AECOM

Appendix B

Hydrogeological, Geotechnical and Contaminated Sites Assessment Report and Memorandum

Geotechnical, Hydrogeological and Contaminated Site Assessment Report

Region of Peel Snow Storage

Region of Peel

60646784

June 2024

Delivering a better world

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AECOM: 2015-04-13

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1. Introduction

The Region of Peel retained AECOM Canada Ltd. (AECOM) to provide preliminary design engineering services for nine (9) proposed snow disposal locations in the Town of Caledon and the City of Brampton, Ontario (the Sites). As per the client's request, four (4) sites (Site #2, 4, 7, and 8) have been cancelled during the completion of the project. The locations of the five (5) sites are shown in **figures 1 to 5** The five (5) are as follows:

- Site #1 – Highway No. 50 Carpool Lot
- Site #3 – West Brampton Reservoir and Pumping Station
- Site #5 – Johnston Sports Park
- Site #6 – Tullamore Reservoir and Pumping Station
- Site #9 – Alloa Reservoir and Pumping Station.

This report presents the geotechnical investigation undertaken by the AECOM team for Region of Peel. The geotechnical scope of work includes the completion of a field investigation program and the snow storage design recommendations.

This report also describes the hydrogeological conditions for all five (5) sites including summarizing and characterizing the local physical and groundwater setting, estimating infiltration and movement of meltwater through the subsurface. A summary and interpretation, and discussion of the assessment results are provided in the report.

An environmental soil and groundwater sampling program was also completed as a part of the current geotechnical and hydrogeological investigation for evaluating the environmental quality of the fill material and the upper level of native subsurface soil as well as a baseline analysis of the groundwater for the future discharge options during the construction. This sampling/testing program was conducted for the future on-site waste management of excess soil for the waste disposal and re-use options during the construction. A summary, interpretation, and discussion of the environmental quality of soil and groundwater conditions of all the sites are provided in the report.

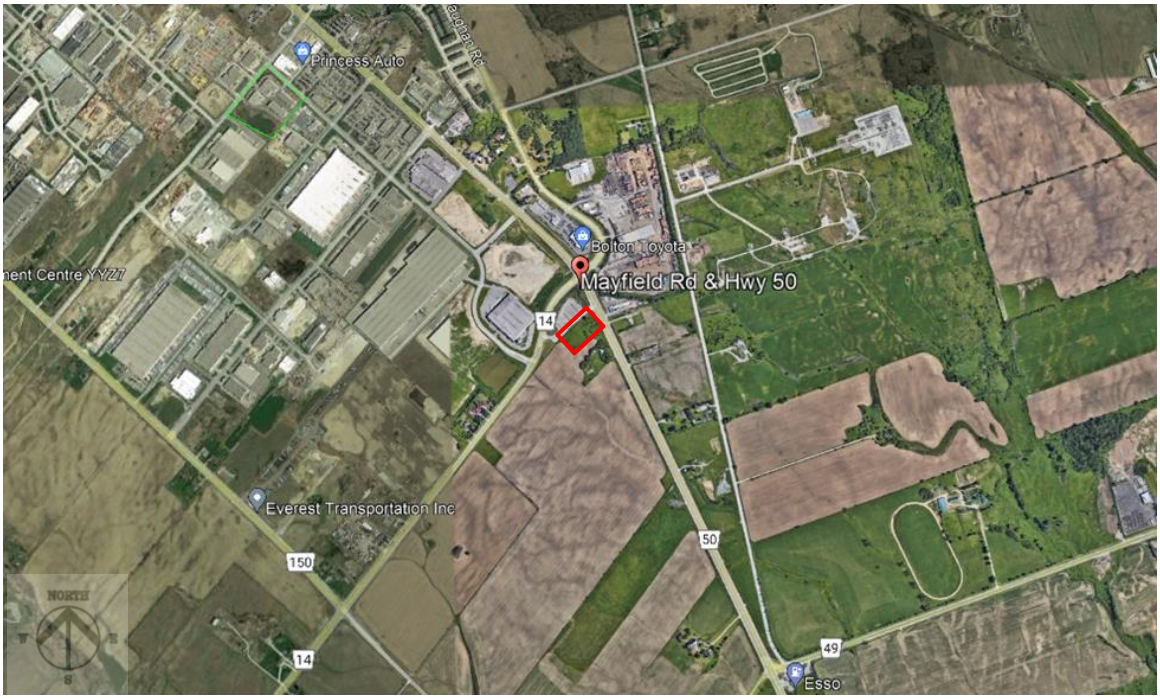

Figure 1: Location of Site #1 Highway No. 50 Car Pool Lot

Figure 2: Location of Site #3 West Brampton Reservoir and Pumping Station

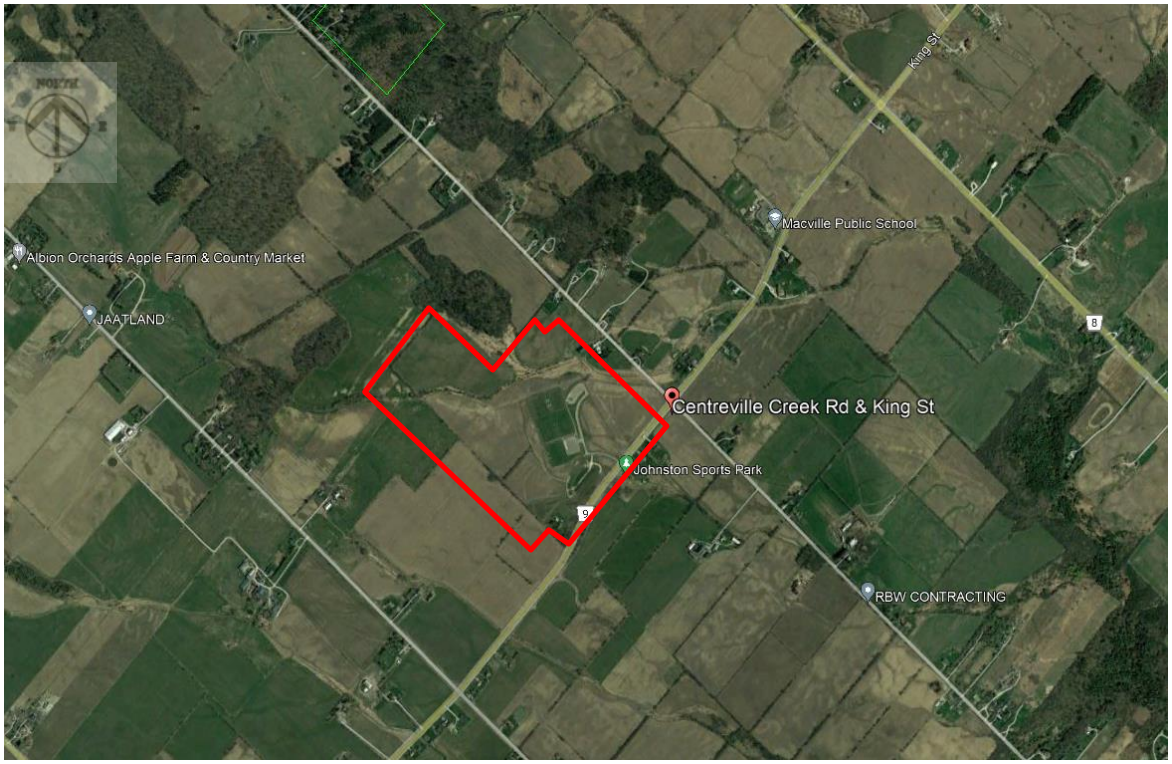

Figure 3: Location of Site #5 Johnston Sports Park

Figure 4: Location of Site #6 Tullamore Reservoir and Pumping Station

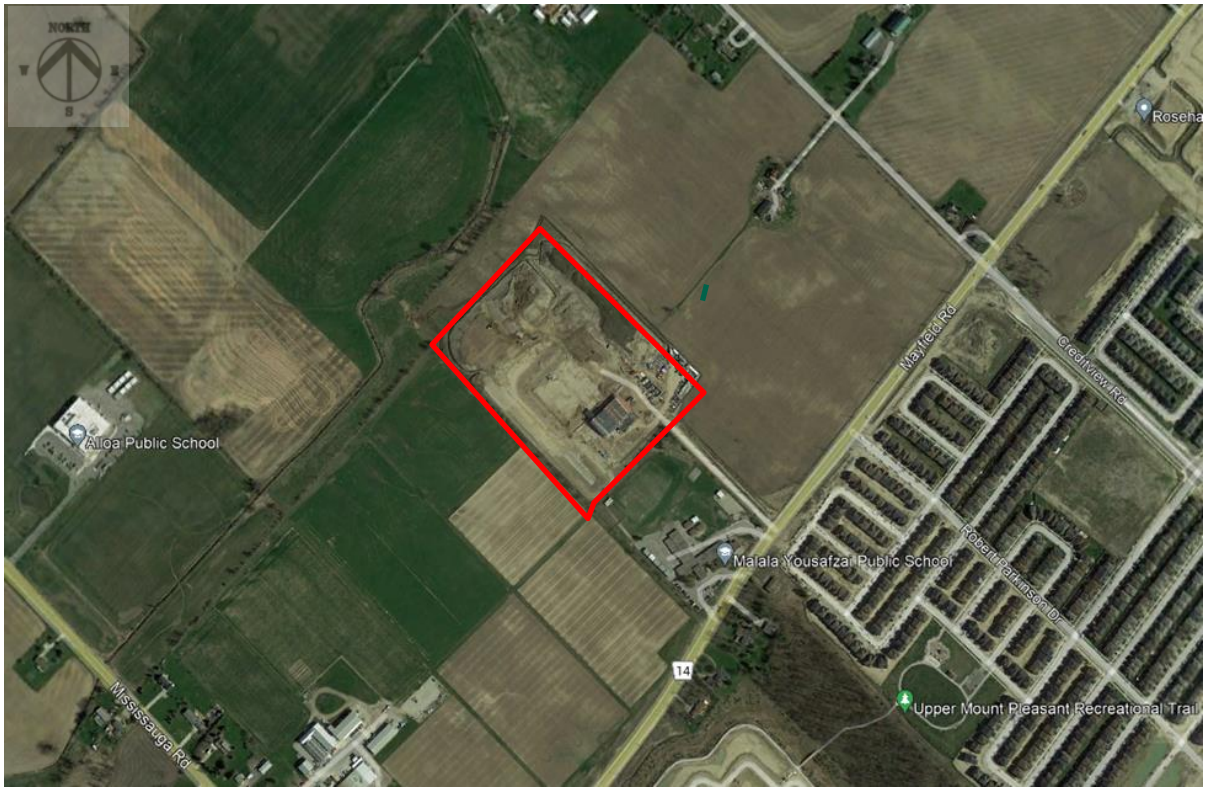

Figure 5: Location of Site #9 Alloa Reservoir and Pumping Station

2. Field Investigation Methodology

This section describes the methods and specific procedures which were followed during the completion of geotechnical, hydrogeological and environmental assessment.

The borehole locations were established in the field on October 15, 2021 and December 8, 2021 by AECOM staff. The public utility infrastructure owners were contracted through the Ontario One Call (On1Call) system to request marking of subsurface utilities in the investigation area. A private utility company, UtilityMarx located in Hamilton Ontario, was subcontracted on December 8, 2021, carried out the locates all existing buried underground infrastructures on each site.

2.1 Geotechnical Investigation Sampling Methodology and Monitoring Well Installation

The geotechnical investigation program was executed from November 15 to 16, from December 15 to 20, 2021 and on January 3, 2022 under the full-time supervision of AECOM field staff. The geotechnical investigation program consisted of the sampled boreholes drilling and the installation of monitoring wells. To carry out the program, AECOM retained the drilling services from Altech Drilling & Investigation Services Ltd. (Altech) located in Cambridge, Ontario and Landshark Drilling (Landshark) located in Brantford, Ontario, two Ministry of the Environment, Conservation, and Parks (MECP) licensed drilling contractors.

The boreholes were advanced using a track-mounted Geoprobe and a track-mounted D-50 drill rig using hollow stem augers. Upon completion of the drilling, monitoring well were installed with stick-up protective casing and backfilled in accordance with Ontario Regulation 903, as amended. Excessive soil cuttings generated during the drilling were contained in steel drums with lid, sampled for Toxicity Characteristic Leachate Procedure (TCLP), and disposed of according to O.Reg 406/19.

The location of each monitoring well for Site #3, 5, 6, and 9 was chosen to best reflect the areas of excavation expected at these Sites. The monitoring well that proposed for Site #1 was cancelled due to a lack of groundwater observed/encountered in the open hole upon completion of the drilling in all three (3) boreholes. All borehole and monitoring well locations are presented in **Appendix A**.

In general, the geotechnical field testing and sampling was carried out using ASTM standards modified based on site conditions. Standard Penetration Tests (SPT) were carried out at selected intervals to assess soil compactness/consistency to correlate its strength and to obtain samples for index (laboratory) testing purposes. SPTs were carried out in general accordance with ASTM D1586.

2.2 Soil Sampling Methodology

Forty-three (43) soil samples and four (4) groundwater samples were submitted to laboratories for chemical analysis. This soil and groundwater sampling program was designed to cover the general environmental quality of the soil and groundwater of each Site.

Soil samples were collected at selected intervals and screened for potential impacts, with the intent of the most impacted samples from both fill and native material being submitted for analysis as worst-case conservative assessments. Soil samples were screened for combustible organic vapours using an RKI GX-6000 photoionization detector (PID), which was calibrated using isobutylene. Soil vapours readings were in a range of 0 to less than 10 ppm in all soil samples across the Site. In addition, field observation of impacts of soil contamination including

staining or soil odours during the selection of samples, however, none were observed in the samples. Therefore, representative samples from each stratigraphic unit were submitted for laboratory analysis for selected inorganic parameters and metals, polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons F1 to F4 (PHCs), volatile organic compounds (VOCs), and polychlorinated biphenyls (PCBs).

AECOM staff wore new nitrile gloves during the collection of each soil sample to reduce the potential for cross-contamination. Samples for PHC F1 and VOCs analyses were collected immediately by placing roughly 2 cubic centimeters (cm^3) of soil material into an airtight vial containing 3 mL of methanol-based preservative. Samples for other parameters were transferred from the sample collection bag to appropriate laboratory-supplied jars once drilling was completed and PID vapour readings had been collected. All samples were placed on ice for preservation until received by the AGAT laboratories, which is certified to ISO 9001:2015 and accredited to ISO 17025:2005 UKAS ref 4028.

Chain-of-custody (COC) procedures were followed during the submission of samples to the laboratory. Sample packaging and submission procedures were followed per the project sampling procedures, to ensure sample integrity from the point of sampling up until submission to the analytical laboratory. Samples were packaged and submitted to the laboratory as outlined below:

- Sample name, project number, and date were written on each sample container.
- Caps on the sample containers were checked to ensure they are properly sealed.
- Chain-of-custody forms were completed with the required information and signed and dated to document the sample custody transfer.
- Sample containers were protected in bubble wrap in coolers.
- Sample containers were placed in a cooler with ice.
- All samples were delivered by field staff directly to AGAT Laboratories (Mississauga, ON) to be analyzed within the recommended hold times.
- Original chain-of-custody forms accompanied each submission, and copies were retained.

All analytical testing of soil samples was performed by AGAT Laboratory and the Certificates of Analysis are provided in **Appendix G**. The results of the analyses on the soil samples were compared with the Ministry of the Environment, Conservation and Parks (MECP) Table 2 Full Depth Generic Condition Standards (SCS) in a Potable Groundwater Conditions for Industrial/Commercial/Community (ICC) property use, for coarse-textured soil (Table 2 SCS). The SCS was selected based on the site location, the average thickness of the overburdened soil, groundwater conditions, the current property uses, and sieve and hydrometer test results carried out on soil samples.

Groundwater samples were submitted to Bureau Veritas Laboratories of Mississauga, Ontario for analysis for M&I, VOCs, BTEX, and PHCs F1-F4, PAHs, and PCBs. Bureau Veritas Laboratories is a member of the Canadian Association for Laboratory Accreditation Inc. (CALA) and meets the requirements of Section 47 of O.Reg.153/04 certifying that the analytical laboratory is accredited in accordance with the International Standard ISO/IEC 17025 and with standards developed the Standards Council of Canada. The results of the analysis of the groundwater samples were compared with MECP Table 2 Full Depth Generic Site Condition Standards a Potable Groundwater Condition for All Types of Property Uses and coarse-textured soil. Certificates of Analysis provided by Bureau Veritas Laboratories are included in **Appendix H**.

2.3 Geotechnical Laboratory Testing

The soil samples were transported to the AECOM Laboratory in Etobicoke, ON for review and laboratory testing. Selected soil samples were tested for natural moisture content (ASTM D2216), particle size distribution of soils using sieve analysis (ASTM D6913), Atterberg limit determination (ASTM D4318), and unit weight of soils (ASTM D7263). The test results are presented in **Appendix C**.

2.4 Groundwater Level Monitoring

Each monitoring well was developed following installation for the purposes of removing sediment, rectifying possible damage caused to the target formation during the drilling process, and/or improving the hydraulic properties of the filter pack installed around the well screen. The well development process also ensures that collected groundwater samples are representative of in situ conditions of the screened aquifer formation surrounding the monitoring well.

In addition, groundwater level measurements were obtained at each monitoring well within a few weeks of their installation and following the completion of well development. Groundwater levels were subsequently monitored during each groundwater sampling event (where applicable) and at the time of single well response testing (SWRT).

Measured depth to groundwater and groundwater elevation are presented in **Tables 7, 9, 10 and 13**. Additional groundwater level measurements were completed within the four (4) monitoring wells were further confirmed during subsequent groundwater level monitoring events.

2.5 Single Well Response Testing

Single Well Response Testing (SWRT) was carried out at monitoring wells to provide an estimate of the hydraulic conductivity of the screened geologic materials at each location.

Prior to SWRT the depth to water was measured within each monitoring well and used to determine the static water level for each well. The static water level represents the initial water levels for the single well response testing. The SWRT method involves causing a rapid change in the hydraulic head within a well and measuring the water level response back to a static water level condition. The SWRT method may include one or a combination of rising head or falling head tests, depending on the position of the static groundwater level within the monitoring well being tested. Prior to start of each test, a datalogger was installed within the target well and configured to obtain readings on a regular (i.e., 0.5 to 1 second) interval. Information collected by the datalogger was confirmed through the collection of manual groundwater level measurements using an electronic water level indicator.

Falling head tests were carried out using a solid slug, which was introduced into the well to a depth completely below the static water level causing the water level to initially rise and subsequently fall back to static, and rising head tests were carried out by completely removing the solid slug from the water column causing the water level to initially drop and subsequently rise back to static. Immediately following the introduction of the slug into the well, manual groundwater levels and elapsed time were measured as the water level recovered to its original static elevation. These measurements were supplemented with data collected by the installed datalogger. Each single well response test was concluded when the water level returned to its static elevation.

Analysis of the time-displacement data for unconfined aquifers is typically performed using the Bouwer and Rice method (1976):

$$K = \frac{{r_c}^2 \, ln\left(\frac{R_e}{r_w}\right)}{2Lt} ln\left(\frac{h_0}{h_t}\right)$$

Where:
- K = hydraulic conductivity of the tested material (m/s)
- R_e = radius of the test (m)
- r_c = effective casing radius (m)
- r_w = equivalent well radius (m)
- L = length of the screen interval (m)
- h_0 = water level displacement at time t_0 (m)
- h_t = water level displacement at time t (m)
- t = time (s)

The radius of the test (Re) is defined using the following equation for partially penetrating wells:

$$ln\left(\frac{R_e}{r_w}\right) = \left[\frac{1.1}{ln\left(\frac{b}{r_w}\right)} + \frac{A + B\,ln\left(\frac{D-b}{r_w}\right)}{\frac{L}{r_w}}\right]^{-1}$$

Where: A, B = fitting parameters that are a function of (L/rw)
D = distance of the water table above the base of aquifer (m)
b = depth of the base of screen below the water table (m)
L = length of the screen interval (m)

Using the Bouwer-Rice method, the time-displacement data are plotted on a semi-logarithmic scale. Values are then taken from the plot and input to the equation above to estimate the hydraulic conductivity (K) of the soil and/or rock formation(s) contacted along the well screen/sand pack length. SWRT results are summarized in **Tables 8, 11 and 14**, with individual analysis reports contained in **Appendix D**.

2.6 Groundwater Quality Sampling

Groundwater samples were collected from monitoring wells within sites between February 11 to March 8, 2022 and submitted to Bureau Veritas Laboratories for water quality analysis. The results of the analyses were compared to the Provincial Water Quality Objectives (PWQO) criteria limits.

The analytical results received from Bureau Veritas Laboratories indicate that the tested groundwater samples were generally below most of the criteria limits for the applicable standards, with the exception of those parameters summarized in **Tables 12 and 15**. Certificates of Analysis provided by Bureau Veritas Laboratories are included in **Appendix E**.

The concentration of Un-ionized Ammonia provided in the certificates of analysis was calculated by the laboratory for each groundwater sample based on measured pH and temperature when the samples were received, rather than the field-measured parameters of pH and temperature at the time of sample collection. As a result, the laboratory calculated and reported Un-ionized Ammonia values do not accurately reflect the actual concentration within each sampled well.

Ammonia is highly soluble in water and its speciation is affected by a wide variety of environmental parameters including pH, temperature, and ionic strength. In aqueous solutions, an equilibrium exists between Un-ionized (NH3) and ionized (NH4+) Ammonia species (Canadian Council of Ministers of the Environment, 2010). The equilibrium constant for this reaction is a function of temperature and solution pH (Florida Department of Environmental Protection, 2001). Thus, if the equilibrium constant is known for a particular temperature and the pH of the solution is also known, the fraction of Un-ionized Ammonia can be calculated. The Un-ionized Ammonia concentration can be calculated if the Total Ammonia concentration is also known from laboratory analysis (Florida Department of Environmental Protection, 2001).

Field measurements of pH and temperature together with the laboratory-derived concentration of Total Ammonia (mg/L) were utilized to calculate the Un-ionized Ammonia concentration for selected sampled monitoring wells. The calculation process followed the procedure and equations provided in Emerson et.al., 1975 and the calculation parameters are presented in **Appendix F**. The calculated concentration of Un-ionized Ammonia for the selected sampled well was compared to the PWQO criteria of 0.02 mg/L. Results indicate that none of the monitoring wells were found to contain a concentration of Un-ionized Ammonia in excess of the PWQO criteria.

3. Site #1 – Highway No. 50 Car Pool Lot

Site #1 is located at the south side of Mayfield Road and the west side of Highway 50 in Brampton, as shown in Figure 1. The site is an undeveloped area covered by grass and bushes. Three (3) boreholes including BH1-1 to BH1-3 on the green land were advanced. During the investigation, no abnormal odour or staining was detected.

3.1 Subsurface Conditions

The subsurface conditions are presented in this section for Site #1. The existing conditions of materials encountered are summarized in this section. The stratigraphic layers were inferred from non-continuous sampling and observation of drilling resistance and typically represents a transition from one soil type to another. These boundaries should not be interpreted to represent the actual planes of geological change. The subsurface conditions have been confirmed at the borehole locations only, and they may vary between and beyond the borehole locations. Refer to **Appendix B** for the borehole logs. Borehole locations are presented in **Appendix A**.

3.1.1 Topsoil

Topsoil was encountered at the ground surface in all three boreholes. The thickness of topsoil ranged from 200 mm to 240 mm (average of 223 mm).

3.1.2 Silty Clay Till

A layer of silty clay till was encountered beneath topsoil in all three boreholes. The thickness of the silty clay till layer was approximate 5.0 m. This layer was encountered at elevations ranging from 226.4 to 226.1 mASL and extended to 221.4 to 221.2 mASL. All three boreholes were terminated in this layer.

SPT testing conducted on this layer had N values ranging from WH to 36 blows per 0.3 m penetration indicating very soft to hard in consistency, but generally a stiff to hard cohesive soil. Moisture content test results ranged from 12.5% to 57.6%. Sieve and hydrometer analysis results on selected samples in this layer indicated gravel sizes ranged from 1% to 2%, sand sizes ranging from 16% to 21%, silt sizes ranging from 47% to 51%, and clay sizes ranging from 31% to 34%. The Atterberg limits test conducted on selected silty clay till samples had plastic limit ranged from 18% to 19% and liquid limit ranged from 27% to 28%, indicating a low plasticity soil. The soil density analysis was conducted on till samples indicating wet unit weight ranging from 21.8 kN/m^3 and dry unit weight ranging from 19.2 kN/m3. Results of the laboratory testing are present in **Appendix C**.

3.2 Groundwater Conditions

No groundwater was observed in the open hole upon the completion of the drilling in all three boreholes. Groundwater levels should be expected to fluctuate seasonally and dependent on precipitation events. The supplementary infiltration testing and monitoring well readings will be ongoing and reported separately in the future.

3.3 Environmental Sampling and Test Results

In total, ten (10) soil samples were retrieved and submitted for chemical analysis of metals and inorganics, PHCs, PAHs, VOCs, and PCBs as per the following:

Table 1: Summary of Chemical Analysis for Site #1

Site ID	Sample ID / Parameter Tested				
	Selected Inorganic Parameters and Metals (M&I)	Petroleum Hydrocarbons F1 to F4 (PHCs)	Volatile Organic Compounds (VOCs)	Polycyclic Aromatic Hydrocarbons (PAHs)	Polychlorinated Biphenyls (PCBs)
Site 1	BH-1-1 SS2, BH-1-2 SS2, BH-1-2 SS2	BH-1-1 SS5, BH-1-3 SS5	BH-1-1 SS5, BH-1-3 SS5	BH-1-2 SS1, BH-1-3 SS1	BH-1-3 SS1

All soil samples analyzed were either non-detect or detected with parameters well below the MECP Table 2 SCS for one or more contaminants of M&I, PAHs, PCBs, PHCs, and VOCs parameters at the borehole locations. Based on the review of the laboratory QA/QC program, sample results are considered acceptable.

4. Site #3 – West Brampton Reservoir and Pumping Station

Site #3 is located at the west side of Mississauga Road and the south side of Williams Parkway in Brampton, as shown in Figure 2. The entrance of the site has been developed with asphalt pavement structure which connected with an existing structure for agriculture purpose. Both northwest and southeast sides of the structure is undeveloped areas covered by grass and bushes. Six (6) boreholes from BH3-1 to BH3-6 on the green land were advanced. During the investigation, no abnormal odour or staining was detected.

4.1 Subsurface Conditions

The subsurface conditions are presented in this section for Site #3. The existing conditions of materials encountered are summarized in this section. The stratigraphic layers were inferred from non-continuous sampling and observation of drilling resistance and typically represents a transition from one soil type to another. These boundaries should not be interpreted to represent the actual planes of geological change. The subsurface conditions have been confirmed at the borehole locations only, and they may vary between and beyond the borehole locations. Refer to **Appendix B** for the borehole logs. Borehole locations are presented in **Appendix A**.

4.1.1 Topsoil

Topsoil was encountered at the ground surface in all boreholes except for BH3-4/MW, where the soil samples at the ground surface could not be retrieved due to frozen ground. The thickness of topsoil ranged from 50 mm to 230 mm (average of 162 mm).

4.1.2 Clayey Silt Fill

A layer of clayey silt fill was encountered underneath the topsoil in BH3-1, BH3-5 and BH3-6 and underneath sand fill in BH3-4/MW. The thickness of this fill layer ranged from 0.5 to 1.3 m. This layer was encountered at the elevation of 237.2 to 230.4 mASL and extended to 236.6 to 229.5 mASL.

SPT testing conducted on this fill layer had N value ranged from 2 to 21 blows per 0.3 m penetration indicating soft to very stiff in consistency. Moisture content tests result on one selected fill sample ranged from 16.8% to 51.9%. Sieve and hydrometer analysis results on one selected fill sample indicated gravel size of 0%, sand size of 33%, silt size of 44%, and clay size of 23%. Results of the laboratory testing are present in **Appendix C**.

4.1.3 Sand and Gravel/Sand Fill

A layer of sand and gravel/sand fill was encountered underneath the topsoil in BH3-2 and BH3-4/MW. The thickness of this fill layer ranged from 0.4 to 0.6 m. This layer was encountered at the elevation of 236.1 to 230.9 mASL and extended to 235.5 to 230.4 mASL.

SPT testing conducted on this fill layer had N value ranged from 4 to 17 blows per 0.3 m penetration indicating very loose to compact in compactness. Moisture content tests result on one selected fill sample ranged from 21.1% to 23.9%. Results of the laboratory testing are present in **Appendix C**.

4.1.4 Sandy Silt Fill

A layer of sandy silt fill was encountered underneath the clayey silt fill or sand and gravel/sand fill in BH3-1 to BH3-3 and BH3-5. The thickness of this fill layer ranged from 0.7 to 0.8 m. This layer was encountered at the elevation of 234.2 to 236.6 mASL and extended to 234.3 to 234.7 mASL.

SPT testing conducted on this fill layer had N value ranged from 3 to 17 blows per 0.3 m penetration indicating very loose to compact in compactness. Moisture content tests result on selected fill samples ranged from 13.9% to 21.8%. Sieve and hydrometer analysis results on one selected fill sample indicated gravel size of 4%, sand size of 40%, silt size of 37%, and clay size of 19%. Results of the laboratory testing are present in **Appendix C**.

4.1.5 Silty Clay Till

A layer of silty clay till was encountered beneath fill in BH3-1 to BH3-3. The thickness of the silty clay till layer ranged from 0.4 to 1.8 m. This layer was encountered at elevations ranging from 233.5 to 234.6 mASL and extended to 231.7 to 233.7 mASL. BH3-2 and BH3-3 were terminated in this layer.

SPT testing conducted on this layer had N values ranging from 8 to over 50 blows per 0.3 m penetration indicating stiff to hard, but generally very stiff to hard in consistency. Moisture content test results ranged from 5.9% to 21.2%. Sieve and hydrometer analysis results on selected samples in this layer indicated gravel sizes ranged from 3%, sand sizes ranging from 10% to 22%, silt sizes ranging from 48% to 68%, and clay sizes ranging from 19% to 27%. Results of the laboratory testing are present in **Appendix C**.

4.1.6 Sandy Silt

A layer of hydraulic sandy silt was encountered beneath the fill in BH3-4/MW to BH3-6. The thickness of the sandy silt layer ranged from 2.1 to 3.8 m. This layer was encountered at elevations ranging from 229.6 to 229.5 mASL and extended to 227.4 to 225.8 mASL. BH3-4/MW and BH3-5 were terminated in this layer.

SPT testing conducted on this layer had N values ranging from 2 to 36 blows per 0.3 m penetration indicating very loose to compact in compactness, but generally compact soil. Moisture content test results ranged from 6.1% to 26.9%. Sieve and hydrometer analysis results on selected samples in this layer indicated gravel sizes ranged from 3% to 7%, sand sizes ranging from 21% to 22%, and fine sizes ranging from 72% to 75%. Results of the laboratory testing are present in **Appendix C**.

4.1.7 Bedrock (Weathered Shale)

A weathered reddish shale bedrock (Queenston formation) was encountered underneath the layer of silty clay till in boreholes BH3-1. This bedrock was encountered at elevation ranged from 233.7 mASL and extended to 233.6 mASL. Borehole BH3-1 was terminated in this layer.

4.2 Groundwater Conditions

The groundwater levels were observed in the open hole upon the completion of the drilling of select boreholes, and was summarized in **Table 2**.

Table 2: The Summary of Groundwater Levels in the Open Hole

Borehole ID	Groundwater Depth (mbgs)	Groundwater Elevation (mASL)	Date
BH3-1	Dry	Dry	Dec 6, 2021
BH3-2	Dry	Dry	Jan 3, 2022
BH3-3	3.3	231.7	Jan 3, 2022
BH3-4/MW	2.1	233.1	Dec 16, 2021
BH3-5	2.6	228.4	Dec 16, 2021
BH3-6	1.8	229.2	Dec 16, 2021

A groundwater monitoring well (BH3-4/MW) was constructed at the site on December 16, 2021 as part of the geotechnical investigation. Groundwater level monitoring at BH3-4/MW was conducted by AECOM between February 11, 2022 to March 8, 2022. **Table 3** provides a summary of BH3-4/MW including groundwater levels, elevation data, depths, and screen intervals (in mBGS and mASL).

As shown in **Table 3**, observed static groundwater level elevations at BH3-4/MW were ranged from approximately 226.50 mASL to 226.60 mASL. It is expected that the groundwater levels within the Site #3 will be subjected to seasonal fluctuations including response to spring freshet and localized precipitation events.

Long-term groundwater data are also being collected at BH3-4/MW using water level data loggers. The purpose of this monitoring is to assess water level fluctuation over time. It is anticipated that the collected groundwater data will be analyzed and presented in a subsequent memorandum to this report.

Table 3: Construction Details and Groundwater Level Measurements (BH3-4/MW)

Monitoring Well ID	Ground Surface Elevation (mASL)[2]	Screen Interval Depth (mBGS)[1]		Screen Interval Elevation (mASL)[2]		Groundwater Level Depth and Elevation		
		Top	Bottom	Top	Bottom	Date	Depth to Groundwater (mBGS)[1]	Groundwater Elevation (mASL)[2]
BH3-4/MW	231.00	4.00	5.52	227.00	225.48	Feb 11, 2022	4.50	226.50
						Feb 28, 2022	4.43	226.57
						Mar 8, 2022	4.40	226.60

Notes: 1. mBGS = metres below ground surface
2. mASL = metres above mean sea level

SWRT was conducted at BH3-4/MW on February 11, 2022. Collected data were analyzed to provide an estimate of the hydraulic conductivity (K) of the stratum surrounding each respective monitoring well screen. SWRT results for BH3-4/MW are summarized in **Table 4,** with the individual analysis reports contained in **Appendix D**.

Infiltration rate testing will be completed using a Guelph Permeameter to evaluate the field saturated vertical hydraulic conductivity within the upper surficial soils at the selected location within Site #3 in Spring 2022. The infiltration testing results will be presented in a subsequent memorandum to this report.

Table 4: Single Well Response Testing Results (BH3-4/MW)

Monitoring Well ID	Test Date	Analytical Method [1]	Top of Test Interval (mBGS)[2]	Bottom of Test Interval (mBGS)[2]	Test Type	Hydraulic Conductivity (m/s)[3]	Geologic Formation
BH3-4/MW	Feb 11, 2022	Bouwer and Rice	4.50	5.52	Rising Head	7.88×10^{-6}	Sandy Silt
	Feb 11, 2022	Bouwer and Rice			Rising Head	6.23×10^{-6}	

Notes: 1: Bouwer and Rice (1976)
2: mBGS = metres Below Ground Surface
3: m/s = metre per second

Groundwater samples were collected from BH3-4/MW on February 11, 2022 and submitted to Bureau Veritas Laboratories for geochemical analysis. The results of the analysis were compared to Provincial Water Quality Standards (PWQO) criteria limits. Laboratory results indicate no exceedances of the applicable PWQO parameters in BH3-4/MW groundwater results. Certificates of Analysis provided by Bureau Veritas Laboratories are included in **Appendix E**.

4.3 Environmental Sampling and Test Results

In total, six (6) soil samples were retrieved and submitted for chemical analysis of metals and inorganics, PHCs, VOCs, and PCBs as per the following:

Table 5: Summary of Chemical Analysis for Site #3

Site ID	Sample ID / Parameter Tested			
	Selected Inorganic Parameters and Metals (M&I)	Petroleum Hydrocarbons F1 to F4 (PHCs)	Volatile Organic Compounds (VOCs)	Polychlorinated Biphenyls (PCBs)
Site 3	BH-3-1 SS2, BH-3-2 SS3, BH-3-2 SS2	BH-3-1 SS4	BH-3-1 SS4	BH-3-1 SS1

All soil samples analyzed were either non-detect or detected with parameters well below the MECP Table 2 SCS for one or more contaminants of M&I, PCBs, PHCs, and VOCs parameters at the borehole locations. Based on the review of the laboratory QA/QC program, sample results are considered acceptable.

Groundwater samples were collected from BH-3-4/MW on February 11, 2022 and submitted to Bureau Veritas Laboratories for chemical analysis. The results of the analysis were compared to Table 2 SCS. The groundwater sample analyzed including metals, VOCs, PHCs F1 - F4, PAHs, and PCBs results indicated that the concentration of all analyzed parameters met the applicable MECP Table 2 SCS Standards.

5. Site #5 – Johnston Sports Park

Site #5 is located at the west side of Centreville Creek Road and the north side of King St in Caledon, as shown in Figure 3. The access road from King Street as well as two parking areas were developed with asphalt pavement. The rest areas of the site are undeveloped areas covered by grass and bushes. Five (5) boreholes including BH5-1 to BH5-5 on the green land were advanced. During the investigation, no abnormal odour or staining was detected.

5.1 Subsurface Conditions

The subsurface conditions are presented in this section for Site #5. The existing conditions of materials encountered are summarized in this section. The stratigraphic layers were inferred from non-continuous sampling and observation of drilling resistance and typically represents a transition from one soil type to another. These boundaries should not be interpreted to represent the actual planes of geological change. The subsurface conditions have been confirmed at the borehole locations only, and they may vary between and beyond the borehole locations. Refer to **Appendix B** for the borehole logs. Borehole locations are presented in **Appendix A**.

5.1.1 Silty Clay Fill

A layer of silty clay fill was encountered at the ground surface in all five boreholes. The thickness of this fill layer ranged from 0.7 to 2.1 m. This layer was encountered at the elevation of 268.2 to 267.5 mASL and extended to 267.5 to 265.6 mASL.

SPT testing conducted on this fill layer had N value ranged from 4 to 13 blows per 0.3 m penetration indicating soft to very stiff in consistency. Moisture content tests result on selected fill sample ranged from 21.0% to 29.3%. Sieve and hydrometer analysis results on one selected fill sample indicated gravel size of 0%, sand size of 17%, silt size of 53%, and clay size of 30%. The Atterberg limits test conducted on one selected silty clay fill sample had plastic limit of 22% and liquid limit of 32%, indicating a medium plasticity soil. Results of the laboratory testing are present in **Appendix C**.

5.1.2 Silty Clay Till

A layer of silty clay till was encountered beneath the layer of fill in all boreholes. The thickness of the silty clay till layer ranged from 1.5 to 4.5 m. This layer was encountered at elevations ranging from 267.5 to 265.6 mASL and extended to 264.5 to 262.3 mASL. All the boreholes were terminated in this layer.

SPT testing conducted on this layer had N values ranging from 13 to 59 blows per 0.3 m penetration indicating stiff to hard in consistency, but generally a very stiff to hard cohesive soil. Moisture content test results ranged from 11.4% to 21.6%. Sieve and hydrometer analysis results on selected samples in this layer indicated gravel sizes ranged from 1%, sand sizes ranging from 15% to 21%, silt sizes ranging from 46% to 48%, and clay sizes ranging from 30% to 38%. The Atterberg limits test conducted on selected silty clay till samples had plastic limit ranged from 19% and liquid limit ranged from 31% to 33%, indicating a medium plasticity soil. The soil density analysis was conducted on till samples indicating wet unit weight ranging from 21.9 to 22.1 kN/m^3 and dry unit weight ranging from 19.2 to 19.5 kN/m^3. Results of the laboratory testing are present in **Appendix C**.

5.2 Groundwater Conditions

No groundwater levels were observed in the open hole upon the completion of the drilling.

A groundwater monitoring well (BH5-3/MW) was constructed at the site on December 20th, 2021 as part of the geotechnical investigation. Groundwater level monitoring at BH5-3/MW was conducted by AECOM between February 11, 2022 to March 8, 2022. **Table 6** provides a summary of BH5-3/MW including groundwater levels, elevation data, depths, and screen intervals (in mBGS and mASL).

Table 6: Construction Details and Groundwater Level Measurements (BH5-3/MW)

Monitoring Well ID	Ground Surface Elevation (mASL)[2]	Screen Interval Depth (mBGS)[1]		Screen Interval Elevation (mASL)[2]		Groundwater Level Depth and Elevation		
		Top	Bottom	Top	Bottom	Date	Depth to Groundwater (mBGS)[1,3]	Groundwater Elevation (mASL)[2,3]
BH5-3/MW	267.50	2.13	5.18	265.37	262.32	Feb 11, 2022	0.14	267.36
						Feb 28, 2022	0.32	267.18
						Mar 7, 2022	0.31	267.19
						Mar 8, 2022	0.31	267.19

Notes: 1. mBGS = metres below ground surface
2. mASL = metres above mean sea level
3. The monitoring well BH5-3/MW was frozen from February 11, 2022 to March 8, 2022. Groundwater level data collected from February 11, 2022 to March 8, 2022 at BH5-3/MW are pre-development.

The Monitoring well BH5-3/MW was frozen during four (4) site visits conducted between February 11, 2022 to March 8, 2022. The monitoring well development, SWRT and groundwater sampling at BH5-3/MW will be completed in Spring 2022. It is anticipated that the collected groundwater data will be analyzed and presented in a subsequent memorandum to this report.

Infiltration rate testing will be completed using a Guelph Permeameter to evaluate the field saturated vertical hydraulic conductivity within the upper surficial soils at the selected location within Site #5 in Spring 2022. The infiltration testing results will be presented in a subsequent memorandum to this report.

5.3 Environmental Sampling and Test Results

In total, twelve (12) soil samples were retrieved and submitted for chemical analysis of metals and inorganics, PHCs, PAHs, VOCs, and PCBs as per the following:

Table 7: Summary of Chemical Analysis for Site #5

Site ID	Sample ID / Parameter Tested				
	Selected Inorganic Parameters and Metals (M&I)	Petroleum Hydrocarbons F1 to F4 (PHCs)	Volatile Organic Compounds (VOCs)	Polycyclic Aromatic Hydrocarbons (PAHs)	Polychlorinated Biphenyls (PCBs)
Site 5	BH-5-1 SS2, BH-5-2 SS2, BH-5-3 SS1, BH-5-4 SS2, BH-5-5 SS2	BH-5-2 SS2, BH-5-3 SS6A	BH-5-2 SS2, BH-5-3 SS6A	BH-5-1 SS1, BH-5-2 SS1	BH-5-2 SS1

All soil samples analyzed were either non-detect or detected with parameters well below the MECP Table 2 SCS for one or more contaminants of M&I, PAHs, PCBs, PHCs, and VOCs parameters at the borehole locations. Based on the review of the laboratory QA/QC program, sample results are considered acceptable.

Groundwater samples were collected from BH5-3/MW on May 9, 2022 and submitted to Bureau Veritas Laboratories for chemical analysis. The results of the analysis were compared to Table 2 SCS. The groundwater sample analyzed including metals, VOCs, PHCs F1 - F4, PAHs, and PCBs results indicated that the concentration of all analyzed parameters met the applicable MECP Table 2 SCS Standards.

6. Site #6 – Tullamore Reservoir and Pumping Station

Site #6 is located at the west side of Innis Lake Road and the north side of Mayfield Rd in Brampton, as shown in Figure 4. The south part of the site was developed with an existing structure with the asphalt pavement parking area and the access road. An existing stormwater management pond is located at the west side of the structure. The other access loop with asphalt pavement was developed at the north part of the site. The rest areas of the site are undeveloped and covered by grass and bushes. Three (3) boreholes from BH6-1 to BH6-3 on the green land were advanced. During the investigation, no abnormal odour or staining was detected.

6.1 Subsurface Conditions

The subsurface conditions are presented in this section for Site #6. The existing conditions of materials encountered are summarized in this section. The stratigraphic layers were inferred from non-continuous sampling and observation of drilling resistance and typically represents a transition from one soil type to another. These boundaries should not be interpreted to represent the actual planes of geological change. The subsurface conditions have been confirmed at the borehole locations only, and they may vary between and beyond the borehole locations. Refer to **Appendix B** for the borehole logs. Borehole locations are presented in **Appendix A**.

6.1.1 Sandy Silt Fill

A layer of sandy silt fill was encountered at the ground surface only in BH6-1/MW. The thickness of this fill layer was 1.2 m. This layer was encountered at the elevation of 229.8 mASL and extended to 228.3 mASL.
SPT testing conducted on this fill layer had N value ranged from 5 to 6 blows per 0.3 m penetration indicating loose in compactness. Moisture content tests result on selected fill samples ranged from 16.8% to 75.0%. Results of the laboratory testing are present in **Appendix C**.

6.1.2 Silty Clay Fill

A layer of silty clay fill was encountered at the ground surface in BH6-2 and BH6-3. The thickness of this fill layer ranged from 1.2 to 2.3 m. This layer was encountered at the elevation of 231.0 mASL and extended to 229.8 to 228.7 mASL.

SPT testing conducted on this fill layer had N value ranged from 6 to 22 blows per 0.3 m penetration indicating firm to very stiff soil in consistency. Moisture content tests result on selected fill samples ranged from 14.7% to 27.8%. Sieve and hydrometer analysis results on one selected fill sample indicated gravel size of 1%, sand size of 20%, silt size of 38%, and clay size of 41%. The Atterberg limits test conducted on one selected silty clay fill sample had plastic limit ranged from 21% and liquid limit ranged from 33%, indicating a low to medium plasticity soil. The soil density analysis was conducted on a fill sample indicating wet unit weight of 21.6 kN/m^3 and dry unit weight of 19.1 kN/m^3. Results of the laboratory testing are present in **Appendix C**.

6.1.3 Silty Clay Till

A layer of silty clay till was encountered beneath the fill layers in all three boreholes. The thickness of the silty clay till layer ranged from 0.4 to 1.9 m. This layer was encountered at elevations ranging from 229.8 to 228.7 mASL and extended to 228.9 to 228.3 mASL. All the boreholes were terminated in this layer.

SPT testing conducted on this layer had N values ranging from 13 to over 50 blows per 0.3 m penetration indicating stiff to hard in consistency, but generally a very stiff to hard cohesive soil. Moisture content test results ranged from 13.8% to 24.1%. Sieve and hydrometer analysis results on selected samples in this layer indicated gravel sizes ranged from 0 to 3%, sand sizes ranging from 16% to 36%, silt sizes ranging from 33% to 39%, and clay sizes ranging from 28% to 45%. The Atterberg limits test conducted on selected silty clay till samples had plastic limit ranged from 18% too 21% and liquid limit ranged from 28% to 35%, indicating a low to medium plasticity soil. The soil density analysis was conducted on till samples indicating wet unit weight of 21.0 kN/m^3 and dry unit weight of 18.0 kN/m^3. Results of the laboratory testing are present in **Appendix C**.

6.2 Groundwater Conditions

No groundwater levels were observed in the open hole upon the completion of the drilling.

A groundwater monitoring well (BH6-1/MW) was constructed at the site on November 15, 2021 as part of the project-related geotechnical investigation. Groundwater level monitoring at BH6-1/MW was conducted by AECOM between March 7, 2022 to March 8, 2022. **Table 8** provides a summary of BH6-1/MW including groundwater levels, elevation data, depths, and screen intervals (in mBGS and mASL).

Table 8: Construction Details and Groundwater Level Measurements (BH6-1/MW)

Monitoring Well ID	Ground Surface Elevation (mASL)[2]	Screen Interval Depth (mBGS)[1]		Screen Interval Elevation (mASL)[2]		Groundwater Level Depth and Elevation		
		Top	Bottom	Top	Bottom	Date	Depth to Groundwater (mBGS)[1,3,4]	Groundwater Elevation (mASL)[2,3,4]
BH6-1/MW	231.00	1.50	2.41	229.50	228.59	Mar 7, 2022	0.66	230.34
						Mar 8, 2022	1.83	229.17

Notes: 1. mBGS = metres below ground surface
2. mASL = metres above mean sea level
3. Groundwater level data collected on March 7, 2022 was pre-development.
4. Groundwater level data collected on March 8, 2022 are not static as the well was recovering from the following development and/or groundwater sampling.

Long-term groundwater data are also being collected at BH6-1/MW using water level data loggers. The purpose of this monitoring is to assess water level fluctuation over time. It is expected that the groundwater levels within the site will be subjected to seasonal fluctuations including response to spring freshet and localized precipitation events. It is anticipated that the collected groundwater data will be analyzed and presented in a subsequent memorandum to this report.

SWRT was conducted at BH6-1/MW on March 7, 2022. Collected data were analyzed to provide an estimate of the hydraulic conductivity (K) of the stratum surrounding each respective monitoring well screen. SWRT results for BH6-1/MW are summarized in **Table 9**, with the individual analysis reports contained in **Appendix D**.

Infiltration rate testing will be completed using a Guelph Permeameter to evaluate the field saturated vertical hydraulic conductivity within the upper surficial soils at the selected location within Site #6 in Spring 2022. The infiltration testing results will be presented in a subsequent memorandum to this report.

Table 9: Summary of Single Well Response Testing Results (BH6-1/MW)

Monitoring Well ID	Test Date	Analytical Method[1]	Top of Test Interval (mBGS)[2]	Bottom of Test Interval (mBGS)[2]	Type of Slug Test	Hydraulic Conductivity (m/s)[3]	Geologic Formation
BH6-1/MW	Mar 7, 2022	Bouwer and Rice	1.83	2.41	Rising Head	1.99×10^{-8}	Silty Clay (Till) with trace gravel and sandy

Notes: 1 – Bouwer and Rice (1976)
2 – mBGS = metres Below Ground Surface
3 – m/s = metre per second

Groundwater samples were collected from BH6-1/MW on March 7, 2022 and submitted to Bureau Veritas Laboratories for geochemical analysis. The results of the analysis were compared to Provincial Water Quality Standards (PWQO) criteria limits. As shown in **Table 10**, dissolved uranium exceeded the PWQO guidelines limits. Given these exceedances, the use of water treatment prior to the discharge to the natural environment should be included as part of the dewatering plan. Certificates of Analysis provided by Bureau Veritas Laboratories are included in **Appendix E**.

Table 10: Summary of Parameters Exceeding PWQO Guidelines (BH6-1/MW)

Parameter Group	Monitoring Well	Parameter	PWQO Guideline	Reported Value (ug/L)
Inorganics	BH6-1MW	Dissolved Uranium	5.0	5.6

Notes: ug/L = micrograms per Litre

6.3 Environmental Sampling and Test Results

In total, five (5) soil samples were retrieved and submitted for chemical analysis of metals and inorganics, and PCBs.

All soil samples analyzed were either non-detect or detected with parameters well below the MECP Table 2 SCS for one or more contaminants of M&I and PCBs parameters at the borehole locations. Based on the review of the laboratory QA/QC program, sample results are considered acceptable.

Groundwater samples were collected from BH6-1/MW on March 7, 2022 and submitted to Bureau Veritas Laboratories for chemical analysis of metals, VOCs, PHCs F1 - F4, PAHs, and PCBs. The results of the analysis were compared to Table 2 SCS. The groundwater sample analyzed including metals, VOCs, PHCs F1 - F4, PAHs, and PCBs results indicated that the concentration of all analyzed parameters met the applicable MECP Table 2 SCS Standards.

7. Site #9 – Alloa Reservoir and Pumping Station

Site #9 is located at the west side of Creditview Road and the north side of Mayfield Rd in Brampton, as shown in Figure 5. The south half part of the site has been developed with an existing structure with asphalt pavement parking area and access road. The north half of the site are undeveloped areas covered by grass. Three (3) boreholes including BH9-1 to BH9-3/MW on the green land were advanced.

7.1 Subsurface Conditions

The subsurface conditions are presented in this section for Site #9. The existing conditions of materials encountered are summarized in this section. The stratigraphic layers were inferred from non-continuous sampling and observation of drilling resistance and typically represents a transition from one soil type to another. These boundaries should not be interpreted to represent the actual planes of geological change. The subsurface conditions have been confirmed at the borehole locations only, and they may vary between and beyond the borehole locations. Refer to **Appendix B** for the borehole logs. Borehole locations are presented in **Appendix A**.

7.1.1 Sandy Silt Fill

A layer of sandy silt fill was encountered at the ground surface in BH9-1 and BH9-3/MW. The thickness of this fill layer ranged from 0.6 to 1.2 m. This layer was encountered at the elevation of 262.0 mASL and extended to 261.4 to 260.8 mASL.

SPT testing conducted on this fill layer had N value ranged from 7 to 15 blows per 0.3 m penetration indicating loose to compact in compactness. Moisture content tests result on selected fill samples ranged from 14.1% to 26.3%. Results of the laboratory testing are present in **Appendix C**.

7.1.2 Sand Fill

A layer of sand fill was encountered below sandy silt fill only in BH9-3/MW. The thickness of this fill layer was 0.6 m. This layer was encountered at the elevation of 261.4 mASL and extended to 260.8 mASL.

One SPT testing conducted on this fill layer had N value of 4 blows per 0.3 m penetration indicating verry loose in compactness. A moisture content test result on one selected fill sample was13.7%. Results of the laboratory testing are present in **Appendix C**.

7.1.3 Silty Clay Fill

A layer of silty clay fill was encountered at the ground surface in BH9-2 and below the layer sand fill in BH9-3/MW. The thickness of this fill layer ranged from 1.9 to 3.7 m. This layer was encountered at the elevation of 262.0 to 260.8 mASL and extended to 259.0 to 258.3 mASL.

SPT testing conducted on this fill layer had N value ranged from 3 to 18 blows per 0.3 m penetration indicating soft to very stiff in consistency, but generally a firm to stiff soil. Moisture content tests result on selected fill samples ranged from 12.3% to 23.5%. Results of the laboratory testing are present in **Appendix C**.

7.1.4 Silty Clay

A layer of silty clay was encountered beneath the layer of sandy silt fill in BH9-1. The thickness of the silty clay till layer was 1.2 m. This layer was encountered at elevations ranging from 260.8 mASL and extended to 259.6 mASL. SPT testing conducted on this layer had N values ranging from 6 to 8 blows per 0.3 m penetration indicating a stiff to hard in consistency. Moisture content test results ranged from 12.6% to 16.0%. Sieve and hydrometer analysis results on one selected sample in this layer indicated gravel sizes of 3%, sand sizes of 29%, silt of 39%, and clay sizes of 29%. Results of the laboratory testing are present in **Appendix C**.

7.1.5 Silty Clay Till

A layer of silty clay till was encountered beneath fill in BH9-2 and BH9-3/MW and beneath silty clay in BH9-1. The thickness of the silty clay till layer ranged from 3.0 to 4.3 m. This layer was encountered at elevations ranging from 259.6 to 258.3 mASL and extended to 255.3 mASL. All the boreholes were terminated in this layer.

SPT testing conducted on this layer had N values ranging from 11 to 44 blows per 0.3 m penetration indicating a stiff to hard in consistency. Moisture content test results ranged from 10.4% to 21.9%. Sieve and hydrometer analysis results on selected samples in this layer indicated gravel sizes ranged from 2% to 3%, sand sizes ranging from 23% to 24%, silt sizes ranging from 47% to 56%, and clay sizes ranging from 18% to 27%. The Atterberg limits test conducted on selected silty clay till samples had plastic limit ranged from 19% to 26% and liquid limit ranged from 27% to 35%, indicating a low to medium plasticity soil. The soil density analysis was conducted on selected till samples indicating wet unit weight ranging from 20.5 to 21.8 kN/m^3 and dry unit weight ranging from 17.8 to 19.1 kN/m^3. Results of the laboratory testing are present in **Appendix C**.

7.2 Groundwater Conditions

No groundwater levels were observed in the open hole upon the completion of the drilling.

A groundwater monitoring well (BH9-3/MW) was constructed at the site on November 16, 2021 as part of the geotechnical investigation. Groundwater level monitoring at BH9-3/MW was conducted by AECOM between March 7, 2022 to March 8, 2022. **Table 11** provides a summary of BH9-3/MW including groundwater levels, elevation data, depths, and screen intervals (in mBGS and mASL).

Table 11: Construction Details and Groundwater Level Measurements (BH9-3/MW)

Monitoring Well ID	Ground Surface Elevation (mASL)[2]	Screen Interval Depth (mBGS)[1]		Screen Interval Elevation (mASL)[2]		Groundwater Level Depth and Elevation		
		Top	Bottom	Top	Bottom	Date	Depth to Groundwater (mBGS)[1,3,4]	Groundwater Elevation (mASL)[2,3,4]
BH9-3/MW	262.00	3.26	6.31	258.74	255.69	Mar 7, 2022	3.23	258.77
						Mar 8, 2022	5.25	256.76

Notes: 1. mBGS = metres below ground surface
2. mASL = metres above mean sea level
3. Groundwater level data collected on March 7, 2022 was pre-development.
4. Groundwater level data collected on March 8, 2022 are not static as the well was recovering from the following development and/or groundwater sampling.

Long-term groundwater data are also being collected at BH9-3/MW using water level data loggers. The purpose of this monitoring is to assess water level fluctuation over time. It is expected that the groundwater levels within the

site will be subjected to seasonal fluctuations including response to spring freshet and localized precipitation events. It is anticipated that the collected groundwater data will be analyzed and presented in a subsequent memorandum to this report.

SWRT was conducted at BH9-3/MW on March 7, 2022. Collected data were analyzed to provide an estimate of the hydraulic conductivity (K) of the stratum surrounding each respective monitoring well screen. SWRT results for BH9-3/MW are summarized in **Table 12** with the individual analysis reports contained in **Appendix D**.

Infiltration testing will be completed using a Guelph Permeameter to evaluate the field saturated vertical hydraulic conductivity within the upper surficial soils at the selected location within Site #9 in Spring 2022. The infiltration testing results will be presented in a subsequent memorandum to this report.

Table 12: Single Well Response Testing Results (BH9-3/MW)

Monitoring Well ID	Test Date	Analytical Method[1]	Top of Test Interval (mBGS)[2]	Bottom of Test Interval (mBGS)[2]	Type of Slug Test	Hydraulic Conductivity (m/s)[3]	Geologic Formation
BH9-3/MW	Mar 7, 2022	Bouwer and Rice	5.25	6.31	Rising Head	1.55×10^{-8}	Silty Clay (Till) with some sand and trace gravel

Notes: 1 – Bouwer and Rice (1976)
2 – mBGS = metres Below Ground Surface
3 – m/s = metre per second

Groundwater samples were collected from BH9-3/MW on March 8, 2022 and submitted to Bureau Veritas Laboratories for geochemical analysis. The results of the analysis were compared to Provincial Water Quality Standards (PWQO) criteria limits. As shown in **Table 13**, dissolved uranium exceeded the PWQO guidelines limits. Given these exceedances, the use of water treatment prior to the discharge to the natural environment should be included as part of the dewatering plan. Certificates of Analysis provided by Bureau Veritas Laboratories are included in **Appendix E**.

Table 13: Summary of Parameters Exceeding PWQO Guidelines (BH9-3/MW)

Parameter Group	Monitoring Well	Parameter	PWQO Guideline	Reported Value (ug/L)
Inorganics	BH9-3MW	Dissolved Uranium	5.0	5.4

Notes: ug/L = micrograms per Litre

7.3 Environmental Sampling and Test Results

Nine (9) soil samples were retrieved and submitted for chemical analysis of metals and inorganics, and PCBs.

Groundwater samples were collected from BH-9-3/MW on March 8, 2022 and submitted to Bureau Veritas Laboratories for chemical analysis of metals, VOCs, PHCs F1 - F4, PAHs, and PCBs.

All nine (9) soil samples analyzed were either non-detect or detected with parameters well below the MECP Table 2 SCS for one or more contaminants of M&I and PCBs parameters at the borehole locations. Based on the review of the laboratory QA/QC program, sample results are considered acceptable.

The results of the analysis for groundwater samples were compared to Table 2 SCS. The groundwater sample analyzed including metals, VOCs, PHCs F1 - F4, PAHs, and PCBs results indicated that the concentration of all analyzed parameters met the applicable MECP Table 2 SCS Standards.

8. Pavement Design Recommendations for Truck Route

Based on the current investigation, the following recommendation is suggested for all the sites (#1, #3, #5, #6 and #9). It is recommended that the site be cleared and grubbed, topsoil stripped and earth graded to allow for placement of the light duty pavement structure indicated in Table 14 as per the typical pavement structure requirements for the Region of Peel.

Table 14: Flexible Pavement Design Recommendations

Pavement Structure	Light Duty Pavement Structure Layer [1)] Thickness (mm)	Heavy Duty Pavement Structure Layer [1)] Thickness (mm)	Compaction Minimum Requirement
HL3 or Superpave 12.5 mm Surface Course	50	50	92% MRD (OPSS 310)
HL8 or Superpave 19.0 Binder Course	70 (one lift)	110 (two lifts)	92% MRD (OPSS 310)
Granular Base: Granular 'A'	150	150	100% SPMDD (OPSS 501)
Granular Base: Granular 'B'	450	450	100% SPMDD (OPSS 501)
Total Thickness	**720**	**760**	

Pavement Design Notes: *1. Light Duty Pavement Structure shown in Table 2 is based on 15 years of service life*
2. PGAC Grade 58-28
3. Superpave mix design traffic, category B

9. Geotechnical Design Considerations

9.1 Bearing Capacity

This section of the report provides geotechnical design recommendations for the proposed snow storage structures. The recommendations are based on the subsurface conditions encountered during the current geotechnical investigation. It is assumed that shallow foundations (e.g., square or spread footing) supports the snow storage structure for all the site locations. The calculation does not consider any eccentric loading cases. The following design values presented in **Table 15** for all five (5) sites. The founding depth is assumed to be 1.2 mbgs frost depth below the final grade.

Table 15: Geotechnical Capacity of Shallow Foundation

Footing Size (m)	Founding Soil	Factored Geotechnical Resistance at ULS (kPa)*	Geotechnical Reaction at SLS (kPa)**
Site 1	Stiff to hard silty clay till	250	160
Site 3	Very stiff to hard silty clay till	350	230
Site 5	Very stiff to hard silty clay till	350	230
Site 6	Very stiff to hard silty clay till	350	230
Site 9	Firm to stiff silty clay fill over stiff to hard silty clay till	200	130

*Notes: * - Factored Geotechnical Resistance at ULS uses a Geotechnical Resistance factor of 0.5.*
*** - The geotechnical resistance at SLS for 25 mm of settlement is considered.*

9.2 Lateral Earth Pressure on Structures

The peat type snow storage system, retaining wall and temporary roadway protection, if any, should be designed to resist lateral earth pressure. Where the snow storage system can be drained effectively to eliminated hydrostatic pressure on the walls, earth pressures equation can be simplified in accordance with the CHBDC.
The expression for calculating lateral earth pressure is given by:

P = K(ɤh + q) for non-braced cut
P = earth pressure intensity at depth h, kPa
K = earth pressure coefficient
ɤ = unit weight of retained soil, kN/m3
q = surcharge near wall, kPa
h = depth to point of interest, m
H = depth of excavation (m)

The mobilization of full active or passive resistance requires a measurable and perhaps significant wall movement or rotation. Therefore, unless the structural element can tolerate these deflections, the at-rest earth pressure should be used in design.

The effect of compaction surcharge should be taken into account in the calculations of active and at- rest earth pressures. The lateral pressure due to compaction should be taken as at least 12 kPa at the surface, and its magnitude should be assumed to diminish linearly with depth to zero at the depth where the active (or at rest) pressure is equal to 12 kPa. This pressure distribution should be added to the calculated active (or at rest) pressure. Notwithstanding, lighter compaction equipment and smaller lifts should be used adjacent to walls to prevent overstressing.

For design purposes, the unfactored static earth pressure parameters given in **Table 16** can be used (assuming wall friction is neglected, the back wall is vertical and the ground surface is horizontal both on the retained side as well as in front of the toe):

Table 16: Material Types and Unfactored Earth Pressure Properties under Static Conditions

Material	Unfactored Friction Angle ϕ' (°)	Coefficient of Active Earth Pressure (K_a)	Coefficient of Passive Earth Pressure (K_p)	Coefficient of Earth Pressure at Rest (K_0)	Unit Weight ɤ (kN/m^3)
Granular A	35	0.27	3.69	0.43	22
Granular B, Type II	32	0.31	3.25	0.47	21
Firm to stiff silty clay fill	27	0.38	2.67	0.55	20
Very stiff to hard silty clay till	29	0.35	2.88	0.52	21

10. Construction Considerations

The available preliminary traffic data from the City consist of Average Annual Daily Traffic (AADT) for 2022 and it is presented below:

10.1 Site Preparation and Engineered Fill Construction

The area within the limits of the proposed snow storage locations should be stripped and cleared of surface vegetation, topsoil and debris prior to construction. Any soil containing excessive organics or loose/disturbed materials are not suitable for the subgrade of structure **foundations or** engineered fill. Therefore, the areas with those soils should be excavated and replace with engineered fill comprised of Granular A or Granular B, Type I or Type II. Granular B Type II would be a preferred engineered fill if any high groundwater table is encountered. In order to prevent migration of fine soil particles a geotextile can be used underneath Granular B.

Engineered fill could be placed after stripping all topsoil, organic matter, fill and other compressible, weak and deleterious material within an area extending at least 1.0 m beyond the outside edge of the founding level of any footings, after stripping, the entire area should be heavily proof-rolled inspected and approved by a Geotechnical Engineer. Engineered fill should be placed in accordance with OPSS 501. The fill material should be placed in thin layers not exceeding approximately 300 mm when loose, oversize particles larger than 120 mm should be discarded, and each fill layer should be uniformly compacted with heavy compactors, suitable for the type of fill used, the engineered fill below the footing and floor slab should be compacted to 100% of its SPMDD, while within outside/exterior paved areas, the fill should be compacted to 98% of its SPMDD.

Full-time geotechnical inspection and quality control (by means of frequent field density of laboratory testing) should be provided by the Geotechnical Engineer. Every lift should be evaluated by a sufficient number of tests to ensure that the level of compaction is constantly achieved, and the compaction procedure is applied.

10.2 Subgrade Preparation for Pavement

After all removals of incompetent soils including vegetation, topsoil and debris, the contractor shall compact and/or proof roll the remaining existing subgrade/fill. This material shall be inspected by a qualified Geotechnical Engineer prior to adding base or subbase material placement. any earth fill material below granular base or subbase shall be placed and compacted in lifts no more than 300 mm thick. The Geotechnical Engineer shall identify any poorly performing areas (i.e. wet areas, areas of poor compactness, areas of unsuitable cohesive material) and direct the contractor to remove the poorly performing areas by sub-excavating and backfilling with Granular A.

10.2.1 Granular Base/Subbase Placement

The granular base / subbase course(s) shall conform to the OPSS.MUNI 1010 for select granular materials and shall be compacted to at least 100% of the SPMDD as indicated in Table 2. The material lifts shall not exceed 300 mm in thickness.

Compaction testing of the granular base / subbase lift(s) shall be conducted according to OPSS.MUNI 501 and required document (i.e., gradation of materials, proctor test results, compaction reports) should be submitted to the Contract Admin (CA) and the region.

10.2.2 Hot Mix Asphaltic Concrete Pavement

Hot Mix Asphaltic Concrete (HMAC) used for the new pavement construction (whether new material or recycled material) shall conform to the OPSS.MUNI 310 requirements. The asphaltic concrete courses shall use Performance Grade Asphalt Cement (PGAC) PG 58-28 and be designed to traffic category C in case of Superior Performance Asphalt Pavement (Superpave) to be used.

The asphaltic concrete shall conform to OPSS.MUNI 1050 and be placed and compacted to at least 92% MRD as indicated in Table 2. The asphalt mix design shall be submitted to the consultant for their review prior to the start of pavement construction.

10.3 Temporary Excavation

All excavations should be carried out in accordance with the Ontario Occupational Health and Safety Act (OHSA). The soils of the Site can be classified as Type 1, 2, 3 or 4 depending on the subsurface soil conditions and groundwater conditions.

According to Section 3, for Site #1, the native very stiff soil indicates Type 2 soil at the proposed snow storage area so a side slope of 1H: 1V is required for the excavation in accordance with the OHSA. The slope will be adjusted based on the site and construction conditions according to OHSA.

According to Section 3, for Site #3, #5, #6 and #9, the existing fill soil indicates Type 4 soil at the proposed snow storage area so a side slope of 3H: 1V is required for the excavation in accordance with the OHSA. The slope will be adjusted based on the site and construction conditions according to OHSA.

Stockpiles of excavated materials should be kept at least 3.0 m or the length of 1 excavation depth, whichever is larger, away from the edge of the excavation to avoid slope instability. The slope stability of any excavations is subject to confirmation by the geotechnical engineer onsite. Care should also be taken to avoid the overloading of any underground services/structures by stockpiles, where applicable.

10.4 Dewatering

Since the groundwater level encountered at higher level in the open hole at Site #3, dewatering effort may be anticipated during the excavation work. The groundwater level needs to be controlled to 0.5 m below the final excavation level to avoid adverse effect such basal heave, foundation disturbance and any surface or groundwater seepage should be controlled from the excavation prior to any material being placed. In general, pumping using properly filtered sumps, and/or filtered drains placed along the base of the excavation should provide sufficient groundwater control during the construction. Please refer to the Hydrogeological report for the detailed dewatering plan.

For all other sites (#1, #5, #6 and #9), as no groundwater was observed in the open hole upon the completion of the drilling, dewatering may not be required during any excavation works. However, this will be confirmed once the groundwater data in the monitoring wells are available.

10.5 Frost Protection

The frost penetration depth for Region of Peel is considered as 1.2 m in accordance with Ontario Provincial Standard Drawing (OPSD) 3090.101.

The existing subgrade soil, silty clay, based on the sieve and hydrometer analyses and the MTO Frost Protection Criteria (**Table 17**) is considered a moderately to highly frost susceptible soil. Therefore, a relatively thick granular base has been recommended. The installation of a sub-drain system would reduce the potential for frost heave of the pavement structure.

Table 17: Soil Frost Susceptibility (MTO)

Grain Size (Silt and Clay Portion)	Susceptibility to Frost heave
0 to 40%	Low
40 to 55%	Moderate
55 to 100%	High

10.6 Settlement Considerations

As the snow storage will be founded on very stiff to hard silty clay till, with the assumption of 10.0 m height snow piles last about 4 months storage period, the settlement will be minor (less than 25 mm) which will not be an issue.

10.7 Soil Storage and Disposal

Work included under this item shall be for the complete excavation, hauling, and disposal off-site of cut material as per the engineering plans. The material is to be tested and disposed of off-site at a suitable location based on the test results.

Quantities for all earth and topsoil items shall be calculated using the pre and post survey information and calculated using computer volume modeling software. The Contractor to ensure that CA is provided adequate notice a minimum of 48 hours, and ample time to conduct the required survey work.

The new Soil Storage Rules (Part I – the Rules for Soil Management and Part II – the Excess Soil Quality Standards) shall be followed. A procedure to manage soil that is encountered during excavation that is observed to be likely contaminated shall be applied. The excess soil generated shall follow transportation safety guidelines and transportation records shall be generated accurately to document the movement of the excess soil. The excess soil designated for reused must meet the Excess Soil Quality Standards or site-specific Soil Quality Standards and must be used for a Beneficial Purpose. Specific processing methods can be utilized to reduce concentrations of contaminates to levels that are suitable for reuse. All records generated under O. Reg. 406/19 must be kept on file for 7 years.

All excess earth excavation remaining after use as fill shall be removed from the site to locations arranged for and at the sole expense of the Contractor, all included in the unit price bid for these items.
The excess soil is to be disposed of off-site, at locations (reuse site, a Class 1 soil management site, a Class 2 soil management site or a local waste transfer facility) arranged for and at the sole expense of the Contractor. The unit price shall include excavation, loading, hauling, and disposing offsite at the sole expense of the Contractor, including any environmental or weigh ticket requirements.

Disposal locations will depend on the soil type as determined by the testing carried out as part of MOE O. Reg. 153/04 and MOE O. Reg. 406/19. Refer to the environmental report regarding the detailed requirements of contaminated and soil disposal.

10.8 Drainage and Meltwater Management

Site drainage and meltwater should be directed to a meltwater collection pond. Site meltwater should be directed away from the snow piles and dumping area to reduce ponding/rutting. The meltwater collection pond should be designed with an impermeable base, a forebay to collect litter and settle coarse sediments and a larger secondary area (polishing pond) to settle finer particles. The uncontaminated drainage should be isolated from the meltwater. the meltwater collection pond should be designed large enough to handle the expected meltwater volume, other site drainage and the periodic additional load from precipitation events. The outlet should be controlled to regulate the release to the receiving water body. The point of discharge should be protected to prevent scour. Adequate access to the pond needs to be provided to allow for periodic cleanout of sediments. The polishing pond should be designed to encourage complete circulation to avoid salt stratification and the potential for higher releasees during wet weather flows.

11. Seismic Site Classification

Table 18 Site Classification for Seismic Site Response (CFEM 2006) summarizes the site classification based on the soil properties in the top 20 m of subsurface. Considering the undrained shear strength and SPT values of the stiff to hard silty clay till encountered, a seismic site classification of the building and proposed snow storage facilities at all the sites (#1, #3, #5, #6 and #9) is Site Class D.

Table 18: Site Classification for Seismic Site Response (CFEM 2006)

Average Properties in top 20 m				
Site Class	Ground Profile Name	Shear Wave Velocity $\overline{V_s}$ (m/s)	Standard Penetration Resistance $\overline{N}_{60}$	Soil Undrained Shear Strength s_u (kPa)
A	Hard Rock	$\overline{V_s} > 1500$	Not Applicable	Not Applicable
B	Rock	$760 < \overline{V_s} \leq 1500$	Not Applicable	Not Applicable
C	Very Dense Soil and Soft Rock	$360 < \overline{V_s} \leq 760$	$\overline{N}_{60} > 50$	$s_u > 100$
D	Stiff Soil	$180 < \overline{V_s} \leq 360$	$15 \leq \overline{N}_{60} \leq 50$	$50 < s_u \leq 100$
E	Soft Soil	$\overline{V_s} \leq 180$	$\overline{N}_{60} < 15$	$s_u < 50$
		Any profile with more than 3m of soil with the following characteristics: • Plasticity Index PI > 20; • Moisture Content w ≥ 40%; and • Undrained Shear Strength $s_u < 25$ kPa		
F	Other Soil	Site Specific Evaluation Required		

The adjust of the spectral accelerations and PGA values should be referred to Tables 4.2 to 4.9 in CHBDC S6-14. Design PGA and Sa (T), and these should be selected based on project specific requirements as described in the minimum performance level in CHBDC S6-14. Seismic earth pressures acting on the structure may be estimated using Mononobe-Okabe or Wood methods depending on the rigidity or tolerable movement of the structures.

12. Liquefaction Considerations

The subsurface soil at the proposed snow storage locations from approximately 0.2 to 6.7 m below the ground surface at this site mainly comprises silty clay till with SPT N-values ranging from 8 to over 50. Based on the observed SPT values, the subsoil could potentially be susceptible to liquefaction.
In addition, silty clay till may be classified as fine-grained soils. As shown in the grain size distribution analysis, they have a significant portion (over 70%) of fines passing through the #200 sieve. To delineate liquefaction susceptibility, this report adopted the empirical criteria recommended in the CFEM:

- $w/w_L \geq 0.85$ and $I_P \leq 12$: Susceptible to liquefaction or cyclic mobility;
- $w/w_L \geq 0.80$ and $10 \leq I_P \leq 12$: Moderately susceptible to liquefaction;
- $w/w_L < 0.85$ and $I_P \geq 12$: No liquefaction or cyclic mobility.

Where w is the in-situ soil water content, w_L is the liquid limit of the soil and I_P is the plasticity index of the soil. The results of the soil liquefaction susceptibility encountered within the proposed structure are shown in **Figure 6**. Based on the above criteria, the liquefaction potential for the silty clay till is 'no liquefaction'.

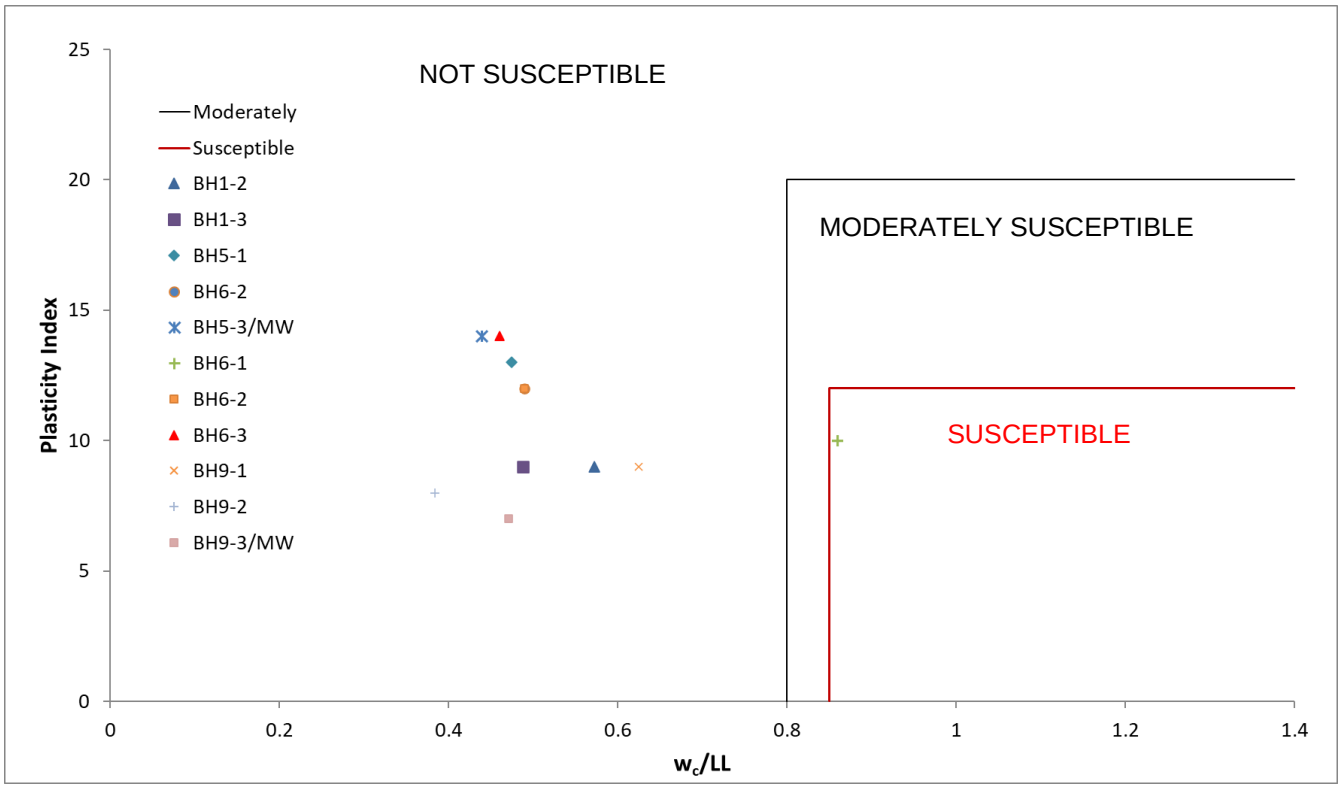

Figure 6: CFEM Recommended Criteria for Liquefaction Assessment of Fine-Grained Soils

13. Summary of Environmental Sampling

In total forty-three (43) soil samples were retrieved during Geotechnical and Hydrogeological Investigation to evaluate the general environmental quality of the fill material and the upper level of native subsurface soil as well as a baseline analysis of the groundwater for the future discharge options during the construction. This sampling/testing program was conducted for the future on-site waste management of excess soil for the waste disposal and re-use options during the construction.

Based on the background soil analytical results, all soil samples analyzed were either non-detect or detected with parameters well below the MECP Table 2 SCS for one or more contaminants of M&I, PAHs, PCBs, PHCs, and VOCs parameters.

Groundwater samples were collected from Sites #3, #5, #6, and #9, and submitted to Bureau Veritas Laboratories for chemical analysis. The results of the analysis were compared to Table 2 SCS. The groundwater sample analyzed including metals, VOCs, PHCs F1 - F4, PAHs, and PCBs results indicated that the concentration of all analyzed parameters met the applicable MECP Table 2 SCS Standards.

Any monitoring wells that are not in use must be decommissioned as per applicable regulations.

As part of the project, construction activities may include excavation which may generate more soil than can be reused on the Site, material that is termed “excess soil. It is noted that the quantity of soil to be excavated and the quantity of excess soil to be removed from the Project Sites are not known at this time. If the volume of excess soil exceeds 2000 m^3 a formal filing of a notice with MECP would be required.

Ontario Regulation 406/19 requires a project leader for a project to comply with specific requirements before removing excess soil from a project area. These obligations apply to the projects and in the circumstances set out in the regulation. Generally, the requirements include the following:

- Preparation of an assessment of past uses (APU);
- Preparation and implementation of a sampling and analysis plan (SAP);
- Preparation of a soil characterization report;
- Preparation of an excess soil destination assessment report; and
- Development and implementation of a tracking system.

14. References

Bouwer, H and R.C. Rice, 1976:
A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells. Water Resource Research 52(2): 311 – 316.

Canadian council of Ministers of the Environment, 2010:
Canadian Water Quality guidelines for the Protection of Aquatic Life – Ammonia.

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Calculation of un-ionized ammonia in fresh water. February 12, 2001.

