,4-Difluorobenzene (sur.)	2024/09/17		92	%	50 - 140
			4-Bromofluorobenzene (sur.)	2024/09/17		112	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2024/09/17		97	%	50 - 140
			Benzene	2024/09/17		99	%	50 - 140
			Toluene	2024/09/17		105	%	50 - 140
			Ethylbenzene	2024/09/17		108	%	50 - 140
			m & p-Xylene	2024/09/17		109	%	50 - 140
			o-Xylene	2024/09/17		108	%	50 - 140
			F1 (C6-C10)	2024/09/17		99	%	60 - 140
B517529	DO1	Spiked Blank	1,4-Difluorobenzene (sur.)	2024/09/17		95	%	50 - 140
			4-Bromofluorobenzene (sur.)	2024/09/17		111	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2024/09/17		96	%	50 - 140
			Benzene	2024/09/17		98	%	60 - 130
			Toluene	2024/09/17		104	%	60 - 130
			Ethylbenzene	2024/09/17		107	%	60 - 130
			m & p-Xylene	2024/09/17		107	%	60 - 130
			o-Xylene	2024/09/17		105	%	60 - 130
			F1 (C6-C10)	2024/09/17		111	%	60 - 140
B517529	DO1	Method Blank	1,4-Difluorobenzene (sur.)	2024/09/17		97	%	50 - 140
			4-Bromofluorobenzene (sur.)	2024/09/17		108	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2024/09/17		99	%	50 - 140
			Benzene	2024/09/17	<0.40		ug/L	
			Toluene	2024/09/17	<0.40		ug/L	
			Ethylbenzene	2024/09/17	<0.40		ug/L	
			m & p-Xylene	2024/09/17	<0.80		ug/L	
			o-Xylene	2024/09/17	<0.40		ug/L	
			F1 (C6-C10)	2024/09/17	<100		ug/L	
B517529	DO1	RPD	Benzene	2024/09/17	NC		%	30
			Toluene	2024/09/17	NC		%	30
			Ethylbenzene	2024/09/17	NC		%	30
			m & p-Xylene	2024/09/17	NC		%	30
			o-Xylene	2024/09/17	NC		%	30
			F1 (C6-C10)	2024/09/17	NC		%	30
B517637	ISW	Matrix Spike	Nitrite (N)	2024/09/15		100	%	80 - 120
			Nitrate plus Nitrite (N)	2024/09/15		NC	%	80 - 120
B517637	ISW	Spiked Blank	Nitrite (N)	2024/09/15		100	%	80 - 120
			Nitrate plus Nitrite (N)	2024/09/15		97	%	80 - 120
B517637	ISW	Method Blank	Nitrite (N)	2024/09/15	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2024/09/15	<0.010		mg/L	
B517637	ISW	RPD	Nitrite (N)	2024/09/15	0.87		%	20
			Nitrate plus Nitrite (N)	2024/09/15	0.43		%	20
B517662	EC0	Spiked Blank	O-TERPHENYL (sur.)	2024/09/16		94	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2024/09/16		87	%	60 - 140

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B517662	EC0	Method Blank	O-TERPHENYL (sur.)	2024/09/16		94	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2024/09/16	<0.10		mg/L	
B517667	CHA	Spiked Blank	O-TERPHENYL (sur.)	2024/09/19		97	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2024/09/19		89	%	60 - 140
B517667	CHA	Method Blank	O-TERPHENYL (sur.)	2024/09/19		99	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2024/09/19	<0.10		mg/L	
B517698	ISW	Matrix Spike	Nitrite (N)	2024/09/15		105	%	80 - 120
			Nitrate plus Nitrite (N)	2024/09/15		110	%	80 - 120
B517698	ISW	Spiked Blank	Nitrite (N)	2024/09/15		102	%	80 - 120
			Nitrate plus Nitrite (N)	2024/09/15		102	%	80 - 120
B517698	ISW	Method Blank	Nitrite (N)	2024/09/15	<0.010		mg/L	
			Nitrate plus Nitrite (N)	2024/09/15	<0.010		mg/L	
B517698	ISW	RPD	Nitrite (N)	2024/09/15	NC		%	20
			Nitrate plus Nitrite (N)	2024/09/15	1.0		%	20
B517846	TNY	Matrix Spike [CVK345-01]	Total Suspended Solids	2024/09/17		100	%	80 - 120
B517846	TNY	Spiked Blank	Total Suspended Solids	2024/09/17		96	%	80 - 120
B517846	TNY	Method Blank	Total Suspended Solids	2024/09/17	<0.99		mg/L	
B517846	TNY	RPD [CVK344-01]	Total Suspended Solids	2024/09/17	5.9		%	20
B518014	JAB	Matrix Spike	Dissolved Aluminum (Al)	2024/09/16		NC	%	80 - 120
			Dissolved Antimony (Sb)	2024/09/16		99	%	80 - 120
			Dissolved Arsenic (As)	2024/09/16		102	%	80 - 120
			Dissolved Beryllium (Be)	2024/09/16		94	%	80 - 120
			Dissolved Chromium (Cr)	2024/09/16		101	%	80 - 120
			Dissolved Cobalt (Co)	2024/09/16		99	%	80 - 120
			Dissolved Copper (Cu)	2024/09/16		109	%	80 - 120
			Dissolved Lead (Pb)	2024/09/16		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2024/09/16		106	%	80 - 120
			Dissolved Nickel (Ni)	2024/09/16		103	%	80 - 120
			Dissolved Selenium (Se)	2024/09/16		99	%	80 - 120
			Dissolved Silver (Ag)	2024/09/16		103	%	80 - 120
			Dissolved Thallium (Tl)	2024/09/16		95	%	80 - 120
			Dissolved Tin (Sn)	2024/09/16		99	%	80 - 120
			Dissolved Titanium (Ti)	2024/09/16		108	%	80 - 120
			Dissolved Uranium (U)	2024/09/16		95	%	80 - 120
			Dissolved Vanadium (V)	2024/09/16		102	%	80 - 120
			Dissolved Zinc (Zn)	2024/09/16		100	%	80 - 120
B518014	JAB	Spiked Blank	Dissolved Aluminum (Al)	2024/09/16		101	%	80 - 120
			Dissolved Antimony (Sb)	2024/09/16		100	%	80 - 120
			Dissolved Arsenic (As)	2024/09/16		103	%	80 - 120
			Dissolved Beryllium (Be)	2024/09/16		95	%	80 - 120
			Dissolved Chromium (Cr)	2024/09/16		102	%	80 - 120
			Dissolved Cobalt (Co)	2024/09/16		104	%	80 - 120
			Dissolved Copper (Cu)	2024/09/16		105	%	80 - 120
			Dissolved Lead (Pb)	2024/09/16		100	%	80 - 120
			Dissolved Molybdenum (Mo)	2024/09/16		102	%	80 - 120
			Dissolved Nickel (Ni)	2024/09/16		103	%	80 - 120
			Dissolved Selenium (Se)	2024/09/16		102	%	80 - 120
			Dissolved Silver (Ag)	2024/09/16		99	%	80 - 120
			Dissolved Thallium (Tl)	2024/09/16		97	%	80 - 120
			Dissolved Tin (Sn)	2024/09/16		96	%	80 - 120
			Dissolved Titanium (Ti)	2024/09/16		105	%	80 - 120
			Dissolved Uranium (U)	2024/09/16		95	%	80 - 120
			Dissolved Vanadium (V)	2024/09/16		104	%	80 - 120
			Dissolved Zinc (Zn)	2024/09/16		101	%	80 - 120
B518014	JAB	Method Blank	Dissolved Aluminum (Al)	2024/09/16	<0.0030		mg/L	