Ministry of the Environment, 1996:
Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario, May 1996 (MOE 1996 Guidance Manual)

Ministry of the Environment, Conservation, and Parks (MECP), 2011:
Environmental Protection Act – Ontario Regulation 153/04 (as amended) – Record of Site Condition regulation - Part XV.1 of the Environmental Protection Act

Ministry of the Environment, Conservation, and Parks (MECP), 2011:
Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011

Ministry of the Environment, Conservation, and Parks (MECP), 2021:
Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality March 9, 2004 (PIBS 4696), amended as of July 1, 2011 and as of February 19, 2021 Version 3.1

Appendix A

Borehole Location Plan

LEGEND

Geotechnical Borehole - 5.18 m Depth

NOTES:

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2022.01.20	BH Plan	BK	TA

CLIENT NAME:
REGION OF PEEL

PROJECT LOCATION:
Highway No. 50 Car Pool lot

PROJECT NUMBER: 60646784

BOREHOLE LOCATION PLAN

DRAWN BY: BK	SCALE: 1:1500	DRAWING No. **1**
CHECKED: TA	DATE: JAN 2021	REVISION **0**

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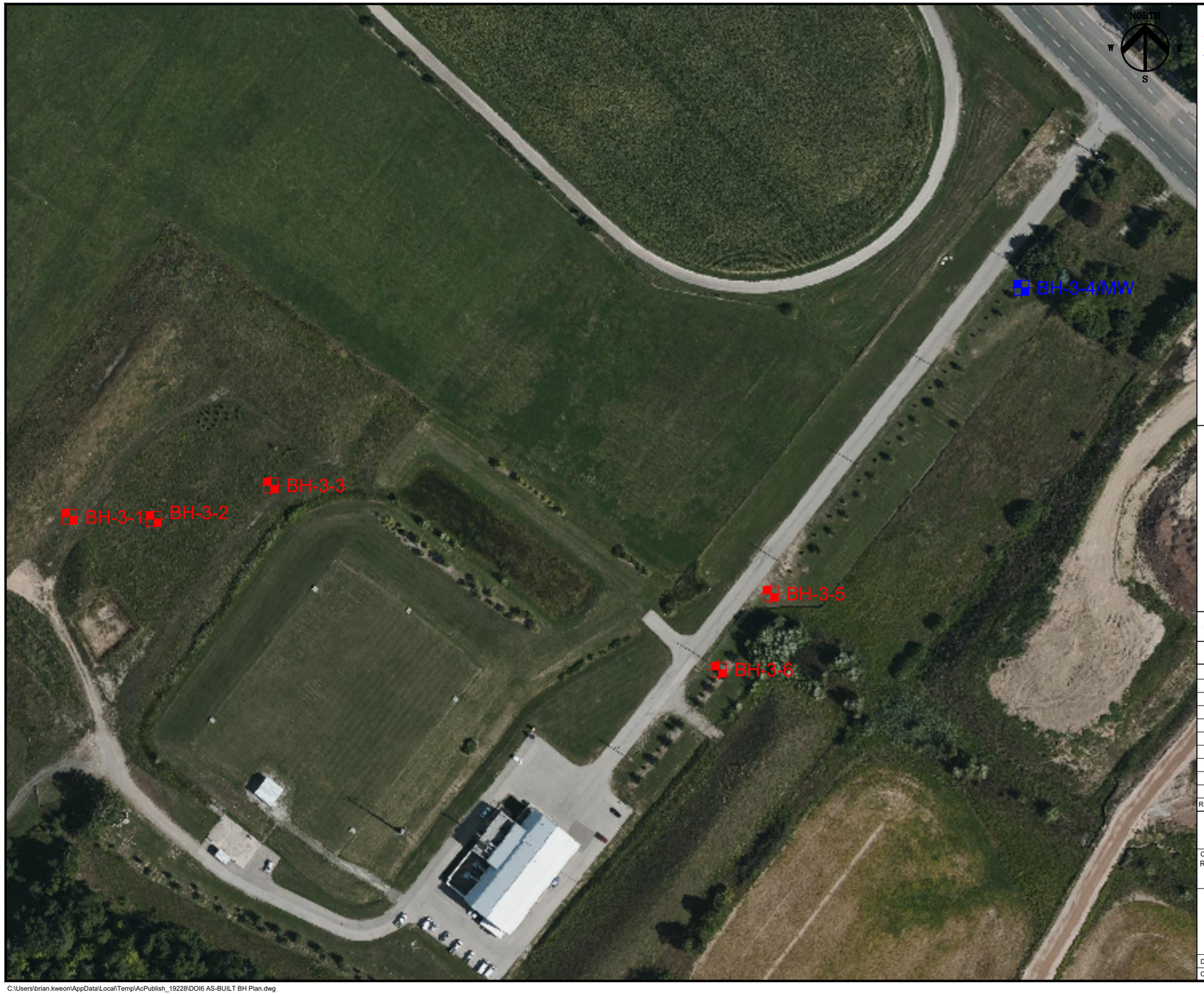

LEGEND

- Geotechnical Borehole - 3.66 m Depth
- Geotechnical Borehole with Monitoring Wells - 3.66 m Depth

NOTES:

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2022.01.20	BH Plan	BK	TA

CLIENT NAME:
REGION OF PEEL

PROJECT LOCATION:
West Brampton Reservoir and Pumping Station

PROJECT NUMBER: 60646784

BOREHOLE LOCATION PLAN

DRAWN BY: BK	SCALE: 1:1500	DRAWING No. **2**
CHECKED: TA	DATE: JAN 2021	REVISION **0**

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LEGEND

- Geotechnical Borehole - 3.66 m Depth
- Geotechnical Borehole with Monitoring Wells - 5.18 m Depth

NOTES:

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2022.01.20	BH Plan	BK	TA

CLIENT NAME:
REGION OF PEEL

PROJECT LOCATION:
Johnston Sports Park

PROJECT NUMBER: 60646784

BOREHOLE LOCATION PLAN

DRAWN BY: BK	SCALE: 1:1500	DRAWING No. **3**
CHECKED: TA	DATE: JAN 2021	REVISION **0**

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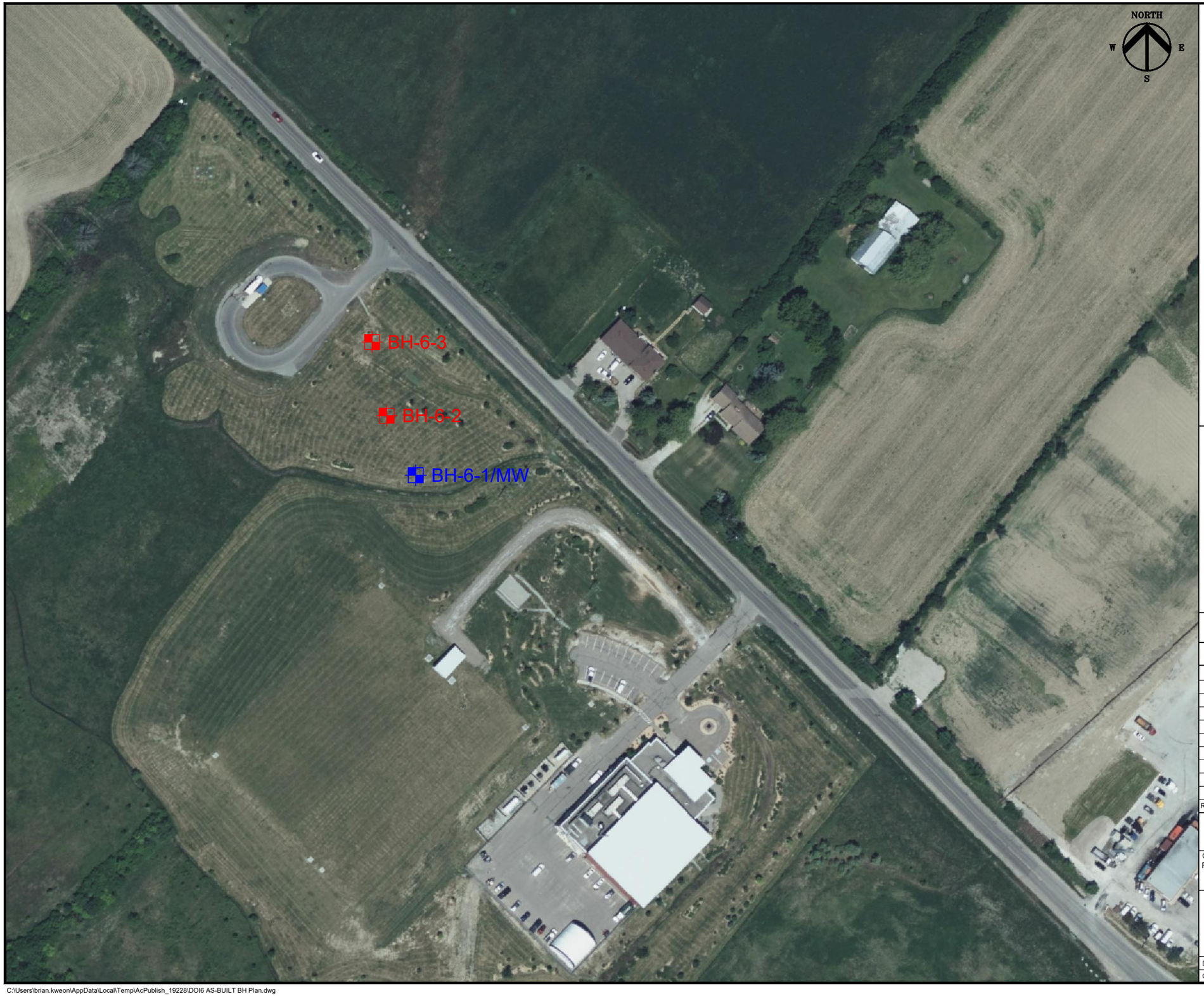

LEGEND

- Geotechnical Borehole - 2.7 m Depth
- Geotechnical Borehole with Monitoring Wells - 2.7 m Depth

NOTES:

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2022.01.20	BH Plan	BK	TA

CLIENT NAME:
REGION OF PEEL

PROJECT LOCATION:
Tullamore Reservoir and Pumping Station

PROJECT NUMBER: 60646784

BOREHOLE LOCATION PLAN

DRAWN BY: BK	SCALE: 1:1500	DRAWING No. **4**
CHECKED: TA	DATE: JAN 2021	REVISION **0**

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NORTH
W E
S

LEGEND

Geotechnical Borehole - 6.71 m Depth

Geotechnical Borehole with Monitoring Wells - 6.71 m Depth

NOTES:

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2022.01.20	BH Plan	BK	TA

CLIENT NAME:
REGION OF PEEL

PROJECT LOCATION:
Alloa Reservoir and Pumping Station

PROJECT NUMBER: 60646784

BOREHOLE LOCATION PLAN

DRAWN BY: BK	SCALE: 1:1500	DRAWING No. **5**
CHECKED: TA	DATE: JAN 2021	REVISION **0**

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Appendix B

Borehole Logs

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TERMINOLOGY USED IN BOREHOLE LOGS

Topsoil: Mixture of soil and humus capable of supporting good vegetative growth.

Peat: A mass of organic matter usually fibrous in texture in various stages of decomposition, generally dark brown to black in colour and of spongy consistency.

Fill: The term fill has been used to describe materials which have been placed by non-natural processes. Fills can often be heterogeneous in nature and those relying on this report should expect them to contain deleterious materials. Such materials can include wood, bricks, slag, porcelain, organics, and obstructions such as scrap metal, storage tanks, and abandoned concrete/steel structures.

Due to the uncertainty of the placement method of the material, the boring samples obtained for this report are not expected to represent other materials at any horizontal or vertical distance from where the sample was obtained.

Fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill site. Unless specifically stated, the fill on this site has not been tested for contaminants that can be considered toxic or hazardous. Testing to determine the toxicity of fill materials can be conducted, if requested.

Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Till must be considered heterogeneous in composition and containing pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) and boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the logs. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Due to the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone. Caution is essential when dealing with sensitive excavations or dewatering programs in till materials.

Terminology describing soil structure

Desiccated: having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.

Stratified: alternating layers of varying material or color with the layers greater than 6 mm thick.

Laminated: alternating layers of varying material or color with the layers less than 6 mm thick.

Fissured: material breaks along plane of fracture.

Varved: composed of regular alternating layers of silt and clay.

Slickensided: fracture planes appear polished or glossy, sometimes striated.

Blocky: cohesive soil that can be broken down into small angular lumps which resist further breakdown.

Lensed: inclusion of small pockets of different soil, such as small lenses of sand scattered through a mass of clay; not thickness.

Seam: a thin, confined layer of soil having different particle size, texture, or color from materials above and below.

Homogeneous: same color and appearance throughout.

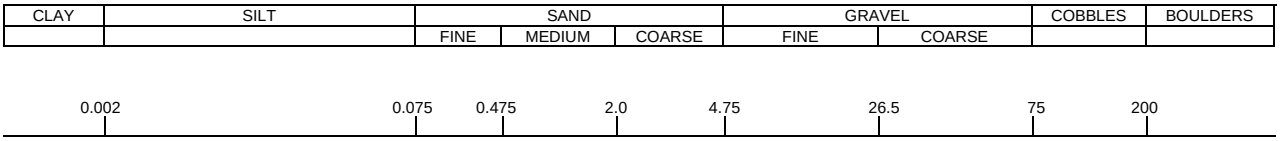
Well Graded: having wide range in grain sized and substantial amounts of all predominantly on grain size.

Uniformly Graded: predominantly on grain size.

Residual: completed weathered sedimentary rock mixed with native soils.

All soil sample descriptions included in this report generally follow the Canadian Foundations Engineering Manual and the Unified Soil Classification System. These systems follow the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by AECOM follow the same system. Note that, with exception of those samples where a grain size distribution analysis has been completed, all samples have been classified by visual inspection. Visual inspection classification is not sufficient to provide exact gain sizing.

ISSMFE / USCS SOIL CLASSIFICATION



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

The standard terminology to describe cohesive soils includes consistency, which is based on undrained shear strength as measured by in-situ vane tests, penetrometer tests, unconfined compression tests or similar field and laboratory analysis. Standard Penetration Test 'N' values can also be used to provide an approximate indication of the consistency and shear strength of fine grained, cohesive soils.

The standard terminology to describe cohesionless soils includes the compactness condition as determined by the Standard Penetration Test 'N' value.

Cohesionless Soils		Cohesive Soils			Composition	
Compactness Condition	**SPT N-Index (blows per 0.3 m)**	**Consistency**	**Undrained Shear Strength (kPa)**	**SPT N-Index (blows per 0.3 m)**	**Term**	**Criteria**
Very loose	0 – 4	Very soft	< 12	< 2	Trace	1% - 10%
Loose	4 – 10	Soft	12 - 25	2 – 4	Some	10% - 20%
Compact	10 – 30	Firm	25 – 50	4 – 8	Adjective	20% - 35%
Dense	30 – 50	Stiff	50 – 100	8 – 15	And	> 35%
Very Dense	> 50	Very Stiff	100 - 200	15 – 30	Noun	> 35% & largest fraction
		Hard	> 200	> 30		

Standard Penetration Test (SPT):

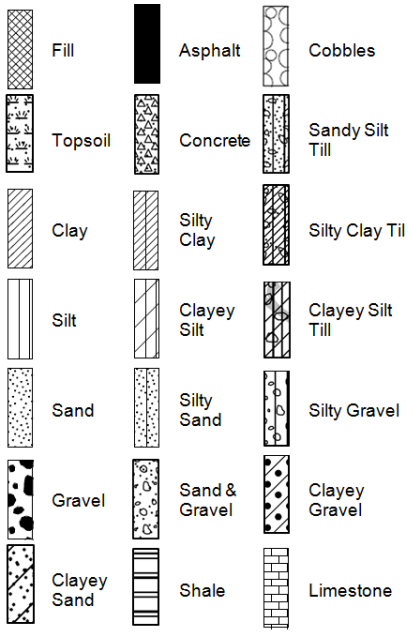
The number of blows required to drive a 50 mm (2 in.) open split spoon sampler from a depth of 150 mm (6 in.) to 450 mm (18 in.) in undisturbed soil. Each blow is driven by a 63.6 kg (140 lb.) hammer free falling a distance of 0.76 m (30 in.).

Sample & Soil Abbreviations	
CORE	Rock core sample
AS	Auger sample
FV	Field vane
PP	Pocket penetrometer
SG	Specific Gravity
GS	Grab sample
SS	Split spoon sample
DCPT	Dynamic cone penetration test
GR	Gravel
SA	Sand
SI	Silt
CL	Clay

Contaminant Abbreviations	
BNAE	base/neutral/acid extractables
BTEX	benzene, toluene, ethylbenzene, xylenes
OCP	organochlorine pesticides
MI	metals & inorganics
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PHC	CCME petroleum hydrocarbons (fractions 1 – 4)
VOC	volatile organic compounds (includes BTEX)

Plasticity Description	Liquid Limit (w_l)
Low	$w_l < 30$
Medium	$30 < w_l < 50$
High	$50 < w_l$

Strata/Graphic Plot



AECOM

Explanatory Sheet To Rock Core Log

Column No.	Description
1.	Elevation and Depth of Geotechnical Boundary in Borehole
2.	Drilling Method Used
3.	General Description of Geotechnical Unit: Quantitative description including rock type (s), percentage of rock types, frequency and sizes of interbeds, colour, texture, weathering, strength and general joint spacing

Hardness

H1	Extremely Hard	Cannot be scratched with a pocket knife or sharp pick. Can only be chipped with repeated heavy hammer blows
H2	Very Hard	Cannot be scratched with a pocket knife or sharp pick. Breaks with repeated heavy hammer blows
H3	Hard	Can be scratched with a pocket knife or sharp pick with difficulty (heavy pressure) Breaks with heavy hammer blows
H4	Moderately Hard	Can be scratched with a pocket knife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows
H5	Moderately Soft	Can be grooved 1.6 mm (1/16 in) with a pocket knife or sharp pick
H6	Soft	Can be grooved or gouged easily with a pocket knife or sharp pick with slight pressure, can be scratech with a finger nail. Breaks with light or moderate manual pressure
H7	Very Soft	Can readily be indented, grooved or gouged with a finger nail, or Carved with pocket knife. Breaks with light manual pressure
Strength (from ISRM)		Approx UCS
Svh	Very High Strength	>200 MPa
Sh	High Strength	50 to 200 MPa
Sm	Medium Strength	15 to 50 MPa
Sl	Low Strength	4 to 15 MPa
Svl	Very Low Strength	1 to 4 MPa

4. Geological Symbol for Rock or Soil Material
5. Elevation of Geotechnical Boundary
6. Run Number: Drill run number
7. Penetration Rate: meters per min
8. Colour & Return Percentage:
9. Core Recovery: Core recovery is the total length of core pieces, irrespective of their individual lengths, obtained in a core run and expressed as a percentage of the length of that core run.
10. Rock Quality Designation (RQD): The total length of those pieces of sound core which are 10 cm (4 inches) or greater in length in a core run expressed as a percentage of the total length of that core run. Sound pieces of rack are those pieces separated by natural breaks and not machine breaks or subsequent artificial breaks.

0 - 25 percent	Very Poor Quality
25 - 40 percent	Poor Quality
40 - 75 percent	Fair Quality
75 - 90 percent	Good Quality
90 - 100 percent	Very Good Quality

11. Fracturing:

Fu	Unfractured	No Fractures
Fvs	Very Slightly Fractured	Core length greater than 0.9 m (3 ft)
Fsl	Slightly Fractured	Core length from 0.3 to 0.9 m (1 to 3 ft)
Fm	Moderately Fractured	Core length from 0.1 to 0.3 m (4 in. to 1 ft)
Fi	Intensely Fractured	Core lengths from 0.25 to 0.1 m (1 in. to 4 in.)
Fvi	Very Intensely Fractured	Mostly chips and fragments

12. Degreed of dip of discontinuity measured from the axis of rock core.

AECOM

13. Discontinuity Description

Fracture Width (FW)

FWt	Tight	No visible separation
FWs	Slightly Open	FW< 0.8 mm (1/32 in.)
FWm	Moderately Open	0.8 mm (1/32 in.)≤FW<3.2 mm (1/8 in.)
FWo	Open	3.2 mm (1/8 in.) ≤FW<9.7 mm (3/8 in.)
FWmw	Moderatley Wide	9.7 mm(3/8 in.) ≤FW<25.4 mm (1 in.)
FWw	Wide	FW≥25.4 mm(1 in.)

Fracture Filling or Coating Thickness(FF)

FFc	Clean	No film coating
FFvt	Very Thin	FF< 0.8 mm (1/32 in.)
FFm	Moderately Thin	0.8 mm (1/32 in.)≤FF<3.2 mm (1/8 in.)
FFt	Thin	3.2 mm (1/8 in.) ≤FF<9.7 mm (3/8 in.)
FFmt	Moderately Thick	9.7 mm(3/8 in.) ≤FF<25.4 mm (1 in.)
FFw	Thick	FF≥25.4 mm(1 in.)

Roughness

Rst	Stepped	Near normal steps and ridges occur on the fracture surface
Rr	Rough	Large angular asperities can be seen
Rm	Moderately Rough	Asperities are cleanly visible and fracture surface feels abrasive
Rs	Slightly Rough	Small asperities on the fracture surface are visible and can be felt
Rsm	Smooth	No asperities, smooth to the touch

Bedding Spacing (Sb)

Bm	Massive	≤Sb > 3 m (10 ft)
Bvt	Very Thickly Bedded	0.9 m (3 ft) ≤ Sb ≤ 3 m (10 ft)
Bt	Thickly Bedded	0.3 m (1 ft) ≤ Sb ≤ 0.9 m (3 ft)
Bm	Moderately Bedded	0.1 m (4 in.) ≤ Sb ≤ 0.3 m (1 ft)
Bt	Thinly Bedded	25 mm (1 in.) ≤ Sb ≤ 0.1 m (4 in.)
Bvt	Very Thinly Bedded	6 mm (1/4 in.) ≤ Sb ≤ 25 mm (1 in.)
Bl	Laminated	SB ≤ 6 mm (1/4 in.)

Orientation

Of	Flat	= 0 - 20^{o}
Od	Dipping	= 20 - 50^{o}
Ov	Vertical	= 50 - 90^{o}

Surface Shape

Planar	Flat surface
Wavy	Undulating surface

Fracture Type:

B	Bedding
J	Fault
C	Joint
F	Foliation
S	Shear Plane
M	Mechanical Breaks

14. Hydraulic Conductivity (cm/sec)

15. Point Load Index:

Extremely Strong	> 10
Very Strong	4 - 10
Strong	2 - 4
Medium Strong	1 - 2

PROJECT: Region of Peel Snow Storage
LOCATION: Hwy 50 Car Pool Lot
COORDINATES: N 4855681.3; E 604793.4
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH1-1

SHEET 1 OF 1

START DATE: Dec 15, 2021
END DATE: Dec 15, 2021
BORING METHOD: 203 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●, rem V. ⊕ U △) / WATER CONTENT PERCENT (Wp, w, Wl)	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		226.62					GR SA SI CL	
0	Power Auger Drilling / 203 mm O.D. Hollow Stem Auger	**TOPSOIL:** 240 mm thick		0.00 226.38						
		SILTY CLAY (TILL): trace gravel, some sand, brown to grey, moist. very soft to hard		0.24	1	SS	WH			
1		very stiff			2	SS	21			
2					3	SS	22		2 16 51 31	
		hard			4	SS	36			
3					5	SS	35			
4										
5		very stiff			6	SS	22			
				221.44						
		END OF BOREHOLE		5.18						
6		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 5.18 mbgs upon completion of the drilling.								
7										
8										
9										
10										

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

PROJECT: Region of Peel Snow Storage
LOCATION: Hwy 50 Car Pool Lot
COORDINATES: N 4855691.8; E 604826.9
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH1-2

SHEET 1 OF 1

START DATE: Dec 15, 2021
END DATE: Dec 15, 2021
BORING METHOD: 203 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. - + Q - ●, rem V. - ⊕ U - △) 20 40 60 80	WATER CONTENT PERCENT Wp — w — Wl 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		226.62				20 40 60 80 / 100 200 300 400		GR SA SI CL	
0	Power Auger Drilling / 203 mm O.D. Hollow Stem Auger	**TOPSOIL:** 200 mm thick		0.00 / 226.42							
		SILTY CLAY (TILL): trace gravel, some sand to sandy, brown to grey, moist, soft to very stiff		0.20	1	SS	2				
1		---------- very stiff			2	SS	17				
2					3	SS	16				
					4	SS	17			1 21 47 31 Wet UW 21.80KN/cum Dry UW 19.18KN/cum	
3					5	SS	21				
4		---------- stiff									
5					6	SS	14				
				221.44							
		END OF BOREHOLE		5.18							
6		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 5.18 mbgs upon completion of the drilling.									
7											
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Hwy 50 Car Pool Lot
COORDINATES: N 4855717.6; E 604815.2
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH1-3

SHEET 1 OF 1

START DATE: Dec 15, 2021
END DATE: Dec 15, 2021
BORING METHOD: 203 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●, rem V. ⊕ U △) 20 40 60 80 / 100 200 300 400	WATER CONTENT PERCENT Wp — w — Wl 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		226.34						GR SA SI CL	
0	Power Auger Drilling / 203 mm O.D. Hollow Stem Auger	**TOPSOIL:** 230 mm thick		0.00 226.11							
		SILTY CLAY (TILL): trace gravel, some sand, brown to grey, moist, very soft to hard		0.23	1	SS	1			57.56	
		stiff									
1					2	SS	11				
2					3	SS	14				
		very stiff			4	SS	25				
3										Wet UW 21.78KN/cum Dry UW 19.30KN/cum	
		hard			5	SS	32			1 18 47 34	
4											
5					6	SS	30				
				221.16							
		END OF BOREHOLE		5.18							
6		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 5.18 mbgs upon completion of the drilling.									
7											
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: West Brampton Reservoir and Pumping Station
COORDINATES: N 4834560.1; E 594764.0
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH3-1

SHEET 1 OF 1

START DATE: Dec 16, 2021
END DATE: Dec 16, 2021
BORING METHOD: 203 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. - + Q - ● / rem V. - ⊕ U - △) 20 40 60 80	WATER CONTENT PERCENT Wp — W — Wl 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		237.33						GR SA SI CL	
0	Power Auger Drilling / 203 mm O.D. Hollow Stem Auger	**TOPSOIL:** 180 mm thick		0.00 / 237.15							
		FILL: clayey silt, trace gravel, trace sand, dark brown, moist, soft		0.18	1	SS	2		○		
				236.63							
1		**FILL:** sandy silt, some organics, trace gravel, trace clay, red, moist, compact to very loose		0.70	2	SS	10		○		
		---------- loose			3	SS	9		○		
2		---------- very loose			4	SS	4		○		
				234.33							
3		**SILTY CLAY (TILL):** trace gravel, some sand, red, moist, hard		3.00	5	SS	34		○	3 10 68 19	
				233.73							
		ROCK FRAGMENT: red, moist, very dense		3.66							
4		**AUGER REFUSAL** **END OF BOREHOLE**									
5		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 3.66 mbgs upon completion of the drilling.									
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7											
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: West Brampton Reservoir and Pumping Station
COORDINATES: N 4834559.2; E 594797.5
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH3-2

SHEET 1 OF 1

START DATE: Jan 3, 2022
END DATE: Jan 3, 2022
BORING METHOD: 107 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES N VALUE	SHEAR STRENGTH Cu, kPa (nat V. - + Q - ●, rem V. - ⊕ U - △) 20 40 60 80 / 100 200 300 400 ■ □	WATER CONTENT PERCENT Wp — w — Wl 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		236.15							
0	Power Auger Drilling / 107 mm O.D. Hollow Stem Auger	**TOPSOIL:** 50 mm thick		0.05							
		FILL: sand and gravel, some organics, some silt and clay, brown, moist, compact			1	SS	17				
				235.45							
		FILL: sandy silt, some organics, some clay, trace gravel, brown, moist, compact		0.70							
1					2	SS	17			4 40 37 19	
				234.65							
		SILTY CLAY (TILL): trace sand, grey, moist, stiff to hard		1.50							
					3	SS	8				
2		occasional cobbles, very stiff									
					4A	SS	24				
		red, moist, hard			4B	SS	50/127mm				
		some rock fragment		232.90							
3		**AUGER REFUSAL**		3.25							
		END OF BOREHOLE									
		Notes:									
		1. This log is to be read with the subject report and project number as presented above.									
		2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.									
		3. No abnormal odour or staining was observed unless otherwise indicated.									
		4. No groundwater was observed in the open hole to 3.25 mbgs upon completion of the drilling.									
4											
5											
6											
7											
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: WH
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: West Brampton Reservoir and Pumping Station
COORDINATES: N 4834572.5; E 594844.0
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH3-3

SHEET 1 OF 1

START DATE: Jan 3, 2022
END DATE: Jan 3, 2022
BORING METHOD: 107 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●; rem V. ⊕ U △) / WATER CONTENT PERCENT (Wp, w, Wl)	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		234.96					GR SA SI CL	
0	Power Auger Drilling / 107 mm O.D. Hollow Stem Auger	**FROZEN:** no sample		0.00						
				234.20						
1		**FILL:** sandy silt, some organics, trace gravel, trace clay, brown, moist, very loose		0.76	1	SS	3			
				233.46						
2		**SILTY CLAY (TILL):** trace gravel, some sand, brown to reddish brown, moist, very stiff to hard		1.50	2	SS	21		3 22 48 27	▽ Jan 3, 2022
		---------- hard			3	SS	50/ 4mm			
3				231.68	4	SS	50/ 3mm			
		AUGER REFUSAL **END OF BOREHOLE**		3.28						
4		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. The groundwater was observed in the open hole at the depth of 3.28 mbgs upon completion of the drilling.								
5										
6										
7										
8										
9										
10										

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: WH
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: West Brampton Reservoir and Pumping Station
COORDINATES: N 4834651.2; E 595142.4
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH3-4/MW

SHEET 1 OF 1

START DATE: Dec 16, 2021
END DATE: Dec 16, 2021
BORING METHOD: 203 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●, rem V. ⊕ U △) 20 40 60 80 / 100 200 300 400	WATER CONTENT PERCENT Wp — w — Wl 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		231.00						GR SA SI CL	
0	Power Auger Drilling / 203 mm O.D. Hollow Stem Auger	**TOPSOIL:** 150 mm thick		0.00 230.85							
		FILL: sand, some rootlets, some organics, trace gravel, brown, moist, very loose		0.15	1	SS	4				
				230.39							
		FILL: clayey silt, some rock pieces, sandy, brown, moist, loose		0.61							
1					2	SS	5			0 33 44 23	
				229.63							
		SANDY SILT: hydraulic, brown, wet to moist, very loose to compact		1.37							
2					3	SS	4				Dec 16, 2021
					4	SS	2				
3					5	SS	2				
4		---------- compact									
					6	SS	29				
5				225.82							
		END OF BOREHOLE		5.18							
6		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. The groundwater was observed in the open hole at the depth of 2.13 mbgs upon completion of the drilling. 5. A 51-mm I.D. PVC monitoring well was installed upon completion of the drilling. The monitoring wells screened interval was constructed overserved groundwater between 2.13 and 5.18 mbgs. 6. The groundwater level was observed in the monitoring well as follows: Date Depth Elevation									
7											
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: West Brampton Reservoir and Pumping Station
COORDINATES: N 4834499.3; E 595022.1
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH3-5

SHEET 1 OF 1

START DATE: Dec 16, 2021
END DATE: Dec 16, 2021
BORING METHOD: 203 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●, rem V. ⊕ U △) / WATER CONTENT PERCENT (Wp, w, Wl)	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		231.00					GR SA SI CL	
0	Power Auger Drilling, 203 mm O.D. Hollow Stem Auger	**TOPSOIL:** 230 mm thick		0.00 230.77						
		FILL: silty clay, some organics, trace gravel, trace sand, brown, moist, firm		0.23	1	SS	7			
				230.30						
1		**FILL:** sandy silt, some organics, trace gravel, trace clay, brown, moist, loose		0.70	2	SS	9			
				229.50						
2		**SANDY SILT:** hydraulic, trace gravel, brown, wet, compact to dense		1.50	3	SS	13		7 21 (72)	
		---------- dense			4	SS	32			▽ Dec 16, 2021
3					5	SS	36			
				227.34						
4		**END OF BOREHOLE**		3.66						
		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. The groundwater was observed in the open hole at the depth of 2.6 mbgs upon completion of the drilling.								
5										
6										
7										
8										
9										
10										

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: West Brampton Reservoir and Pumping Station
COORDINATES: N 4834529.5; E 595042.7
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH3-6

SHEET 1 OF 1

START DATE: Dec 16, 2021
END DATE: Dec 16, 2021
BORING METHOD: 203 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●, rem V. ⊕ U △) 20 40 60 80	WATER CONTENT PERCENT Wp W WI 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		231.00						GR SA SI CL	
0	Power Auger Drilling, 203 mm O.D. Hollow Stem Auger	**TOPSOIL:** 200 mm thick		0.00 / 230.80							
		FILL: silty clay, some organics, trace gravel, trace sand, brown to redish brown, moist to wet, soft to very stiff		0.20	1	SS	2		○		
1		some rock fragments, very stiff			2	SS	21		○ 51.89		
				229.50							
		SANDY SILT: hydrolic, occasional cobbles, trace gravel, red, wet, very loose		1.50	3	SS	3		○		▽ Dec 16, 2021
2		brown to reddish brown, compact			4	SS	23		○	3 22 (75)	
3		occasional cobbles, some rock fragments			5	SS	22		○		
				227.42							
		GRAVELLY SAND: brown, wet, compact		3.58 / 3.66							
4		**END OF BOREHOLE**									
5		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. The groundwater was observed in the open hole at the depth of 1.83 mbgs upon completion of the drilling.									
6											
7											
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Johnston Sports Park
COORDINATES: N 4855854.3; E 596921.0
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH5-1

SHEET 1 OF 1

START DATE: Dec 20, 2021
END DATE: Dec 20, 2021
BORING METHOD: 127 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. - + Q - ●, rem V. - ⊕ U - △) 20 40 60 80 / 100 200 300 400	WATER CONTENT PERCENT Wp W WI 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		268.17						GR SA SI CL	
0	Power Auger Drilling / 127 mm O.D. Hollow Stem Auger	**FILL:** silty clay, some organics, brown, moist, firm		0.00	1	SS	7				
				267.47							
1		**SILTY CLAY (TILL):** occasional cobbles, trace gravel, some sand, brown to grey, moist, stiff to hard		0.70	2	SS	13				
2					3	SS	20			1 13 44 42	
		---------- very stiff			4	SS	25			Wet UW 21.89KN/cum Dry UW 19.15KN/cum	
3		---------- grey, hard			5	SS	59				
				264.51							
		END OF BOREHOLE		3.66							
4		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 3.66 mbgs upon completion of the drilling.									
5											
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(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Johnston Sports Park
COORDINATES: N 4855746.5; E 596822.9
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH5-2

SHEET 1 OF 1

START DATE: Dec 20, 2021
END DATE: Dec 20, 2021
BORING METHOD: 203 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. - + Q - ● / rem V. - ⊕ U - △) 20 40 60 80	WATER CONTENT PERCENT Wp W WI 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		267.75						GR SA SI CL	
0	Power Auger Drilling 203 mm O.D. Hollow Stem Auger	**FILL:** silty clay, some organics, trace sand, trace gravel, brown, moist, firm		0.00	1	SS	4				
1					2	SS	5				
2				265.62	3	SS	5				
		SILTY CLAY (TILL): trace gravel, some sand, brown, moist, hard		2.13	4	SS	45			1 15 46 38	
3					5	SS	34				
				264.09							
		END OF BOREHOLE		3.66							
4		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 3.66 mbgs upon completion of the drilling.									
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(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Johnston Sports Park
COORDINATES: N 4855663.6; E 596916.0
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH5-3/MW

SHEET 1 OF 1

START DATE: Dec 20, 2021
END DATE: Dec 20, 2021
BORING METHOD: 203 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●, rem V. ⊕ U △) 20 40 60 80 / 100 200 300 400	WATER CONTENT PERCENT Wp — w — Wl 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		267.50						GR SA SI CL	
0	Power Auger Drilling 203 mm O.D. Hollow Stem Auger	**FILL:** silty clay, some organics, trace sand, trace gravel, brown, moist, firm		0.00	1	SS	5				
				266.80							
1		**SILTY CLAY (TILL):** trace gravel, some sand, brown, moist, very stiff to hard		0.70	2	SS	23				
2					3	SS	18				
					4	SS	25				
3		---------- hard			5	SS	32			1 21 48 30	
4											
		---------- grey, very stiff			6	SS	25				
5				262.32							
		END OF BOREHOLE		5.18							
6		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 5.18 mbgs upon completion of the drilling. 5. A 51-mm I.D. PVC monitoring well was installed upon completion of the drilling. The monitoring wells screened interval was constructed overserved groundwater between 2.13 and 5.18 mbgs. 6. The groundwater level was observed in the monitoring well as follows: Date Depth Elevation										
7											
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Johnston Sports Park
COORDINATES: N 4855767.3; E 596903.6
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH5-4

SHEET 1 OF 1

START DATE: Dec 20, 2021
END DATE: Dec 20, 2021
BORING METHOD: 203 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●, rem V. ⊕ U △) / WATER CONTENT PERCENT (Wp, w, Wl)	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		267.57					GR SA SI CL	
0	Power Auger Drilling; 203 mm O.D. Hollow Stem Auger	**FILL:** silty clay, some organics, trace sand, trace gravel, brown, moist, stiff		0.00	1	SS	13			
				266.87						
1		**SILTY CLAY (TILL):** occasional cobbles, trace gravel, brown to grey, moist, very stiff to hard		0.70	2	SS	15			
2					3	SS	19			
		---------- hard			4	SS	31			
3		---------- grey			5	SS	30		Wet UW 22.11KN/cum Dry UW 19.47KN/cum	
				263.91						
		END OF BOREHOLE		3.66						
4		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 3.66 mbgs upon completion of the drilling.								
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(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Johnston Sports Park
COORDINATES: N 4855772.2; E 597009.7
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH5-5

SHEET 1 OF 1

START DATE: Dec 20, 2021
END DATE: Dec 20, 2021
BORING METHOD: 127 mm O.D. Hollow Stem Auger
CONTRACTOR: Altech Drilling&Investigation Service Ltd.
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●, rem V. ⊕ U △) / WATER CONTENT PERCENT (Wp, w, Wl)	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		267.71					GR SA SI CL	
0	Power Auger Drilling; 127 mm O.D. Hollow Stem Auger	**FILL:** silty clay, some organics, some sand, trace gravel, brown, moist, firm		0.00	1	SS	5		0 17 53 30	
				267.01						
1		**SILTY CLAY (TILL):** trace gravel, trace sand, brown to grey, moist, very stiff to hard		0.70	2	SS	18			
2					3	SS	20			
		---------- hard			4	SS	35			
3		---------- some rock fragments, very stiff, grey			5	SS	25			
				264.05						
		END OF BOREHOLE		3.66						
4		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 3.66 mbgs upon completion of the drilling.								
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10										

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: DP
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Tullamore Reservoir and Pumping Station
COORDINATES: N 4850703.4; E 600325.3
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH6-1/MW

SHEET 1 OF 1

START DATE: Nov 15, 2021
END DATE: Nov 15, 2021
BORING METHOD: 152 mm O.D. Hollow Stem Auger
CONTRACTOR: Landshark Drilling
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●, rem V. ⊕ U △) 20 40 60 80	WATER CONTENT PERCENT Wp W WI 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		231.00						GR SA SI CL	
0	Power Auger Drilling; 152 mm O.D. Hollow Stem Auger	**FILL:** sandy silt, some organics, some gravel, trace clay, grey, brown, moist, firm		0.00	1	SS	5		75.03		
1					2	SS	6				
		SILTY CLAY (TILL): trace gravel, sandy, grey and brown, moist, stiff to very stiff		229.78 1.22	3	SS	13			3 36 33 28 Wet UW 20.99KN/cum Dry UW 18.03KN/cum	
2		---------- very stiff			4	SS	21				
				228.26	5	SS	29				
3		**AUGER REFUSAL** **END OF BOREHOLE**		2.74							
4		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 2.74 mbgs upon completion of the drilling. 5. A 51-mm I.D. PVC monitoring well was installed upon completion of the drilling. The monitoring wells screened interval was constructed overserved groundwater between 1.83 and 2.74 mbgs. 6. The groundwater level was observed in the monitoring well as follows: Date Depth Elevation									
5											
6											
7											
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: BK
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Tullamore Reservoir and Pumping Station
COORDINATES: N 4850727.0; E 600313.8
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH6-2

SHEET 1 OF 1

START DATE: Nov 15, 2021
END DATE: Nov 15, 2021
BORING METHOD: 152 mm O.D. Hollow Stem Auger
CONTRACTOR: Landshark Drilling

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. - + Q - ●, rem V. - ⊕ U - △) 20 40 60 80 / 100 200 300 400	WATER CONTENT PERCENT Wp W WI 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		231.00						GR SA SI CL	
0	Power Auger Drilling / 152 mm O.D. Hollow Stem Auger	**FILL:** silty clay, some organics, some rock pieces, trace gravel, some sand to sandy, grey, moist, very stiff to stiff		0.00	1	SS	17				
1		stiff			2	SS	12			1 20 38 41	
		grey to brown, very stiff			3	SS	22				
2					4	SS	19			Wet UW 21.59KN/cum Dry UW 19.10KN/cum 2 23 38 37	
				228.71							
		SILTY CLAY (TILL): trace gravel, sandy, brown, moist, very stiff to hard		2.29	5	SS	50/ 4mm				
				228.30							
3		**AUGER REFUSAL** **END OF BOREHOLE**		2.70							
		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 2.7 mbgs upon completion of the drilling.									
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10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: BK
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Tullamore Reservoir and Pumping Station
COORDINATES: N 4850756.2; E 600308.0
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH6-3

SHEET 1 OF 1

START DATE: Nov 15, 2021
END DATE: Nov 15, 2021
BORING METHOD: 152 mm O.D. Hollow Stem Auger
CONTRACTOR: Landshark Drilling

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. - + Q - ●, rem V. - ⊕ U - △) 20 40 60 80	WATER CONTENT PERCENT Wp W WI 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		231.00						GR SA SI CL	
0	Power Auger Drilling; 152 mm O.D. Hollow Stem Auger	**FILL:** silty clay, some organics, brown and grey, moist, firm to stiff		0.00	1	SS	6				
		stiff			2	SS	14				
1		**SILTY CLAY (TILL):** some sand, brown and grey, moist, very stiff to hard		229.78 1.22	3	SS	18				
		hard			4	SS	>50			0 16 39 45	
2		**AUGER REFUSAL**		228.87 2.13							
		END OF BOREHOLE									
3		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 2.13 mbgs upon completion of the drilling.									
4											
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7											
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: BK
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Alloa Reservoir and Pumping Station
COORDINATES: N 4839583.9; E 591534.2
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH9-1

SHEET 1 OF 1

START DATE: Nov 16, 2021
END DATE: Nov 16, 2021
BORING METHOD: 152 mm O.D. Hollow Stem Auger
CONTRACTOR: Landshark Drilling

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●; rem V. ⊕ U △) 20 40 60 80	WATER CONTENT PERCENT Wp — w — Wl 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		262.00						GR SA SI CL	
0	Power Auger Drilling; 152 mm O.D. Hollow Stem Auger	**FILL:** sandy silt, some organics, trace gravel, trace clay, dark brown, moist, stiff to very stiff		0.00	1	SS	14				
		brown to grey, very stiff			2	SS	15				
1				260.78							
		CLAYEY SILT: sandy, trace gravel, some organics, dark brown, moist, firm to stiff		1.22	3	SS	6			3 29 39 29	
		light brown, stiff			4	SS	8				
2				259.56							
		SILTY CLAY (TILL): some sand, trace gravel, light brown, grey, moist, stiff to hard		2.44	5	SS	11			1 18 42 39 Wet UW 20.45KN/cum Dry UW 17.75KN/cum	
		hard			6	SS	32				
3											
4											
					7	SS	32				
5											
6		grey to brown, very stiff			8	SS	22				
				255.29							
7		**END OF BOREHOLE** Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 6.71 mbgs upon completion of the drilling.		6.71							
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: BK
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Alloa Reservoir and Pumping Station
COORDINATES: N 4839576.8; E 591584.6
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH9-2

SHEET 1 OF 1

START DATE: Nov 16, 2021
END DATE: Nov 16, 2021
BORING METHOD: 152 mm O.D. Hollow Stem Auger
CONTRACTOR: Landshark Drilling

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. - + Q - ● / rem V. - ⊕ U - △) 20 40 60 80	WATER CONTENT PERCENT Wp — w — Wl 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		262.00						GR SA SI CL	
0	Power Auger Drilling; 152 mm O.D. Hollow Stem Auger	**FILL:** silty clay, trace sand, trace gravel, dark brown to grey, moist, soft to very stiff		0.00	1	SS	3	○			
1					2	SS	13	○			
2		very stiff			3	SS	8	○			
					4	SS	18	○			
3		firm			5	SS	7	○			
		some shale segments			6	SS	11	○			
		SILTY CLAY (TILL): sandy, trace gravel, trace rock pieces, brown, grey, white, moist, hard		258.34 3.66							
4											
5					7	SS	26	○			
6		brown, light brown			8	SS	44	○ ⊢—⊣		3 23 56 18	
				255.29							
7		**END OF BOREHOLE**		6.71							
8		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 6.71 mbgs upon completion of the drilling.									
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: BK
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

PROJECT: Region of Peel Snow Storage
LOCATION: Alloa Reservoir and Pumping Station
COORDINATES: N 4839543.1; E 591585.8
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH9-3/MW

SHEET 1 OF 1

START DATE: Nov 16, 2021
END DATE: Nov 16, 2021
BORING METHOD: 127 mm O.D. Hollow Stem Auger
CONTRACTOR: Landshark Drilling

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	N VALUE	SHEAR STRENGTH Cu, kPa (nat V. + Q ●; rem V. ⊕ U △) 20 40 60 80 / 100 200 300 400	WATER CONTENT PERCENT Wp W WI 10 20 30 40	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		262.00						GR SA SI CL	
0	Power Auger Drilling / 127 mm O.D. Hollow Stem Auger	**FILL:** sandy silt, trace gravel, some sand, dark brown, moist, firm		0.00 / 261.39	1	SS	7				
1		**FILL:** sand, trace gravel, grey, wet, very loose		0.61 / 260.78	2	SS	4				
2		**FILL:** silty clay, trace gravel, natural organics, brown, moist, firm to very stiff --- some sand, grey, stiff --- very stiff		1.22 / 258.95	3 4 5	SS SS SS	4 12 18				
3		**SILTY CLAY (TILL):** some sand, trace gravel, brown and black, moist, stiff to hard		3.05	6	SS	9				
4											
5		--- very stiff			7	SS	24			2 24 47 27 Wet UW 21.81KN/cum Dry UW 19.08KN/cum	
6		--- hard			8	SS	41				
7		**END OF BOREHOLE**		255.29 / 6.71							
8		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole to 6.71 mbgs upon completion of the drilling. 5. A 51-mm I.D. PVC monitoring well was installed upon completion of the drilling. The monitoring wells screened interval was constructed overserved groundwater between 3.05 and 6.10 mbgs. 6. The groundwater level was observed in the monitoring well as follows: Date Depth Elevation									
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

AECOM

LOGGED: BK
CHECKED: TA

AECOM_BH_001 60646784 REGION OF PEEL_LAB UPDATED.GPJ GAL-MISS.GDT 22-2-7

Appendix C

Laboratory Test Results

AECOM CANADA LTD.

MOISTURE CONTENT DETERMINATION

CLIENT	AECOM	**DATE**	December 16, 2021
PROJECT NUMBER	60646784	**TESTED BY**	SAM
PROJECT NAME	Peel Region Snow Storgae Site 1	**REVIEWED BY**	Ramana M
LOCATION	Peel Region, Ontario		

				Observations			Formula		
Borehole Name	**Sample Id**	**Depth (feet)**	**Can Id**	**Weight of Empty Can (g) W_1**	**Weight of Wet Soil + Can (g) W_2**	**Weight of Dry Soil + Can (g) W_3**	**Weight of Water (g) $W_w = (W_2-W_3)$**	**Weight of Dry soil (g) $W_s = (W_3-W_1)$**	**Moisture Content (%) $w = (W_w/W_s)*100$**
BH-1-2/MW	SS1	0-2	61	13.48	50.39	39.80	10.59	26.32	40.24
	SS2	2.5-4.5	91	13.63	65.45	57.31	8.14	43.68	18.64
	SS3	5-7	145	13.97	77.58	68.74	8.84	54.77	16.14
	SS4	7.5-9.5	69	13.65	72.05	64.24	7.81	50.59	15.44
	SS5	10-12	120	13.58	72.10	63.70	8.40	50.12	16.76
	SS6	15-17	80	13.51	67.46	58.53	8.93	45.02	19.84
BH-1-1	SS1	0-2	58	13.53	82.40	68.02	14.38	54.49	26.39
	SS2	2.5-4.5	171	13.66	66.62	58.33	8.29	44.67	18.56
	SS3	5-7	185	13.55	86.59	75.53	11.06	61.98	17.84
	SS4	7.5-9.5	101	13.51	86.66	77.41	9.25	63.90	14.48
	SS5	10-12	114	13.40	78.88	70.02	8.86	56.62	15.65
	SS6	15-17	118	13.65	102.98	91.54	11.44	77.89	14.69
BH-1-3	SS1	0-2	193	13.46	73.71	51.70	22.01	38.24	57.56
	SS2	2.5-4.5	152	13.31	79.08	65.87	13.21	52.56	25.13
	SS3	5-7	108	13.63	79.00	69.69	9.31	56.06	16.61
	SS4	7.5-9.5	127	13.68	95.13	85.14	9.99	71.46	13.98
	SS5	10-12	132	13.55	70.48	63.64	6.84	50.09	13.66
	SS6	15-17	81	13.80	74.44	67.69	6.75	53.89	12.53

Total Samples	18

AECOM CANADA LTD.

DETERMINATION OF UNIT WEIGHT - ASTM D7263

Project Number	60646784	**Date Tested**	18-Dec-21	**Tested by**	
Project Name		**Location**		**Checked by**	Ramana M

Water Content

Test Info	**Lab Number**		**202112017S**		**202112018S**					
	Borehole Name		**BH 1-3**		**BH1-2 MW**					
	Sample ID		**SS5**		**SS4**					
	Depth		**10.00**		**7.50**					
	Trial		**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	Tare ID		75	66	89	62				
Mass in Grams	**Tare Wt**		13.62	13.33	13.59	13.55				
	Tare + Wet Soil		52.74	51.72	65.23	56.20				
	Tare + Dry Soil		48.31	47.35	58.56	51.46				
	Water	M_w	4.43	4.37	6.67	4.74				
	Dry Soil	M_d	34.69	34.02	44.97	37.91				
Water Content %		w	12.77	12.85	14.82	12.51				
Average %			12.81		13.66					

Weight- Volume Relations

Temp of water (C)			25.3	25.3	25.5	25.5				
Density of Water			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mass in Grams	**Wet Soil**	M_t	131.67	110.54	123.56	106.61				
	Soil + Wax in Air		136.99	116.30	130.63	110.76				
	Wax		5.32	5.76	7.07	4.15				
	Wet Soil + Wax in water		72.30	59.75	67.01	58.41				
	Dry Soil[A]	M_d	116.76	97.96	107.61	94.76				
Specific Gravity of Soil (assumed)		G_s	2.72	2.72	2.72	2.72				
Volume in CC	Wet Soil + Wax[B]		64.69	56.55	63.62	52.35				
	Wax		5.86	6.34	7.79	4.57				
	Wet Soil	V	58.83	50.21	55.83	47.78				
	Dry Soil = M_d / G_s	V_S	43.01	36.08	39.63	34.90				
KN/cum	Wet Unit Weight = (M_t/V)x9.81	γ_m	21.96	21.60	21.71	21.89				
	Average Wet Unit Weight		**21.78**		**21.80**					
	Dry Unit Weight = (M_d/V)x9.81	γ_d	19.47	19.14	18.91	19.46				
	Average Dry Unit Weight		**19.30**		**19.18**					
Void Ratio = ($V-V_S$)/V_S		e	0.37	0.39	0.41	0.37				
Porosity % = [($V-V_S$)/V]x100		n	26.90	28.14	29.01	26.95				
Degree of Saturation = [V_w/($V-V_s$)] x100		S	94.22	89.07	98.47	92.03				

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202112019	Borehole No	BH 1 -1	Tested by	Dharmik P
Project Name	Snow Storage Project Site 1	Sample Id	SS3	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	5-7	Date	19-Dec-21
Location	PEEL Region, Ontario	Soil Classification	Lean Clay with Sand, trace gravel (CL)		

Soil Hydrometer Used

151 H SN#	993585	◉
	115105	○

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		204.8	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	63.1	cm^3
Length of Bulb	(L_2)	14.15	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.5	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.1351	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	20.27	g
Air Dried Mass	(Wa)	20.37	g
Hygroscopic Corr Factor	(F)	0.995	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.8	g
% Passing 2.0 mm Sieve	(P10)	96.9	
Sample Represented	(W)	51.4	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	3.7	201.0	98.2
2.0	6.4	198.3	96.9

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.7	96.8
0.850	0.9	48.8	95.1
0.425	1.8	47.9	93.3
0.25	3.0	46.8	91.0
0.106	6.3	43.4	84.5
0.075	7.7	42.0	81.8
Pass 0.075	0.4		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
20-Dec-21	10:32:00 AM	1.0	1.0260	0.0030	25.9	1.0230	71.1	9.19	8.79435	0.01258456	0.0382
	10:33:00 AM	2.0	1.0250	0.0030	25.9	1.0220	68.0	9.46	8.79435	0.01258456	0.0274
	10:36:00 AM	5.0	1.0230	0.0030	25.9	1.0200	61.8	10.00	8.79435	0.01258456	0.0178
	10:46:00 AM	15.0	1.0215	0.0030	25.8	1.0185	57.2	10.41	8.81384	0.0125985	0.0105
	11:01:00 AM	30.0	1.0195	0.0030	25.3	1.0165	51.0	10.95	8.91247	0.01266879	0.0077
	11:31:00 AM	60.0	1.0180	0.0030	25.0	1.0150	46.4	11.35	8.97259	0.01271145	0.0055
	2:41:00 PM	250.0	1.0150	0.0030	24.2	1.0120	37.1	12.16	9.13649	0.01282703	0.0028
21-Dec-21	10:31:00 AM	1440.0	1.0115	0.0030	23.4	1.0085	26.3	13.11	9.30578	0.01294531	0.0012

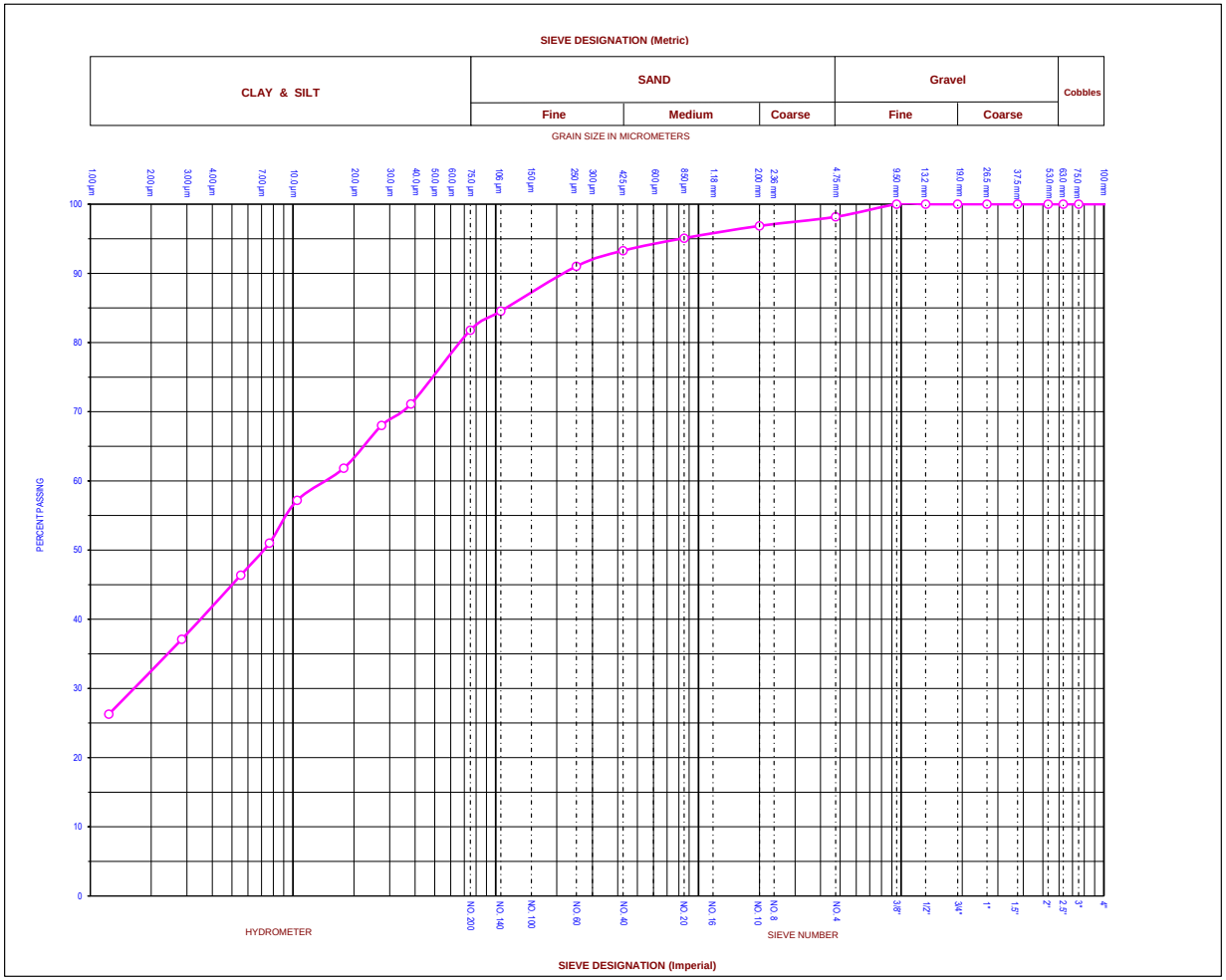
L1 cm	Viscosiity C	K (η/(Gs-1)
3.24	-0.518485	5.1731466
3.51	-0.518485	5.1731466
4.05	-0.518485	5.1731466
4.45	-0.516271	5.1846127
4.99	-0.505144	5.2426281
5.40	-0.498420	5.2779944
6.21	-0.480318	5.3744072
7.15	-0.461960	5.4739861

Mass Retained on Seive # 10	16.73
Mass Passed Seive # 10	188.03
Jar Number	

Hygroscopic Data		
	Can Id	143
	Empty Can Weight (g)	13.57
	Can+ Air Dried Soil (g)	33.94
	Can + Oven Dried Soil (g)	33.84

AECOM Canada Ltd.

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	December 19, 2021	Project Number	60646784			Gravel (%)	2
	Sample ID	BH 1 -1	SS3	Depth (feet)	5-7	Project Name	Snow Storage Project Site 1			Sand (%)	16
	Lab Sample No:	202112019				Project Location	PEEL Region, Ontario			Silt (%)	51
	Soil Classification	Lean Clay with Sand, trace gravel (CL)								Clay (%)	31
	Figure No.			D10	N/A	D30	0.002	D60	0.015	Cu	N/A	Cc	N/A

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202112018	Borehole No	BH 1-2MW	Tested by	Dharmik P
Project Name	Snow Storage Project Site 1	Sample Id	SS4	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	7.5-9.5	Date	19-Dec-21
Location	PEEL Region, Ontario	Soil Classification	Lean Clay with Sand, trace gravel (CL)		

Soil Hydrometer Used

151 H SN#	993585	○
	115105	◉

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		467.3	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	61.1	cm^3
Length of Bulb	(L_2)	14.44	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.17	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.3535	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	25.93	g
Air Dried Mass	(Wa)	26.06	g
Hygroscopic Corr Factor	(F)	0.995	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.8	g
% Passing 2.0 mm Sieve	(P10)	97.1	
Sample Represented	(W)	51.2	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	4.5	462.8	99.0
2.0	13.4	453.9	97.1

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.7	97.1
0.850	0.8	49.0	95.6
0.425	2.1	47.7	93.1
0.25	3.6	46.1	90.1
0.106	7.9	41.8	81.7
0.075	9.8	40.0	78.1
Pass 0.075	0.7		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_b /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
20-Dec-21	10:32:00 AM	1.0	1.0255	0.0030	26.3	1.0225	69.8	9.52	8.71714	0.0125292	0.0387
	10:33:00 AM	2.0	1.0240	0.0030	26.3	1.0210	65.1	9.92	8.71714	0.0125292	0.0279
	10:36:00 AM	5.0	1.0225	0.0030	26.3	1.0195	60.5	10.33	8.71714	0.0125292	0.0180
	10:46:00 AM	15.0	1.0210	0.0030	26.0	1.0180	55.8	10.73	8.77493	0.01257066	0.0106
	11:01:00 AM	30.0	1.0195	0.0030	25.7	1.0165	51.2	11.14	8.83341	0.01261248	0.0077
	11:31:00 AM	60.0	1.0180	0.0030	25.3	1.0150	46.5	11.54	8.91247	0.01266879	0.0056
	2:41:00 PM	250.0	1.0150	0.0030	24.2	1.0120	37.2	12.35	9.13649	0.01282703	0.0029
21-Dec-21	10:31:00 AM	1440.0	1.0115	0.0030	24.0	1.0085	26.4	13.30	9.17830	0.01285634	0.0012

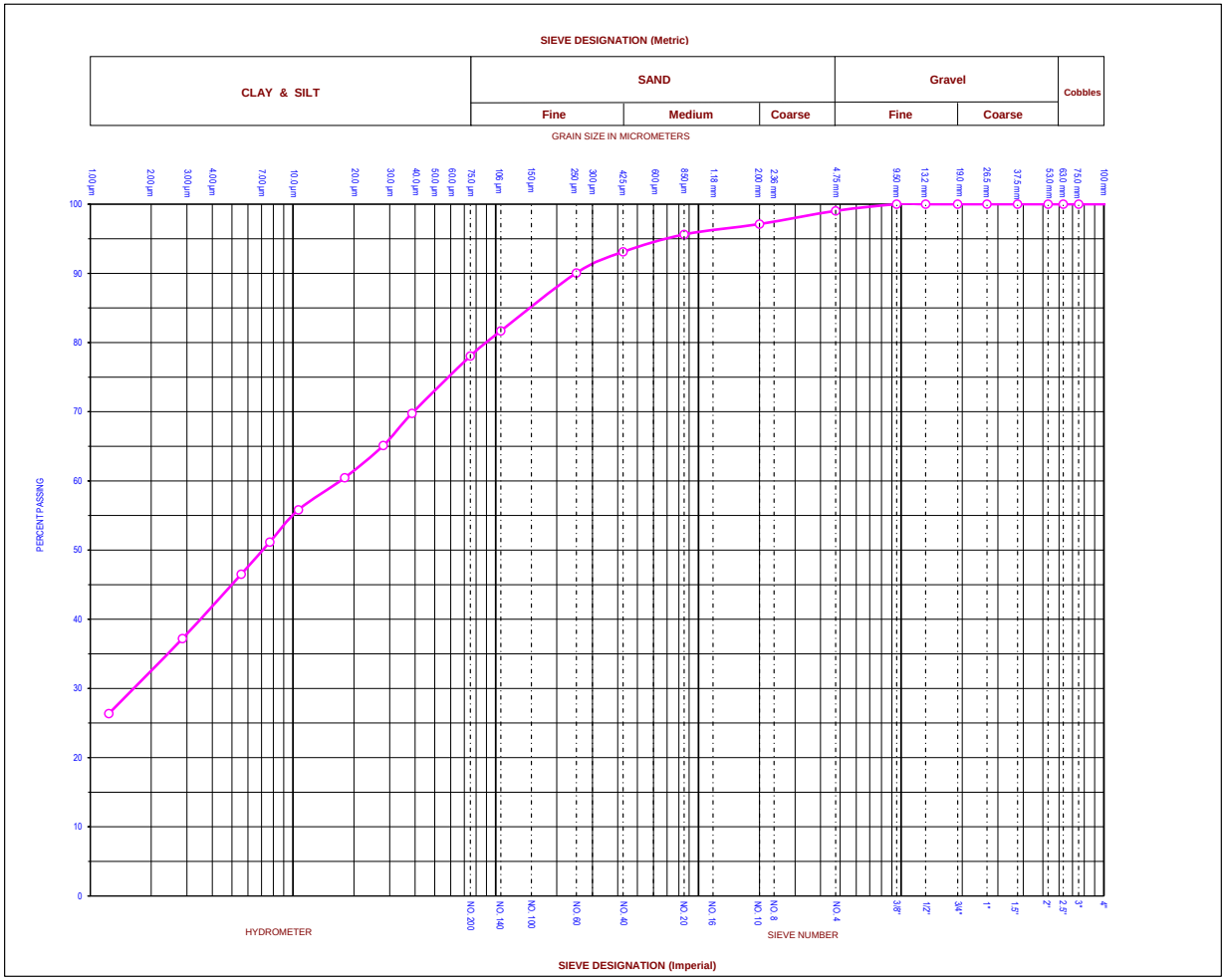
L1 cm	Viscosiity C	K (η/(Gs-1)
3.37	-0.527303	5.1277306
3.78	-0.527303	5.1277306
4.19	-0.527303	5.1277306
4.59	-0.520695	5.1617255
4.99	-0.514053	5.1961241
5.40	-0.505144	5.2426281
6.21	-0.480318	5.3744072
7.15	-0.475753	5.3989998

Mass Retained on Seive # 10	164.28
Mass Passed Seive # 10	303.03
Jar Number	

Hygroscopic Data		
	Can Id	156
	Empty Can Weight (g)	13.55
	Can+ Air Dried Soil (g)	39.61
	Can + Oven Dried Soil (g)	39.48

AECOM Canada Ltd.

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	December 19, 2021		Project Number	60646784			Gravel (%)	1
	Sample ID	BH 1-2MW	SS4	Depth (feet)	7.5-9.5		Project Name	Snow Storage Project Site 1			Sand (%)	21
	Lab Sample No:	202112018					Project Location	PEEL Region, Ontario			Silt (%)	47
	Soil Classification	Lean Clay with Sand, trace gravel (CL)									Clay (%)	31
	Figure No.			D10	N/A	D30	0.002	D60	0.017	Cu	N/A	Cc	N/A

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202112017	Borehole No	BH 1-3	Tested by	Dharmik P
Project Name	Snow Storage Project Site 1	Sample Id	SS5	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	10-12	Date	19-Dec-21
Location	PEEL Region, Ontario	Soil Classification	Lean Clay with Sand, trace gravel (CL)		

Soil Hydrometer Used

151 H SN#	993585	◉
	115105	○

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		396.0	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	63.1	cm^3
Length of Bulb	(L_2)	14.15	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.5	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.1351	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	19.65	g
Air Dried Mass	(Wa)	19.71	g
Hygroscopic Corr Factor	(F)	0.997	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.8	g
% Passing 2.0 mm Sieve	(P10)	97.1	
Sample Represented	(W)	51.3	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	4.5	391.5	98.9
2.0	11.5	384.5	97.1

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.8	97.1
0.850	1.2	48.6	94.8
0.425	2.3	47.5	92.6
0.25	3.6	46.3	90.2
0.106	7.0	42.9	83.5
0.075	8.4	41.4	80.7
Pass 0.075	0.9		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_b /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
20-Dec-21	10:14:00 AM	1.0	1.0260	0.0030	26.6	1.0230	71.2	9.19	8.66003	0.01248808	0.0379
	10:15:00 AM	2.0	1.0250	0.0030	26.6	1.0220	68.1	9.46	8.66003	0.01248808	0.0272
	10:18:00 AM	5.0	1.0235	0.0030	26.5	1.0205	63.4	9.87	8.67899	0.01250175	0.0176
	10:28:00 AM	15.0	1.0220	0.0030	26.2	1.0190	58.8	10.27	8.73633	0.01254298	0.0104
	10:43:00 AM	30.0	1.0205	0.0030	26.0	1.0175	54.1	10.68	8.77493	0.01257066	0.0075
	11:13:00 AM	60.0	1.0190	0.0030	25.5	1.0160	49.5	11.08	8.87278	0.01264055	0.0054
	2:23:00 PM	250.0	1.0160	0.0030	24.3	1.0130	40.2	11.89	9.11572	0.01281243	0.0028
21-Dec-21	10:13:00 AM	1440.0	1.0120	0.0030	24.0	1.0090	27.8	12.97	9.17830	0.01285634	0.0012

L1 cm	Viscosiity C	K (η/(Gs-1)
3.24	-0.533877	5.0941327
3.51	-0.533877	5.0941327
3.91	-0.531689	5.1052883
4.32	-0.525104	5.1390178
4.73	-0.520695	5.1617255
5.13	-0.509606	5.2192839
5.94	-0.482595	5.3621853
7.02	-0.475753	5.3989998

Mass Retained on Seive # 10	151.89
Mass Passed Seive # 10	244.1
Jar Number	

Hygroscopic Data		
	Can Id	189
	Empty Can Weight (g)	13.46
	Can+ Air Dried Soil (g)	33.17
	Can + Oven Dried Soil (g)	33.11

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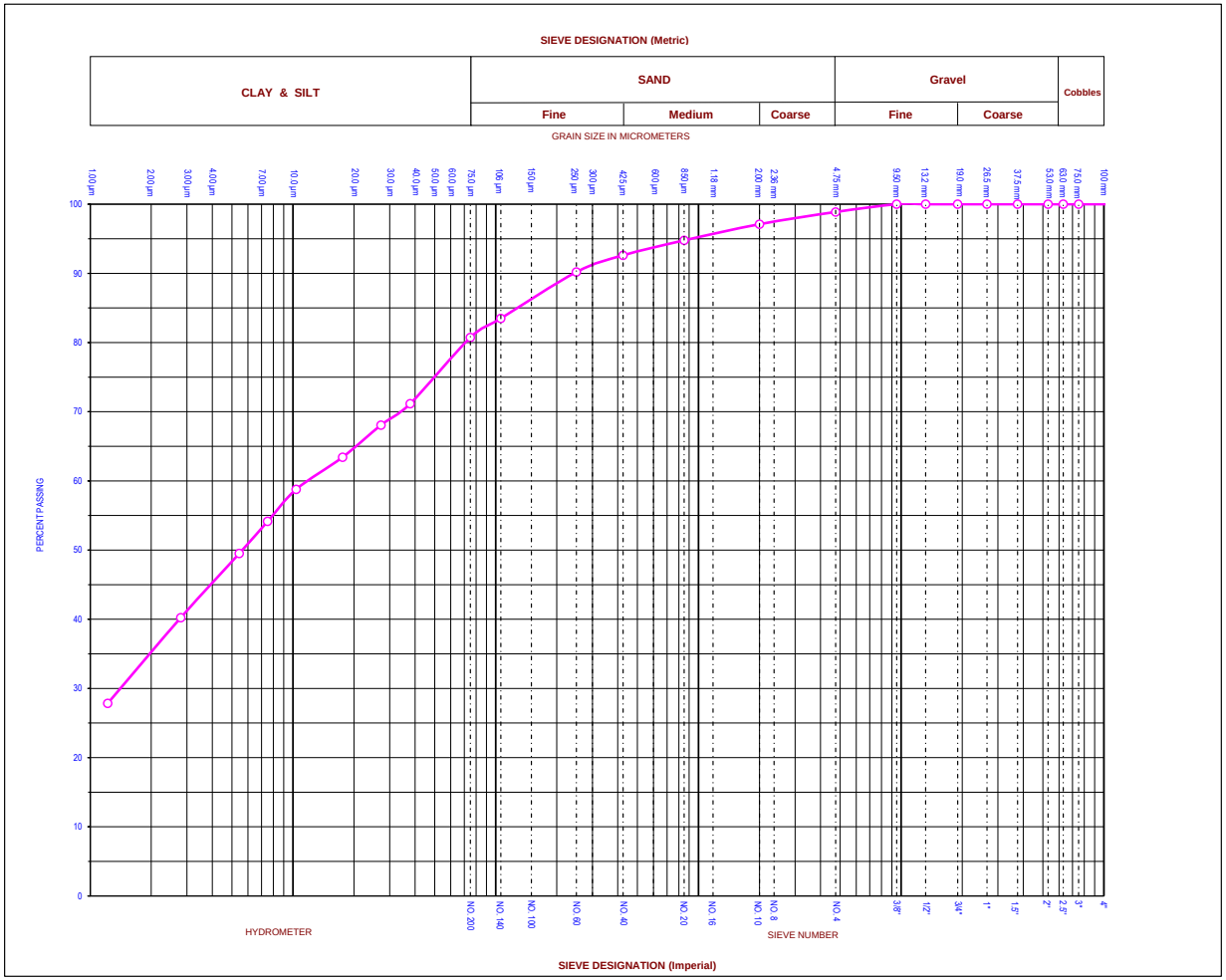
UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

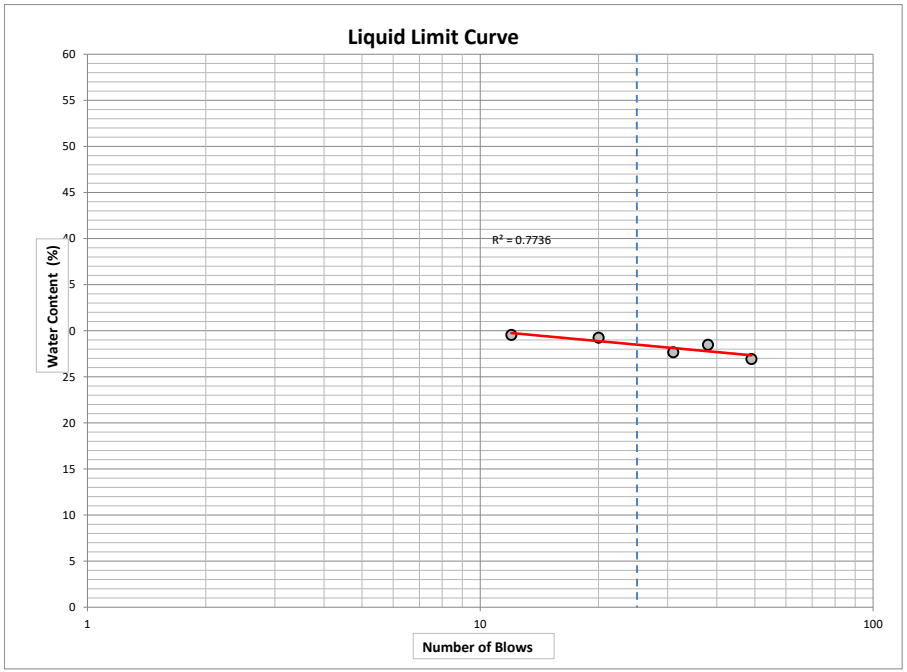
AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	December 19, 2021		Project Number	60646784			Gravel (%)	1	
	Sample ID	BH 1-3	SS5	Depth (feet)	10-12		Project Name	Snow Storage Project Site 1			Sand (%)	18	
	Lab Sample No:	202112017					Project Location	PEEL Region, Ontario			Silt (%)	47	
	Soil Classification	Lean Clay with Sand, trace gravel (CL)									Clay (%)	34	
	Figure No.			D10	N/A		D30	0.001	D60	0.012	Cu	N/A	Cc	N/A

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	December 20, 2021	
Project Name	Snow Storage Project Site 1				Tested By		
Location	Peel Region, Ontario				Reviewed By	Ramana M	
Borehole Number	BH1-3	Sample Id	SS5	Depth (feet)	10-12	Lab Number	202112017

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		96	142	178	95	51	
Weight of Empty Container (g) W_1		13.45	13.76	13.53	13.67	13.44	
Weight of Container + Wet Soil (g) W_2		22.12	19.75	23.57	22.48	21.23	
Weight of Container + Dry Soil(g) W_3		20.14	18.45	21.30	20.53	19.58	
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.98	1.30	2.27	1.95	1.65	
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	6.69	4.69	7.77	6.86	6.14	
Water Content (%)	$w = (W_w / W_s) * 100$	29.54	27.65	29.25	28.48	26.93	
Number of Blows		12	31	20	38	49	
Liquid Limit (%) From Graph		28.5					



AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	December 20, 2021	
Project Name	Snow Storage Project Site 1				Tested By	0	
Location	Peel Region, Ontario				Reviewed By	Ramana M	
Borehole Number	BH1-3	Sample Id	SS5	Depth (feet)	10-12	Lab Number	202112017

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		167	105	182			
Weight of Empty Container (g) W_1		13.668	13.79	13.40			
Weight of Container + Wet Soil (g) W_2		21.991	21.68	23.63			
Weight of Container + Dry Soil(g) W_3		20.69	20.42	22.02			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.30	1.26	1.61			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	7.02	6.64	8.62			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	18.53	19.04	18.63			
Average Plastic Limit (%) w_P		18.73					

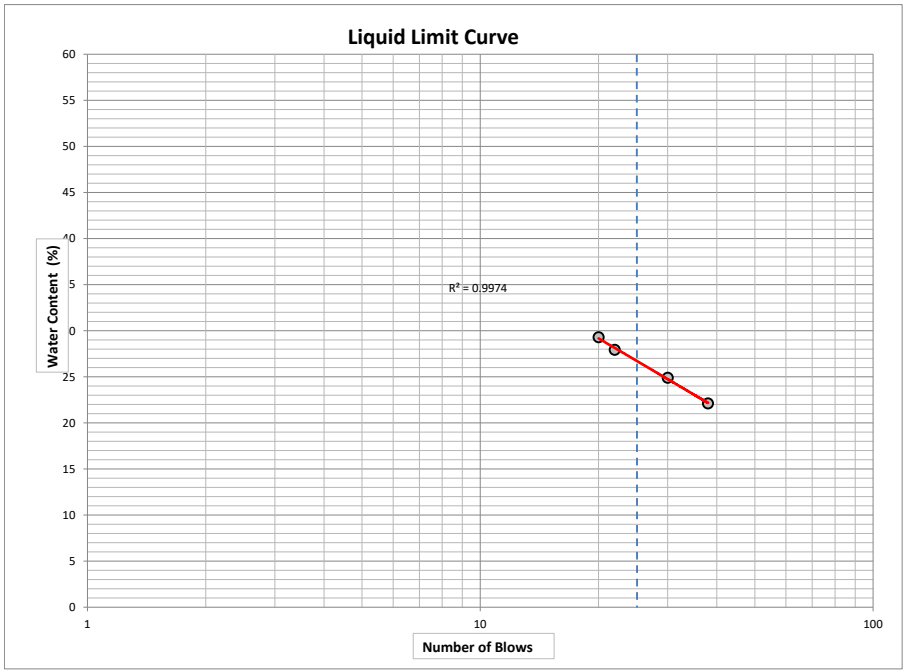
Result Summary	
Liquid Limit (%)	28
Plastic Limit (%)	19
Plasticity Index (%)	9
Sample status	Plastic

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	December 20, 2021	
Project Name	Snow Storage Project Site 1				Tested By		
Location	Peel Region, Ontario				Reviewed By	Ramana M	
Borehole Number	BH 1-2MW	Sample Id	SS4	Depth (feet)	7.5	Lab Number	202112018

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		60	136	176	129		
Weight of Empty Container (g) W_1		13.37	13.71	13.60	13.59		
Weight of Container + Wet Soil (g) W_2		21.84	23.23	22.82	21.73		
Weight of Container + Dry Soil(g) W_3		19.92	21.51	20.81	20.11		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.92	1.72	2.01	1.62		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	6.55	7.80	7.21	6.52		
Water Content (%)	$w = (W_w / W_s) * 100$	29.29	22.11	27.93	24.89		
Number of Blows		20	38	22	30		
Liquid Limit (%) From Graph		26.7					



AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	December 20, 2021	
Project Name	Snow Storage Project Site 1				Tested By	0	
Location	Peel Region, Ontario				Reviewed By	Ramana M	
Borehole Number	BH 1-2MW	Sample Id	SS4	Depth (feet)	7.5	Lab Number	202112018

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		82	74	54			
Weight of Empty Container (g) W_1		13.536	14.15	13.65			
Weight of Container + Wet Soil (g) W_2		20.518	21.67	22.37			
Weight of Container + Dry Soil(g) W_3		19.43	20.51	21.03			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.09	1.16	1.34			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	5.89	6.36	7.38			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	18.46	18.22	18.18			
Average Plastic Limit (%) w_P		18.29					

Result Summary	
Liquid Limit (%)	27
Plastic Limit (%)	18
Plasticity Index (%)	9
Sample status	Plastic

AECOM CANADA LTD.

MOISTURE CONTENT DETERMINATION

CLIENT	AECOM	DATE	December 17, 2021
PROJECT NUMBER	60646784	TESTED BY	SAM
PROJECT NAME		REVIEWED BY	Ramana M
LOCATION	Peel Region Snow Storage-SITE 3		

Borehole Name	Sample Id	Depth (feet)	Can Id	Observations			Formula		
				Weight of Empty Can (g) W_1	Weight of Wet Soil + Can (g) W_2	Weight of Dry Soil + Can (g) W_3	Weight of Water (g) $W_w = (W_2-W_3)$	Weight of Dry soil (g) $W_s = (W_3-W_1)$	Moisture Content (%) $w = (W_w/W_s)*100$
BH 3-1	SS1	0-2	86	13.47	97.32	81.09	16.23	67.62	24.00
	SS2	2.5-4.5	63	13.50	84.04	73.99	10.05	60.49	16.61
	SS3	5-7	164	13.60	75.35	66.14	9.21	52.54	17.53
	SS4	7.5-9.5	166	13.50	76.23	68.57	7.66	55.07	13.91
	SS5	10-12	73	13.66	91.09	83.52	7.57	69.86	10.84
BH 3-4	SS1	0-2	161	13.46	77.06	64.80	12.26	51.34	23.88
	SS2	2.5-4.5	138	13.60	82.54	70.55	11.99	56.95	21.05
	SS3A	5-7	130	13.50	102.91	86.32	16.59	72.82	22.78
	SS3B	5-7	87	13.77	79.02	68.56	10.46	54.79	19.09
	SS4	7.5-9.5	84	13.53	85.24	78.33	6.91	64.80	10.66
	SS5	10-12	158	13.92	95.21	86.06	9.15	72.14	12.68
	SS6	15-17	55	13.35	105.35	92.28	13.07	78.93	16.56
BH 3-5	SS1	0-2	126	13.87	80.77	61.57	19.20	47.70	40.25
	SS2	2.5-4.5	52	13.97	74.19	65.01	9.18	51.04	17.99
	SS3	5-7	169	13.54	86.29	71.73	14.56	58.19	25.02
	SS4	7.5-9.5	149	13.55	117.89	95.78	22.11	82.23	26.89
	SS5	10-12	184	13.63	106.61	88.25	18.36	74.62	24.60
BH 3-6	SS1	0-2	72	13.86	82.32	67.41	14.91	53.55	27.84
	SS2	2.5-4.5	165	13.94	86.93	76.43	10.50	62.49	16.80
	SS3	5-7	168	13.62	85.92	61.22	24.70	47.60	51.89
	SS4	7.5-9.5	162	13.50	97.87	86.15	11.72	72.65	16.13
	SS5A	10-12	113	13.64	84.39	76.17	8.22	62.53	13.15
	SS5B	10-12	102	13.50	44.21	42.44	1.77	28.94	6.12

Total Samples	23

AECOM CANADA LTD.

Client	AECOM	**Borehole No**	BH 3-6	**Lab No**	202112014
Project Number	60646784	**Sample ID**	SS4	**Date**	Dec,18-2021
Project Name	Snow Storage Project Site 3			**Depth (Feet)**	7.5-9.5
Location	Peel Region, Ontario			**Tested by**	Sam
Soil Classification	Sandy Silt, trace gravel (ML)			**Reviewed by**	Ramana M

Total Sample Mass (A) g	891.1	**% Coarse Aggregate (D)**	2.8	**% Fine Aggregate (E)**	97.2

COARSE AGGREGATE

Sieve (mm)	Individual Mass Retained (g)	Cumultive Mass Retained (g) [X]	Coarse Aggegate Portion Only		% Passing (Total Sample
			% Retained	% Passing	
106				100.0	100.0
75.0				100.0	100.0
63.0				100.0	100.0
53.0				100.0	100.0
37.5				100.0	100.0
26.5				100.0	100.0
22.4				100.0	100.0
19.0				100.0	100.0
16.0	8.1	8.1	32.1	67.9	99.1
13.2	4.1	12.2	48.5	51.5	98.6
9.5	3.9	16.1	64.0	36.0	98.2
6.7	7.9	24.0	95.7	4.3	97.3
4.75	1.1	25.1	100.0		97.2
Pan		Pan + [B]	Mass Passing 4.75 mm (g) [C = A-B]		866

FINE AGGREGATE

Sample Mass before washing (g) [F]	410.33	Mass passing 75 µm sieve by washing (g)	305.73
Sample Mass after washing (g)	104.6	Mass passing 75 µm sieve by sieving (g)	10.68

Sieve (mm)	Cumultive Mass Retained (g) [Y]	Fine Aggregate Portion Only		% Passing (Total Sample
		% Retained	% Passing	
4.75	0.28	0.1	99.9	97.12
2.36	7.45	1.8	98.2	95.42
1.18	15.23	3.7	96.3	93.58
0.600	23.18	5.6	94.4	91.70
0.425	28.73	7.0	93.0	90.38
0.300	35.4	8.6	91.4	88.80
0.150	59.58	14.5	85.5	83.08
0.075	93.92	22.9	77.1	74.94
Pan	10.68	Total Mass passing 75 µm sieve (g)	316.41	

Calculations:

D = (B/A) * 100
E= (C/A) * 100

Coarse Aggregate Portion:
% Retained =(X/B) * 100
% Passing = ((B-X) /B) * 100

Fine Aggregate Portion:
% Retained =(Y/F) * 100
% Passing = ((F-Y) /F) * 100

Total Mass Calculations

% Retained on Coarse Aggregate Sieves = (X/A) * 100

% Retained on Fine Aggregate Sieves = (Y/F) * E + % Ret. 4.75

% Passing Coarse Aggregate Sieves = ((A -X)/A)) * 100

% Passing on Fine Aggregate Sieves = ((F - Y)/F) * E

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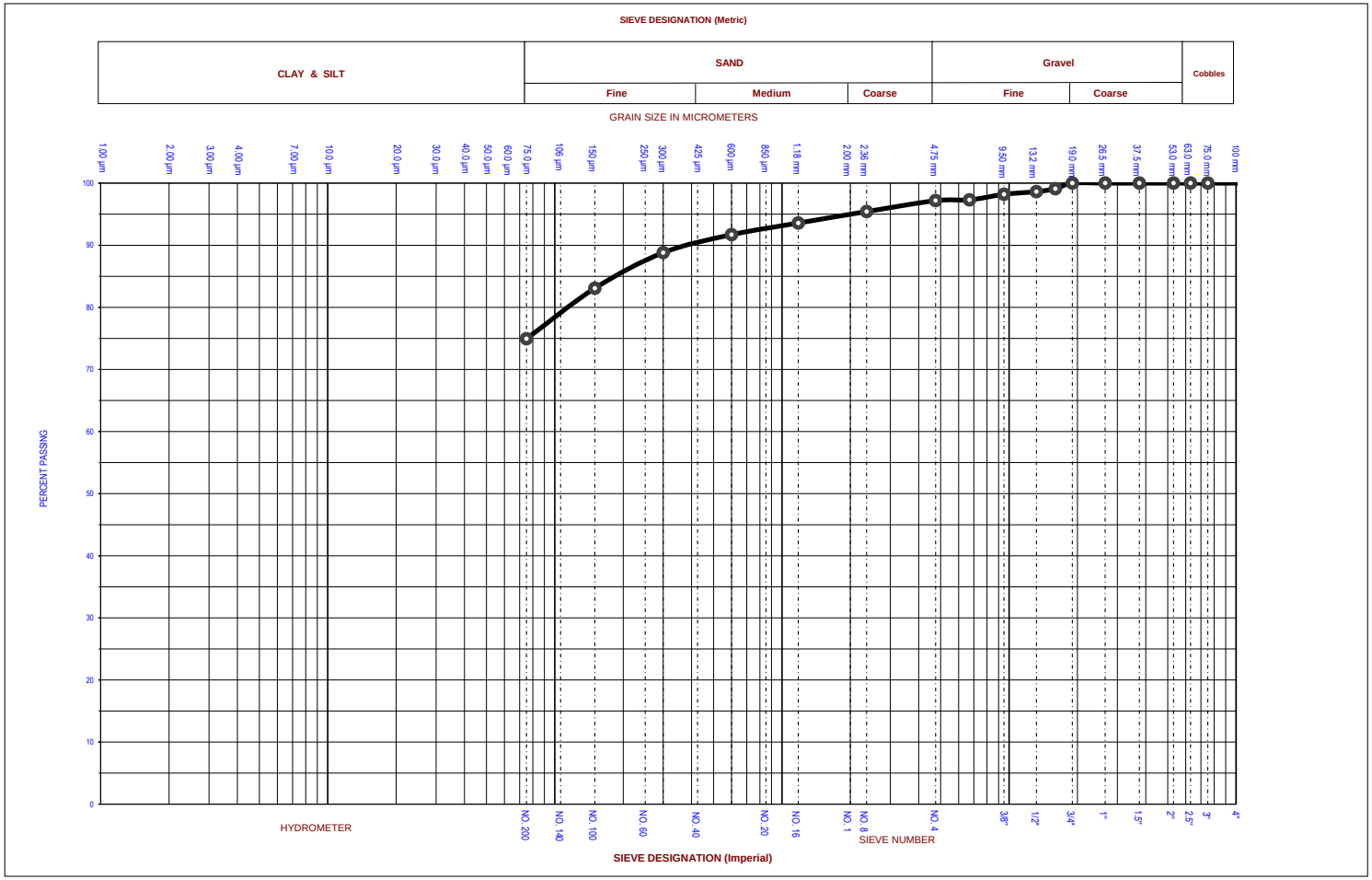

GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario			Client		AECOM			Date	Dec,18-2021		Project Number		60646784		
			Borehole No / Sample Id		BH 3-6 SS4			Depth (feet)	7.5-9.5		Lab No		202112014		
			Project Name		Snow Storage Project Site 3						Project Location		Peel Region, Ontario		
			Soil Classification		Sandy Silt, trace gravel (ML)						Figure No:				
Gravel(%)	3	Sand(%)	22	Fines(%)	75	D_{60} (mm)	N/A	D_{30} (mm)	N/A	D_{10} (mm)	N/A	C_U	N/A	C_c	N/A

AECOM CANADA LTD.

Client	AECOM	**Borehole No**	BH 3-5	**Lab No**	202112013
Project Number	60646784	**Sample ID**	SS3	**Date**	Dec,18-2021
Project Name	Snow Storage Project Site 3			**Depth (Feet)**	5-7
Location	Peel Region, Ontario			**Tested by**	Sam
Soil Classification	Sandy Silt, trace gravel (ML)			**Reviewed by**	Ramana M

Total Sample Mass (A) g	766.7	**% Coarse Aggregate (D)**	6.8	**% Fine Aggregate (E)**	93.2

COARSE AGGREGATE

Sieve (mm)	Individual Mass Retained (g)	Cumultive Mass Retained (g) [X]	Coarse Aggegate Portion Only		% Passing (Total Sample
			% Retained	% Passing	
106				100.0	100.0
75.0				100.0	100.0
63.0				100.0	100.0
53.0				100.0	100.0
37.5				100.0	100.0
26.5	37.3	37.3	71.3	28.7	95.1
22.4		37.3	71.3	28.7	95.1
19.0		37.3	71.3	28.7	95.1
16.0	7.2	44.5	85.1	14.9	94.2
13.2		44.5	85.1	14.9	94.2
9.5	1.6	46.1	88.2	11.8	94.0
6.7	2.8	48.9	93.6	6.4	93.6
4.75	3.3	52.3	100.0		93.2
Pan	0.3	Pan + [B]	Mass Passing 4.75 mm (g) [C = A-B]		714.42

FINE AGGREGATE

Sample Mass before washing (g) [F]	342.24	Mass passing 75 µm sieve by washing (g)	162.32
Sample Mass after washing (g)	179.92	Mass passing 75 µm sieve by sieving (g)	101.94

Sieve (mm)	Cumultive Mass Retained (g) [Y]	Fine Aggregate Portion Only		% Passing (Total Sample
		% Retained	% Passing	
4.75			100.0	93.18
2.36	1.12	0.3	99.7	92.88
1.18	2.16	0.6	99.4	92.59
0.600	3.27	1.0	99.0	92.29
0.425	3.74	1.1	98.9	92.16
0.300	4.14	1.2	98.8	92.05
0.150	15.96	4.7	95.3	88.84
0.075	77.98	22.8	77.2	71.95
Pan	101.94	Total Mass passing 75 µm sieve (g)	264.26	

Calculations:

D = (B/A) * 100
E= (C/A) * 100

Coarse Aggregate Portion:
% Retained =(X/B) * 100
% Passing = ((B-X) /B) * 100

Fine Aggregate Portion:
% Retained =(Y/F) * 100
% Passing = ((F-Y) /F) * 100

Total Mass Calculations

% Retained on Coarse Aggregate Sieves = (X/A) * 100

% Retained on Fine Aggregate Sieves = (Y/F) * E + % Ret. 4.75

% Passing Coarse Aggregate Sieves = ((A -X)/A)) * 100

% Passing on Fine Aggregate Sieves = ((F - Y)/F) * E

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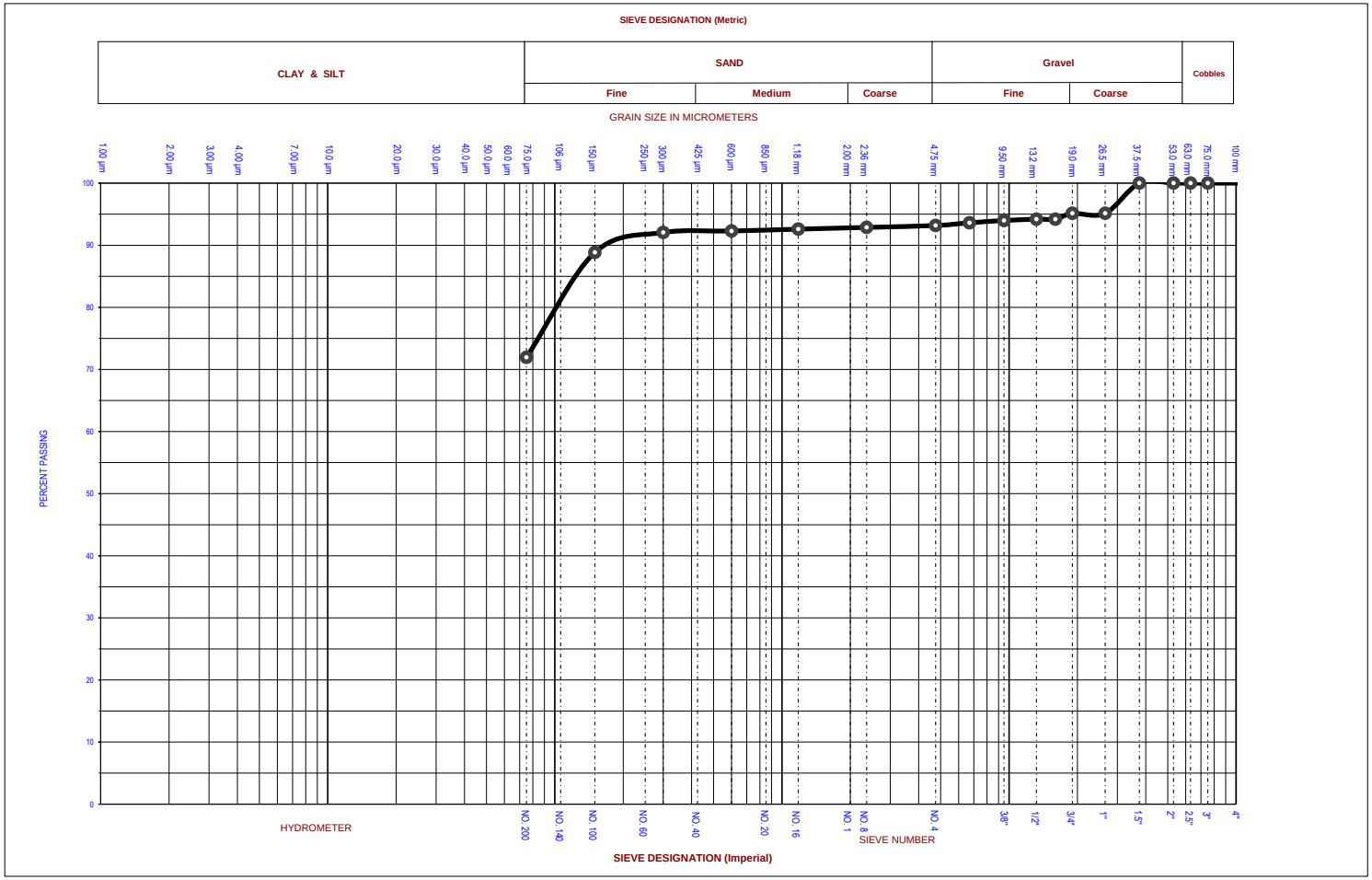

GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario			Client		AECOM			Date	Dec,18-2021		Project Number		60646784		
			Borehole No / Sample Id		BH 3-5 SS3			Depth (feet)	5-7		Lab No		202112013		
			Project Name		Snow Storage Project Site 3						Project Location		Peel Region, Ontario		
			Soil Classification		Sandy Silt, trace gravel (ML)						Figure No:				
Gravel(%)	7	Sand(%)	21	Fines(%)	72	D_{60} (mm)	N/A	D_{30} (mm)	N/A	D_{10} (mm)	N/A	C_U	N/A	C_c	N/A

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202112016	Borehole No	BH 3-4	Tested by	Dharmik P
Project Name	Snow Storage Project Site 3	Sample Id	SS2	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	2.5-4.5	Date	19-Dec-21
Location	PEEL Region, Ontario	Soil Classification	Sandy Lean Clay, trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	○
	115105	◉

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		387.7	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	61.1	cm^3
Length of Bulb	(L_2)	14.44	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.17	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.3535	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	20.62	g
Air Dried Mass	(Wa)	20.74	g
Hygroscopic Corr Factor	(F)	0.994	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.7	g
% Passing 2.0 mm Sieve	(P10)	96.5	
Sample Represented	(W)	51.5	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	1.1	386.6	99.7
2.0	13.6	374.1	96.5

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.7	96.5
0.850	1.0	48.7	94.6
0.425	2.0	47.8	92.7
0.25	3.0	46.7	90.7
0.106	9.9	39.9	77.4
0.075	15.1	34.6	67.2
Pass 0.075	3.4		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
20-Dec-21	9:56:00 AM	1.0	1.0190	0.0030	25.7	1.0160	49.3	11.27	8.83341	0.01261248	0.0423
	9:57:00 AM	2.0	1.0175	0.0030	25.7	1.0145	44.7	11.68	8.83341	0.01261248	0.0305
	10:00:00 AM	5.0	1.0155	0.0030	25.7	1.0125	38.5	12.22	8.83341	0.01261248	0.0197
	10:10:00 AM	15.0	1.0145	0.0030	25.6	1.0115	35.5	12.49	8.85306	0.0126265	0.0115
	10:25:00 AM	30.0	1.0135	0.0030	25.5	1.0105	32.4	12.76	8.87278	0.01264055	0.0082
	10:55:00 AM	60.0	1.0125	0.0030	25.2	1.0095	29.3	13.03	8.93243	0.01268297	0.0059
	2:05:00 PM	250.0	1.0115	0.0030	24.2	1.0085	26.2	13.30	9.13649	0.01282703	0.0030
21-Dec-21	9:55:00 AM	1440.0	1.0095	0.0030	24.0	1.0065	20.0	13.84	9.17830	0.01285634	0.0013

L1 cm	Viscosiity C	K (η/(Gs-1)
5.13	-0.514053	5.19612409
5.53	-0.514053	5.19612409
6.07	-0.514053	5.19612409
6.35	-0.511832	5.2076811
6.61	-0.509606	5.21928394
6.89	-0.502906	5.25436996
7.15	-0.480318	5.37440725
7.69	-0.475753	5.39899976

Mass Retained on Seive # 10	130.62
Mass Passed Seive # 10	257.05
Jar Number	

Hygroscopic Data		
	Can Id	77
	Empty Can Weight (g)	13.51
	Can+ Air Dried Soil (g)	34.25
	Can + Oven Dried Soil (g)	34.13

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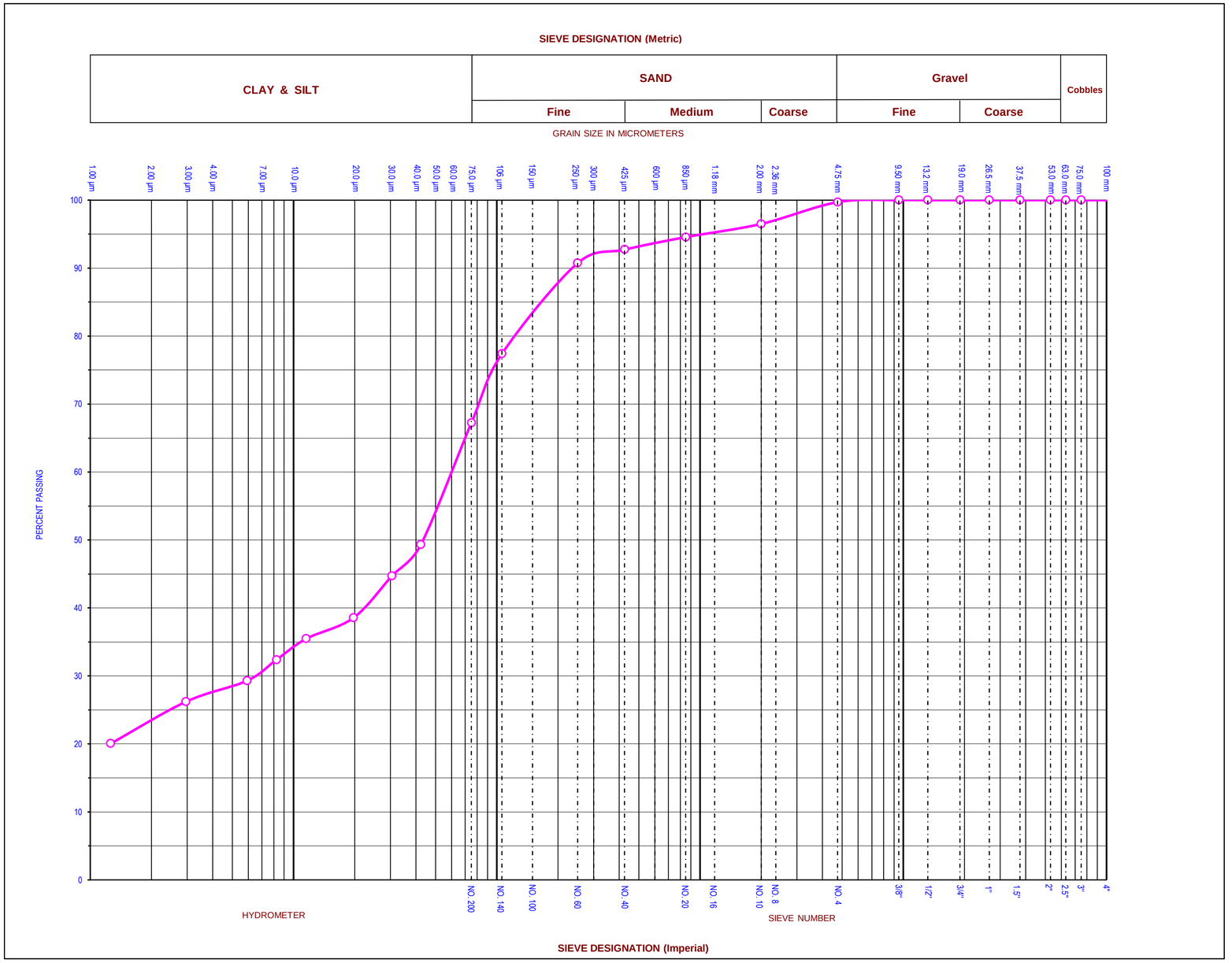
UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	**Client**	AECOM		**Date**	December 19, 2021	**Project Number**	60646784			**Gravel (%)**	0
	Sample ID	BH 3-4	SS2	**Depth (feet)**	2.5-4.5	**Project Name**	Snow Storage Project Site 3			**Sand (%)**	33
	Lab Sample No:	202112016				**Project Location**	PEEL Region, Ontario			**Silt (%)**	44
	Soil Classification	Sandy Lean Clay, trace gravel (CL)								**Clay (%)**	23
	Figure No.			**D10**	N/A	**D30**	0.006	**D60**	0.062	**Cu**	N/A	**Cc**	N/A

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202112015	Borehole No	BH 3-1	Tested by	Dharmik P
Project Name	Snow Storage Project Site 3	Sample Id	SS5	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	10-12	Date	19-Dec-21
Location	PEEL Region, Ontario	Soil Classification	Silty Clay, trace sand, trace gravel (CL-ML)		

Soil Hydrometer Used		
151 H SN#	993585	◉
	115105	○

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		524.4	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	63.1	cm^3
Length of Bulb	(L_2)	14.15	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.5	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.1351	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	32.25	g
Air Dried Mass	(Wa)	26.39	g
Hygroscopic Corr Factor	(F)	1.222	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	61.1	g
% Passing 2.0 mm Sieve	(P10)	92.4	
Sample Represented	(W)	66.1	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	14.1	510.3	97.3
2.0	40.0	484.4	92.4

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	61.1	92.3
0.850	0.9	60.2	91.1
0.425	1.4	59.7	90.3
0.25	1.8	59.3	89.7
0.106	2.8	58.3	88.1
0.075	3.6	57.5	86.9
Pass 0.075	0.3		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
20-Dec-21	9:37:00 AM	1.0	1.0290	0.0030	26.4	1.0260	62.4	8.38	8.69803	0.01251545	0.0362
	9:38:00 AM	2.0	1.0270	0.0030	26.4	1.0240	57.6	8.92	8.69803	0.01251545	0.0264
	9:41:00 AM	5.0	1.0240	0.0030	26.4	1.0210	50.4	9.73	8.69803	0.01251545	0.0175
	9:51:00 AM	15.0	1.0215	0.0030	26.2	1.0185	44.4	10.41	8.73633	0.01254298	0.0104
	10:06:00 AM	30.0	1.0190	0.0030	26.0	1.0160	38.4	11.08	8.77493	0.01257066	0.0076
	10:36:00 AM	60.0	1.0165	0.0030	25.5	1.0135	32.4	11.76	8.87278	0.01264055	0.0056
	1:46:00 PM	250.0	1.0125	0.0030	24.3	1.0095	22.8	12.84	9.11572	0.01281243	0.0029
21-Dec-21	9:36:00 AM	1440.0	1.0095	0.0030	24.0	1.0065	15.6	13.65	9.17830	0.01285634	0.0013

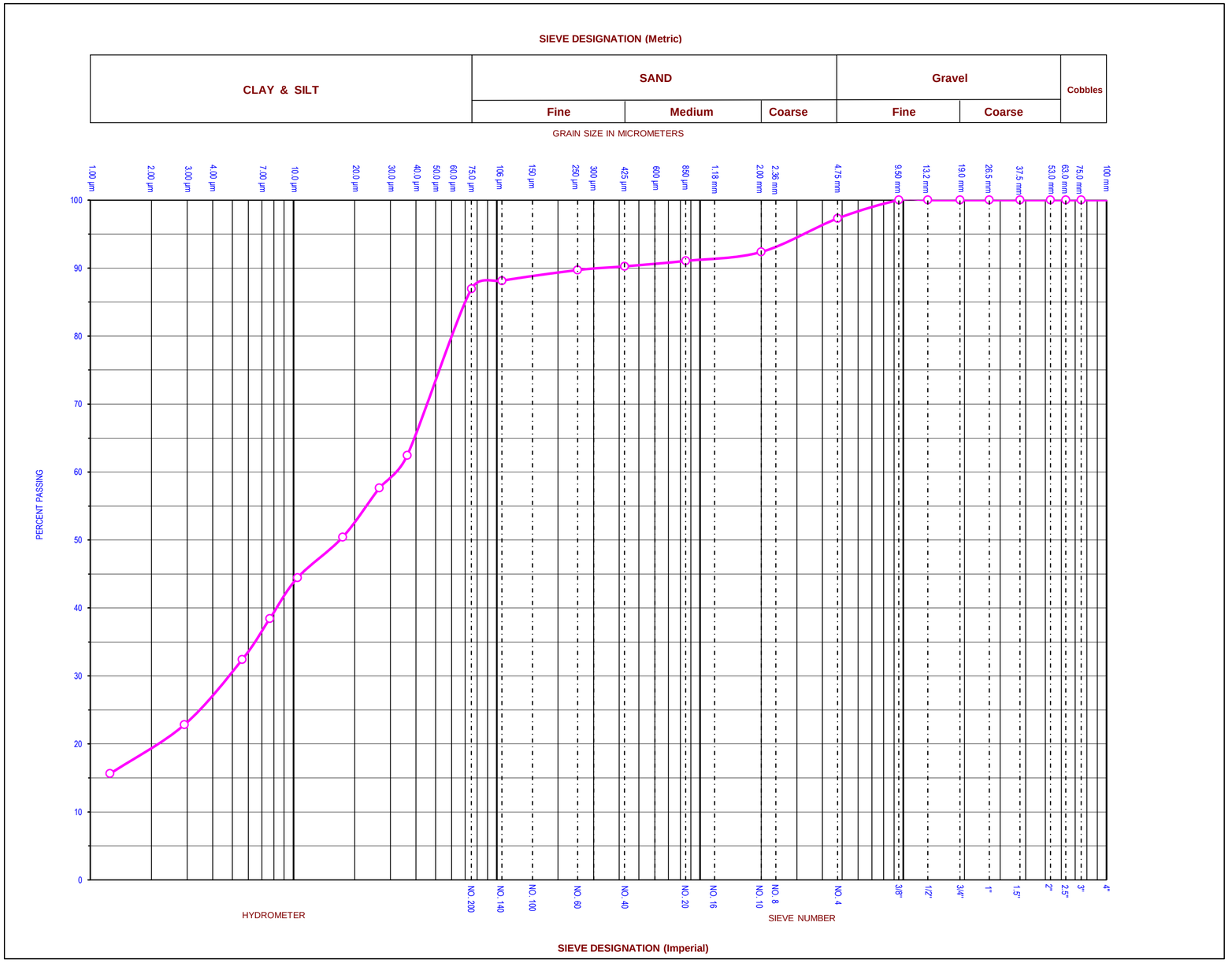
L1 cm	Viscosiity C	K (η/(Gs-1)
2.43	-0.529498	5.11648748
2.97	-0.529498	5.11648748
3.78	-0.529498	5.11648748
4.45	-0.525104	5.1390178
5.13	-0.520695	5.16172555
5.81	-0.509606	5.21928394
6.89	-0.482595	5.36218532
7.69	-0.475753	5.39899976

Mass Retained on Seive # 10	142.26
Mass Passed Seive # 10	382.12
Jar Number	

Hygroscopic Data		
	Can Id	135
	Empty Can Weight (g)	13.65
	Can+ Air Dried Soil (g)	40.04
	Can + Oven Dried Soil (g)	45.90

AECOM Canada Ltd.

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	**Client**	AECOM		**Date**	December 19, 2021	**Project Number**	60646784			**Gravel (%)**	3
	Sample ID	BH 3-1	SS5	**Depth (feet)**	10-12	**Project Name**	Snow Storage Project Site 3			**Sand (%)**	10
	Lab Sample No:	202112015				**Project Location**	PEEL Region, Ontario			**Silt (%)**	68
	Soil Classification	Silty Clay, trace sand, trace gravel (CL-ML)								**Clay (%)**	19
	Figure No.		**D10**	N/A	**D30**	0.005	**D60**	0.031	**Cu** N/A	**Cc**	N/A

AECOM CANADA LTD.

MOISTURE CONTENT DETERMINATION

CLIENT	AECOM	DATE	December 21, 2021
PROJECT NUMBER	60646784 (SITE 5)	TESTED BY	SAM
PROJECT NAME		REVIEWED BY	Ramana M
LOCATION			

Borehole Name	Sample Id	Depth (feet)	Can Id	Observations			Formula		
				Weight of Empty Can (g) W_1	Weight of Wet Soil + Can (g) W_2	Weight of Dry Soil + Can (g) W_3	Weight of Water (g) $W_w = (W_2-W_3)$	Weight of Dry soil (g) $W_s = (W_3-W_1)$	Moisture Content (%) $w = (W_w/W_s)*100$
BH 5-1	SS1	0-2	86	13.44	69.38	58.37	11.01	44.93	24.50
	SS2	2.5-4.5	67	13.50	69.90	62.70	7.20	49.20	14.63
	SS3	5-7	164	13.56	66.74	59.73	7.01	46.17	15.18
	SS4	7.5-9.5	166	13.47	89.45	79.48	9.97	66.01	15.10
	SS5	10-12	73	13.66	73.73	67.57	6.16	53.91	11.43
BH 5-2	SS1	0-2	158	13.86	65.16	53.54	11.62	39.68	29.28
	SS2	2.5-4.5	161	13.46	85.01	69.63	15.38	56.17	27.38
	SS3	5-7	138	13.58	81.89	69.83	12.06	56.25	21.44
	SS4	7.5-9.5	84	13.49	74.66	67.28	7.38	53.79	13.72
	SS5	10-12	130	13.50	85.46	77.51	7.95	64.01	12.42
BH 5-3	SS1	0-2	126	13.84	87.25	74.53	12.72	60.69	20.96
	SS2	2.5-4.5	52	13.95	79.30	67.71	11.59	53.76	21.56
	SS3	5-7	55	13.32	80.94	70.84	10.10	57.52	17.56
	SS4	7.5-9.5	169	13.67	82.12	72.57	9.55	58.90	16.21
	SS5	10-12	87	13.75	80.75	72.27	8.48	58.52	14.49
	SS5A	15-17	162	13.52	92.13	83.80	8.33	70.28	11.85
	SS5B	15-17	102	13.50	80.24	71.05	9.19	57.55	15.97
BH 5-4	SS1	0-2	193	13.45	84.68	70.23	14.45	56.78	25.45
	SS2	2.5-4.5	152	13.32	78.27	69.24	9.03	55.92	16.15
	SS3	5-7	101	13.51	77.98	69.04	8.94	55.53	16.10
	SS4	7.5-9.5	145	13.94	76.03	67.69	8.34	53.75	15.52
	SS5	10-12	185	13.51	72.62	64.35	8.27	50.84	16.27
BH 5-5	SS1	0-2	58	13.55	78.83	64.29	14.54	50.74	28.66
	SS2	2.5-4.5	171	13.67	76.15	66.41	9.74	52.74	18.47
	SS3	5-7	69	13.65	86.59	77.33	9.26	63.68	14.54
	SS4	7.5-9.5	91	13.62	77.96	69.46	8.50	55.84	15.22
	SS5	10-12	61	13.47	78.75	69.65	9.10	56.18	16.20

Total Samples	27

AECOM CANADA LTD.

DETERMINATION OF UNIT WEIGHT - ASTM D7263

Project Number	60646784	**Date Tested**	23-Dec-21	**Tested by**	Dharmik P
Project Name	Snow Storage Project Site 5	**Location**	Peel Region, Ontario	**Checked by**	Ramana M

Water Content									
Test Info	**Lab Number**		**202112021S**		**202112024S**				
	Borehole Name		**BH 5-1**		**BH 5-4**				
	Sample ID		**SS4**		**SS5**				
	Depth		**7.5-9.5**		**10.00**				
	Trial		**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	Tare ID		154	81	97	68				
Mass in Grams	**Tare Wt**		13.61	13.74	13.51	13.44				
	Tare + Wet Soil		76.57	74.31	70.00	65.65				
	Tare + Dry Soil		66.92	68.42	63.16	59.52				
	Water	M_w	9.65	5.89	6.84	6.13				
	Dry Soil	M_d	53.31	54.68	49.65	46.08				
Water Content %		w	18.10	10.77	13.77	13.31				
Average %			14.43		13.54					
Weight- Volume Relations									
Temp of water (C)			16.5	16.5	16.6	16.6				
Density of Water			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mass in Grams	**Wet Soil**	M_t	120.41	96.46	109.54	97.38				
	Soil + Wax in Air		125.20	102.09	115.88	103.17				
	Wax		4.79	5.64	6.34	5.78				
	Wet Soil + Wax in water		66.01	52.61	60.86	53.06				
	Dry Soil[A]	M_d	101.96	87.08	96.28	85.95				
Specific Gravity of Soil (assumed)		G_S	2.72	2.72	2.72	2.72				
Volume in CC	Wet Soil + Wax[B]		59.19	49.48	55.02	50.11				
	Wax		5.27	6.21	6.99	6.37				
	Wet Soil	V	53.91	43.27	48.04	43.74				
	Dry Soil = M_d / G_s	V_S	37.55	32.07	35.46	31.66				
KN/cum	Wet Unit Weight = (M_t/V)x9.81	γ_m	21.91	21.87	22.37	21.84				
	Average Wet Unit Weight		**21.89**		**22.11**					
	Dry Unit Weight = (M_d/V)x9.81	γ_d	18.55	19.74	19.66	19.28				
	Average Dry Unit Weight		**19.15**		**19.47**					
Void Ratio = ($V-V_S$)/V_S		e	0.44	0.35	0.35	0.38				
Porosity % = [($V-V_S$)/V]x100		n	30.34	25.88	26.18	27.62				
Degree of Saturation = [V_w/($V-V_s$)] x100		S	100.00	83.70	100.00	94.66				

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202112025	Borehole No	BH-5-5	Tested by	Dharmik P
Project Name	Snow Storage Project	Sample Id	SS1	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	0-2	Date	23-Dec-21
Location	Peel Region, Ontario	Soil Classification	Lean Clay with Sand, trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	◉
	115105	○

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		377.0	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	63.1	cm^3
Length of Bulb	(L_2)	14.15	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.5	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.1351	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	24.26	g
Air Dried Mass	(Wa)	24.36	g
Hygroscopic Corr Factor	(F)	0.996	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.8	g
% Passing 2.0 mm Sieve	(P10)	98.1	
Sample Represented	(W)	50.7	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	0.6	376.4	99.8
2.0	7.0	370.0	98.1

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00		49.8	98.1
0.850	0.9	48.9	96.3
0.425	1.9	47.9	94.5
0.25	3.5	46.3	91.3
0.106	6.6	43.2	85.1
0.075	7.6	42.2	83.2
Pass 0.075	0.2		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
24-Dec-21	10:24:00 AM	1.0	1.0275	0.0030	25.9	1.0245	76.7	8.79	8.79435	0.01258456	0.0373
	10:25:00 AM	2.0	1.0265	0.0030	25.9	1.0235	73.6	9.06	8.79435	0.01258456	0.0268
	10:28:00 AM	5.0	1.0255	0.0030	25.8	1.0225	70.4	9.33	8.81384	0.0125985	0.0172
	10:38:00 AM	15.0	1.0230	0.0030	25.6	1.0200	62.6	10.00	8.85306	0.0126265	0.0103
	10:53:00 AM	30.0	1.0200	0.0030	25.4	1.0170	53.2	10.81	8.89259	0.01265465	0.0076
	11:23:00 AM	60.0	1.0180	0.0030	24.9	1.0150	47.0	11.35	8.99279	0.01272575	0.0055
	2:33:00 PM	250.0	1.0145	0.0030	24.5	1.0115	36.0	12.30	9.07441	0.01278337	0.0028
25-Dec-21	10:23:00 AM	1440.0	1.0110	0.0030	24.2	1.0080	25.0	13.24	9.13649	0.01282703	0.0012

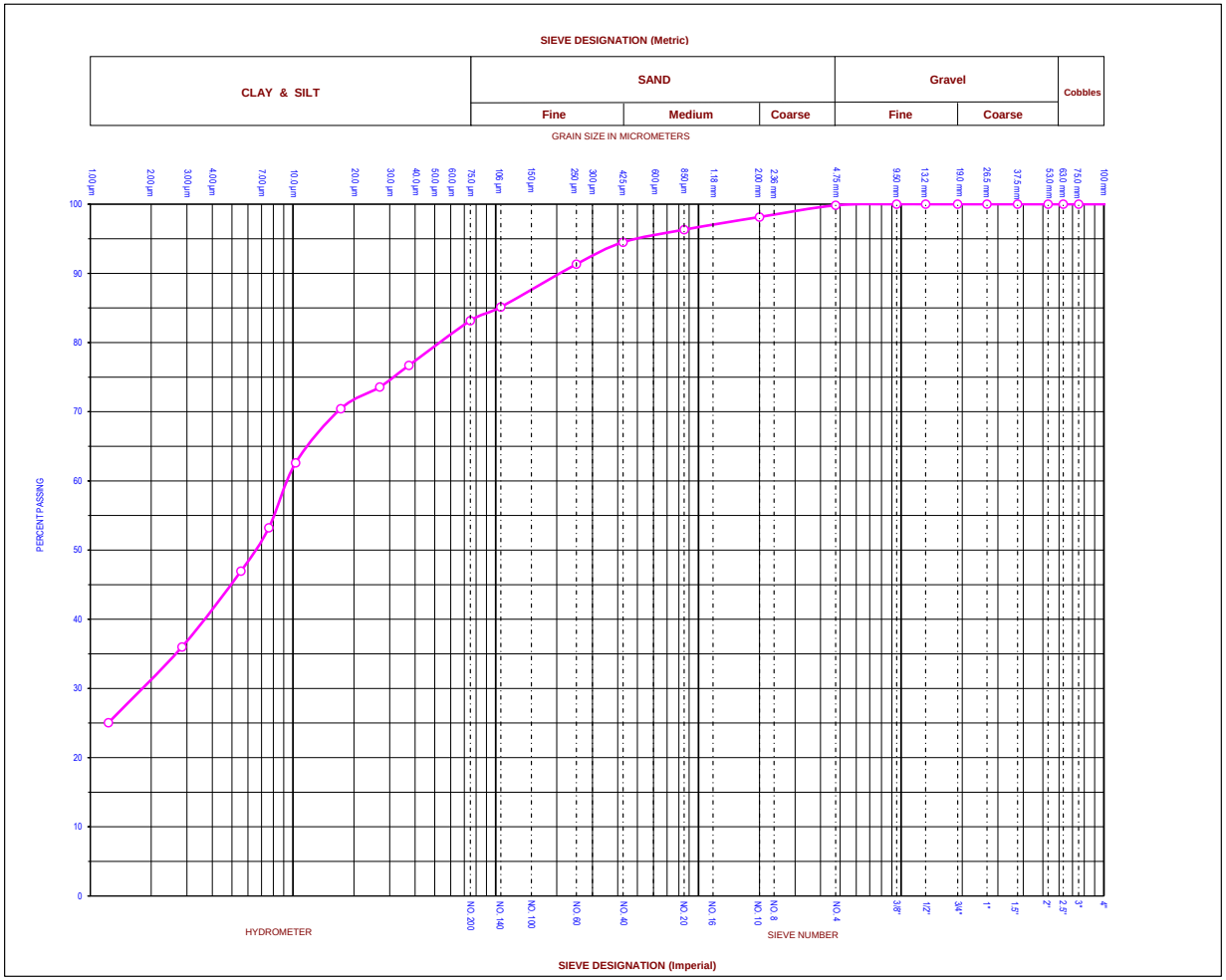
L1 cm	Viscosiity C	K (η/(Gs-1)
2.83	-0.518485	5.1731466
3.11	-0.518485	5.1731466
3.37	-0.516271	5.1846127
4.05	-0.511832	5.2076811
4.86	-0.507377	5.2309329
5.40	-0.496171	5.2898775
6.35	-0.487136	5.3378888
7.29	-0.480318	5.3744072

Mass Retained on Seive # 10	99.74
Mass Passed Seive # 10	277.29
Jar Number	

Hygroscopic Data		
	Can Id	123
	Empty Can Weight (g)	13.65
	Can+ Air Dried Soil (g)	38.01
	Can + Oven Dried Soil (g)	37.91

AECOM Canada Ltd.

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	December 23, 2021	Project Number	60646784			Gravel (%)	0
	Sample ID	BH-5-5	SS1	Depth (feet)	0-2	Project Name	Snow Storage Project			Sand (%)	17
	Lab Sample No:	202112025				Project Location	Peel Region, Ontario			Silt (%)	53
	Soil Classification	Lean Clay with Sand, trace gravel (CL)								Clay (%)	30
	Figure No.			D10	N/A	D30	0.002	D60	0.010	Cu	N/A	Cc	N/A

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202112023	Borehole No	BH-5-3	Tested by	Dharmik P
Project Name		Sample Id	SS5	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	10-12	Date	23-Dec-21
Location		Soil Classification	Lean Clay with Sand, trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	○
	115105	◉

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		483.0	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	61.1	cm^3
Length of Bulb	(L_2)	14.44	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.17	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.3535	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	24.67	g
Air Dried Mass	(Wa)	24.74	g
Hygroscopic Corr Factor	(F)	0.997	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.9	g
% Passing 2.0 mm Sieve	(P10)	96.1	
Sample Represented	(W)	51.9	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	4.7	478.3	99.0
2.0	18.6	464.4	96.1

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00		49.9	96.1
0.850	1.0	48.9	94.3
0.425	2.2	47.7	91.9
0.25	3.9	46.0	88.6
0.106	8.0	41.8	80.7
0.075	9.3	40.6	78.3
Pass 0.075	0.4		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_b /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm	L1 cm	Viscosiity C	K (η/(Gs-1)
24-Dec-21	10:04:00 AM	1.0	1.0260	0.0030	26.1	1.0230	70.4	9.38	8.75559	0.0125568	0.0385	3.24	-0.522902	5.1503494
	10:05:00 AM	2.0	1.0250	0.0030	26.1	1.0220	67.4	9.65	8.75559	0.0125568	0.0276	3.51	-0.522902	5.1503494
	10:08:00 AM	5.0	1.0235	0.0030	26.1	1.0205	62.8	10.06	8.75559	0.0125568	0.0178	3.91	-0.522902	5.1503494
	10:18:00 AM	15.0	1.0220	0.0030	26.1	1.0190	58.2	10.46	8.75559	0.0125568	0.0105	4.32	-0.522902	5.1503494
	10:33:00 AM	30.0	1.0205	0.0030	25.7	1.0175	53.6	10.87	8.83341	0.01261248	0.0076	4.73	-0.514053	5.1961241
	11:03:00 AM	60.0	1.0185	0.0030	25.3	1.0155	47.5	11.41	8.91247	0.01266879	0.0055	5.27	-0.505144	5.2426281
	2:13:00 PM	250.0	1.0150	0.0030	24.5	1.0120	36.8	12.35	9.07441	0.01278337	0.0028	6.21	-0.487136	5.3378888
25-Dec-21	10:03:00 AM	1440.0	1.0110	0.0030	24.3	1.0080	24.5	13.43	9.11572	0.01281243	0.0012	7.29	-0.482595	5.3621853

Mass Retained on Seive # 10	139.75
Mass Passed Seive # 10	343.26
Jar Number	

Hygroscopic Data		
	Can Id	72
	Empty Can Weight (g)	13.74
	Can+ Air Dried Soil (g)	38.48
	Can + Oven Dried Soil (g)	38.41

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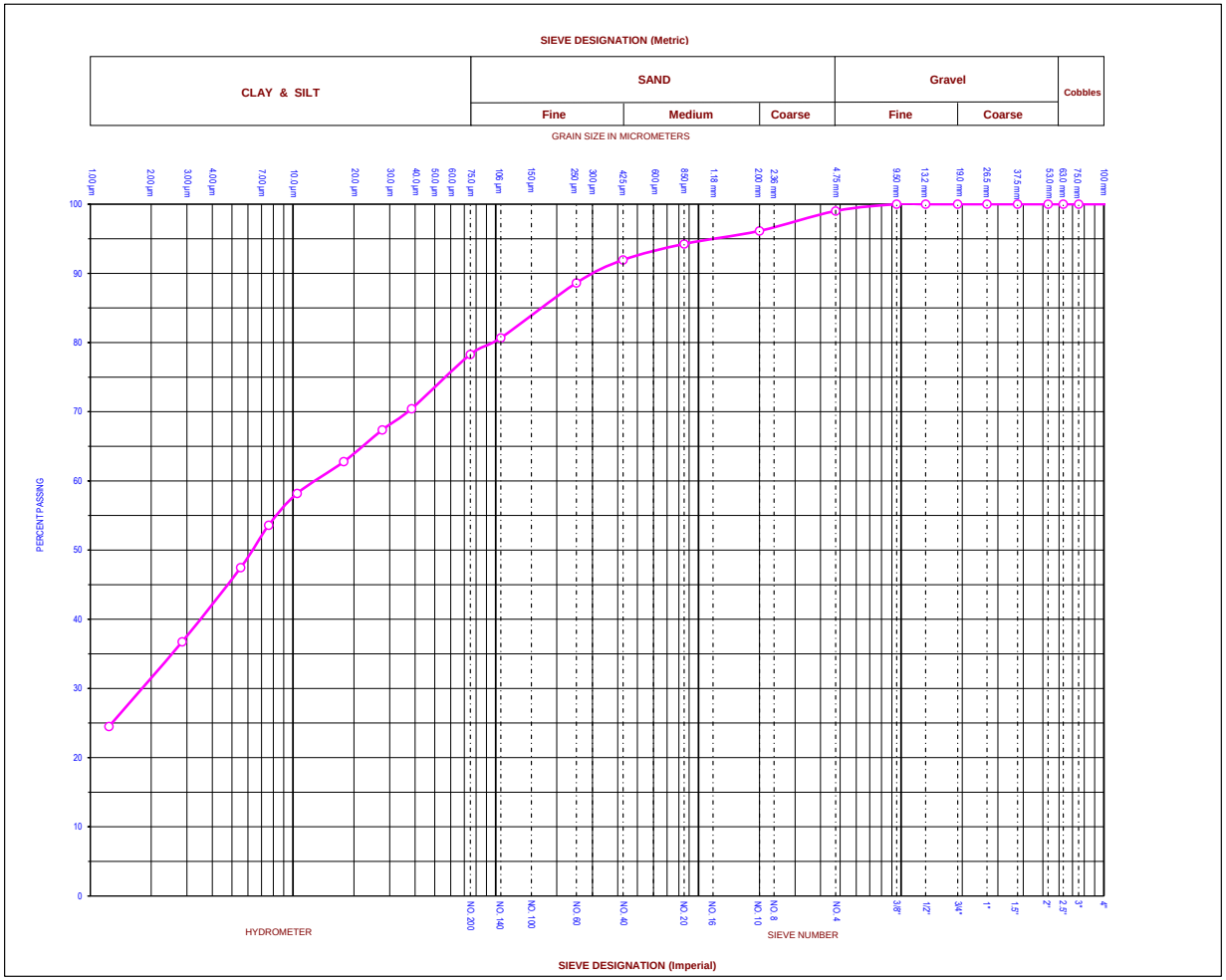
UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	December 23, 2021	Project Number	60646784			Gravel (%)	1
	Sample ID	BH-5-3	SS5	Depth (feet)	10-12	Project Name	0			Sand (%)	21
	Lab Sample No:	202112023				Project Location	0			Silt (%)	48
	Soil Classification	Lean Clay with Sand, trace gravel (CL)								Clay (%)	30
	Figure No.		D10	N/A	D30	0.002	D60	0.013	Cu	N/A	Cc	N/A

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202112022	Borehole No	BH-5-2	Tested by	Dharmik P
Project Name		Sample Id	SS4	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	7.5-9.5	Date	23-Dec-21
Location		Soil Classification	Lean Clay with Sand, trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	◉
	115105	○

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		324.9	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	63.1	cm^3
Length of Bulb	(L_2)	14.15	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.5	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.1351	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	19.18	g
Air Dried Mass	(Wa)	19.25	g
Hygroscopic Corr Factor	(F)	0.996	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.8	g
% Passing 2.0 mm Sieve	(P10)	97.9	
Sample Represented	(W)	50.9	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	1.9	323.0	99.4
2.0	6.9	318.0	97.9

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00		49.8	97.9
0.850	1.0	48.8	95.9
0.425	2.0	47.9	94.0
0.25	3.1	46.7	91.7
0.106	5.8	44.0	86.5
0.075	6.9	43.0	84.4
Pass 0.075	0.2		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_b /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
24-Dec-21	9:45:00 AM	1.0	1.0270	0.0030	26.4	1.0240	74.9	8.92	8.69803	0.01251545	0.0374
	9:46:00 AM	2.0	1.0265	0.0030	26.4	1.0235	73.3	9.06	8.69803	0.01251545	0.0266
	9:49:00 AM	5.0	1.0250	0.0030	26.3	1.0220	68.6	9.46	8.71714	0.0125292	0.0172
	9:59:00 AM	15.0	1.0235	0.0030	26.1	1.0205	64.0	9.87	8.75559	0.0125568	0.0102
	10:14:00 AM	30.0	1.0220	0.0030	26.0	1.0190	59.3	10.27	8.77493	0.01257066	0.0074
	10:44:00 AM	60.0	1.0210	0.0030	25.4	1.0180	56.2	10.54	8.89259	0.01265465	0.0053
	1:54:00 PM	250.0	1.0170	0.0030	24.5	1.0140	43.7	11.62	9.07441	0.01278337	0.0028
25-Dec-21	9:44:00 AM	1440.0	1.0130	0.0030	24.4	1.0100	31.2	12.70	9.09502	0.01279788	0.0012

L1 cm	Viscosiity C	K (η/(Gs-1)
2.97	-0.529498	5.1164875
3.11	-0.529498	5.1164875
3.51	-0.527303	5.1277306
3.91	-0.522902	5.1503494
4.32	-0.520695	5.1617255
4.59	-0.507377	5.2309329
5.67	-0.487136	5.3378888
6.75	-0.484868	5.3500126

Mass Retained on Seive # 10	51.05
Mass Passed Seive # 10	273.84
Jar Number	

Hygroscopic Data		
	Can Id	99
	Empty Can Weight (g)	13.69
	Can+ Air Dried Soil (g)	32.94
	Can + Oven Dried Soil (g)	32.87

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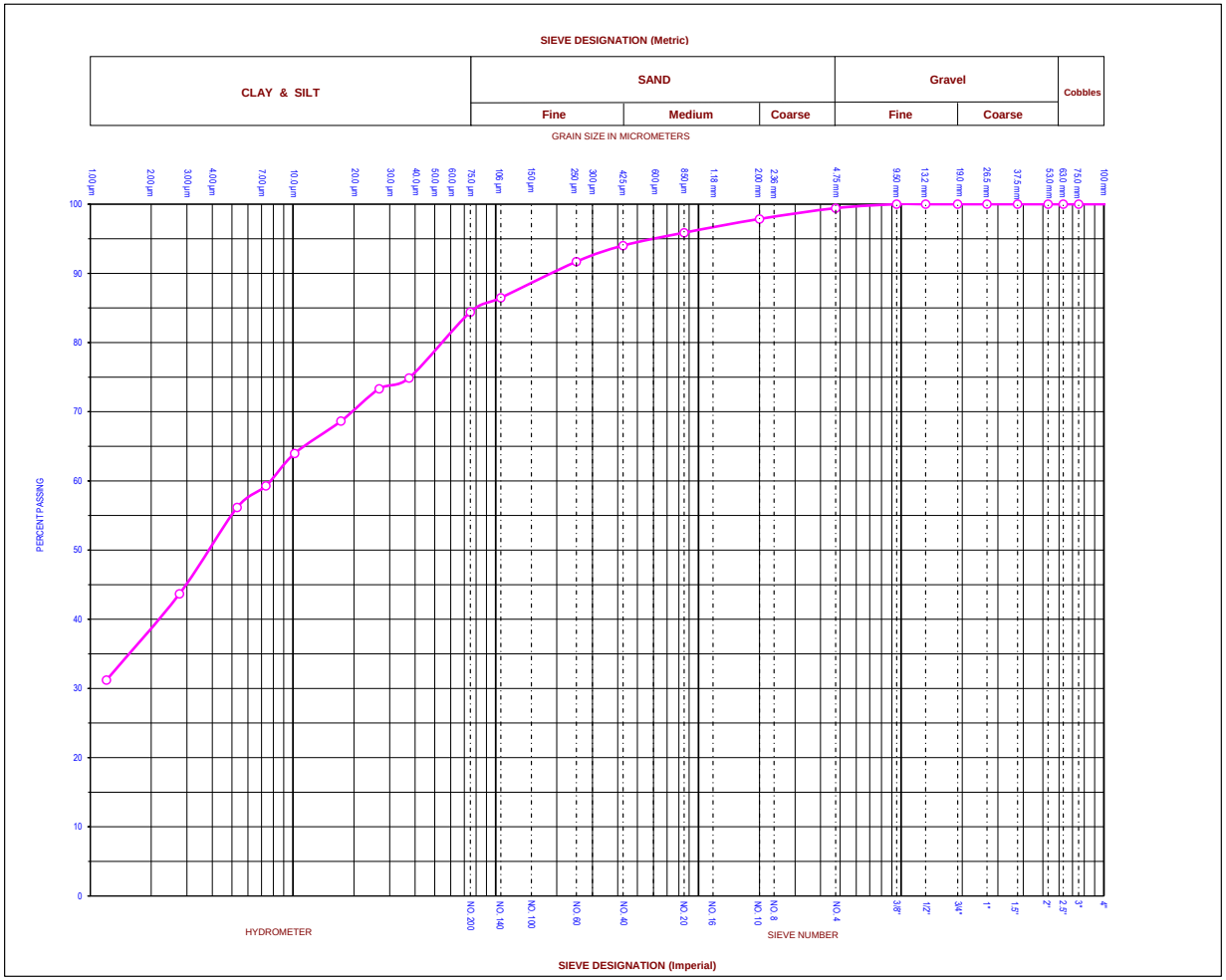
UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	December 23, 2021		Project Number	60646784			Gravel (%)	1	
	Sample ID	BH-5-2	SS4	Depth (feet)	7.5-9.5		Project Name	0			Sand (%)	15	
	Lab Sample No:	202112022					Project Location	0			Silt (%)	46	
	Soil Classification	Lean Clay with Sand, trace gravel (CL)									Clay (%)	38	
	Figure No.			D10	N/A	D30	N/A	D60	0.008	Cu	N/A	Cc	N/A

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202112020	Borehole No	BH-5-1	Tested by	Dharmik P
Project Name		Sample Id	SS3	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	5-7	Date	23-Dec-21
Location		Soil Classification			

Soil Hydrometer Used

151 H SN#	993585	○
	115105	◉

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		347.0	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	61.1	cm^3
Length of Bulb	(L_2)	14.44	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.17	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.3535	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	24.95	g
Air Dried Mass	(Wa)	25.06	g
Hygroscopic Corr Factor	(F)	0.996	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.8	g
% Passing 2.0 mm Sieve	(P10)	97.7	
Sample Represented	(W)	50.9	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	2.8	344.1	99.2
2.0	7.9	339.1	97.7

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00		49.8	97.7
0.850	1.0	48.8	95.8
0.425	1.7	48.1	94.3
0.25	2.7	47.1	92.4
0.106	5.1	44.7	87.7
0.075	6.1	43.7	85.7
Pass 0.075	0.2		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_b /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
24-Dec-21	9:28:00 AM	1.0	1.0290	0.0030	25.6	1.0260	81.1	8.57	8.85306	0.0126265	0.0370
	9:29:00 AM	2.0	1.0280	0.0030	25.6	1.0250	77.9	8.84	8.85306	0.0126265	0.0265
	9:32:00 AM	5.0	1.0270	0.0030	25.6	1.0240	74.8	9.11	8.85306	0.0126265	0.0170
	9:42:00 AM	15.0	1.0255	0.0030	25.5	1.0225	70.1	9.52	8.87278	0.01264055	0.0101
	9:57:00 AM	30.0	1.0240	0.0030	25.3	1.0210	65.5	9.92	8.91247	0.01266879	0.0073
	10:27:00 AM	60.0	1.0220	0.0030	25.1	1.0190	59.2	10.46	8.95247	0.01269719	0.0053
	1:37:00 PM	250.0	1.0185	0.0030	24.5	1.0155	48.3	11.41	9.07441	0.01278337	0.0027
25-Dec-21	9:27:00 AM	1440.0	1.0140	0.0030	24.3	1.0110	34.3	12.62	9.11572	0.01281243	0.0012

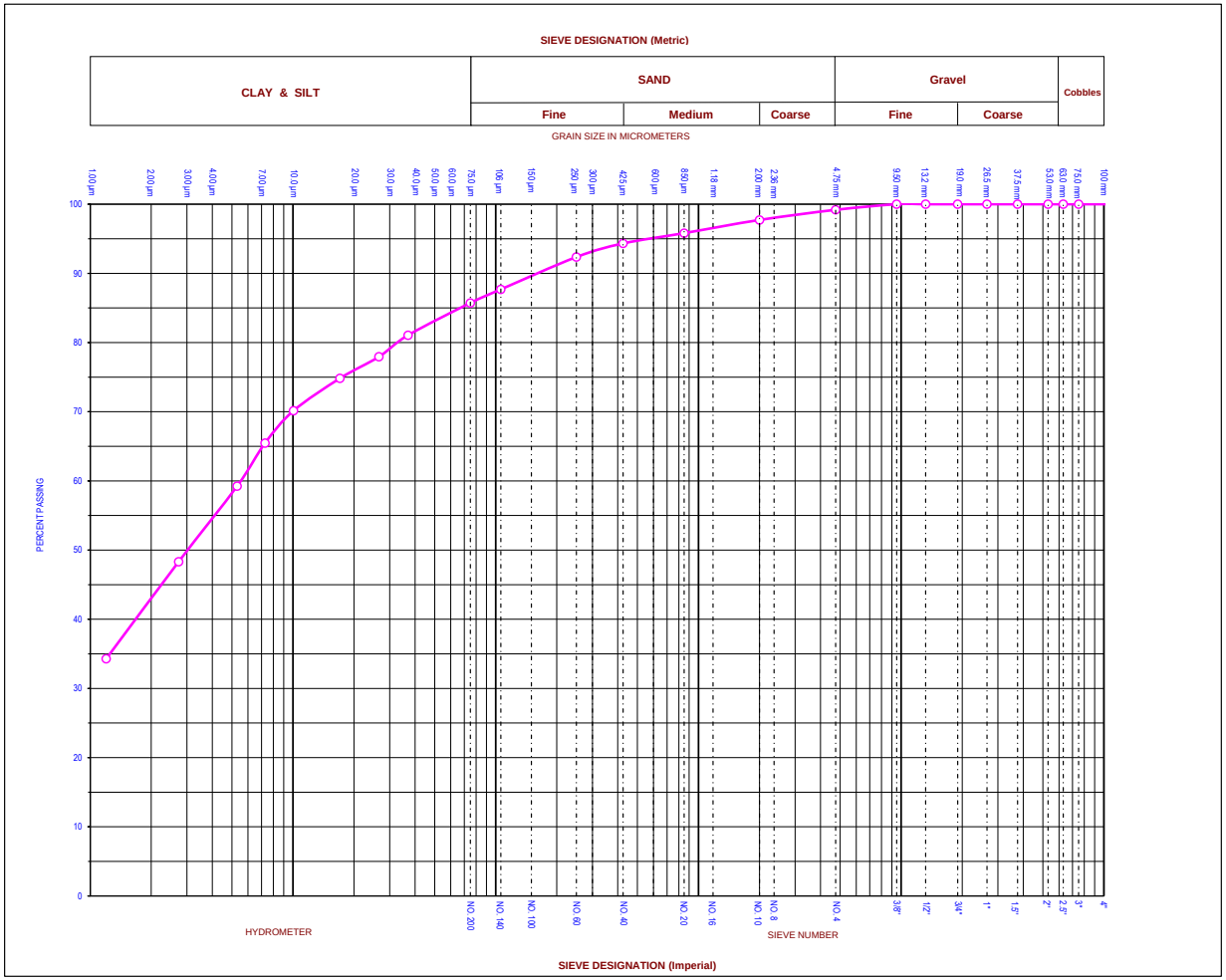
L1 cm	Viscosiity C	K (η/(Gs-1)
2.43	-0.511832	5.2076811
2.70	-0.511832	5.2076811
2.97	-0.511832	5.2076811
3.37	-0.509606	5.2192839
3.78	-0.505144	5.2426281
4.32	-0.500665	5.2661586
5.27	-0.487136	5.3378888
6.48	-0.482595	5.3621853

Mass Retained on Seive # 10	63.48
Mass Passed Seive # 10	283.48
Jar Number	

Hygroscopic Data		
	Can Id	134
	Empty Can Weight (g)	13.91
	Can+ Air Dried Soil (g)	38.97
	Can + Oven Dried Soil (g)	38.86

AECOM Canada Ltd.

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

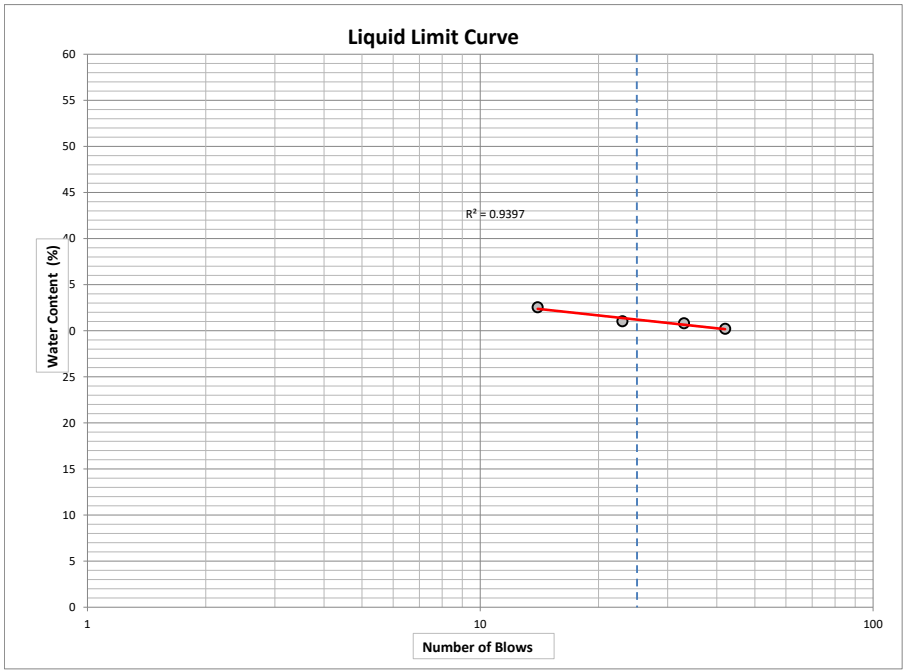
AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	December 23, 2021		Project Number	60646784			Gravel (%)	1	
	Sample ID	BH-5-1	SS3	Depth (feet)	5-7		Project Name	0			Sand (%)	13	
	Lab Sample No:	202112020					Project Location	0			Silt (%)	44	
	Soil Classification	0									Clay (%)	42	
	Figure No.			D10	N/A	D30	N/A	D60	0.006	Cu	N/A	Cc	N/A

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	December 24, 2021	
Project Name					Tested By		
Location					Reviewed By	Ramana M	
Borehole Number	BH 5-2	Sample Id	SS4	Depth (feet)	7.5-9.5	Lab Number	202112022

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		191	129	127	116		
Weight of Empty Container (g) W_1		13.70	13.57	13.65	13.76		
Weight of Container + Wet Soil (g) W_2		25.10	26.56	24.60	25.09		
Weight of Container + Dry Soil(g) W_3		22.41	23.48	21.91	22.46		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	2.69	3.08	2.69	2.63		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	8.72	9.92	8.26	8.70		
Water Content (%)	$w = (W_w / W_s) * 100$	30.81	31.02	32.54	30.21		
Number of Blows		33	23	14	42		
Liquid Limit (%) From Graph		31.2					



AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	December 24, 2021	
Project Name	0				Tested By	0	
Location	0				Reviewed By	Ramana M	
Borehole Number	BH 5-2	Sample Id	SS4	Depth (feet)	7.5-9.5	Lab Number	202112022

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		160	142	189			
Weight of Empty Container (g) W_1		13.337	13.71	13.44			
Weight of Container + Wet Soil (g) W_2		19.746	20.52	21.79			
Weight of Container + Dry Soil(g) W_3		18.72	19.43	20.50			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.03	1.09	1.29			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	5.38	5.72	7.06			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	19.06	19.11	18.28			
Average Plastic Limit (%) w_P		18.82					

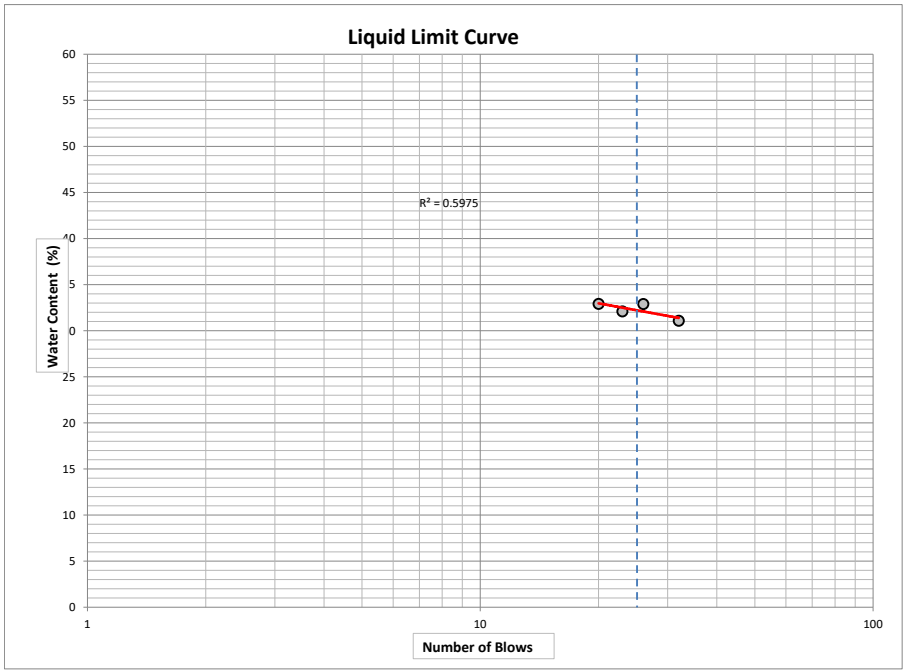
Result Summary	
Liquid Limit (%)	31
Plastic Limit (%)	19
Plasticity Index (%)	12
Sample status	Plastic

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	December 25, 2021	
Project Name					Tested By		
Location					Reviewed By	Ramana M	
Borehole Number	BH 5-1	Sample Id	SS3	Depth (feet)	5-7	Lab Number	202112020

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		147	56	133	173		
Weight of Empty Container (g) W_1		13.58	13.51	13.56	13.44		
Weight of Container + Wet Soil (g) W_2		26.22	25.56	25.36	23.13		
Weight of Container + Dry Soil(g) W_3		23.09	22.70	22.49	20.73		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	3.13	2.86	2.87	2.40		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	9.51	9.19	8.93	7.29		
Water Content (%)	$w = (W_w / W_s) * 100$	32.92	31.07	32.09	32.89		
Number of Blows		20	32	23	26		
Liquid Limit (%) From Graph		32.2					



AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	December 25, 2021	
Project Name	0				Tested By	0	
Location	0				Reviewed By	Ramana M	
Borehole Number	BH 5-1	Sample Id	SS3	Depth (feet)	5-7	Lab Number	202112020

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		121	110	188			
Weight of Empty Container (g) W_1		13.803	13.88	13.49			
Weight of Container + Wet Soil (g) W_2		18.987	16.36	16.67			
Weight of Container + Dry Soil(g) W_3		18.23	15.94	16.15			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	0.76	0.42	0.52			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	4.43	2.06	2.66			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	17.10	20.26	19.37			
Average Plastic Limit (%) w_P		18.91					

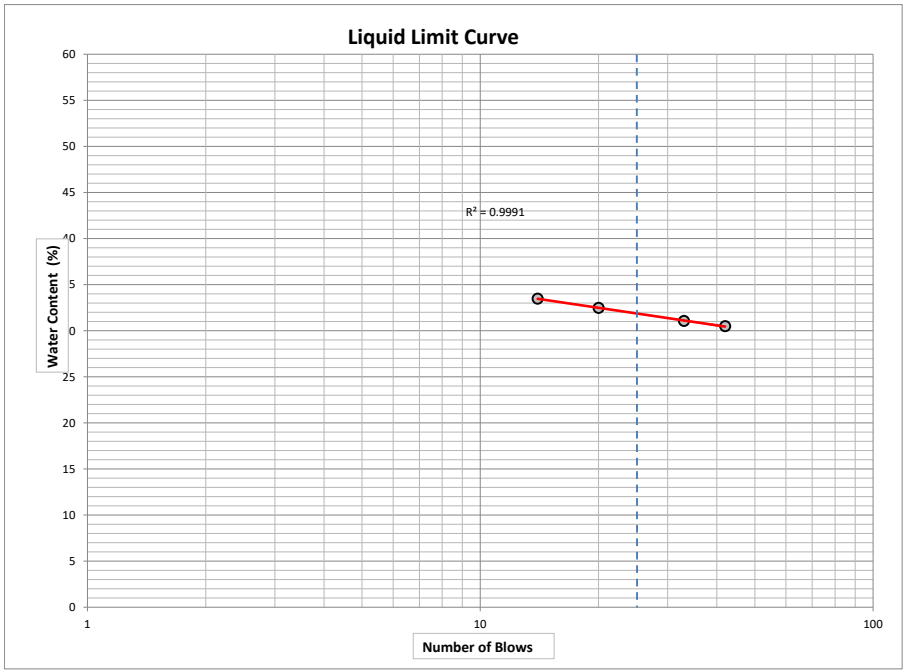
Result Summary	
Liquid Limit (%)	32
Plastic Limit (%)	19
Plasticity Index (%)	13
Sample status	Plastic

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	December 25, 2021	
Project Name					Tested By		
Location					Reviewed By	Ramana M	
Borehole Number	BH 5-5	Sample Id	SS1	Depth (feet)	0-2	Lab Number	202112025S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		180	100	67	140		
Weight of Empty Container (g) W_1		13.51	13.60	13.59	13.72		
Weight of Container + Wet Soil (g) W_2		21.78	24.85	21.78	22.07		
Weight of Container + Dry Soil(g) W_3		19.85	22.03	19.84	20.02		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.93	2.82	1.94	2.05		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	6.34	8.43	6.26	6.30		
Water Content (%)	$w = (W_w / W_s) * 100$	30.49	33.48	31.06	32.48		
Number of Blows		42	14	33	20		
Liquid Limit (%) From Graph		31.9					



AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	December 25, 2021	
Project Name	0				Tested By	0	
Location	0				Reviewed By	Ramana M	
Borehole Number	BH 5-5	Sample Id	SS1	Depth (feet)	0-2	Lab Number	202112025S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		128	71	146			
Weight of Empty Container (g) W_1		13.737	13.68	13.86			
Weight of Container + Wet Soil (g) W_2		20.196	21.70	24.48			
Weight of Container + Dry Soil(g) W_3		19.01	20.25	22.54			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.19	1.45	1.94			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	5.27	6.57	8.68			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	22.49	22.01	22.35			
Average Plastic Limit (%) w_P		22.28					

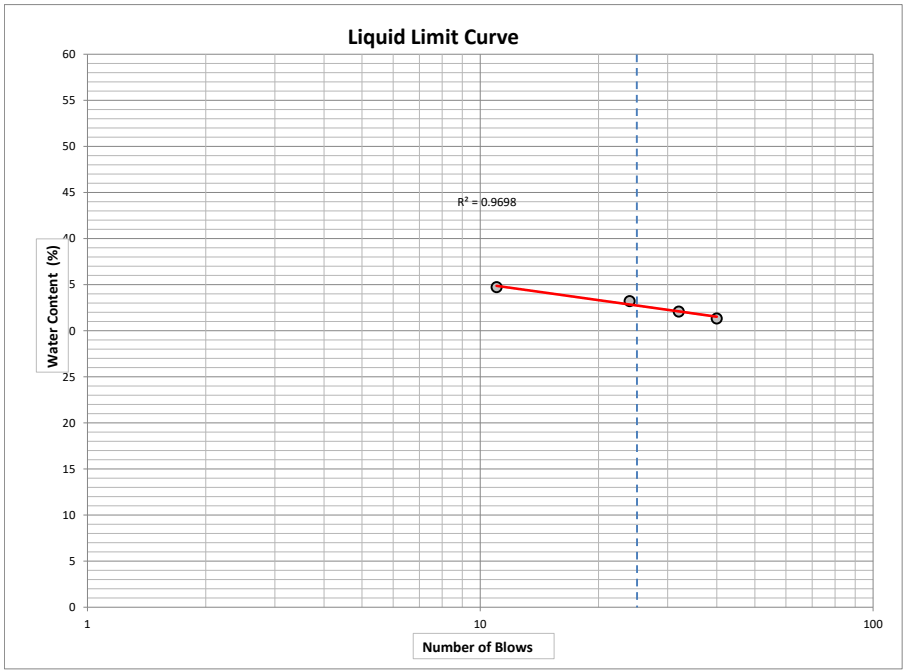
Result Summary	
Liquid Limit (%)	32
Plastic Limit (%)	22
Plasticity Index (%)	10
Sample status	Plastic

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	December 25, 2021	
Project Name					Tested By		
Location					Reviewed By	Ramana M	
Borehole Number	BH 5-3	Sample Id	SS5	Depth (feet)	10-12	Lab Number	202112023

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		194	83	107	90		
Weight of Empty Container (g) W_1		13.74	13.71	13.65	13.53		
Weight of Container + Wet Soil (g) W_2		25.88	24.46	22.43	21.59		
Weight of Container + Dry Soil(g) W_3		22.75	21.78	20.34	19.63		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	3.13	2.68	2.09	1.96		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	9.01	8.07	6.69	6.11		
Water Content (%)	$w = (W_w / W_s) * 100$	34.73	33.22	31.32	32.07		
Number of Blows		11	24	40	32		
Liquid Limit (%) From Graph		32.7					



AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	December 25, 2021	
Project Name	0				Tested By	0	
Location	0				Reviewed By	Ramana M	
Borehole Number	BH 5-3	Sample Id	SS5	Depth (feet)	10-12	Lab Number	202112023

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		172	153	103			
Weight of Empty Container (g) W_1		13.448	13.58	13.58			
Weight of Container + Wet Soil (g) W_2		21.243	22.16	26.74			
Weight of Container + Dry Soil(g) W_3		20	20.78	24.64			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.24	1.38	2.10			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	6.55	7.20	11.06			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	18.97	19.14	18.98			
Average Plastic Limit (%) w_P		19.03					

Result Summary	
Liquid Limit (%)	33
Plastic Limit (%)	19
Plasticity Index (%)	14
Sample status	Plastic

AECOM CANADA LTD.

MOISTURE CONTENT DETERMINATION

CLIENT	AECOM							**DATE**	November 16, 2021	
PROJECT NUMBER	60646784							**TESTED BY**	Dharmik	
PROJECT NAME	Tullamore Reservoir & Pumping station							**REVIEWED BY**	Ramana M	
LOCATION	Peel Region									
				Observations			**Formula**			
Borehole Name	**Sample Id**	**Depth (feet)**	**Can Id**	**Weight of Empty Can (g) W_1**	**Weight of Wet Soil + Can (g) W_2**	**Weight of Dry Soil + Can (g) W_3**	**Weight of Water (g) $W_w = (W_2-W_3)$**	**Weight of Dry soil (g) $W_s = (W_3-W_1)$**	**Moisture Content (%) $w = (W_w/W_s)*100$**	
BH 6-1	SS1	0	86	13.49	42.30	29.95	12.35	16.46	75.03	
	SS2	2	134	13.96	86.80	76.35	10.45	62.39	16.75	
	SS3	4	89	13.61	72.12	60.77	11.35	47.16	24.07	
	SS4	6	193	13.49	79.48	71.50	7.98	58.01	13.76	
	SS5	8	81	13.85	73.56	66.06	7.50	52.21	14.37	
BH 6-2MW	SS1	0	127	13.69	79.53	65.22	14.31	51.53	27.77	
	SS2	2	132	13.57	90.77	80.04	10.73	66.47	16.14	
	SS3	4	58	13.54	102.96	91.14	11.82	77.60	15.23	
	SS4	6	191	14.26	81.42	72.08	9.34	57.82	16.15	
	SS5	8	118	13.65	58.51	50.50	8.01	36.85	21.74	
BH 6-3	SS1	0	171	13.65	81.03	71.16	9.87	57.51	17.16	
	SS2	2	108	13.69	96.96	86.26	10.70	72.57	14.74	
	SS3	4	130	13.60	79.30	70.12	9.18	56.52	16.24	
	SS4	6	120	13.64	77.54	68.67	8.87	55.03	16.12	

Total Samples	**14**

AECOM CANADA LTD.

DETERMINATION OF UNIT WEIGHT - ASTM D7263

Project Number	60646784		**Date Tested**	19-Nov-21		**Tested by**					
Project Name	Tullumore reservior		**Location**	Region of Peel		**Checked by**	Ramana M				
Water Content											
Test Info	**Lab Number**		**202111031S**		**202111033S**						
	Borehole Name		**BH 6-1**		**BH 6-2**						
	Sample ID		**SS3**		**SS4**						
	Depth		**4.00**		**6.00**						
	Trial		**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	
	Tare ID		91	122	185	135					
Mass in Grams	**Tare Wt**		13.65	13.76	13.54	13.66					
	Tare + Wet Soil		42.72	56.02	47.53	61.88					
	Tare + Dry Soil		38.50	50.23	44.00	55.78					
	Water	M_w	4.22	5.79	3.53	6.10					
	Dry Soil	M_d	24.85	36.47	30.46	42.12					
Water Content %		w	16.99	15.88	11.60	14.49					
Average %			16.43		13.04						
Weight- Volume Relations											
Temp of water (C)			18.2	18.2	18.2	18.2					
Density of Water			1.00	1.00	1.00	1.00					
Mass in Grams	**Wet Soil**	M_t	90.19	91.43	86.31	58.32					
	Soil + Wax in Air		95.16	95.69	92.32	61.69					
	Wax		4.97	4.26	6.01	3.37					
	Wet Soil + Wax in water		47.10	48.69	46.09	31.75					
	Dry Soil[A]	M_d	77.10	78.91	77.34	50.94					
Specific Gravity of Soil (assumed)		G_S	2.72	2.72	2.72	2.72					
Volume in CC	Wet Soil + Wax[B]		48.06	47.00	46.23	29.94					
	Wax		5.47	4.69	6.62	3.71					
	Wet Soil	V	42.59	42.31	39.61	26.23					
	Dry Soil = M_d / G_s	V_S	28.40	29.06	28.49	18.76					
KN/cum	Wet Unit Weight = (M_t/V)x9.81	γ_m	20.77	21.20	21.38	21.81					
	Average Wet Unit Weight		**20.99**		**21.59**						
	Dry Unit Weight = (M_d/V)x9.81	γ_d	17.76	18.29	19.15	19.05					
	Average Dry Unit Weight		**18.03**		**19.10**						
Void Ratio = ($V-V_S$)/V_S		e	0.50	0.46	0.39	0.40					
Porosity % = [($V-V_S$)/V]x100		n	33.33	31.31	28.09	28.46					
Degree of Saturation = [V_w/($V-V_s$)] x100		S	92.28	94.56	80.64	98.84					

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Hydrometer Analysis

Lab No	202111034S	Borehole No	BH 6-3	Tested by	SAM
Project Name	Tullumore reservior	Sample Id	SS-4	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	6-8	Date	22-Nov-21
Location	Region of peel, Ontario	Soil Classification	Lean Clay, some sand (CL)		

Soil Hydrometer Used		
151 H SN#	993585	◉
	115105	○

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		336.1	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	63.1	cm^3
Length of Bulb	(L_2)	14.15	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.5	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.1351	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	25.97	g
Air Dried Mass	(Wa)	26.15	g
Hygroscopic Corr Factor	(F)	0.993	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.7	g
% Passing 2.0 mm Sieve	(P10)	97.8	
Sample Represented	(W)	50.8	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	1.5	334.6	99.6
2.0	7.3	328.8	97.8

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.7	97.8
0.850	0.7	49.0	96.5
0.425	1.6	48.0	94.7
0.25	2.7	47.0	92.6
0.106	5.6	44.0	86.8
0.075	7.0	42.7	84.1
Pass 0.075	0.4		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
23-Nov-21	12:06:00 PM	1.0	1.0285	0.0030	19.7	1.0255	79.8	8.52	10.16579	0.01353028	0.0395
	12:07:00 PM	2.0	1.0280	0.0030	19.7	1.0250	78.2	8.65	10.16579	0.01353028	0.0281
	12:10:00 PM	5.0	1.0270	0.0030	19.6	1.0240	75.1	8.92	10.19094	0.013547	0.0181
	12:20:00 PM	15.0	1.0245	0.0030	19.5	1.0215	67.3	9.60	10.21619	0.01356378	0.0109
	12:35:00 PM	30.0	1.0235	0.0030	19.3	1.0205	64.2	9.87	10.26703	0.01359748	0.0078
	1:05:00 PM	60.0	1.0220	0.0030	19.1	1.0190	59.5	10.27	10.31830	0.01363139	0.0056
	4:15:00 PM	250.0	1.0200	0.0030	18.8	1.0170	53.2	10.81	10.39602	0.01368264	0.0028
24-Nov-21	12:05:00 PM	1440.0	1.0150	0.0030	18.0	1.0120	37.6	12.16	10.60820	0.01382156	0.0013

L1 cm	Viscosiity C	K (η/(Gs-1)
2.57	-0.373568	5.97987537
2.70	-0.373568	5.97987537
2.97	-0.371097	5.99466877
3.65	-0.368622	6.00952507
3.91	-0.363658	6.03942759
4.32	-0.358677	6.06958532
4.86	-0.351173	6.11530563
6.21	-0.330968	6.24011988

Mass Retained on Seive # 10	57.86
Mass Passed Seive # 10	278.22
Jar Number	

Hygroscopic Data		
	Can Id	124
	Empty Can Weight (g)	13.72
	Can+ Air Dried Soil (g)	39.87
	Can + Oven Dried Soil (g)	39.69

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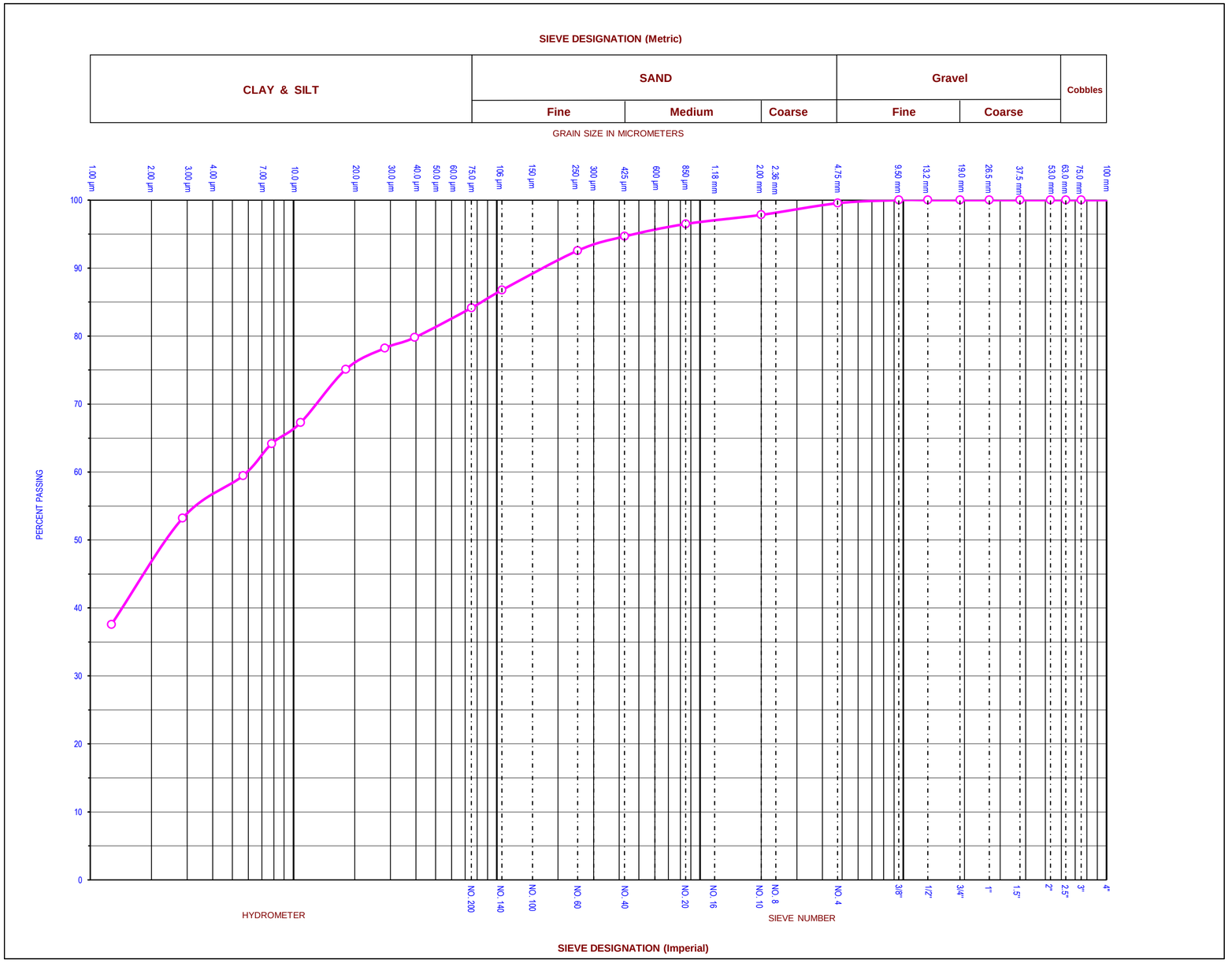
UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

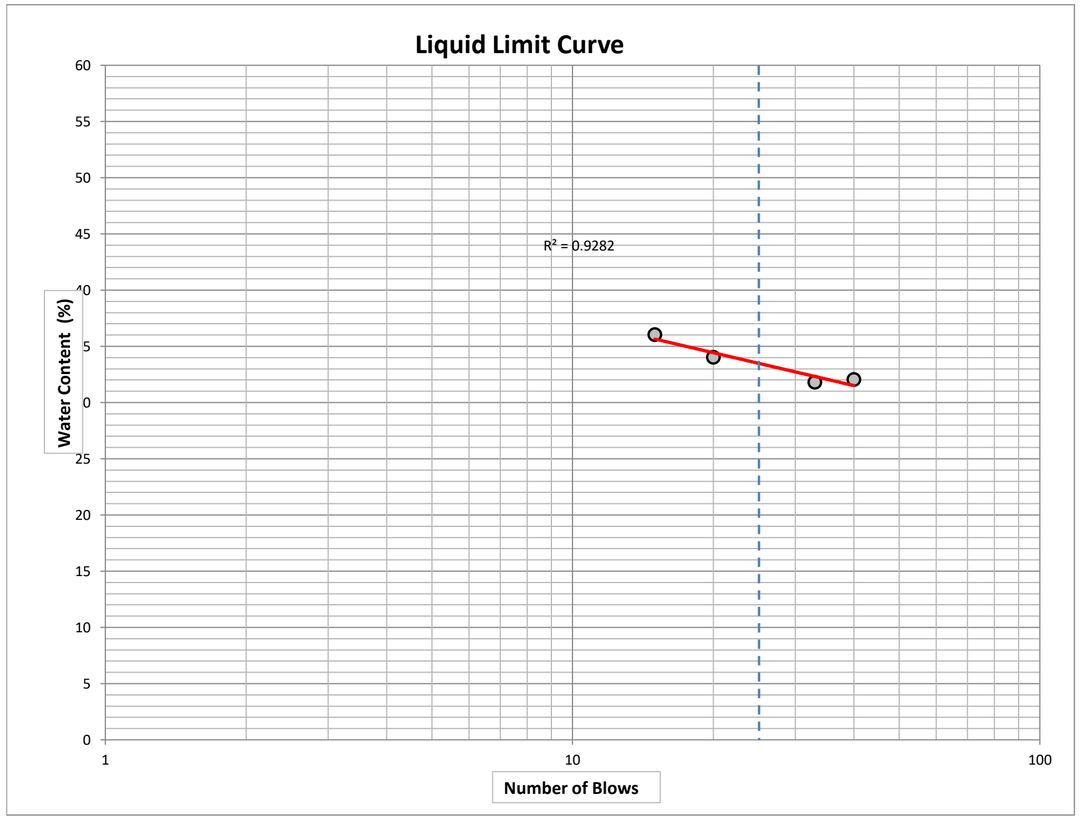
AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	November 22, 2021	Project Number	60646784			Gravel (%)	0
	Sample ID	BH 6-3	SS-4	Depth (feet)	6-8	Project Name	Tullumore reservior			Sand (%)	16
	Lab Sample No:	202111034S				Project Location	Region of peel, Ontario			Silt (%)	39
	Soil Classification	Lean Clay, some sand (CL)								Clay (%)	45
	Figure No.		D10	N/A	D30	N/A	D60	0.006	Cu	N/A	Cc	N/A

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	November 24, 2021	
Project Name	Tullumore & Pumping Station				Tested By		
Location					Reviewed By	Ramana M	
Borehole Number	BH 6-2	Sample Id	SS4	Depth (feet)	6-8	Lab Number	202111033S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		129	176	136	60		
Weight of Empty Container (g) W_1		13.60	13.60	13.70	13.34		
Weight of Container + Wet Soil (g) W_2		33.27	29.59	29.61	31.27		
Weight of Container + Dry Soil(g) W_3		28.06	25.53	25.77	26.92		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	5.21	4.06	3.84	4.35		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	14.46	11.93	12.07	13.58		
Water Content (%)	$w = (W_w / W_s) * 100$	36.03	34.03	31.81	32.03		
Number of Blows		15	20	33	40		
Liquid Limit (%) From Graph		33.5					



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DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	November 24, 2021	
Project Name	Tullumore & Pumping Station				Tested By	0	
Location	0				Reviewed By	Ramana M	
Borehole Number	BH 6-2	Sample Id	SS4	Depth (feet)	6-8	Lab Number	202111033S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		111	54	82			
Weight of Empty Container (g) W_1		13.64	13.65	14.16			
Weight of Container + Wet Soil (g) W_2		21.21	23.11	22.20			
Weight of Container + Dry Soil(g) W_3		19.89	21.48	20.84			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.32	1.63	1.36			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	6.25	7.83	6.68			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	21.12	20.82	20.36			
Average Plastic Limit (%) w_P		20.77					

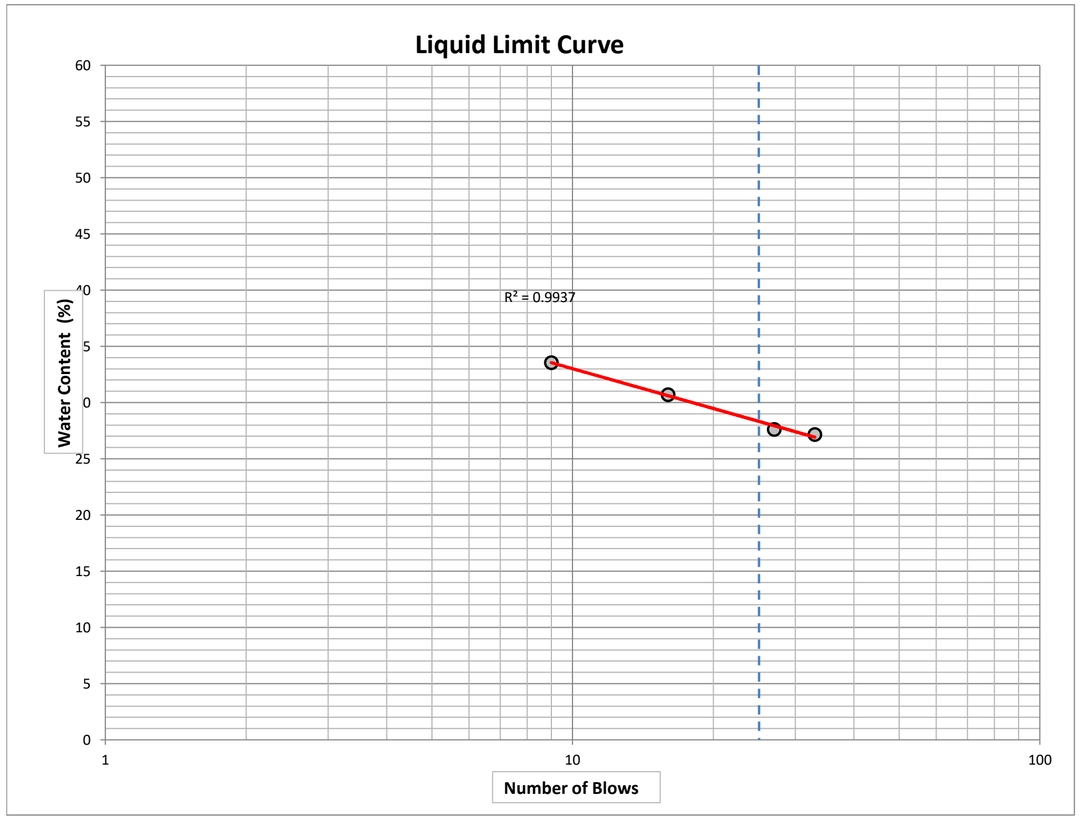
Result Summary	
Liquid Limit (%)	33
Plastic Limit (%)	21
Plasticity Index (%)	12
Sample status	Plastic

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	November 24, 2021	
Project Name	Tullumore & Pumping Station				Tested By		
Location					Reviewed By	Ramana M	
Borehole Number	BH 6-1	Sample Id	SS3	Depth (feet)	4	Lab Number	202111031S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		96	51	142	95		
Weight of Empty Container (g) W_1		13.47	13.44	13.77	13.68		
Weight of Container + Wet Soil (g) W_2		29.03	28.68	27.77	25.82		
Weight of Container + Dry Soil(g) W_3		25.12	25.38	24.48	23.23		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	3.91	3.30	3.29	2.59		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	11.65	11.95	10.71	9.55		
Water Content (%)	$w = (W_w / W_s) * 100$	33.55	27.62	30.70	27.15		
Number of Blows		9	27	16	33		
Liquid Limit (%) From Graph		28.3					



AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	November 24, 2021	
Project Name	Tullumore & Pumping Station				Tested By	0	
Location	0				Reviewed By	Ramana M	
Borehole Number	BH 6-1	Sample Id	SS3	Depth (feet)	4	Lab Number	202111031S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		178	167	105			
Weight of Empty Container (g) W_1		13.537	13.68	13.79			
Weight of Container + Wet Soil (g) W_2		22.29	20.65	21.54			
Weight of Container + Dry Soil(g) W_3		20.94	19.61	20.37			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.35	1.04	1.17			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	7.40	5.93	6.58			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	18.24	17.48	17.80			
Average Plastic Limit (%) w_P		17.84					

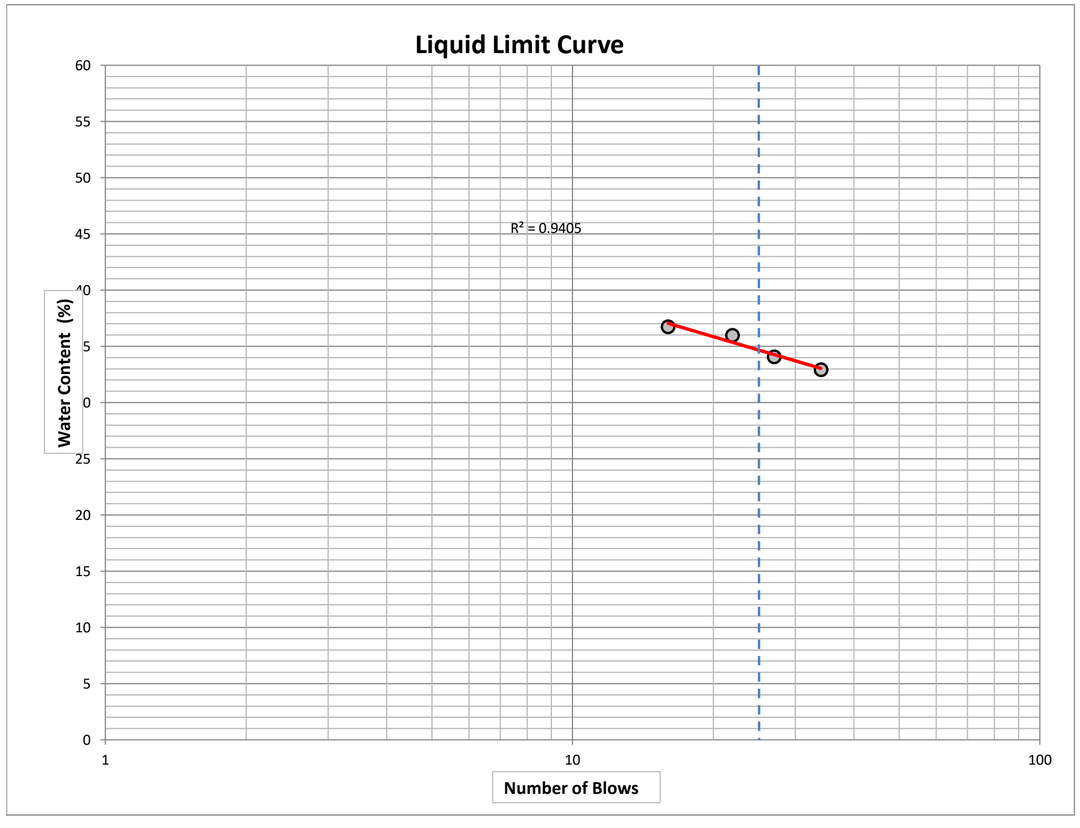
Result Summary	
Liquid Limit (%)	28
Plastic Limit (%)	18
Plasticity Index (%)	10
Sample status	Plastic

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	November 26, 2021	
Project Name	Tullumore & Pumping Station				Tested By		
Location					Reviewed By	Ramana M	
Borehole Number	BH-6-3	Sample Id	SS4	Depth (feet)	7.5	Lab Number	202111034S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		140	67	100	180		
Weight of Empty Container (g) W_1		13.73	13.61	13.59	13.50		
Weight of Container + Wet Soil (g) W_2		31.74	27.11	24.01	25.97		
Weight of Container + Dry Soil(g) W_3		27.28	23.68	21.21	22.67		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	4.46	3.43	2.80	3.30		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	13.55	10.07	7.62	9.17		
Water Content (%)	$w = (W_w / W_s) * 100$	32.92	34.06	36.75	35.99		
Number of Blows		34	27	16	22		
Liquid Limit (%) From Graph		34.7					



AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	November 26, 2021	
Project Name	Tullumore & Pumping Station				Tested By	0	
Location	0				Reviewed By	Ramana M	
Borehole Number	BH-6-3	Sample Id	SS4	Depth (feet)	7.5	Lab Number	202111034S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		146	71	128			
Weight of Empty Container (g) W_1		13.84	13.66	13.72			
Weight of Container + Wet Soil (g) W_2		22.96	24.13	22.45			
Weight of Container + Dry Soil(g) W_3		21.35	22.31	20.94			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.61	1.82	1.51			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	7.51	8.65	7.22			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	21.44	21.04	20.91			
Average Plastic Limit (%) w_P		21.13					

Result Summary	
Liquid Limit (%)	35
Plastic Limit (%)	21
Plasticity Index (%)	14
Sample status	Plastic

AECOM CANADA LTD.