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Antimony (Sb)	2024/09/16	<0.00060		mg/L	
			Dissolved Arsenic (As)	2024/09/16	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2024/09/16	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2024/09/16	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2024/09/16	<0.00030		mg/L	
			Dissolved Copper (Cu)	2024/09/16	<0.0010		mg/L	
			Dissolved Lead (Pb)	2024/09/16	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2024/09/16	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2024/09/16	<0.00050		mg/L	
			Dissolved Selenium (Se)	2024/09/16	<0.00020		mg/L	
			Dissolved Silver (Ag)	2024/09/16	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2024/09/16	<0.00020		mg/L	
			Dissolved Tin (Sn)	2024/09/16	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2024/09/16	<0.0010		mg/L	
			Dissolved Uranium (U)	2024/09/16	<0.00010		mg/L	
			Dissolved Vanadium (V)	2024/09/16	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2024/09/16	<0.0030		mg/L	
B518014	JAB	RPD	Dissolved Aluminum (Al)	2024/09/16	5.4		%	20
			Dissolved Antimony (Sb)	2024/09/16	NC		%	20
			Dissolved Arsenic (As)	2024/09/16	14		%	20
			Dissolved Beryllium (Be)	2024/09/16	NC		%	20
			Dissolved Chromium (Cr)	2024/09/16	15		%	20
			Dissolved Cobalt (Co)	2024/09/16	4.5		%	20
			Dissolved Copper (Cu)	2024/09/16	3.7		%	20
			Dissolved Lead (Pb)	2024/09/16	NC		%	20
			Dissolved Molybdenum (Mo)	2024/09/16	5.3		%	20
			Dissolved Nickel (Ni)	2024/09/16	6.5		%	20
			Dissolved Selenium (Se)	2024/09/16	3.4		%	20
			Dissolved Silver (Ag)	2024/09/16	NC		%	20
			Dissolved Thallium (Tl)	2024/09/16	NC		%	20
			Dissolved Tin (Sn)	2024/09/16	NC		%	20
			Dissolved Titanium (Ti)	2024/09/16	6.2		%	20
			Dissolved Uranium (U)	2024/09/16	2.0		%	20
			Dissolved Vanadium (V)	2024/09/16	1.9		%	20
			Dissolved Zinc (Zn)	2024/09/16	4.9		%	20
B518051	HAP	Matrix Spike	Chloride (Cl)	2024/09/16		103	%	80 - 120
			Sulphate (SO4)	2024/09/16		86	%	80 - 120
B518051	HAP	Spiked Blank	Chloride (Cl)	2024/09/16		98	%	80 - 120
			Sulphate (SO4)	2024/09/16		98	%	80 - 120
B518051	HAP	Method Blank	Chloride (Cl)	2024/09/16	<1.0		mg/L	
			Sulphate (SO4)	2024/09/16	<1.0		mg/L	
B518051	HAP	RPD	Chloride (Cl)	2024/09/16	12		%	20
			Sulphate (SO4)	2024/09/16	1.0		%	20
B518328	S4L	Matrix Spike	Dissolved Barium (Ba)	2024/09/19		94	%	80 - 120
			Dissolved Boron (B)	2024/09/19		93	%	80 - 120
			Dissolved Calcium (Ca)	2024/09/19		102	%	80 - 120
			Dissolved Iron (Fe)	2024/09/19		97	%	80 - 120
			Dissolved Lithium (Li)	2024/09/19		90	%	80 - 120
			Dissolved Magnesium (Mg)	2024/09/19		100	%	80 - 120
			Dissolved Manganese (Mn)	2024/09/19		97	%	80 - 120
			Dissolved Phosphorus (P)	2024/09/19		94	%	80 - 120
			Dissolved Potassium (K)	2024/09/19		98	%	80 - 120
			Dissolved Silicon (Si)	2024/09/19		86	%	80 - 120
			Dissolved Sodium (Na)	2024/09/19		92	%	80 - 120
			Dissolved Strontium (Sr)	2024/09/19		92	%	80 - 120

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Sulphur (S)	2024/09/19		99	%	N/A
B518328	S4L	Spiked Blank	Dissolved Barium (Ba)	2024/09/19		100	%	80 - 120
			Dissolved Boron (B)	2024/09/19		99	%	80 - 120
			Dissolved Calcium (Ca)	2024/09/19		100	%	80 - 120
			Dissolved Iron (Fe)	2024/09/19		104	%	80 - 120
			Dissolved Lithium (Li)	2024/09/19		99	%	80 - 120
			Dissolved Magnesium (Mg)	2024/09/19		102	%	80 - 120
			Dissolved Manganese (Mn)	2024/09/19		103	%	80 - 120
			Dissolved Phosphorus (P)	2024/09/19		97	%	80 - 120
			Dissolved Potassium (K)	2024/09/19		103	%	80 - 120
			Dissolved Silicon (Si)	2024/09/19		94	%	80 - 120
			Dissolved Sodium (Na)	2024/09/19		100	%	80 - 120
			Dissolved Strontium (Sr)	2024/09/19		95	%	80 - 120
			Dissolved Sulphur (S)	2024/09/19		96	%	80 - 120
B518328	S4L	Method Blank	Dissolved Barium (Ba)	2024/09/19	<0.010		mg/L	
			Dissolved Boron (B)	2024/09/19	<0.020		mg/L	
			Dissolved Calcium (Ca)	2024/09/19	<0.30		mg/L	
			Dissolved Iron (Fe)	2024/09/19	<0.060		mg/L	
			Dissolved Lithium (Li)	2024/09/19	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2024/09/19	<0.20		mg/L	
			Dissolved Manganese (Mn)	2024/09/19	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2024/09/19	<0.10		mg/L	
			Dissolved Potassium (K)	2024/09/19	<0.30		mg/L	
			Dissolved Silicon (Si)	2024/09/19	<0.50		mg/L	
			Dissolved Sodium (Na)	2024/09/19	<0.50		mg/L	
			Dissolved Strontium (Sr)	2024/09/19	<0.020		mg/L	
			Dissolved Sulphur (S)	2024/09/19	<0.20		mg/L	
B518328	S4L	RPD	Dissolved Calcium (Ca)	2024/09/19	3.7		%	20
			Dissolved Iron (Fe)	2024/09/19	NC		%	20
			Dissolved Magnesium (Mg)	2024/09/19	2.0		%	20
			Dissolved Manganese (Mn)	2024/09/19	9.0		%	20
			Dissolved Potassium (K)	2024/09/19	11		%	20
			Dissolved Sodium (Na)	2024/09/19	3.2		%	20
B518347	JAB	Matrix Spike	Dissolved Barium (Ba)	2024/09/19		92	%	80 - 120
			Dissolved Boron (B)	2024/09/19		93	%	80 - 120
			Dissolved Calcium (Ca)	2024/09/19		98	%	80 - 120
			Dissolved Iron (Fe)	2024/09/19		107	%	80 - 120
			Dissolved Lithium (Li)	2024/09/19		98	%	80 - 120
			Dissolved Magnesium (Mg)	2024/09/19		98	%	80 - 120
			Dissolved Manganese (Mn)	2024/09/19		103	%	80 - 120
			Dissolved Phosphorus (P)	2024/09/19		104	%	80 - 120
			Dissolved Potassium (K)	2024/09/19		96	%	80 - 120
			Dissolved Silicon (Si)	2024/09/19		94	%	80 - 120
			Dissolved Strontium (Sr)	2024/09/19		88	%	80 - 120
			Dissolved Sulphur (S)	2024/09/19		103	%	80 - 120
B518347	JAB	Spiked Blank	Dissolved Barium (Ba)	2024/09/19		99	%	80 - 120
			Dissolved Boron (B)	2024/09/19		94	%	80 - 120
			Dissolved Calcium (Ca)	2024/09/19		101	%	80 - 120
			Dissolved Iron (Fe)	2024/09/19		105	%	80 - 120
			Dissolved Lithium (Li)	2024/09/19		104	%	80 - 120
			Dissolved Magnesium (Mg)	2024/09/19		101	%	80 - 120
			Dissolved Manganese (Mn)	2024/09/19		101	%	80 - 120
			Dissolved Phosphorus (P)	2024/09/19		101	%	80 - 120
			Dissolved Potassium (K)	2024/09/19		99	%	80 - 120
			Dissolved Silicon (Si)	2024/09/19		94	%	80 - 120

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Sodium (Na)	2024/09/19		101	%	80 - 120
			Dissolved Strontium (Sr)	2024/09/19		95	%	80 - 120
			Dissolved Sulphur (S)	2024/09/19		97	%	80 - 120
B518347	JAB	Method Blank	Dissolved Barium (Ba)	2024/09/19	<0.010		mg/L	
			Dissolved Boron (B)	2024/09/19	<0.020		mg/L	
			Dissolved Calcium (Ca)	2024/09/19	<0.30		mg/L	
			Dissolved Iron (Fe)	2024/09/19	<0.060		mg/L	
			Dissolved Lithium (Li)	2024/09/19	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2024/09/19	<0.20		mg/L	
			Dissolved Manganese (Mn)	2024/09/19	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2024/09/19	<0.10		mg/L	
			Dissolved Potassium (K)	2024/09/19	<0.30		mg/L	
			Dissolved Silicon (Si)	2024/09/19	<0.50		mg/L	
			Dissolved Sodium (Na)	2024/09/19	<0.50		mg/L	
			Dissolved Strontium (Sr)	2024/09/19	<0.020		mg/L	
			Dissolved Sulphur (S)	2024/09/19	<0.20		mg/L	
B518347	JAB	RPD	Dissolved Calcium (Ca)	2024/09/19	0.79		%	20
			Dissolved Iron (Fe)	2024/09/19	4.4		%	20
			Dissolved Magnesium (Mg)	2024/09/19	0.0066		%	20
			Dissolved Manganese (Mn)	2024/09/19	0.23		%	20
			Dissolved Potassium (K)	2024/09/19	0.38		%	20
			Dissolved Sodium (Na)	2024/09/19	6.2		%	20
B518594	HE1	Matrix Spike	Total Suspended Solids	2024/09/17		NC	%	80 - 120
B518594	HE1	Spiked Blank	Total Suspended Solids	2024/09/17		89	%	80 - 120
B518594	HE1	Method Blank	Total Suspended Solids	2024/09/17	<1.0		mg/L	
B518594	HE1	RPD	Total Suspended Solids	2024/09/17	7.9		%	20
B519186	JAB	Matrix Spike	Dissolved Aluminum (Al)	2024/09/16		97	%	80 - 120
			Dissolved Antimony (Sb)	2024/09/16		96	%	80 - 120
			Dissolved Arsenic (As)	2024/09/16		100	%	80 - 120
			Dissolved Beryllium (Be)	2024/09/16		88	%	80 - 120
			Dissolved Chromium (Cr)	2024/09/16		92	%	80 - 120
			Dissolved Cobalt (Co)	2024/09/16		93	%	80 - 120
			Dissolved Copper (Cu)	2024/09/16		91	%	80 - 120
			Dissolved Lead (Pb)	2024/09/16		91	%	80 - 120
			Dissolved Molybdenum (Mo)	2024/09/16		104	%	80 - 120
			Dissolved Nickel (Ni)	2024/09/16		91	%	80 - 120
			Dissolved Selenium (Se)	2024/09/16		96	%	80 - 120
			Dissolved Silver (Ag)	2024/09/16		95	%	80 - 120
			Dissolved Thallium (Tl)	2024/09/16		91	%	80 - 120
			Dissolved Tin (Sn)	2024/09/16		102	%	80 - 120
			Dissolved Titanium (Ti)	2024/09/16		93	%	80 - 120
			Dissolved Uranium (U)	2024/09/16		93	%	80 - 120
			Dissolved Vanadium (V)	2024/09/16		96	%	80 - 120
			Dissolved Zinc (Zn)	2024/09/16		89	%	80 - 120
B519186	JAB	Spiked Blank	Dissolved Aluminum (Al)	2024/09/16		100	%	80 - 120
			Dissolved Antimony (Sb)	2024/09/16		91	%	80 - 120
			Dissolved Arsenic (As)	2024/09/16		87	%	80 - 120
			Dissolved Beryllium (Be)	2024/09/16		84	%	80 - 120
			Dissolved Chromium (Cr)	2024/09/16		90	%	80 - 120
			Dissolved Cobalt (Co)	2024/09/16		91	%	80 - 120
			Dissolved Copper (Cu)	2024/09/16		91	%	80 - 120
			Dissolved Lead (Pb)	2024/09/16		92	%	80 - 120
			Dissolved Molybdenum (Mo)	2024/09/16		97	%	80 - 120
			Dissolved Nickel (Ni)	2024/09/16		90	%	80 - 120
			Dissolved Selenium (Se)	2024/09/16		85	%	80 - 120

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Silver (Ag)	2024/09/16		94	%	80 - 120
			Dissolved Thallium (Tl)	2024/09/16		92	%	80 - 120
			Dissolved Tin (Sn)	2024/09/16		98	%	80 - 120
			Dissolved Titanium (Ti)	2024/09/16		88	%	80 - 120
			Dissolved Uranium (U)	2024/09/16		91	%	80 - 120
			Dissolved Vanadium (V)	2024/09/16		93	%	80 - 120
			Dissolved Zinc (Zn)	2024/09/16		81	%	80 - 120
B519186	JAB	Method Blank	Dissolved Aluminum (Al)	2024/09/17	<0.0030		mg/L	
			Dissolved Antimony (Sb)	2024/09/17	<0.00060		mg/L	
			Dissolved Arsenic (As)	2024/09/17	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2024/09/17	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2024/09/17	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2024/09/17	<0.00030		mg/L	
			Dissolved Copper (Cu)	2024/09/17	<0.0010		mg/L	
			Dissolved Lead (Pb)	2024/09/17	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2024/09/17	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2024/09/17	<0.00050		mg/L	
			Dissolved Selenium (Se)	2024/09/17	<0.00020		mg/L	
			Dissolved Silver (Ag)	2024/09/17	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2024/09/17	<0.00020		mg/L	
			Dissolved Tin (Sn)	2024/09/17	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2024/09/17	<0.0010		mg/L	
			Dissolved Uranium (U)	2024/09/17	<0.00010		mg/L	
			Dissolved Vanadium (V)	2024/09/17	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2024/09/17	<0.0030		mg/L	
B519186	JAB	RPD	Dissolved Aluminum (Al)	2024/09/16	NC		%	20
			Dissolved Antimony (Sb)	2024/09/16	NC		%	20
			Dissolved Arsenic (As)	2024/09/16	1.1		%	20
			Dissolved Beryllium (Be)	2024/09/16	NC		%	20
			Dissolved Chromium (Cr)	2024/09/16	NC		%	20
			Dissolved Cobalt (Co)	2024/09/16	NC		%	20
			Dissolved Copper (Cu)	2024/09/16	3.5		%	20
			Dissolved Lead (Pb)	2024/09/16	NC		%	20
			Dissolved Molybdenum (Mo)	2024/09/16	0.68		%	20
			Dissolved Nickel (Ni)	2024/09/16	8.8		%	20
			Dissolved Selenium (Se)	2024/09/16	NC		%	20
			Dissolved Silver (Ag)	2024/09/16	NC		%	20
			Dissolved Thallium (Tl)	2024/09/16	NC		%	20
			Dissolved Tin (Sn)	2024/09/16	NC		%	20
			Dissolved Titanium (Ti)	2024/09/16	NC		%	20
			Dissolved Uranium (U)	2024/09/16	1.8		%	20
			Dissolved Vanadium (V)	2024/09/16	NC		%	20
			Dissolved Zinc (Zn)	2024/09/16	3.9		%	20
B519322	S4L	Matrix Spike	Dissolved Barium (Ba)	2024/09/19		95	%	80 - 120
			Dissolved Boron (B)	2024/09/19		95	%	80 - 120
			Dissolved Calcium (Ca)	2024/09/19		101	%	80 - 120
			Dissolved Iron (Fe)	2024/09/19		109	%	80 - 120
			Dissolved Lithium (Li)	2024/09/19		101	%	80 - 120
			Dissolved Magnesium (Mg)	2024/09/19		100	%	80 - 120
			Dissolved Manganese (Mn)	2024/09/19		103	%	80 - 120
			Dissolved Phosphorus (P)	2024/09/19		104	%	80 - 120
			Dissolved Potassium (K)	2024/09/19		98	%	80 - 120
			Dissolved Silicon (Si)	2024/09/19		96	%	80 - 120
			Dissolved Sodium (Na)	2024/09/19		NC	%	80 - 120
			Dissolved Strontium (Sr)	2024/09/19		91	%	80 - 120