MOISTURE CONTENT DETERMINATION

CLIENT	AECOM	DATE	11/18/2021
PROJECT NUMBER	60646784	TESTED BY	SE
PROJECT NAME	Allan Reservior and Pumping Station	REVIEWED BY	Ramana M
LOCATION	Peel Region		

Borehole Name	Sample Id	Depth (feet)	Can Id	Observations			Formula		
				Weight of Empty Can (g) W_1	Weight of Wet Soil + Can (g) W_2	Weight of Dry Soil + Can (g) W_3	Weight of Water (g) $W_w = (W_2-W_3)$	Weight of Dry soil (g) $W_s = (W_3-W_1)$	Moisture Content (%) $w = (W_w/W_s)*100$
Waste Bin Sample	Site 9#1	-	64	13.49	76.00	68.91	7.09	55.42	12.79
BH9-3MW	SS1	0 - 2	78	13.47	65.15	55.18	9.97	41.71	23.90
	SS2	2 - 4	161	14.47	86.28	77.63	8.65	63.16	13.70
	SS3	4 - 6	149	13.57	79.06	69.21	9.85	55.64	17.70
	SS4A	6 -8	169	13.56	88.06	78.93	9.13	65.37	13.97
	SS4B	6 -8	52	14.03	95.44	84.61	10.83	70.58	15.34
	SS5	8 -10	72	13.89	78.55	71.47	7.08	57.58	12.30
	SS6	10 - 12	165	13.98	73.95	64.70	9.25	50.72	18.24
	SS7	15 -17	126	13.77	87.02	78.22	8.80	64.45	13.65
	SS8	20 22	84	13.79	74.85	66.06	8.79	52.27	16.82
Waste Bin Sample	Site 9#2	-	156	13.47	78.95	70.56	8.39	57.09	14.70
BH9-1	SS1	0 -2	102	13.53	83.03	68.55	14.48	55.02	26.32
	SS2	2 -4	192	13.45	85.44	76.56	8.88	63.11	14.07
	SS3	4 -6	55	13.35	87.27	77.11	10.16	63.76	15.93
	SS4	6 - 8	113	13.65	82.94	75.19	7.75	61.54	12.59
	SS5	8 -10	168	13.61	86.99	73.83	13.16	60.22	21.85
	SS6	10 - 12	166	13.49	96.05	81.19	14.86	67.70	21.95
	SS7	15 - 17	87	13.77	89.48	79.52	9.96	65.75	15.15
	SS8	20 - 22	148	13.44	89.37	79.72	9.65	66.28	14.56
Waste Bin Sample	Site 6	-	164	13.61	71.17	63.41	7.76	49.80	15.58
BH9-2	SS1	0 - 2	63	13.52	85.54	71.86	13.68	58.34	23.45
	SS2	2 -4	162	13.51	88.54	78.67	9.87	65.16	15.15
	SS3	4 -6	88	13.61	92.45	83.34	9.11	69.73	13.06
	SS4	6 - 8	157	13.60	77.56	70.31	7.25	56.71	12.78
	SS5	8 -10	184	13.69	84.81	74.54	10.27	60.85	16.88
	SS6	10 - 12	138	13.61	82.70	74.26	8.44	60.65	13.92
	SS7	15 - 17	112	13.72	81.90	73.33	8.57	59.61	14.38

	SS8	20 -22	73	13.70	75.30	69.52	5.78	55.82	10.35
								Total Samples	**28**

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DETERMINATION OF UNIT WEIGHT - ASTM D7263

Project Number	60646784	**Date Tested**	19-Nov-21	**Tested by**	
Project Name	Allon Reservior & pumping station	**Location**		**Checked by**	Ramana M

Water Content

Test Info	**Lab Number**		**202111036S**		**202111037S**					
	Borehole Name		**BH 9-3**		**BH 9-1**					
	Sample ID		**SS7**		**SS5**					
	Depth		**15.00**		**8.00**					
	Trial		**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	Tare ID		189	116	62	69				
Mass in Grams	**Tare Wt**		13.48	14.02	13.59	13.65				
	Tare + Wet Soil		58.08	84.73	55.26	43.54				
	Tare + Dry Soil		52.12	76.46	49.10	40.06				
	Water	M_w	5.96	8.27	6.16	3.48				
	Dry Soil	M_d	38.64	62.44	35.51	26.41				
Water Content %		w	15.42	13.25	17.35	13.19				
Average %			14.34		15.27					

Weight- Volume Relations

Temp of water (C)			18.2	18.2	18.2	18.2				
Density of Water			1.00	1.00	1.00	1.00				
Mass in Grams	**Wet Soil**	M_t	141.29	110.78	130.30	82.07				
	Soil + Wax in Air		148.17	116.45	136.57	85.61				
	Wax		6.88	5.67	6.27	3.54				
	Wet Soil + Wax in water		77.06	60.38	66.46	42.76				
	Dry Soil[A]	M_d	122.41	97.82	111.03	72.51				
Specific Gravity of Soil (assumed)		G_S	2.72	2.72	2.72	2.72				
Volume in CC	Wet Soil + Wax[B]		71.11	56.07	70.11	42.85				
	Wax		7.58	6.24	6.91	3.90				
	Wet Soil	V	63.53	49.83	63.20	38.95				
	Dry Soil = M_d / G_s	V_S	45.09	36.03	40.90	26.71				
KN/cum	Wet Unit Weight = (M_t/V)x9.81	γ_m	21.82	21.81	20.22	20.67				
	Average Wet Unit Weight		**21.81**		**20.45**					
	Dry Unit Weight = (M_d/V)x9.81	γ_d	18.90	19.26	17.23	18.26				
	Average Dry Unit Weight		**19.08**		**17.75**					
Void Ratio = ($V-V_S$)/V_S		e	0.41	0.38	0.55	0.46				
Porosity % = [($V-V_S$)/V]x100		n	29.03	27.69	35.30	31.44				
Degree of Saturation = [V_w/($V-V_s$)] x100		S	100.00	93.95	86.36	78.10				

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Hydrometer Analysis

Lab No	202111035S	Borehole No	BH 9-2	Tested by	Dharmik P
Project Name	Alloa Resevoiur aand Pumping Station	Sample Id	SS-8	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	20-22	Date	22-Nov-21
Location	Peel Region, Ontario	Soil Classification	Lean Clay with Sand, trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	○
	115105	◉

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		691.8	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	61.1	cm^3
Length of Bulb	(L_2)	14.44	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.17	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.3535	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	34.63	g
Air Dried Mass	(Wa)	34.82	g
Hygroscopic Corr Factor	(F)	0.995	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.7	g
% Passing 2.0 mm Sieve	(P10)	94.5	
Sample Represented	(W)	52.6	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	17.8	674.0	97.4
2.0	38.4	653.4	94.5

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.7	94.5
0.850	1.9	47.8	90.9
0.425	3.6	46.1	87.6
0.25	5.3	44.5	84.4
0.106	9.3	40.4	76.8
0.075	11.0	38.7	73.6
Pass 0.075	1.6		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
23-Nov-21	12:25:00 PM	1.0	1.0225	0.0030	19.9	1.0195	58.8	10.33	10.11581	0.01349698	0.0434
	12:26:00 PM	2.0	1.0210	0.0030	19.9	1.0180	54.3	10.73	10.11581	0.01349698	0.0313
	12:29:00 PM	5.0	1.0190	0.0030	19.8	1.0160	48.3	11.27	10.14075	0.0135136	0.0203
	12:39:00 PM	15.0	1.0175	0.0030	19.5	1.0145	43.7	11.68	10.21619	0.01356378	0.0120
	12:54:00 PM	30.0	1.0155	0.0030	19.3	1.0125	37.7	12.22	10.26703	0.01359748	0.0087
	1:24:00 PM	60.0	1.0135	0.0030	19.0	1.0105	31.7	12.76	10.34409	0.01364842	0.0063
	4:34:00 PM	250.0	1.0115	0.0030	18.7	1.0085	25.6	13.30	10.42215	0.01369982	0.0032
24-Nov-21	12:24:00 PM	1440.0	1.0075	0.0030	18.0	1.0045	13.6	14.38	10.60820	0.01382156	0.0014

L1 cm	Viscosiity C	K (η/(Gs-1)
4.19	-0.378496	5.95047606
4.59	-0.378496	5.95047606
5.13	-0.376034	5.96514456
5.53	-0.368622	6.00952507
6.07	-0.363658	6.03942759
6.61	-0.356180	6.08476063
7.15	-0.348663	6.1306759
8.23	-0.330968	6.24011988

Mass Retained on Seive # 10	231.275
Mass Passed Seive # 10	460.52
Jar Number	

Hygroscopic Data		
	Can Id	80
	Empty Can Weight (g)	13.51
	Can+ Air Dried Soil (g)	48.33
	Can + Oven Dried Soil (g)	48.14

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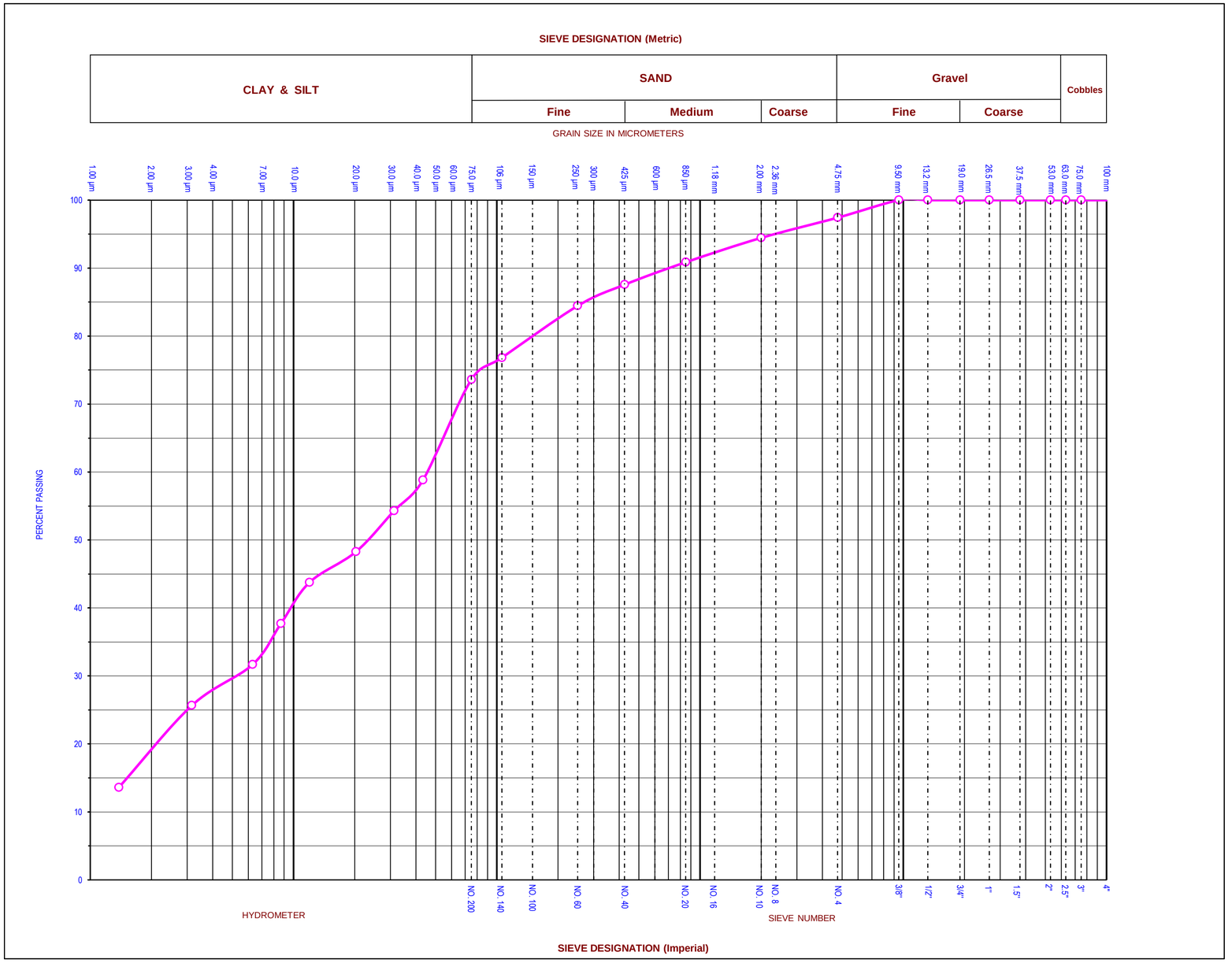

GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	November 22, 2021	Project Number	60646784			Gravel (%)	3
	Sample ID	BH 9-2	SS-8	Depth (feet)	20-22	Project Name	Alloa Resevoiur aand Pumping Station			Sand (%)	23
	Lab Sample No:	202111035S				Project Location	Peel Region, Ontario			Silt (%)	56
	Soil Classification	Lean Clay with Sand, trace gravel (CL)								Clay (%)	18
	Figure No.		D10	N/A	D30	0.005	D60	0.046	Cu	N/A	Cc	N/A

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202111036S	Borehole No	BH 9-13	Tested by	Dharmik P
Project Name	Alloa Resevoiur aand Pumping Station	Sample Id	SS-7	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	15-17	Date	23-Nov-21
Location	Peel Region, Ontario	Soil Classification	Lean Clay with Sand, trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	○
	115105	◉

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		540.6	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	61.1	cm^3
Length of Bulb	(L_2)	14.44	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.17	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.3535	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	46.65	g
Air Dried Mass	(Wa)	46.96	g
Hygroscopic Corr Factor	(F)	0.993	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.7	g
% Passing 2.0 mm Sieve	(P10)	92.8	
Sample Represented	(W)	53.5	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	11.4	529.2	97.9
2.0	39.0	501.6	92.8

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.7	92.8
0.850	1.5	48.2	90.0
0.425	3.1	46.6	87.0
0.25	4.6	45.1	84.2
0.106	8.5	41.2	76.9
0.075	10.2	39.4	73.7
Pass 0.075	3.4		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
24-Nov-21	9:51:00 AM	1.0	1.0265	0.0030	19.5	1.0235	69.7	9.25	10.21619	0.01356378	0.0412
	9:52:00 AM	2.0	1.0250	0.0030	19.5	1.0220	65.3	9.65	10.21619	0.01356378	0.0298
	9:55:00 AM	5.0	1.0230	0.0030	19.4	1.0200	59.3	10.19	10.24156	0.01358061	0.0194
	10:05:00 AM	15.0	1.0215	0.0030	19.2	1.0185	54.9	10.60	10.29261	0.01361441	0.0114
	10:20:00 AM	30.0	1.0200	0.0030	19.1	1.0170	50.4	11.00	10.31830	0.01363139	0.0083
	10:50:00 AM	60.0	1.0180	0.0030	18.9	1.0150	44.5	11.54	10.37000	0.0136655	0.0060
	2:00:00 PM	250.0	1.0150	0.0030	18.9	1.0120	35.6	12.35	10.37000	0.0136655	0.0030
25-Nov-21	9:50:00 AM	1440.0	1.0105	0.0030	17.9	1.0075	22.3	13.57	10.63524	0.01383916	0.0013

L1 cm	Viscosiity C	K (η/(Gs-1)
3.11	-0.368622	6.00952507
3.51	-0.368622	6.00952507
4.05	-0.366142	6.02444458
4.45	-0.361170	6.05447441
4.86	-0.358677	6.06958532
5.40	-0.353679	6.10000064
6.21	-0.353679	6.10000064
7.43	-0.328423	6.25602271

Mass Retained on Seive # 10	174.225
Mass Passed Seive # 10	366.39
Jar Number	

Hygroscopic Data		
	Can Id	139
	Empty Can Weight (g)	13.60
	Can+ Air Dried Soil (g)	60.56
	Can + Oven Dried Soil (g)	60.25

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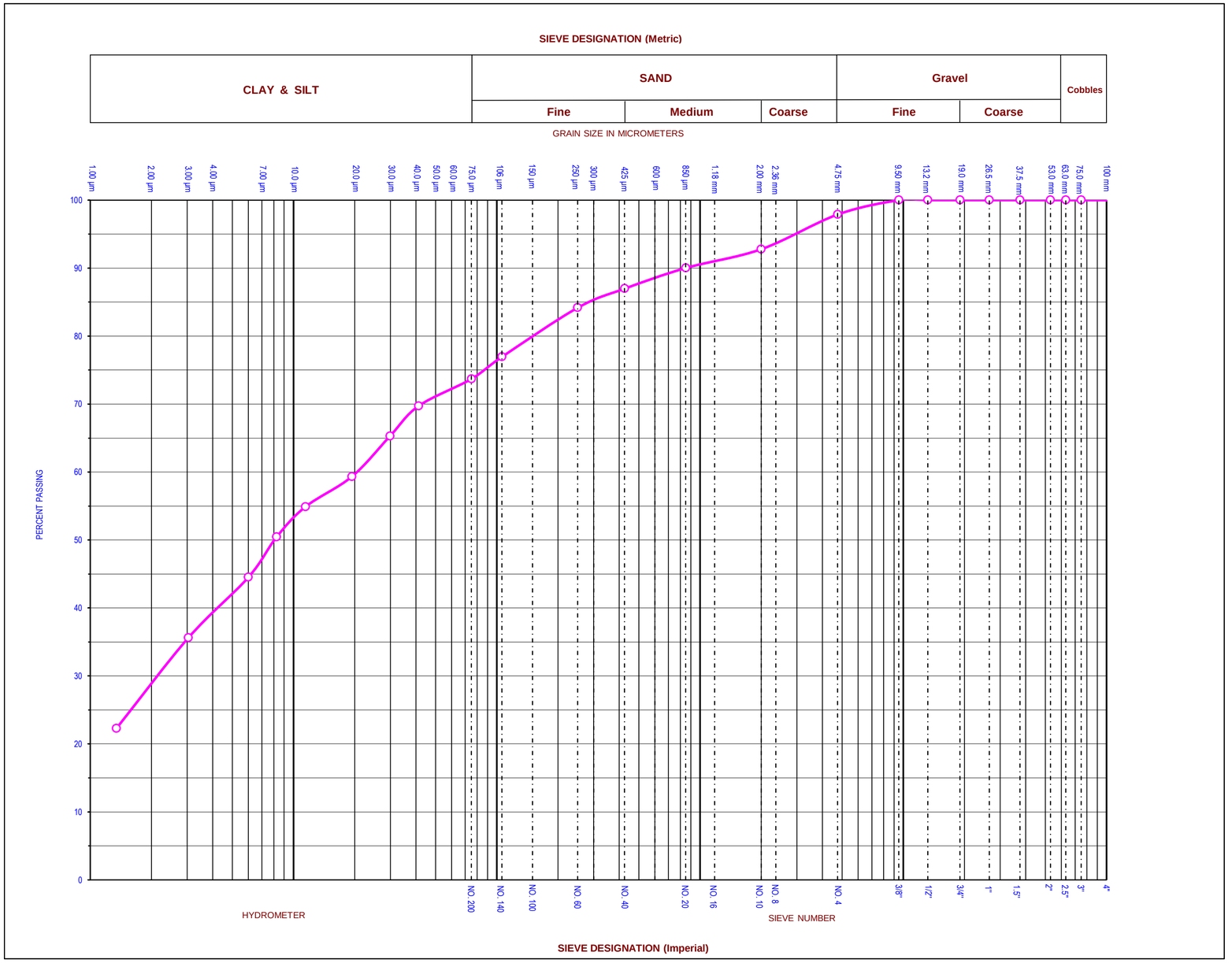
UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	**Client**	AECOM		**Date**	November 23, 2021	**Project Number**	60646784			**Gravel (%)**	2
	Sample ID	BH 9-13	SS-7	**Depth (feet)**	15-17	**Project Name**	Alloa Resevoiur aand Pumping Station			**Sand (%)**	24
	Lab Sample No:	202111036S				**Project Location**	Peel Region, Ontario			**Silt (%)**	47
	Soil Classification	Lean Clay with Sand, trace gravel (CL)								**Clay (%)**	27
	Figure No.			**D10**	N/A	**D30**	0.002	**D60**	0.021	**Cu**	N/A	**Cc**	N/A

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202111037S	Borehole No	BH 9-1	Tested by	Dharmik P
Project Name	Alloa Resevoiur aand Pumping Station	Sample Id	SS-5	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	8-10	Date	23-Nov-21
Location	Peel Region, Ontario	Soil Classification	Lean Clay with Sand, trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	◉
	115105	○

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		502.9	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	63.1	cm^3
Length of Bulb	(L_2)	14.15	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.5	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.1351	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	42.04	g
Air Dried Mass	(Wa)	42.22	g
Hygroscopic Corr Factor	(F)	0.996	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.8	g
% Passing 2.0 mm Sieve	(P10)	95.6	
Sample Represented	(W)	52.1	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	7.3	495.6	98.5
2.0	22.2	480.7	95.6

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.8	95.6
0.850	1.2	48.5	93.2
0.425	2.4	47.4	90.9
0.25	3.6	46.2	88.7
0.106	6.3	43.4	83.4
0.075	7.5	42.3	81.2
Pass 0.075	0.5		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
24-Nov-21	10:11:00 AM	1.0	1.0290	0.0030	20.5	1.0260	79.3	8.38	9.96839	0.01339827	0.0388
	10:12:00 AM	2.0	1.0280	0.0030	20.5	1.0250	76.2	8.65	9.96839	0.01339827	0.0279
	10:15:00 AM	5.0	1.0265	0.0030	20.3	1.0235	71.7	9.06	10.01711	0.01343097	0.0181
	10:25:00 AM	15.0	1.0250	0.0030	20.3	1.0220	67.1	9.46	10.01711	0.01343097	0.0107
	10:40:00 AM	30.0	1.0230	0.0030	20.1	1.0200	61.0	10.00	10.06625	0.01346388	0.0078
	11:10:00 AM	60.0	1.0210	0.0030	19.8	1.0180	54.9	10.54	10.14075	0.0135136	0.0057
	2:20:00 PM	250.0	1.0180	0.0030	18.9	1.0150	45.7	11.35	10.37000	0.0136655	0.0029
25-Nov-21	10:10:00 AM	1440.0	1.0140	0.0030	18.0	1.0110	33.5	12.43	10.60820	0.01382156	0.0013

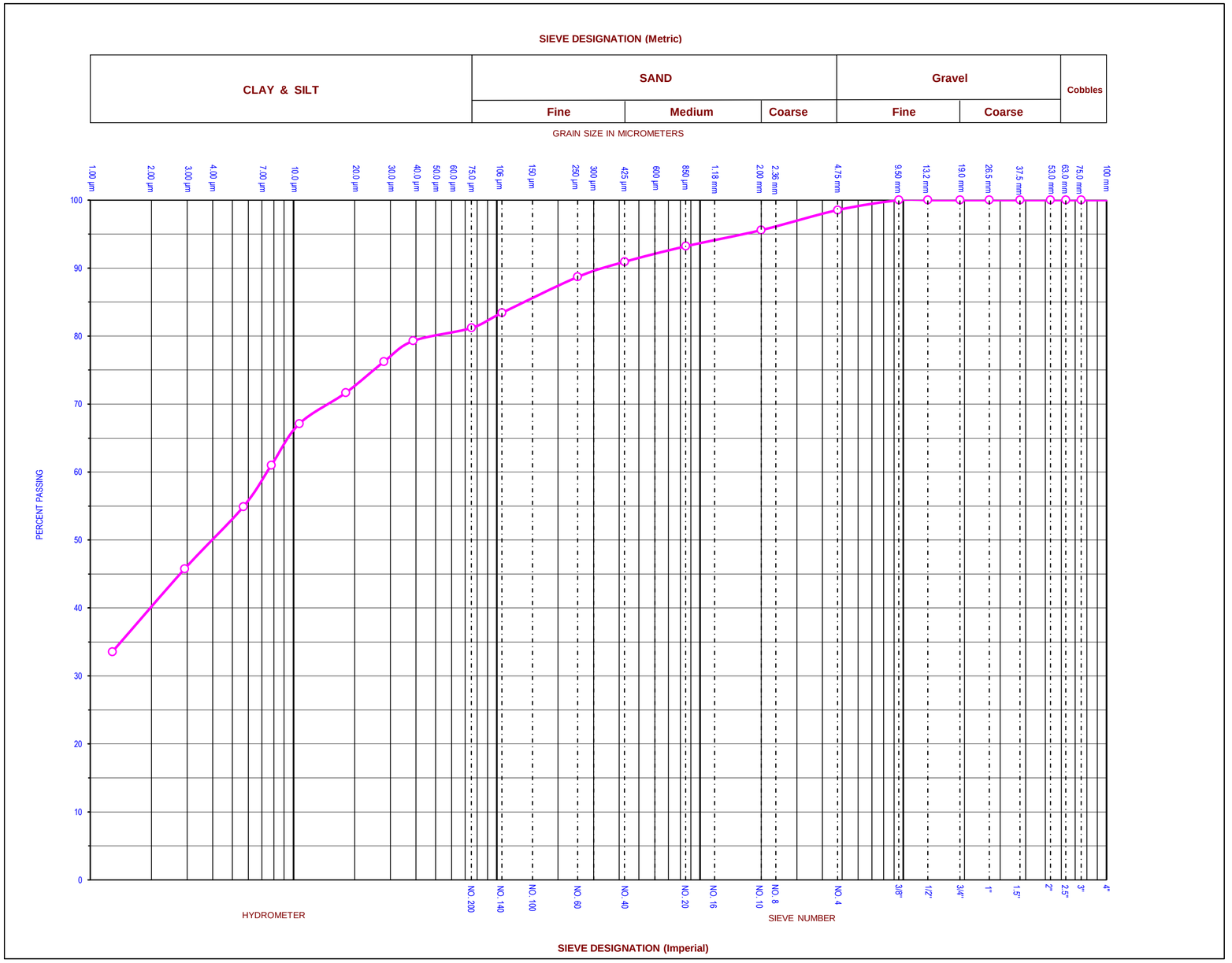
L1 cm	Viscosiity C	K (η/(Gs-1)
2.43	-0.393177	5.86375637
2.70	-0.393177	5.86375637
3.11	-0.388301	5.89241899
3.51	-0.388301	5.89241899
4.05	-0.383407	5.92132474
4.59	-0.376034	5.96514456
5.40	-0.353679	6.10000064
6.48	-0.330968	6.24011988

Mass Retained on Seive # 10	178.05
Mass Passed Seive # 10	324.86
Jar Number	

Hygroscopic Data		
	Can Id	61
	Empty Can Weight (g)	13.50
	Can+ Air Dried Soil (g)	55.72
	Can + Oven Dried Soil (g)	55.54

AECOM Canada Ltd.

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	**Client**	AECOM		**Date**	November 23, 2021	**Project Number**	60646784			**Gravel (%)**	1
	Sample ID	BH 9-1	SS-5	**Depth (feet)**	8-10	**Project Name**	Alloa Resevoiur aand Pumping Station			**Sand (%)**	18
	Lab Sample No:	202111037S				**Project Location**	Peel Region, Ontario			**Silt (%)**	42
	Soil Classification	Lean Clay with Sand, trace gravel (CL)								**Clay (%)**	39
	Figure No.		**D10**	N/A	**D30**	N/A	**D60**	0.007	**Cu**	N/A	**Cc**	N/A

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202111038S	Borehole No	BH 9-1	Tested by	Dharmik P
Project Name	Alloa Resevoiur aand Pumping Station	Sample Id	SS-3	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)	4-6	Date	22-Nov-21
Location	Peel Region, Ontario	Soil Classification	Sandy Lean Clay, trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	○
	115105	◉

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		661.9	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	61.1	cm^3
Length of Bulb	(L_2)	14.44	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.17	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.3535	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	69.929	g
Air Dried Mass	(Wa)	70.144	g
Hygroscopic Corr Factor	(F)	0.997	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.8	g
% Passing 2.0 mm Sieve	(P10)	91.8	
Sample Represented	(W)	54.3	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	21.1	640.8	96.8
2.0	54.1	607.8	91.8

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.8	91.8
0.850	2.0	47.8	88.1
0.425	4.1	45.7	84.2
0.25	6.1	43.8	80.6
0.106	11.0	38.9	71.6
0.075	13.0	36.9	68.0
Pass 0.075	1.1		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
23-Nov-21	10:29:00 AM	1.0	1.0260	0.0030	20.1	1.0230	67.3	9.38	10.06625	0.01346388	0.0412
	10:30:00 AM	2.0	1.0245	0.0030	20.1	1.0215	62.9	9.79	10.06625	0.01346388	0.0298
	10:33:00 AM	5.0	1.0225	0.0030	20.0	1.0195	57.1	10.33	10.09098	0.0134804	0.0194
	10:43:00 AM	15.0	1.0210	0.0030	19.9	1.0180	52.7	10.73	10.11581	0.01349698	0.0114
	10:58:00 AM	30.0	1.0190	0.0030	19.8	1.0160	46.8	11.27	10.14075	0.0135136	0.0083
	11:28:00 AM	60.0	1.0170	0.0030	19.6	1.0140	41.0	11.81	10.19094	0.013547	0.0060
	2:38:00 PM	250.0	1.0145	0.0030	19.0	1.0115	33.6	12.49	10.34409	0.01364842	0.0031
24-Nov-21	10:28:00 AM	1440.0	1.0120	0.0030	18.0	1.0090	26.3	13.16	10.60820	0.01382156	0.0013

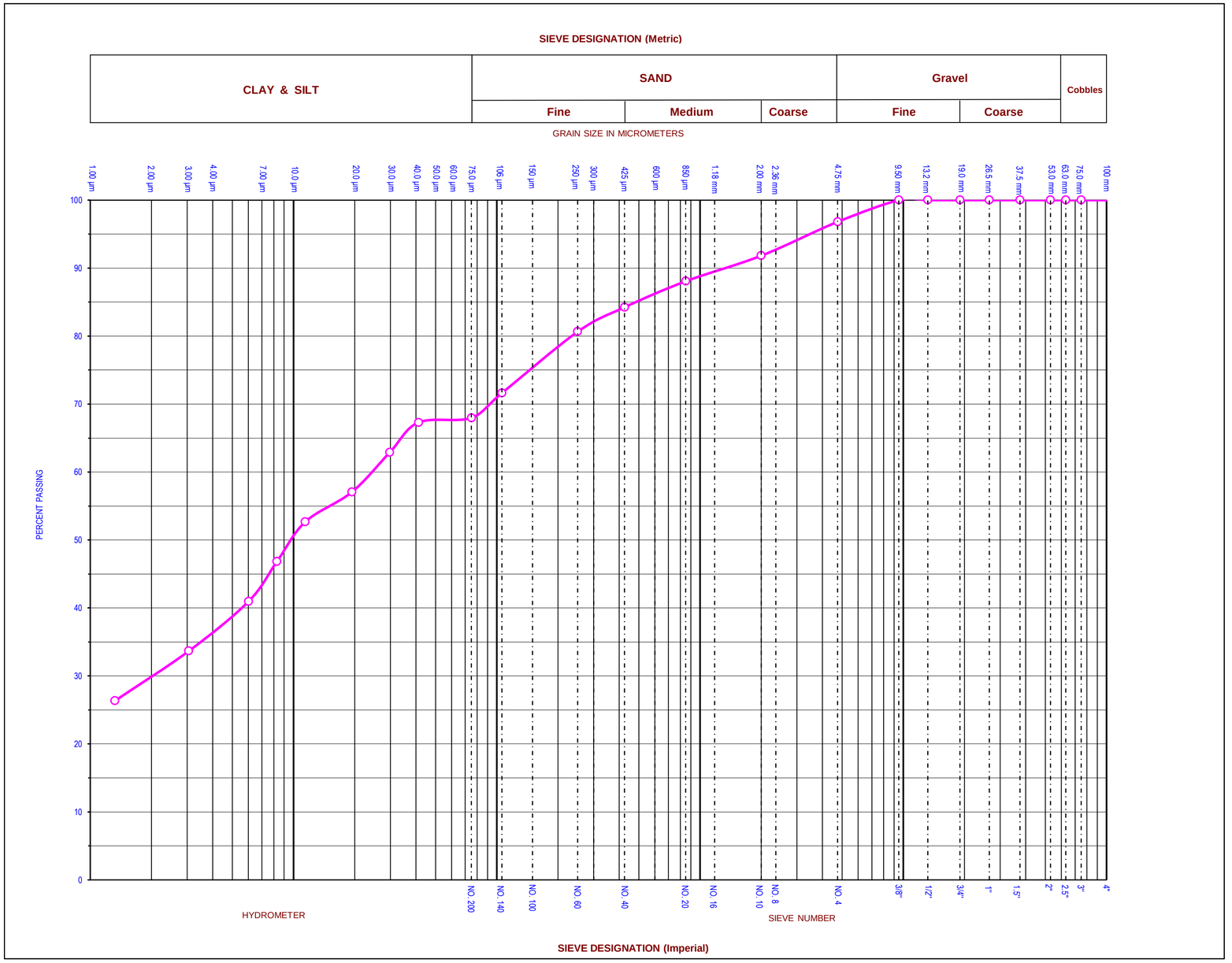
L1 cm	Viscosiity C	K (η/(Gs-1)
3.24	-0.383407	5.92132474
3.65	-0.383407	5.92132474
4.19	-0.380954	5.93586956
4.59	-0.378496	5.95047606
5.13	-0.376034	5.96514456
5.67	-0.371097	5.99466877
6.35	-0.356180	6.08476063
7.02	-0.330968	6.24011988

Mass Retained on Seive # 10	427.72
Mass Passed Seive # 10	234.2
Jar Number	

Hygroscopic Data		
	Can Id	131
	Empty Can Weight (g)	13.75
	Can+ Air Dried Soil (g)	83.90
	Can + Oven Dried Soil (g)	83.68

AECOM Canada Ltd.

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

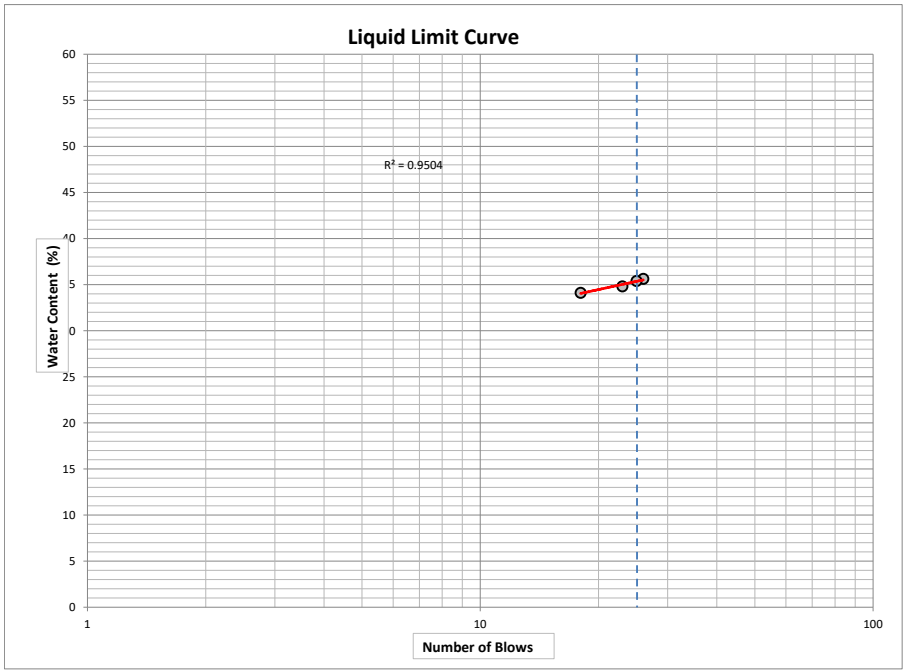
AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	November 22, 2021	Project Number	60646784			Gravel (%)	3
	Sample ID	BH 9-1	SS-3	Depth (feet)	4-6	Project Name	Alloa Resevoiur aand Pumping Station			Sand (%)	29
	Lab Sample No:	202111038S				Project Location	Peel Region, Ontario			Silt (%)	39
	Soil Classification	Sandy Lean Clay, trace gravel (CL)								Clay (%)	29
	Figure No.		D10	N/A	D30	0.002	D60	0.025	Cu	N/A	Cc	N/A

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	November 26, 2021	
Project Name	Allon & Pumping Station				Tested By		
Location					Reviewed By	Ramana M	
Borehole Number	BH 9-1	Sample Id	SS5	Depth (feet)	8-10	Lab Number	202111037S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		96	142	51	95		
Weight of Empty Container (g) W_1		13.45	13.76	13.44	13.70		
Weight of Container + Wet Soil (g) W_2		22.31	25.11	24.30	21.64		
Weight of Container + Dry Soil(g) W_3		20.02	22.13	21.46	19.62		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	2.29	2.98	2.84	2.02		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	6.57	8.37	8.02	5.92		
Water Content (%)	$w = (W_w / W_s) * 100$	34.81	35.63	35.39	34.12		
Number of Blows		23	26	25	18		
Liquid Limit (%) From Graph		35.4					



AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	November 26, 2021	
Project Name	Allon & Pumping Station				Tested By	0	
Location	0				Reviewed By	Ramana M	
Borehole Number	BH 9-1	Sample Id	SS5	Depth (feet)	8-10	Lab Number	202111037S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		178	167	105			
Weight of Empty Container (g) W_1		13.529	13.67	13.79			
Weight of Container + Wet Soil (g) W_2		20.593	19.18	21.72			
Weight of Container + Dry Soil(g) W_3		19.13	18.04	20.11			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.46	1.14	1.61			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	5.60	4.37	6.32			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	26.12	25.98	25.45			
Average Plastic Limit (%) w_P		25.85					

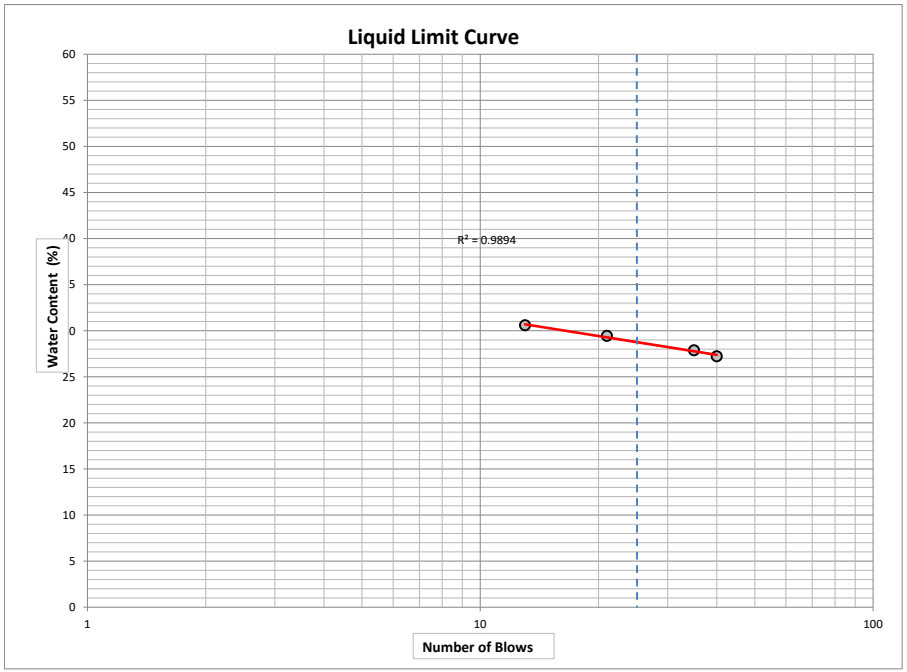
Result Summary	
Liquid Limit (%)	35
Plastic Limit (%)	26
Plasticity Index (%)	9
Sample status	Plastic

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	November 26, 2021	
Project Name	Allon & Pumping Station				Tested By		
Location					Reviewed By	Ramana M	
Borehole Number	BH 9-3	Sample Id	SS7	Depth (feet)	15-17	Lab Number	202111036S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		111	54	82	74		
Weight of Empty Container (g) W_1		13.62	13.64	13.54	14.15		
Weight of Container + Wet Soil (g) W_2		28.83	27.25	24.46	25.41		
Weight of Container + Dry Soil(g) W_3		25.27	24.34	22.08	22.85		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	3.56	2.91	2.38	2.56		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	11.65	10.70	8.54	8.70		
Water Content (%)	$w = (W_w / W_s) * 100$	30.59	27.22	27.88	29.44		
Number of Blows		13	40	35	21		
Liquid Limit (%) From Graph		28.8					



AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	November 26, 2021	
Project Name	Allon & Pumping Station				Tested By	0	
Location	0				Reviewed By	Ramana M	
Borehole Number	BH 9-3	Sample Id	SS7	Depth (feet)	15-17	Lab Number	202111036S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		129	176	136			
Weight of Empty Container (g) W_1		13.596	13.61	13.71			
Weight of Container + Wet Soil (g) W_2		20.522	18.32	20.18			
Weight of Container + Dry Soil(g) W_3		19.26	17.46	19.01			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.26	0.86	1.17			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	5.66	3.85	5.30			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	22.28	22.27	22.15			
Average Plastic Limit (%) w_P		22.23					

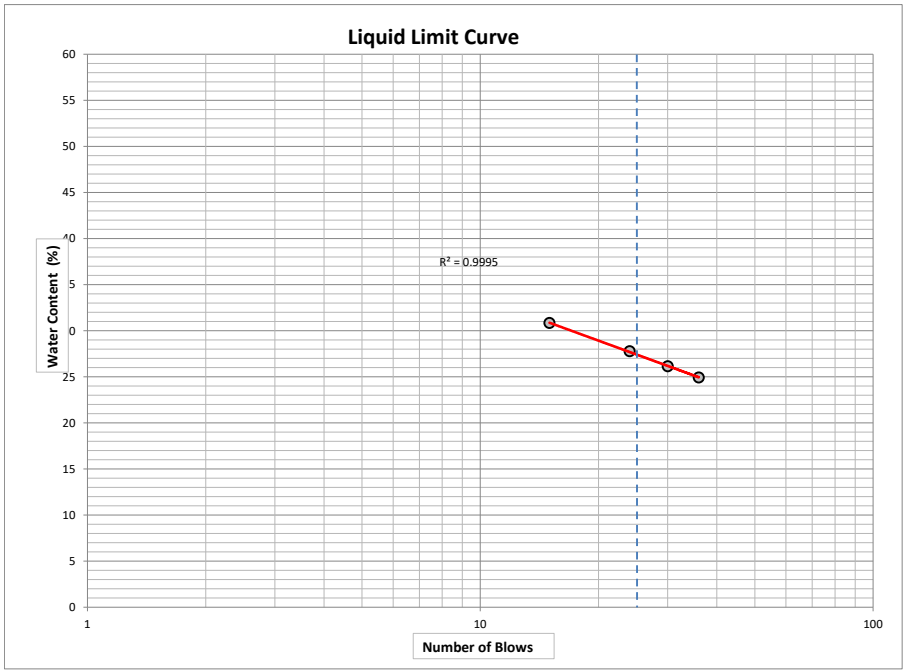
Result Summary	
Liquid Limit (%)	29
Plastic Limit (%)	22
Plasticity Index (%)	7
Sample status	Plastic

AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	November 26, 2021	
Project Name	Allon & Pumping Station				Tested By		
Location	Region of Peel, Ontario				Reviewed By	Ramana M	
Borehole Number	BH 9-2	Sample Id	SS8	Depth (feet)	20	Lab Number	202111035S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		153	59	83	103		
Weight of Empty Container (g) W_1		13.57	13.55	13.73	13.63		
Weight of Container + Wet Soil (g) W_2		29.72	27.78	24.94	27.86		
Weight of Container + Dry Soil(g) W_3		26.21	24.94	22.30	24.91		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	3.51	2.84	2.64	2.95		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	12.64	11.39	8.57	11.28		
Water Content (%)	$w = (W_w / W_s) * 100$	27.78	24.93	30.84	26.14		
Number of Blows		24	36	15	30		
Liquid Limit (%) From Graph		27.4					



AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

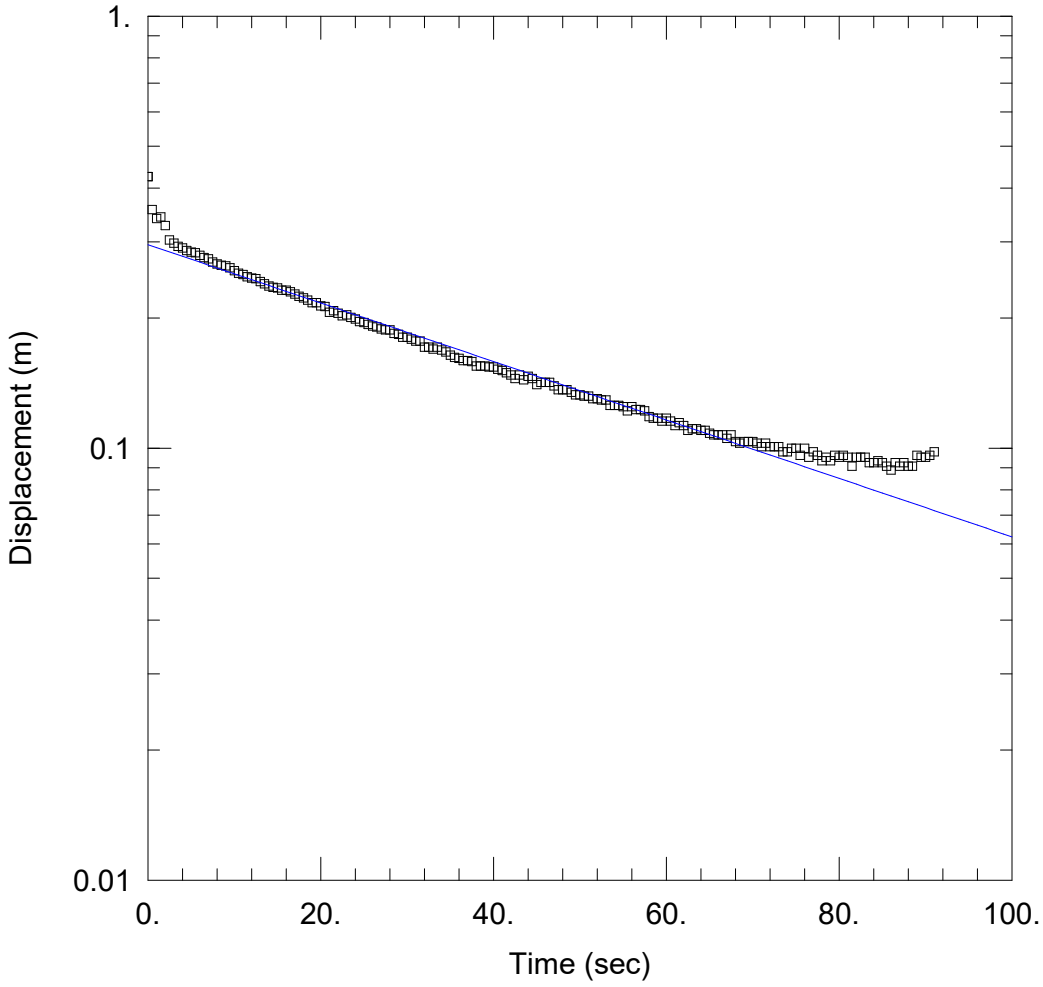
Client	AECOM	Project Number	60646784		Date	November 26, 2021	
Project Name	Allon & Pumping Station				Tested By	0	
Location	Region of Peel, Ontario				Reviewed By	Ramana M	
Borehole Number	BH 9-2	Sample Id	SS8	Depth (feet)	20	Lab Number	202111035S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		90	172	107			
Weight of Empty Container (g) W_1		13.571	13.49	13.67			
Weight of Container + Wet Soil (g) W_2		20.003	22.41	22.37			
Weight of Container + Dry Soil(g) W_3		18.97	20.96	20.95			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.03	1.45	1.42			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	5.40	7.47	7.28			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	19.13	19.47	19.46			
Average Plastic Limit (%) w_P		19.35					

Result Summary	
Liquid Limit (%)	27
Plastic Limit (%)	19
Plasticity Index (%)	8
Sample status	Plastic

Appendix D

Single Well Response Test Analysis Reports



SITE 3 - WEST BRAMPTON RESERVOIR AND PUMPING STATION - BH-3-4 - RISING HEAD TEST

Data Set: C:\...\BH-3-4 RHT #1.aqt
Date: 03/03/22 Time: 16:29:02

PROJECT INFORMATION

Company: AECOM Canada Ltd.
Client: Peel Region
Project: 60646784
Location: Site 3
Test Well: BH-3-4
Test Date: 2022-02-11

AQUIFER DATA

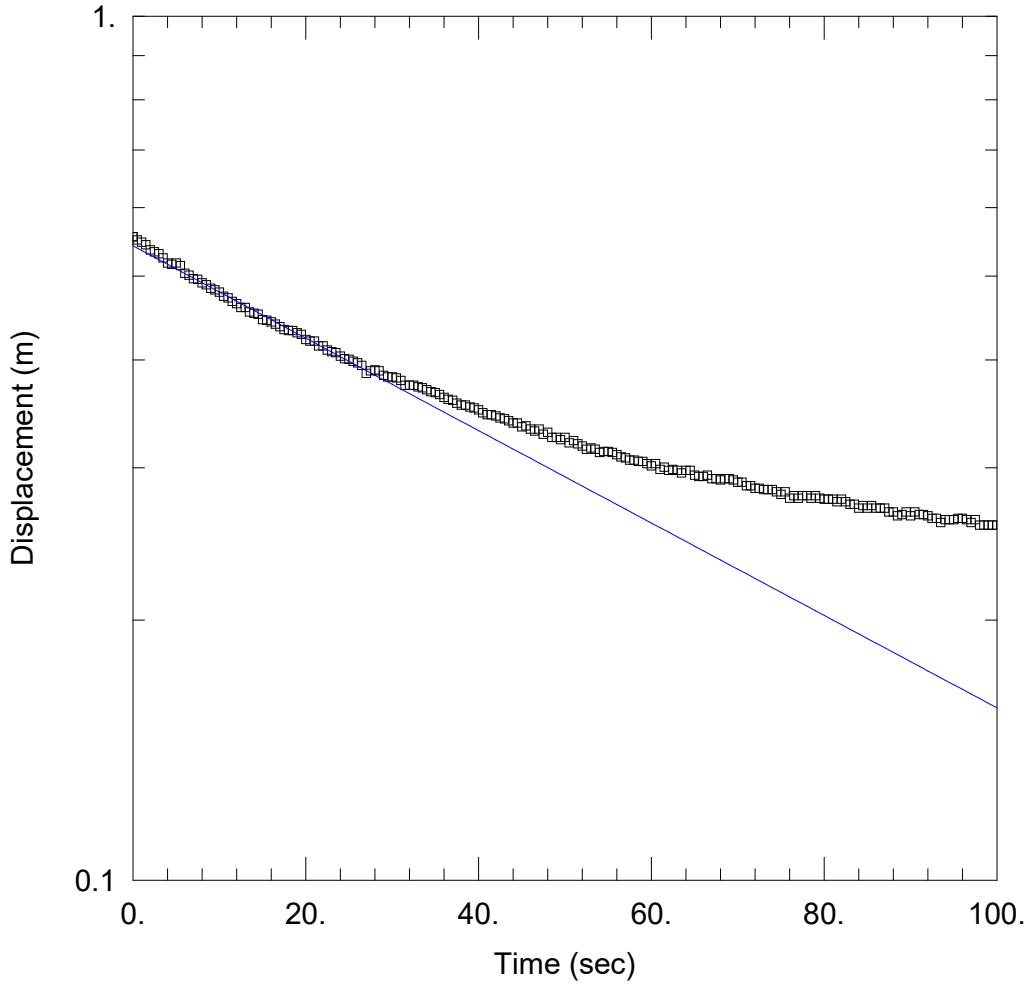
Saturated Thickness: 1.02 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-3-4)

Initial Displacement: 0.4253 m
Total Well Penetration Depth: 1.02 m
Casing Radius: 0.025 m
Static Water Column Height: 1.02 m
Screen Length: 1.02 m
Well Radius: 0.102 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 7.875E-6 m/sec
y0 = 0.2958 m



SITE 3 - WEST BRAMPTON RESERVOIR AND PUMPING STATION - BH-3-4 - RISING HEAD TEST

Data Set: C:\...\BH-3-4 RHT #2.aqt
Date: 03/03/22 Time: 16:33:50

PROJECT INFORMATION

Company: AECOM Canada Ltd.
Client: Peel Region
Project: 60646784
Location: Site 3
Test Well: BH-3-4
Test Date: 2022-02-11

AQUIFER DATA

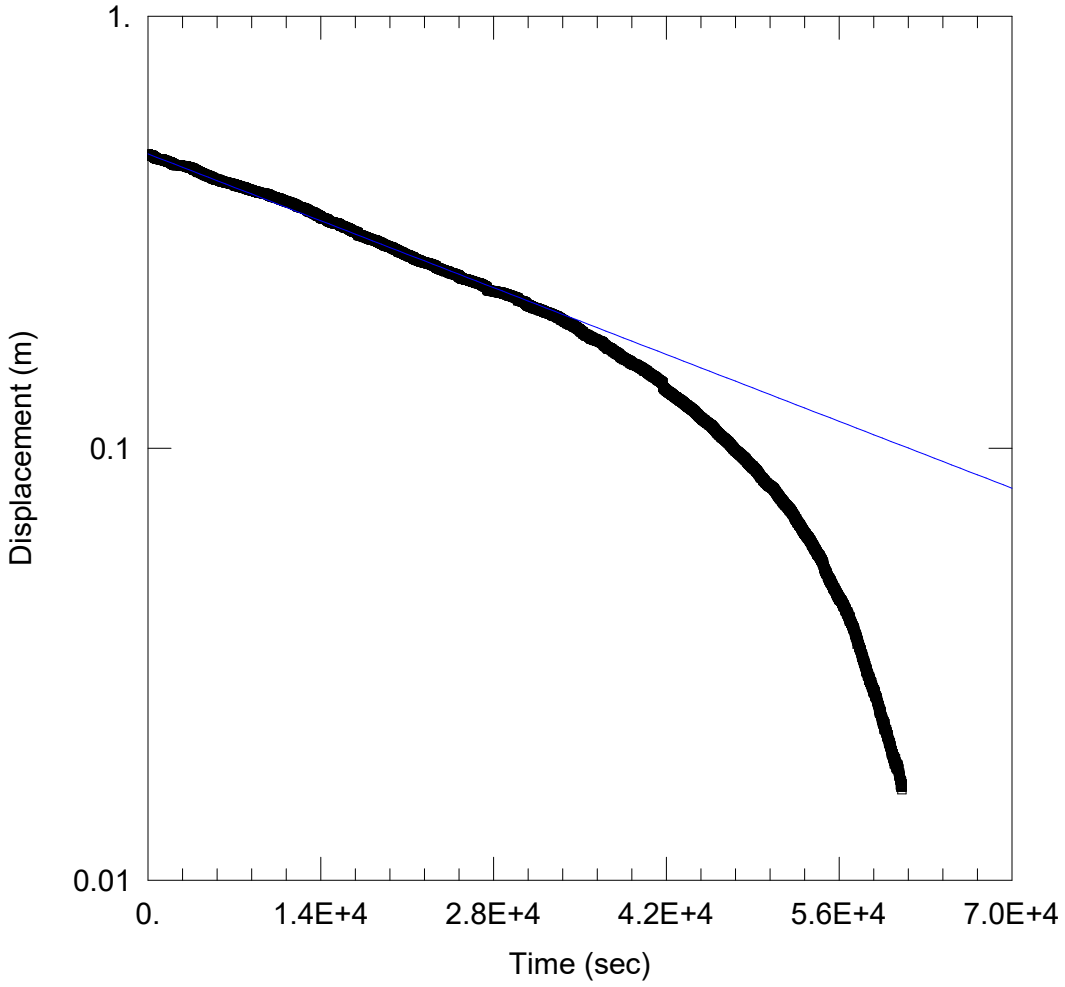
Saturated Thickness: 1.02 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-3-4)

Initial Displacement: 0.5555 m
Total Well Penetration Depth: 1.02 m
Casing Radius: 0.025 m
Static Water Column Height: 1.02 m
Screen Length: 1.02 m
Well Radius: 0.102 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.225E-6 m/sec
y0 = 0.5422 m



SITE 6 - TULLAMORE RESERVOIR AND PUMPING STATION - BH6-1/MW - RISING HEAD TEST

Data Set: C:\...\BH6-1 RHT.aqt
Date: 03/16/22 Time: 13:32:11

PROJECT INFORMATION

Company: AECOM Canada Ltd.
Client: Peel Region
Project: 60646784
Location: Site 6
Test Well: BH6-1/MW
Test Date: 2022-03-07

AQUIFER DATA

Saturated Thickness: 0.58 m Anisotropy Ratio (Kz/Kr): 1.

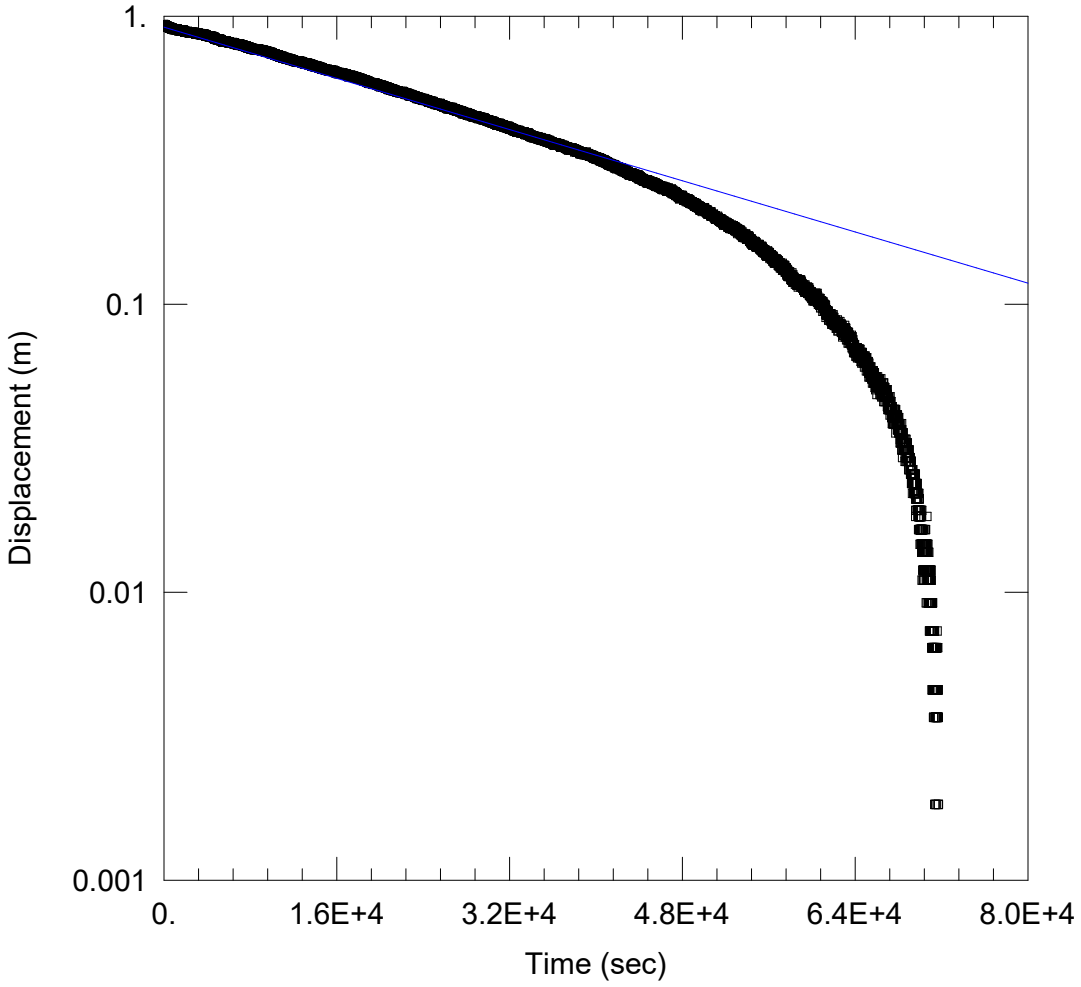
WELL DATA (BH6-1/MW)

Initial Displacement: 0.48 m
Total Well Penetration Depth: 0.58 m
Casing Radius: 0.025 m
Static Water Column Height: 0.58 m
Screen Length: 0.58 m
Well Radius: 0.076 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.991E-8 m/sec y0 = 0.4798 m



SITE 9 - ALLOA RESERVOIR AND PUMPING STATION - BH9-3/MW - RISING HEAD TEST

Data Set: C:\...\BH9-3 RHT.aqt
Date: 03/16/22 Time: 13:26:32

PROJECT INFORMATION

Company: AECOM Canada Ltd.
Client: Peel Region
Project: 60646784
Location: Site 9
Test Well: BH9-3/MW
Test Date: 2022-03-07

AQUIFER DATA

Saturated Thickness: 1.06 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH9-3/MW)

Initial Displacement: 0.935 m
Total Well Penetration Depth: 1.06 m
Casing Radius: 0.025 m
Static Water Column Height: 1.06 m
Screen Length: 1.06 m
Well Radius: 0.064 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.552E-8 m/sec y0 = 0.9145 m

Appendix E

Groundwater Quality Results – Laboratory Certificate of Analysis

Your Project #: 60646784
Site#: SITE 3
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Your C.O.C. #: 865657-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/03/23
Report #: R7054869
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C237378
Received: 2022/02/11, 13:57

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2022/02/14	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2022/02/14	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	1	N/A	2022/02/14	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	1	N/A	2022/02/14	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2022/02/14	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	1	N/A	2022/02/16	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	1	N/A	2022/02/14	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2022/02/16		
Anion and Cation Sum	1	N/A	2022/02/16		
Total Ammonia-N	1	N/A	2022/02/15	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2022/02/15	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2022/02/12	2022/02/14	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	1	N/A	2022/02/14	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2022/02/16		Auto Calc
Sat. pH and Langelier Index (@ 4C)	1	N/A	2022/02/16		Auto Calc
Sulphate by Automated Colourimetry	1	N/A	2022/02/14	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	1	N/A	2022/02/16		Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 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 CCME, MELCC, EPA, APHA. Where applicable, the analytical testing herein was performed in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Bureau Veritas is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are

Your Project #: 60646784
Site#: SITE 3
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Your C.O.C. #: 865657-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/03/23
Report #: R7054869
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

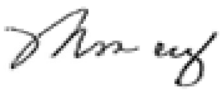
BUREAU VERITAS JOB #: C237378
Received: 2022/02/11, 13:57

reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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 samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of 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. Bureau Veritas is not responsible for the accuracy or any data impacts that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
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.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



Marijane Cruz
Senior Project Manager
23 Mar 2022 12:17:14

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756
==========
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Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID			RVK190		
Sampling Date			2022/02/11 10:30		
COC Number			865657-01-01		
	UNITS	Criteria	BH-3-4	RDL	QC Batch
Calculated Parameters					
Anion Sum	me/L	-	15.4	N/A	7829376
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	340	1.0	7829230
Calculated TDS	mg/L	-	850	1.0	7829379
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	<1.0	1.0	7829230
Cation Sum	me/L	-	15.2	N/A	7829376
Hardness (CaCO3)	mg/L	-	670	1.0	7829352
Ion Balance (% Difference)	%	-	0.770	N/A	7829375
Langelier Index (@ 20C)	N/A	-	0.618		7829377
Langelier Index (@ 4C)	N/A	-	0.372		7829378
Saturation pH (@ 20C)	N/A	-	6.70		7829377
Saturation pH (@ 4C)	N/A	-	6.94		7829378
Inorganics					
Total Ammonia-N	mg/L	-	0.29	0.050	7834790
Conductivity	umho/cm	-	1500	1.0	7831193
Dissolved Organic Carbon	mg/L	-	1.5	0.40	7830114
Orthophosphate (P)	mg/L	-	<0.010	0.010	7831249
pH	pH	**6.5:8.5**	7.31		7830387
Dissolved Sulphate (SO4)	mg/L	-	130	1.0	7831275
Alkalinity (Total as CaCO3)	mg/L	-	340	1.0	7831188
Dissolved Chloride (Cl-)	mg/L	-	210	3.0	7831168
Nitrite (N)	mg/L	-	<0.010	0.010	7831015
Nitrate (N)	mg/L	-	1.19	0.10	7831015
Nitrate + Nitrite (N)	mg/L	-	1.19	0.10	7831015
Metals					
Dissolved Aluminum (Al)	ug/L	-	<4.9	4.9	7831166
Dissolved Antimony (Sb)	ug/L	**20**	<0.50	0.50	7831166
Dissolved Arsenic (As)	ug/L	**100**	<1.0	1.0	7831166
Dissolved Barium (Ba)	ug/L	-	93	2.0	7831166
Dissolved Beryllium (Be)	ug/L	**11**	<0.40	0.40	7831166
Dissolved Bismuth (Bi)	ug/L	-	<1.0	1.0	7831166

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable

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RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID			RVK190		
Sampling Date			2022/02/11 10:30		
COC Number			865657-01-01		
	UNITS	Criteria	BH-3-4	RDL	QC Batch
Dissolved Boron (B)	ug/L	**200**	28	10	7831166
Dissolved Cadmium (Cd)	ug/L	**0.2**	<0.090	0.090	7831166
Dissolved Calcium (Ca)	ug/L	-	200000	200	7831166
Dissolved Cesium (Cs)	ug/L	-	<0.20	0.20	7831166
Dissolved Chromium (Cr)	ug/L	-	<5.0	5.0	7831166
Dissolved Cobalt (Co)	ug/L	**0.9**	<0.50	0.50	7831166
Dissolved Copper (Cu)	ug/L	**5**	2.8	0.90	7831166
Dissolved Iron (Fe)	ug/L	**300**	<100	100	7831166
Dissolved Lead (Pb)	ug/L	**5**	<0.50	0.50	7831166
Dissolved Lithium (Li)	ug/L	-	9.5	5.0	7831166
Dissolved Magnesium (Mg)	ug/L	-	40000	50	7831166
Dissolved Manganese (Mn)	ug/L	-	330	2.0	7831166
Dissolved Molybdenum (Mo)	ug/L	**40**	<0.50	0.50	7831166
Dissolved Nickel (Ni)	ug/L	**25**	2.0	1.0	7831166
Dissolved Phosphorus (P)	ug/L	-	<100	100	7831166
Dissolved Potassium (K)	ug/L	-	2400	200	7831166
Dissolved Rubidium (Rb)	ug/L	-	1.8	0.20	7831166
Dissolved Selenium (Se)	ug/L	**100**	<2.0	2.0	7831166
Dissolved Silicon (Si)	ug/L	-	6500	50	7831166
Dissolved Silver (Ag)	ug/L	**0.1**	<0.090	0.090	7831166
Dissolved Sodium (Na)	ug/L	-	42000	100	7831166
Dissolved Strontium (Sr)	ug/L	-	540	1.0	7831166
Dissolved Tellurium (Te)	ug/L	-	<1.0	1.0	7831166
Dissolved Thallium (Tl)	ug/L	**0.3**	<0.050	0.050	7831166
Dissolved Thorium (Th)	ug/L	-	<2.0	2.0	7831166
Dissolved Tin (Sn)	ug/L	-	<1.0	1.0	7831166
Dissolved Titanium (Ti)	ug/L	-	<5.0	5.0	7831166
Dissolved Tungsten (W)	ug/L	**30**	<1.0	1.0	7831166
Dissolved Uranium (U)	ug/L	**5**	2.5	0.10	7831166
Dissolved Vanadium (V)	ug/L	**6**	<0.50	0.50	7831166
Dissolved Zinc (Zn)	ug/L	**30**	<5.0	5.0	7831166
Dissolved Zirconium (Zr)	ug/L	**4**	<1.0	1.0	7831166

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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Bureau Veritas Job #: C237378
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Sampler Initials: DP

TEST SUMMARY

Bureau Veritas ID: RVK190
Sample ID: BH-3-4
Matrix: Water

Collected: 2022/02/11
Shipped:
Received: 2022/02/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7831188	N/A	2022/02/14	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7829230	N/A	2022/02/14	Automated Statchk
Chloride by Automated Colourimetry	KONE	7831168	N/A	2022/02/14	Alina Dobreanu
Conductivity	AT	7831193	N/A	2022/02/14	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7830114	N/A	2022/02/14	Anna-Kay Gooden
Hardness (calculated as CaCO3)		7829352	N/A	2022/02/16	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7831166	N/A	2022/02/14	Nan Raykha
Ion Balance (% Difference)	CALC	7829375	N/A	2022/02/16	Automated Statchk
Anion and Cation Sum	CALC	7829376	N/A	2022/02/16	Automated Statchk
Total Ammonia-N	LACH/NH4	7834790	N/A	2022/02/15	Amanpreet Sappal
Nitrate & Nitrite as Nitrogen in Water	LACH	7831015	N/A	2022/02/15	Chandra Nandlal
pH	AT	7830387	2022/02/12	2022/02/14	Taslima Aktar
Orthophosphate	KONE	7831249	N/A	2022/02/14	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7829377	N/A	2022/02/16	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7829378	N/A	2022/02/16	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7831275	N/A	2022/02/14	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	7829379	N/A	2022/02/16	Automated Statchk

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GENERAL COMMENTS

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

Package 1	4.7°C

Revised Report (2022/03/23) : Results have been split onto separate reports per client request.

Revised Report (2022/02/28) : Reg 153 criteria and PWQO guidelines aadded per client request.

Results relate only to the items tested.

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Bureau Veritas Job #: C237378
Report Date: 2022/03/23

QUALITY ASSURANCE REPORT

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Sampler Initials: DP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7830114	Dissolved Organic Carbon	2022/02/14	98	80 - 120	96	80 - 120	<0.40	mg/L	NC (1)	20
7830387	pH	2022/02/14			102	98 - 103			0.54 (1)	N/A
7831015	Nitrate (N)	2022/02/15	108	80 - 120	103	80 - 120	<0.10	mg/L	1.7 (1)	20
7831015	Nitrite (N)	2022/02/15	107	80 - 120	106	80 - 120	<0.010	mg/L	NC (1)	20
7831166	Dissolved Aluminum (Al)	2022/02/14	98	80 - 120	97	80 - 120	<4.9	ug/L	NC (1)	20
7831166	Dissolved Antimony (Sb)	2022/02/14	103	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20
7831166	Dissolved Arsenic (As)	2022/02/14	96	80 - 120	98	80 - 120	<1.0	ug/L	NC (1)	20
7831166	Dissolved Barium (Ba)	2022/02/14	99	80 - 120	100	80 - 120	<2.0	ug/L	NC (1)	20
7831166	Dissolved Beryllium (Be)	2022/02/14	95	80 - 120	97	80 - 120	<0.40	ug/L	NC (1)	20
7831166	Dissolved Bismuth (Bi)	2022/02/14	89	80 - 120	97	80 - 120	<1.0	ug/L		
7831166	Dissolved Boron (B)	2022/02/14	90	80 - 120	94	80 - 120	<10	ug/L	3.1 (1)	20
7831166	Dissolved Cadmium (Cd)	2022/02/14	98	80 - 120	99	80 - 120	<0.090	ug/L	NC (1)	20
7831166	Dissolved Calcium (Ca)	2022/02/14	100	80 - 120	98	80 - 120	<200	ug/L	3.2 (1)	20
7831166	Dissolved Cesium (Cs)	2022/02/14	101	80 - 120	101	80 - 120	<0.20	ug/L		
7831166	Dissolved Chromium (Cr)	2022/02/14	94	80 - 120	95	80 - 120	<5.0	ug/L	NC (1)	20
7831166	Dissolved Cobalt (Co)	2022/02/14	96	80 - 120	98	80 - 120	<0.50	ug/L	NC (1)	20
7831166	Dissolved Copper (Cu)	2022/02/14	98	80 - 120	98	80 - 120	<0.90	ug/L	0.30 (1)	20
7831166	Dissolved Iron (Fe)	2022/02/14	95	80 - 120	97	80 - 120	<100	ug/L	NC (1)	20
7831166	Dissolved Lead (Pb)	2022/02/14	91	80 - 120	97	80 - 120	<0.50	ug/L	NC (1)	20
7831166	Dissolved Lithium (Li)	2022/02/14	97	80 - 120	102	80 - 120	<5.0	ug/L		
7831166	Dissolved Magnesium (Mg)	2022/02/14	96	80 - 120	98	80 - 120	<50	ug/L	6.3 (1)	20
7831166	Dissolved Manganese (Mn)	2022/02/14	96	80 - 120	98	80 - 120	<2.0	ug/L	NC (1)	20
7831166	Dissolved Molybdenum (Mo)	2022/02/14	102	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20
7831166	Dissolved Nickel (Ni)	2022/02/14	91	80 - 120	94	80 - 120	<1.0	ug/L	NC (1)	20
7831166	Dissolved Phosphorus (P)	2022/02/14	111	80 - 120	117	80 - 120	<100	ug/L	NC (1)	20
7831166	Dissolved Potassium (K)	2022/02/14	99	80 - 120	95	80 - 120	<200	ug/L	NC (1)	20
7831166	Dissolved Rubidium (Rb)	2022/02/14	95	80 - 120	97	80 - 120	<0.20	ug/L		
7831166	Dissolved Selenium (Se)	2022/02/14	97	80 - 120	99	80 - 120	<2.0	ug/L	NC (1)	20
7831166	Dissolved Silicon (Si)	2022/02/14	98	80 - 120	98	80 - 120	<50	ug/L	2.3 (1)	20
7831166	Dissolved Silver (Ag)	2022/02/14	93	80 - 120	101	80 - 120	<0.090	ug/L	NC (1)	20

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7831166	Dissolved Sodium (Na)	2022/02/14	NC	80 - 120	95	80 - 120	<100	ug/L	1.1 (1)	20
7831166	Dissolved Strontium (Sr)	2022/02/14	96	80 - 120	98	80 - 120	<1.0	ug/L	2.7 (1)	20
7831166	Dissolved Tellurium (Te)	2022/02/14	99	80 - 120	103	80 - 120	<1.0	ug/L		
7831166	Dissolved Thallium (Tl)	2022/02/14	90	80 - 120	99	80 - 120	<0.050	ug/L	NC (1)	20
7831166	Dissolved Thorium (Th)	2022/02/14	96	80 - 120	101	80 - 120	<2.0	ug/L		
7831166	Dissolved Tin (Sn)	2022/02/14	100	80 - 120	101	80 - 120	<1.0	ug/L		
7831166	Dissolved Titanium (Ti)	2022/02/14	97	80 - 120	95	80 - 120	<5.0	ug/L	NC (1)	20
7831166	Dissolved Tungsten (W)	2022/02/14	95	80 - 120	100	80 - 120	<1.0	ug/L		
7831166	Dissolved Uranium (U)	2022/02/14	91	80 - 120	96	80 - 120	<0.10	ug/L	2.5 (1)	20
7831166	Dissolved Vanadium (V)	2022/02/14	97	80 - 120	97	80 - 120	<0.50	ug/L	NC (1)	20
7831166	Dissolved Zinc (Zn)	2022/02/14	95	80 - 120	97	80 - 120	<5.0	ug/L	0.037 (1)	20
7831166	Dissolved Zirconium (Zr)	2022/02/14	104	80 - 120	101	80 - 120	<1.0	ug/L		
7831168	Dissolved Chloride (Cl-)	2022/02/14	NC	80 - 120	104	80 - 120	<1.0	mg/L	1.5 (1)	20
7831188	Alkalinity (Total as CaCO3)	2022/02/14			96	85 - 115	<1.0	mg/L	0.68 (1)	20
7831193	Conductivity	2022/02/14			100	85 - 115	<1.0	umho/cm	0.50 (1)	25
7831249	Orthophosphate (P)	2022/02/14	118	75 - 125	99	80 - 120	<0.010	mg/L	NC (1)	25
7831275	Dissolved Sulphate (SO4)	2022/02/14	89	75 - 125	104	80 - 120	<1.0	mg/L	0.89 (1)	20
7834790	Total Ammonia-N	2022/02/15	NC	75 - 125	101	80 - 120	<0.050	mg/L	0.092 (1)	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.

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) Duplicate Parent ID

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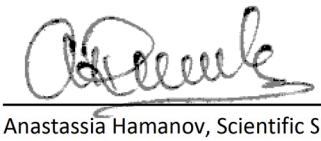
Bureau Veritas Job #: C237378
Report Date: 2022/03/23

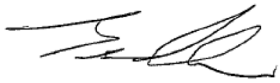
AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Sampler Initials: DP

VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist



Brad Newman, B.Sc., C.Chem., Scientific Service Specialist

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BOD

Bureau Veritas
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvna.com

Page of

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#23482 AECOM Canada Ltd	Company Name:	AECOM Canada Ltd.	Quotation #:	C20375	Bureau Veritas Job #:	Bottle Order #: 865657
Attention:	Accounts Payable	Attention:	Brian Holden	P.O. #:			
Address:	50 Sportsworld Crossing Rd Suite 290	Address:	50 Sportsworld Crossing Rd Suite 290	Project:	60646784		Project Manager:
	Kitchener ON N2P 0A4		Kitchener ON N2P 0A4	Project Name:	Peel Region – West Brampton Reservoir & Pumping Station	COC #: C#865657-01-01	Marijane Cruz
Tel:	(519) 650-5313 Fax: (519) 650-3422 4	Tel:	(519) 340-1617 Fax:	Site #:	Site 3		
Email:	CANSSC.E-billing@aecom.com	Email:	brian.holden@aecom.com ; dhwanish.parikh@aecom.com	Sampled By:	Dhwanish Parikh		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ **For RSC**
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558. ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ____
- ☐ PWQO ☐ Reg 406 Table ____
- ☐ Other ____

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ____

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☐
(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 #)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 VOCs by HS & F1-F4	O.Reg 153 PAHs	O.Reg 153 PCBs (Water)	O.Reg 153 Metals & Inorganics Pkg (Wtr)	Biochemical Oxygen Demand (BOD)	Total Suspended Solids	Dissolved Aluminum (0.2 u, clay free)	RCAp - Comprehensive			# of Bottles	Comments
1		BH-3-4	Feb 11, 2022	10:30	GW	+	X	X	X	X	X	X	X	X			18	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

11-Feb-22 13:57
Marijane Cruz
C237378
RJM ENV-1787

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Dhwanish Parikh [signature]	22/02/11	2:00	[signature]	2022/02/11	1357	

Laboratory Use Only				
Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	5/7/6/3	Present		✓
		Intact		

* 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/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.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Bureau Veritas Job #: C237378
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Sampler Initials: DP

Exceedance Summary Table – Prov. Water Quality Obj.