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Sulphur (S)	2024/09/19		103	%	80 - 120
B519322	S4L	Spiked Blank	Dissolved Barium (Ba)	2024/09/19		99	%	80 - 120
			Dissolved Boron (B)	2024/09/19		96	%	80 - 120
			Dissolved Calcium (Ca)	2024/09/19		103	%	80 - 120
			Dissolved Iron (Fe)	2024/09/19		108	%	80 - 120
			Dissolved Lithium (Li)	2024/09/19		106	%	80 - 120
			Dissolved Magnesium (Mg)	2024/09/19		102	%	80 - 120
			Dissolved Manganese (Mn)	2024/09/19		103	%	80 - 120
			Dissolved Phosphorus (P)	2024/09/19		103	%	80 - 120
			Dissolved Potassium (K)	2024/09/19		101	%	80 - 120
			Dissolved Silicon (Si)	2024/09/19		96	%	80 - 120
			Dissolved Sodium (Na)	2024/09/19		103	%	80 - 120
			Dissolved Strontium (Sr)	2024/09/19		95	%	80 - 120
			Dissolved Sulphur (S)	2024/09/19		100	%	80 - 120
B519322	S4L	Method Blank	Dissolved Barium (Ba)	2024/09/20	<0.010		mg/L	
			Dissolved Boron (B)	2024/09/20	<0.020		mg/L	
			Dissolved Calcium (Ca)	2024/09/20	<0.30		mg/L	
			Dissolved Iron (Fe)	2024/09/20	<0.060		mg/L	
			Dissolved Lithium (Li)	2024/09/20	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2024/09/20	<0.20		mg/L	
			Dissolved Manganese (Mn)	2024/09/20	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2024/09/20	<0.10		mg/L	
			Dissolved Potassium (K)	2024/09/20	<0.30		mg/L	
			Dissolved Silicon (Si)	2024/09/20	<0.50		mg/L	
			Dissolved Sodium (Na)	2024/09/20	<0.50		mg/L	
			Dissolved Strontium (Sr)	2024/09/20	<0.020		mg/L	
			Dissolved Sulphur (S)	2024/09/20	<0.20		mg/L	
B519322	S4L	RPD	Dissolved Calcium (Ca)	2024/09/19	2.7		%	20
			Dissolved Iron (Fe)	2024/09/19	12		%	20
			Dissolved Magnesium (Mg)	2024/09/19	10		%	20
			Dissolved Manganese (Mn)	2024/09/19	4.2		%	20
			Dissolved Potassium (K)	2024/09/19	2.0		%	20
			Dissolved Sodium (Na)	2024/09/19	2.0		%	20
B519908	KYH	Matrix Spike	Dissolved Cadmium (Cd)	2024/09/17		103	%	80 - 120
B519908	KYH	Spiked Blank	Dissolved Cadmium (Cd)	2024/09/17		106	%	80 - 120
B519908	KYH	Method Blank	Dissolved Cadmium (Cd)	2024/09/17	<0.0050		ug/L	
B519908	KYH	RPD	Dissolved Cadmium (Cd)	2024/09/17	NC		%	20
B522732	S4L	Matrix Spike	Dissolved Barium (Ba)	2024/09/17		96	%	80 - 120
			Dissolved Boron (B)	2024/09/17		92	%	80 - 120
			Dissolved Calcium (Ca)	2024/09/17		NC	%	80 - 120
			Dissolved Iron (Fe)	2024/09/17		104	%	80 - 120
			Dissolved Lithium (Li)	2024/09/17		94	%	80 - 120
			Dissolved Magnesium (Mg)	2024/09/17		94	%	80 - 120
			Dissolved Manganese (Mn)	2024/09/17		105	%	80 - 120
			Dissolved Phosphorus (P)	2024/09/17		101	%	80 - 120
			Dissolved Potassium (K)	2024/09/17		94	%	80 - 120
			Dissolved Silicon (Si)	2024/09/17		93	%	80 - 120
			Dissolved Sodium (Na)	2024/09/17		92	%	80 - 120
			Dissolved Strontium (Sr)	2024/09/17		95	%	80 - 120
			Dissolved Sulphur (S)	2024/09/17		102	%	80 - 120
B522732	S4L	Spiked Blank	Dissolved Barium (Ba)	2024/09/17		102	%	80 - 120
			Dissolved Boron (B)	2024/09/17		95	%	80 - 120
			Dissolved Calcium (Ca)	2024/09/17		101	%	80 - 120
			Dissolved Iron (Fe)	2024/09/17		106	%	80 - 120
			Dissolved Lithium (Li)	2024/09/17		100	%	80 - 120

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Magnesium (Mg)	2024/09/17		102	%	80 - 120
			Dissolved Manganese (Mn)	2024/09/17		107	%	80 - 120
			Dissolved Phosphorus (P)	2024/09/17		102	%	80 - 120
			Dissolved Potassium (K)	2024/09/17		101	%	80 - 120
			Dissolved Silicon (Si)	2024/09/17		99	%	80 - 120
			Dissolved Sodium (Na)	2024/09/17		98	%	80 - 120
			Dissolved Strontium (Sr)	2024/09/17		102	%	80 - 120
			Dissolved Sulphur (S)	2024/09/17		99	%	80 - 120
B522732	S4L	Method Blank	Dissolved Barium (Ba)	2024/09/17	<0.010		mg/L	
			Dissolved Boron (B)	2024/09/17	<0.020		mg/L	
			Dissolved Calcium (Ca)	2024/09/17	<0.30		mg/L	
			Dissolved Iron (Fe)	2024/09/17	<0.060		mg/L	
			Dissolved Lithium (Li)	2024/09/17	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2024/09/17	<0.20		mg/L	
			Dissolved Manganese (Mn)	2024/09/17	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2024/09/17	<0.10		mg/L	
			Dissolved Potassium (K)	2024/09/17	<0.30		mg/L	
			Dissolved Silicon (Si)	2024/09/17	<0.50		mg/L	
			Dissolved Sodium (Na)	2024/09/17	<0.50		mg/L	
			Dissolved Strontium (Sr)	2024/09/17	<0.020		mg/L	
			Dissolved Sulphur (S)	2024/09/17	<0.20		mg/L	
B522732	S4L	RPD	Dissolved Barium (Ba)	2024/09/17	0.39		%	20
			Dissolved Boron (B)	2024/09/17	4.5		%	20
			Dissolved Calcium (Ca)	2024/09/17	0.79		%	20
			Dissolved Iron (Fe)	2024/09/17	NC		%	20
			Dissolved Lithium (Li)	2024/09/17	1.4		%	20
			Dissolved Magnesium (Mg)	2024/09/17	0.74		%	20
			Dissolved Manganese (Mn)	2024/09/17	NC		%	20
			Dissolved Phosphorus (P)	2024/09/17	NC		%	20
			Dissolved Potassium (K)	2024/09/17	0.40		%	20
			Dissolved Silicon (Si)	2024/09/17	0.065		%	20
			Dissolved Sodium (Na)	2024/09/17	0.92		%	20
			Dissolved Strontium (Sr)	2024/09/17	1.3		%	20
			Dissolved Sulphur (S)	2024/09/17	0.75		%	20
B525684	AYE	Spiked Blank	Alkalinity (Total as CaCO3)	2024/09/18		98	%	80 - 120
B525684	AYE	Method Blank	Alkalinity (PP as CaCO3)	2024/09/18	<1.0		mg/L	
			Alkalinity (Total as CaCO3)	2024/09/18	<1.0		mg/L	
			Bicarbonate (HCO3)	2024/09/18	<1.0		mg/L	
			Carbonate (CO3)	2024/09/18	<1.0		mg/L	
			Hydroxide (OH)	2024/09/18	<1.0		mg/L	
B525684	AYE	RPD	Alkalinity (PP as CaCO3)	2024/09/18	NC		%	20
			Alkalinity (Total as CaCO3)	2024/09/18	0.21		%	20
			Bicarbonate (HCO3)	2024/09/18	0.21		%	20
			Carbonate (CO3)	2024/09/18	NC		%	20
			Hydroxide (OH)	2024/09/18	NC		%	20
B525689	AYE	Spiked Blank	pH	2024/09/18		100	%	97 - 103
B525689	AYE	RPD	pH	2024/09/18	1.2		%	N/A
B525691	AYE	Spiked Blank	Conductivity	2024/09/18		101	%	90 - 110
B525691	AYE	Method Blank	Conductivity	2024/09/18	<2.0		uS/cm	
B525691	AYE	RPD	Conductivity	2024/09/18	0.35		%	10
B526019	RY3	Matrix Spike	Total Cadmium (Cd)	2024/09/19		101	%	80 - 120
B526019	RY3	Spiked Blank	Total Cadmium (Cd)	2024/09/19		104	%	80 - 120
B526019	RY3	Method Blank	Total Cadmium (Cd)	2024/09/19	<0.0050		ug/L	
B526019	RY3	RPD	Total Cadmium (Cd)	2024/09/19	NC		%	20
B529587	KH2	Matrix Spike	Total Aluminum (Al)	2024/09/20		102	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Antimony (Sb)	2024/09/20		107	%	80 - 120
			Total Arsenic (As)	2024/09/20		104	%	80 - 120
			Total Beryllium (Be)	2024/09/20		95	%	80 - 120
			Total Chromium (Cr)	2024/09/20		101	%	80 - 120
			Total Cobalt (Co)	2024/09/20		100	%	80 - 120
			Total Copper (Cu)	2024/09/20		98	%	80 - 120
			Total Lead (Pb)	2024/09/20		105	%	80 - 120
			Total Molybdenum (Mo)	2024/09/20		109	%	80 - 120
			Total Nickel (Ni)	2024/09/20		99	%	80 - 120
			Total Selenium (Se)	2024/09/20		98	%	80 - 120
			Total Silver (Ag)	2024/09/20		105	%	80 - 120
			Total Thallium (Tl)	2024/09/20		104	%	80 - 120
			Total Tin (Sn)	2024/09/20		108	%	80 - 120
			Total Titanium (Ti)	2024/09/20		102	%	80 - 120
			Total Uranium (U)	2024/09/20		108	%	80 - 120
			Total Vanadium (V)	2024/09/20		104	%	80 - 120
			Total Zinc (Zn)	2024/09/20		98	%	80 - 120
B529587	KH2	Spiked Blank	Total Aluminum (Al)	2024/09/20		106	%	80 - 120
			Total Antimony (Sb)	2024/09/20		100	%	80 - 120
			Total Arsenic (As)	2024/09/20		97	%	80 - 120
			Total Beryllium (Be)	2024/09/20		93	%	80 - 120
			Total Chromium (Cr)	2024/09/20		97	%	80 - 120
			Total Cobalt (Co)	2024/09/20		96	%	80 - 120
			Total Copper (Cu)	2024/09/20		94	%	80 - 120
			Total Lead (Pb)	2024/09/20		99	%	80 - 120
			Total Molybdenum (Mo)	2024/09/20		100	%	80 - 120
			Total Nickel (Ni)	2024/09/20		95	%	80 - 120
			Total Selenium (Se)	2024/09/20		96	%	80 - 120
			Total Silver (Ag)	2024/09/20		98	%	80 - 120
			Total Thallium (Tl)	2024/09/20		98	%	80 - 120
			Total Tin (Sn)	2024/09/20		100	%	80 - 120
			Total Titanium (Ti)	2024/09/20		95	%	80 - 120
			Total Uranium (U)	2024/09/20		99	%	80 - 120
			Total Vanadium (V)	2024/09/20		97	%	80 - 120
			Total Zinc (Zn)	2024/09/20		94	%	80 - 120
B529587	KH2	Method Blank	Total Aluminum (Al)	2024/09/20	<0.0030		mg/L	
			Total Antimony (Sb)	2024/09/20	<0.00060		mg/L	
			Total Arsenic (As)	2024/09/20	<0.00020		mg/L	
			Total Beryllium (Be)	2024/09/20	<0.0010		mg/L	
			Total Chromium (Cr)	2024/09/20	<0.0010		mg/L	
			Total Cobalt (Co)	2024/09/20	<0.00030		mg/L	
			Total Copper (Cu)	2024/09/20	<0.0010		mg/L	
			Total Lead (Pb)	2024/09/20	<0.00020		mg/L	
			Total Molybdenum (Mo)	2024/09/20	<0.00020		mg/L	
			Total Nickel (Ni)	2024/09/20	<0.00050		mg/L	
			Total Selenium (Se)	2024/09/20	<0.00020		mg/L	
			Total Silver (Ag)	2024/09/20	<0.00010		mg/L	
			Total Thallium (Tl)	2024/09/20	<0.00020		mg/L	
			Total Tin (Sn)	2024/09/20	<0.0010		mg/L	
			Total Titanium (Ti)	2024/09/20	<0.0010		mg/L	
			Total Uranium (U)	2024/09/20	<0.00010		mg/L	
			Total Vanadium (V)	2024/09/20	<0.0010		mg/L	
			Total Zinc (Zn)	2024/09/20	<0.0030		mg/L	
B529587	KH2	RPD	Total Aluminum (Al)	2024/09/20	NC		%	20
			Total Antimony (Sb)	2024/09/20	NC		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Arsenic (As)	2024/09/20	NC		%	20
			Total Beryllium (Be)	2024/09/20	NC		%	20
			Total Chromium (Cr)	2024/09/20	NC		%	20
			Total Cobalt (Co)	2024/09/20	NC		%	20
			Total Copper (Cu)	2024/09/20	NC		%	20
			Total Lead (Pb)	2024/09/20	NC		%	20
			Total Molybdenum (Mo)	2024/09/20	9.9		%	20
			Total Nickel (Ni)	2024/09/20	NC		%	20
			Total Selenium (Se)	2024/09/20	NC		%	20
			Total Silver (Ag)	2024/09/20	NC		%	20
			Total Thallium (Tl)	2024/09/20	NC		%	20
			Total Tin (Sn)	2024/09/20	NC		%	20
			Total Titanium (Ti)	2024/09/20	NC		%	20
			Total Uranium (U)	2024/09/20	1.5		%	20
			Total Vanadium (V)	2024/09/20	NC		%	20
			Total Zinc (Zn)	2024/09/20	NC		%	20
B529590	JAB	Matrix Spike [CVK347-04]	Total Barium (Ba)	2024/09/20		106	%	80 - 120
			Total Boron (B)	2024/09/20		104	%	80 - 120
			Total Calcium (Ca)	2024/09/20		109	%	80 - 120
			Total Iron (Fe)	2024/09/20		112	%	80 - 120
			Total Lithium (Li)	2024/09/20		107	%	80 - 120
			Total Magnesium (Mg)	2024/09/20		109	%	80 - 120
			Total Manganese (Mn)	2024/09/20		107	%	80 - 120
			Total Phosphorus (P)	2024/09/20		106	%	80 - 120
			Total Potassium (K)	2024/09/20		108	%	80 - 120
			Total Silicon (Si)	2024/09/20		103	%	80 - 120
			Total Sodium (Na)	2024/09/20		110	%	80 - 120
			Total Strontium (Sr)	2024/09/20		101	%	80 - 120
			Total Sulphur (S)	2024/09/20		104	%	80 - 120
B529590	JAB	Spiked Blank	Total Barium (Ba)	2024/09/20		104	%	80 - 120
			Total Boron (B)	2024/09/20		102	%	80 - 120
			Total Calcium (Ca)	2024/09/20		105	%	80 - 120
			Total Iron (Fe)	2024/09/20		115	%	80 - 120
			Total Lithium (Li)	2024/09/20		103	%	80 - 120
			Total Magnesium (Mg)	2024/09/20		105	%	80 - 120
			Total Manganese (Mn)	2024/09/20		105	%	80 - 120
			Total Phosphorus (P)	2024/09/20		106	%	80 - 120
			Total Potassium (K)	2024/09/20		104	%	80 - 120
			Total Silicon (Si)	2024/09/20		104	%	80 - 120
			Total Sodium (Na)	2024/09/20		107	%	80 - 120
			Total Strontium (Sr)	2024/09/20		99	%	80 - 120
			Total Sulphur (S)	2024/09/20		103	%	80 - 120
B529590	JAB	Method Blank	Total Barium (Ba)	2024/09/20	<0.010		mg/L	
			Total Boron (B)	2024/09/20	<0.020		mg/L	
			Total Calcium (Ca)	2024/09/20	<0.30		mg/L	
			Total Iron (Fe)	2024/09/20	<0.060		mg/L	
			Total Lithium (Li)	2024/09/20	<0.020		mg/L	
			Total Magnesium (Mg)	2024/09/20	<0.20		mg/L	
			Total Manganese (Mn)	2024/09/20	<0.0040		mg/L	
			Total Phosphorus (P)	2024/09/20	<0.10		mg/L	
			Total Potassium (K)	2024/09/20	<0.30		mg/L	
			Total Silicon (Si)	2024/09/20	<0.50		mg/L	
			Total Sodium (Na)	2024/09/20	<0.50		mg/L	
			Total Strontium (Sr)	2024/09/20	<0.020		mg/L	
			Total Sulphur (S)	2024/09/20	<0.20		mg/L	