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Your Project #: 60646784
Site#: SITE 6 & SITE 9
Site Location: REGION OF PEEL SNOW STORAGE
Your C.O.C. #: 868053-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/03/23
Report #: R7055671
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C260765
Received: 2022/03/08, 12:43

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	2	N/A	2022/03/10	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	2	N/A	2022/03/11	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	2	N/A	2022/03/14	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	2	N/A	2022/03/11	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2022/03/10	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	2	N/A	2022/03/11	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	2	N/A	2022/03/10	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	2	N/A	2022/03/15		
Anion and Cation Sum	2	N/A	2022/03/11		
Total Ammonia-N	2	N/A	2022/03/10	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	2	N/A	2022/03/15	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2022/03/09	2022/03/10	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	2	N/A	2022/03/10	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	2	N/A	2022/03/15		Auto Calc
Sat. pH and Langelier Index (@ 4C)	2	N/A	2022/03/15		Auto Calc
Sulphate by Automated Colourimetry	2	N/A	2022/03/15	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	2	N/A	2022/03/15		Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 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 CCME, MELCC, EPA, APHA. Where applicable, the analytical testing herein was performed in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Bureau Veritas is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are

Your Project #: 60646784
Site#: SITE 6 & SITE 9
Site Location: REGION OF PEEL SNOW STORAGE
Your C.O.C. #: 868053-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/03/23
Report #: R7055671
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C260765
Received: 2022/03/08, 12:43

reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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 samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of 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. Bureau Veritas is not responsible for the accuracy or any data impacts that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
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.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Marijane Cruz
Senior Project Manager
23 Mar 2022 17:56:47

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756
==========
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 Signature Page.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C260765
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: REGION OF PEEL SNOW STORAGE
Sampler Initials: DP

RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID			SAN903			SAN903			SAN904		
Sampling Date			2022/03/07 10:00			2022/03/07 10:00			2022/03/08 10:30		
COC Number			868053-01-01			868053-01-01			868053-01-01		
	UNITS	Criteria	BH6-1/MW	RDL	QC Batch	BH6-1/MW Lab-Dup	RDL	QC Batch	BH9-3/MW	RDL	QC Batch
Calculated Parameters											
Anion Sum	me/L	-	15.4	N/A	7872697				15.9	N/A	7872697
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	340	1.0	7872700				620	1.0	7872700
Calculated TDS	mg/L	-	880	1.0	7872703				860	1.0	7872703
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	2.8	1.0	7872700				4.4	1.0	7872700
Cation Sum	me/L	-	16.6	N/A	7872697				17.7	N/A	7872697
Hardness (CaCO3)	mg/L	-	690	1.0	7872394				830	1.0	7872394
Ion Balance (% Difference)	%	-	3.73	N/A	7872695				5.13	N/A	7872695
Langelier Index (@ 20C)	N/A	-	1.17		7872701				1.51		7872701
Langelier Index (@ 4C)	N/A	-	0.927		7872702				1.26		7872702
Saturation pH (@ 20C)	N/A	-	6.78		7872701				6.37		7872701
Saturation pH (@ 4C)	N/A	-	7.03		7872702				6.62		7872702
Inorganics											
Total Ammonia-N	mg/L	-	<0.050	0.050	7875196				0.073	0.050	7875196
Conductivity	umho/cm	-	1400	1.0	7874066	1400	1.0	7874066	1300	1.0	7874066
Dissolved Organic Carbon	mg/L	-	2.5	0.40	7873137				5.3	0.40	7873137
Orthophosphate (P)	mg/L	-	<0.010	0.010	7873903				<0.010	0.010	7873903
pH	pH	**6.5:8.5**	7.95		7874088	7.99		7874088	7.88		7874088
Dissolved Sulphate (SO4)	mg/L	-	210	1.0	7873895				100	1.0	7873895
Alkalinity (Total as CaCO3)	mg/L	-	340	1.0	7874087	340	1.0	7874087	620	1.0	7874087
Dissolved Chloride (Cl-)	mg/L	-	150	2.0	7873885				48	1.0	7873885
Nitrite (N)	mg/L	-	<0.010	0.010	7873950				<0.010	0.010	7873950
Nitrate (N)	mg/L	-	0.52	0.10	7873950				0.16	0.10	7873950
Nitrate + Nitrite (N)	mg/L	-	0.52	0.10	7873950				0.16	0.10	7873950
Metals											
Dissolved Aluminum (Al)	ug/L	-	<4.9	4.9	7874515				6.0	4.9	7874515
Dissolved Antimony (Sb)	ug/L	**20**	<0.50	0.50	7874515				<0.50	0.50	7874515
Dissolved Arsenic (As)	ug/L	**100**	<1.0	1.0	7874515				<1.0	1.0	7874515
Dissolved Barium (Ba)	ug/L	-	110	2.0	7874515				120	2.0	7874515
Dissolved Beryllium (Be)	ug/L	**11**	<0.40	0.40	7874515				<0.40	0.40	7874515
Dissolved Bismuth (Bi)	ug/L	-	<1.0	1.0	7874515				<1.0	1.0	7874515

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C260765
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: REGION OF PEEL SNOW STORAGE
Sampler Initials: DP

RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID			SAN903			SAN903			SAN904		
Sampling Date			2022/03/07 10:00			2022/03/07 10:00			2022/03/08 10:30		
COC Number			868053-01-01			868053-01-01			868053-01-01		
	UNITS	Criteria	BH6-1/MW	RDL	QC Batch	BH6-1/MW Lab-Dup	RDL	QC Batch	BH9-3/MW	RDL	QC Batch
Dissolved Boron (B)	ug/L	**200**	57	10	7874515				52	10	7874515
Dissolved Cadmium (Cd)	ug/L	**0.2**	<0.090	0.090	7874515				<0.090	0.090	7874515
Dissolved Calcium (Ca)	ug/L	-	170000	200	7874515				230000	200	7874515
Dissolved Cesium (Cs)	ug/L	-	<0.20	0.20	7874515				<0.20	0.20	7874515
Dissolved Chromium (Cr)	ug/L	-	<5.0	5.0	7874515				<5.0	5.0	7874515
Dissolved Cobalt (Co)	ug/L	**0.9**	<0.50	0.50	7874515				0.57	0.50	7874515
Dissolved Copper (Cu)	ug/L	**5**	1.2	0.90	7874515				2.4	0.90	7874515
Dissolved Iron (Fe)	ug/L	**300**	<100	100	7874515				<100	100	7874515
Dissolved Lead (Pb)	ug/L	**5**	<0.50	0.50	7874515				<0.50	0.50	7874515
Dissolved Lithium (Li)	ug/L	-	25	5.0	7874515				15	5.0	7874515
Dissolved Magnesium (Mg)	ug/L	-	66000	50	7874515				61000	50	7874515
Dissolved Manganese (Mn)	ug/L	-	40	2.0	7874515				1000	2.0	7874515
Dissolved Molybdenum (Mo)	ug/L	**40**	2.8	0.50	7874515				3.6	0.50	7874515
Dissolved Nickel (Ni)	ug/L	**25**	1.2	1.0	7874515				6.5	1.0	7874515
Dissolved Phosphorus (P)	ug/L	-	<100	100	7874515				<100	100	7874515
Dissolved Potassium (K)	ug/L	-	4700	200	7874515				7600	200	7874515
Dissolved Rubidium (Rb)	ug/L	-	1.2	0.20	7874515				1.5	0.20	7874515
Dissolved Selenium (Se)	ug/L	**100**	<2.0	2.0	7874515				<2.0	2.0	7874515
Dissolved Silicon (Si)	ug/L	-	6600	50	7874515				8400	50	7874515
Dissolved Silver (Ag)	ug/L	**0.1**	<0.090	0.090	7874515				<0.090	0.090	7874515
Dissolved Sodium (Na)	ug/L	-	61000	100	7874515				21000	100	7874515
Dissolved Strontium (Sr)	ug/L	-	1400	1.0	7874515				630	1.0	7874515
Dissolved Tellurium (Te)	ug/L	-	<1.0	1.0	7874515				<1.0	1.0	7874515
Dissolved Thallium (Tl)	ug/L	**0.3**	<0.050	0.050	7874515				<0.050	0.050	7874515
Dissolved Thorium (Th)	ug/L	-	<2.0	2.0	7874515				<2.0	2.0	7874515
Dissolved Tin (Sn)	ug/L	-	1.1	1.0	7874515				<1.0	1.0	7874515
Dissolved Titanium (Ti)	ug/L	-	<5.0	5.0	7874515				<5.0	5.0	7874515
Dissolved Tungsten (W)	ug/L	**30**	<1.0	1.0	7874515				<1.0	1.0	7874515
Dissolved Uranium (U)	ug/L	**5**	**5.6**	0.10	7874515				**5.4**	0.10	7874515
Dissolved Vanadium (V)	ug/L	**6**	<0.50	0.50	7874515				0.77	0.50	7874515
Dissolved Zinc (Zn)	ug/L	**30**	<5.0	5.0	7874515				<5.0	5.0	7874515
Dissolved Zirconium (Zr)	ug/L	**4**	<1.0	1.0	7874515				<1.0	1.0	7874515

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C260765
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: REGION OF PEEL SNOW STORAGE
Sampler Initials: DP

TEST SUMMARY

Bureau Veritas ID: SAN903
Sample ID: BH6-1/MW
Matrix: Water

Collected: 2022/03/07
Shipped:
Received: 2022/03/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7874087	N/A	2022/03/10	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7872700	N/A	2022/03/11	Automated Statchk
Chloride by Automated Colourimetry	KONE	7873885	N/A	2022/03/14	Avneet Kour Sudan
Conductivity	AT	7874066	N/A	2022/03/11	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7873137	N/A	2022/03/10	Anna-Kay Gooden
Hardness (calculated as CaCO3)		7872394	N/A	2022/03/11	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7874515	N/A	2022/03/10	Nan Raykha
Ion Balance (% Difference)	CALC	7872695	N/A	2022/03/15	Automated Statchk
Anion and Cation Sum	CALC	7872697	N/A	2022/03/11	Automated Statchk
Total Ammonia-N	LACH/NH4	7875196	N/A	2022/03/10	Raiq Kashif
Nitrate & Nitrite as Nitrogen in Water	LACH	7873950	N/A	2022/03/15	Amanpreet Sappal
pH	AT	7874088	2022/03/09	2022/03/10	Surinder Rai
Orthophosphate	KONE	7873903	N/A	2022/03/10	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7872701	N/A	2022/03/15	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7872702	N/A	2022/03/15	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7873895	N/A	2022/03/15	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7872703	N/A	2022/03/15	Automated Statchk

Bureau Veritas ID: SAN903 Dup
Sample ID: BH6-1/MW
Matrix: Water

Collected: 2022/03/07
Shipped:
Received: 2022/03/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7874087	N/A	2022/03/10	Surinder Rai
Conductivity	AT	7874066	N/A	2022/03/11	Surinder Rai
pH	AT	7874088	2022/03/09	2022/03/10	Surinder Rai

Bureau Veritas ID: SAN904
Sample ID: BH9-3/MW
Matrix: Water

Collected: 2022/03/08
Shipped:
Received: 2022/03/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7874087	N/A	2022/03/10	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7872700	N/A	2022/03/11	Automated Statchk
Chloride by Automated Colourimetry	KONE	7873885	N/A	2022/03/14	Avneet Kour Sudan
Conductivity	AT	7874066	N/A	2022/03/11	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7873137	N/A	2022/03/10	Anna-Kay Gooden
Hardness (calculated as CaCO3)		7872394	N/A	2022/03/11	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7874515	N/A	2022/03/10	Nan Raykha
Ion Balance (% Difference)	CALC	7872695	N/A	2022/03/15	Automated Statchk
Anion and Cation Sum	CALC	7872697	N/A	2022/03/11	Automated Statchk
Total Ammonia-N	LACH/NH4	7875196	N/A	2022/03/10	Raiq Kashif
Nitrate & Nitrite as Nitrogen in Water	LACH	7873950	N/A	2022/03/15	Amanpreet Sappal
pH	AT	7874088	2022/03/09	2022/03/10	Surinder Rai

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C260765
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: REGION OF PEEL SNOW STORAGE
Sampler Initials: DP

TEST SUMMARY

Bureau Veritas ID: SAN904
Sample ID: BH9-3/MW
Matrix: Water

Collected: 2022/03/08
Shipped:
Received: 2022/03/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Orthophosphate	KONF	7873903	N/A	2022/03/10	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7872701	N/A	2022/03/15	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7872702	N/A	2022/03/15	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7873895	N/A	2022/03/15	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7872703	N/A	2022/03/15	Automated Statchk

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GENERAL COMMENTS

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

Package 1	4.7°C

Revised Report (2022/03/23) : Results have been split onto separate reports per client request.

Results relate only to the items tested.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C260765
Report Date: 2022/03/23

QUALITY ASSURANCE REPORT

AECOM Canada Ltd
Client Project #: 60646784
Site Location: REGION OF PEEL SNOW STORAGE
Sampler Initials: DP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7873137	Dissolved Organic Carbon	2022/03/10	89	80 - 120	93	80 - 120	<0.40	mg/L	0.44 (1)	20
7873885	Dissolved Chloride (Cl-)	2022/03/14	106	80 - 120	106	80 - 120	<1.0	mg/L	0.43 (1)	20
7873895	Dissolved Sulphate (SO4)	2022/03/15	118	75 - 125	104	80 - 120	<1.0	mg/L	0.60 (1)	20
7873903	Orthophosphate (P)	2022/03/10	106	75 - 125	99	80 - 120	<0.010	mg/L	NC (1)	25
7873950	Nitrate (N)	2022/03/15	NC	80 - 120	96	80 - 120	<0.10	mg/L	2.1 (1)	20
7873950	Nitrite (N)	2022/03/15	102	80 - 120	103	80 - 120	<0.010	mg/L	9.0 (1)	20
7874066	Conductivity	2022/03/11			103	85 - 115	<1.0	umho/cm	0.21 (2)	25
7874087	Alkalinity (Total as CaCO3)	2022/03/10			98	85 - 115	<1.0	mg/L	1.9 (2)	20
7874088	pH	2022/03/10			102	98 - 103			0.51 (2)	N/A
7874515	Dissolved Aluminum (Al)	2022/03/10	122 (3)	80 - 120	102	80 - 120	<4.9	ug/L		
7874515	Dissolved Antimony (Sb)	2022/03/10	100	80 - 120	102	80 - 120	<0.50	ug/L	4.6 (1)	20
7874515	Dissolved Arsenic (As)	2022/03/10	99	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
7874515	Dissolved Barium (Ba)	2022/03/10	106	80 - 120	105	80 - 120	<2.0	ug/L	4.0 (1)	20
7874515	Dissolved Beryllium (Be)	2022/03/10	94	80 - 120	105	80 - 120	<0.40	ug/L	NC (1)	20
7874515	Dissolved Bismuth (Bi)	2022/03/10	86	80 - 120	99	80 - 120	<1.0	ug/L		
7874515	Dissolved Boron (B)	2022/03/10	NC	80 - 120	100	80 - 120	<10	ug/L	3.2 (1)	20
7874515	Dissolved Cadmium (Cd)	2022/03/10	95	80 - 120	99	80 - 120	<0.090	ug/L	NC (1)	20
7874515	Dissolved Calcium (Ca)	2022/03/10	NC	80 - 120	103	80 - 120	<200	ug/L		
7874515	Dissolved Cesium (Cs)	2022/03/10	107	80 - 120	104	80 - 120	<0.20	ug/L		
7874515	Dissolved Chromium (Cr)	2022/03/10	103	80 - 120	96	80 - 120	<5.0	ug/L	NC (1)	20
7874515	Dissolved Cobalt (Co)	2022/03/10	98	80 - 120	98	80 - 120	<0.50	ug/L	4.5 (1)	20
7874515	Dissolved Copper (Cu)	2022/03/10	109	80 - 120	101	80 - 120	<0.90	ug/L	11 (1)	20
7874515	Dissolved Iron (Fe)	2022/03/10	100	80 - 120	98	80 - 120	<100	ug/L		
7874515	Dissolved Lead (Pb)	2022/03/10	92	80 - 120	99	80 - 120	<0.50	ug/L	NC (1)	20
7874515	Dissolved Lithium (Li)	2022/03/10	96	80 - 120	107	80 - 120	<5.0	ug/L		
7874515	Dissolved Magnesium (Mg)	2022/03/10	NC	80 - 120	97	80 - 120	<50	ug/L		
7874515	Dissolved Manganese (Mn)	2022/03/10	NC	80 - 120	99	80 - 120	<2.0	ug/L		
7874515	Dissolved Molybdenum (Mo)	2022/03/10	116	80 - 120	104	80 - 120	<0.50	ug/L	4.3 (1)	20
7874515	Dissolved Nickel (Ni)	2022/03/10	94	80 - 120	95	80 - 120	<1.0	ug/L	6.4 (1)	20
7874515	Dissolved Phosphorus (P)	2022/03/10	121 (3)	80 - 120	111	80 - 120	<100	ug/L		
7874515	Dissolved Potassium (K)	2022/03/10	116	80 - 120	104	80 - 120	<200	ug/L		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7874515	Dissolved Rubidium (Rb)	2022/03/10	95	80 - 120	99	80 - 120	<0.20	ug/L		
7874515	Dissolved Selenium (Se)	2022/03/10	101	80 - 120	98	80 - 120	<2.0	ug/L	NC (1)	20
7874515	Dissolved Silicon (Si)	2022/03/10	NC	80 - 120	99	80 - 120	<50	ug/L		
7874515	Dissolved Silver (Ag)	2022/03/10	80	80 - 120	101	80 - 120	<0.090	ug/L	NC (1)	20
7874515	Dissolved Sodium (Na)	2022/03/10	NC	80 - 120	97	80 - 120	<100	ug/L		
7874515	Dissolved Strontium (Sr)	2022/03/10	NC	80 - 120	98	80 - 120	<1.0	ug/L		
7874515	Dissolved Tellurium (Te)	2022/03/10	90	80 - 120	101	80 - 120	<1.0	ug/L		
7874515	Dissolved Thallium (Tl)	2022/03/10	92	80 - 120	101	80 - 120	<0.050	ug/L	8.4 (1)	20
7874515	Dissolved Thorium (Th)	2022/03/10	84	80 - 120	95	80 - 120	<2.0	ug/L		
7874515	Dissolved Tin (Sn)	2022/03/10	100	80 - 120	102	80 - 120	<1.0	ug/L		
7874515	Dissolved Titanium (Ti)	2022/03/10	105	80 - 120	99	80 - 120	<5.0	ug/L		
7874515	Dissolved Tungsten (W)	2022/03/10	104	80 - 120	103	80 - 120	<1.0	ug/L		
7874515	Dissolved Uranium (U)	2022/03/10	82	80 - 120	97	80 - 120	<0.10	ug/L	8.3 (1)	20
7874515	Dissolved Vanadium (V)	2022/03/10	108	80 - 120	99	80 - 120	<0.50	ug/L	14 (1)	20
7874515	Dissolved Zinc (Zn)	2022/03/10	91	80 - 120	97	80 - 120	<5.0	ug/L	3.7 (1)	20
7874515	Dissolved Zirconium (Zr)	2022/03/10	116	80 - 120	104	80 - 120	<1.0	ug/L		
7875196	Total Ammonia-N	2022/03/10	101	75 - 125	101	80 - 120	<0.050	mg/L	NC (1)	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.

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) Duplicate Parent ID

(2) Duplicate Parent ID [SAN903-02]

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

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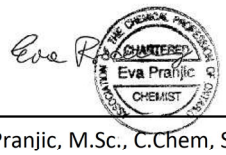
Bureau Veritas Job #: C260765
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: REGION OF PEEL SNOW STORAGE
Sampler Initials: DP

VALIDATION SIGNATURE PAGE

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



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

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 Signature Page.

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CHAI

Page of

08-Mar-22 12:43
Marijane Cruz
C260765
KTN ENV-1712
C#868053-01-01

Order #: I053
Manager: Marijane Cruz

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#23482 AECOM Canada Ltd	Company Name:	AECOM Canada Ltd	Quotation #:	C20375
Attention:	Accounts Payable	Attention:	Brian Holden / Dhwanish Parikh	P.O. #:	
Address:	50 Sportsworld Crossing Rd Suite 290	Address:	105 Commerce Valley Drive, 7th floor	Project:	60646784
	Kitchener ON N2P 0A4		Markham, ON	Project Name:	Region of Peel Snow Storage
Tel:	(519) 650-5313 Fax: (519) 650-3422 4	Tel:	(519) 340-1617 Fax:	Site #:	Site 6 & Site 9
Email:	CANSSC.E-billing@aecom.com	Email:	brian.holden@aecom.com; dhwanish.parikh@aecom.com	Sampled By:	Dhwanish Parikh

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558. ☐ Storm Sewer Bylaw ☐ MISA Municipality ______ ☐ PWQO ☐ Reg 406 Table ______ ☐ Other ______

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ______

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(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	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 VOCs by HS & F1-F4	O.Reg 153 PAHs	O.Reg 153 PCBs (Water)	O.Reg 153 Metals & Inorganics Pkg (Wtr)	Biochemical Oxygen Demand (BOD)	Total Suspended Solids	Dissolved Aluminum (0.2 u, clay free)	RCAp - Comprehensive			# of Bottles	Comments
1		BH6-1/MW	March 7, 2022	10:00	GW	Y	✓	✓	✓	✓	✓	✓	✓	✓			18	Limited Groundwater & filled out both set to minimal requirements as suggested by Marijane Cruz. (BH6-1/MW)
2		BH9-3/MW	March 8, 2022	10:30	GW	Y	✓	✓	✓	✓	✓	✓	✓	✓			18	
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Dhwanish Parikh	22/03/08	11:30	NIRAL PATEL	2022/03/08	12:43	

Laboratory Use Only				
Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	5/5/4	Present		
		Intact		

NM 2022/03/08

* 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/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.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Exceedance Summary Table – Prov. Water Quality Obj.

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
BH6-1/MW	SAN903-06	Dissolved Uranium (U)	5	5.6	0.10	ug/L
BH9-3/MW	SAN904-06	Dissolved Uranium (U)	5	5.4	0.10	ug/L

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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Appendix F

Calculated Un-ionized Ammonia Concentration in Sampled Monitoring Wells

Calculated Un-Ionized Ammonia Concentration in Sampled Monitoring Wells

Well ID	Sampling Date	Water Temperature °C (Field)*1	pH (Field)*1	Total Ammonia From Laboratory Certificate of Analysis (mg/L)	Ambient Water Temperature in Kelvin (T)	pKa	*f*	Ammonia Un-ionized (Calculated) (mg/L)
				0.05*2				0.02*3,4
BH3-4/MW	February 11, 2022	9.20	6.80	0.29	282.36	9.76	0.001099	0.0003
BH6-1/MW	March 7, 2022	4.00	7.73	<0.05	277.16	9.94	0.006131	N/A
BH9-3/MW	March 8, 2022	8.00	7.33	0.07	281.16	9.80	0.003380	0.0002

Notes: *1 Water Temperature and pH values were obtained at the time of sample collection.
*2- Laboratory Reporting Detection Limit (RDL) for Total Ammonia = 0.05 mg/L.
*3- PWQO Threshold for Un-Ionized Ammonia = 0.02 mg/L.
*4- N/A = Un-Ionized Ammonia was not calculated for the sample of well BH6-1/MW where the Total Ammonia Concentration was found to be below the Laboratory RDL.

Appendix G

Soil Quality Results – Laboratory Certificate of Analysis

AGAT Laboratories

5835 COOPERS AVENUE
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CANADA L4Z 1Y2
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FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: AECOM CANADA LTD
105 COMMERCE VALLEY DR.W 7TH FLOOR
MARKHAM, ON L3T7W3
(905) 886-7022

ATTENTION TO: Arif Chowdhury

PROJECT: 60646784

AGAT WORK ORDER: 21T846798

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Lab Manager

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Jan 06, 2022

PAGES (INCLUDING COVER): 18

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*

AGAT Laboratories

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CANADA L4Z 1Y2
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FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 21T846798

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-06

SAMPLE DESCRIPTION:				BH-1-1 SS2	BH-1-2 SS2	BH-1-3 SS2
SAMPLE TYPE:				Soil	Soil	Soil
DATE SAMPLED:				2021-12-17 13:00	2021-12-17 13:00	2021-12-17 13:00
Parameter	Unit	G / S	RDL	3363515	3363516	3363517
Antimony	µg/g	40	0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	4	3	5
Barium	µg/g	670	2.0	82.9	152	79.1
Beryllium	µg/g	8	0.4	0.7	0.7	0.7
Boron	µg/g	120	5	8	11	8
Boron (Hot Water Soluble)	µg/g	2	0.10	<0.10	<0.10	<0.10
Cadmium	µg/g	1.9	0.5	<0.5	<0.5	<0.5
Chromium	µg/g	160	5	22	29	22
Cobalt	µg/g	80	0.5	10.5	10.5	11.5
Copper	µg/g	230	1.0	23.4	19.6	24.1
Lead	µg/g	120	1	10	9	11
Molybdenum	µg/g	40	0.5	0.5	<0.5	<0.5
Nickel	µg/g	270	1	20	20	22
Selenium	µg/g	5.5	0.8	<0.8	<0.8	<0.8
Silver	µg/g	40	0.5	<0.5	<0.5	<0.5
Thallium	µg/g	3.3	0.5	<0.5	<0.5	<0.5
Uranium	µg/g	33	0.50	0.58	0.61	0.58
Vanadium	µg/g	86	0.4	29.0	38.1	29.1
Zinc	µg/g	340	5	54	52	52
Chromium, Hexavalent	µg/g	8	0.2	<0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040	<0.040
Mercury	µg/g	3.9	0.10	<0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	1.4	0.005	0.157	0.151	0.203
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	12	N/A	0.417	0.383	0.661
pH, 2:1 CaCl2 Extraction	pH Units	5.0-9.0	NA	7.54	7.47	7.48

Certified By:

AGAT Laboratories

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MISSISSAUGA, ONTARIO
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TEL (905)712-5100
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 21T846798

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-06

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3363515-3363517 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Amanjot Bhela

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
AMANJOT BHELA
CHEMIST

AGAT Laboratories

5835 COOPERS AVENUE
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 21T846798

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-06

				SAMPLE DESCRIPTION:	BH-1-2 SS1	BH-1-3 SS1
				SAMPLE TYPE:	Soil	Soil
				DATE SAMPLED:	2021-12-17 13:00	2021-12-17 13:00
Parameter	Unit	G / S	RDL		3363591	3363592
Naphthalene	µg/g	9.6	0.05		<0.05	<0.05
Acenaphthylene	µg/g	0.15	0.05		<0.05	<0.05
Acenaphthene	µg/g	21	0.05		<0.05	<0.05
Fluorene	µg/g	62	0.05		<0.05	<0.05
Phenanthrene	µg/g	12	0.05		<0.05	<0.05
Anthracene	µg/g	0.67	0.05		<0.05	<0.05
Fluoranthene	µg/g	9.6	0.05		<0.05	<0.05
Pyrene	µg/g	96	0.05		<0.05	<0.05
Benz(a)anthracene	µg/g	0.96	0.05		<0.05	<0.05
Chrysene	µg/g	9.6	0.05		<0.05	<0.05
Benzo(b)fluoranthene	µg/g	0.96	0.05		<0.05	<0.05
Benzo(k)fluoranthene	µg/g	0.96	0.05		<0.05	<0.05
Benzo(a)pyrene	µg/g	0.3	0.05		<0.05	<0.05
Indeno(1,2,3-cd)pyrene	µg/g	0.76	0.05		<0.05	<0.05
Dibenz(a,h)anthracene	µg/g	0.1	0.05		<0.05	<0.05
Benzo(g,h,i)perylene	µg/g	9.6	0.05		<0.05	<0.05
1 and 2 Methlynaphthalene	µg/g	30	0.05		<0.05	<0.05
Moisture Content	%		0.1		20.2	25.9
Surrogate	Unit	Acceptable Limits				
Naphthalene-d8	%	50-140			109	93
Acridine-d9	%	50-140			85	94
Terphenyl-d14	%	50-140			99	98

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3363591-3363592 Results are based on the dry weight of the soil.
Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T846798

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-06

				SAMPLE DESCRIPTION:	BH-1-1 SS5	BH-1-3 SS5
				SAMPLE TYPE:	Soil	Soil
				DATE SAMPLED:	2021-12-17 13:00	2021-12-17 13:00
Parameter	Unit	G / S	RDL		3363593	3363594
F1 (C6 - C10)	µg/g	55	5		<5	<5
F1 (C6 to C10) minus BTEX	µg/g	55	5		<5	<5
F2 (C10 to C16)	µg/g	230	10		<10	<10
F3 (C16 to C34)	µg/g	1700	50		<50	<50
F4 (C34 to C50)	µg/g	3300	50		<50	<50
Gravimetric Heavy Hydrocarbons	µg/g	3300	50		NA	NA
Moisture Content	%		0.1		13.7	11.2
Surrogate	Unit	Acceptable Limits				
Toluene-d8	% Recovery	50-140			104	76
Terphenyl	%	60-140			85	76

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3363593-3363594 Results are based on sample dry weight.
The C6-C10 fraction is calculated using toluene response factor.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified without the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Analysis performed at AGAT Toronto (unless marked by *)

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Certificate of Analysis

AGAT WORK ORDER: 21T846798

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-06

				SAMPLE DESCRIPTION:	BH-1-1 SS5	BH-1-3 SS5
				SAMPLE TYPE:	Soil	Soil
				DATE SAMPLED:	2021-12-17 13:00	2021-12-17 13:00
Parameter	Unit	G / S	RDL		3363593	3363594
Dichlorodifluoromethane	µg/g	16	0.05		<0.05	<0.05
Vinyl Chloride	ug/g	0.032	0.02		<0.02	<0.02
Bromomethane	ug/g	0.05	0.05		<0.05	<0.05
Trichlorofluoromethane	ug/g	4	0.05		<0.05	<0.05
Acetone	ug/g	16	0.50		<0.50	<0.50
1,1-Dichloroethylene	ug/g	0.064	0.05		<0.05	<0.05
Methylene Chloride	ug/g	1.6	0.05		<0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g	1.3	0.05		<0.05	<0.05
Methyl tert-butyl Ether	ug/g	1.6	0.05		<0.05	<0.05
1,1-Dichloroethane	ug/g	0.47	0.02		<0.02	<0.02
Methyl Ethyl Ketone	ug/g	70	0.50		<0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g	1.9	0.02		<0.02	<0.02
Chloroform	ug/g	0.47	0.04		<0.04	<0.04
1,2-Dichloroethane	ug/g	0.05	0.03		<0.03	<0.03
1,1,1-Trichloroethane	ug/g	6.1	0.05		<0.05	<0.05
Carbon Tetrachloride	ug/g	0.21	0.05		<0.05	<0.05
Benzene	ug/g	0.32	0.02		<0.02	<0.02
1,2-Dichloropropane	ug/g	0.16	0.03		<0.03	<0.03
Trichloroethylene	ug/g	0.55	0.03		<0.03	<0.03
Bromodichloromethane	ug/g	1.5	0.05		<0.05	<0.05
Methyl Isobutyl Ketone	ug/g	31	0.50		<0.50	<0.50
1,1,2-Trichloroethane	ug/g	0.05	0.04		<0.04	<0.04
Toluene	ug/g	6.4	0.05		<0.05	<0.05
Dibromochloromethane	ug/g	2.3	0.05		<0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04		<0.04	<0.04
Tetrachloroethylene	ug/g	1.9	0.05		<0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g	0.087	0.04		<0.04	<0.04
Chlorobenzene	ug/g	2.4	0.05		<0.05	<0.05
Ethylbenzene	ug/g	1.1	0.05		<0.05	<0.05

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AGAT WORK ORDER: 21T846798

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-06

				SAMPLE DESCRIPTION:	BH-1-1 SS5	BH-1-3 SS5
				SAMPLE TYPE:	Soil	Soil
				DATE SAMPLED:	2021-12-17 13:00	2021-12-17 13:00
Parameter	Unit	G / S	RDL		3363593	3363594
m & p-Xylene	ug/g		0.05		<0.05	<0.05
Bromoform	ug/g	0.61	0.05		<0.05	<0.05
Styrene	ug/g	34	0.05		<0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05		<0.05	<0.05
o-Xylene	ug/g		0.05		<0.05	<0.05
1,3-Dichlorobenzene	ug/g	9.6	0.05		<0.05	<0.05
1,4-Dichlorobenzene	ug/g	0.2	0.05		<0.05	<0.05
1,2-Dichlorobenzene	ug/g	1.2	0.05		<0.05	<0.05
Xylenes (Total)	ug/g	26	0.05		<0.05	<0.05
1,3-Dichloropropene (Cis + Trans)	µg/g	0.059	0.04		<0.04	<0.04
n-Hexane	µg/g	46	0.05		<0.05	<0.05
Moisture Content	%		0.1		13.7	11.2
Surrogate	Unit	Acceptable Limits				
Toluene-d8	% Recovery	50-140			102	98
4-Bromofluorobenzene	% Recovery	50-140			87	89

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3363593-3363594 The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

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AGAT WORK ORDER: 21T846798

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

Total PCBs (soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-06

				SAMPLE DESCRIPTION:	BH-1-3 SS1
				SAMPLE TYPE:	Soil
				DATE SAMPLED:	2021-12-17 13:00
Parameter	Unit	G / S	RDL		3363542
Polychlorinated Biphenyls	µg/g	1.1	0.1		<0.1
Moisture Content	%		0.1		18.0
Surrogate	Unit	Acceptable Limits			
Decachlorobiphenyl	%	60-130			84

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3363542 Results are based on the dry weight of soil extracted.

Analysis performed at AGAT Toronto (unless marked by *)

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T846798

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Jan 06, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	3379761		<0.8	<0.8	NA	< 0.8	137%	70%	130%	102%	80%	120%	96%	70%	130%
Arsenic	3379761		<1	<1	NA	< 1	121%	70%	130%	105%	80%	120%	109%	70%	130%
Barium	3379761		12.0	12.3	2.5%	< 2.0	118%	70%	130%	101%	80%	120%	105%	70%	130%
Beryllium	3379761		<0.4	<0.4	NA	< 0.4	113%	70%	130%	108%	80%	120%	101%	70%	130%
Boron	3379761		<5	<5	NA	< 5	87%	70%	130%	99%	80%	120%	106%	70%	130%
Boron (Hot Water Soluble)	3384560		0.24	0.24	NA	< 0.10	99%	60%	140%	94%	70%	130%	94%	60%	140%
Cadmium	3379761		<0.5	<0.5	NA	< 0.5	104%	70%	130%	104%	80%	120%	104%	70%	130%
Chromium	3379761		<5	<5	NA	< 5	103%	70%	130%	102%	80%	120%	108%	70%	130%
Cobalt	3379761		1.5	1.5	NA	< 0.5	105%	70%	130%	105%	80%	120%	101%	70%	130%
Copper	3379761		2.9	2.9	NA	< 1.0	101%	70%	130%	111%	80%	120%	98%	70%	130%
Lead	3379761		2	2	NA	< 1	115%	70%	130%	104%	80%	120%	98%	70%	130%
Molybdenum	3379761		<0.5	<0.5	NA	< 0.5	112%	70%	130%	110%	80%	120%	111%	70%	130%
Nickel	3379761		<1	<1	NA	< 1	105%	70%	130%	104%	80%	120%	97%	70%	130%
Selenium	3379761		<0.8	<0.8	NA	< 0.8	71%	70%	130%	105%	80%	120%	107%	70%	130%
Silver	3379761		<0.5	<0.5	NA	< 0.5	104%	70%	130%	101%	80%	120%	95%	70%	130%
Thallium	3379761		<0.5	<0.5	NA	< 0.5	114%	70%	130%	99%	80%	120%	94%	70%	130%
Uranium	3379761		<0.50	<0.50	NA	< 0.50	120%	70%	130%	103%	80%	120%	105%	70%	130%
Vanadium	3379761		6.8	7.0	2.9%	< 0.4	108%	70%	130%	96%	80%	120%	106%	70%	130%
Zinc	3379761		9	9	NA	< 5	112%	70%	130%	110%	80%	120%	110%	70%	130%
Chromium, Hexavalent	3363711		<0.2	<0.2	NA	< 0.2	95%	70%	130%	91%	80%	120%	83%	70%	130%
Cyanide, Free	3386261		<0.040	<0.040	NA	< 0.040	91%	70%	130%	94%	80%	120%	91%	70%	130%
Mercury	3379761		<0.10	<0.10	NA	< 0.10	109%	70%	130%	98%	80%	120%	95%	70%	130%
Electrical Conductivity (2:1)	3384560		0.136	0.139	2.2%	< 0.005	104%	80%	120%	NA			NA		
Sodium Adsorption Ratio (2:1) (Calc.)	3384560		0.087	0.090	3.4%	N/A	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	3370404		6.72	7.93	16.5%	NA	99%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.
More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

O. Reg. 153(511) - Metals & Inorganics (Soil)															
Sodium Adsorption Ratio (2:1) (Calc.)	3363702		1.45	1.42	1.7%	N/A	NA			NA			7%		

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD
AGAT WORK ORDER: 21T846798
PROJECT: 60646784
ATTENTION TO: Arif Chowdhury
SAMPLING SITE:
SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Jan 06, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

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SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Jan 06, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total PCBs (soil)															
Polychlorinated Biphenyls	3378722		< 0.1	< 0.1	NA	< 0.1	103%	60%	140%	102%	60%	140%	98%	60%	140%
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	3354673		< 0.05	< 0.05	NA	< 0.05	90%	50%	140%	97%	50%	140%	93%	50%	140%
Acenaphthylene	3354673		< 0.05	< 0.05	NA	< 0.05	105%	50%	140%	85%	50%	140%	92%	50%	140%
Acenaphthene	3354673		< 0.05	< 0.05	NA	< 0.05	78%	50%	140%	90%	50%	140%	91%	50%	140%
Fluorene	3354673		< 0.05	< 0.05	NA	< 0.05	85%	50%	140%	75%	50%	140%	78%	50%	140%
Phenanthrene	3354673		< 0.05	< 0.05	NA	< 0.05	71%	50%	140%	93%	50%	140%	78%	50%	140%
Anthracene	3354673		< 0.05	< 0.05	NA	< 0.05	82%	50%	140%	92%	50%	140%	85%	50%	140%
Fluoranthene	3354673		< 0.05	< 0.05	NA	< 0.05	93%	50%	140%	101%	50%	140%	93%	50%	140%
Pyrene	3354673		< 0.05	< 0.05	NA	< 0.05	92%	50%	140%	71%	50%	140%	92%	50%	140%
Benz(a)anthracene	3354673		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	85%	50%	140%	101%	50%	140%
Chrysene	3354673		< 0.05	< 0.05	NA	< 0.05	78%	50%	140%	93%	50%	140%	54%	50%	140%
Benzo(b)fluoranthene	3354673		< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	92%	50%	140%	85%	50%	140%
Benzo(k)fluoranthene	3354673		< 0.05	< 0.05	NA	< 0.05	93%	50%	140%	105%	50%	140%	93%	50%	140%
Benzo(a)pyrene	3354673		< 0.05	< 0.05	NA	< 0.05	82%	50%	140%	98%	50%	140%	92%	50%	140%
Indeno(1,2,3-cd)pyrene	3354673		< 0.05	< 0.05	NA	< 0.05	91%	50%	140%	86%	50%	140%	98%	50%	140%
Dibenz(a,h)anthracene	3354673		< 0.05	< 0.05	NA	< 0.05	105%	50%	140%	85%	50%	140%	105%	50%	140%
Benzo(g,h,i)perylene	3354673		< 0.05	< 0.05	NA	< 0.05	78%	50%	140%	80%	50%	140%	98%	50%	140%
O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)															
F1 (C6 - C10)	3377182		<5	<5	NA	< 5	113%	60%	140%	97%	60%	140%	107%	60%	140%
F2 (C10 to C16)	3384564		< 10	< 10	NA	< 10	101%	60%	140%	75%	60%	140%	84%	60%	140%
F3 (C16 to C34)	3384564		< 50	< 50	NA	< 50	102%	60%	140%	74%	60%	140%	78%	60%	140%
F4 (C34 to C50)	3384564		< 50	< 50	NA	< 50	99%	60%	140%	71%	60%	140%	85%	60%	140%
O. Reg. 153(511) - VOCs (Soil)															
Dichlorodifluoromethane	3393322		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	103%	50%	140%	53%	50%	140%
Vinyl Chloride	3393322		< 0.02	< 0.02	NA	< 0.02	104%	50%	140%	94%	50%	140%	103%	50%	140%
Bromomethane	3393322		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	69%	50%	140%	79%	50%	140%
Trichlorofluoromethane	3393322		< 0.05	< 0.05	NA	< 0.05	89%	50%	140%	56%	50%	140%	83%	50%	140%
Acetone	3393322		< 0.50	< 0.50	NA	< 0.50	88%	50%	140%	97%	50%	140%	101%	50%	140%
1,1-Dichloroethylene	3393322		< 0.05	< 0.05	NA	< 0.05	119%	50%	140%	83%	60%	130%	93%	50%	140%
Methylene Chloride	3393322		< 0.05	< 0.05	NA	< 0.05	79%	50%	140%	112%	60%	130%	83%	50%	140%
Trans- 1,2-Dichloroethylene	3393322		< 0.05	< 0.05	NA	< 0.05	115%	50%	140%	82%	60%	130%	82%	50%	140%
Methyl tert-butyl Ether	3393322		< 0.05	< 0.05	NA	< 0.05	105%	50%	140%	71%	60%	130%	90%	50%	140%
1,1-Dichloroethane	3393322		< 0.02	< 0.02	NA	< 0.02	72%	50%	140%	112%	60%	130%	78%	50%	140%
Methyl Ethyl Ketone	3393322		< 0.50	< 0.50	NA	< 0.50	102%	50%	140%	85%	50%	140%	98%	50%	140%
Cis- 1,2-Dichloroethylene	3393322		< 0.02	< 0.02	NA	< 0.02	75%	50%	140%	101%	60%	130%	109%	50%	140%
Chloroform	3393322		< 0.04	< 0.04	NA	< 0.04	117%	50%	140%	107%	60%	130%	95%	50%	140%
1,2-Dichloroethane	3393322		< 0.03	< 0.03	NA	< 0.03	111%	50%	140%	101%	60%	130%	83%	50%	140%

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD
AGAT WORK ORDER: 21T846798
PROJECT: 60646784
ATTENTION TO: Arif Chowdhury
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jan 06, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,1,1-Trichloroethane	3393322		< 0.05	< 0.05	NA	< 0.05	92%	50%	140%	86%	60%	130%	81%	50%	140%
Carbon Tetrachloride	3393322		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	78%	60%	130%	80%	50%	140%
Benzene	3393322		< 0.02	< 0.02	NA	< 0.02	110%	50%	140%	112%	60%	130%	92%	50%	140%
1,2-Dichloropropane	3393322		< 0.03	< 0.03	NA	< 0.03	85%	50%	140%	96%	60%	130%	99%	50%	140%
Trichloroethylene	3393322		< 0.03	< 0.03	NA	< 0.03	103%	50%	140%	118%	60%	130%	111%	50%	140%
Bromodichloromethane	3393322		< 0.05	< 0.05	NA	< 0.05	91%	50%	140%	96%	60%	130%	112%	50%	140%
Methyl Isobutyl Ketone	3393322		< 0.50	< 0.50	NA	< 0.50	104%	50%	140%	98%	50%	140%	100%	50%	140%
1,1,2-Trichloroethane	3393322		< 0.04	< 0.04	NA	< 0.04	96%	50%	140%	112%	60%	130%	105%	50%	140%
Toluene	3393322		< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	76%	60%	130%	102%	50%	140%
Dibromochloromethane	3393322		< 0.05	< 0.05	NA	< 0.05	88%	50%	140%	119%	60%	130%	109%	50%	140%
Ethylene Dibromide	3393322		< 0.04	< 0.04	NA	< 0.04	89%	50%	140%	106%	60%	130%	93%	50%	140%
Tetrachloroethylene	3393322		< 0.05	< 0.05	NA	< 0.05	76%	50%	140%	108%	60%	130%	80%	50%	140%
1,1,1,2-Tetrachloroethane	3393322		< 0.04	< 0.04	NA	< 0.04	110%	50%	140%	84%	60%	130%	91%	50%	140%
Chlorobenzene	3393322		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	106%	60%	130%	82%	50%	140%
Ethylbenzene	3393322		< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	97%	60%	130%	82%	50%	140%
m & p-Xylene	3393322		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	94%	60%	130%	106%	50%	140%
Bromoform	3393322		< 0.05	< 0.05	NA	< 0.05	87%	50%	140%	89%	60%	130%	103%	50%	140%
Styrene	3393322		< 0.05	< 0.05	NA	< 0.05	90%	50%	140%	85%	60%	130%	118%	50%	140%
1,1,2,2-Tetrachloroethane	3393322		< 0.05	< 0.05	NA	< 0.05	88%	50%	140%	96%	60%	130%	94%	50%	140%
o-Xylene	3393322		< 0.05	< 0.05	NA	< 0.05	82%	50%	140%	89%	60%	130%	92%	50%	140%
1,3-Dichlorobenzene	3393322		< 0.05	< 0.05	NA	< 0.05	83%	50%	140%	89%	60%	130%	96%	50%	140%
1,4-Dichlorobenzene	3393322		< 0.05	< 0.05	NA	< 0.05	111%	50%	140%	105%	60%	130%	85%	50%	140%
1,2-Dichlorobenzene	3393322		< 0.05	< 0.05	NA	< 0.05	91%	50%	140%	102%	60%	130%	86%	50%	140%
n-Hexane	3393322		< 0.05	< 0.05	NA	< 0.05	106%	50%	140%	103%	60%	130%	114%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: N Popnikolof

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QC Exceedance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T846798

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

RPT Date: Jan 06, 2022

PARAMETER	Sample Id	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
			Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)										
Antimony		137%	70%	130%	102%	80%	120%	96%	70%	130%

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.
More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T846798

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T846798

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluorene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benz(a)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
1 and 2 Methlynaphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
F1 (C6 - C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T846798

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Bromomethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T846798

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Bromoform	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5002	modified from EPA 5035A & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	modified from EPA 5035A & EPA 8260D	(P&T)GC/MS
Moisture Content	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Polychlorinated Biphenyls	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Moisture Content	ORG-91-5009	CCME Tier 1 Method	BALANCE

AGAT Laboratories
5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
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webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 21T846798

Cooler Quantity: 1 blue + 1 red

Arrival Temperatures: 3.6 | 3.4 | 5.2
2.4 | 3.7 | 3.8

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: Free ICE

Report Information:

Company: AECOM Canada Ltd.
Contact: Arif Chowdhury / Dhwanish Parikh
Address: 105 Commerce Valley Dr, W, 7th floor
Markham, ON
Phone: 416 420 5590 Fax:
Reports to be sent to:
1. Email: Arif.Chowdhury@aecom.com
2. Email: dhwanish.parikh@aecom.com

Regulatory Requirements:

(Please check all applicable boxes)

☑ Regulation 153/04
Table 2 (Indicate One)
☑ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture (Check One)
☑ Coarse
☐ Fine

☐ Excess Soils R406
Table ____ (Indicate One)

☐ Regulation 558

☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm
____ (Region)

☐ Prov. Water Quality Objectives (PWQO)

☐ Other
____ (Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply): ____

Please provide prior notification for rush TAT
*TAT is exclusive of weekends and statutory holidays

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: G0646784
Site Location: Site 1
Sampled By: Dhwanish Parikh
AGAT Quote #: ____ PO: ____
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y/N	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs; Analyze F4G if required ☐ Yes ☐ No	O. Reg 153: PAHs	O. Reg 153: PCBs	O. Reg 153: VOC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	Potentially Hazardous or High Concentration (Y/N)
BH-1-1 SS2	Dec 17, 2021	1:00 AM/PM	1	S			X										
BH-1-2 SS2			1	S			X										
BH-1-3 SS2			1	S			X										
BH-1-3 SS1			1	S							X						
BH-1-2 SS1			1	S						X							
BH-1-3 SS1			1	S			—	—		X							
BH-1-1 SS5			2	S					X			X					
BH-1-3 SS5			2	S					X			X					

12 DEC 17 4 pm 5 pm

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Dhwanish Parikh Dhwanish	Dec 17, 2021	12:00	NTAT		
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

Page ____ of ____

Nº: T 129487

Document ID: DIV-78-1511-021

Pink Copy - Client | Yellow Copy - AGAT | White Copy- AGAT

Date Issued: March 9, 2021

AGAT Laboratories

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CLIENT NAME: AECOM CANADA LTD
105 Commerce Valley Drive West 7th Floor
MARKHAM, ON L3T7W3
(905) 886-7022

ATTENTION TO: Arif Chowdhury

PROJECT: 60646784

AGAT WORK ORDER: 21T846922

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Lab Manager

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Jan 10, 2022

PAGES (INCLUDING COVER): 15

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T846922

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-10

				SAMPLE DESCRIPTION:	BH-3-1 SS2
				SAMPLE TYPE:	Soil
				DATE SAMPLED:	2021-12-17 13:30
Parameter	Unit	G / S	RDL		3363623
Antimony	µg/g	40	0.8		<0.8
Arsenic	µg/g	18	1		5
Barium	µg/g	670	2.0		98.6
Beryllium	µg/g	8	0.4		0.6
Boron	µg/g	120	5		10
Boron (Hot Water Soluble)	µg/g	2	0.10		0.26
Cadmium	µg/g	1.9	0.5		<0.5
Chromium	µg/g	160	5		21
Cobalt	µg/g	80	0.5		10.2
Copper	µg/g	230	1.0		27.0
Lead	µg/g	120	1		13
Molybdenum	µg/g	40	0.5		<0.5
Nickel	µg/g	270	1		21
Selenium	µg/g	5.5	0.8		<0.8
Silver	µg/g	40	0.5		<0.5
Thallium	µg/g	3.3	0.5		<0.5
Uranium	µg/g	33	0.50		0.61
Vanadium	µg/g	86	0.4		30.7
Zinc	µg/g	340	5		61
Chromium, Hexavalent	µg/g	8	0.2		<0.2
Cyanide, Free	µg/g	0.051	0.040		<0.040
Mercury	µg/g	3.9	0.10		<0.10
Electrical Conductivity (2:1)	mS/cm	1.4	0.005		0.761
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	12	N/A		3.23
pH, 2:1 CaCl2 Extraction	pH Units	5.0-9.0	NA		7.54

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T846922

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3363623 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Amanjot Bhela

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
AMANJOT BHELA
CHEMIST

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AGAT WORK ORDER: 21T846922

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-10

				SAMPLE DESCRIPTION:	BH-3-1 SS4
				SAMPLE TYPE:	Soil
				DATE SAMPLED:	2021-12-17 13:30
Parameter	Unit	G / S	RDL		3363630
F1 (C6 - C10)	µg/g	55	5		<5
F1 (C6 to C10) minus BTEX	µg/g	55	5		<5
F2 (C10 to C16)	µg/g	230	10		<10
F3 (C16 to C34)	µg/g	1700	50		<50
F4 (C34 to C50)	µg/g	3300	50		<50
Gravimetric Heavy Hydrocarbons	µg/g	3300	50		NA
Moisture Content	%		0.1		17.0
Surrogate	Unit	Acceptable Limits			
Toluene-d8	% Recovery	50-140			83
Terphenyl	%	60-140			88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3363630 Results are based on sample dry weight.
The C6-C10 fraction is calculated using toluene response factor.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified without the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

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AGAT WORK ORDER: 21T846922

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-10

		SAMPLE DESCRIPTION:		BH-3-1 SS4
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2021-12-17 13:30
Parameter	Unit	G / S	RDL	3363630
Dichlorodifluoromethane	µg/g	16	0.05	<0.05
Vinyl Chloride	ug/g	0.032	0.02	<0.02
Bromomethane	ug/g	0.05	0.05	<0.05
Trichlorofluoromethane	ug/g	4	0.05	<0.05
Acetone	ug/g	16	0.50	<0.50
1,1-Dichloroethylene	ug/g	0.064	0.05	<0.05
Methylene Chloride	ug/g	1.6	0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g	1.3	0.05	<0.05
Methyl tert-butyl Ether	ug/g	1.6	0.05	<0.05
1,1-Dichloroethane	ug/g	0.47	0.02	<0.02
Methyl Ethyl Ketone	ug/g	70	0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g	1.9	0.02	<0.02
Chloroform	ug/g	0.47	0.04	<0.04
1,2-Dichloroethane	ug/g	0.05	0.03	<0.03
1,1,1-Trichloroethane	ug/g	6.1	0.05	<0.05
Carbon Tetrachloride	ug/g	0.21	0.05	<0.05
Benzene	ug/g	0.32	0.02	<0.02
1,2-Dichloropropane	ug/g	0.16	0.03	<0.03
Trichloroethylene	ug/g	0.55	0.03	<0.03
Bromodichloromethane	ug/g	1.5	0.05	<0.05
Methyl Isobutyl Ketone	ug/g	31	0.50	<0.50
1,1,2-Trichloroethane	ug/g	0.05	0.04	<0.04
Toluene	ug/g	6.4	0.05	<0.05
Dibromochloromethane	ug/g	2.3	0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04	<0.04
Tetrachloroethylene	ug/g	1.9	0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g	0.087	0.04	<0.04
Chlorobenzene	ug/g	2.4	0.05	<0.05
Ethylbenzene	ug/g	1.1	0.05	<0.05

Certified By: NPopowkolof

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AGAT WORK ORDER: 21T846922

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-10

				SAMPLE DESCRIPTION:	BH-3-1 SS4
				SAMPLE TYPE:	Soil
				DATE SAMPLED:	2021-12-17 13:30
Parameter	Unit	G / S	RDL		3363630
m & p-Xylene	ug/g		0.05		<0.05
Bromoform	ug/g	0.61	0.05		<0.05
Styrene	ug/g	34	0.05		<0.05
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05		<0.05
o-Xylene	ug/g		0.05		<0.05
1,3-Dichlorobenzene	ug/g	9.6	0.05		<0.05
1,4-Dichlorobenzene	ug/g	0.2	0.05		<0.05
1,2-Dichlorobenzene	ug/g	1.2	0.05		<0.05
Xylenes (Total)	ug/g	26	0.05		<0.05
1,3-Dichloropropene (Cis + Trans)	µg/g	0.059	0.04		<0.04
n-Hexane	µg/g	46	0.05		<0.05
Moisture Content	%		0.1		17.0
Surrogate	Unit	Acceptable Limits			
Toluene-d8	% Recovery	50-140			98
4-Bromofluorobenzene	% Recovery	50-140			78

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3363630 The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: 

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AGAT WORK ORDER: 21T846922

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

Total PCBs (soil)

DATE RECEIVED: 2021-12-17

DATE REPORTED: 2022-01-10

				SAMPLE DESCRIPTION:	BH-3-1 SS1
				SAMPLE TYPE:	Soil
				DATE SAMPLED:	2021-12-17 13:30
Parameter	Unit	G / S	RDL		3363627
Polychlorinated Biphenyls	µg/g	1.1	0.1		<0.1
Moisture Content	%		0.1		16.0
Surrogate	Unit	Acceptable Limits			
Decachlorobiphenyl	%	60-130			88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3363627 Results are based on the dry weight of soil extracted.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popowkolof

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T846922

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Jan 10, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	3386164		<0.8	<0.8	NA	< 0.8	139%	70%	130%	99%	80%	120%	100%	70%	130%
Arsenic	3386164		8	8	0.0%	< 1	118%	70%	130%	95%	80%	120%	95%	70%	130%
Barium	3386164		105	104	1.0%	< 2.0	110%	70%	130%	103%	80%	120%	99%	70%	130%
Beryllium	3386164		0.9	0.9	NA	< 0.4	87%	70%	130%	81%	80%	120%	84%	70%	130%
Boron	3386164		8	9	NA	< 5	75%	70%	130%	80%	80%	120%	73%	70%	130%
Boron (Hot Water Soluble)	3370053		0.45	0.49	NA	< 0.10	102%	60%	140%	90%	70%	130%	110%	60%	140%
Cadmium	3386164		<0.5	<0.5	NA	< 0.5	107%	70%	130%	103%	80%	120%	103%	70%	130%
Chromium	3386164		27	27	0.0%	< 5	99%	70%	130%	102%	80%	120%	90%	70%	130%
Cobalt	3386164		15.8	15.8	0.0%	< 0.5	104%	70%	130%	93%	80%	120%	92%	70%	130%
Copper	3386164		44.7	44.2	1.1%	< 1.0	100%	70%	130%	100%	80%	120%	101%	70%	130%
Lead	3386164		17	17	0.0%	< 1	102%	70%	130%	99%	80%	120%	100%	70%	130%
Molybdenum	3386164		0.5	0.5	NA	< 0.5	111%	70%	130%	107%	80%	120%	103%	70%	130%
Nickel	3386164		34	35	2.9%	< 1	102%	70%	130%	94%	80%	120%	92%	70%	130%
Selenium	3386164		<0.8	<0.8	NA	< 0.8	85%	70%	130%	104%	80%	120%	102%	70%	130%
Silver	3386164		<0.5	<0.5	NA	< 0.5	107%	70%	130%	103%	80%	120%	96%	70%	130%
Thallium	3386164		<0.5	<0.5	NA	< 0.5	108%	70%	130%	97%	80%	120%	98%	70%	130%
Uranium	3386164		0.59	0.60	NA	< 0.50	109%	70%	130%	98%	80%	120%	104%	70%	130%
Vanadium	3386164		38.9	39.2	0.8%	< 0.4	110%	70%	130%	91%	80%	120%	92%	70%	130%
Zinc	3386164		85	84	1.2%	< 5	103%	70%	130%	100%	80%	120%	114%	70%	130%
Chromium, Hexavalent	3363702		<0.2	<0.2	NA	< 0.2	92%	70%	130%	97%	80%	120%	84%	70%	130%
Cyanide, Free	3386261		<0.040	<0.040	NA	< 0.040	91%	70%	130%	94%	80%	120%	91%	70%	130%
Mercury	3386164		0.15	0.13	NA	< 0.10	118%	70%	130%	99%	80%	120%	100%	70%	130%
Electrical Conductivity (2:1)	3384560		0.136	0.139	2.2%	< 0.005	104%	80%	120%	NA			NA		
Sodium Adsorption Ratio (2:1) (Calc.)	3363702		1.45	1.42	2.1%	N/A	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	3370404		6.72	7.93	16.5%	NA	99%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.
More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

Certified By:

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T846922

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Jan 10, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total PCBs (soil)															
Polychlorinated Biphenyls	3378722		< 0.1	< 0.1	NA	< 0.1	103%	60%	140%	102%	60%	140%	98%	60%	140%
O. Reg. 153(511) - VOCs (Soil)															
Dichlorodifluoromethane	3393322		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	103%	50%	140%	53%	50%	140%
Vinyl Chloride	3393322		< 0.02	< 0.02	NA	< 0.02	104%	50%	140%	94%	50%	140%	103%	50%	140%
Bromomethane	3393322		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	69%	50%	140%	79%	50%	140%
Trichlorofluoromethane	3393322		< 0.05	< 0.05	NA	< 0.05	89%	50%	140%	56%	50%	140%	83%	50%	140%
Acetone	3393322		< 0.50	< 0.50	NA	< 0.50	88%	50%	140%	97%	50%	140%	101%	50%	140%
1,1-Dichloroethylene	3393322		< 0.05	< 0.05	NA	< 0.05	119%	50%	140%	83%	60%	130%	93%	50%	140%
Methylene Chloride	3393322		< 0.05	< 0.05	NA	< 0.05	79%	50%	140%	112%	60%	130%	83%	50%	140%
Trans- 1,2-Dichloroethylene	3393322		< 0.05	< 0.05	NA	< 0.05	115%	50%	140%	82%	60%	130%	82%	50%	140%
Methyl tert-butyl Ether	3393322		< 0.05	< 0.05	NA	< 0.05	105%	50%	140%	71%	60%	130%	90%	50%	140%
1,1-Dichloroethane	3393322		< 0.02	< 0.02	NA	< 0.02	72%	50%	140%	112%	60%	130%	78%	50%	140%
Methyl Ethyl Ketone	3393322		< 0.50	< 0.50	NA	< 0.50	102%	50%	140%	85%	50%	140%	98%	50%	140%
Cis- 1,2-Dichloroethylene	3393322		< 0.02	< 0.02	NA	< 0.02	75%	50%	140%	101%	60%	130%	109%	50%	140%
Chloroform	3393322		< 0.04	< 0.04	NA	< 0.04	117%	50%	140%	107%	60%	130%	95%	50%	140%
1,2-Dichloroethane	3393322		< 0.03	< 0.03	NA	< 0.03	111%	50%	140%	101%	60%	130%	83%	50%	140%
1,1,1-Trichloroethane	3393322		< 0.05	< 0.05	NA	< 0.05	92%	50%	140%	86%	60%	130%	81%	50%	140%
Carbon Tetrachloride	3393322		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	78%	60%	130%	80%	50%	140%
Benzene	3393322		< 0.02	< 0.02	NA	< 0.02	110%	50%	140%	112%	60%	130%	92%	50%	140%
1,2-Dichloropropane	3393322		< 0.03	< 0.03	NA	< 0.03	85%	50%	140%	96%	60%	130%	99%	50%	140%
Trichloroethylene	3393322		< 0.03	< 0.03	NA	< 0.03	103%	50%	140%	118%	60%	130%	111%	50%	140%
Bromodichloromethane	3393322		< 0.05	< 0.05	NA	< 0.05	91%	50%	140%	96%	60%	130%	112%	50%	140%
Methyl Isobutyl Ketone	3393322		< 0.50	< 0.50	NA	< 0.50	104%	50%	140%	98%	50%	140%	100%	50%	140%
1,1,2-Trichloroethane	3393322		< 0.04	< 0.04	NA	< 0.04	96%	50%	140%	112%	60%	130%	105%	50%	140%
Toluene	3393322		< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	76%	60%	130%	102%	50%	140%
Dibromochloromethane	3393322		< 0.05	< 0.05	NA	< 0.05	88%	50%	140%	119%	60%	130%	109%	50%	140%
Ethylene Dibromide	3393322		< 0.04	< 0.04	NA	< 0.04	89%	50%	140%	106%	60%	130%	93%	50%	140%
Tetrachloroethylene	3393322		< 0.05	< 0.05	NA	< 0.05	76%	50%	140%	108%	60%	130%	80%	50%	140%
1,1,1,2-Tetrachloroethane	3393322		< 0.04	< 0.04	NA	< 0.04	110%	50%	140%	84%	60%	130%	91%	50%	140%
Chlorobenzene	3393322		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	106%	60%	130%	82%	50%	140%
Ethylbenzene	3393322		< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	97%	60%	130%	82%	50%	140%
m & p-Xylene	3393322		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	94%	60%	130%	106%	50%	140%
Bromoform	3393322		< 0.05	< 0.05	NA	< 0.05	87%	50%	140%	89%	60%	130%	103%	50%	140%
Styrene	3393322		< 0.05	< 0.05	NA	< 0.05	90%	50%	140%	85%	60%	130%	118%	50%	140%
1,1,2,2-Tetrachloroethane	3393322		< 0.05	< 0.05	NA	< 0.05	88%	50%	140%	96%	60%	130%	94%	50%	140%
o-Xylene	3393322		< 0.05	< 0.05	NA	< 0.05	82%	50%	140%	89%	60%	130%	92%	50%	140%
1,3-Dichlorobenzene	3393322		< 0.05	< 0.05	NA	< 0.05	83%	50%	140%	89%	60%	130%	96%	50%	140%
1,4-Dichlorobenzene	3393322		< 0.05	< 0.05	NA	< 0.05	111%	50%	140%	105%	60%	130%	85%	50%	140%

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD
AGAT WORK ORDER: 21T846922
PROJECT: 60646784
ATTENTION TO: Arif Chowdhury
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jan 10, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,2-Dichlorobenzene	3393322		< 0.05	< 0.05	NA	< 0.05	91%	50%	140%	102%	60%	130%	86%	50%	140%
n-Hexane	3393322		< 0.05	< 0.05	NA	< 0.05	106%	50%	140%	103%	60%	130%	114%	50%	140%
O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)															
F1 (C6 - C10)	3377182		<5	<5	NA	< 5	113%	60%	140%	97%	60%	140%	107%	60%	140%
F2 (C10 to C16)	3384564		< 10	< 10	NA	< 10	101%	60%	140%	75%	60%	140%	84%	60%	140%
F3 (C16 to C34)	3384564		< 50	< 50	NA	< 50	102%	60%	140%	74%	60%	140%	78%	60%	140%
F4 (C34 to C50)	3384564		< 50	< 50	NA	< 50	99%	60%	140%	71%	60%	140%	85%	60%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: N Popnikolof

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QC Exceedance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T846922

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

RPT Date: Jan 10, 2022

PARAMETER	Sample Id	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
			Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)										
Antimony		139%	70%	130%	99%	80%	120%	100%	70%	130%

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.
More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T846922

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T846922

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
F1 (C6 - C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: AECOM CANADA LTD
AGAT WORK ORDER: 21T846922
PROJECT: 60646784
ATTENTION TO: Arif Chowdhury
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Toluene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Bromoform	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5002	modified from EPA 5035A & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	modified from EPA 5035A & EPA 8260D	(P&T)GC/MS
Moisture Content	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Polychlorinated Biphenyls	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Moisture Content	ORG-91-5009	CCME Tier 1 Method	BALANCE

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Laboratory Use Only

Work Order #: 21T846922

Cooler Quantity: 1 black + 1 Med

Arrival Temperatures: 3.6 | 3.4 | 3.2 / 2.4 | 3.7 | 3.8

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: Free ice

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: AECOM Canada Ltd.
Contact: Arif Chowdhury / Dhwanish Parikh
Address: 105 Commerce Valley Dr. W, 7th floor, Markham, ON
Phone: 416 420 5590 Fax:
Reports to be sent to:
1. Email: Arif.chowdhury@aecom.com
2. Email: dhwanish.parikh@aecom.com

Regulatory Requirements: ☐ No Regulatory Requirement

(Please check all applicable boxes)

☑ Regulation 153/04 — Table 2 (Indicate One): ☑ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (Check One): ☑ Coarse ☐ Fine
☐ Sewer Use: ☐ Sanitary ☐ Storm
Region ______ (Indicate One)
☐ MISA
☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other ______ (Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Report Guideline on Certificate of Analysis ☑ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply): ______

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 60646784
Site Location: Site 3
Sampled By: Dhwanish Parikh
AGAT Quote #: ______ PO: ______

Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	Metals and Inorganics (O. Reg 153)	☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals ☐ 153 Metals (Incl. Hydrides)	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ Cr⁶⁺ ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH₃ ☐ TKN ☐ NO₃ ☐ NO₂ ☐ NO₃+NO₂	Volatiles: ☑ VOC ☑ BTEX ☐ THM	PHCs F1 - F4	ABNs	PAHs	PCBs: ☑ Total ☐ Aroclors	Organochlorine Pesticides	TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Sewer Use
Bn-3-1 SS2	Dec 17, 2021	1:30	1	S			X													
Bn-3-4 SS2			1				X													
Bn-3-5 SS1			1				X													
Bn-3-6 SS1			1				X													
Bn-3-1 SS4			1														X			
Bn-3-5 SS4			1													X				
Bn-3-6 SS2			1													X				
Bn-3-1 SS4			2										X	X						
Bn-3-4 SS5			2										X	X						

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Dhwanish Parikh [signature]	Dec 17, 2021	3:00	Neil Ramnarain [signature]	Dec. 17/21	4:15PM

Page ____ of ____

Nº: T 073596

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

Document ID: DIV-78-1511.015 Date Issued: March 16, 2018

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CLIENT NAME: AECOM CANADA LTD
105 COMMERCE VALLEY DR.W 7TH FLOOR
MARKHAM, ON L3T7W3
(905) 886-7022

ATTENTION TO: Arif Chowdhury

PROJECT: 60646784

AGAT WORK ORDER: 21T847546

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Lab Manager

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Jan 10, 2022

PAGES (INCLUDING COVER): 16

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

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Certificate of Analysis

AGAT WORK ORDER: 21T847546

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-12-20

DATE REPORTED: 2022-01-10

SAMPLE DESCRIPTION:				Bh-5-1 SS2	Bh-5-2 SS1	Bh-5-3 SS1	Bh-5-4 SS2	Bh-5-5 SS2
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2021-12-20 17:00	2021-12-20 17:00	2021-12-20 17:00	2021-12-20 17:00	2021-12-20 17:00
Parameter	Unit	G / S	RDL	3378851	3378853	3378854	3378855	3378856
Antimony	µg/g	40	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	4	4	5	5	4
Barium	µg/g	670	2.0	116	88.6	109	117	97.5
Beryllium	µg/g	8	0.4	0.7	0.7	0.8	0.7	0.7
Boron	µg/g	120	5	13	9	11	9	12
Boron (Hot Water Soluble)	µg/g	2	0.10	0.12	0.26	<0.10	0.10	<0.10
Cadmium	µg/g	1.9	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/g	160	5	26	22	27	25	25
Cobalt	µg/g	80	0.5	10.8	8.2	12.1	12.5	10.3
Copper	µg/g	230	1.0	19.4	16.3	23.3	26.1	21.3
Lead	µg/g	120	1	10	13	10	11	9
Molybdenum	µg/g	40	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	µg/g	270	1	21	17	24	23	20
Selenium	µg/g	5.5	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Silver	µg/g	40	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	µg/g	3.3	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Uranium	µg/g	33	0.50	0.85	1.12	0.67	0.94	0.80
Vanadium	µg/g	86	0.4	37.0	30.7	38.4	34.2	35.1
Zinc	µg/g	340	5	51	66	53	51	49
Chromium, Hexavalent	µg/g	8	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040	<0.040	<0.040	<0.040
Mercury	µg/g	3.9	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	1.4	0.005	0.249	0.232	0.144	0.214	0.225
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	12	N/A	1.08	0.554	0.316	1.11	1.33
pH, 2:1 CaCl2 Extraction	pH Units	5.0-9.0	NA	7.68	7.42	7.62	6.79	7.38

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T847546

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-12-20

DATE REPORTED: 2022-01-10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3378851-3378856 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Amanjot Bhela

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
AMANJOT BHELA
CHEMIST

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T847546

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2021-12-20

DATE REPORTED: 2022-01-10

				SAMPLE DESCRIPTION:	Bh-5-2 SS1	Bh-5-1 SS1
				SAMPLE TYPE:	Soil	Soil
				DATE SAMPLED:	2021-12-20 17:00	2021-12-20 17:00
Parameter	Unit	G / S	RDL		3378853	3378859
Naphthalene	µg/g	0.6	0.05		<0.05	<0.05
Acenaphthylene	µg/g	0.15	0.05		<0.05	<0.05
Acenaphthene	µg/g	7.9	0.05		<0.05	<0.05
Fluorene	µg/g	62	0.05		<0.05	<0.05
Phenanthrene	µg/g	6.2	0.05		<0.05	<0.05
Anthracene	µg/g	0.67	0.05		<0.05	<0.05
Fluoranthene	µg/g	0.69	0.05		<0.05	<0.05
Pyrene	µg/g	78	0.05		<0.05	<0.05
Benz(a)anthracene	µg/g	0.5	0.05		<0.05	<0.05
Chrysene	µg/g	7	0.05		<0.05	<0.05
Benzo(b)fluoranthene	µg/g	0.78	0.05		<0.05	<0.05
Benzo(k)fluoranthene	µg/g	0.78	0.05		<0.05	<0.05
Benzo(a)pyrene	µg/g	0.3	0.05		<0.05	<0.05
Indeno(1,2,3-cd)pyrene	µg/g	0.38	0.05		<0.05	<0.05
Dibenz(a,h)anthracene	µg/g	0.1	0.05		<0.05	<0.05
Benzo(g,h,i)perylene	µg/g	6.6	0.05		<0.05	<0.05
1 and 2 Methlynaphthalene	µg/g	0.99	0.05		<0.05	<0.05
Moisture Content	%		0.1		18.4	21.0
Surrogate	Unit	Acceptable Limits				
Naphthalene-d8	%	50-140			105	93
Acridine-d9	%	50-140			78	97
Terphenyl-d14	%	50-140			88	98

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Residential/Parkland/Institutional Property Use - Coarse Textured Soils **pH range listed applies to surface soil only**
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3378853-3378859 Results are based on the dry weight of the soil.
Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: NPopowkolof

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Certificate of Analysis

AGAT WORK ORDER: 21T847546

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)

DATE RECEIVED: 2021-12-20

DATE REPORTED: 2022-01-10

				SAMPLE DESCRIPTION:	Bh-5-2 SS2	BH-5-3 SS6A
				SAMPLE TYPE:	Soil	Soil
				DATE SAMPLED:	2021-12-20 17:00	2021-12-20 17:00
Parameter	Unit	G / S	RDL		3378861	3378862
F1 (C6 - C10)	µg/g	55	5		<5	<5
F1 (C6 to C10) minus BTEX	µg/g	55	5		<5	<5
F2 (C10 to C16)	µg/g	230	10		<10	<10
F3 (C16 to C34)	µg/g	1700	50		<50	<50
F4 (C34 to C50)	µg/g	3300	50		<50	<50
Gravimetric Heavy Hydrocarbons	µg/g	3300	50		NA	NA
Moisture Content	%		0.1		19.6	8.7
Surrogate	Unit	Acceptable Limits				
Toluene-d8	% Recovery	50-140			101	100
Terphenyl	%	60-140			74	78

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3378861-3378862 Results are based on sample dry weight.
The C6-C10 fraction is calculated using toluene response factor.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified without the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: NPopowich

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Certificate of Analysis

AGAT WORK ORDER: 21T847546

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2021-12-20

DATE REPORTED: 2022-01-10

				SAMPLE DESCRIPTION:	Bh-5-2 SS2	BH-5-3 SS6A
				SAMPLE TYPE:	Soil	Soil
				DATE SAMPLED:	2021-12-20 17:00	2021-12-20 17:00
Parameter	Unit	G / S	RDL		3378861	3378862
Dichlorodifluoromethane	µg/g	16	0.05		<0.05	<0.05
Vinyl Chloride	ug/g	0.032	0.02		<0.02	<0.02
Bromomethane	ug/g	0.05	0.05		<0.05	<0.05
Trichlorofluoromethane	ug/g	4	0.05		<0.05	<0.05
Acetone	ug/g	16	0.50		<0.50	<0.50
1,1-Dichloroethylene	ug/g	0.064	0.05		<0.05	<0.05
Methylene Chloride	ug/g	1.6	0.05		<0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g	1.3	0.05		<0.05	<0.05
Methyl tert-butyl Ether	ug/g	1.6	0.05		<0.05	<0.05
1,1-Dichloroethane	ug/g	0.47	0.02		<0.02	<0.02
Methyl Ethyl Ketone	ug/g	70	0.50		<0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g	1.9	0.02		<0.02	<0.02
Chloroform	ug/g	0.47	0.04		<0.04	<0.04
1,2-Dichloroethane	ug/g	0.05	0.03		<0.03	<0.03
1,1,1-Trichloroethane	ug/g	6.1	0.05		<0.05	<0.05
Carbon Tetrachloride	ug/g	0.21	0.05		<0.05	<0.05
Benzene	ug/g	0.32	0.02		<0.02	<0.02
1,2-Dichloropropane	ug/g	0.16	0.03		<0.03	<0.03
Trichloroethylene	ug/g	0.55	0.03		<0.03	<0.03
Bromodichloromethane	ug/g	1.5	0.05		<0.05	<0.05
Methyl Isobutyl Ketone	ug/g	31	0.50		<0.50	<0.50
1,1,2-Trichloroethane	ug/g	0.05	0.04		<0.04	<0.04
Toluene	ug/g	6.4	0.05		<0.05	<0.05
Dibromochloromethane	ug/g	2.3	0.05		<0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04		<0.04	<0.04
Tetrachloroethylene	ug/g	1.9	0.05		<0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g	0.087	0.04		<0.04	<0.04
Chlorobenzene	ug/g	2.4	0.05		<0.05	<0.05
Ethylbenzene	ug/g	1.1	0.05		<0.05	<0.05

Certified By: N Popnikolof

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AGAT WORK ORDER: 21T847546

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2021-12-20

DATE REPORTED: 2022-01-10

				SAMPLE DESCRIPTION:	Bh-5-2 SS2	BH-5-3 SS6A
				SAMPLE TYPE:	Soil	Soil
				DATE SAMPLED:	2021-12-20 17:00	2021-12-20 17:00
Parameter	Unit	G / S	RDL		3378861	3378862
m & p-Xylene	ug/g		0.05		<0.05	<0.05
Bromoform	ug/g	0.61	0.05		<0.05	<0.05
Styrene	ug/g	34	0.05		<0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05		<0.05	<0.05
o-Xylene	ug/g		0.05		<0.05	<0.05
1,3-Dichlorobenzene	ug/g	9.6	0.05		<0.05	<0.05
1,4-Dichlorobenzene	ug/g	0.2	0.05		<0.05	<0.05
1,2-Dichlorobenzene	ug/g	1.2	0.05		<0.05	<0.05
Xylenes (Total)	ug/g	26	0.05		<0.05	<0.05
1,3-Dichloropropene (Cis + Trans)	µg/g	0.059	0.04		<0.04	<0.04
n-Hexane	µg/g	46	0.05		<0.05	<0.05
Moisture Content	%		0.1		19.6	8.7
Surrogate	Unit	Acceptable Limits				
Toluene-d8	% Recovery	50-140			84	79
4-Bromofluorobenzene	% Recovery	50-140			75	85

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3378861-3378862 The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

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Certificate of Analysis

AGAT WORK ORDER: 21T847546

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

Total PCBs (soil)

DATE RECEIVED: 2021-12-20

DATE REPORTED: 2022-01-10

				SAMPLE DESCRIPTION:	Bh-5-2 SS1
				SAMPLE TYPE:	Soil
				DATE SAMPLED:	2021-12-20 17:00
Parameter	Unit	G / S	RDL		3378853
Polychlorinated Biphenyls	µg/g	0.35	0.1		<0.1
Moisture Content	%		0.1		18.4
Surrogate	Unit	Acceptable Limits			
Decachlorobiphenyl	%	60-130			104

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Residential/Parkland/Institutional Property Use - Coarse Textured Soils **pH range listed applies to surface soil only**
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3378853 Results are based on the dry weight of soil extracted.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popowkolof

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD
AGAT WORK ORDER: 21T847546
PROJECT: 60646784
ATTENTION TO: Arif Chowdhury
SAMPLING SITE:
SAMPLED BY:

Soil Analysis

RPT Date: Jan 10, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	3378851	3378851	<0.8	<0.8	NA	< 0.8	123%	70%	130%	91%	80%	120%	101%	70%	130%
Arsenic	3378851	3378851	4	4	NA	< 1	117%	70%	130%	92%	80%	120%	95%	70%	130%
Barium	3378851	3378851	116	125	7.5%	< 2.0	106%	70%	130%	89%	80%	120%	101%	70%	130%
Beryllium	3378851	3378851	0.7	0.8	NA	< 0.4	109%	70%	130%	94%	80%	120%	93%	70%	130%
Boron	3378851	3378851	13	14	NA	< 5	95%	70%	130%	91%	80%	120%	87%	70%	130%
Boron (Hot Water Soluble)	3394165		0.18	0.20	NA	< 0.10	85%	60%	140%	106%	70%	130%	94%	60%	140%
Cadmium	3378851	3378851	<0.5	<0.5	NA	< 0.5	114%	70%	130%	95%	80%	120%	98%	70%	130%
Chromium	3378851	3378851	26	27	3.8%	< 5	108%	70%	130%	106%	80%	120%	98%	70%	130%
Cobalt	3378851	3378851	10.8	11.1	2.7%	< 0.5	102%	70%	130%	93%	80%	120%	94%	70%	130%
Copper	3378851	3378851	19.4	20.0	3.0%	< 1.0	98%	70%	130%	98%	80%	120%	89%	70%	130%
Lead	3378851	3378851	10	10	0.0%	< 1	107%	70%	130%	95%	80%	120%	95%	70%	130%
Molybdenum	3378851	3378851	<0.5	<0.5	NA	< 0.5	109%	70%	130%	100%	80%	120%	103%	70%	130%
Nickel	3378851	3378851	21	22	4.7%	< 1	99%	70%	130%	92%	80%	120%	89%	70%	130%
Selenium	3378851	3378851	<0.8	<0.8	NA	< 0.8	101%	70%	130%	95%	80%	120%	95%	70%	130%
Silver	3378851	3378851	<0.5	<0.5	NA	< 0.5	102%	70%	130%	95%	80%	120%	91%	70%	130%
Thallium	3378851	3378851	<0.5	<0.5	NA	< 0.5	115%	70%	130%	94%	80%	120%	93%	70%	130%
Uranium	3378851	3378851	0.85	0.91	NA	< 0.50	118%	70%	130%	96%	80%	120%	102%	70%	130%
Vanadium	3378851	3378851	37.0	37.3	0.8%	< 0.4	110%	70%	130%	87%	80%	120%	86%	70%	130%
Zinc	3378851	3378851	51	51	0.0%	< 5	107%	70%	130%	97%	80%	120%	102%	70%	130%
Chromium, Hexavalent	3379720		<0.2	<0.2	NA	< 0.2	94%	70%	130%	93%	80%	120%	92%	70%	130%
Cyanide, Free	3394289		<0.040	<0.040	NA	< 0.040	95%	70%	130%	106%	80%	120%	104%	70%	130%
Mercury	3378851	3378851	<0.10	<0.10	NA	< 0.10	101%	70%	130%	100%	80%	120%	102%	70%	130%
Electrical Conductivity (2:1)	3378851	3378851	0.249	0.250	0.4%	< 0.005	109%	80%	120%	NA			NA		
Sodium Adsorption Ratio (2:1) (Calc.)	3378851	3378851	1.08	1.09	0.9%	N/A	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	3384671		6.59	6.91	4.7%	NA	99%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

O. Reg. 153(511) - Metals & Inorganics (Soil)															
pH, 2:1 CaCl2 Extraction	3378855	3378855	6.79	7.20	5.9%		99%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By: Amanjot Bhela

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD
AGAT WORK ORDER: 21T847546
PROJECT: 60646784
ATTENTION TO: Arif Chowdhury
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Jan 10, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	3354673		< 0.05	< 0.05	NA	< 0.05	90%	50%	140%	97%	50%	140%	93%	50%	140%
Acenaphthylene	3354673		< 0.05	< 0.05	NA	< 0.05	105%	50%	140%	85%	50%	140%	92%	50%	140%
Acenaphthene	3354673		< 0.05	< 0.05	NA	< 0.05	78%	50%	140%	90%	50%	140%	91%	50%	140%
Fluorene	3354673		< 0.05	< 0.05	NA	< 0.05	85%	50%	140%	75%	50%	140%	78%	50%	140%
Phenanthrene	3354673		< 0.05	< 0.05	NA	< 0.05	71%	50%	140%	93%	50%	140%	78%	50%	140%
Anthracene	3354673		< 0.05	< 0.05	NA	< 0.05	82%	50%	140%	92%	50%	140%	85%	50%	140%
Fluoranthene	3354673		< 0.05	< 0.05	NA	< 0.05	93%	50%	140%	101%	50%	140%	93%	50%	140%
Pyrene	3354673		< 0.05	< 0.05	NA	< 0.05	92%	50%	140%	71%	50%	140%	92%	50%	140%
Benz(a)anthracene	3354673		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	85%	50%	140%	101%	50%	140%
Chrysene	3354673		< 0.05	< 0.05	NA	< 0.05	78%	50%	140%	93%	50%	140%	54%	50%	140%
Benzo(b)fluoranthene	3354673		< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	92%	50%	140%	85%	50%	140%
Benzo(k)fluoranthene	3354673		< 0.05	< 0.05	NA	< 0.05	93%	50%	140%	105%	50%	140%	93%	50%	140%
Benzo(a)pyrene	3354673		< 0.05	< 0.05	NA	< 0.05	82%	50%	140%	98%	50%	140%	92%	50%	140%
Indeno(1,2,3-cd)pyrene	3354673		< 0.05	< 0.05	NA	< 0.05	91%	50%	140%	86%	50%	140%	98%	50%	140%
Dibenz(a,h)anthracene	3354673		< 0.05	< 0.05	NA	< 0.05	105%	50%	140%	85%	50%	140%	105%	50%	140%
Benzo(g,h,i)perylene	3354673		< 0.05	< 0.05	NA	< 0.05	78%	50%	140%	80%	50%	140%	98%	50%	140%
Total PCBs (soil)															
Polychlorinated Biphenyls	3393873		< 0.1	< 0.1	NA	< 0.1	105%	60%	140%	103%	60%	140%	105%	60%	140%
O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)															
F1 (C6 - C10)	3394272		<5	<5	NA	< 5	102%	60%	140%	104%	60%	140%	94%	60%	140%
F2 (C10 to C16)	3386566		< 10	< 10	NA	< 10	78%	60%	140%	76%	60%	140%	61%	60%	140%
F3 (C16 to C34)	3386566		< 50	< 50	NA	< 50	84%	60%	140%	84%	60%	140%	76%	60%	140%
F4 (C34 to C50)	3386566		< 50	< 50	NA	< 50	78%	60%	140%	87%	60%	140%	68%	60%	140%
O. Reg. 153(511) - VOCs (Soil)															
Dichlorodifluoromethane	3377976		< 0.05	< 0.05	NA	< 0.05	82%	50%	140%	80%	50%	140%	110%	50%	140%
Vinyl Chloride	3377976		< 0.02	< 0.02	NA	< 0.02	105%	50%	140%	84%	50%	140%	80%	50%	140%
Bromomethane	3377976		< 0.05	< 0.05	NA	< 0.05	105%	50%	140%	97%	50%	140%	100%	50%	140%
Trichlorofluoromethane	3377976		< 0.05	< 0.05	NA	< 0.05	77%	50%	140%	84%	50%	140%	93%	50%	140%
Acetone	3377976		< 0.50	< 0.50	NA	< 0.50	96%	50%	140%	101%	50%	140%	101%	50%	140%
1,1-Dichloroethylene	3377976		< 0.05	< 0.05	NA	< 0.05	91%	50%	140%	96%	60%	130%	85%	50%	140%
Methylene Chloride	3377976		< 0.05	< 0.05	NA	< 0.05	92%	50%	140%	100%	60%	130%	87%	50%	140%
Trans- 1,2-Dichloroethylene	3377976		< 0.05	< 0.05	NA	< 0.05	88%	50%	140%	86%	60%	130%	81%	50%	140%
Methyl tert-butyl Ether	3377976		< 0.05	< 0.05	NA	< 0.05	91%	50%	140%	79%	60%	130%	91%	50%	140%
1,1-Dichloroethane	3377976		< 0.02	< 0.02	NA	< 0.02	76%	50%	140%	71%	60%	130%	83%	50%	140%
Methyl Ethyl Ketone	3377976		< 0.50	< 0.50	NA	< 0.50	102%	50%	140%	98%	50%	140%	103%	50%	140%
Cis- 1,2-Dichloroethylene	3377976		< 0.02	< 0.02	NA	< 0.02	98%	50%	140%	111%	60%	130%	89%	50%	140%
Chloroform	3377976		< 0.04	< 0.04	NA	< 0.04	114%	50%	140%	80%	60%	130%	82%	50%	140%
1,2-Dichloroethane	3377976		< 0.03	< 0.03	NA	< 0.03	97%	50%	140%	86%	60%	130%	77%	50%	140%

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD
AGAT WORK ORDER: 21T847546
PROJECT: 60646784
ATTENTION TO: Arif Chowdhury
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jan 10, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,1,1-Trichloroethane	3377976		< 0.05	< 0.05	NA	< 0.05	89%	50%	140%	80%	60%	130%	82%	50%	140%
Carbon Tetrachloride	3377976		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	85%	60%	130%	79%	50%	140%
Benzene	3377976		< 0.02	< 0.02	NA	< 0.02	109%	50%	140%	81%	60%	130%	89%	50%	140%
1,2-Dichloropropane	3377976		< 0.03	< 0.03	NA	< 0.03	91%	50%	140%	88%	60%	130%	78%	50%	140%
Trichloroethylene	3377976		< 0.03	< 0.03	NA	< 0.03	101%	50%	140%	100%	60%	130%	90%	50%	140%
Bromodichloromethane	3377976		< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	94%	60%	130%	80%	50%	140%
Methyl Isobutyl Ketone	3377976		< 0.50	< 0.50	NA	< 0.50	105%	50%	140%	105%	50%	140%	103%	50%	140%
1,1,2-Trichloroethane	3377976		< 0.04	< 0.04	NA	< 0.04	114%	50%	140%	87%	60%	130%	118%	50%	140%
Toluene	3377976		< 0.05	< 0.05	NA	< 0.05	119%	50%	140%	98%	60%	130%	87%	50%	140%
Dibromochloromethane	3377976		< 0.05	< 0.05	NA	< 0.05	83%	50%	140%	97%	60%	130%	118%	50%	140%
Ethylene Dibromide	3377976		< 0.04	< 0.04	NA	< 0.04	99%	50%	140%	95%	60%	130%	100%	50%	140%
1,1,1,2-Tetrachloroethane	3377976		< 0.04	< 0.04	NA	< 0.04	80%	50%	140%	82%	60%	130%	94%	50%	140%
Chlorobenzene	3377976		< 0.05	< 0.05	NA	< 0.05	93%	50%	140%	104%	60%	130%	97%	50%	140%
Ethylbenzene	3377976		< 0.05	< 0.05	NA	< 0.05	106%	50%	140%	88%	60%	130%	85%	50%	140%
m & p-Xylene	3377976		< 0.05	< 0.05	NA	< 0.05	100%	50%	140%	107%	60%	130%	107%	50%	140%
Bromoform	3377976		< 0.05	< 0.05	NA	< 0.05	80%	50%	140%	99%	60%	130%	86%	50%	140%
Styrene	3377976		< 0.05	< 0.05	NA	< 0.05	72%	50%	140%	112%	60%	130%	119%	50%	140%
1,1,2,2-Tetrachloroethane	3377976		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	91%	60%	130%	111%	50%	140%
o-Xylene	3377976		< 0.05	< 0.05	NA	< 0.05	76%	50%	140%	80%	60%	130%	101%	50%	140%
1,3-Dichlorobenzene	3377976		< 0.05	< 0.05	NA	< 0.05	72%	50%	140%	91%	60%	130%	73%	50%	140%
1,4-Dichlorobenzene	3377976		< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	92%	60%	130%	83%	50%	140%
1,2-Dichlorobenzene	3377976		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	105%	60%	130%	81%	50%	140%
n-Hexane	3377976		< 0.05	< 0.05	NA	< 0.05	73%	50%	140%	88%	60%	130%	74%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T847546

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T847546

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluorene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benz(a)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
1 and 2 Methlynaphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
F1 (C6 - C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T847546

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Bromomethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T847546

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Bromoform	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5002	modified from EPA 5035A & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	modified from EPA 5035A & EPA 8260D	(P&T)GC/MS
Moisture Content	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Polychlorinated Biphenyls	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Moisture Content	ORG-91-5009	CCME Tier 1 Method	BALANCE

AGAT Laboratories

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Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 21T847546

Cooler Quantity: 1 large black

Arrival Temperatures: 3.0 | 2.2 | 2.4

Custody Seal Intact: ☐ Yes ☐ No ☑ N/A

Notes: free ice

Report Information:

Company: AECOM Canada Ltd

Contact: Arif Chowdhury / Dhwanish Parikh

Address: 105 Commerce Valley Dr W, 7th Floor Markham, ON

Phone: 4169205596 Fax:

Reports to be sent to:

1. Email: Arif.Chowdhury@aecom.com
2. Email: dhwanish.Parikh@aecom.com

Regulatory Requirements:

(Please check all applicable boxes)

☑ Regulation 153/04

Table 2 (Indicate One)

☑ Ind/Com

☐ Res/Park

☐ Agriculture

Soil Texture (Check One)

☑ Coarse

☐ Fine

☐ Excess Soils R406

Table ____ (Indicate One)

☐ Regulation 558

☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm

Region ____

☐ Prov. Water Quality Objectives (PWQO)

☐ Other ____ (Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply): ____

Please provide prior notification for rush TAT

*TAT is exclusive of weekends and statutory holidays

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 60646784

Site Location: Site 5

Sampled By: Dhwanish Parikh

AGAT Quote #: ____ PO: ____

Please note: If quotation number is not provided, client will be billed full price for analysis.