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B529590	JAB	RPD	Total Barium (Ba)	2024/09/20	18		%	20
			Total Boron (B)	2024/09/20	19		%	20
			Total Calcium (Ca)	2024/09/20	20		%	20
			Total Iron (Fe)	2024/09/20	3.4		%	20
			Total Lithium (Li)	2024/09/20	7.8		%	20
			Total Magnesium (Mg)	2024/09/20	19		%	20
			Total Manganese (Mn)	2024/09/20	3.2		%	20
			Total Phosphorus (P)	2024/09/20	NC		%	20
			Total Potassium (K)	2024/09/20	20		%	20
			Total Silicon (Si)	2024/09/20	1.5		%	20
			Total Sodium (Na)	2024/09/20	20		%	20
			Total Strontium (Sr)	2024/09/20	25 (1)		%	20
			Total Sulphur (S)	2024/09/20	1.2		%	20
B529912	KH2	Matrix Spike	Total Aluminum (Al)	2024/09/20		NC	%	80 - 120
			Total Antimony (Sb)	2024/09/20		102	%	80 - 120
			Total Arsenic (As)	2024/09/20		102	%	80 - 120
			Total Beryllium (Be)	2024/09/20		96	%	80 - 120
			Total Chromium (Cr)	2024/09/20		96	%	80 - 120
			Total Cobalt (Co)	2024/09/20		93	%	80 - 120
			Total Copper (Cu)	2024/09/20		91	%	80 - 120
			Total Lead (Pb)	2024/09/20		97	%	80 - 120
			Total Molybdenum (Mo)	2024/09/20		104	%	80 - 120
			Total Nickel (Ni)	2024/09/20		92	%	80 - 120
			Total Selenium (Se)	2024/09/20		98	%	80 - 120
			Total Silver (Ag)	2024/09/20		100	%	80 - 120
			Total Thallium (Tl)	2024/09/20		97	%	80 - 120
			Total Tin (Sn)	2024/09/20		105	%	80 - 120
			Total Titanium (Ti)	2024/09/20		97	%	80 - 120
			Total Uranium (U)	2024/09/20		99	%	80 - 120
			Total Vanadium (V)	2024/09/20		98	%	80 - 120
			Total Zinc (Zn)	2024/09/20		96	%	80 - 120
B529912	KH2	Spiked Blank	Total Aluminum (Al)	2024/09/20		103	%	80 - 120
			Total Antimony (Sb)	2024/09/20		102	%	80 - 120
			Total Arsenic (As)	2024/09/20		100	%	80 - 120
			Total Beryllium (Be)	2024/09/20		96	%	80 - 120
			Total Chromium (Cr)	2024/09/20		96	%	80 - 120
			Total Cobalt (Co)	2024/09/20		95	%	80 - 120
			Total Copper (Cu)	2024/09/20		94	%	80 - 120
			Total Lead (Pb)	2024/09/20		98	%	80 - 120
			Total Molybdenum (Mo)	2024/09/20		102	%	80 - 120
			Total Nickel (Ni)	2024/09/20		95	%	80 - 120
			Total Selenium (Se)	2024/09/20		99	%	80 - 120
			Total Silver (Ag)	2024/09/20		98	%	80 - 120
			Total Thallium (Tl)	2024/09/20		96	%	80 - 120
			Total Tin (Sn)	2024/09/20		103	%	80 - 120
			Total Titanium (Ti)	2024/09/20		98	%	80 - 120
			Total Uranium (U)	2024/09/20		99	%	80 - 120
			Total Vanadium (V)	2024/09/20		98	%	80 - 120
			Total Zinc (Zn)	2024/09/20		97	%	80 - 120
B529912	KH2	Method Blank	Total Aluminum (Al)	2024/09/21	<0.0030		mg/L	
			Total Antimony (Sb)	2024/09/21	<0.00060		mg/L	
			Total Arsenic (As)	2024/09/21	<0.00020		mg/L	
			Total Beryllium (Be)	2024/09/21	<0.0010		mg/L	
			Total Chromium (Cr)	2024/09/21	<0.0010		mg/L	
			Total Cobalt (Co)	2024/09/21	<0.00030		mg/L	

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Copper (Cu)	2024/09/21	<0.0010		mg/L	
			Total Lead (Pb)	2024/09/21	<0.00020		mg/L	
			Total Molybdenum (Mo)	2024/09/21	<0.00020		mg/L	
			Total Nickel (Ni)	2024/09/21	<0.00050		mg/L	
			Total Selenium (Se)	2024/09/21	<0.00020		mg/L	
			Total Silver (Ag)	2024/09/21	<0.00010		mg/L	
			Total Thallium (Tl)	2024/09/21	<0.00020		mg/L	
			Total Tin (Sn)	2024/09/21	<0.0010		mg/L	
			Total Titanium (Ti)	2024/09/21	<0.0010		mg/L	
			Total Uranium (U)	2024/09/21	<0.00010		mg/L	
			Total Vanadium (V)	2024/09/21	<0.0010		mg/L	
			Total Zinc (Zn)	2024/09/21	<0.0030		mg/L	
B529912	KH2	RPD	Total Aluminum (Al)	2024/09/21	5.3		%	20
			Total Antimony (Sb)	2024/09/21	NC		%	20
			Total Arsenic (As)	2024/09/21	14		%	20
			Total Beryllium (Be)	2024/09/21	NC		%	20
			Total Chromium (Cr)	2024/09/21	15		%	20
			Total Cobalt (Co)	2024/09/21	15		%	20
			Total Copper (Cu)	2024/09/21	11		%	20
			Total Lead (Pb)	2024/09/21	12		%	20
			Total Molybdenum (Mo)	2024/09/21	16		%	20
			Total Nickel (Ni)	2024/09/21	20		%	20
			Total Selenium (Se)	2024/09/21	NC		%	20
			Total Silver (Ag)	2024/09/21	NC		%	20
			Total Thallium (Tl)	2024/09/21	NC		%	20
			Total Tin (Sn)	2024/09/21	5.0		%	20
			Total Titanium (Ti)	2024/09/21	6.9		%	20
			Total Uranium (U)	2024/09/21	9.3		%	20
			Total Vanadium (V)	2024/09/21	18		%	20
			Total Zinc (Zn)	2024/09/21	7.1		%	20
B529921	S1D	Matrix Spike	Total Barium (Ba)	2024/09/21		91	%	80 - 120
			Total Boron (B)	2024/09/21		89	%	80 - 120
			Total Calcium (Ca)	2024/09/21		NC	%	80 - 120
			Total Iron (Fe)	2024/09/21		108	%	80 - 120
			Total Lithium (Li)	2024/09/21		84	%	80 - 120
			Total Magnesium (Mg)	2024/09/21		100	%	80 - 120
			Total Manganese (Mn)	2024/09/21		108	%	80 - 120
			Total Phosphorus (P)	2024/09/21		103	%	80 - 120
			Total Potassium (K)	2024/09/21		87	%	80 - 120
			Total Silicon (Si)	2024/09/21		105	%	80 - 120
			Total Sodium (Na)	2024/09/21		85	%	80 - 120
			Total Strontium (Sr)	2024/09/21		90	%	80 - 120
			Total Sulphur (S)	2024/09/21		104	%	80 - 120
B529921	S1D	Spiked Blank	Total Barium (Ba)	2024/09/21		91	%	80 - 120
			Total Boron (B)	2024/09/21		88	%	80 - 120
			Total Calcium (Ca)	2024/09/21		86	%	80 - 120
			Total Iron (Fe)	2024/09/21		99	%	80 - 120
			Total Lithium (Li)	2024/09/21		84	%	80 - 120
			Total Magnesium (Mg)	2024/09/21		98	%	80 - 120
			Total Manganese (Mn)	2024/09/21		105	%	80 - 120
			Total Phosphorus (P)	2024/09/21		102	%	80 - 120
			Total Potassium (K)	2024/09/21		87	%	80 - 120
			Total Silicon (Si)	2024/09/21		102	%	80 - 120
			Total Sodium (Na)	2024/09/21		86	%	80 - 120
			Total Strontium (Sr)	2024/09/21		90	%	80 - 120

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Sulphur (S)	2024/09/21		101	%	80 - 120
B529921	S1D	Method Blank	Total Barium (Ba)	2024/09/21	<0.010		mg/L	
			Total Boron (B)	2024/09/21	<0.020		mg/L	
			Total Calcium (Ca)	2024/09/21	<0.30		mg/L	
			Total Iron (Fe)	2024/09/21	<0.060		mg/L	
			Total Lithium (Li)	2024/09/21	<0.020		mg/L	
			Total Magnesium (Mg)	2024/09/21	<0.20		mg/L	
			Total Manganese (Mn)	2024/09/21	<0.0040		mg/L	
			Total Phosphorus (P)	2024/09/21	<0.10		mg/L	
			Total Potassium (K)	2024/09/21	<0.30		mg/L	
			Total Silicon (Si)	2024/09/21	<0.50		mg/L	
			Total Sodium (Na)	2024/09/21	<0.50		mg/L	
			Total Strontium (Sr)	2024/09/21	<0.020		mg/L	
			Total Sulphur (S)	2024/09/21	<0.20		mg/L	
B529921	S1D	RPD	Total Barium (Ba)	2024/09/21	0.57		%	20
			Total Boron (B)	2024/09/21	1.1		%	20
			Total Calcium (Ca)	2024/09/21	0.045		%	20
			Total Iron (Fe)	2024/09/21	1.1		%	20
			Total Lithium (Li)	2024/09/21	NC		%	20
			Total Magnesium (Mg)	2024/09/21	1.4		%	20
			Total Manganese (Mn)	2024/09/21	1.1		%	20
			Total Phosphorus (P)	2024/09/21	NC		%	20
			Total Potassium (K)	2024/09/21	0.39		%	20
			Total Silicon (Si)	2024/09/21	0.64		%	20
			Total Sodium (Na)	2024/09/21	0.022		%	20
			Total Strontium (Sr)	2024/09/21	0.49		%	20
			Total Sulphur (S)	2024/09/21	0.93		%	20
B532243	KH2	Matrix Spike	Total Lead (Pb)	2024/09/23		115	%	80 - 120
B532243	KH2	Spiked Blank	Total Lead (Pb)	2024/09/23		109	%	80 - 120
B532243	KH2	Method Blank	Total Lead (Pb)	2024/09/23	<0.00020		mg/L	
B532243	KH2	RPD	Total Lead (Pb)	2024/09/23	NC		%	20
B533784	KH2	Matrix Spike	Total Aluminum (Al)	2024/09/24		NC	%	80 - 120
			Total Antimony (Sb)	2024/09/24		91	%	80 - 120
			Total Arsenic (As)	2024/09/24		98	%	80 - 120
			Total Beryllium (Be)	2024/09/24		98	%	80 - 120
			Total Chromium (Cr)	2024/09/24		94	%	80 - 120
			Total Cobalt (Co)	2024/09/24		94	%	80 - 120
			Total Copper (Cu)	2024/09/24		94	%	80 - 120
			Total Lead (Pb)	2024/09/24		94	%	80 - 120
			Total Molybdenum (Mo)	2024/09/24		93	%	80 - 120
			Total Nickel (Ni)	2024/09/24		94	%	80 - 120
			Total Selenium (Se)	2024/09/24		97	%	80 - 120
			Total Silver (Ag)	2024/09/24		96	%	80 - 120
			Total Thallium (Tl)	2024/09/24		86	%	80 - 120
			Total Tin (Sn)	2024/09/24		95	%	80 - 120
			Total Titanium (Ti)	2024/09/24		89	%	80 - 120
			Total Uranium (U)	2024/09/24		96	%	80 - 120
			Total Vanadium (V)	2024/09/24		96	%	80 - 120
			Total Zinc (Zn)	2024/09/24		72 (1)	%	80 - 120
B533784	KH2	Spiked Blank	Total Aluminum (Al)	2024/09/24		101	%	80 - 120
			Total Antimony (Sb)	2024/09/24		102	%	80 - 120
			Total Arsenic (As)	2024/09/24		104	%	80 - 120
			Total Beryllium (Be)	2024/09/24		100	%	80 - 120
			Total Chromium (Cr)	2024/09/24		100	%	80 - 120
			Total Cobalt (Co)	2024/09/24		101	%	80 - 120

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Copper (Cu)	2024/09/24		101	%	80 - 120
			Total Lead (Pb)	2024/09/24		98	%	80 - 120
			Total Molybdenum (Mo)	2024/09/24		100	%	80 - 120
			Total Nickel (Ni)	2024/09/24		101	%	80 - 120
			Total Selenium (Se)	2024/09/24		101	%	80 - 120
			Total Silver (Ag)	2024/09/24		101	%	80 - 120
			Total Thallium (Tl)	2024/09/24		96	%	80 - 120
			Total Tin (Sn)	2024/09/24		100	%	80 - 120
			Total Titanium (Ti)	2024/09/24		98	%	80 - 120
			Total Uranium (U)	2024/09/24		104	%	80 - 120
			Total Vanadium (V)	2024/09/24		101	%	80 - 120
			Total Zinc (Zn)	2024/09/24		101	%	80 - 120
B533784	KH2	Method Blank	Total Aluminum (Al)	2024/09/24	<0.0030		mg/L	
			Total Antimony (Sb)	2024/09/24	<0.00060		mg/L	
			Total Arsenic (As)	2024/09/24	<0.00020		mg/L	
			Total Beryllium (Be)	2024/09/24	<0.0010		mg/L	
			Total Chromium (Cr)	2024/09/24	<0.0010		mg/L	
			Total Cobalt (Co)	2024/09/24	<0.00030		mg/L	
			Total Copper (Cu)	2024/09/24	<0.0010		mg/L	
			Total Lead (Pb)	2024/09/24	<0.00020		mg/L	
			Total Molybdenum (Mo)	2024/09/24	<0.00020		mg/L	
			Total Nickel (Ni)	2024/09/24	<0.00050		mg/L	
			Total Selenium (Se)	2024/09/24	<0.00020		mg/L	
			Total Silver (Ag)	2024/09/24	<0.00010		mg/L	
			Total Thallium (Tl)	2024/09/24	<0.00020		mg/L	
			Total Tin (Sn)	2024/09/24	<0.0010		mg/L	
			Total Titanium (Ti)	2024/09/24	<0.0010		mg/L	
			Total Uranium (U)	2024/09/24	<0.00010		mg/L	
			Total Vanadium (V)	2024/09/24	<0.0010		mg/L	
			Total Zinc (Zn)	2024/09/24	<0.0030		mg/L	
B533784	KH2	RPD	Total Aluminum (Al)	2024/09/24	0.29		%	20
			Total Antimony (Sb)	2024/09/24	NC		%	20
			Total Arsenic (As)	2024/09/24	2.2		%	20
			Total Beryllium (Be)	2024/09/24	NC		%	20
			Total Chromium (Cr)	2024/09/24	NC		%	20
			Total Cobalt (Co)	2024/09/24	NC		%	20
			Total Copper (Cu)	2024/09/24	0.31		%	20
			Total Lead (Pb)	2024/09/24	NC		%	20
			Total Molybdenum (Mo)	2024/09/24	2.0		%	20
			Total Nickel (Ni)	2024/09/24	4.1		%	20
			Total Selenium (Se)	2024/09/24	NC		%	20
			Total Silver (Ag)	2024/09/24	NC		%	20
			Total Thallium (Tl)	2024/09/24	NC		%	20
			Total Tin (Sn)	2024/09/24	NC		%	20
			Total Titanium (Ti)	2024/09/24	NC		%	20
			Total Uranium (U)	2024/09/24	NC		%	20
			Total Vanadium (V)	2024/09/24	NC		%	20
			Total Zinc (Zn)	2024/09/24	5.8		%	20
B533786	S4L	Matrix Spike	Total Barium (Ba)	2024/09/24		99	%	80 - 120
			Total Boron (B)	2024/09/24		105	%	80 - 120
			Total Calcium (Ca)	2024/09/24		NC	%	80 - 120
			Total Iron (Fe)	2024/09/24		NC	%	80 - 120
			Total Lithium (Li)	2024/09/24		98	%	80 - 120
			Total Magnesium (Mg)	2024/09/24		102	%	80 - 120
			Total Manganese (Mn)	2024/09/24		105	%	80 - 120