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:

Contact:

Address:

Email:

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs Analyze F4G if required ☐ Yes ☐ No	PAHs	PCBs	VOC	O. Reg 558: Landfill Disposal Characterization TCLP: TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	Potentially Hazardous or High Concentration (Y/N)
Bh-5-1 SS2	Dec 20, 2021	5:00 PM	1	S			X										
Bh-5-2 SS1	|	|	3	|			X			X	X						
Bh-5-3 SS1	|	|	1	|			X										
Bh-5-4 SS2	|	|	1	|			X										
Bh-5-5 SS2	|	|	1	|			X										
Bh-5-1 SS1	|	|	1	|						X							
Bh-5-2 SS2	|	|	2	|					X			X					
Bh-5-3 SS6A	|	|	2	|					X			X					

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Dhwanish Parikh [signature]	Dec 20, 2021	6:20	Adriana Bellavia [signature]		

'21DEC20 6:20PM

Page ____ of ____

Nº: T 128993

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CLIENT NAME: AECOM CANADA LTD
105 COMMERCE VALLEY DR.W 7TH FLOOR
MARKHAM, ON L3T7W3
(905) 886-7022

ATTENTION TO: Arif Chowdhury

PROJECT: 60646784

AGAT WORK ORDER: 21T848552

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Jan 10, 2022

PAGES (INCLUDING COVER): 9

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T848552
PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD
SAMPLING SITE:Site 6

ATTENTION TO: Arif Chowdhury
SAMPLED BY:Dhwanish P.

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-12-22

DATE REPORTED: 2022-01-10

SAMPLE DESCRIPTION:				BH6-1/MW SS2	BH6-1/MW SS4	BH6-2 SS1	BH6-3 SS1	BH6-3 SS3
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2021-12-22 13:00	2021-12-22 13:00	2021-12-22 13:00	2021-12-22 13:00	2021-12-22 13:00
Parameter	Unit	G / S	RDL	3386920	3386921	3386923	3386924	3386925
Antimony	µg/g	40	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	5	5	5	4	4
Barium	µg/g	670	2.0	96.1	98.6	57.6	111	103
Beryllium	µg/g	8	0.4	0.8	0.5	0.5	0.7	0.6
Boron	µg/g	120	5	6	8	7	5	9
Boron (Hot Water Soluble)	µg/g	2	0.10	0.24	<0.10	0.32	0.11	<0.10
Cadmium	µg/g	1.9	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/g	160	5	26	24	20	25	26
Cobalt	µg/g	80	0.5	12.9	13.9	9.9	10.6	14.1
Copper	µg/g	230	1.0	26.0	26.2	21.9	20.6	23.1
Lead	µg/g	120	1	14	10	8	13	10
Molybdenum	µg/g	40	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	µg/g	270	1	27	26	20	22	26
Selenium	µg/g	5.5	0.8	<0.8	<0.8	0.8	<0.8	<0.8
Silver	µg/g	40	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	µg/g	3.3	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Uranium	µg/g	33	0.50	0.72	0.63	0.59	0.65	0.71
Vanadium	µg/g	86	0.4	36.4	32.1	29.1	35.8	31.6
Zinc	µg/g	340	5	72	58	56	62	58
Chromium, Hexavalent	µg/g	8	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040	<0.040	<0.040	<0.040
Mercury	µg/g	3.9	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	1.4	0.005	0.477	0.201	0.175	1.01	0.413
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	12	N/A	0.709	0.385	0.185	0.430	0.770
pH, 2:1 CaCl2 Extraction	pH Units	5.0-9.0	NA	7.10	7.45	7.52	7.55	7.63

Certified By:

AGAT Laboratories

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 21T848552

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 6

SAMPLED BY:Dhwanish P.

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-12-22

DATE REPORTED: 2022-01-10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3386920-3386925 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 21T848552

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 6

SAMPLED BY:Dhwanish P.

Total PCBs (soil)

DATE RECEIVED: 2021-12-22

DATE REPORTED: 2022-01-10

				SAMPLE DESCRIPTION:	BH6-1/MW SS1	BH6-2 SS1
				SAMPLE TYPE:	Soil	Soil
				DATE SAMPLED:	2021-12-22 13:00	2021-12-22 13:00
Parameter	Unit	G / S	RDL		3386922	3386923
Polychlorinated Biphenyls	µg/g	1.1	0.1		<0.1	<0.1
Moisture Content	%		0.1		12.8	16.4
Surrogate	Unit	Acceptable Limits				
Decachlorobiphenyl	%	60-130			120	112

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3386922-3386923 Results are based on the dry weight of soil extracted.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

AGAT Laboratories

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD
PROJECT: 60646784
SAMPLING SITE:Site 6

AGAT WORK ORDER: 21T848552
ATTENTION TO: Arif Chowdhury
SAMPLED BY:Dhwanish P.

Soil Analysis

RPT Date: Jan 10, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	3386556		<0.8	<0.8	NA	< 0.8	117%	70%	130%	103%	80%	120%	87%	70%	130%
Arsenic	3386556		3	3	NA	< 1	119%	70%	130%	109%	80%	120%	113%	70%	130%
Barium	3386556		37.2	38.5	3.4%	< 2.0	110%	70%	130%	110%	80%	120%	112%	70%	130%
Beryllium	3386556		<0.4	<0.4	NA	< 0.4	74%	70%	130%	93%	80%	120%	94%	70%	130%
Boron	3386556		<5	<5	NA	< 5	72%	70%	130%	93%	80%	120%	87%	70%	130%
Boron (Hot Water Soluble)	3387208		0.39	0.37	NA	< 0.10	95%	60%	140%	97%	70%	130%	107%	60%	140%
Cadmium	3386556		<0.5	<0.5	NA	< 0.5	107%	70%	130%	104%	80%	120%	103%	70%	130%
Chromium	3386556		11	11	NA	< 5	93%	70%	130%	96%	80%	120%	106%	70%	130%
Cobalt	3386556		4.8	4.7	2.1%	< 0.5	97%	70%	130%	91%	80%	120%	102%	70%	130%
Copper	3386556		12.7	13.0	2.3%	< 1.0	96%	70%	130%	98%	80%	120%	105%	70%	130%
Lead	3386556		10	10	0.0%	< 1	98%	70%	130%	101%	80%	120%	105%	70%	130%
Molybdenum	3386556		<0.5	<0.5	NA	< 0.5	123%	70%	130%	105%	80%	120%	119%	70%	130%
Nickel	3386556		8	8	0.0%	< 1	96%	70%	130%	92%	80%	120%	102%	70%	130%
Selenium	3386556		1.1	<0.8	NA	< 0.8	104%	70%	130%	114%	80%	120%	114%	70%	130%
Silver	3386556		<0.5	<0.5	NA	< 0.5	98%	70%	130%	101%	80%	120%	101%	70%	130%
Thallium	3386556		<0.5	<0.5	NA	< 0.5	96%	70%	130%	98%	80%	120%	100%	70%	130%
Uranium	3386556		<0.50	<0.50	NA	< 0.50	102%	70%	130%	98%	80%	120%	107%	70%	130%
Vanadium	3386556		20.0	20.5	2.5%	< 0.4	98%	70%	130%	90%	80%	120%	106%	70%	130%
Zinc	3386556		52	52	0.0%	< 5	102%	70%	130%	104%	80%	120%	118%	70%	130%
Chromium, Hexavalent	3387226		<0.2	<0.2	NA	< 0.2	104%	70%	130%	103%	80%	120%	81%	70%	130%
Cyanide, Free	3406495		<0.040	<0.040	NA	< 0.040	105%	70%	130%	104%	80%	120%	105%	70%	130%
Mercury	3386556		<0.10	<0.10	NA	< 0.10	104%	70%	130%	94%	80%	120%	100%	70%	130%
Electrical Conductivity (2:1)	3411794		0.184	0.190	3.2%	< 0.005	109%	80%	120%						
Sodium Adsorption Ratio (2:1) (Calc.)	3411794		0.098	0.099	1.0%	NA									
pH, 2:1 CaCl2 Extraction	3383368		6.67	6.74	1.0%	NA	99%	80%	120%						

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:

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http://www.agatlabs.com

Quality Assurance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T848552

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 6

SAMPLED BY:Dhwanish P.

Trace Organics Analysis

RPT Date: Jan 10, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total PCBs (soil)															
Polychlorinated Biphenyls	3393873		< 0.1	< 0.1	NA	< 0.1	105%	60%	140%	103%	60%	140%	105%	60%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: N Popnikolof

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T848552

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 6

SAMPLED BY:Dhwanish P.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T848552

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 6

SAMPLED BY:Dhwanish P.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Polychlorinated Biphenyls	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Moisture Content	ORG-91-5009	CCME Tier 1 Method	BALANCE

AGAT Laboratories

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webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 21T848552

Cooler Quantity: 1
Arrival Temperatures: 6 | 5.3 | 6.6

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes: ice

Report Information:

Company: AECOM Canada Ltd
Contact: Arif Chowdhury / Dhwanish Parikh
Address: 105 Commerce Valley Dr W, 7th floor
Markham, ON
Phone: 416 420 5590 Fax:
Reports to be sent to:
1. Email: Arif.chowdhury@aecom.com
2. Email: dhwanish.parikh@aecom.com

Regulatory Requirements:

☐ No Regulatory Requirement
(Please check all applicable boxes)

☑ Regulation 153/04
Table 2 (Indicate One)
☑ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture (Check One)
☑ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region _____ (Indicate One)
☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
(Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: G0646784
Site Location: Site 6
Sampled By: Dhwanish Parikh
AGAT Quote #: _____ PO: _____
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	O. Reg 153: Metals and Inorganics	O. Reg 153: All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals ☐ 153 Metals (incl. Hydrides)	O. Reg 153: ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ Cr^{6+} ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2	Volatiles: ☐ VOC ☐ BTEX ☐ THM	PHCs F1 - F4	ABNs	PAHs	PCBs: ☑ Total ☐ Aroclors	Organochlorine Pesticides	TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Sewer Use						Potentially Hazardous or High Concentration (Y/N)
BH6-1/MW SS2	Dec 22,2021	1:00	1	S			X										X										
BH6-1/MW SS4			1	S			X										X										
BH6-1/MW SS1			1	S													X										
BH6-2 SS1			1	S			X										X										
BH6-3 SS1			1	S			X										X										
BH6-3 SS3			1	S			X										X										

Samples Relinquished By (Print Name and Sign): Dhwanish Parikh	Date Dec 22,2021	Time 2:00	Samples Received By (Print Name and Sign):	Date	Time 3:02	21 DEC 22 3:02 PM	
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time	Page ____ of ____	
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time	N°: T 092404	

Document ID: DOC-FR-151-016

Pink Copy - Client | Yellow Copy - AGAT | White Copy- AGAT

Date Issued: March 23, 2019

AGAT Laboratories

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CLIENT NAME: AECOM CANADA LTD
105 COMMERCE VALLEY DR.W 7TH FLOOR
MARKHAM, ON L3T7W3
(905) 886-7022

ATTENTION TO: Arif Chowdhury

PROJECT: 60646784

AGAT WORK ORDER: 21T848556

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Lab Manager

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

DATE REPORTED: Jan 11, 2022

PAGES (INCLUDING COVER): 9

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T848556

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 9

SAMPLED BY:Dhwanish P.

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-12-22

DATE REPORTED: 2022-01-11

SAMPLE DESCRIPTION:				BH9-1 SS2	BH9-1 SS4	BH9-2 SS1	BH9-2 SS3	BH9-2 SS7	BH9-3/MW SS3	BH9-3/MW SS6
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2021-12-22 13:00	2021-12-22 13:00	2021-12-22 13:00	2021-12-22 13:00	2021-12-22 13:00	2021-12-22 13:00	2021-12-22 13:00
Parameter	Unit	G / S	RDL	3387023	3387024	3387025	3387026	3387027	3387029	3387030
Antimony	µg/g	1.3	0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	6	6	4	5	5	3	8
Barium	µg/g	220	2.0	85.2	84.5	84.7	94.3	109	52.9	84.3
Beryllium	µg/g	2.5	0.4	0.5	0.6	0.6	0.6	0.7	<0.4	0.9
Boron	µg/g	36	5	10	9	7	9	10	7	8
Boron (Hot Water Soluble)	µg/g	NA	0.10	0.12	0.14	0.30	0.13	<0.10	0.25	<0.10
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/g	70	5	22	22	20	22	25	17	26
Cobalt	µg/g	21	0.5	13.7	13.0	10.2	12.5	12.9	6.5	14.6
Copper	µg/g	92	1.0	40.6	38.3	25.3	34.1	27.5	13.6	37.9
Lead	µg/g	120	1	12	10	12	10	11	9	12
Molybdenum	µg/g	2	0.5	0.5	<0.5	<0.5	0.5	<0.5	1.4	<0.5
Nickel	µg/g	82	1	25	24	19	23	25	11	31
Selenium	µg/g	1.5	0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Silver	µg/g	0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	µg/g	1	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Uranium	µg/g	2.5	0.50	0.68	0.68	0.67	0.72	0.73	1.27	0.55
Vanadium	µg/g	86	0.4	33.0	30.7	30.5	29.8	33.7	24.3	38.0
Zinc	µg/g	290	5	77	56	61	55	76	49	61
Chromium, Hexavalent	µg/g	0.66	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	0.57	0.005	0.270	0.296	0.312	0.299	0.284	0.449	0.266
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	2.4	N/A	0.251	0.375	0.247	0.318	0.222	0.261	0.146
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.59	7.58	7.43	7.54	7.60	7.55	7.65

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T848556

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 9

SAMPLED BY:Dhwanish P.

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-12-22

DATE REPORTED: 2022-01-11

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3387023-3387030 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T848556

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 9

SAMPLED BY:Dhwanish P.

Total PCBs (soil)

DATE RECEIVED: 2021-12-22

DATE REPORTED: 2022-01-11

		SAMPLE DESCRIPTION:		BH9-1 SS1	BH9-3/MW SS1
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2021-12-22 13:00	2021-12-22 13:00
Parameter	Unit	G / S	RDL	3386927	3387028
Polychlorinated Biphenyls	µg/g	1.1	0.1	<0.1	<0.1
Moisture Content	%		0.1	13.1	17.9
Surrogate	Unit	Acceptable Limits			
Decachlorobiphenyl	%	60-130		120	116

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3386927-3387028 Results are based on the dry weight of soil extracted.

Analysis performed at AGAT Toronto (unless marked by *)

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD
AGAT WORK ORDER: 21T848556
PROJECT: 60646784
ATTENTION TO: Arif Chowdhury
SAMPLING SITE:Site 9
SAMPLED BY:Dhwanish P.

Soil Analysis

RPT Date: Jan 11, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	3393314		<0.8	<0.8	NA	< 0.8	113%	70%	130%	98%	80%	120%	103%	70%	130%
Arsenic	3393314		<1	<1	NA	< 1	120%	70%	130%	102%	80%	120%	110%	70%	130%
Barium	3393314		8.0	8.4	NA	< 2.0	114%	70%	130%	103%	80%	120%	112%	70%	130%
Beryllium	3393314		<0.4	<0.4	NA	< 0.4	84%	70%	130%	115%	80%	120%	102%	70%	130%
Boron	3393314		<5	<5	NA	< 5	79%	70%	130%	115%	80%	120%	116%	70%	130%
Boron (Hot Water Soluble)	3393314		<0.10	<0.10	NA	< 0.10	112%	60%	140%	98%	70%	130%	102%	60%	140%
Cadmium	3393314		<0.5	<0.5	NA	< 0.5	91%	70%	130%	102%	80%	120%	110%	70%	130%
Chromium	3393314		<5	<5	NA	< 5	107%	70%	130%	102%	80%	120%	114%	70%	130%
Cobalt	3393314		2.4	2.4	NA	< 0.5	110%	70%	130%	104%	80%	120%	114%	70%	130%
Copper	3393314		2.6	2.8	NA	< 1.0	102%	70%	130%	97%	80%	120%	102%	70%	130%
Lead	3393314		2	2	NA	< 1	107%	70%	130%	108%	80%	120%	103%	70%	130%
Molybdenum	3393314		0.8	<0.5	NA	< 0.5	123%	70%	130%	109%	80%	120%	123%	70%	130%
Nickel	3393314		1	<1	NA	< 1	111%	70%	130%	106%	80%	120%	106%	70%	130%
Selenium	3393314		<0.8	<0.8	NA	< 0.8	100%	70%	130%	109%	80%	120%	112%	70%	130%
Silver	3393314		<0.5	<0.5	NA	< 0.5	102%	70%	130%	112%	80%	120%	100%	70%	130%
Thallium	3393314		<0.5	<0.5	NA	< 0.5	101%	70%	130%	106%	80%	120%	103%	70%	130%
Uranium	3393314		<0.50	<0.50	NA	< 0.50	120%	70%	130%	114%	80%	120%	114%	70%	130%
Vanadium	3393314		8.5	8.8	3.5%	< 0.4	112%	70%	130%	103%	80%	120%	117%	70%	130%
Zinc	3393314		8	8	NA	< 5	106%	70%	130%	97%	80%	120%	113%	70%	130%
Chromium, Hexavalent	3387226		<0.2	<0.2	NA	< 0.2	104%	70%	130%	103%	80%	120%	81%	70%	130%
Cyanide, Free	3406495		<0.040	<0.040	NA	< 0.040	105%	70%	130%	104%	80%	120%	105%	70%	130%
Mercury	3393314		<0.10	<0.10	NA	< 0.10	104%	70%	130%	100%	80%	120%	97%	70%	130%
Electrical Conductivity (2:1)	3387023	3387023	0.270	0.264	2.2%	< 0.005	103%	80%	120%	NA			NA		
Sodium Adsorption Ratio (2:1) (Calc.)	3387023	3387023	0.251	0.262	4.3%	NA	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	3383368		6.67	6.74	1.0%	NA	99%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T848556

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 9

SAMPLED BY:Dhwanish P.

Trace Organics Analysis

RPT Date: Jan 11, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total PCBs (soil)															
Polychlorinated Biphenyls	3393873		< 0.1	< 0.1	NA	< 0.1	105%	60%	140%	103%	60%	140%	105%	60%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T848556

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 9

SAMPLED BY:Dhwanish P.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T848556

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 9

SAMPLED BY:Dhwanish P.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Polychlorinated Biphenyls	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Moisture Content	ORG-91-5009	CCME Tier 1 Method	BALANCE

AGAT Laboratories

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webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: AECOM Canada Ltd.
Contact: Arif Chowdhury / Dhwanish Parikh
Address: 105 Commerce Valley Dr W, 7th Floor
Markham, ON
Phone: 416 420 5590 Fax:
Reports to be sent to:
1. Email: Arif.chowdhury@aecom.com
2. Email: dhwanish.parikh@aecom.com

Project Information:

Project: 60647871
Site Location: Site 9
Sampled By: Dhwanish Parikh
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☐ No ☐
Company:
Contact:
Address:
Email:

Regulatory Requirements:

☐ No Regulatory Requirement
(Please check all applicable boxes)

☑ Regulation 153/04 — Table 2 (Indicate One): ☑ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (Check One): ☑ Coarse ☐ Fine

☐ Sewer Use — ☐ Sanitary ☐ Storm
Region: (Indicate One) ☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
(Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☐ No

Laboratory Use Only

Work Order #: 21T848556
Cooler Quantity:
Arrival Temperatures: 7.9 | 8.3 | 8.1
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes: ice

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day
OR Date Required (Rush Surcharges May Apply):
Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*
For 'Same Day' analysis, please contact your AGAT CPM

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	O. Reg 153: Metals and Inorganics	O. Reg 153: All Metals / 153 Metals (excl. Hydrides) / Hydride Metals / 153 Metals (incl. Hydrides)	O. Reg 153: ORPs: B-HWS, Cl, CN, Cr6+, EC, FOC, Hg, pH, SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: TP, NH3, TKN, NO3, NO2, NO2+NO3	Volatiles: VOC, BTEX, THM	PHCs F1 - F4	ABNs	PAHs	PCBs: Total, Aroclors	Organochlorine Pesticides	TCLP: M&I, VOCs, ABNs, B(a)P, PCBs	Sewer Use	Potentially Hazardous or High Concentration (Y/N)
Bh9-1 SS1	Dec 22, 2021	1:00	1	S													X				
Bh9-1 SS2			1				X														
Bh9-1 SS4			1				X														
Bh9-2 SS1			1				X														
Bh9-2 SS3			1				X														
Bh9-2 SS7			1				X														
Bh9-3/MW SS1			1														X				
Bh9-3/MW SS3			1				X														
Bh9-3/MW SS6			1				X														

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Dhwanish Parikh	Dec 22, 2021		Simi Z		3:03

21 DEC 22 3:03

Page ____ of ____

No: T 092405

Document ID: DIV 78-1511-016

Pink Copy - Client | Yellow Copy - AGAT | White Copy- AGAT

Date Issued: March 22, 2019

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CLIENT NAME: AECOM CANADA LTD
105 Commerce Valley Drive West 7th Floor
MARKHAM, ON L3T7W3
(905) 886-7022
ATTENTION TO: Arif Chowdhury
PROJECT: 60646784
AGAT WORK ORDER: 22T853926
SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer
DATE REPORTED: Jan 25, 2022
PAGES (INCLUDING COVER): 6
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.

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Certificate of Analysis

AGAT WORK ORDER: 22T853926

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 3

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2022-01-14

DATE REPORTED: 2022-01-25

		SAMPLE DESCRIPTION:		BH-3-2 SS3	BH-3-2 SS2
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2022-01-14 13:30	2022-01-14 13:30
Parameter	Unit	G / S	RDL	3428845	3428846
Antimony	µg/g	40	0.8	<0.8	<0.8
Arsenic	µg/g	18	1	6	7
Barium	µg/g	670	2.0	94.1	100
Beryllium	µg/g	8	0.4	0.7	0.6
Boron	µg/g	120	5	7	12
Boron (Hot Water Soluble)	µg/g	2	0.10	0.26	0.12
Cadmium	µg/g	1.9	0.5	<0.5	<0.5
Chromium	µg/g	160	5	26	27
Cobalt	µg/g	80	0.5	13.6	14.8
Copper	µg/g	230	1.0	39.4	35.8
Lead	µg/g	120	1	15	11
Molybdenum	µg/g	40	0.5	<0.5	0.6
Nickel	µg/g	270	1	26	29
Selenium	µg/g	5.5	0.8	<0.8	<0.8
Silver	µg/g	40	0.5	<0.5	<0.5
Thallium	µg/g	3.3	0.5	<0.5	<0.5
Uranium	µg/g	33	0.50	0.66	0.60
Vanadium	µg/g	86	0.4	39.1	37.0
Zinc	µg/g	340	5	73	66
Chromium, Hexavalent	µg/g	8	0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040
Mercury	µg/g	3.9	0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	1.4	0.005	0.267	0.402
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	12	N/A	0.209	3.59
pH, 2:1 CaCl2 Extraction	pH Units	5.0-9.0	NA	7.22	7.38

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 22T853926

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 3

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2022-01-14

DATE REPORTED: 2022-01-25

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3428845-3428846 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD
AGAT WORK ORDER: 22T853926
PROJECT: 60646784
ATTENTION TO: Arif Chowdhury
SAMPLING SITE:Site 3
SAMPLED BY:

Soil Analysis

RPT Date: Jan 25, 2022			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	3345073		<0.8	<0.8	NA	< 0.8	129%	70%	130%	93%	80%	120%	77%	70%	130%
Arsenic	3345073		26	26	0.0%	< 1	103%	70%	130%	97%	80%	120%	106%	70%	130%
Barium	3345073		271	269	0.7%	< 2.0	118%	70%	130%	99%	80%	120%	107%	70%	130%
Beryllium	3345073		0.4	<0.4	NA	< 0.4	104%	70%	130%	98%	80%	120%	81%	70%	130%
Boron	3345073		19	19	NA	< 5	84%	70%	130%	101%	80%	120%	78%	70%	130%
Boron (Hot Water Soluble)	3430303		<0.10	<0.10	NA	< 0.10	106%	60%	140%	97%	70%	130%	97%	60%	140%
Cadmium	3345073		1.0	1.0	NA	< 0.5	103%	70%	130%	99%	80%	120%	100%	70%	130%
Chromium	3345073		13	13	NA	< 5	120%	70%	130%	106%	80%	120%	106%	70%	130%
Cobalt	3345073		9.3	9.4	1.1%	< 0.5	130%	70%	130%	108%	80%	120%	107%	70%	130%
Copper	3345073		23.0	22.7	1.3%	< 1.0	112%	70%	130%	108%	80%	120%	98%	70%	130%
Lead	3345073		99	99	0.0%	< 1	117%	70%	130%	105%	80%	120%	96%	70%	130%
Molybdenum	3345073		1.6	1.6	NA	< 0.5	130%	70%	130%	103%	80%	120%	121%	70%	130%
Nickel	3345073		14	14	0.0%	< 1	126%	70%	130%	106%	80%	120%	99%	70%	130%
Selenium	3345073		2.9	2.8	NA	< 0.8	105%	70%	130%	105%	80%	120%	117%	70%	130%
Silver	3345073		<0.5	<0.5	NA	< 0.5	99%	70%	130%	100%	80%	120%	93%	70%	130%
Thallium	3345073		<0.5	<0.5	NA	< 0.5	122%	70%	130%	99%	80%	120%	98%	70%	130%
Uranium	3345073		<0.50	<0.50	NA	< 0.50	127%	70%	130%	107%	80%	120%	111%	70%	130%
Vanadium	3345073		26.4	26.0	1.5%	< 0.4	122%	70%	130%	103%	80%	120%	106%	70%	130%
Zinc	3345073		435	438	0.7%	< 5	124%	70%	130%	109%	80%	120%	95%	70%	130%
Chromium, Hexavalent	3444542		<0.2	<0.2	NA	< 0.2	99%	70%	130%	98%	80%	120%	83%	70%	130%
Cyanide, Free	3430065		<0.040	<0.040	NA	< 0.040	94%	70%	130%	104%	80%	120%	94%	70%	130%
Mercury	3345073		<0.10	<0.10	NA	< 0.10	125%	70%	130%	95%	80%	120%	90%	70%	130%
Electrical Conductivity (2:1)	3430303		1.44	1.46	1.4%	< 0.005	109%	80%	120%						
Sodium Adsorption Ratio (2:1) (Calc.)	3430303		22.0	21.8	0.9%	NA									
pH, 2:1 CaCl2 Extraction	3430065		6.77	7.01	3.5%	NA	99%	80%	120%						

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 22T853926

PROJECT: 60646784

ATTENTION TO: Arif Chowdhury

SAMPLING SITE:Site 3

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: AECOM Canada Ltd.
Contact: Arif Chowdhury / Dhwanish Parikh
Address: 105 Commerce Valley Dr W, 7th Floor
Markham, ON
Phone: 416 710 5540 Fax:
Reports to be sent to:
1. Email: Arif.chowdhury@aecom.com
2. Email: dhwanish.parikh@aecom.com

Project Information:

Project: 60696784
Site Location: Site 3
Sampled By: Dhwanish Parikh
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐
Company:
Contact:
Address:
Email:

Regulatory Requirements:

(Please check all applicable boxes)

☑ Regulation 153/04
Table 2 *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture *(Check One)*
☑ Coarse
☐ Fine

☐ Excess Soils R406
Table *Indicate One*

☐ Regulation 558

☐ CCME

☐ Sewer Use
☐ Sanitary ☐ Storm
Region

☐ Prov. Water Quality Objectives (PWQO)

☐ Other
Indicate One

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☐ No

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Laboratory Use Only

Work Order #: 22T853926
Cooler Quantity: 1 Cooler
Arrival Temperatures: 9.3 | 9.4
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes:

Turnaround Time (TAT) Required:

Regular TAT ☐ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y / N	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs	O. Reg 153: Analyze F4G if required ☐ Yes ☐ No	O. Reg 153: PAHs	O. Reg 153: PCBs	O. Reg 153: VOC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	Potentially Hazardous or High Concentration (Y/N)
BH-3-2 SS3	01/11/21	1:30 AM/PM	1	S			X											
BH-3-3 SS2	01/11/21	2:00 AM/PM	1	S			X											
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																

22 JAN 14 2:05 PM

Samples Relinquished By (Print Name and Sign): Dhwanish Parikh	Date: 01/11/21	Time: 2:00	Samples Received By (Print Name and Sign): NEAC G	Date:	Time:
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign):	Date:	Time:
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign):	Date:	Time:

Page ____ of ____

Nº: T 129480

Appendix H

Groundwater Quality Results – Laboratory Certificate of Analysis

Your Project #: 60646784
Site#: SITE 3
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Your C.O.C. #: 865657-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/03/23
Report #: R7054807
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C237378
Received: 2022/02/11, 13:57

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Methylnaphthalene Sum	1	N/A	2022/02/17	CAM SOP-00301	EPA 8270D m
Dissolved Aluminum (0.2 u, clay free)	1	N/A	2022/02/14	CAM SOP-00447	EPA 6020B m
Biochemical Oxygen Demand (BOD)	1	2022/02/12	2022/02/17	CAM SOP-00427	SM 23 5210B m
1,3-Dichloropropene Sum	1	N/A	2022/02/15		EPA 8260C m
Chloride by Automated Colourimetry	1	N/A	2022/02/14	CAM SOP-00463	SM 23 4500-Cl E m
Chromium (VI) in Water	1	N/A	2022/02/15	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide	1	N/A	2022/02/16	CAM SOP-00457	OMOE E3015 m
Petroleum Hydrocarbons F2-F4 in Water (1)	1	2022/02/15	2022/02/16	CAM SOP-00316	CCME PHC-CWS m
Mercury	1	2022/02/15	2022/02/15	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	1	N/A	2022/02/14	CAM SOP-00447	EPA 6020B m
PAH Compounds in Water by GC/MS (SIM)	1	2022/02/15	2022/02/16	CAM SOP-00318	EPA 8270D m
Polychlorinated Biphenyl in Water	1	2022/02/14	2022/02/15	CAM SOP-00309	EPA 8082A m
Total Suspended Solids	1	2022/02/12	2022/02/14	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds and F1 PHCs	1	N/A	2022/02/14	CAM SOP-00230	EPA 8260C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 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 CCME, MELCC, EPA, APHA. Where applicable, the analytical testing herein was performed in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Bureau Veritas is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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 samples provided by the Client using the testing methodology referenced in this report.

Your Project #: 60646784
Site#: SITE 3
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Your C.O.C. #: 865657-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/03/23
Report #: R7054807
Version: 3 - Revision

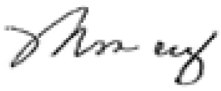
CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C237378
Received: 2022/02/11, 13:57

Interpretation and use of 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. Bureau Veritas is not responsible for the accuracy or any data impacts that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
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.
(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key



Marijane Cruz
Senior Project Manager
23 Mar 2022 11:49:27

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756
==========
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 Signature Page.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C237378
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Sampler Initials: DP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		RVK190		
Sampling Date		2022/02/11 10:30		
COC Number		865657-01-01		
	UNITS	BH-3-4	RDL	QC Batch
Inorganics				
Total BOD	mg/L	<2	2	7830878
Total Suspended Solids	mg/L	1100	10	7831000

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C237378
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Sampler Initials: DP

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		RVK190		
Sampling Date		2022/02/11 10:30		
COC Number		865657-01-01		
	UNITS	**BH-3-4**	**RDL**	**QC Batch**
Metals				
Dissolved (0.2u) Aluminum (Al)	ug/L	<5	5	7831086

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

O.REG 153 METALS & INORGANICS PKG (WTR)

Bureau Veritas ID			RVK190		
Sampling Date			2022/02/11 10:30		
COC Number			865657-01-01		
	UNITS	Criteria	BH-3-4	RDL	QC Batch
Inorganics					
WAD Cyanide (Free)	ug/L	**66**	<1	1	7836938
Dissolved Chloride (Cl-)	mg/L	**790**	210	3.0	7831168
Metals					
Chromium (VI)	ug/L	**25**	<0.50	0.50	7831933
Mercury (Hg)	ug/L	**0.29**	<0.10	0.10	7834018
Dissolved Antimony (Sb)	ug/L	**6.0**	<0.50	0.50	7831166
Dissolved Arsenic (As)	ug/L	**25**	<1.0	1.0	7831166
Dissolved Barium (Ba)	ug/L	**1000**	93	2.0	7831166
Dissolved Beryllium (Be)	ug/L	**4.0**	<0.40	0.40	7831166
Dissolved Boron (B)	ug/L	**5000**	28	10	7831166
Dissolved Cadmium (Cd)	ug/L	**2.7**	<0.090	0.090	7831166
Dissolved Chromium (Cr)	ug/L	**50**	<5.0	5.0	7831166
Dissolved Cobalt (Co)	ug/L	**3.8**	<0.50	0.50	7831166
Dissolved Copper (Cu)	ug/L	**87**	2.8	0.90	7831166
Dissolved Lead (Pb)	ug/L	**10**	<0.50	0.50	7831166
Dissolved Molybdenum (Mo)	ug/L	**70**	<0.50	0.50	7831166
Dissolved Nickel (Ni)	ug/L	**100**	2.0	1.0	7831166
Dissolved Selenium (Se)	ug/L	**10**	<2.0	2.0	7831166
Dissolved Silver (Ag)	ug/L	**1.5**	<0.090	0.090	7831166
Dissolved Sodium (Na)	ug/L	**490000**	42000	100	7831166
Dissolved Thallium (Tl)	ug/L	**2.0**	<0.050	0.050	7831166
Dissolved Uranium (U)	ug/L	**20**	2.5	0.10	7831166
Dissolved Vanadium (V)	ug/L	**6.2**	<0.50	0.50	7831166
Dissolved Zinc (Zn)	ug/L	**1100**	<5.0	5.0	7831166

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

O.REG 153 PAHS (WATER)

Bureau Veritas ID			RVK190		
Sampling Date			2022/02/11 10:30		
COC Number			865657-01-01		
	UNITS	Criteria	BH-3-4	RDL	QC Batch
Calculated Parameters					
Methylnaphthalene, 2-(1-)	ug/L	**3.2**	<0.071	0.071	7829300
Polyaromatic Hydrocarbons					
Acenaphthene	ug/L	**4.1**	<0.050	0.050	7834883
Acenaphthylene	ug/L	**1**	<0.050	0.050	7834883
Anthracene	ug/L	**2.4**	<0.050	0.050	7834883
Benzo(a)anthracene	ug/L	**1.0**	<0.050	0.050	7834883
Benzo(a)pyrene	ug/L	**0.01**	<0.0090	0.0090	7834883
Benzo(b/j)fluoranthene	ug/L	**0.1**	<0.050	0.050	7834883
Benzo(g,h,i)perylene	ug/L	**0.2**	<0.050	0.050	7834883
Benzo(k)fluoranthene	ug/L	**0.1**	<0.050	0.050	7834883
Chrysene	ug/L	**0.1**	<0.050	0.050	7834883
Dibenzo(a,h)anthracene	ug/L	**0.2**	<0.050	0.050	7834883
Fluoranthene	ug/L	**0.41**	<0.050	0.050	7834883
Fluorene	ug/L	**120**	<0.050	0.050	7834883
Indeno(1,2,3-cd)pyrene	ug/L	**0.2**	<0.050	0.050	7834883
1-Methylnaphthalene	ug/L	**3.2**	<0.050	0.050	7834883
2-Methylnaphthalene	ug/L	**3.2**	<0.050	0.050	7834883
Naphthalene	ug/L	**11**	<0.050	0.050	7834883
Phenanthrene	ug/L	**1**	<0.030	0.030	7834883
Pyrene	ug/L	**4.1**	<0.050	0.050	7834883
Surrogate Recovery (%)					
D10-Anthracene	%	-	108		7834883
D14-Terphenyl (FS)	%	-	94		7834883
D8-Acenaphthylene	%	-	94		7834883

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

O.REG 153 PCBS (WATER)

Bureau Veritas ID			RVK190		
Sampling Date			2022/02/11 10:30		
COC Number			865657-01-01		
	UNITS	Criteria	BH-3-4	RDL	QC Batch
PCBs					
Aroclor 1242	ug/L	-	<0.05	0.05	7832907
Aroclor 1248	ug/L	-	<0.05	0.05	7832907
Aroclor 1254	ug/L	-	<0.05	0.05	7832907
Aroclor 1260	ug/L	-	<0.05	0.05	7832907
Total PCB	ug/L	**3.0**	<0.05	0.05	7832907
Surrogate Recovery (%)					
Decachlorobiphenyl	%	**-**	79		7832907

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Bureau Veritas ID			RVK190		
Sampling Date			2022/02/11 10:30		
COC Number			865657-01-01		
	UNITS	Criteria	BH-3-4	RDL	QC Batch
Calculated Parameters					
1,3-Dichloropropene (cis+trans)	ug/L	**0.5**	<0.50	0.50	7829899
Volatile Organics					
Acetone (2-Propanone)	ug/L	**2700**	<10	10	7829610
Benzene	ug/L	**5.0**	<0.17	0.17	7829610
Bromodichloromethane	ug/L	**16.0**	<0.50	0.50	7829610
Bromoform	ug/L	**25.0**	<1.0	1.0	7829610
Bromomethane	ug/L	**0.89**	<0.50	0.50	7829610
Carbon Tetrachloride	ug/L	**0.79**	<0.20	0.20	7829610
Chlorobenzene	ug/L	**30**	<0.20	0.20	7829610
Chloroform	ug/L	**2.4**	<0.20	0.20	7829610
Dibromochloromethane	ug/L	**25.0**	<0.50	0.50	7829610
1,2-Dichlorobenzene	ug/L	**3.0**	<0.50	0.50	7829610
1,3-Dichlorobenzene	ug/L	**59**	<0.50	0.50	7829610
1,4-Dichlorobenzene	ug/L	**1.0**	<0.50	0.50	7829610
Dichlorodifluoromethane (FREON 12)	ug/L	**590**	<1.0	1.0	7829610
1,1-Dichloroethane	ug/L	**5**	<0.20	0.20	7829610
1,2-Dichloroethane	ug/L	**1.6**	<0.50	0.50	7829610
1,1-Dichloroethylene	ug/L	**1.6**	<0.20	0.20	7829610
cis-1,2-Dichloroethylene	ug/L	**1.6**	<0.50	0.50	7829610
trans-1,2-Dichloroethylene	ug/L	**1.6**	<0.50	0.50	7829610
1,2-Dichloropropane	ug/L	**5.0**	<0.20	0.20	7829610
cis-1,3-Dichloropropene	ug/L	**0.5**	<0.30	0.30	7829610
trans-1,3-Dichloropropene	ug/L	**0.5**	<0.40	0.40	7829610
Ethylbenzene	ug/L	**2.4**	<0.20	0.20	7829610
Ethylene Dibromide	ug/L	**0.2**	<0.20	0.20	7829610
Hexane	ug/L	**51**	<1.0	1.0	7829610
Methylene Chloride(Dichloromethane)	ug/L	**50**	<2.0	2.0	7829610
Methyl Ethyl Ketone (2-Butanone)	ug/L	**1800**	<10	10	7829610
Methyl Isobutyl Ketone	ug/L	**640**	<5.0	5.0	7829610

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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O.REG 153 VOCS BY HS & F1-F4 (WATER)

Bureau Veritas ID			RVK190		
Sampling Date			2022/02/11 10:30		
COC Number			865657-01-01		
	UNITS	Criteria	BH-3-4	RDL	QC Batch
Methyl t-butyl ether (MTBE)	ug/L	**15**	<0.50	0.50	7829610
Styrene	ug/L	**5.4**	<0.50	0.50	7829610
1,1,1,2-Tetrachloroethane	ug/L	**1.1**	<0.50	0.50	7829610
1,1,2,2-Tetrachloroethane	ug/L	**1.0**	<0.50	0.50	7829610
Tetrachloroethylene	ug/L	**1.6**	<0.20	0.20	7829610
Toluene	ug/L	**24**	<0.20	0.20	7829610
1,1,1-Trichloroethane	ug/L	**200**	<0.20	0.20	7829610
1,1,2-Trichloroethane	ug/L	**4.7**	<0.50	0.50	7829610
Trichloroethylene	ug/L	**1.6**	<0.20	0.20	7829610
Trichlorofluoromethane (FREON 11)	ug/L	**150**	<0.50	0.50	7829610
Vinyl Chloride	ug/L	**0.5**	<0.20	0.20	7829610
p+m-Xylene	ug/L	-	<0.20	0.20	7829610
o-Xylene	ug/L	-	<0.20	0.20	7829610
Total Xylenes	ug/L	**300**	<0.20	0.20	7829610
F1 (C6-C10)	ug/L	**750**	<25	25	7829610
F1 (C6-C10) - BTEX	ug/L	**750**	<25	25	7829610
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/L	**150**	<100	100	7834908
F3 (C16-C34 Hydrocarbons)	ug/L	**500**	<200	200	7834908
F4 (C34-C50 Hydrocarbons)	ug/L	**500**	<200	200	7834908
Reached Baseline at C50	ug/L	-	Yes		7834908
Surrogate Recovery (%)					
o-Terphenyl	%	-	87		7834908
4-Bromofluorobenzene	%	-	90		7829610
D4-1,2-Dichloroethane	%	-	113		7829610
D8-Toluene	%	-	94		7829610

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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Bureau Veritas Job #: C237378
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Sampler Initials: DP

TEST SUMMARY

Bureau Veritas ID: RVK190
Sample ID: BH-3-4
Matrix: Water

Collected: 2022/02/11
Shipped:
Received: 2022/02/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7829300	N/A	2022/02/17	Automated Statchk
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	7831086	N/A	2022/02/14	Nan Raykha
Biochemical Oxygen Demand (BOD)	DO	7830878	2022/02/12	2022/02/17	Surleen Kaur Romana
1,3-Dichloropropene Sum	CALC	7829899	N/A	2022/02/15	Automated Statchk
Chloride by Automated Colourimetry	KONE	7831168	N/A	2022/02/14	Alina Dobreanu
Chromium (VI) in Water	IC	7831933	N/A	2022/02/15	Theodora LI
Free (WAD) Cyanide	SKAL/CN	7836938	N/A	2022/02/16	Nimarta Singh
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7834908	2022/02/15	2022/02/16	Dennis Ngondu
Mercury	CV/AA	7834018	2022/02/15	2022/02/15	Prempal Bhatti
Dissolved Metals by ICPMS	ICP/MS	7831166	N/A	2022/02/14	Nan Raykha
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7834883	2022/02/15	2022/02/16	Jonghan Yoon
Polychlorinated Biphenyl in Water	GC/ECD	7832907	2022/02/14	2022/02/15	Farag Mansour
Total Suspended Solids	BAL	7831000	2022/02/12	2022/02/14	Shaneil Hall
Volatile Organic Compounds and F1 PHCs	GC/MSFD	7829610	N/A	2022/02/14	Juan Pangilinan

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GENERAL COMMENTS

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

Package 1	4.7°C

Revised Report (2022/03/23) : Results have been split onto separate reports per client request.

Revised Report (2022/02/28) : Reg 153 criteria and PWQO guidelines aadded per client request.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7829610	4-Bromofluorobenzene	2022/02/14	109	70 - 130	114	70 - 130	99	%				
7829610	D4-1,2-Dichloroethane	2022/02/14	103	70 - 130	98	70 - 130	97	%				
7829610	D8-Toluene	2022/02/14	103	70 - 130	101	70 - 130	93	%				
7832907	Decachlorobiphenyl	2022/02/14	100	60 - 130	72	60 - 130	59 (2)	%				
7834883	D10-Anthracene	2022/02/16	99	50 - 130	109	50 - 130	112	%				
7834883	D14-Terphenyl (FS)	2022/02/16	104	50 - 130	114	50 - 130	114	%				
7834883	D8-Acenaphthylene	2022/02/16	89	50 - 130	98	50 - 130	97	%				
7834908	o-Terphenyl	2022/02/15	96	60 - 130	97	60 - 130	99	%				
7829610	1,1,1,2-Tetrachloroethane	2022/02/14	96	70 - 130	98	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	1,1,1-Trichloroethane	2022/02/14	103	70 - 130	105	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	1,1,2,2-Tetrachloroethane	2022/02/14	84	70 - 130	85	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	1,1,2-Trichloroethane	2022/02/14	84	70 - 130	86	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	1,1-Dichloroethane	2022/02/14	84	70 - 130	88	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	1,1-Dichloroethylene	2022/02/14	97	70 - 130	92	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	1,2-Dichlorobenzene	2022/02/14	94	70 - 130	94	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	1,2-Dichloroethane	2022/02/14	92	70 - 130	92	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	1,2-Dichloropropane	2022/02/14	85	70 - 130	88	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	1,3-Dichlorobenzene	2022/02/14	94	70 - 130	96	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	1,4-Dichlorobenzene	2022/02/14	109	70 - 130	111	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	Acetone (2-Propanone)	2022/02/14	101	60 - 140	91	60 - 140	<10	ug/L	NC (1)	30		
7829610	Benzene	2022/02/14	87	70 - 130	89	70 - 130	<0.17	ug/L	NC (1)	30		
7829610	Bromodichloromethane	2022/02/14	99	70 - 130	98	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	Bromoform	2022/02/14	100	70 - 130	100	70 - 130	<1.0	ug/L	NC (1)	30		
7829610	Bromomethane	2022/02/14	115	60 - 140	94	60 - 140	<0.50	ug/L	NC (1)	30		
7829610	Carbon Tetrachloride	2022/02/14	109	70 - 130	105	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	Chlorobenzene	2022/02/14	94	70 - 130	96	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	Chloroform	2022/02/14	91	70 - 130	94	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	cis-1,2-Dichloroethylene	2022/02/14	103	70 - 130	102	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	cis-1,3-Dichloropropene	2022/02/14	99	70 - 130	89	70 - 130	<0.30	ug/L	NC (1)	30		
7829610	Dibromochloromethane	2022/02/14	90	70 - 130	93	70 - 130	<0.50	ug/L	NC (1)	30		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7829610	Dichlorodifluoromethane (FREON 12)	2022/02/14	92	60 - 140	98	60 - 140	<1.0	ug/L	NC (1)	30		
7829610	Ethylbenzene	2022/02/14	86	70 - 130	92	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	Ethylene Dibromide	2022/02/14	87	70 - 130	89	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	F1 (C6-C10) - BTEX	2022/02/14					<25	ug/L	NC (1)	30		
7829610	F1 (C6-C10)	2022/02/14	84	60 - 140	93	60 - 140	<25	ug/L	NC (1)	30		
7829610	Hexane	2022/02/14	96	70 - 130	95	70 - 130	<1.0	ug/L	NC (1)	30		
7829610	Methyl Ethyl Ketone (2-Butanone)	2022/02/14	89	60 - 140	88	60 - 140	<10	ug/L	NC (1)	30		
7829610	Methyl Isobutyl Ketone	2022/02/14	107	70 - 130	95	70 - 130	<5.0	ug/L	NC (1)	30		
7829610	Methyl t-butyl ether (MTBE)	2022/02/14	92	70 - 130	93	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	Methylene Chloride(Dichloromethane)	2022/02/14	112	70 - 130	109	70 - 130	<2.0	ug/L	NC (1)	30		
7829610	o-Xylene	2022/02/14	89	70 - 130	94	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	p+m-Xylene	2022/02/14	93	70 - 130	99	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	Styrene	2022/02/14	104	70 - 130	110	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	Tetrachloroethylene	2022/02/14	89	70 - 130	96	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	Toluene	2022/02/14	97	70 - 130	95	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	Total Xylenes	2022/02/14					<0.20	ug/L	NC (1)	30		
7829610	trans-1,2-Dichloroethylene	2022/02/14	97	70 - 130	97	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	trans-1,3-Dichloropropene	2022/02/14	108	70 - 130	85	70 - 130	<0.40	ug/L	NC (1)	30		
7829610	Trichloroethylene	2022/02/14	107	70 - 130	112	70 - 130	<0.20	ug/L	NC (1)	30		
7829610	Trichlorofluoromethane (FREON 11)	2022/02/14	110	70 - 130	105	70 - 130	<0.50	ug/L	NC (1)	30		
7829610	Vinyl Chloride	2022/02/14	88	70 - 130	90	70 - 130	<0.20	ug/L	NC (1)	30		
7830878	Total BOD	2022/02/17					<2	mg/L	11 (1)	30	97	80 - 120
7831000	Total Suspended Solids	2022/02/14					<10	mg/L	0.95 (1)	25	95	85 - 115
7831086	Dissolved (0.2u) Aluminum (Al)	2022/02/14	97	75 - 125	96	90 - 110	<5	ug/L	NC (1)	20		
7831166	Dissolved Antimony (Sb)	2022/02/14	103	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20		
7831166	Dissolved Arsenic (As)	2022/02/14	96	80 - 120	98	80 - 120	<1.0	ug/L	NC (1)	20		
7831166	Dissolved Barium (Ba)	2022/02/14	99	80 - 120	100	80 - 120	<2.0	ug/L	NC (1)	20		
7831166	Dissolved Beryllium (Be)	2022/02/14	95	80 - 120	97	80 - 120	<0.40	ug/L	NC (1)	20		
7831166	Dissolved Boron (B)	2022/02/14	90	80 - 120	94	80 - 120	<10	ug/L	3.1 (1)	20		
7831166	Dissolved Cadmium (Cd)	2022/02/14	98	80 - 120	99	80 - 120	<0.090	ug/L	NC (1)	20		

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			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7831166	Dissolved Chromium (Cr)	2022/02/14	94	80 - 120	95	80 - 120	<5.0	ug/L	NC (1)	20		
7831166	Dissolved Cobalt (Co)	2022/02/14	96	80 - 120	98	80 - 120	<0.50	ug/L	NC (1)	20		
7831166	Dissolved Copper (Cu)	2022/02/14	98	80 - 120	98	80 - 120	<0.90	ug/L	0.30 (1)	20		
7831166	Dissolved Lead (Pb)	2022/02/14	91	80 - 120	97	80 - 120	<0.50	ug/L	NC (1)	20		
7831166	Dissolved Molybdenum (Mo)	2022/02/14	102	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20		
7831166	Dissolved Nickel (Ni)	2022/02/14	91	80 - 120	94	80 - 120	<1.0	ug/L	NC (1)	20		
7831166	Dissolved Selenium (Se)	2022/02/14	97	80 - 120	99	80 - 120	<2.0	ug/L	NC (1)	20		
7831166	Dissolved Silver (Ag)	2022/02/14	93	80 - 120	101	80 - 120	<0.090	ug/L	NC (1)	20		
7831166	Dissolved Sodium (Na)	2022/02/14	NC	80 - 120	95	80 - 120	<100	ug/L	1.1 (1)	20		
7831166	Dissolved Thallium (Tl)	2022/02/14	90	80 - 120	99	80 - 120	<0.050	ug/L	NC (1)	20		
7831166	Dissolved Uranium (U)	2022/02/14	91	80 - 120	96	80 - 120	<0.10	ug/L	2.5 (1)	20		
7831166	Dissolved Vanadium (V)	2022/02/14	97	80 - 120	97	80 - 120	<0.50	ug/L	NC (1)	20		
7831166	Dissolved Zinc (Zn)	2022/02/14	95	80 - 120	97	80 - 120	<5.0	ug/L	0.037 (1)	20		
7831168	Dissolved Chloride (Cl-)	2022/02/14	NC	80 - 120	104	80 - 120	<1.0	mg/L	1.5 (1)	20		
7831933	Chromium (VI)	2022/02/15	99	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20		
7832907	Aroclor 1242	2022/02/15					<0.05	ug/L	NC (1)	30		
7832907	Aroclor 1248	2022/02/15					<0.05	ug/L	8.7 (1)	30		
7832907	Aroclor 1254	2022/02/15					<0.05	ug/L	NC (1)	30		
7832907	Aroclor 1260	2022/02/15	103	60 - 130	69	60 - 130	<0.05	ug/L	NC (1)	30		
7832907	Total PCB	2022/02/15	103	60 - 130	69	60 - 130	<0.05	ug/L	8.7 (1)	40		
7834018	Mercury (Hg)	2022/02/15	82	75 - 125	92	80 - 120	<0.10	ug/L	NC (1)	20		
7834883	1-Methylnaphthalene	2022/02/16	109	50 - 130	103	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	2-Methylnaphthalene	2022/02/16	108	50 - 130	102	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Acenaphthene	2022/02/16	97	50 - 130	91	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Acenaphthylene	2022/02/16	93	50 - 130	88	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Anthracene	2022/02/16	99	50 - 130	96	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Benzo(a)anthracene	2022/02/16	86	50 - 130	86	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Benzo(a)pyrene	2022/02/16	84	50 - 130	85	50 - 130	<0.0090	ug/L	NC (1)	30		
7834883	Benzo(b/j)fluoranthene	2022/02/16	88	50 - 130	88	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Benzo(g,h,i)perylene	2022/02/16	83	50 - 130	83	50 - 130	<0.050	ug/L	NC (1)	30		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7834883	Benzo(k)fluoranthene	2022/02/16	85	50 - 130	84	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Chrysene	2022/02/16	92	50 - 130	91	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Dibenzo(a,h)anthracene	2022/02/16	76	50 - 130	78	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Fluoranthene	2022/02/16	111	50 - 130	109	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Fluorene	2022/02/16	102	50 - 130	99	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Indeno(1,2,3-cd)pyrene	2022/02/16	88	50 - 130	89	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Naphthalene	2022/02/16	95	50 - 130	90	50 - 130	<0.050	ug/L	NC (1)	30		
7834883	Phenanthrene	2022/02/16	100	50 - 130	97	50 - 130	<0.030	ug/L	NC (1)	30		
7834883	Pyrene	2022/02/16	108	50 - 130	106	50 - 130	<0.050	ug/L	NC (1)	30		
7834908	F2 (C10-C16 Hydrocarbons)	2022/02/15	89	60 - 130	91	60 - 130	<100	ug/L	NC (1)	30		
7834908	F3 (C16-C34 Hydrocarbons)	2022/02/15	87	60 - 130	89	60 - 130	<200	ug/L	NC (1)	30		
7834908	F4 (C34-C50 Hydrocarbons)	2022/02/15	87	60 - 130	88	60 - 130	<200	ug/L	NC (1)	30		
7836938	WAD Cyanide (Free)	2022/02/16	97	80 - 120	94	80 - 120	<1	ug/L	NC (1)	20		

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.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

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) Duplicate Parent ID

(2) Surrogate recovery is below the control limit stipulated by Ont Reg 153, however, this recovery is still within Bureau Veritas performance based limits. Results reported with recoveries within this range are still valid but may have a low bias.

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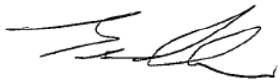
Bureau Veritas Job #: C237378
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION - WEST BRAMPTON RESERVOIR & PLUMPING STATION
Sampler Initials: DP

VALIDATION SIGNATURE PAGE

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



Brad Newman, B.Sc., C.Chem., Scientific Service Specialist

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 Signature Page.

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Bureau Veritas
3740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free:800-563-6266 Fax (905) 817-5777 www.bvna.com

Page of

CHAIN OF CUSTODY RECORD

INVOICE TO:

Company Name: #23482 AECOM Canada Ltd
Attention: Accounts Payable
Address: 50 Sportsworld Crossing Rd Suite 290
Kitchener ON N2P 0A4
Tel: (519) 650-5313 Fax: (519) 650-3422 4
Email: CANSSC E-billing@aecom.com

REPORT TO:

Company Name: AECOM Canada Ltd.
Attention: Brian Holden
Address: 50 Sportsworld Crossing Rd Suite 290
Kitchener ON N2P 0A4
Tel: (519) 340-1617 Fax:
Email: brian.holden@aecom.com ; dhwanish.parikh@aecom.com

PROJECT INFORMATION:

Quotation #: C20375
P.O. #:
Project: 60646784
Project Name: Peel Region - West Brampton Reservoir & Pumping Station
Site #: Site 3
Sampled By: Dhwanish Parikh

Laboratory Use Only:

Bureau Veritas Job #:
Bottle Order #: 865657
Project Manager: Marijane Cruz
C#865657-01-01

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ For RSC
☐ Table ___

Other Regulations
☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558. ☐ Storm Sewer Bylaw
☐ MISA Municipality ___
☐ PWQO ☐ Reg 406 Table ___
☐ Other

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☐
(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	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 VOCs by HS & F1-F4	O.Reg 153 PAHs	O.Reg 153 PCBs (Water)	O.Reg 153 Metals & Inorganics Pkg (WW)	Biochemical Oxygen Demand (BOD)	Total Suspended Solids	Dissolved Aluminum (0.2 u, clay free)	RCAp - Comprehensive			# of Bottles	Comments
1		BH-3-4	Feb 11/2022	10:30	GW	X	X	X	X	X	X	X	X	X			13	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

11-Feb-22 13:57
Marijane Cruz
C237378
RJM ENV-1787

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Dhwanish Parikh Dhwanish	22/02/11	2:00		22/02/11	1357	

Laboratory Use Only
Time Sensitive
Temperature (°C) on Recei: 5 6 13
Custody Seal: Present ☐ Intact ☐ Yes ☐ No ☐

* 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/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.

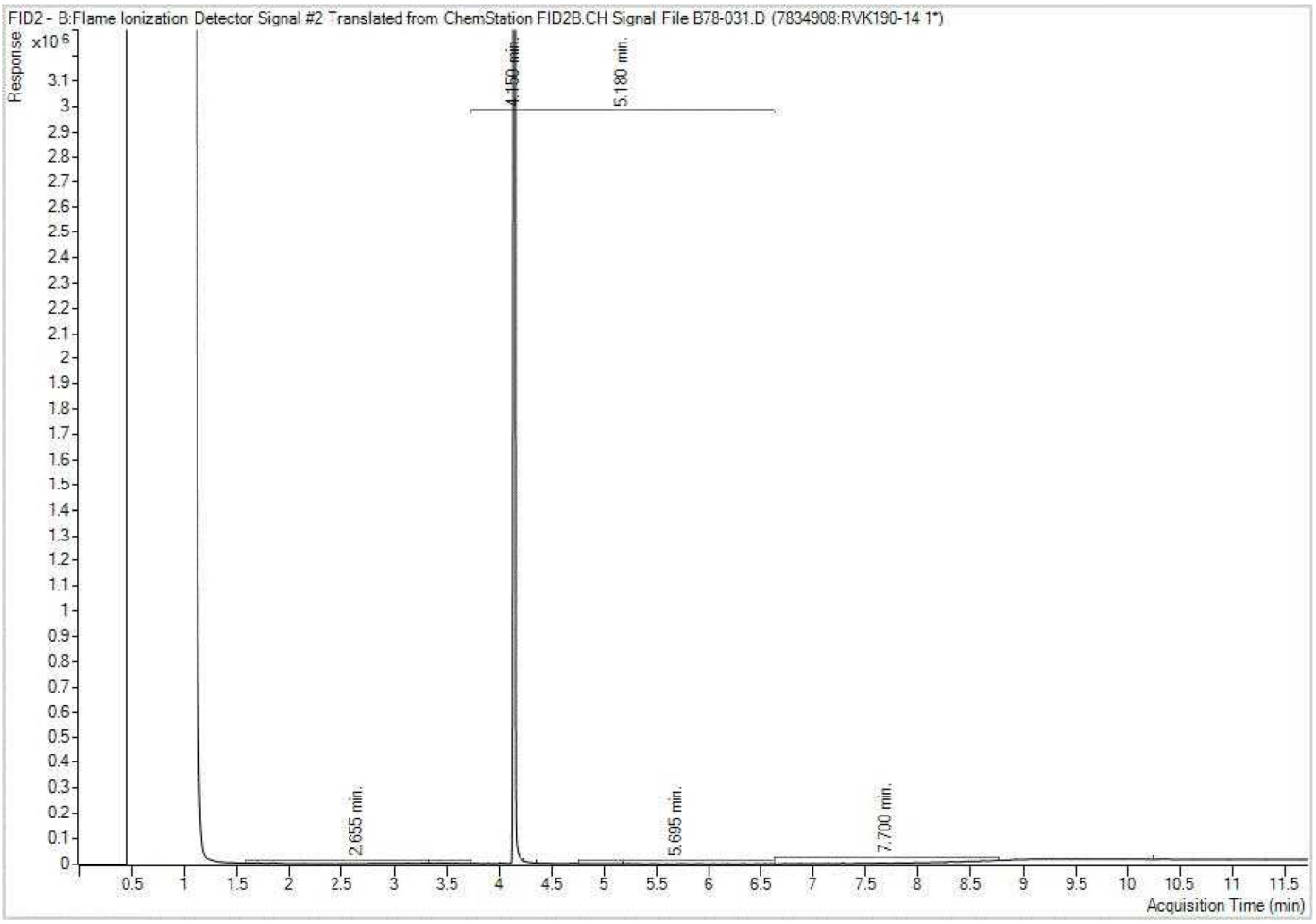
** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Exceedance Summary Table – Reg153/04 T2-GW-C

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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Your Project #: 60646784
Site#: SITE 6 & SITE 9
Site Location: REGION OF PEEL SNOW STORAGE
Your C.O.C. #: 868053-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/03/23
Report #: R7055687
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C260765
Received: 2022/03/08, 12:43

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Methylnaphthalene Sum	2	N/A	2022/03/14	CAM SOP-00301	EPA 8270D m
Dissolved Aluminum (0.2 u, clay free)	2	N/A	2022/03/11	CAM SOP-00447	EPA 6020B m
Biochemical Oxygen Demand (BOD)	2	2022/03/10	2022/03/15	CAM SOP-00427	SM 23 5210B m
1,3-Dichloropropene Sum	2	N/A	2022/03/11		EPA 8260C m
Chloride by Automated Colourimetry	2	N/A	2022/03/14	CAM SOP-00463	SM 23 4500-Cl E m
Chromium (VI) in Water	2	N/A	2022/03/11	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide	2	N/A	2022/03/10	CAM SOP-00457	OMOE E3015 m
Petroleum Hydrocarbons F2-F4 in Water (1)	2	2022/03/10	2022/03/10	CAM SOP-00316	CCME PHC-CWS m
Mercury	2	2022/03/10	2022/03/10	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	2	N/A	2022/03/10	CAM SOP-00447	EPA 6020B m
PAH Compounds in Water by GC/MS (SIM)	2	2022/03/10	2022/03/11	CAM SOP-00318	EPA 8270D m
Polychlorinated Biphenyl in Water	2	2022/03/10	2022/03/11	CAM SOP-00309	EPA 8082A m
Total Suspended Solids	2	2022/03/10	2022/03/11	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds and F1 PHCs	2	N/A	2022/03/10	CAM SOP-00230	EPA 8260C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 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 CCME, MELCC, EPA, APHA. Where applicable, the analytical testing herein was performed in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Bureau Veritas is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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 samples provided by the Client using the testing methodology referenced in this report.

Your Project #: 60646784
Site#: SITE 6 & SITE 9
Site Location: REGION OF PEEL SNOW STORAGE
Your C.O.C. #: 868053-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/03/23
Report #: R7055687
Version: 3 - Revision

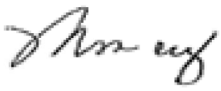
CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C260765
Received: 2022/03/08, 12:43

Interpretation and use of 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. Bureau Veritas is not responsible for the accuracy or any data impacts that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
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.
(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key



Marijane Cruz
Senior Project Manager
23 Mar 2022 18:10:33

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756
==========
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 Signature Page.

Bureau Veritas Job #: C260765
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: REGION OF PEEL SNOW STORAGE
Sampler Initials: DP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		SAN903	SAN904		
Sampling Date		2022/03/07 10:00	2022/03/08 10:30		
COC Number		868053-01-01	868053-01-01		
	UNITS	BH6-1/MW	BH9-3/MW	RDL	QC Batch
Inorganics					
Total BOD	mg/L	<2	<2	2	7874502
Total Suspended Solids	mg/L	120	110	10	7875462

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		SAN903	SAN904	SAN904		
Sampling Date		2022/03/07 10:00	2022/03/08 10:30	2022/03/08 10:30		
COC Number		868053-01-01	868053-01-01	868053-01-01		
	UNITS	BH6-1/MW	BH9-3/MW	BH9-3/MW Lab-Dup	RDL	QC Batch
Metals						
Dissolved (0.2u) Aluminum (Al)	ug/L	6	36	35	5	7875256

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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O.REG 153 METALS & INORGANICS PKG (WTR)

Bureau Veritas ID			SAN903		SAN904		
Sampling Date			2022/03/07 10:00		2022/03/08 10:30		
COC Number			868053-01-01		868053-01-01		
	UNITS	Criteria	BH6-1/MW	RDL	BH9-3/MW	RDL	QC Batch
Inorganics							
WAD Cyanide (Free)	ug/L	**66**	<1	1	<1	1	7875039
Dissolved Chloride (Cl-)	mg/L	**790**	150	2.0	48	1.0	7873885
Metals							
Chromium (VI)	ug/L	**25**	0.65	0.50	<0.50	0.50	7874547
Mercury (Hg)	ug/L	**0.29**	<0.10	0.10	<0.10	0.10	7874921
Dissolved Aluminum (Al)	ug/L	**-**	<4.9	4.9	6.0	4.9	7874515
Dissolved Antimony (Sb)	ug/L	**6.0**	<0.50	0.50	<0.50	0.50	7874515
Dissolved Arsenic (As)	ug/L	**25**	<1.0	1.0	<1.0	1.0	7874515
Dissolved Barium (Ba)	ug/L	**1000**	110	2.0	120	2.0	7874515
Dissolved Beryllium (Be)	ug/L	**4.0**	<0.40	0.40	<0.40	0.40	7874515
Dissolved Bismuth (Bi)	ug/L	**-**	<1.0	1.0	<1.0	1.0	7874515
Dissolved Boron (B)	ug/L	**5000**	57	10	52	10	7874515
Dissolved Cadmium (Cd)	ug/L	**2.7**	<0.090	0.090	<0.090	0.090	7874515
Dissolved Calcium (Ca)	ug/L	**-**	170000	200	230000	200	7874515
Dissolved Cesium (Cs)	ug/L	**-**	<0.20	0.20	<0.20	0.20	7874515
Dissolved Chromium (Cr)	ug/L	**50**	<5.0	5.0	<5.0	5.0	7874515
Dissolved Cobalt (Co)	ug/L	**3.8**	<0.50	0.50	0.57	0.50	7874515
Dissolved Copper (Cu)	ug/L	**87**	1.2	0.90	2.4	0.90	7874515
Dissolved Iron (Fe)	ug/L	**-**	<100	100	<100	100	7874515
Dissolved Lead (Pb)	ug/L	**10**	<0.50	0.50	<0.50	0.50	7874515
Dissolved Lithium (Li)	ug/L	**-**	25	5.0	15	5.0	7874515
Dissolved Magnesium (Mg)	ug/L	**-**	66000	50	61000	50	7874515
Dissolved Manganese (Mn)	ug/L	**-**	40	2.0	1000	2.0	7874515
Dissolved Molybdenum (Mo)	ug/L	**70**	2.8	0.50	3.6	0.50	7874515
Dissolved Nickel (Ni)	ug/L	**100**	1.2	1.0	6.5	1.0	7874515
Dissolved Phosphorus (P)	ug/L	**-**	<100	100	<100	100	7874515
Dissolved Potassium (K)	ug/L	**-**	4700	200	7600	200	7874515
Dissolved Rubidium (Rb)	ug/L	**-**	1.2	0.20	1.5	0.20	7874515
Dissolved Selenium (Se)	ug/L	**10**	<2.0	2.0	<2.0	2.0	7874515
Dissolved Silicon (Si)	ug/L	**-**	6600	50	8400	50	7874515

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C260765
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: REGION OF PEEL SNOW STORAGE
Sampler Initials: DP

O.REG 153 METALS & INORGANICS PKG (WTR)

Bureau Veritas ID			SAN903		SAN904		
Sampling Date			2022/03/07 10:00		2022/03/08 10:30		
COC Number			868053-01-01		868053-01-01		
	UNITS	Criteria	BH6-1/MW	RDL	BH9-3/MW	RDL	QC Batch
Dissolved Silver (Ag)	ug/L	**1.5**	<0.090	0.090	<0.090	0.090	7874515
Dissolved Sodium (Na)	ug/L	**490000**	61000	100	21000	100	7874515
Dissolved Strontium (Sr)	ug/L	-	1400	1.0	630	1.0	7874515
Dissolved Tellurium (Te)	ug/L	**-**	<1.0	1.0	<1.0	1.0	7874515
Dissolved Thallium (Tl)	ug/L	**2.0**	<0.050	0.050	<0.050	0.050	7874515
Dissolved Thorium (Th)	ug/L	**-**	<2.0	2.0	<2.0	2.0	7874515
Dissolved Tin (Sn)	ug/L	**-**	1.1	1.0	<1.0	1.0	7874515
Dissolved Titanium (Ti)	ug/L	**-**	<5.0	5.0	<5.0	5.0	7874515
Dissolved Tungsten (W)	ug/L	**-**	<1.0	1.0	<1.0	1.0	7874515
Dissolved Uranium (U)	ug/L	**20**	5.6	0.10	5.4	0.10	7874515
Dissolved Vanadium (V)	ug/L	**6.2**	<0.50	0.50	0.77	0.50	7874515
Dissolved Zinc (Zn)	ug/L	**1100**	<5.0	5.0	<5.0	5.0	7874515
Dissolved Zirconium (Zr)	ug/L	**-**	<1.0	1.0	<1.0	1.0	7874515

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

O.REG 153 PAHS (WATER)

Bureau Veritas ID			SAN903	SAN904			SAN904		
Sampling Date			2022/03/07 10:00	2022/03/08 10:30			2022/03/08 10:30		
COC Number			868053-01-01	868053-01-01			868053-01-01		
	UNITS	Criteria	BH6-1/MW	BH9-3/MW	RDL	QC Batch	BH9-3/MW Lab-Dup	RDL	QC Batch
Calculated Parameters									
Methylnaphthalene, 2-(1-)	ug/L	**3.2**	<0.071	<0.071	0.071	7869690			
Polyaromatic Hydrocarbons									
Acenaphthene	ug/L	**4.1**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Acenaphthylene	ug/L	**1**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Anthracene	ug/L	**2.4**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Benzo(a)anthracene	ug/L	**1.0**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Benzo(a)pyrene	ug/L	**0.01**	<0.0090	<0.0090	0.0090	7874508	<0.0090	0.0090	7874508
Benzo(b/j)fluoranthene	ug/L	**0.1**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Benzo(g,h,i)perylene	ug/L	**0.2**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Benzo(k)fluoranthene	ug/L	**0.1**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Chrysene	ug/L	**0.1**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Dibenzo(a,h)anthracene	ug/L	**0.2**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Fluoranthene	ug/L	**0.41**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Fluorene	ug/L	**120**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Indeno(1,2,3-cd)pyrene	ug/L	**0.2**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
1-Methylnaphthalene	ug/L	**3.2**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
2-Methylnaphthalene	ug/L	**3.2**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Naphthalene	ug/L	**11**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Phenanthrene	ug/L	**1**	<0.030	<0.030	0.030	7874508	<0.030	0.030	7874508
Pyrene	ug/L	**4.1**	<0.050	<0.050	0.050	7874508	<0.050	0.050	7874508
Surrogate Recovery (%)									
D10-Anthracene	%	-	109	114		7874508	110		7874508
D14-Terphenyl (FS)	%	-	85	86		7874508	90		7874508
D8-Acenaphthylene	%	-	97	103		7874508	99		7874508

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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O.REG 153 PCBS (WATER)

Bureau Veritas ID			SAN903	SAN904		
Sampling Date			2022/03/07 10:00	2022/03/08 10:30		
COC Number			868053-01-01	868053-01-01		
	UNITS	Criteria	BH6-1/MW	BH9-3/MW	RDL	QC Batch
PCBs						
Aroclor 1242	ug/L	-	<0.05	<0.05	0.05	7875734
Aroclor 1248	ug/L	-	<0.05	<0.05	0.05	7875734
Aroclor 1254	ug/L	-	<0.05	<0.05	0.05	7875734
Aroclor 1260	ug/L	-	<0.05	<0.05	0.05	7875734
Total PCB	ug/L	**3.0**	<0.05	<0.05	0.05	7875734
Surrogate Recovery (%)						
Decachlorobiphenyl	%	-	85	70		7875734

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
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O.REG 153 VOCS BY HS & F1-F4 (WATER)

Bureau Veritas ID			SAN903	SAN904			SAN904		
Sampling Date			2022/03/07 10:00	2022/03/08 10:30			2022/03/08 10:30		
COC Number			868053-01-01	868053-01-01			868053-01-01		
	UNITS	Criteria	BH6-1/MW	BH9-3/MW	RDL	QC Batch	BH9-3/MW Lab-Dup	RDL	QC Batch
Calculated Parameters									
1,3-Dichloropropene (cis+trans)	ug/L	**0.5**	<0.50	<0.50	0.50	7871624			
Volatile Organics									
Acetone (2-Propanone)	ug/L	**2700**	<10	<10	10	7872138			
Benzene	ug/L	**5.0**	<0.17	<0.17	0.17	7872138			
Bromodichloromethane	ug/L	**16.0**	<0.50	<0.50	0.50	7872138			
Bromoform	ug/L	**25.0**	<1.0	<1.0	1.0	7872138			
Bromomethane	ug/L	**0.89**	<0.50	<0.50	0.50	7872138			
Carbon Tetrachloride	ug/L	**0.79**	<0.20	<0.20	0.20	7872138			
Chlorobenzene	ug/L	**30**	<0.20	<0.20	0.20	7872138			
Chloroform	ug/L	**2.4**	<0.20	<0.20	0.20	7872138			
Dibromochloromethane	ug/L	**25.0**	<0.50	<0.50	0.50	7872138			
1,2-Dichlorobenzene	ug/L	**3.0**	<0.50	<0.50	0.50	7872138			
1,3-Dichlorobenzene	ug/L	**59**	<0.50	<0.50	0.50	7872138			
1,4-Dichlorobenzene	ug/L	**1.0**	<0.50	<0.50	0.50	7872138			
Dichlorodifluoromethane (FREON 12)	ug/L	**590**	<1.0	<1.0	1.0	7872138			
1,1-Dichloroethane	ug/L	**5**	<0.20	<0.20	0.20	7872138			
1,2-Dichloroethane	ug/L	**1.6**	<0.50	<0.50	0.50	7872138			
1,1-Dichloroethylene	ug/L	**1.6**	<0.20	<0.20	0.20	7872138			
cis-1,2-Dichloroethylene	ug/L	**1.6**	<0.50	<0.50	0.50	7872138			
trans-1,2-Dichloroethylene	ug/L	**1.6**	<0.50	<0.50	0.50	7872138			
1,2-Dichloropropane	ug/L	**5.0**	<0.20	<0.20	0.20	7872138			
cis-1,3-Dichloropropene	ug/L	**0.5**	<0.30	<0.30	0.30	7872138			
trans-1,3-Dichloropropene	ug/L	**0.5**	<0.40	<0.40	0.40	7872138			
Ethylbenzene	ug/L	**2.4**	<0.20	<0.20	0.20	7872138			
Ethylene Dibromide	ug/L	**0.2**	<0.20	<0.20	0.20	7872138			
Hexane	ug/L	**51**	<1.0	<1.0	1.0	7872138			
Methylene Chloride(Dichloromethane)	ug/L	**50**	<2.0	<2.0	2.0	7872138			
Methyl Ethyl Ketone (2-Butanone)	ug/L	**1800**	<10	<10	10	7872138			
Methyl Isobutyl Ketone	ug/L	**640**	<5.0	<5.0	5.0	7872138			
Methyl t-butyl ether (MTBE)	ug/L	**15**	<0.50	<0.50	0.50	7872138			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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O.REG 153 VOCS BY HS & F1-F4 (WATER)

Bureau Veritas ID			SAN903	SAN904			SAN904		
Sampling Date			2022/03/07 10:00	2022/03/08 10:30			2022/03/08 10:30		
COC Number			868053-01-01	868053-01-01			868053-01-01		
	UNITS	Criteria	BH6-1/MW	BH9-3/MW	RDL	QC Batch	BH9-3/MW Lab-Dup	RDL	QC Batch
Styrene	ug/L	**5.4**	<0.50	<0.50	0.50	7872138			
1,1,1,2-Tetrachloroethane	ug/L	**1.1**	<0.50	<0.50	0.50	7872138			
1,1,2,2-Tetrachloroethane	ug/L	**1.0**	<0.50	<0.50	0.50	7872138			
Tetrachloroethylene	ug/L	**1.6**	<0.20	<0.20	0.20	7872138			
Toluene	ug/L	**24**	<0.20	<0.20	0.20	7872138			
1,1,1-Trichloroethane	ug/L	**200**	<0.20	<0.20	0.20	7872138			
1,1,2-Trichloroethane	ug/L	**4.7**	<0.50	<0.50	0.50	7872138			
Trichloroethylene	ug/L	**1.6**	<0.20	<0.20	0.20	7872138			
Trichlorofluoromethane (FREON 11)	ug/L	**150**	<0.50	<0.50	0.50	7872138			
Vinyl Chloride	ug/L	**0.5**	<0.20	<0.20	0.20	7872138			
p+m-Xylene	ug/L	-	<0.20	<0.20	0.20	7872138			
o-Xylene	ug/L	-	<0.20	<0.20	0.20	7872138			
Total Xylenes	ug/L	**300**	<0.20	<0.20	0.20	7872138			
F1 (C6-C10)	ug/L	**750**	<25	<25	25	7872138			
F1 (C6-C10) - BTEX	ug/L	**750**	<25	<25	25	7872138			
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/L	**150**	<100	<100	100	7874536	<100	100	7874536
F3 (C16-C34 Hydrocarbons)	ug/L	**500**	<200	<200	200	7874536	<200	200	7874536
F4 (C34-C50 Hydrocarbons)	ug/L	**500**	<200	<200	200	7874536	<200	200	7874536
Reached Baseline at C50	ug/L	-	Yes	Yes		7874536	Yes		7874536
Surrogate Recovery (%)									
o-Terphenyl	%	-	96	87		7874536	95		7874536
4-Bromofluorobenzene	%	-	95	95		7872138			
D4-1,2-Dichloroethane	%	-	101	101		7872138			
D8-Toluene	%	-	96	97		7872138			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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Bureau Veritas Job #: C260765
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: REGION OF PEEL SNOW STORAGE
Sampler Initials: DP

TEST SUMMARY

Bureau Veritas ID: SAN903
Sample ID: BH6-1/MW
Matrix: Water

Collected: 2022/03/07
Shipped:
Received: 2022/03/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7869690	N/A	2022/03/14	Automated Statchk
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	7875256	N/A	2022/03/11	Arefa Dabhad
Biochemical Oxygen Demand (BOD)	DO	7874502	2022/03/10	2022/03/15	Surleen Kaur Romana
1,3-Dichloropropene Sum	CALC	7871624	N/A	2022/03/11	Automated Statchk
Chloride by Automated Colourimetry	KONE	7873885	N/A	2022/03/14	Avneet Kour Sudan
Chromium (VI) in Water	IC	7874547	N/A	2022/03/11	Theodora LI
Free (WAD) Cyanide	SKAL/CN	7875039	N/A	2022/03/10	Aditiben Patel
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7874536	2022/03/10	2022/03/10	Agnieszka Brzuzy-Snopko
Mercury	CV/AA	7874921	2022/03/10	2022/03/10	Indira HarryPaul
Dissolved Metals by ICPMS	ICP/MS	7874515	N/A	2022/03/10	Nan Raykha
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7874508	2022/03/10	2022/03/11	Mitesh Raj
Polychlorinated Biphenyl in Water	GC/ECD	7875734	2022/03/10	2022/03/11	Farag Mansour
Total Suspended Solids	BAL	7875462	2022/03/10	2022/03/11	Shaneil Hall
Volatile Organic Compounds and F1 PHCs	GC/MSFD	7872138	N/A	2022/03/10	Juan Pangilinan

Bureau Veritas ID: SAN904
Sample ID: BH9-3/MW
Matrix: Water

Collected: 2022/03/08
Shipped:
Received: 2022/03/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7869690	N/A	2022/03/14	Automated Statchk
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	7875256	N/A	2022/03/11	Arefa Dabhad
Biochemical Oxygen Demand (BOD)	DO	7874502	2022/03/10	2022/03/15	Surleen Kaur Romana
1,3-Dichloropropene Sum	CALC	7871624	N/A	2022/03/11	Automated Statchk
Chloride by Automated Colourimetry	KONE	7873885	N/A	2022/03/14	Avneet Kour Sudan
Chromium (VI) in Water	IC	7874547	N/A	2022/03/11	Theodora LI
Free (WAD) Cyanide	SKAL/CN	7875039	N/A	2022/03/10	Aditiben Patel
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7874536	2022/03/10	2022/03/10	Agnieszka Brzuzy-Snopko
Mercury	CV/AA	7874921	2022/03/10	2022/03/10	Indira HarryPaul
Dissolved Metals by ICPMS	ICP/MS	7874515	N/A	2022/03/10	Nan Raykha
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7874508	2022/03/10	2022/03/11	Mitesh Raj
Polychlorinated Biphenyl in Water	GC/ECD	7875734	2022/03/10	2022/03/11	Farag Mansour
Total Suspended Solids	BAL	7875462	2022/03/10	2022/03/11	Shaneil Hall
Volatile Organic Compounds and F1 PHCs	GC/MSFD	7872138	N/A	2022/03/10	Juan Pangilinan

Bureau Veritas ID: SAN904 Dup
Sample ID: BH9-3/MW
Matrix: Water

Collected: 2022/03/08
Shipped:
Received: 2022/03/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	7875256	N/A	2022/03/11	Arefa Dabhad
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7874536	2022/03/10	2022/03/10	Agnieszka Brzuzy-Snopko
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7874508	2022/03/10	2022/03/11	Mitesh Raj

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GENERAL COMMENTS

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

Package 1	4.7°C

Revised Report (2022/03/23) : Results have been split onto separate reports per client request.

Results relate only to the items tested.

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Bureau Veritas Job #: C260765
Report Date: 2022/03/23

QUALITY ASSURANCE REPORT

AECOM Canada Ltd
Client Project #: 60646784
Site Location: REGION OF PEEL SNOW STORAGE
Sampler Initials: DP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7872138	4-Bromofluorobenzene	2022/03/10	101	70 - 130	100	70 - 130	96	%				
7872138	D4-1,2-Dichloroethane	2022/03/10	99	70 - 130	99	70 - 130	99	%				
7872138	D8-Toluene	2022/03/10	100	70 - 130	100	70 - 130	98	%				
7874508	D10-Anthracene	2022/03/11	92	50 - 130	106	50 - 130	98	%				
7874508	D14-Terphenyl (FS)	2022/03/11	81	50 - 130	95	50 - 130	88	%				
7874508	D8-Acenaphthylene	2022/03/11	84	50 - 130	99	50 - 130	84	%				
7874536	o-Terphenyl	2022/03/10	86	60 - 130	86	60 - 130	82	%				
7875734	Decachlorobiphenyl	2022/03/11	88	60 - 130	69	60 - 130	87	%				
7872138	1,1,1,2-Tetrachloroethane	2022/03/10	95	70 - 130	94	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	1,1,1-Trichloroethane	2022/03/10	99	70 - 130	97	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	1,1,2,2-Tetrachloroethane	2022/03/10	92	70 - 130	87	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	1,1,2-Trichloroethane	2022/03/10	98	70 - 130	94	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	1,1-Dichloroethane	2022/03/10	93	70 - 130	91	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	1,1-Dichloroethylene	2022/03/10	99	70 - 130	96	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	1,2-Dichlorobenzene	2022/03/10	94	70 - 130	91	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	1,2-Dichloroethane	2022/03/10	93	70 - 130	90	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	1,2-Dichloropropane	2022/03/10	92	70 - 130	89	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	1,3-Dichlorobenzene	2022/03/10	95	70 - 130	93	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	1,4-Dichlorobenzene	2022/03/10	111	70 - 130	109	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	Acetone (2-Propanone)	2022/03/10	92	60 - 140	81	60 - 140	<10	ug/L	NC (1)	30		
7872138	Benzene	2022/03/10	91	70 - 130	89	70 - 130	<0.17	ug/L	NC (1)	30		
7872138	Bromodichloromethane	2022/03/10	98	70 - 130	95	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	Bromoform	2022/03/10	92	70 - 130	88	70 - 130	<1.0	ug/L	NC (1)	30		
7872138	Bromomethane	2022/03/10	106	60 - 140	99	60 - 140	<0.50	ug/L	NC (1)	30		
7872138	Carbon Tetrachloride	2022/03/10	98	70 - 130	97	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	Chlorobenzene	2022/03/10	95	70 - 130	93	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	Chloroform	2022/03/10	99	70 - 130	96	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	cis-1,2-Dichloroethylene	2022/03/10	99	70 - 130	96	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	cis-1,3-Dichloropropene	2022/03/10	92	70 - 130	86	70 - 130	<0.30	ug/L	NC (1)	30		
7872138	Dibromochloromethane	2022/03/10	93	70 - 130	90	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	Dichlorodifluoromethane (FREON 12)	2022/03/10	85	60 - 140	73	60 - 140	<1.0	ug/L	NC (1)	30		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7872138	Ethylbenzene	2022/03/10	88	70 - 130	87	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	Ethylene Dibromide	2022/03/10	90	70 - 130	86	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	F1 (C6-C10) - BTEX	2022/03/10					<25	ug/L	NC (1)	30		
7872138	F1 (C6-C10)	2022/03/10	87	60 - 140	92	60 - 140	<25	ug/L	NC (1)	30		
7872138	Hexane	2022/03/10	97	70 - 130	94	70 - 130	<1.0	ug/L	NC (1)	30		
7872138	Methyl Ethyl Ketone (2-Butanone)	2022/03/10	89	60 - 140	80	60 - 140	<10	ug/L	NC (1)	30		
7872138	Methyl Isobutyl Ketone	2022/03/10	83	70 - 130	78	70 - 130	<5.0	ug/L	NC (1)	30		
7872138	Methyl t-butyl ether (MTBE)	2022/03/10	85	70 - 130	83	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	Methylene Chloride(Dichloromethane)	2022/03/10	108	70 - 130	105	70 - 130	<2.0	ug/L	NC (1)	30		
7872138	o-Xylene	2022/03/10	87	70 - 130	85	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	p+m-Xylene	2022/03/10	90	70 - 130	88	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	Styrene	2022/03/10	95	70 - 130	93	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	Tetrachloroethylene	2022/03/10	95	70 - 130	93	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	Toluene	2022/03/10	90	70 - 130	88	70 - 130	<0.20	ug/L	NC (1)	30		
7872138	Total Xylenes	2022/03/10					<0.20	ug/L	NC (1)	30		
7872138	trans-1,2-Dichloroethylene	2022/03/10	103	70 - 130	101	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	trans-1,3-Dichloropropene	2022/03/10	95	70 - 130	87	70 - 130	<0.40	ug/L	NC (1)	30		
7872138	Trichloroethylene	2022/03/10	104	70 - 130	103	70 - 130	<0.20	ug/L	0.077 (1)	30		
7872138	Trichlorofluoromethane (FREON 11)	2022/03/10	108	70 - 130	104	70 - 130	<0.50	ug/L	NC (1)	30		
7872138	Vinyl Chloride	2022/03/10	97	70 - 130	93	70 - 130	<0.20	ug/L	NC (1)	30		
7873885	Dissolved Chloride (Cl-)	2022/03/14	106	80 - 120	106	80 - 120	<1.0	mg/L	0.43 (1)	20		
7874502	Total BOD	2022/03/15					<2	mg/L	2.8 (1)	30	97	80 - 120
7874508	1-Methylnaphthalene	2022/03/11	80	50 - 130	75	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	2-Methylnaphthalene	2022/03/11	78	50 - 130	73	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Acenaphthene	2022/03/11	86	50 - 130	82	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Acenaphthylene	2022/03/11	87	50 - 130	81	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Anthracene	2022/03/11	94	50 - 130	91	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Benzo(a)anthracene	2022/03/11	94	50 - 130	90	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Benzo(a)pyrene	2022/03/11	95	50 - 130	91	50 - 130	<0.0090	ug/L	NC (2)	30		
7874508	Benzo(b/j)fluoranthene	2022/03/11	93	50 - 130	86	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Benzo(g,h,i)perylene	2022/03/11	98	50 - 130	93	50 - 130	<0.050	ug/L	NC (2)	30		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7874508	Benzo(k)fluoranthene	2022/03/11	93	50 - 130	94	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Chrysene	2022/03/11	97	50 - 130	92	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Dibenzo(a,h)anthracene	2022/03/11	94	50 - 130	94	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Fluoranthene	2022/03/11	90	50 - 130	88	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Fluorene	2022/03/11	96	50 - 130	91	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Indeno(1,2,3-cd)pyrene	2022/03/11	103	50 - 130	99	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Naphthalene	2022/03/11	74	50 - 130	70	50 - 130	<0.050	ug/L	NC (2)	30		
7874508	Phenanthrene	2022/03/11	95	50 - 130	88	50 - 130	<0.030	ug/L	NC (2)	30		
7874508	Pyrene	2022/03/11	90	50 - 130	90	50 - 130	<0.050	ug/L	NC (2)	30		
7874515	Dissolved Aluminum (Al)	2022/03/10	122 (3)	80 - 120	102	80 - 120	<4.9	ug/L				
7874515	Dissolved Antimony (Sb)	2022/03/10	100	80 - 120	102	80 - 120	<0.50	ug/L	4.6 (1)	20		
7874515	Dissolved Arsenic (As)	2022/03/10	99	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20		
7874515	Dissolved Barium (Ba)	2022/03/10	106	80 - 120	105	80 - 120	<2.0	ug/L	4.0 (1)	20		
7874515	Dissolved Beryllium (Be)	2022/03/10	94	80 - 120	105	80 - 120	<0.40	ug/L	NC (1)	20		
7874515	Dissolved Bismuth (Bi)	2022/03/10	86	80 - 120	99	80 - 120	<1.0	ug/L				
7874515	Dissolved Boron (B)	2022/03/10	NC	80 - 120	100	80 - 120	<10	ug/L	3.2 (1)	20		
7874515	Dissolved Cadmium (Cd)	2022/03/10	95	80 - 120	99	80 - 120	<0.090	ug/L	NC (1)	20		
7874515	Dissolved Calcium (Ca)	2022/03/10	NC	80 - 120	103	80 - 120	<200	ug/L				
7874515	Dissolved Cesium (Cs)	2022/03/10	107	80 - 120	104	80 - 120	<0.20	ug/L				
7874515	Dissolved Chromium (Cr)	2022/03/10	103	80 - 120	96	80 - 120	<5.0	ug/L	NC (1)	20		
7874515	Dissolved Cobalt (Co)	2022/03/10	98	80 - 120	98	80 - 120	<0.50	ug/L	4.5 (1)	20		
7874515	Dissolved Copper (Cu)	2022/03/10	109	80 - 120	101	80 - 120	<0.90	ug/L	11 (1)	20		
7874515	Dissolved Iron (Fe)	2022/03/10	100	80 - 120	98	80 - 120	<100	ug/L				
7874515	Dissolved Lead (Pb)	2022/03/10	92	80 - 120	99	80 - 120	<0.50	ug/L	NC (1)	20		
7874515	Dissolved Lithium (Li)	2022/03/10	96	80 - 120	107	80 - 120	<5.0	ug/L				
7874515	Dissolved Magnesium (Mg)	2022/03/10	NC	80 - 120	97	80 - 120	<50	ug/L				
7874515	Dissolved Manganese (Mn)	2022/03/10	NC	80 - 120	99	80 - 120	<2.0	ug/L				
7874515	Dissolved Molybdenum (Mo)	2022/03/10	116	80 - 120	104	80 - 120	<0.50	ug/L	4.3 (1)	20		
7874515	Dissolved Nickel (Ni)	2022/03/10	94	80 - 120	95	80 - 120	<1.0	ug/L	6.4 (1)	20		
7874515	Dissolved Phosphorus (P)	2022/03/10	121 (3)	80 - 120	111	80 - 120	<100	ug/L				
7874515	Dissolved Potassium (K)	2022/03/10	116	80 - 120	104	80 - 120	<200	ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7874515	Dissolved Rubidium (Rb)	2022/03/10	95	80 - 120	99	80 - 120	<0.20	ug/L				
7874515	Dissolved Selenium (Se)	2022/03/10	101	80 - 120	98	80 - 120	<2.0	ug/L	NC (1)	20		
7874515	Dissolved Silicon (Si)	2022/03/10	NC	80 - 120	99	80 - 120	<50	ug/L				
7874515	Dissolved Silver (Ag)	2022/03/10	80	80 - 120	101	80 - 120	<0.090	ug/L	NC (1)	20		
7874515	Dissolved Sodium (Na)	2022/03/10	NC	80 - 120	97	80 - 120	<100	ug/L				
7874515	Dissolved Strontium (Sr)	2022/03/10	NC	80 - 120	98	80 - 120	<1.0	ug/L				
7874515	Dissolved Tellurium (Te)	2022/03/10	90	80 - 120	101	80 - 120	<1.0	ug/L				
7874515	Dissolved Thallium (Tl)	2022/03/10	92	80 - 120	101	80 - 120	<0.050	ug/L	8.4 (1)	20		
7874515	Dissolved Thorium (Th)	2022/03/10	84	80 - 120	95	80 - 120	<2.0	ug/L				
7874515	Dissolved Tin (Sn)	2022/03/10	100	80 - 120	102	80 - 120	<1.0	ug/L				
7874515	Dissolved Titanium (Ti)	2022/03/10	105	80 - 120	99	80 - 120	<5.0	ug/L				
7874515	Dissolved Tungsten (W)	2022/03/10	104	80 - 120	103	80 - 120	<1.0	ug/L				
7874515	Dissolved Uranium (U)	2022/03/10	82	80 - 120	97	80 - 120	<0.10	ug/L	8.3 (1)	20		
7874515	Dissolved Vanadium (V)	2022/03/10	108	80 - 120	99	80 - 120	<0.50	ug/L	14 (1)	20		
7874515	Dissolved Zinc (Zn)	2022/03/10	91	80 - 120	97	80 - 120	<5.0	ug/L	3.7 (1)	20		
7874515	Dissolved Zirconium (Zr)	2022/03/10	116	80 - 120	104	80 - 120	<1.0	ug/L				
7874536	F2 (C10-C16 Hydrocarbons)	2022/03/10	90	60 - 130	90	60 - 130	<100	ug/L	NC (2)	30		
7874536	F3 (C16-C34 Hydrocarbons)	2022/03/10	91	60 - 130	92	60 - 130	<200	ug/L	NC (2)	30		
7874536	F4 (C34-C50 Hydrocarbons)	2022/03/10	92	60 - 130	93	60 - 130	<200	ug/L	NC (2)	30		
7874547	Chromium (VI)	2022/03/11	100	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20		
7874921	Mercury (Hg)	2022/03/10	91	75 - 125	92	80 - 120	<0.10	ug/L	NC (1)	20		
7875039	WAD Cyanide (Free)	2022/03/10	90	80 - 120	96	80 - 120	<1	ug/L	NC (1)	20		
7875256	Dissolved (0.2u) Aluminum (Al)	2022/03/11	101 (4)	80 - 120	100	80 - 120	<5	ug/L	1.9 (5)	20		
7875462	Total Suspended Solids	2022/03/11					<10	mg/L	5.4 (1)	25	96	85 - 115
7875734	Aroclor 1242	2022/03/11					<0.05	ug/L				
7875734	Aroclor 1248	2022/03/11					<0.05	ug/L				
7875734	Aroclor 1254	2022/03/11					<0.05	ug/L				
7875734	Aroclor 1260	2022/03/11	93	60 - 130	92	60 - 130	<0.05	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7875734	Total PCB	2022/03/11	93	60 - 130	92	60 - 130	<0.05	ug/L	NC (1)	40		

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.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

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) Duplicate Parent ID

(2) Duplicate Parent ID [SAN904-09]

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

(4) Matrix Spike Parent ID [SAN904-02]

(5) Duplicate Parent ID [SAN904-02]

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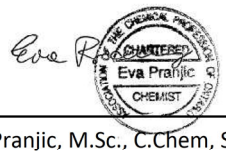
Bureau Veritas Job #: C260765
Report Date: 2022/03/23

AECOM Canada Ltd
Client Project #: 60646784
Site Location: REGION OF PEEL SNOW STORAGE
Sampler Initials: DP

VALIDATION SIGNATURE PAGE

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



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

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 Signature Page.

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CHAI

Page of

08-Mar-22 12:43
Marijane Cruz
C260765
KTN ENV-1712
C#868053-01-01

Order #:
I053
Manager:
Marijane Cruz

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#23482 AECOM Canada Ltd	Company Name:	AECOM Canada Ltd	Quotation #:	C20375
Attention:	Accounts Payable	Attention:	Brian Holden / Dhwanish Parikh	P.O. #:	
Address:	50 Sportsworld Crossing Rd Suite 290	Address:	105 Commerce Valley Drive, 7th floor	Project:	60646784
	Kitchener ON N2P 0A4		Markham, ON	Project Name:	Region of Peel Snow Storage
Tel:	(519) 650-5313 Fax: (519) 650-3422 4	Tel:	(519) 340-1617 Fax:	Site #:	Site 6 & Site 9
Email:	CANSSC.E-billing@aecom.com	Email:	brian.holden@aecom.com; dhwanish.parikh@aecom.com	Sampled By:	Dhwanish Parikh

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558. ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ______
- ☐ PWQO ☐ Reg 406 Table ______
- ☐ Other ______

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ______

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(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	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 VOCs by HS & F1-F4	O.Reg 153 PAHs	O.Reg 153 PCBs (Water)	O.Reg 153 Metals & Inorganics Pkg (Wtr)	Biochemical Oxygen Demand (BOD)	Total Suspended Solids	Dissolved Aluminum (0.2 u, clay free)	RCAp - Comprehensive			# of Bottles	Comments
1		BH6-1/MW	March 7, 2022	10:00	GW	Y	✓	✓	✓	✓	✓	✓	✓	✓			18	Limited Groundwater & filled out both set to minimal requirements as suggested by Marijane Cruz. (BH6-1/MW)
2		BH9-3/MW	March 8, 2022	10:30	GW	Y	✓	✓	✓	✓	✓	✓	✓	✓			18	
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Dhwanish Parikh [signature]	22/03/08	11:30	[signature] NIRAL PATEL	2022/03/08	12:43	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	5/5/4	Present		—
		Intact		—

N/A 2022/03/08

* 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/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.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

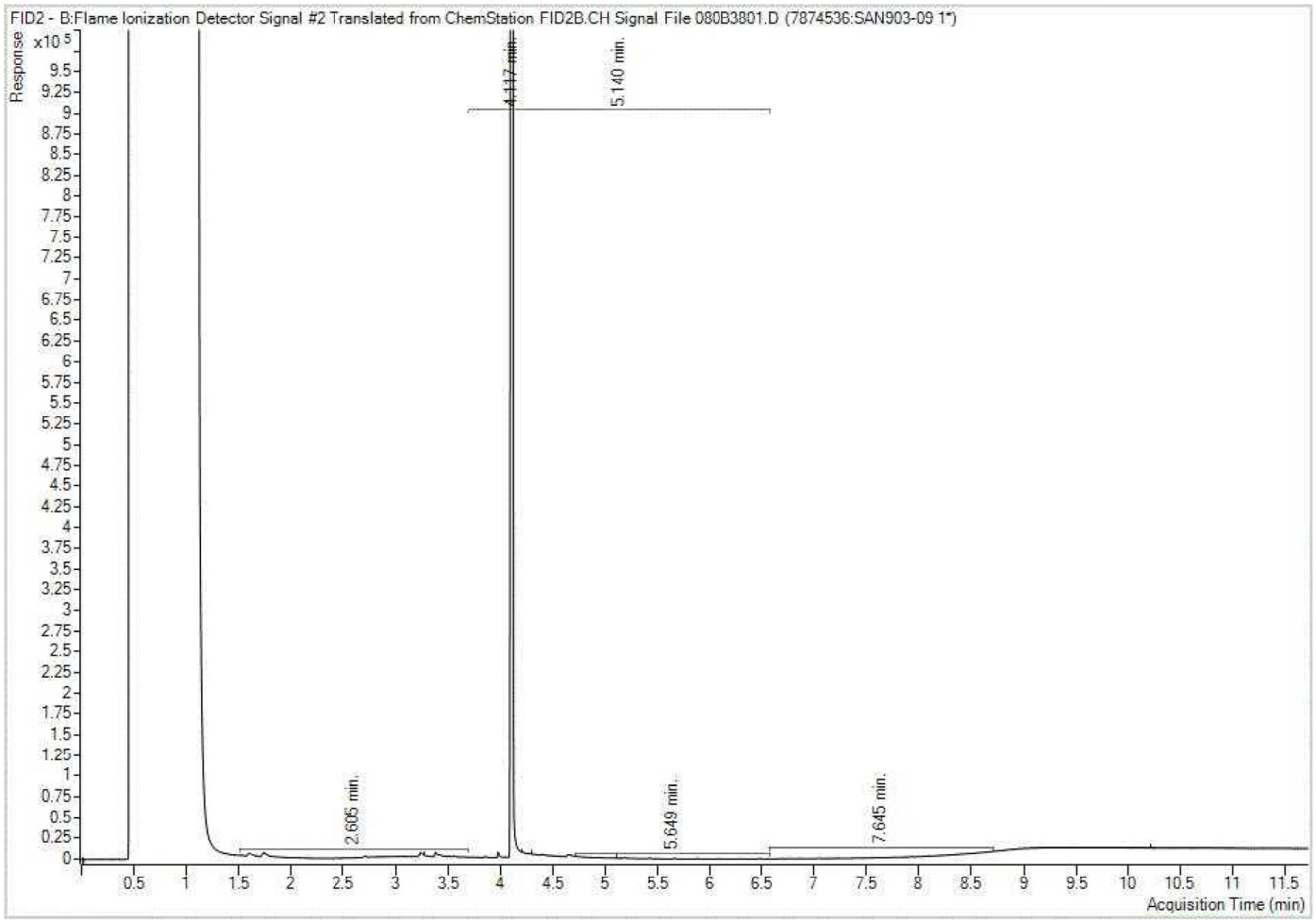
SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Bureau Veritas Job #: C260765
Report Date: 2022/03/23
Bureau Veritas Sample: SAN903

AECOM Canada Ltd
Client Project #: 60646784
Project name: REGION OF PEEL SNOW STORAGE
Client ID: BH6-1/MW

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

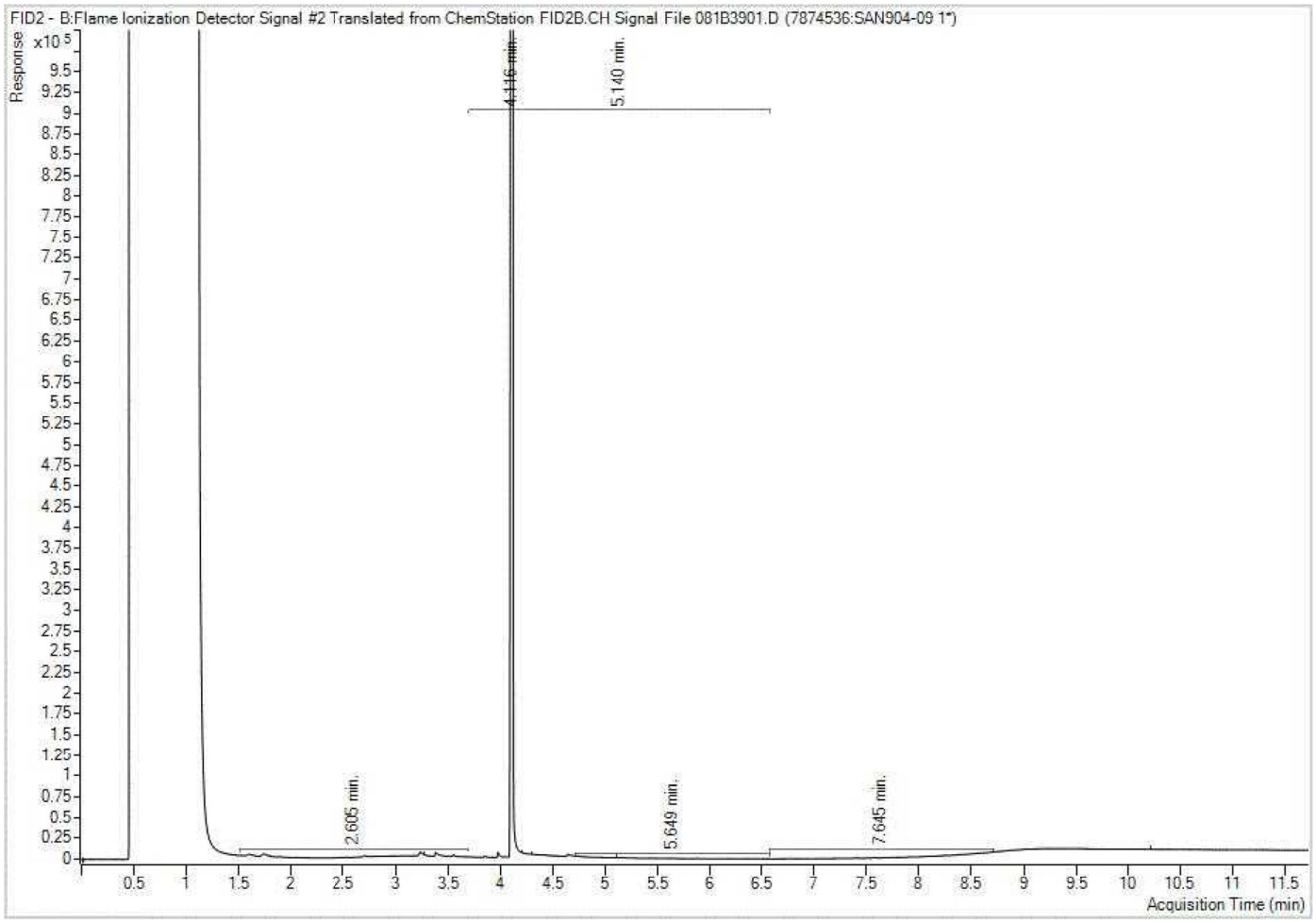


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C260765
Report Date: 2022/03/23
Bureau Veritas Sample: SAN904

AECOM Canada Ltd
Client Project #: 60646784
Project name: REGION OF PEEL SNOW STORAGE
Client ID: BH9-3/MW

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

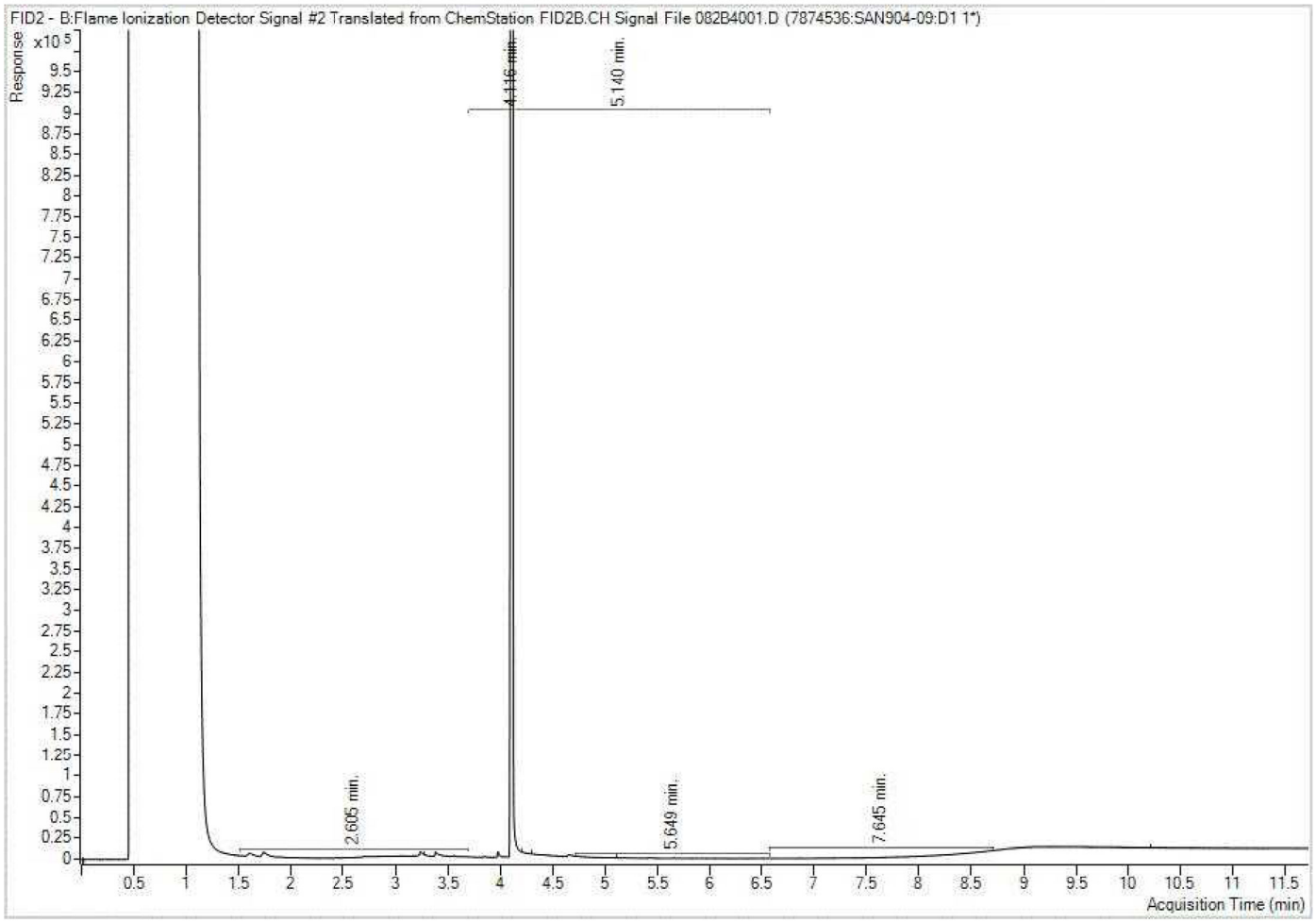


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C260765
Report Date: 2022/03/23
Bureau Veritas Sample: SAN904 Lab-Dup

AECOM Canada Ltd
Client Project #: 60646784
Project name: REGION OF PEEL SNOW STORAGE
Client ID: BH9-3/MW

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Exceedance Summary Table – Reg153/04 T2-GW-C

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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Your Project #: 60646784
Site#: SITE 5
Site Location: PEEL REGION SNOW STORGAE
Your C.O.C. #: 877485-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/05/16
Report #: R7127331
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C2C4120
Received: 2022/05/09, 13:32

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Methylnaphthalene Sum	1	N/A	2022/05/12	CAM SOP-00301	EPA 8270D m
1,3-Dichloropropene Sum	1	N/A	2022/05/12		EPA 8260C m
Chloride by Automated Colourimetry	1	N/A	2022/05/11	CAM SOP-00463	SM 23 4500-Cl E m
Chromium (VI) in Water	1	N/A	2022/05/12	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide	1	N/A	2022/05/12	CAM SOP-00457	OMOE E3015 m
Petroleum Hydrocarbons F2-F4 in Water (1)	1	2022/05/11	2022/05/11	CAM SOP-00316	CCME PHC-CWS m
Mercury	1	2022/05/11	2022/05/11	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	1	N/A	2022/05/12	CAM SOP-00447	EPA 6020B m
PAH Compounds in Water by GC/MS (SIM)	1	2022/05/11	2022/05/12	CAM SOP-00318	EPA 8270D m
Polychlorinated Biphenyl in Water	1	2022/05/10	2022/05/11	CAM SOP-00309	EPA 8082A m
Volatile Organic Compounds and F1 PHCs	1	N/A	2022/05/11	CAM SOP-00230	EPA 8260C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 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 CCME, MELCC, EPA, APHA. Where applicable, the analytical testing herein was performed in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Bureau Veritas is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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 samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of 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. Bureau Veritas is not responsible for the accuracy or any data impacts that result from the information provided by the customer or their agent.

Your Project #: 60646784
Site#: SITE 5
Site Location: PEEL REGION SNOW STORGAE
Your C.O.C. #: 877485-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/05/16
Report #: R7127331
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C2C4120
Received: 2022/05/09, 13:32

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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.
(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756
==========
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 Signature Page.

O.REG 153 METALS & INORGANICS PKG (WTR)

Bureau Veritas ID			SOL754			SOL754		
Sampling Date			2022/05/09 10:00			2022/05/09 10:00		
COC Number			877485-01-01			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch	BH5-3/MW Lab-Dup	RDL	QC Batch
Inorganics								
WAD Cyanide (Free)	ug/L	**66**	<1	1	7991656	<1	1	7991656
Dissolved Chloride (Cl-)	mg/L	**790**	1.1	1.0	7987615			
Metals								
Chromium (VI)	ug/L	**25**	<0.50	0.50	7983524			
Mercury (Hg)	ug/L	**0.29**	<0.10	0.10	7988165			
Dissolved Antimony (Sb)	ug/L	**6.0**	<0.50	0.50	7989687			
Dissolved Arsenic (As)	ug/L	**25**	2.9	1.0	7989687			
Dissolved Barium (Ba)	ug/L	**1000**	57	2.0	7989687			
Dissolved Beryllium (Be)	ug/L	**4.0**	<0.40	0.40	7989687			
Dissolved Boron (B)	ug/L	**5000**	72	10	7989687			
Dissolved Cadmium (Cd)	ug/L	**2.7**	<0.090	0.090	7989687			
Dissolved Chromium (Cr)	ug/L	**50**	<5.0	5.0	7989687			
Dissolved Cobalt (Co)	ug/L	**3.8**	1.1	0.50	7989687			
Dissolved Copper (Cu)	ug/L	**87**	0.92	0.90	7989687			
Dissolved Lead (Pb)	ug/L	**10**	<0.50	0.50	7989687			
Dissolved Molybdenum (Mo)	ug/L	**70**	7.2	0.50	7989687			
Dissolved Nickel (Ni)	ug/L	**100**	2.0	1.0	7989687			
Dissolved Selenium (Se)	ug/L	**10**	<2.0	2.0	7989687			
Dissolved Silver (Ag)	ug/L	**1.5**	<0.090	0.090	7989687			
Dissolved Sodium (Na)	ug/L	**490000**	26000	100	7989687			
Dissolved Thallium (Tl)	ug/L	**2.0**	<0.050	0.050	7989687			
Dissolved Uranium (U)	ug/L	**20**	0.70	0.10	7989687			
Dissolved Vanadium (V)	ug/L	**6.2**	1.4	0.50	7989687			
Dissolved Zinc (Zn)	ug/L	**1100**	<5.0	5.0	7989687			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

O.REG 153 PAHS (WATER)

Bureau Veritas ID			SOL754		
Sampling Date			2022/05/09 10:00		
COC Number			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch
Calculated Parameters					
Methylnaphthalene, 2-(1-)	ug/L	**3.2**	<0.071	0.071	7983964
Polyaromatic Hydrocarbons					
Acenaphthene	ug/L	**4.1**	<0.050	0.050	7989423
Acenaphthylene	ug/L	**1**	<0.050	0.050	7989423
Anthracene	ug/L	**2.4**	<0.050	0.050	7989423
Benzo(a)anthracene	ug/L	**1.0**	<0.050	0.050	7989423
Benzo(a)pyrene	ug/L	**0.01**	<0.0090	0.0090	7989423
Benzo(b/j)fluoranthene	ug/L	**0.1**	<0.050	0.050	7989423
Benzo(g,h,i)perylene	ug/L	**0.2**	<0.050	0.050	7989423
Benzo(k)fluoranthene	ug/L	**0.1**	<0.050	0.050	7989423
Chrysene	ug/L	**0.1**	<0.050	0.050	7989423
Dibenzo(a,h)anthracene	ug/L	**0.2**	<0.050	0.050	7989423
Fluoranthene	ug/L	**0.41**	<0.050	0.050	7989423
Fluorene	ug/L	**120**	<0.050	0.050	7989423
Indeno(1,2,3-cd)pyrene	ug/L	**0.2**	<0.050	0.050	7989423
1-Methylnaphthalene	ug/L	**3.2**	<0.050	0.050	7989423
2-Methylnaphthalene	ug/L	**3.2**	<0.050	0.050	7989423
Naphthalene	ug/L	**11**	<0.050	0.050	7989423
Phenanthrene	ug/L	**1**	<0.030	0.030	7989423
Pyrene	ug/L	**4.1**	<0.050	0.050	7989423
Surrogate Recovery (%)					
D10-Anthracene	%	-	95		7989423
D14-Terphenyl (FS)	%	-	84		7989423
D8-Acenaphthylene	%	-	89		7989423

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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O.REG 153 PCBS (WATER)

Bureau Veritas ID			SOL754		
Sampling Date			2022/05/09 10:00		
COC Number			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch
PCBs					
Aroclor 1242	ug/L	-	<0.05	0.05	7986811
Aroclor 1248	ug/L	-	<0.05	0.05	7986811
Aroclor 1254	ug/L	-	<0.05	0.05	7986811
Aroclor 1260	ug/L	-	<0.05	0.05	7986811
Total PCB	ug/L	**3.0**	<0.05	0.05	7986811
Surrogate Recovery (%)					
Decachlorobiphenyl	%	-	79		7986811

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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O.REG 153 VOCS BY HS & F1-F4 (WATER)

Bureau Veritas ID			SOL754		
Sampling Date			2022/05/09 10:00		
COC Number			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch
Calculated Parameters					
1,3-Dichloropropene (cis+trans)	ug/L	**0.5**	<0.50	0.50	7983481
Volatile Organics					
Acetone (2-Propanone)	ug/L	**2700**	<10	10	7986264
Benzene	ug/L	**5.0**	<0.17	0.17	7986264
Bromodichloromethane	ug/L	**16.0**	<0.50	0.50	7986264
Bromoform	ug/L	**25.0**	<1.0	1.0	7986264
Bromomethane	ug/L	**0.89**	<0.50	0.50	7986264
Carbon Tetrachloride	ug/L	**0.79**	<0.20	0.20	7986264
Chlorobenzene	ug/L	**30**	<0.20	0.20	7986264
Chloroform	ug/L	**2.4**	<0.20	0.20	7986264
Dibromochloromethane	ug/L	**25.0**	<0.50	0.50	7986264
1,2-Dichlorobenzene	ug/L	**3.0**	<0.50	0.50	7986264
1,3-Dichlorobenzene	ug/L	**59**	<0.50	0.50	7986264
1,4-Dichlorobenzene	ug/L	**1.0**	<0.50	0.50	7986264
Dichlorodifluoromethane (FREON 12)	ug/L	**590**	<1.0	1.0	7986264
1,1-Dichloroethane	ug/L	**5**	<0.20	0.20	7986264
1,2-Dichloroethane	ug/L	**1.6**	<0.50	0.50	7986264
1,1-Dichloroethylene	ug/L	**1.6**	<0.20	0.20	7986264
cis-1,2-Dichloroethylene	ug/L	**1.6**	<0.50	0.50	7986264
trans-1,2-Dichloroethylene	ug/L	**1.6**	<0.50	0.50	7986264
1,2-Dichloropropane	ug/L	**5.0**	<0.20	0.20	7986264
cis-1,3-Dichloropropene	ug/L	**0.5**	<0.30	0.30	7986264
trans-1,3-Dichloropropene	ug/L	**0.5**	<0.40	0.40	7986264
Ethylbenzene	ug/L	**2.4**	<0.20	0.20	7986264
Ethylene Dibromide	ug/L	**0.2**	<0.20	0.20	7986264
Hexane	ug/L	**51**	<1.0	1.0	7986264
Methylene Chloride(Dichloromethane)	ug/L	**50**	<2.0	2.0	7986264
Methyl Ethyl Ketone (2-Butanone)	ug/L	**1800**	<10	10	7986264
Methyl Isobutyl Ketone	ug/L	**640**	<5.0	5.0	7986264
Methyl t-butyl ether (MTBE)	ug/L	**15**	<0.50	0.50	7986264

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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O.REG 153 VOCS BY HS & F1-F4 (WATER)

Bureau Veritas ID			SOL754		
Sampling Date			2022/05/09 10:00		
COC Number			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch
Styrene	ug/L	**5.4**	<0.50	0.50	7986264
1,1,1,2-Tetrachloroethane	ug/L	**1.1**	<0.50	0.50	7986264
1,1,2,2-Tetrachloroethane	ug/L	**1.0**	<0.50	0.50	7986264
Tetrachloroethylene	ug/L	**1.6**	<0.20	0.20	7986264
Toluene	ug/L	**24**	<0.20	0.20	7986264
1,1,1-Trichloroethane	ug/L	**200**	<0.20	0.20	7986264
1,1,2-Trichloroethane	ug/L	**4.7**	<0.50	0.50	7986264
Trichloroethylene	ug/L	**1.6**	<0.20	0.20	7986264
Trichlorofluoromethane (FREON 11)	ug/L	**150**	<0.50	0.50	7986264
Vinyl Chloride	ug/L	**0.5**	<0.20	0.20	7986264
p+m-Xylene	ug/L	-	<0.20	0.20	7986264
o-Xylene	ug/L	-	<0.20	0.20	7986264
Total Xylenes	ug/L	**300**	<0.20	0.20	7986264
F1 (C6-C10)	ug/L	**750**	<25	25	7986264
F1 (C6-C10) - BTEX	ug/L	**750**	<25	25	7986264
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/L	**150**	<100	100	7989444
F3 (C16-C34 Hydrocarbons)	ug/L	**500**	<200	200	7989444
F4 (C34-C50 Hydrocarbons)	ug/L	**500**	<200	200	7989444
Reached Baseline at C50	ug/L	-	Yes		7989444
Surrogate Recovery (%)					
o-Terphenyl	%	-	98		7989444
4-Bromofluorobenzene	%	-	93		7986264
D4-1,2-Dichloroethane	%	-	104		7986264
D8-Toluene	%	-	98		7986264

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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Bureau Veritas Job #: C2C4120
Report Date: 2022/05/16

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORGAE
Sampler Initials: DP

TEST SUMMARY

Bureau Veritas ID: SOL754
Sample ID: BH5-3/MW
Matrix: Water

Collected: 2022/05/09
Shipped:
Received: 2022/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7983964	N/A	2022/05/12	Automated Statchk
1,3-Dichloropropene Sum	CALC	7983481	N/A	2022/05/12	Automated Statchk
Chloride by Automated Colourimetry	KONE	7987615	N/A	2022/05/11	Alina Dobreanu
Chromium (VI) in Water	IC	7983524	N/A	2022/05/12	Theodora LI
Free (WAD) Cyanide	SKAL/CN	7991656	N/A	2022/05/12	Nimarta Singh
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7989444	2022/05/11	2022/05/11	Anna Stuglik-Rolland
Mercury	CV/AA	7988165	2022/05/11	2022/05/11	Jaswinder Kaur
Dissolved Metals by ICPMS	ICP/MS	7989687	N/A	2022/05/12	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7989423	2022/05/11	2022/05/12	Jonghan Yoon
Polychlorinated Biphenyl in Water	GC/ECD	7986811	2022/05/10	2022/05/11	Farag Mansour
Volatile Organic Compounds and F1 PHCs	GC/MSFD	7986264	N/A	2022/05/11	Xueming Jiang

Bureau Veritas ID: SOL754 Dup
Sample ID: BH5-3/MW
Matrix: Water

Collected: 2022/05/09
Shipped:
Received: 2022/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	SKAL/CN	7991656	N/A	2022/05/12	Nimarta Singh

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GENERAL COMMENTS

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

Package 1	7.0°C

Revised Report (2022/05/16) : Results have been split onto separate reports per client request.

Cooler custody seal present and intact.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7986264	4-Bromofluorobenzene	2022/05/11	96	70 - 130	96	70 - 130	93	%		
7986264	D4-1,2-Dichloroethane	2022/05/11	103	70 - 130	101	70 - 130	102	%		
7986264	D8-Toluene	2022/05/11	102	70 - 130	103	70 - 130	99	%		
7986811	Decachlorobiphenyl	2022/05/11	76	60 - 130	68	60 - 130	78	%		
7989423	D10-Anthracene	2022/05/12	104	50 - 130	99	50 - 130	114	%		
7989423	D14-Terphenyl (FS)	2022/05/12	89	50 - 130	94	50 - 130	91	%		
7989423	D8-Acenaphthylene	2022/05/12	95	50 - 130	88	50 - 130	90	%		
7989444	o-Terphenyl	2022/05/11	96	60 - 130	95	60 - 130	95	%		
7983524	Chromium (VI)	2022/05/12	99	80 - 120	103	80 - 120	<0.50	ug/L	NC (1)	20
7986264	1,1,1,2-Tetrachloroethane	2022/05/11	98	70 - 130	95	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,1,1-Trichloroethane	2022/05/11	100	70 - 130	97	70 - 130	<0.20	ug/L	NC (1)	30
7986264	1,1,2,2-Tetrachloroethane	2022/05/11	98	70 - 130	93	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,1,2-Trichloroethane	2022/05/11	107	70 - 130	101	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,1-Dichloroethane	2022/05/11	97	70 - 130	93	70 - 130	<0.20	ug/L	NC (1)	30
7986264	1,1-Dichloroethylene	2022/05/11	102	70 - 130	99	70 - 130	<0.20	ug/L	NC (1)	30
7986264	1,2-Dichlorobenzene	2022/05/11	99	70 - 130	96	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,2-Dichloroethane	2022/05/11	97	70 - 130	92	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,2-Dichloropropane	2022/05/11	97	70 - 130	92	70 - 130	<0.20	ug/L	NC (1)	30
7986264	1,3-Dichlorobenzene	2022/05/11	99	70 - 130	96	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,4-Dichlorobenzene	2022/05/11	115	70 - 130	112	70 - 130	<0.50	ug/L	NC (1)	30
7986264	Acetone (2-Propanone)	2022/05/11	100	60 - 140	94	60 - 140	<10	ug/L	NC (1)	30
7986264	Benzene	2022/05/11	93	70 - 130	90	70 - 130	<0.17	ug/L	NC (1)	30
7986264	Bromodichloromethane	2022/05/11	100	70 - 130	95	70 - 130	<0.50	ug/L	NC (1)	30
7986264	Bromoform	2022/05/11	92	70 - 130	87	70 - 130	<1.0	ug/L	NC (1)	30
7986264	Bromomethane	2022/05/11	103	60 - 140	95	60 - 140	<0.50	ug/L	NC (1)	30
7986264	Carbon Tetrachloride	2022/05/11	97	70 - 130	95	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Chlorobenzene	2022/05/11	100	70 - 130	96	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Chloroform	2022/05/11	99	70 - 130	95	70 - 130	<0.20	ug/L	NC (1)	30
7986264	cis-1,2-Dichloroethylene	2022/05/11	98	70 - 130	94	70 - 130	<0.50	ug/L	NC (1)	30
7986264	cis-1,3-Dichloropropene	2022/05/11	90	70 - 130	81	70 - 130	<0.30	ug/L	NC (1)	30
7986264	Dibromochloromethane	2022/05/11	96	70 - 130	91	70 - 130	<0.50	ug/L	NC (1)	30

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7986264	Dichlorodifluoromethane (FREON 12)	2022/05/11	88	60 - 140	88	60 - 140	<1.0	ug/L	NC (1)	30
7986264	Ethylbenzene	2022/05/11	94	70 - 130	91	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Ethylene Dibromide	2022/05/11	97	70 - 130	91	70 - 130	<0.20	ug/L	NC (1)	30
7986264	F1 (C6-C10) - BTEX	2022/05/11					<25	ug/L	NC (1)	30
7986264	F1 (C6-C10)	2022/05/11	93	60 - 140	95	60 - 140	<25	ug/L	NC (1)	30
7986264	Hexane	2022/05/11	104	70 - 130	101	70 - 130	<1.0	ug/L	NC (1)	30
7986264	Methyl Ethyl Ketone (2-Butanone)	2022/05/11	100	60 - 140	95	60 - 140	<10	ug/L	NC (1)	30
7986264	Methyl Isobutyl Ketone	2022/05/11	87	70 - 130	83	70 - 130	<5.0	ug/L	NC (1)	30
7986264	Methyl t-butyl ether (MTBE)	2022/05/11	87	70 - 130	84	70 - 130	<0.50	ug/L	NC (1)	30
7986264	Methylene Chloride(Dichloromethane)	2022/05/11	105	70 - 130	101	70 - 130	<2.0	ug/L	NC (1)	30
7986264	o-Xylene	2022/05/11	92	70 - 130	90	70 - 130	<0.20	ug/L	NC (1)	30
7986264	p+m-Xylene	2022/05/11	96	70 - 130	94	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Styrene	2022/05/11	97	70 - 130	94	70 - 130	<0.50	ug/L	NC (1)	30
7986264	Tetrachloroethylene	2022/05/11	98	70 - 130	95	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Toluene	2022/05/11	92	70 - 130	90	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Total Xylenes	2022/05/11					<0.20	ug/L	NC (1)	30
7986264	trans-1,2-Dichloroethylene	2022/05/11	102	70 - 130	98	70 - 130	<0.50	ug/L	NC (1)	30
7986264	trans-1,3-Dichloropropene	2022/05/11	102	70 - 130	88	70 - 130	<0.40	ug/L	NC (1)	30
7986264	Trichloroethylene	2022/05/11	102	70 - 130	99	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Trichlorofluoromethane (FREON 11)	2022/05/11	103	70 - 130	101	70 - 130	<0.50	ug/L	NC (1)	30
7986264	Vinyl Chloride	2022/05/11	98	70 - 130	96	70 - 130	<0.20	ug/L	NC (1)	30
7986811	Aroclor 1242	2022/05/11					<0.05	ug/L		
7986811	Aroclor 1248	2022/05/11					<0.05	ug/L		
7986811	Aroclor 1254	2022/05/11					<0.05	ug/L		
7986811	Aroclor 1260	2022/05/11	88	60 - 130	73	60 - 130	<0.05	ug/L		
7986811	Total PCB	2022/05/11	88	60 - 130	73	60 - 130	<0.05	ug/L	NC (1)	40
7987615	Dissolved Chloride (Cl-)	2022/05/11	115	80 - 120	104	80 - 120	<1.0	mg/L	1.1 (1)	20
7988165	Mercury (Hg)	2022/05/11	93	75 - 125	95	80 - 120	<0.10	ug/L	NC (1)	20
7989423	1-Methylnaphthalene	2022/05/12	93	50 - 130	83	50 - 130	<0.050	ug/L	NC (1)	30
7989423	2-Methylnaphthalene	2022/05/12	99	50 - 130	87	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Acenaphthene	2022/05/12	100	50 - 130	88	50 - 130	<0.050	ug/L	NC (1)	30

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7989423	Acenaphthylene	2022/05/12	100	50 - 130	88	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Anthracene	2022/05/12	98	50 - 130	88	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Benzo(a)anthracene	2022/05/12	101	50 - 130	86	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Benzo(a)pyrene	2022/05/12	101	50 - 130	86	50 - 130	<0.0090	ug/L	NC (1)	30
7989423	Benzo(b/j)fluoranthene	2022/05/12	93	50 - 130	85	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Benzo(g,h,i)perylene	2022/05/12	98	50 - 130	85	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Benzo(k)fluoranthene	2022/05/12	109	50 - 130	86	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Chrysene	2022/05/12	102	50 - 130	87	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Dibenzo(a,h)anthracene	2022/05/12	109	50 - 130	92	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Fluoranthene	2022/05/12	92	50 - 130	90	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Fluorene	2022/05/12	95	50 - 130	87	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Indeno(1,2,3-cd)pyrene	2022/05/12	99	50 - 130	86	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Naphthalene	2022/05/12	97	50 - 130	87	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Phenanthrene	2022/05/12	100	50 - 130	89	50 - 130	<0.030	ug/L	NC (1)	30
7989423	Pyrene	2022/05/12	92	50 - 130	92	50 - 130	<0.050	ug/L	NC (1)	30
7989444	F2 (C10-C16 Hydrocarbons)	2022/05/11	95	60 - 130	96	60 - 130	<100	ug/L	NC (1)	30
7989444	F3 (C16-C34 Hydrocarbons)	2022/05/11	106	60 - 130	109	60 - 130	<200	ug/L	3.0 (1)	30
7989444	F4 (C34-C50 Hydrocarbons)	2022/05/11	105	60 - 130	106	60 - 130	<200	ug/L	NC (1)	30
7989687	Dissolved Antimony (Sb)	2022/05/12	105	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20
7989687	Dissolved Arsenic (As)	2022/05/12	99	80 - 120	99	80 - 120	<1.0	ug/L	NC (1)	20
7989687	Dissolved Barium (Ba)	2022/05/12	102	80 - 120	99	80 - 120	<2.0	ug/L	0.13 (1)	20
7989687	Dissolved Beryllium (Be)	2022/05/12	103	80 - 120	100	80 - 120	<0.40	ug/L	NC (1)	20
7989687	Dissolved Boron (B)	2022/05/12	102	80 - 120	100	80 - 120	<10	ug/L	0.38 (1)	20
7989687	Dissolved Cadmium (Cd)	2022/05/12	102	80 - 120	98	80 - 120	<0.090	ug/L	NC (1)	20
7989687	Dissolved Chromium (Cr)	2022/05/12	100	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
7989687	Dissolved Cobalt (Co)	2022/05/12	99	80 - 120	98	80 - 120	<0.50	ug/L	0.77 (1)	20
7989687	Dissolved Copper (Cu)	2022/05/12	105	80 - 120	97	80 - 120	<0.90	ug/L	0.66 (1)	20
7989687	Dissolved Lead (Pb)	2022/05/12	101	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20
7989687	Dissolved Molybdenum (Mo)	2022/05/12	108	80 - 120	103	80 - 120	<0.50	ug/L	2.7 (1)	20
7989687	Dissolved Nickel (Ni)	2022/05/12	95	80 - 120	93	80 - 120	<1.0	ug/L	3.1 (1)	20
7989687	Dissolved Selenium (Se)	2022/05/12	100	80 - 120	101	80 - 120	<2.0	ug/L	NC (1)	20

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7989687	Dissolved Silver (Ag)	2022/05/12	90	80 - 120	95	80 - 120	<0.090	ug/L	NC (1)	20
7989687	Dissolved Sodium (Na)	2022/05/12	NC	80 - 120	98	80 - 120	<100	ug/L	0.37 (1)	20
7989687	Dissolved Thallium (Tl)	2022/05/12	103	80 - 120	105	80 - 120	<0.050	ug/L	NC (1)	20
7989687	Dissolved Uranium (U)	2022/05/12	105	80 - 120	103	80 - 120	<0.10	ug/L	3.6 (1)	20
7989687	Dissolved Vanadium (V)	2022/05/12	96	80 - 120	94	80 - 120	<0.50	ug/L	7.8 (1)	20
7989687	Dissolved Zinc (Zn)	2022/05/12	97	80 - 120	97	80 - 120	<5.0	ug/L	1.9 (1)	20
7991656	WAD Cyanide (Free)	2022/05/12	94 (2)	80 - 120	95	80 - 120	<1	ug/L	NC (3)	20

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) Duplicate Parent ID

(2) Matrix Spike Parent ID [SOL754-10]

(3) Duplicate Parent ID [SOL754-10]

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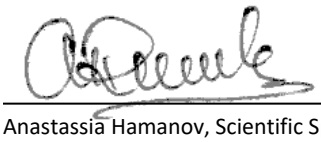
Bureau Veritas Job #: C2C4120
Report Date: 2022/05/16

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORGAE
Sampler Initials: DP

VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist

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 Signature Page.

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IMMEDIATE

Bureau Veritas
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Page of

09-May-22 13:32
Marijane Cruz
C2C4120
KTN ENV-765
C#877485-01-01

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#23482 AECOM Canada Ltd	Company Name:	AECOM Canada Ltd.	Quotation #:	C20375
Attention:	Accounts Payable	Attention:	Brian Holden / Dhwanish Parikh	P.O. #:	
Address:	50 Sportsworld Crossing Rd Suite 290 Kitchener ON N2P 0A4	Address:	50 Sportsworld Crossing Rd Suite 290 Kitchener, ON N2P 0A4	Project:	60646784
Tel:	(519) 650-5313 Fax: (519) 650-3422 4	Tel:	(519) 340-1617 Fax:	Project Name:	Peel Region Snow Storage Site 5
Email:	CANSSC.E-billing@aecom.com	Email:	brian.holden@aecom.com ; dhwanish.parikh@aecom.com	Site #:	
				Sampled By:	Dhwanish Parikh

Le Order #: 377485
ct Manager: Marijane Cruz

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558. ☐ Storm Sewer Bylaw
- ☐ MISA Municipality _____
- ☐ PWQO ☐ Reg 406 Table _____
- ☐ Other _____

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? _____

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(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	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 VOCs by HS & F1-F4	O.Reg 153 PAHs	O.Reg 153 PCBs (Water)	O.Reg 153 Metals & Inorganics Pkg (Wtr)	Biochemical Oxygen Demand (BOD)	Total Suspended Solids	Dissolved Aluminum (0.2 u, clay free)	RCAp - Comprehensive			# of Bottles	Comments
1		BH5-3/MW	May 9, 22	10:00	GW	✓	✓	✓	✓	✓	✓	✓	✓	✓			18	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Dhwanish Parikh	22/05/09	11:00	ENVTRANS	22/05/09	12:32	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	6.7 9.6	Present		
		Intact		

* 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/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.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

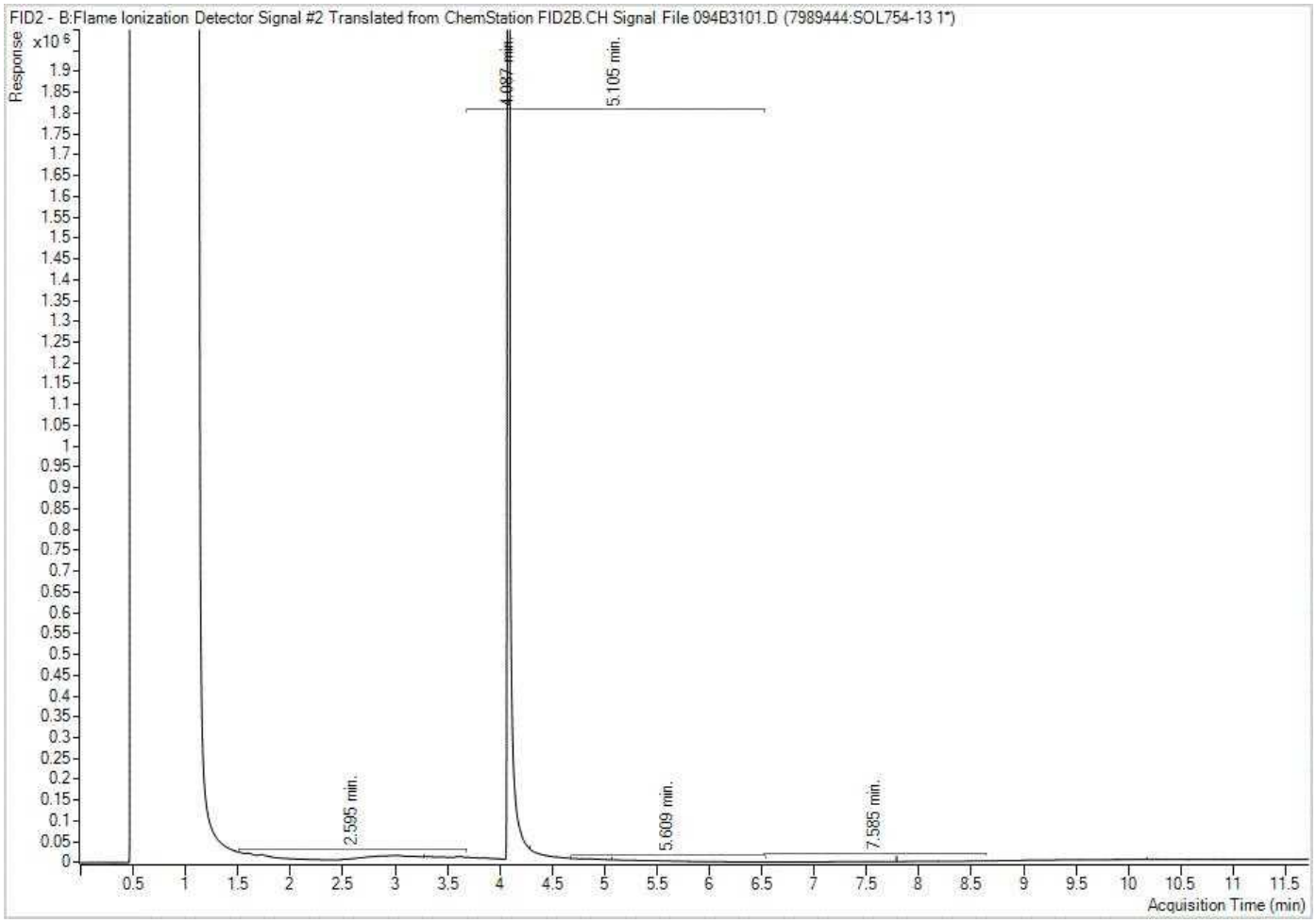
White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Job #: C2C4120
Report Date: 2022/05/16
Bureau Veritas Sample: SOL754

AECOM Canada Ltd
Client Project #: 60646784
Project name: PEEL REGION SNOW STORGAE
Client ID: BH5-3/MW

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Exceedance Summary Table – Reg153/04 T2-GW-C

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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Jia He, M.Eng., P.Eng.
Geotechnical Engineer

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Kitchener, ON N2P 0A4 Canada

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To: Region of Peel

Date: June 6, 2024

Project #: 60646784

From: Miln Harvey, Ph.D., P.Eng.
Brian Holden, M.Sc., P.Geo.

CC:

Technical Memorandum

Subject: **Supplemental Hydrogeological Memorandum – Peel Region Snow Storage, Region of Peel**

1. Purpose

The purpose of this supplemental hydrogeological memorandum is to provide the results of infiltration tests that were completed for nine (9) proposed snow disposal locations in the Town of Caledon and the City of Brampton, Ontario (the Site) and the outstanding hydrogeological testing and water quality sampling results from Site #5. As per the client's request, four (4) sites (Site #2, 4, 7, and 8) have been cancelled during the completion of the project. The location of the infiltration tests at five (5) sites are presented in **Appendix A**. This memorandum describes the infiltration test results of the following sites:

- Site #1 – Highway No. 50 Carpool Lot
- Site #3 – West Brampton Reservoir and Pumping Station
- Site #5 – Johnston Sports Park
- Site #6 – Tullamore Reservoir and Pumping Station
- Site #9 – Alloa Reservoir and Pumping Station

The memorandum will also present the results of the hydrogeological testing, water quality sampling for Site #5 and present hydrographs for all monitoring wells installed as part of the investigation. This memo is to be read in conjunction with the *Geotechnical, Hydrogeological and Contaminated Site Assessment Report* (AECOM, 2022).

2. Infiltration Testing Methodology

Infiltration rate testing was completed using a Guelph Permeameter to evaluate the field saturated vertical hydraulic conductivity within the upper 0.22 to 0.51 m of surficial soils at two (2) to three (3) locations within the five (5) sites (Site #1, 3, 5, 6 and 9) during the period of June 28 and July 4, 2022. The Guelph Permeameter is an in-hole Mariotte bottle device used for measuring the rate of water influx into an unsaturated column of soil by measuring the steady-state flow rate necessary to maintain a constant depth of water in an uncased cylindrical well, from which an estimate of the soil hydraulic properties are determined. The steady state flow rate was measured under constant water heads of 5 cm and 24 cm at each of the testing locations.

Table 1: Infiltration Test Results

Site Name and Address	Test Location ID	Co-ordinates – Zone 17		Depth of Tested Borehole (mBGS)[1]	Dominant Soil Type	Interpretation Method	Field Saturated Hydraulic Conductivity[2] (K_{fs})	Calculations	
		Easting (m)	Northing (m)					Percolation Rate[3] (X)	Percolation Time (T Time)[4]
							(m/s)	(mm/hour)	min/cm
Site #1: Highway No. 50 Car Pool Lot (11221 Hwy 50, Brampton, ON L6R 3J7)	IFT1-1	604803.0	4855699.3	0.51	Clayey silt with some sand to sandy, trace of grass roots and organics	Single Head	6.4×10^{-7}	41	15
	IFT1-2	604794.0	4855664.6	0.50	Silty clay to clayey silt with trace of some sand	Double and Single Head	9.6×10^{-7}	46	13
Site #3: West Brampton Reservoir and Pumping Station (9624 Peel Regional Rd 1, Brampton, ON L6X 0B5)	IFT3-1	595110.5	4834615.7	0.31	Fine sand with trace gravel and silt	Double and Single Head	4.9×10^{-6}	71	8
	IFT3-2	595026.0	4834490.0	0.22	Sand with trace to some silt and gravel (FILL)	Double and Single Head	2.7×10^{-6}	60	10
	IFT3-3	594782.6	4834559.2	0.24	Sand with trace to some silt and gravel (FILL)	Single Head	1.8×10^{-6}	54	11
Site #5: Johnston Sports Park (6898 King St, Caledon East, ON L7C 0V1)	IFT5-1	596881.9	4855781.9	0.35	Clayey silt to silty clay with trace gravel & trace to some sand, occ. Organics	Single Head	6.5×10^{-7}	41	15
	IFT5-2	596956.8	4855754.1	0.45	Clayey silt to silty clay with trace sand	Double and Single Head	1.3×10^{-7}	27	22
	IFT5-3	596884.5	4855690.4	0.40	Clayey silt to silty clay with trace sand, gravel & occ. Organics	Double and Single Head	-	-	-
Site #6: Tullamore Reservoir and Pumping Station (12078 Innis Lake Rd, Caledon East, ON L7C 0Z7)	IFT6-1	600291.7	4850743.6	0.40	Sand with some gravel, trace silt & trace clay (FILL)	Double and Single Head	8.9×10^{-7}	45	13
	IFT6-2	600328.4	4850716.1	0.40	Sand with some silt, trace clay, and trace to some gravel (FILL)	Double and Single Head	6.4×10^{-7}	41	15
Site #9: Alloa Reservoir and Pumping Station (1278 Mayfield Rd, Caledon, ON L7C 0Y7)	IFT9-1	591562.2	4839601.1	0.40	Sand with some gravel & trace silt (FILL)	Double and Single Head	8.3×10^{-6}	82	7
	IFT9-2	591562.2	4839601.1	0.26	Sand with some gravel to gravelly, trace silt (FILL)	Double and Single Head	1.5×10^{-6}	51	12

Notes: 1. *mBGS = metres Below Ground Surface.*
2. *from Guelph Permeameter data analysis.*
3. *Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 - Percolation Time and Soil Descriptions. Toronto, Ontario.* $K_{fs} = (6E\text{-}11)*X^{3.7363}$.
4. *Based on Measured Percolation Rate*

Table 2: Daily Mean Ambient Air Temperature and Total Precipitation Summary for Climate Station No. 6158731

Date	Mean Ambient Air Temperature 0°C	Total Precipitation (mm)	Location of Completed Infiltration Test
June 27, 2022	17.2	0.0	-
June 28, 2022	17.6	0.0	IFT1-1, IFT1-2, IFT6-1, and IFT6-2
June 29, 2022	19.8	4.2	-
June 30, 2022	20.8	0.0	IFT5-1, IFT5-2, IFT5-3, IFT9-1, and IFT9-2
July 3, 2022	20.6	0.0	-
July 4, 2022	20.9	0.0	IFT3-1, IFT3-2, and IFT3-3

Note: Air Temperature and Precipitation data were obtained from the Environment Canada website.

3. Site #1 – Highway No. 50 Carpool Lot

Site #1 is located at the south side of Mayfield Road and the west side of Highway 50 in Brampton (Appendix A). The site is an undeveloped area covered by grass and bushes. Two (2) infiltration tests were completed including IFT1-1 in Clayey Silt with some sand and IFT1-2 in Silty clay to clayey silt.

3.1 Infiltration Testing Results

Based on the completed analysis it was determined that the field saturated vertical hydraulic conductivity of the surficial soils at the two (2) locations of testing ranged between 6.4 x 10^{-7} m/s (IFT1-1) and 9.6 x 10^{-7} m/s (IFT1-2).

It was also determined that percolation rates ranged between 41 and 46 mm/hour and percolation times ranged between 13 and 15 min/cm at IFT1-1 and IFT1-2, respectively.

Analysis of field collected data was conducted using the Soil moisture Equipment Corporation Guelph Permeameter calculation worksheet and is provided in **Appendix B**. The testing and data analysis results are summarized in **Table 1**. If the measured steady state flow rate under the water head of 5 cm is lower than the steady state water flow rate under the water head of 10 cm, the single head method was used for data interpretation. Otherwise, the double head method was used for data interpretation. The normal average for the two methods was used in the calculations as shown in **Appendix B.**

The calculated infiltration rates for Site #1 indicate that the local shallow soils generally are sufficiently permeable to consider multiple Low Impact Development (LID) technologies, as per guidance provided by Ministry of the Environment, Conservation and Parks (MECP) in their *Stormwater Management Planning and Design Manual* (Table 4.1, 2003), as well as by TRCA / Credit Valley Conservation Authority (CVC), within their *Low Impact Development Stormwater Management Planning and Design Guide* (Version 1.0, 2010, Table 3.4.1).

4. Site #3 – West Brampton Reservoir and Pumping Station

Site #3 is located at the west side of Mississauga Road and the south side of Williams Parkway in Brampton, as shown in **Appendix A**. The entrance of the site has been developed with asphalt pavement structure which connected with an existing structure for agriculture purpose. Both northwest and southeast sides of the structure is undeveloped areas covered by grass and bushes. Six (6) boreholes from BH3-1 to BH3-6 on the green land were advanced. During the investigation, no abnormal odour or staining was detected.

4.1 Groundwater Level Monitoring

A groundwater monitoring well (BH3-4/MW) was constructed at the site on December 16, 2021 as part of the geotechnical investigation. Groundwater level monitoring at BH3-4/MW was conducted by AECOM between February 11, 2022 to July 7, 2022. **Table 3** provides a summary of BH3-4/MW including groundwater levels, elevation data, depths, and screen intervals (in mBGS and mASL).

As shown in **Table 3**, observed static groundwater level elevations at BH3-4/MW ranged from approximately 226.50 mASL to 226.74 mASL. It is expected that the groundwater levels within the Site #3 will be subjected to seasonal fluctuations including response to spring freshet and localized precipitation events. Continuous groundwater monitoring was attempted at BH3-4/MW, but the datalogger installed failed to accurately record the groundwater levels on an hourly basis.

Table 3: Construction Details and Groundwater Level Measurements (BH3-4/MW)

Monitoring Well ID	Ground Surface Elevation (mASL)[2]	Screen Interval Depth (mBGS)[1]		Screen Interval Elevation (mASL)[2]		Groundwater Level Depth and Elevation		
		Top	Bottom	Top	Bottom	Date	Depth to Groundwater (mBGS)[1]	Groundwater Elevation (mASL)[2]
BH3-4/MW	231.00	4.00	5.52	227.00	225.48	Feb 11, 2022	4.50	226.50
						Feb 28, 2022	4.43	226.57
						Mar 8, 2022	4.40	226.60
						May 9, 2022	4.26	226.74
						Jul 7, 2022	4.44	226.56

Notes: 1. mBGS = metres below ground surface
2. mASL = metres above mean sea level

4.2 Infiltration Testing Results

Based on the completed analysis it was determined that the field saturated vertical hydraulic conductivity of the surficial soils at the three (3) locations of testing ranged between 1.8 x 10^{-6} m/s (IFT3-3) and 4.9 x 10^{-6} m/s (IFT3-1).

It was also determined that percolation rates ranged between 54 and 71 mm/hour and percolation times ranged between 8 and 11 min/cm at IFT3-1, IFT3-2, and IFT3-3, respectively.

Analysis of field collected data was conducted using the Soil moisture Equipment Corporation Guelph Permeameter calculation worksheet and is provided in **Appendix B**. The testing and data analysis results are summarized in **Table 1**. If the measured steady state flow rate under the water head of 5 cm is lower than the steady state water flow rate under the water head of 10 cm, the single head method was used for data interpretation. Otherwise, the double head method was used for data interpretation. The normal average for the two methods was used in the calculations as shown in **Appendix B.**

The calculated infiltration rates for Site #3 indicate that the local shallow soils generally are sufficiently permeable to consider multiple Low Impact Development (LID) technologies, as per guidance provided by Ministry of the Environment, Conservation and Parks (MECP) in their *Stormwater Management Planning and Design Manual* (Table 4.1, 2003), as well as by TRCA / Credit Valley Conservation Authority (CVC), within their *Low Impact Development Stormwater Management Planning and Design Guide* (Version 1.0, 2010, Table 3.4.1).

5. Site #5 – Johnston Sports Park

Site #5 is located at the west side of Centreville Creek Road and the north side of King St in Caledon, as shown in **Appendix A**. The access road from King Street as well as two parking areas were developed with asphalt pavement. The rest areas of the site are undeveloped areas covered by grass and bushes. Five (5) boreholes including BH5-1 to BH5-5 on the green land were advanced. During the investigation, no abnormal odour or staining was detected.

5.1 Groundwater Level Monitoring

A groundwater monitoring well (BH5-3/MW) was constructed at the site on December 20, 2021 as part of the geotechnical investigation. Groundwater level monitoring at BH5-3/MW was conducted by AECOM between

February 11, 2022 to June 30, 2022. **Table 4** provides a summary of BH5-3/MW including groundwater levels, elevation data, depths, and screen intervals (in mBGS and mASL).

Table 4: Construction Details and Groundwater Level Measurements (BH5-3/MW)

Monitoring Well ID	Ground Surface Elevation (mASL)[2]	Screen Interval Depth (mBGS)[1]		Screen Interval Elevation (mASL)[2]		Groundwater Level Depth and Elevation		
		Top	Bottom	Top	Bottom	Date	Depth to Groundwater (mBGS)[1,3]	Groundwater Elevation (mASL)[2,3]
BH5-3/MW	267.50	2.13	5.18	265.37	262.32	Feb 11, 2022	0.14	267.36
						Feb 28, 2022	0.32	267.18
						Mar 7, 2022	0.31	267.19
						Mar 8, 2022	0.31	267.19
						May 9, 2022	0.19	267.31
						Jun 30, 2022	0.11	267.39

Notes: 1. mBGS = metres below ground surface
2. mASL = metres above mean sea level
3. The monitoring well BH5-3/MW was frozen from February 11, 2022 to March 8, 2022. Groundwater level data collected from February 11, 2022 to March 8, 2022 at BH5-3/MW are pre-development.

The Monitoring well BH5-3/MW was frozen during four (4) site visits conducted between February 11, 2022 to March 8, 2022. As shown in **Table 3**, observed static groundwater level elevations at BH5-3/MW ranged from approximately 267.31 mASL to 267.39 mASL. It is expected that the groundwater levels within the Site #5 will be subjected to seasonal fluctuations including response to spring freshet and localized precipitation.

5.2 Hydraulic Conductivity Test

SWRT was conducted at BH5-3/MW on May 9, 2022. Collected data were analyzed to provide an estimate of the hydraulic conductivity (K) of the stratum surrounding each respective monitoring well screen. SWRT results for BH5-3/MW are summarized in **Table 5**, with the individual analysis reports contained in **Appendix C**.

Table 5: Single Well Response Testing Results (BH5-3/MW)

Monitoring Well ID	Test Date	Analytical Method [1]	Top of Test Interval (mBGS)[2]	Bottom of Test Interval (mBGS)[2]	Test Type	Hydraulic Conductivity (m/s)[3]	Geologic Formation
BH5-3/MW	May 9, 2022	Hvorslev	2.27	5.32	Rising Head	1.34×10^{-8}	Silty Clay

Notes: 1: Hvorslev (1951)
2: mBGS = metres Below Ground Surface
3: m/s = metre per second

5.3 Groundwater Quality

Groundwater samples were collected from BH5-3/MW on May 9, 2022 and submitted to Bureau Veritas Laboratories for geochemical analysis. The results of the analysis were compared to Provincial Water Quality Standards (PWQO) criteria limits. As shown in **Table 6**, dissolved boron and dissolved Cobalt exceeded the PWQO guidelines limits. Given these exceedances, the use of water treatment prior to the discharge to the natural environment should be included as part of the dewatering plan. Certificates of Analysis provided by Bureau Veritas Laboratories are included in **Appendix D**.

Table 6: Summary of Parameters Exceeding PWQO Guidelines (BH5-3/MW)

Parameter Group	Monitoring Well	Parameter	PWQO Guideline (ug/L)	Reported Value (ug/L)
Metals	BH5-3/MW	Dissolved Cobalt	0.9	1.1

Notes: ug/L = micrograms per Litre

5.4 Infiltration Testing Results

Based on the completed analysis it was determined that the field saturated vertical hydraulic conductivity of the surficial soils at the three (3) locations of testing ranged between 1.3 x 10^{-7} m/s (IFT5-2) and 6.5 x 10^{-7} m/s (IFT5-1).

It was also determined that percolation rates ranged between 27 and 41 mm/hour and percolation times ranged between 15 and 22 min/cm at IFT5-1 and IFT5-2, respectively.

Analysis of field collected data was conducted using the Soil moisture Equipment Corporation Guelph Permeameter calculation worksheet and is provided in **Appendix B**. The testing and data analysis results are summarized in **Table 1**. If the measured steady state flow rate under the water head of 5 cm is lower than the steady state water flow rate under the water head of 10 cm, the single head method was used for data interpretation. Otherwise, the double head method was used for data interpretation. The normal average for the two methods was used in the calculations as shown in **Appendix B.**

The calculated infiltration rates for Site #5 indicate that the local shallow soils generally are sufficiently permeable, as only 2 of 3 locations meet the minimum 15 mm/hr percolation rate to consider multiple Low Impact Development (LID) technologies, as per guidance provided by Ministry of the Environment, Conservation and Parks (MECP) in their *Stormwater Management Planning and Design Manual* (Table 4.1, 2003), as well as by TRCA / Credit Valley Conservation Authority (CVC), within their *Low Impact Development Stormwater Management Planning and Design Guide* (Version 1.0, 2010, Table 3.4.1).

6. Site #6 – Tullamore Reservoir and Pumping Station

Site #6 is located at the west side of Innis Lake Road and the north side of Mayfield Rd in Brampton (**Appendix A**). The south part of the site was developed with an existing structure with the asphalt pavement parking area and the access road. An existing stormwater management pond is located at the west side of the structure. The other access loop with asphalt pavement was developed at the north part of the site. The rest areas of the site are undeveloped and covered by grass and bushes. Three (3) boreholes (BH6-1, BH6-2, and BH6-3) on the green land were advanced. During the investigation, no abnormal odour or staining was detected.

6.1 Groundwater Level Monitoring

A groundwater monitoring well (BH6-1/MW) was constructed at the site on November 15, 2021 as part of the project-related geotechnical investigation. Groundwater level monitoring at BH6-1/MW was conducted by AECOM between March 7, 2022 to June 28, 2022. **Table 7** provides a summary of BH6-1/MW including groundwater levels, elevation data, depths, and screen intervals (in mBGS and mASL).

Table 7: Construction Details and Groundwater Level Measurements (BH6-1/MW)

Monitoring Well ID	Ground Surface Elevation (mASL)[2]	Screen Interval Depth (mBGS)[1]		Screen Interval Elevation (mASL)[2]		Groundwater Level Depth and Elevation		
		Top	Bottom	Top	Bottom	Date	Depth to Groundwater (mBGS)[1,3,4]	Groundwater Elevation (mASL)[2,3,4]
BH6-1/MW	231.00	1.50	2.41	229.50	228.59	Mar 7, 2022	0.66	230.34
						Mar 8, 2022	1.83	229.17
						May 9, 2022	0.70	230.30
						Jun 28, 2022	1.30	229.70

Notes: 1. mBGS = metres below ground surface
2. mASL = metres above mean sea level
3. Groundwater level data collected on March 7, 2022 was pre-development.
4. Groundwater level data collected on March 8, 2022 are not static as the well was recovering from the following development and/or groundwater sampling.

As shown in **Table 3**, observed static groundwater level elevations at BH6-1/MW ranged from approximately 229.70 mASL to 230.30 mASL. It is expected that the groundwater levels within the Site #6 will be subjected to seasonal fluctuations including response to spring freshet and localized precipitation.

Long-term groundwater data was also being collected at BH6-1/MW using water level data loggers. The purpose of this monitoring is to assess water level fluctuation over time, the recorded groundwater level elevations at BH6-1/MW ranged from approximately 229.17 mASL to 230.34 mASL. The collected groundwater data was analyzed. Hydrographs along with the local precipitation data from nearest climate station (TORONTO INTL A) are in **Appendix E**.

6.2 Infiltration Testing Results

Infiltration rate testing will be completed using a Guelph Permeameter to evaluate the field saturated vertical hydraulic conductivity within the upper surficial soils at the selected location within Site #6 in Spring 2022. The infiltration testing results will be presented in a subsequent memorandum to this report.

Based on the completed analysis it was determined that the field saturated vertical hydraulic conductivity of the surficial soils at the two (2) locations of testing ranged between 6.4 x 10^{-7} m/s (IFT6-2) and 8.9 x 10^{-7} m/s (IFT6-1).

It was also determined that percolation rates ranged between 41 and 45 mm/hour and percolation times ranged between 13 and 15 min/cm at IFT6-1 and IFT6-2, respectively.

Analysis of field collected data was conducted using the Soil moisture Equipment Corporation Guelph Permeameter calculation worksheet and is provided in **Appendix B**. The testing and data analysis results are summarized in **Table 1**. If the measured steady state flow rate under the water head of 5 cm is lower than the steady state water flow rate under the water head of 10 cm, the single head method was used for data interpretation. Otherwise, the double head method was used for data interpretation. The normal average for the two methods was used in the calculations as shown in **Appendix B.**

The calculated infiltration rates for Site #6 indicate that the local shallow soils generally are sufficiently permeable to consider multiple Low Impact Development (LID) technologies, as per guidance provided by Ministry of the Environment, Conservation and Parks (MECP) in their *Stormwater Management Planning and Design Manual* (Table 4.1, 2003), as well as by TRCA / Credit Valley Conservation Authority (CVC), within their *Low Impact Development Stormwater Management Planning and Design Guide* (Version 1.0, 2010, Table 3.4.1).

7. Site #9 – Alloa Reservoir and Pumping Station

Site #9 is located at the west side of Creditview Road and the north side of Mayfield Rd in Brampton, as shown in **Appendix A**. The south half part of the site has been developed with an existing structure with asphalt pavement parking area and access road. The north half of the site are undeveloped areas covered by grass. Three (3) boreholes including BH9-1 to BH9-3/MW on the green land were advanced.

7.1 Groundwater Level Monitoring

A groundwater monitoring well (BH9-3/MW) was constructed at the site on November 16, 2021 as part of the geotechnical investigation. Groundwater level monitoring at BH9-3/MW was conducted by AECOM between March 7, 2022 to June 30, 2022. **Table 8** provides a summary of BH9-3/MW including groundwater levels, elevation data, depths, and screen intervals (in mBGS and mASL).

Table 8: Construction Details and Groundwater Level Measurements (BH9-3/MW)

Monitoring Well ID	Ground Surface Elevation (mASL)[2]	Screen Interval Depth (mBGS)[1]		Screen Interval Elevation (mASL)[2]		Groundwater Level Depth and Elevation		
		Top	Bottom	Top	Bottom	Date	Depth to Groundwater (mBGS)[1,3,4]	Groundwater Elevation (mASL)[2,3,4]
BH9-3/MW	262.00	3.26	6.31	258.74	255.69	Mar 7, 2022	3.23	258.77
						Mar 8, 2022	5.25	256.76
						May 9, 2022	3.00	259.00
						Jun 30, 2022	3.34	258.66

Notes: 1. mBGS = metres below ground surface
2. mASL = metres above mean sea level
3. Groundwater level data collected on March 7, 2022 was pre-development.
4. Groundwater level data collected on March 8, 2022 are not static as the well was recovering from the following development and/or groundwater sampling.

As shown in **Table 3**, observed static groundwater level elevations at BH9-3/MW ranged from approximately 258.66 mASL to 259.00 mASL. It is expected that the groundwater levels within the Site #9 will be subjected to seasonal fluctuations including response to spring freshet and localized precipitation.

Long-term groundwater data are also being collected at BH9-3/MW using water level data loggers. The purpose of this monitoring is to assess water level fluctuation over time, the recorded groundwater level elevations at BH9-3/MW ranged from approximately 256.76 mASL to 259.00 mASL. The collected groundwater data was analyzed. Hydrographs along with the local precipitation data from nearest climate station (TORONTO INTL A) are in **Appendix E**.