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Phosphorus (P)	2024/09/24		108	%	80 - 120
			Total Potassium (K)	2024/09/24		100	%	80 - 120
			Total Silicon (Si)	2024/09/24		109	%	80 - 120
			Total Sodium (Na)	2024/09/24		98	%	80 - 120
			Total Strontium (Sr)	2024/09/24		96	%	80 - 120
			Total Sulphur (S)	2024/09/24		106	%	80 - 120
B533786	S4L	Spiked Blank	Total Barium (Ba)	2024/09/24		95	%	80 - 120
			Total Boron (B)	2024/09/24		94	%	80 - 120
			Total Calcium (Ca)	2024/09/24		95	%	80 - 120
			Total Iron (Fe)	2024/09/24		99	%	80 - 120
			Total Lithium (Li)	2024/09/24		94	%	80 - 120
			Total Magnesium (Mg)	2024/09/24		99	%	80 - 120
			Total Manganese (Mn)	2024/09/24		95	%	80 - 120
			Total Phosphorus (P)	2024/09/24		96	%	80 - 120
			Total Potassium (K)	2024/09/24		96	%	80 - 120
			Total Silicon (Si)	2024/09/24		95	%	80 - 120
			Total Sodium (Na)	2024/09/24		95	%	80 - 120
			Total Strontium (Sr)	2024/09/24		93	%	80 - 120
			Total Sulphur (S)	2024/09/24		95	%	80 - 120
B533786	S4L	Method Blank	Total Barium (Ba)	2024/09/24	<0.010		mg/L	
			Total Boron (B)	2024/09/24	<0.020		mg/L	
			Total Calcium (Ca)	2024/09/24	<0.30		mg/L	
			Total Iron (Fe)	2024/09/24	<0.070		mg/L	
			Total Lithium (Li)	2024/09/24	<0.020		mg/L	
			Total Magnesium (Mg)	2024/09/24	<0.20		mg/L	
			Total Manganese (Mn)	2024/09/24	<0.0040		mg/L	
			Total Phosphorus (P)	2024/09/24	<0.10		mg/L	
			Total Potassium (K)	2024/09/24	<0.30		mg/L	
			Total Silicon (Si)	2024/09/24	<0.50		mg/L	
			Total Sodium (Na)	2024/09/24	<0.50		mg/L	
			Total Strontium (Sr)	2024/09/24	<0.020		mg/L	
			Total Sulphur (S)	2024/09/24	<0.20		mg/L	
B533786	S4L	RPD	Total Barium (Ba)	2024/09/24	1.5		%	20
			Total Boron (B)	2024/09/24	NC		%	20
			Total Calcium (Ca)	2024/09/24	0.85		%	20
			Total Iron (Fe)	2024/09/24	NC		%	20
			Total Lithium (Li)	2024/09/24	NC		%	20
			Total Magnesium (Mg)	2024/09/24	0.55		%	20
			Total Manganese (Mn)	2024/09/24	NC		%	20
			Total Phosphorus (P)	2024/09/24	NC		%	20
			Total Potassium (K)	2024/09/24	1.6		%	20
			Total Silicon (Si)	2024/09/24	1.9		%	20
			Total Sodium (Na)	2024/09/24	1.3		%	20
			Total Strontium (Sr)	2024/09/24	2.8		%	20

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Sulphur (S)	2024/09/24	1.8		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

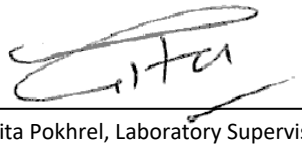
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

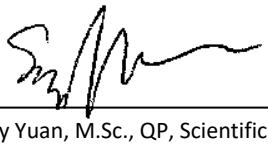
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Gita Pokhrel, Laboratory Supervisor

Janet Gao, B.Sc., QP, Supervisor, Organics



Sandy Yuan, M.Sc., QP, Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

Bureau Veritas Proprietary Software
Logiciel Propriétaire de Bureau Veritas

Automated Statchk

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

C472317
2024/09/12 10:00

Bureau Veritas
4000 19st N.E, Calgary, Alberta Canada T2E 6P8 Tel:(403) 291-3077 Toll-free:800-563-6266 Fax:(403) 291-9468 www.bvna.com

Chain Of Custody Record

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#6699 AECOM CANADA LTD.	Company Name		Quotation #	C40841	Bureau Veritas Job #	Bottle Order #:
Contact Name	ACCOUNTS PAYABLE	Contact Name	Alysha Selinger	P.O. #			734367
Address	18817 Stony Plain Road NW EDMONTON AB T5S 0C2	Address	JESSICA.STEPNEY@AECOM.COM	Project #	60736036	Chain Of Custody Record	Project Manager
Phone	(780) 486-7000 Fax: (780) 486-7070	Phone	Fax:	Project Name		C#734367-01-01	Parminder Virk
	CANSSC.E-billing@aecom.com	Email	alysha.selinger@aecom.com	Site #	CAM-D		
				Sampled By			

MCAL-2024-09-1106

Special Instructions

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to Bureau Veritas

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

Regular (Standard) TAT X

(will be applied if Rush TAT is not specified)

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

Date Required: _____ Time Required: _____

Rush Confirmation Number _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	AT1 BTEX and F1-F2 in Water	Low Level Cd- Total (Group 1)	Regulated Metals (CCME/AT1) - Total	Regulated Metals (CCME/AT1) - Dissolved	Low Level Cd - Dissolved (Group 2)	Routine Water	Total Suspended Solids (NFR)	Polychlorinated Biphenyls in Water			# of Bottles	Comments
1	SID#359154	MW01	2024/09/10	1:00 PM	GW	N	Y	X	X	X	X	X	X	X	X				
2	SID#359155	MW03	→ DID NOT SAMPLE																SEE SAMPLE ID EDIT
3	SID#359156	MW02	2024/09/10	3:00 PM	GW	N	Y	X	X	X	X	X	X	X	X				SEE SAMPLE ID EDIT
4	SID#359157	MW04	→ DID NOT SAMPLE																
5		MW08	2024/09/10	3:30 PM	GW	N	Y	X	X	X	X	X	X	X	X				
6																			
7		FIELD BLANK ONLY PARTIALLY FILLED	2024/09/10	12:00 PM	GW	N	Y	X	X	X	X	X	X	X	X				DO WHAT TESTS YOU CAN
8		TRIP BLANK						X	X	X	X	X	X	X	X				
9								X	X	X	X	X	X	X	X				IGNORE, WRONG LINE
10																			

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only		
Dexton Dion-Hoffman	2024/09/12	9:55 am	Daniel Choi	24/09/13	15:15		Time Sensitive ☐	Temperature (°C) on Receipt MCAL 6.3/6.4/6.8	Custody Seal Intact on Cooler? ☒ Yes ☐ No GM-Y

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Bureau Veritas Yellow: Client

Received in Yellowknife
By: J.MCCANN
10:00
SEP 12 2024
Iceline / Courier

TEMP: 7/5/6
5/3/6

Bureau Veritas Canada (2019) Inc.

aecom.com