7.2 Infiltration Testing Results

Based on the completed analysis it was determined that the field saturated vertical hydraulic conductivity of the surficial soils at the two (2) locations of testing ranged between 1.5 x 10^{-6} m/s (IFT9-2) and 8.3 x 10^{-6} m/s (IFT9-1).

It was also determined that percolation rates ranged between 51 and 82 mm/hour and percolation times ranged between 7 and 12 min/cm at IFT9-1 and IFT9-2, respectively.

Analysis of field collected data was conducted using the Soil moisture Equipment Corporation Guelph Permeameter calculation worksheet and is provided in **Appendix B**. The testing and data analysis results are summarized in **Table 1**. If the measured steady state flow rate under the water head of 5 cm is lower than the steady state water flow rate under the water head of 10 cm, the single head method was used for data interpretation. Otherwise, the double head method was used for data interpretation. The normal average for the two methods was used in the calculations as shown in **Appendix B.**

The calculated infiltration rates for Site #9 indicate that the local shallow soils generally are sufficiently permeable to consider multiple Low Impact Development (LID) technologies, as per guidance provided by Ministry of the Environment, Conservation and Parks (MECP) in their *Stormwater Management Planning and Design Manual* (Table 4.1, 2003), as well as by TRCA / Credit Valley Conservation Authority (CVC), within their *Low Impact Development Stormwater Management Planning and Design Guide* (Version 1.0, 2010, Table 3.4.1).

8. Climate Data

In a review of the test data and infiltration rate estimates presented herein, it should be considered that according to the Toronto and Region Conservation Authority (TRCA) / Credit Valley Conservation Authority (CVC), within their *Low Impact Development Stormwater Management Planning and Design Guide* (Version 1.0, 2010), infiltration testing "should not be conducted in the rain or within 24 hours of significant rainfall events (>15 millimetres depth), or when the temperature is below freezing" (Appendix C, Section C2.3).

Mean ambient air temperatures on the dates of infiltration testing ranged between 17.6 and 20.9°C, as reported by Environment Canada (www.climate.weather.gc.ca) for the Toronto INTL A (Climate ID 6158731). **Table 2** provides a summary of the daily mean ambient air temperatures and the total precipitation on the days prior to and on which each infiltration test was completed, as reported by Environment Canada for Climate Station No. 6158731.

Precipitation received at Climate Station No. 6158731 also was evaluated for each infiltration testing event and was found to be less than 15 mm within the preceding 24-hour period. As per the data presented in **Table 2**, the precipitation received both prior to as well as on the day of testing is not expected to have negatively affected the infiltration results presented herein.

9. References

AECOM, June 2022:
Geotechnical, Hydrogeological and Contaminated Site Assessment Report, Peel Region Snow Storage, Peel Region. Project No. 60646784.

Environment Canada, 2022:
Canadian Historical Climate Data, Toronto INTL A – Station ID 6158731 – Website:
https://climate.weather.gc.ca/historical_data/search_historic_data_e.html

Ministry of Environment, Conservation and Parks (MECP), 2003:
Stormwater Management Planning and Design Manual.

Toronto & Region Conservation Authority (TRCA) / Credit Valley Conservation Authority (CVC), 2010:
Low Impact Development Stormwater Management Planning and Design Guide (Version 1.0).

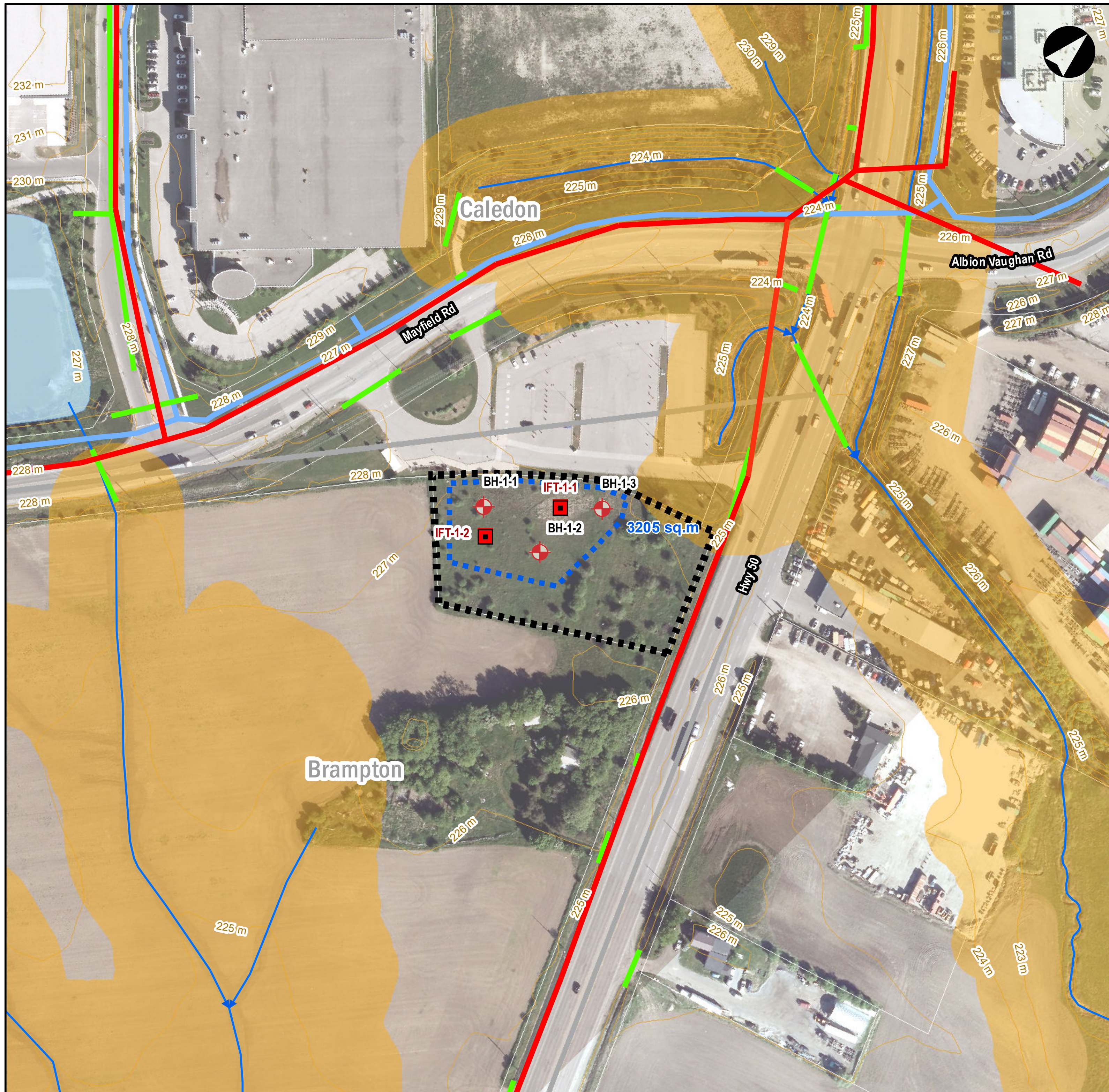
Appendix A

Peel Snow Storage Study Site Map

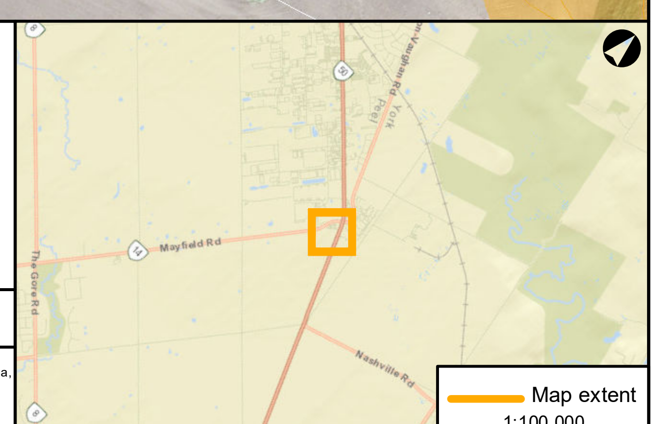
Region of Peel
working with you
AECOM

Snow Storage Site Analysis and Conceptual Design Project 13-4007
AECOM Project: 60646784

Site 1 - Highway No. 50 Car Pool Lot



Infiltration Testing Location
Borehole
Potential Snow Storage Property Boundary
Potential Snow Storage Area
Sanitary System (Per GIS; As-Builts; Location Approximate)
Storm System (Per GIS, As-Builts; Location Approximate)
Water System (Per GIS, As-Builts; Location Approximate)
Contours (1 m interval)
Watercourse
TRCA Regulation Limits
Municipal Boundary



August 2022	Datum: NAD83 UTM17	1:2,500	0 10 20 30 40 50 Meters

Data Source:
Contains information provided by the Region of Peel, City of Mississauga, City of Brampton, and Town of Caledon.
Key base map provided by ESRI.

Data Received / Requested

Requested:
-Traffic data (Turning Movement Counts, Signal Timing Plans)
-GIS data (property boundaries, water, wastewater, storm systems, environmental data, sourcewater protection data, natural areas inventory, ecological land classification data, etc.)
-CAD data (property lines, contours, water, wastewater, storm systems)
-LiDAR Digital Terrain Model (DTM)
-2020 Ortho imagery
-As-built drawings, site plans
-Subsurface Utility Engineering (SUE) Investigations
-Hydrogeology reports, Geotechnical investigation data
-Environmental Site Assessments (ESAs)
-Designated Substance Survey (DSS)
-Heritage register data
-Environmental Compliance Approvals (ECA's)
-Stormwater Management Reports
-Fish and wildlife data (fish community, spawning records, SAR records, etc).
-Background reports, models relevant to watercourses

Current Issues and Opportunities

Conservation Authority: TRCA

Regional Roads within 10 km: 267 lane-km
Primary and Secondary Snow Removal within 10 km: 10 km

Pros:
- Open site
- Regionally owned
- Opportunity to improve stormwater servicing for Highway 50 corridor

Cons:
- Busy roads make truck ingress/egress difficult
- Watercourse adjacent to site

Overall:
Favourable for investigation

Future Development Plans

Potential expansion of the existing carpool lot.
Related Environmental Assessment: Hwy 427 Industrial Secondary Plan (Area 47)

Schedule

Comments

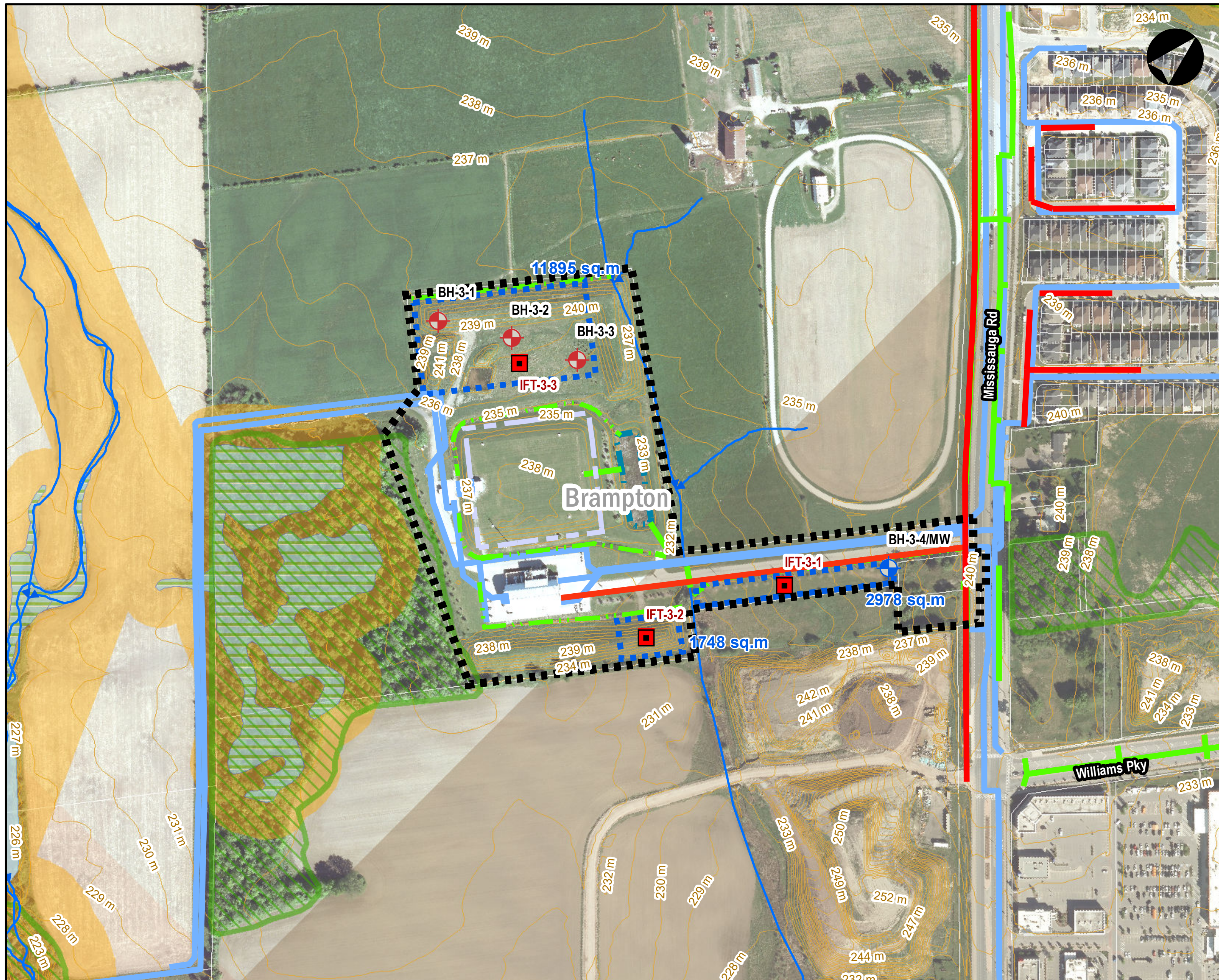
On-site stormwater management would be used to provide quality and quantity controls for snow storage facility.

SPA 47 EA Master Environmental Servicing Plan (MESP) identifies a SWMF to the south, which can potentially be used for snow storage stormwater management. If used, would need to demonstrate no impact to the SPA 47 SWMF.

Future road cross-sections and storm sewers from SPA 47 MESP to be further investigated

Hwy 50 carpool location to be reviewed by active transportation staff.

Site remains favourable for continued investigation.



Infiltration Testing Location
Borehole
Borehole/Monitoring Well
Potential Snow Storage Property Boundary
Reservoir
Potential Snow Storage Area
Sanitary System (Per GIS, As-Builts; Location Approximate)
Storm System (Per GIS, As-Builts; Location Approximate)
Swale/Above-ground feature (Per As-Builts; Location Approximate)
Water System (Per GIS, As-Builts; Location Approximate)
SWMF
Contours (1 m interval)
Watercourse
Natural Areas Inventory
Woodland
Conservation Authority Regulated Limits
Municipal Boundary

August 2022	Datum: NAD83 UTM17	1:5,000	0 20 40 60 80 100 Meters

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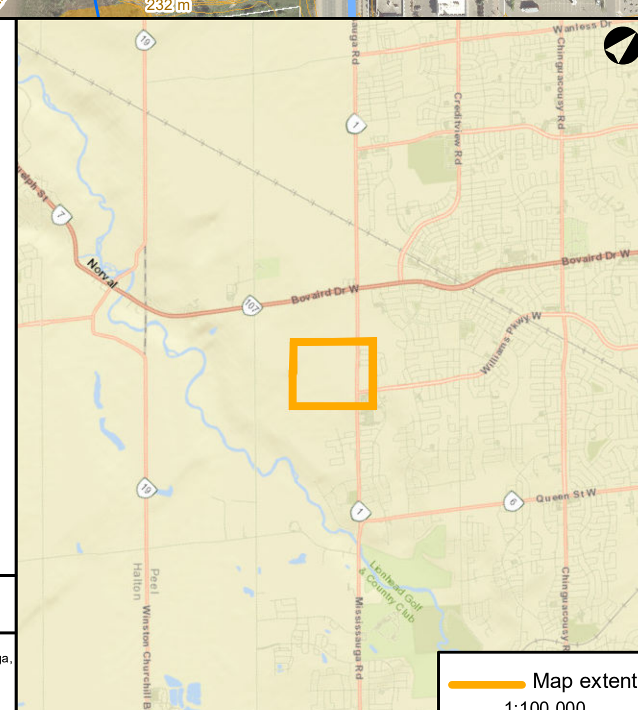
Data Source:
Contains information provided by the Region of Peel, City of Mississauga, City of Brampton, and Town of Caledon.
Key base map provided by ESRI.



Region of Peel working with you
AECOM

Snow Storage Site Analysis and Conceptual Design Project 13-4007
AECOM Project: 60646784

Site 3 - West Brampton Reservoir and Pumping Station

Data Received / Requested

Requested:
- -Traffic data (Turning Movement Counts, Signal Timing Plans)
- -GIS data (property boundaries, water, wastewater, storm systems, environmental data, sourcewater protection data, natural areas inventory, ecological land classification data, etc.)
- -CAD data (property lines, contours, water, wastewater, storm systems).
- -LiDAR Digital Terrain Model (DTM)
- -2020 Ortho imagery
- -As-built drawings, site plans
- -Subsurface Utility Engineering (SUE) Investigations
- -Hydrogeology reports, Geotechnical investigation data
- -Environmental Site Assessments (ESAs)
- -Designated Substance Survey (DSS)
- -Heritage register data
- -Environmental Compliance Approvals (ECA's)
- -Stormwater Management Reports
- -Fish and wildlife data (fish community, spawning records, SAR records, etc).
- -Background reports, models relevant to watercourses

Current Issues and Opportunities

Conservation Authority: CVC

Regional Roads within 10 km: 402 lane-km
Primary and Secondary Snow Removal within 10 km: 68 km

Pros:
- Regionally owned
- Rural area - lower probability for disturbance by truck traffic

Cons:
- Poor grading on site would require extensive re-grading to accommodate snow storage
- Potential conflict with existing critical infrastructure at the site
- Within Highly Vulnerable Aquifer area
- Woodlot and unevaluated wetland to the west

Overall:
Favourable for investigation

Future Development Plans

Long term: Reservoir planned for the north end of the site (~2041+)
Related Secondary Plan: Heritage Heights Secondary Plan (SPA 52 and 53)

Schedule

Comments

Regionally owned property limits include two parcels adjacent to the reservoir property (to the south, along Mississauga Rd.)

South of the access driveway, a long narrow area was originally considered as a possible snow storage location, although overhead utility lines are also adjacent, making the area not feasible.

In the south east corner of the reservoir property, another area was identified as a possible snow storage location. This area has significant fill and would require extensive grading, making this area unsuitable.

The northernost potential snow storage area is the current preferred location along this site. This is the site of future reservoir expansion. Use as a snow storage site would be limited to ~20 years given future development plan for a reservoir.

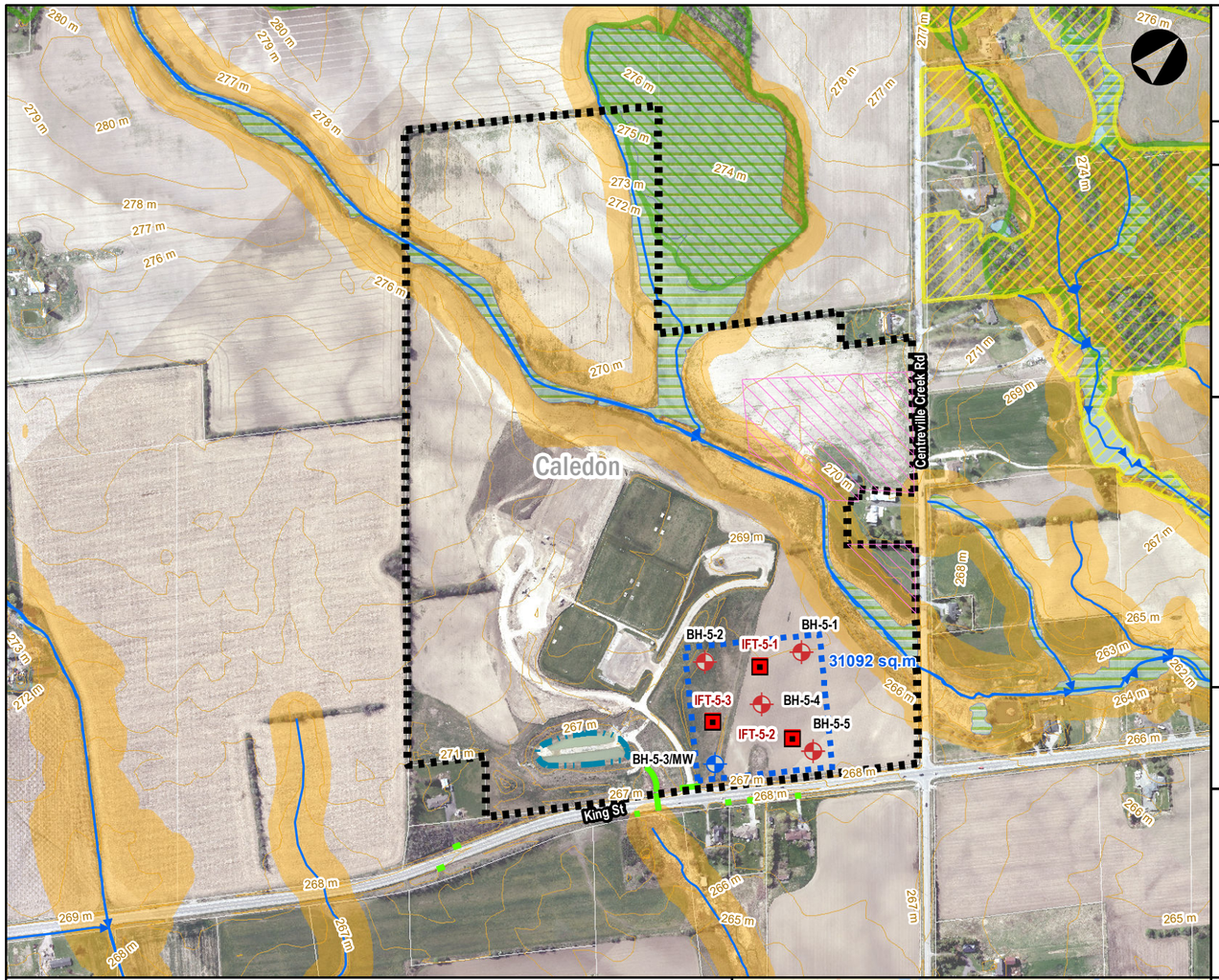
Any snow storage area would be managed using a traditional (non-infiltration) approach to minimize impact of chlorides.

Location and timing of planned sub transmission main to be confirmed by Peel.

Site remains favourable for continued investigation.

Snow Storage Site Analysis and Conceptual Design Project 13-4007
AECOM Project: 60646784

Site 5 - Johnston Sports Park



Data Received / Requested

Requested:
-Traffic data (Turning Movement Counts, Signal Timing Plans)
-GIS data (property boundaries, water, wastewater, storm systems, environmental data, sourcewater protection data, natural areas inventory, ecological land classification data, etc.)
-CAD data (property lines, contours, water, wastewater, storm systems)
-LiDAR Digital Terrain Model (DTM)
-2020 Ortho imagery
-As-built drawings, site plans
-Subsurface Utility Engineering (SUE) Investigations
-Hydrogeology reports, Geotechnical investigation data
-Environmental Site Assessments (ESAs)
-Designated Substance Survey (DSS)
-Heritage register data
-Environmental Compliance Approvals (ECA's)
-Stormwater Management Reports
-Fish and wildlife data (fish community, spawning records, SAR records, etc).
-Background reports, models relevant to watercourses

Current Issues and Opportunities

Conservation Authority: TRCA

Regional Roads within 10 km: 301 lane-km
Primary and Secondary Snow Removal within 10 km: 0 km

Pros:
- Large site
- Open space in southeast corner
- Opportunity to enter/exit off of a secondary road
- Winter operation may not be in conflict with existing use (recreation area/sports park)
- Potential to reconfigure existing SWMF
- Potential joint use with the Town of Caledon

Cons:
-Municipally owned
- Majority of the site falls within a Significant Groundwater Recharge Area
- Portions of the site fall within a Highly Vulnerable Aquifer area
- Low proximity to snow removal areas

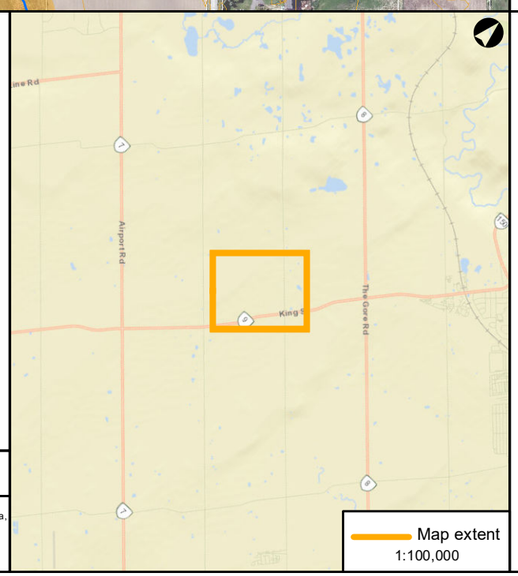
Overall:
Good candidate, favorable for investigation

Future Development Plans

A portion of the property is being sold by the Town of Caledon. This should not impact the potential of the site for snow storage.

Schedule

Infiltration Testing Location
Borehole
Borehole/Monitoring Well
Potential Snow Storage Property Boundary
Portion of Property Being Sold
Potential Snow Storage Area
Sanitary System (Per GIS, As-Builts; Location Approximate)
Storm System (Per GIS, As-Builts; Location Approximate)
Water System (Per GIS, As-Builts; Location Approximate)
SWMF
Contours (1 m interval)
Watercourse
Natural Areas Inventory
Woodland
TRCA Regulation Limits
Municipal Boundary



Comments

The Town of Caledon is open to exploring joint use opportunities with the Region.

Given the current seasonal nature of the property use, an additional use a potential snow storage site is favourable, maximizing year-round use of the property, with minimal conflict with the existing property use.

There are opportunities to design a snow storage area which could also be used as a parking lot during warmer months, increase utility of the site year round.

Permit to enter currently being arranged to allow for borehole and monitoring well installation.

Site remains favourable for continued investigation.

August 2022	Datum: NAD83 UTM17	1:7,500	0 50 100 150 Meters

Data Source:
Contains information provided by the Region of Peel, City of Mississauga, City of Brampton, and Town of Caledon.
Key base map provided by ESRI.

Map location: \\na.aecomnet.com\LFSAMER\Kitchener-CAKCN1\IDCS\Projects\WTR\60646784_SnowStoragePeel\600_CAD_GIS\920_929_GIS_Graphics\Design\03_Working\SiteMaps\60646748_PSS_Site5Johnston_20220802.mxd
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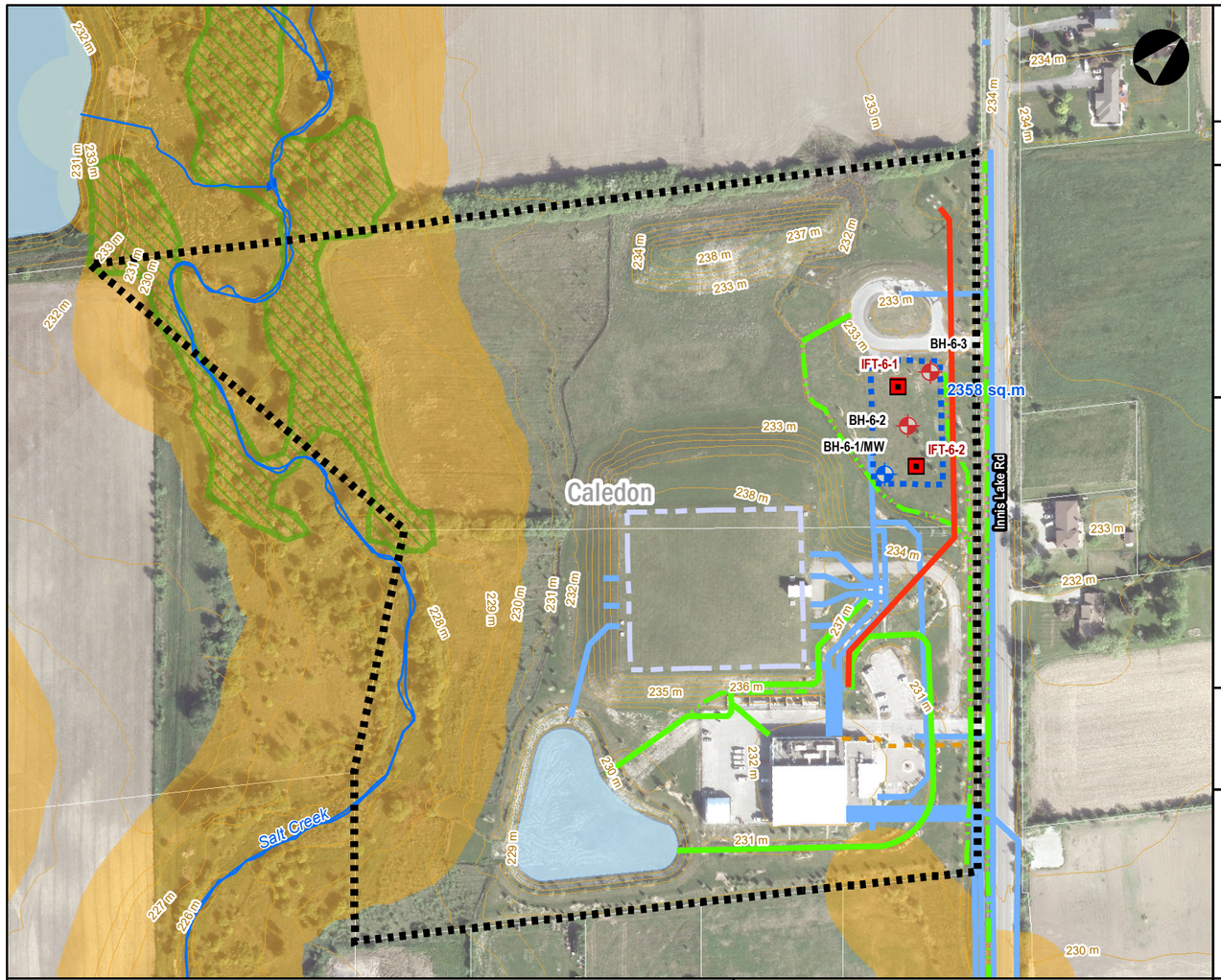


Region of Peel
working with you
AECOM

Snow Storage Site Analysis and Conceptual Design Project 13-4007
AECOM Project: 60646784

Site 6 - Tullamore Reservoir and Pumping Station

Data Received / Requested

Requested:
-Traffic data (Turning Movement Counts, Signal Timing Plans)
-GIS data (property boundaries, water, wastewater, storm systems, environmental data, sourcewater protection data, natural areas inventory, ecological land classification data, etc.)
-CAD data (property lines, contours, water, wastewater, storm systems)
-LiDAR Digital Terrain Model (DTM)
-2020 Ortho imagery
-As-built drawings, site plans
-Subsurface Utility Engineering (SUE) Investigations
-Hydrogeology reports, Geotechnical investigation data
-Environmental Site Assessments (ESAs)
-Designated Substance Survey (DSS)
-Heritage register data
-Environmental Compliance Approvals (ECA's)
-Stormwater Management Reports
-Fish and wildlife data (fish community, spawning records, SAR records, etc).
-Background reports, models relevant to watercourses

Current Issues and Opportunities

Conservation Authority: TRCA

Regional Roads within 10 km: 473 lane-km
Primary and Secondary Snow Removal within 10 km: 30 km

Pros:
- Regionally owned
- Large site
- Open space in by bulk water dispensing station

Cons:
- Potential conflict with existing critical infrastructure at the site
- Species at Risk Concerns – Redside Dace habitat identified along Salt Creek

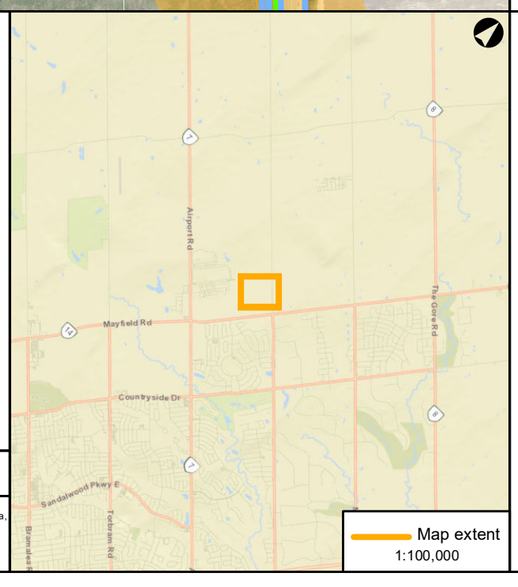
Overall:
Favourable for investigation

Future Development Plans

No known development plans for proposed snow storage area (south of the bulk water dispensing station).
Reservoir expansion is likely in the long-term (future reservoir would be sited north of the existing reservoir).

Schedule

- Infiltration Testing Location
- Borehole
- Borehole/Monitoring Well
- Potential Snow Storage Property Boundary
- Reservoir
- Potential Snow Storage Area
- Sanitary System (Per GIS, As-Builts; Location Approximate)
- Storm System (Per GIS, As-Builts; Location Approximate)
- Swale/Above-ground feature (Per As-Builts; Location Approximate)
- Water System (Per GIS, As-Builts; Location Approximate)
- Gas (Per As-Builts, Location
- Contours (1 m interval)
- Watercourse
- Woodland
- TRCA Regulation Limits
- Municipal Boundary



August 2022 | Datum: NAD83 UTM17 | 1:3,000 | 0 20 40 60 80 100 Meters

Data Source:
Contains information provided by the Region of Peel, City of Mississauga, City of Brampton, and Town of Caledon.
Key base map provided by ESRI.

Comments

Peel Water group favourable to this snow storage location.

The proposed snow storage location, located adjacent to the bulk water filling station, would take advantage of existing access, would have minimal disturbance to reservoir operations, and would increase utility of the site year round.

Drainage from a proposed snow storage location would need to be routed to the east, as a future reservoir would be sited to the west of the proposed snow storage location.

Site remains favourable for continued investigation.

Map location: \\na.aecomnet.com\LFS\AMER\Kitchener-CAKCN1\IDCS\Projects\WTR\60646784_SnowStoragePeel\600_CAD_GIS\920_929_GIS_Graphics\Design\03_Working\SiteMaps\60646748_PSS_Site6Tullamore_20220802.mxd
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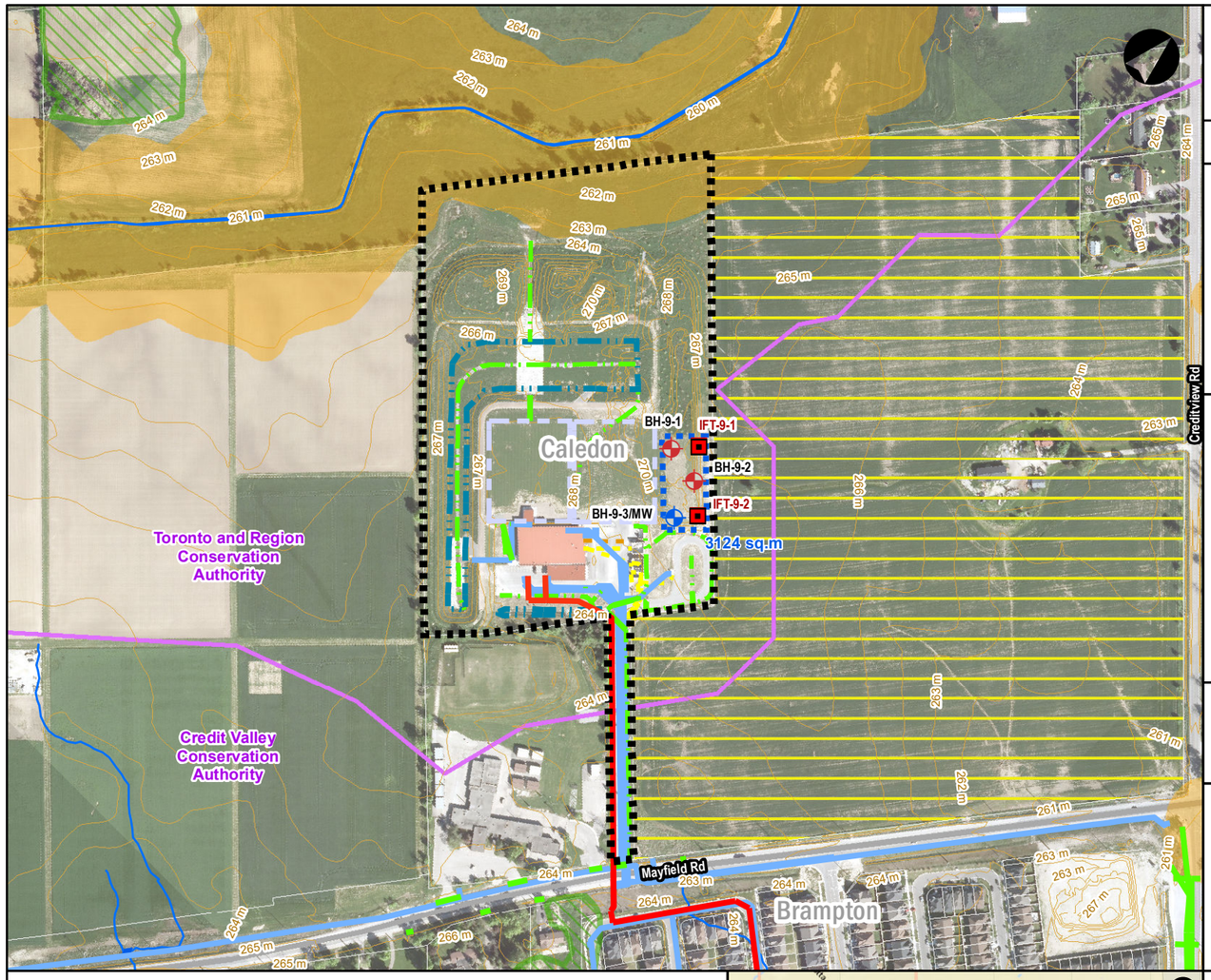


Region of Peel
working with you
AECOM

Snow Storage Site Analysis and Conceptual Design Project 13-4007
AECOM Project: 60646784

Site 9 - Alloa Reservoir and Pumping Station

Data Received / Requested

Requested:
-Traffic data (Turning Movement Counts, Signal Timing Plans)
-GIS data (property boundaries, water, wastewater, storm systems, environmental data, sourcewater protection data, natural areas inventory, ecological land classification data, etc.)
-CAD data (property lines, contours, water, wastewater, storm systems)
-LiDAR Digital Terrain Model (DTM)
-2020 Ortho imagery
-As-built drawings, site plans
-Subsurface Utility Engineering (SUE) Investigations
-Hydrogeology reports, Geotechnical investigation data
-Environmental Site Assessments (ESAs)
-Designated Substance Survey (DSS)
-Heritage register data
-Environmental Compliance Approvals (ECA's)
-Stormwater Management Reports
-Fish and wildlife data (fish community, spawning records, SAR records, etc).
-Background reports, models relevant to watercourses

Current Issues and Opportunities

Conservation Authority: TRCA (North); CVC (South)

Regional Roads within 10 km: 287 lane-km
Primary and Secondary Snow Removal within 10 km: 26 km

Pros:
- Regionally owned
- Large, open site
- Open spaces in southern part of site
- Opportunity to enter/exit off Mayfield Rd

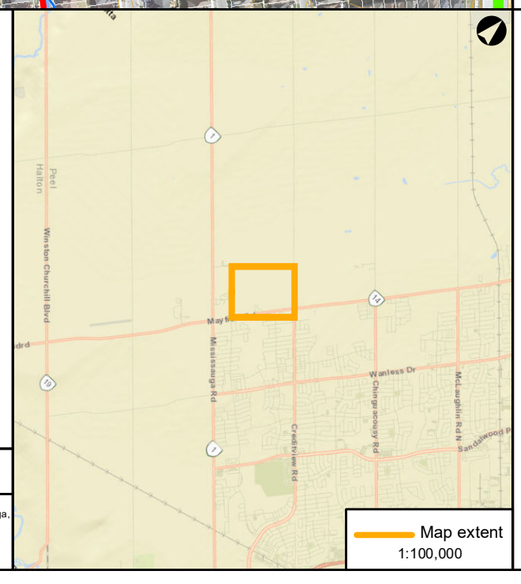
Cons:
- Potential conflict with existing critical infrastructure at the site

Overall:
Favourable for investigation

Future Development Plans
Mayfield Road EA from Chinguacousy Road to Winston Churchill Boulevard

Schedule

Infiltration Testing Location
Borehole
Borehole/Monitoring Well
Potential Snow Storage Property Boundary
Reservoir
Potential Snow Storage Area
Sanitary System (Per GIS. As-Builts; Location Approximate)
Storm System (Per GIS. As-Builts; Location Approximate)
Swale/Above-ground feature (Per As-Builts; Location Approximate)
Water System (Per GIS. As-Builts; Location Approximate)
Gas (Per As-Builts, Location
Hydro (Per As-Builts, Location
SWMF
Contours (1 m interval)
Watercourse
Woodland
Conservation Authority Regulated Limits
Conservation Authority Boundary
Town of Caledon Settlement Area Boundary Expansion
Municipal Boundary



Comments
Peel is in preliminary discussions with Caledon to potentially build a dog park north of the bulk water dispensing station, although potential construction would be ~10 years away, with Caledon to further determine whether there would be significant use by residents.

Adjacent school to the west (Malala Yousafzai Public School) will be closing. The Region has suggested it may be a possible option for a snow storage facility. (The Town of Caledon is considering purchasing the property for a Works Yard, therefore there is a possible joint use opportunity.) The adjacent school has a large private septic system which would need to be considered in the design of a snow storage facility.

Potential noise concerns with a snow storage facility, as there is existing residential development to the south.

To the east, lands are part of the Settlement Area Boundary Expandsion (SABE) - lands which have been preliminarily identified for future development - although Official Plans have not been finalized and are ouside of secondary plan areas. The lands may be developed in the future.

The proposed snow storage location, located adjacent to the bulk water filling station, would take advantage of existing access, and would increase utility of the site year round.

Site remains favourable for continued investigation.

August 2022	Datum: NAD83 UTM17	1:5,000	0 25 50 75 100 125 Meters

Data Source:
Contains information provided by the Region of Peel, City of Mississauga, City of Brampton, and Town of Caledon.
Key base map provided by ESRI.

Map location: \\na.aecomnet.com\LFS\AMER\Kitchener\CAKCN1\GIS\Projects\WTR\60646784_SnowStoragePeel\600_CAD_GIS\920_929_GIS_Graphics\Design\03_Working\SiteMaps\60646748_PSS_SiteAlloa_20220802.mxd
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Appendix B

Infiltration Test Analysis Results

IFT1-1

Site #1: Highway No. 50 Carpool Lot (11221 Hwy 50, Brampton, ON L6R 3J7)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 10

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Res Type	35.2		
H	10		
a	3	α*=	0.12 cm $^{-1}$
H/a	3.33		
a*	0.12	C =	1.28754
C0.01	1.22	Q =	0.0587
C0.04	1.29		
C0.12	1.29	K_{fs} =	6.36E-05 cm/sec
C0.36	1.29		3.82E-03 cm/min
C	1.29		6.36E-07 m/ses
R	0.100		1.50E-03 inch/min
Q	0.06		2.50E-05 inch/sec
pi	3.14		
		Φ_m =	5.30E-04 cm^2 /min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 10

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Res Type	35.22		
H	10		
a	3	α*=	0.12 cm $^{-1}$
H/a	3.3333		
a*	0.12	C =	1.28754
C0.01	1.2184	Q =	0.0587
C0.04	1.2902		
C0.12	1.2875	K_{fs} =	6.36E-05 cm/sec
C0.36	1.2875		3.82E-03 cm/min
C	1.2875		6.36E-07 m/ses
R	0.100		1.50E-03 inch/min
Q	0.0587		2.50E-05 inch/sec
pi	3.1415		
		Φ_m =	5.30E-04 cm^2 /min

Average

K_{fs} = 6.36E-05 cm/sec

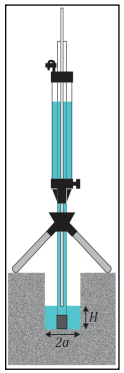
3.82E-03 cm/min

6.36E-07 m/s

1.50E-03 inch/min

2.50E-05 inch/sec

Φ_m = 5.30E-04 cm^2 /min



Double Head Method

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): N/A

Enter the first water Head Height ("H1" in cm): N/A

Enter the second water Head Height ("H2" in cm): N/A

Enter the Borehole Radius ("a" in cm): N/A

Enter the soil texture-structure category (enter one of the below numbers): N/A

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α*= 0 cm $^{-1}$

α= #VALUE!

Steady State Rate of Water Level Change ("R1" in cm/min): N/A

Steady State Rate of Water Level Change ("R2" in cm/min): N/A

Q_1 = #VALUE!

Q_2 = #VALUE!

Res Type:	N/A		
H1/a:	#VALUE!	C_1 =	0
H2/a:	#VALUE!		
C1-0.01:	#VALUE!	C_2 =	0
C2-0.01:	#VALUE!		
C1-0.04:	#VALUE!	G_1 =	#VALUE!
C2-0.04:	#VALUE!		
C1-0.12:	#VALUE!	G_2 =	#VALUE!
C2-0.12:	#VALUE!		
C1-0.36:	#VALUE!	G_3 =	#VALUE!
C2-0.36:	#VALUE!		
G-Denominator:	#VALUE!	G_4 =	#VALUE!
		K_{fs} =	#VALUE! cm/sec
			#VALUE! cm/min
			#VALUE! m/sec
			#VALUE! inch/min
			#VALUE! inch/sec
		Φ_m =	#VALUE! cm^2 /min
		Θ_{fs} =	N/A cm^3/cm^3
		Θ_i =	N/A cm^3/cm^3

Sorptivity #VALUE! (cm $min^{-½}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_2 = \frac{H_1 C_2}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $\Phi_m = G_3Q_1 - G_4Q_2$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	

IFT1-2

Site #1: Highway No. 50 Carpool Lot (11221 Hwy 50, Brampton, ON L6R 3J7)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 10
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Res Type	35.2		
H	10		
a	3	α*=	0.12 cm^{-1}
H/a	3.33		
a*	0.12	C =	1.28754
C0.01	1.22	Q =	0.0587
C0.04	1.29		
C0.12	1.29	K_{fs} =	6.36E-05 cm/sec
C0.36	1.29		3.82E-03 cm/min
C	1.29		6.36E-07 m/ses
R	0.100		1.50E-03 inch/min
Q	0.06		2.50E-05 inch/sec
pi	3.14		
		Φ_m =	5.30E-04 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 20
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

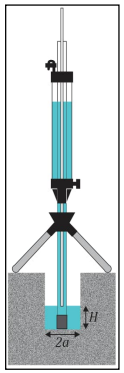
Steady State Rate of Water Level Change ("R" in cm/min): 0.4000

Res Type	35.22		
H	20		
a	3	α*=	0.12 cm^{-1}
H/a	6.6667		
a*	0.12	C =	1.98019
C0.01	1.7546	Q =	0.2348
C0.04	1.9031		
C0.12	1.9802	K_{fs} =	1.29E-04 cm/sec
C0.36	1.9802		7.71E-03 cm/min
C	1.9802		1.29E-06 m/ses
R	0.400		3.04E-03 inch/min
Q	0.2348		5.06E-05 inch/sec
pi	3.1415		
		Φ_m =	1.07E-03 cm^2/min

Average

K_{fs} = 9.61E-05 cm/sec
5.77E-03 cm/min
9.61E-07 m/s
2.27E-03 inch/min
3.78E-05 inch/sec

Φ_m = 8.01E-04 cm^2/min



Double Head Method

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter the first water Head Height ("H1" in cm): 10
Enter the second water Head Height ("H2" in cm): 20

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α*= 0.12 cm^{-1}

α= -0.1716

Steady State Rate of Water Level Change ("R1" in cm/min): 0.1000
Steady State Rate of Water Level Change ("R2" in cm/min): 0.4000

Q_1 = 0.0587

Q_2 = 0.2348

Res Type:	35.22		
H1/a:	3.33333	C_1 =	1.28754
H2/a:	6.66667		
C1-0.01:	1.21841	C_2 =	1.98019
C2-0.01:	1.7546		
C1-0.04:	1.29023	G_1 =	0.00208
C2-0.04:	1.90307		
C1-0.12:	1.28754	G_2 =	0.0016
C2-0.12:	1.98019		
C1-0.36:	1.28754	G_3 =	0.04247
C2-0.36:	1.98019		
G-Denominator:	12397.8	G_4 =	0.0169
		K_{fs} =	2.53E-04 cm/sec
			1.52E-02 cm/min
			2.53E-06 m/sec
			5.98E-03 inch/min
			9.96E-05 inch/sec
		Φ_m =	######## cm^2/min
		Θ_{fs} =	N/A cm^3/cm^3
		Θ_i =	N/A cm^3/cm^3

Sorptivity #VALUE! (cm min$^{-½}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_2 = \frac{H_1 C_2}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	$G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $\Phi_m = G_3Q_1 - G_4Q_2$

IFT3-1

Site #3: West Brampton Reservoir and Pumping Station (9624 Peel Regional Rd 1, Brampton, ON L6X 0B5)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 15
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.6000

Res Type	35.2
H	15
a	3
H/a	5
a*	0.36
C0.01	1.52
C0.04	1.63
C0.12	1.67
C0.36	1.67
C	1.67
R	0.600
Q	0.35
pi	3.14

α^*= 0.36 cm^{-1}

C = 1.66689
Q = 0.3522

K_{fs} = 3.41E-04 *cm/sec*
2.04E-02 *cm/min*
3.41E-06 *m/sec*
8.05E-03 *inch/min*
1.34E-04 *inch/sec*

Φ_m = 9.47E-04 cm^2 /min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 20
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 1.6000

Res Type	35.22
H	20
a	3
H/a	6.6667
a*	0.36
C0.01	1.7546
C0.04	1.9031
C0.12	1.9802
C0.36	1.9802
C	1.9802
R	1.600
Q	0.9392
pi	3.1415

α^*= 0.36 cm^{-1}

C = 1.98019
Q = 0.9392

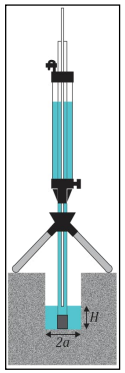
K_{fs} = 6.37E-04 *cm/sec*
3.82E-02 *cm/min*
6.37E-06 *m/ses*
1.51E-02 *inch/min*
2.51E-04 *inch/sec*

Φ_m = 1.77E-03 cm^2 /min

Average

K_{fs} = 4.89E-04 *cm/sec*
2.93E-02 *cm/min*
4.89E-06 *m/s*
1.16E-02 *inch/min*
1.93E-04 *inch/sec*

Φ_m = 1.36E-03 cm^2 /min



Double Head Method

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter the first water Head Height ("H1" in cm): 15
Enter the second water Head Height ("H2" in cm): 20

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α^*= 0.36 cm^{-1}

α= -0.0840

Steady State Rate of Water Level Change ("R1" in cm/min): 0.6000
Steady State Rate of Water Level Change ("R2" in cm/min): 1.6000

Q_1 = 0.3522

Q_2 = 0.9392

Res Type:	35.22
H1/a:	5
H2/a:	6.66667
C1-0.01:	1.51827
C2-0.01:	1.7546
C1-0.04:	1.62914
C2-0.04:	1.90307
C1-0.12:	1.66689
C2-0.12:	1.98019
C1-0.36:	1.66689
C2-0.36:	1.98019
G-Denominator:	9321.73

C_1 = 1.66689
C_2 = 1.98019
G_1 = 0.00358
G_2 = 0.00319
G_3 = 0.07312
G_4 = 0.04939

K_{fs} = 1.73E-03 *cm/sec*
1.04E-01 *cm/min*
1.73E-05 *m/sec*
4.09E-02 *inch/min*
6.82E-04 *inch/sec*

Φ_m = ######## cm^2 /min

Θ_{fs} = N/A cm^3/cm^3

Θ_i = N/A cm^3/cm^3

Sorptivity #VALUE! (*cm min*$^{-1/2}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	α^*(cm^{-1})	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_2 = \frac{H_1 C_2}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	$G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $\Phi_m = G_3Q_1 - G_4Q_2$

IFT3-2

Site #3: West Brampton Reservoir and Pumping Station (9624 Peel Regional Rd 1, Brampton, ON L6X 0B5)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2 (enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 5
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Res Type	35.2
H	5
a	3
H/a	1.67
a*	0.36
C0.01	0.81
C0.04	0.84
C0.12	0.8
C0.36	0.8
C	0.8
R	0.100
Q	0.06
pi	3.14

α^*= 0.36 cm^{-1}

C = 0.80315
Q = 0.0587

K_{fs} = 1.77E-04 cm/sec
1.06E-02 cm/min
1.77E-06 m/sec
4.17E-03 inch/min
6.95E-05 inch/sec

Φ_m = 4.90E-04 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2 (enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 10
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.4000

Res Type	35.22
H	10
a	3
H/a	3.3333
a*	0.36
C0.01	1.2184
C0.04	1.2902
C0.12	1.2875
C0.36	1.2875
C	1.2875
R	0.400
Q	0.2348
pi	3.1415

α^*= 0.36 cm^{-1}

C = 1.28754
Q = 0.2348

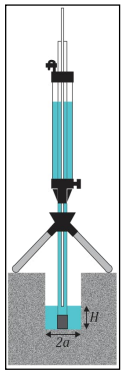
K_{fs} = 3.60E-04 cm/sec
2.16E-02 cm/min
3.60E-06 m/ses
8.51E-03 inch/min
1.42E-04 inch/sec

Φ_m = 1.00E-03 cm^2/min

Average

K_{fs} = 2.68E-04 cm/sec
1.61E-02 cm/min
2.68E-06 m/s
6.34E-03 inch/min
1.06E-04 inch/sec

Φ_m = 7.46E-04 cm^2/min



Double Head Method

Reservoir Cross-sectional area in cm^2 (enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter the first water Head Height ("H1" in cm): 5
Enter the second water Head Height ("H2" in cm): 10

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α^*= 0.36 cm^{-1}

α= -0.2840

Steady State Rate of Water Level Change ("R1" in cm/min): 0.1
Steady State Rate of Water Level Change ("R2" in cm/min): 0.4

Q_1 = 0.0587

Q_2 = 0.2348

Res Type:	35.22
H1/a:	1.66667
H2/a:	3.33333
C1-0.01:	0.80949
C2-0.01:	1.21841
C1-0.04:	0.84206
C2-0.04:	1.29023
C1-0.12:	0.80315
C2-0.12:	1.28754
C1-0.36:	0.80315
C2-0.36:	1.28754
G-Denominator:	1525.69

C_1 = 0.80315
C_2 = 1.28754
G_1 = 0.00526
G_2 = 0.00422
G_3 = 0.05569
G_4 = 0.02415

K_{fs} = 6.82E-04 cm/sec
4.09E-02 cm/min
6.82E-06 m/sec
1.61E-02 inch/min
2.68E-04 inch/sec

Φ_m = ######## cm^2/min

Θ_{fs} = N/A cm^3/cm^3

Θ_i = N/A cm^3/cm^3

Sorptivity #VALUE! ($cm\ min^{-½}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_2 = \frac{H_1 C_2}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	$G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $\Phi_m = G_3Q_1 - G_4Q_2$

IFT3-3

Site #3: West Brampton Reservoir and Pumping Station (9624 Peel Regional Rd 1, Brampton, ON L6X 0B5)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 10

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.2000

Res Type	35.2
H	10
a	3
H/a	3.33
a*	0.36
C0.01	1.22
C0.04	1.29
C0.12	1.29
C0.36	1.29
C	1.29
R	0.200
Q	0.12
pi	3.14

α^*= 0.36 cm^{-1}

C = 1.28754

Q = 0.1174

K_{fs} = 1.80E-04 *cm/sec*
1.08E-02 *cm/min*
1.80E-06 *m/ses*
4.25E-03 *inch/min*
7.09E-05 *inch/sec*

Φ_m = 5.00E-04 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 10

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.2000

Res Type	35.22
H	10
a	3
H/a	3.3333
a*	0.36
C0.01	1.2184
C0.04	1.2902
C0.12	1.2875
C0.36	1.2875
C	1.2875
R	0.200
Q	0.1174
pi	3.1415

α^*= 0.36 cm^{-1}

C = 1.28754

Q = 0.1174

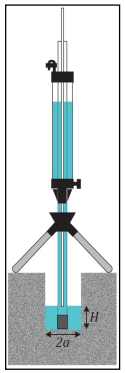
K_{fs} = 1.80E-04 *cm/sec*
1.08E-02 *cm/min*
1.80E-06 *m/ses*
4.25E-03 *inch/min*
7.09E-05 *inch/sec*

Φ_m = 5.00E-04 cm^2/min

Average

K_{fs} = 1.80E-04 *cm/sec*
1.08E-02 *cm/min*
1.80E-06 *m/s*
4.25E-03 *inch/min*
7.09E-05 *inch/sec*

Φ_m = 5.00E-04 cm^2/min



Double Head Method

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): N/A

Enter the first water Head Height ("H1" in cm): N/A

Enter the second water Head Height ("H2" in cm): N/A

Enter the Borehole Radius ("a" in cm): N/A

Enter the soil texture-structure category (enter one of the below numbers): N/A

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α^*= 0 cm^{-1}

α= #VALUE!

Steady State Rate of Water Level Change ("R1" in cm/min): N/A

Steady State Rate of Water Level Change ("R2" in cm/min): N/A

Q_1 = #VALUE!

Q_2 = #VALUE!

Res Type:	N/A
H1/a:	#VALUE!
H2/a:	#VALUE!
C1-0.01:	#VALUE!
C2-0.01:	#VALUE!
C1-0.04:	#VALUE!
C2-0.04:	#VALUE!
C1-0.12:	#VALUE!
C2-0.12:	#VALUE!
C1-0.36:	#VALUE!
C2-0.36:	#VALUE!
G-Denominator:	#VALUE!

C_1 = 0

C_2 = 0

G_1 = #VALUE!

G_2 = #VALUE!

G_3 = #VALUE!

G_4 = #VALUE!

K_{fs} = #VALUE! *cm/sec*
#VALUE! *cm/min*
#VALUE! *m/sec*
#VALUE! *inch/min*
#VALUE! *inch/sec*

Φ_m = #VALUE! cm^2/min

Θ_{fs} = N/A cm^3/cm^3

Θ_i = N/A cm^3/cm^3

Sorptivity #VALUE! $(cm\ min^{-\frac{1}{2}})$

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_2 = \frac{H_1 C_2}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	$G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $\Phi_m = G_3Q_1 - G_4Q_2$

IFT5-1

Site #5: Johnston Sports Park (6898 King St, Caledon East, ON L7C 0V1)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 24

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.2500

Res Type	35.2		
H	24		
a	3	α*=	0.12 cm $^{-1}$
H/a	8		
a*	0.12	C =	2.19621
C0.01	1.91	Q =	0.14675
C0.04	2.09		
C0.12	2.2	K_{fs} =	6.53E-05 cm/sec
C0.36	2.2		3.92E-03 cm/min
C	2.2		6.53E-07 m/ses
R	0.250		1.54E-03 inch/min
Q	0.15		2.57E-05 inch/sec
pi	3.14		
		Φ_m =	5.44E-04 cm^2 /min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 24

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.2500

Res Type	35.22		
H	24		
a	3	α*=	0.12 cm $^{-1}$
H/a	8		
a*	0.12	C =	2.19621
C0.01	1.9122	Q =	0.14675
C0.04	2.0893		
C0.12	2.1962	K_{fs} =	6.53E-05 cm/sec
C0.36	2.1962		3.92E-03 cm/min
C	2.1962		6.53E-07 m/ses
R	0.250		1.54E-03 inch/min
Q	0.1468		2.57E-05 inch/sec
pi	3.1415		
		Φ_m =	5.44E-04 cm^2 /min

Average

K_{fs} = 6.53E-05 cm/sec

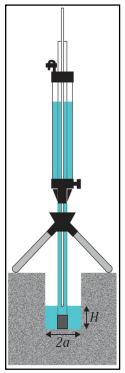
3.92E-03 cm/min

6.53E-07 m/s

1.54E-03 inch/min

2.57E-05 inch/sec

Φ_m = 5.44E-04 cm^2 /min



Double Head Method

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): N/A

Enter the first water Head Height ("H1" in cm): N/A

Enter the second water Head Height ("H2" in cm): N/A

Enter the Borehole Radius ("a" in cm): N/A

Enter the soil texture-structure category (enter one of the below numbers): N/A

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α*= 0 cm $^{-1}$

α= #VALUE!

Steady State Rate of Water Level Change ("R1" in cm/min): N/A

Steady State Rate of Water Level Change ("R2" in cm/min): N/A

Q_1 = #VALUE!

Q_2 = #VALUE!

Res Type:	N/A		
H1/a:	#VALUE!	C_1 =	0
H2/a:	#VALUE!		
C1-0.01:	#VALUE!	C_2 =	0
C2-0.01:	#VALUE!		
C1-0.04:	#VALUE!	G_1 =	#VALUE!
C2-0.04:	#VALUE!		
C1-0.12:	#VALUE!	G_2 =	#VALUE!
C2-0.12:	#VALUE!		
C1-0.36:	#VALUE!	G_3 =	#VALUE!
C2-0.36:	#VALUE!		
G-Denominator:	#VALUE!	G_4 =	#VALUE!
		K_{fs} =	#VALUE! cm/sec
			#VALUE! cm/min
			#VALUE! m/sec
			#VALUE! inch/min
			#VALUE! inch/sec
		Φ_m =	#VALUE! cm^2 /min
		Θ_{fs} =	N/A cm^3/cm^3
		Θ_i =	N/A cm^3/cm^3

Sorptivity #VALUE! (cm $min^{-½}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_2 = \frac{H_1 C_2}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $\Phi_m = G_3Q_1 - G_4Q_2$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	

IFT5-2

Site #5: Johnston Sports Park (6898 King St, Caledon East, ON L7C 0V1)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 12

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0000

Res Type	35.2		
H	12		
a	3	α*=	0.12 cm^{-1}
H/a	4		
a*	0.12	C =	1.44896
C0.01	1.35	Q =	0
C0.04	1.44		
C0.12	1.45	K_{fs} =	0.00E+00 cm/sec
C0.36	1.45		0.00E+00 cm/min
C	1.45		0.00E+00 m/ses
R	0.000		0.00E+00 inch/min
Q	0		0.00E+00 inch/sec
pi	3.14		
		Φ_m =	0.00E+00 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 24

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Res Type	35.22		
H	24		
a	3	α*=	0.12 cm^{-1}
H/a	8		
a*	0.12	C =	2.19621
C0.01	1.9122	Q =	0.0587
C0.04	2.0893		
C0.12	2.1962	K_{fs} =	2.61E-05 cm/sec
C0.36	2.1962		1.57E-03 cm/min
C	2.1962		2.61E-07 m/ses
R	0.100		6.17E-04 inch/min
Q	0.0587		1.03E-05 inch/sec
pi	3.1415		
		Φ_m =	2.18E-04 cm^2/min

Average

K_{fs} = 1.31E-05 cm/sec

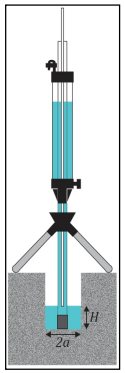
7.83E-04 cm/min

1.31E-07 m/s

3.08E-04 inch/min

5.14E-06 inch/sec

Φ_m = 1.09E-04 cm^2/min



Double Head Method

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter the first water Head Height ("H1" in cm): 12

Enter the second water Head Height ("H2" in cm): 24

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α*= 0.12 cm^{-1}

α= -0.0797

Steady State Rate of Water Level Change ("R1" in cm/min): 0.0000

Steady State Rate of Water Level Change ("R2" in cm/min): 0.1000

Q_1 = 0

Q_2 = 0.0587

Res Type:	35.22		
H1/a:	4	C_1 =	1.44896
H2/a:	8		
C1-0.01:	1.34796	C_2 =	2.19621
C2-0.01:	1.91215		
C1-0.04:	1.43553	G_1 =	0.00162
C2-0.04:	2.0893		
C1-0.12:	1.44896	G_2 =	0.00123
C2-0.12:	2.19621		
C1-0.36:	1.44896	G_3 =	0.03953
C2-0.36:	2.19621		
G-Denominator:	21476	G_4 =	0.01539

K_{fs} = 7.20E-05 cm/sec

4.32E-03 cm/min

7.20E-07 m/sec

1.70E-03 inch/min

2.84E-05 inch/sec

Φ_m = ######## cm^2/min

Θ_{fs} = N/A cm^3/cm^3

Θ_i = N/A cm^3/cm^3

Sorptivity #VALUE! (cm $min^{-½}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_2 = \frac{H_1 C_2}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	$G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $\Phi_m = G_3Q_1 - G_4Q_2$

IFT5-3

Site #5: Johnston Sports Park (6898 King St, Caledon East, ON L7C 0V1)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 10

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0000

Res Type	35.2
H	10
a	3
H/a	3.33
a*	0.12
C0.01	1.22
C0.04	1.29
C0.12	1.29
C0.36	1.29
C	1.29
R	0.000
Q	0
pi	3.14

α^*= 0.12 cm^{-1}

C = 1.28754

Q = 0

K_{fs} = 0.00E+00 cm/sec
0.00E+00 cm/min
0.00E+00 m/sec
0.00E+00 inch/min
0.00E+00 inch/sec

Φ_m = 0.00E+00 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 24

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0000

Res Type	35.22
H	24
a	3
H/a	8
a*	0.12
C0.01	1.9122
C0.04	2.0893
C0.12	2.1962
C0.36	2.1962
C	2.1962
R	0.000
Q	0
pi	3.1415

α^*= 0.12 cm^{-1}

C = 2.19621

Q = 0

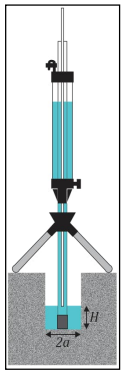
K_{fs} = 0.00E+00 cm/sec
0.00E+00 cm/min
0.00E+00 m/ses
0.00E+00 inch/min
0.00E+00 inch/sec

Φ_m = 0.00E+00 cm^2/min

Average

K_{fs} = 0.00E+00 cm/sec
0.00E+00 cm/min
0.00E+00 m/s
0.00E+00 inch/min
0.00E+00 inch/sec

Φ_m = 0.00E+00 cm^2/min



Double Head Method

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter the first water Head Height ("H1" in cm): 10

Enter the second water Head Height ("H2" in cm): 24

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α^*= 0.12 cm^{-1}

α= #DIV/0!

Steady State Rate of Water Level Change ("R1" in cm/min): 0

Steady State Rate of Water Level Change ("R2" in cm/min): 0

Q_1 = 0

Q_2 = 0

Res Type:	35.22
H1/a:	3.33333
H2/a:	8
C1-0.01:	1.21841
C2-0.01:	1.91215
C1-0.04:	1.29023
C2-0.04:	2.0893
C1-0.12:	1.28754
C2-0.12:	2.19621
C1-0.36:	1.28754
C2-0.36:	2.19621
G-Denominator:	20858.1

C_1 = 1.28754

C_2 = 2.19621

G_1 = 0.00148

G_2 = 0.00105

G_3 = 0.03617

G_4 = 0.01114

K_{fs} = 0.00E+00 cm/sec
0.00E+00 cm/min
0.00E+00 m/sec
0.00E+00 inch/min
0.00E+00 inch/sec

Φ_m = 0.00E+00 cm^2/min

Θ_{fs} = N/A cm^3/cm^3

Θ_i = N/A cm^3/cm^3

Sorptivity #VALUE! ($cm\ min^{-.5}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_2 = \frac{H_1 C_2}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	$G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $\Phi_m = G_3Q_1 - G_4Q_2$

IFT6-1

Site #6: Tullamore Reservoir and Pumping Station (12078 Innis Lake Rd, Caledon East, ON L7C 0Z7)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2 (enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 5
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0500

Res Type	35.2
H	5
a	3
H/a	1.67
a*	0.36
C0.01	0.81
C0.04	0.84
C0.12	0.8
C0.36	0.8
C	0.8
R	0.050
Q	0.03
pi	3.14

α^*= 0.36 cm^{-1}

C = 0.80315
Q = 0.02935

K_{fs} = 8.83E-05 cm/sec
5.30E-03 cm/min
8.83E-07 m/sec
2.09E-03 inch/min
3.48E-05 inch/sec

Φ_m = 2.45E-04 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2 (enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 10
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Res Type	35.22
H	10
a	3
H/a	3.3333
a*	0.36
C0.01	1.2184
C0.04	1.2902
C0.12	1.2875
C0.36	1.2875
C	1.2875
R	0.100
Q	0.0587
pi	3.1415

α^*= 0.36 cm^{-1}

C = 1.28754
Q = 0.0587

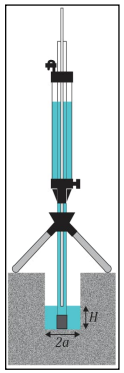
K_{fs} = 9.01E-05 cm/sec
5.40E-03 cm/min
9.01E-07 m/ses
2.13E-03 inch/min
3.55E-05 inch/sec

Φ_m = 2.50E-04 cm^2/min

Average

K_{fs} = 8.92E-05 cm/sec
5.35E-03 cm/min
8.92E-07 m/s
2.11E-03 inch/min
3.51E-05 inch/sec

Φ_m = 2.48E-04 cm^2/min



Double Head Method

Reservoir Cross-sectional area in cm^2 (enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter the first water Head Height ("H1" in cm): 5
Enter the second water Head Height ("H2" in cm): 10

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α^*= 0.36 cm^{-1}

α= 0.4292

Steady State Rate of Water Level Change ("R1" in cm/min): 0.05
Steady State Rate of Water Level Change ("R2" in cm/min): 0.1

Q_1 = 0.02935

Q_2 = 0.0587

Res Type:	35.22
H1/a:	1.66667
H2/a:	3.33333
C1-0.01:	0.80949
C2-0.01:	1.21841
C1-0.04:	0.84206
C2-0.04:	1.29023
C1-0.12:	0.80315
C2-0.12:	1.28754
C1-0.36:	0.80315
C2-0.36:	1.28754
G-Denominator:	1525.69

C_1 = 0.80315
C_2 = 1.28754
G_1 = 0.00526
G_2 = 0.00422
G_3 = 0.05569
G_4 = 0.02415

K_{fs} = 9.32E-05 cm/sec
5.59E-03 cm/min
9.32E-07 m/sec
2.20E-03 inch/min
3.67E-05 inch/sec

Φ_m = 2.17E-04 cm^2/min

Θ_{fs} = N/A cm^3/cm^3

Θ_i = N/A cm^3/cm^3

Sorptivity #VALUE! ($cm\ min^{-.5}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_2 = \frac{H_1 C_2}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	$G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $\Phi_m = G_3Q_1 - G_4Q_2$

IFT6-2

Site #6: Tullamore Reservoir and Pumping Station (12078 Innis Lake Rd, Caledon East, ON L7C 0Z7)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 10
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Res Type	35.2		
H	10		
a	3	α*=	0.12 cm^{-1}
H/a	3.33		
a*	0.12	C =	1.28754
C0.01	1.22	Q =	0.0587
C0.04	1.29		
C0.12	1.29	K_{fs} =	6.36E-05 cm/sec
C0.36	1.29		3.82E-03 cm/min
C	1.29		6.36E-07 m/sec
R	0.100		1.50E-03 inch/min
Q	0.06		2.50E-05 inch/sec
pi	3.14		
		Φ_m =	5.30E-04 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 20
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

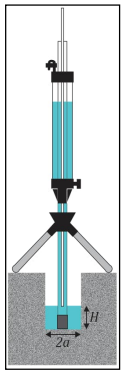
Steady State Rate of Water Level Change ("R" in cm/min): 0.2000

Res Type	35.22		
H	20		
a	3	α*=	0.12 cm^{-1}
H/a	6.6667		
a*	0.12	C =	1.98019
C0.01	1.7546	Q =	0.1174
C0.04	1.9031		
C0.12	1.9802	K_{fs} =	6.43E-05 cm/sec
C0.36	1.9802		3.86E-03 cm/min
C	1.9802		6.43E-07 m/ses
R	0.200		1.52E-03 inch/min
Q	0.1174		2.53E-05 inch/sec
pi	3.1415		
		Φ_m =	5.36E-04 cm^2/min

Average

K_{fs} = 6.39E-05 cm/sec
3.84E-03 cm/min
6.39E-07 m/s
1.51E-03 inch/min
2.52E-05 inch/sec

Φ_m = 5.33E-04 cm^2/min



Double Head Method

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter the first water Head Height ("H1" in cm): 10
Enter the second water Head Height ("H2" in cm): 20

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 3

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α*= 0.12 cm^{-1}

α= 0.1289

Steady State Rate of Water Level Change ("R1" in cm/min): 0.1000
Steady State Rate of Water Level Change ("R2" in cm/min): 0.2000

Q_1 = 0.0587

Q_2 = 0.1174

Res Type:	35.22		
H1/a:	3.33333	C_1 =	1.28754
H2/a:	6.66667		
C1-0.01:	1.21841	C_2 =	1.98019
C2-0.01:	1.7546		
C1-0.04:	1.29023	G_1 =	0.00208
C2-0.04:	1.90307		
C1-0.12:	1.28754	G_2 =	0.0016
C2-0.12:	1.98019		
C1-0.36:	1.28754	G_3 =	0.04247
C2-0.36:	1.98019		
G-Denominator:	12397.8	G_4 =	0.0169
		K_{fs} =	6.56E-05 cm/sec
			3.94E-03 cm/min
			6.56E-07 m/sec
			1.55E-03 inch/min
			2.58E-05 inch/sec
		Φ_m =	5.09E-04 cm^2/min
		Θ_{fs} =	N/A cm^3/cm^3
		Θ_i =	N/A cm^3/cm^3

Sorptivity #VALUE! (cm min$^{-½}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	α^*(cm^{-1})	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_2 = \frac{H_1 C_2}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	$G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $\Phi_m = G_3Q_1 - G_4Q_2$

IFT9-1

Site #9: Alloa Reservoir and Pumping Station (1278 Mayfield Rd, Caledon, ON L7C 0Y7)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 5

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.2000

Res Type	35.2
H	5
a	3
H/a	1.67
a*	0.36
C0.01	0.81
C0.04	0.84
C0.12	0.8
C0.36	0.8
C	0.8
R	0.200
Q	0.12
pi	3.14

α^*= 0.36 cm^{-1}

C = 0.80315

Q = 0.1174

K_{fs} = 3.53E-04 cm/sec
2.12E-02 cm/min
3.53E-06 m/sec
8.34E-03 inch/min
1.39E-04 inch/sec

Φ_m = 9.81E-04 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 15

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 2.3000

Res Type	35.22
H	15
a	3
H/a	5
a*	0.36
C0.01	1.5183
C0.04	1.6291
C0.12	1.6669
C0.36	1.6669
C	1.6669
R	2.300
Q	1.3501
pi	3.1415

α^*= 0.36 cm^{-1}

C = 1.66689

Q = 1.3501

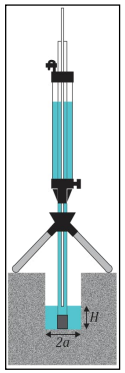
K_{fs} = 1.31E-03 cm/sec
7.84E-02 cm/min
1.31E-05 m/ses
3.09E-02 inch/min
5.14E-04 inch/sec

Φ_m = 3.63E-03 cm^2/min

Average

K_{fs} = 8.30E-04 cm/sec
4.98E-02 cm/min
8.30E-06 m/s
1.96E-02 inch/min
3.27E-04 inch/sec

Φ_m = 2.30E-03 cm^2/min



Double Head Method

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter the first water Head Height ("H1" in cm): 5

Enter the second water Head Height ("H2" in cm): 15

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α^*= 0.36 cm^{-1}

α= -0.2316

Steady State Rate of Water Level Change ("R1" in cm/min): 0.2

Steady State Rate of Water Level Change ("R2" in cm/min): 2.3

Q_1 = 0.1174

Q_2 = 1.3501

Res Type:	35.22
H1/a:	1.66667
H2/a:	5
C1-0.01:	0.80949
C2-0.01:	1.51827
C1-0.04:	0.84206
C2-0.04:	1.62914
C1-0.12:	0.80315
C2-0.12:	1.66689
C1-0.36:	0.80315
C2-0.36:	1.66689
G-Denominator:	4607.27

C_1 = 0.80315

C_2 = 1.66689

G_1 = 0.00261

G_2 = 0.00181

G_3 = 0.04053

G_4 = 0.01035

K_{fs} = 2.14E-03 cm/sec
1.28E-01 cm/min
2.14E-05 m/sec
5.04E-02 inch/min
8.41E-04 inch/sec

Φ_m = ######## cm^2/min

Θ_{fs} = N/A cm^3/cm^3

Θ_i = N/A cm^3/cm^3

Sorptivity #VALUE! ($cm\ min^{-½}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_2 = \frac{H_1 C_2}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	$G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $\Phi_m = G_3Q_1 - G_4Q_2$

IFT9-2

Site #9: Alloa Reservoir and Pumping Station (1278 Mayfield Rd, Caledon, ON L7C 0Y7)

Guelph Permeameter

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 5
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Res Type 35.2
H 5
a 3
H/a 1.67
a* 0.36
C0.01 0.81
C0.04 0.84
C0.12 0.8
C0.36 0.8
C 0.8
R 0.100
Q 0.06
pi 3.14

α^*= 0.36 cm^{-1}

C = 0.80315
Q = 0.0587

K_{fs} = 1.77E-04 cm/sec
1.06E-02 cm/min
1.77E-06 m/sec
4.17E-03 inch/min
6.95E-05 inch/sec

Φ_m = 4.90E-04 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 15
Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.2000

Res Type 35.22
H 15
a 3
H/a 5
a* 0.36
C0.01 1.5183
C0.04 1.6291
C0.12 1.6669
C0.36 1.6669
C 1.6669
R 0.200
Q 0.1174
pi 3.1415

α^*= 0.36 cm^{-1}

C = 1.66689
Q = 0.1174

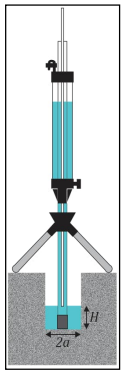
K_{fs} = 1.14E-04 cm/sec
6.82E-03 cm/min
1.14E-06 m/ses
2.68E-03 inch/min
4.47E-05 inch/sec

Φ_m = 3.16E-04 cm^2/min

Average

K_{fs} = 1.45E-04 cm/sec
8.70E-03 cm/min
1.45E-06 m/s
3.43E-03 inch/min
5.71E-05 inch/sec

Φ_m = 4.03E-04 cm^2/min



Double Head Method

Reservoir Cross-sectional area in cm^2
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter the first water Head Height ("H1" in cm): 5
Enter the second water Head Height ("H2" in cm): 15

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 4

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α^*= 0.36 cm^{-1}

α= 0.0506

Steady State Rate of Water Level Change ("R1" in cm/min): 0.1
Steady State Rate of Water Level Change ("R2" in cm/min): 0.2

Q_1 = 0.0587

Q_2 = 0.1174

Res Type: 35.22
H1/a: 1.66667
H2/a: 5
C1-0.01: 0.80949
C2-0.01: 1.51827
C1-0.04: 0.84206
C2-0.04: 1.62914
C1-0.12: 0.80315
C2-0.12: 1.66689
C1-0.36: 0.80315
C2-0.36: 1.66689
G-Denominator: 4607.27

C_1 = 0.80315
C_2 = 1.66689
G_1 = 0.00261
G_2 = 0.00181
G_3 = 0.04053
G_4 = 0.01035

K_{fs} = 5.89E-05 cm/sec
3.53E-03 cm/min
5.89E-07 m/sec
1.39E-03 inch/min
2.32E-05 inch/sec

Φ_m = 1.16E-03 cm^2/min

Θ_{fs} = N/A cm^3/cm^3

Θ_i = N/A cm^3/cm^3

Sorptivity #VALUE! ($cm\ min^{-\frac{1}{2}}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

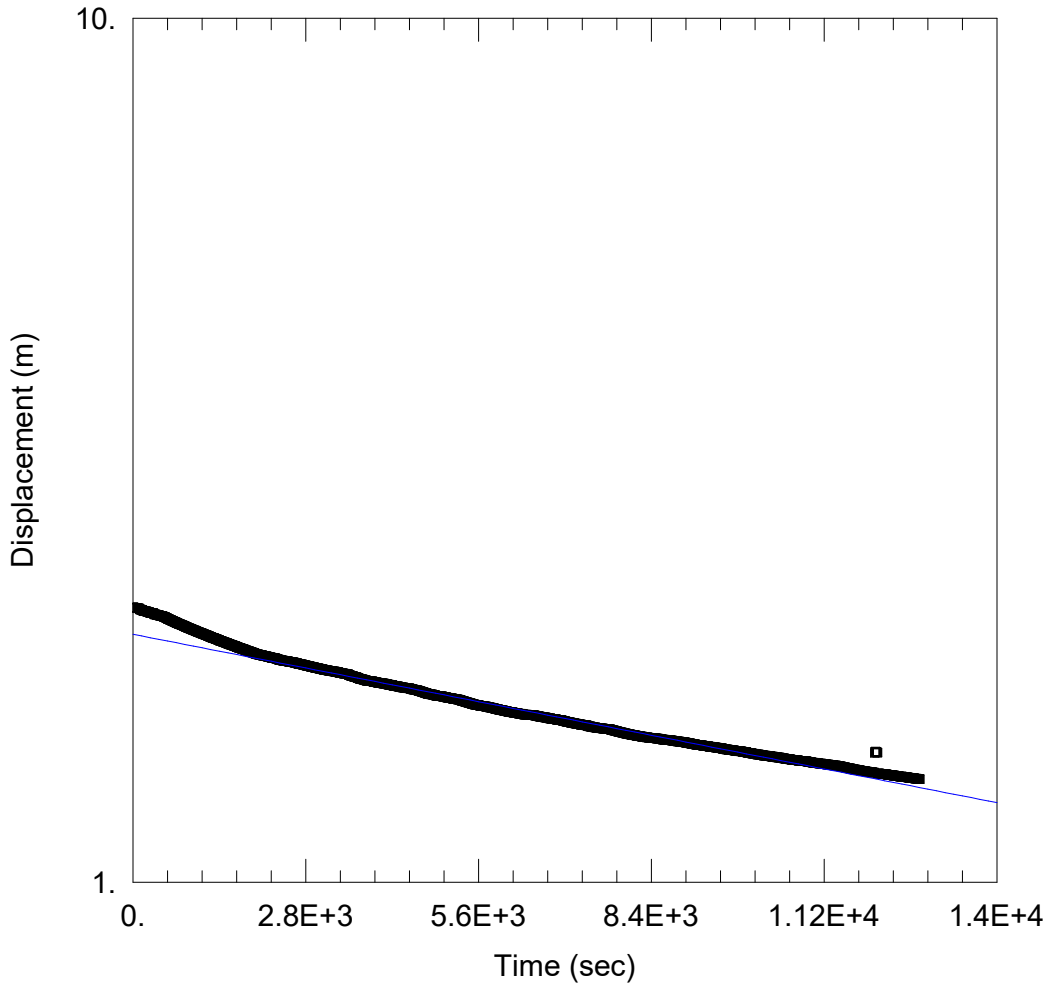
Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{\alpha^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)\alpha^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $G_2 = \frac{H_1 C_2}{\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	$G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi\left(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1)\right)}$ $\Phi_m = G_3Q_1 - G_4Q_2$

Appendix C

Single Well Response Test Analysis Reports



SITE 5 - JOHNSTON SPORTS PARK - BH5-3/MW - RISING HEAD TEST

Data Set: C:\...\BH5-3 RHT.aqt
Date: 05/20/22 Time: 16:02:36

PROJECT INFORMATION

Company: AECOM Canada Ltd.
Client: Peel Region
Project: 60646784
Location: Site 5
Test Well: BH5-3/MW
Test Date: 2022-05-09

AQUIFER DATA

Saturated Thickness: 5.13 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH5-3/MW)

Initial Displacement: 2.08 m
Total Well Penetration Depth: 5.13 m
Casing Radius: 0.025 m
Static Water Column Height: 5.13 m
Screen Length: 3.05 m
Well Radius: 0.102 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.343E-8 m/sec
y0 = 1.935 m

Appendix D

Groundwater Quality Results – Laboratory Certificate of Analysis

Your Project #: 60646784
Site#: SITE 5
Site Location: PEEL REGION SNOW STORGAE
Your C.O.C. #: 877485-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/05/16
Report #: R7127331
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C2C4120
Received: 2022/05/09, 13:32

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Methylnaphthalene Sum	1	N/A	2022/05/12	CAM SOP-00301	EPA 8270D m
1,3-Dichloropropene Sum	1	N/A	2022/05/12		EPA 8260C m
Chloride by Automated Colourimetry	1	N/A	2022/05/11	CAM SOP-00463	SM 23 4500-Cl E m
Chromium (VI) in Water	1	N/A	2022/05/12	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide	1	N/A	2022/05/12	CAM SOP-00457	OMOE E3015 m
Petroleum Hydrocarbons F2-F4 in Water (1)	1	2022/05/11	2022/05/11	CAM SOP-00316	CCME PHC-CWS m
Mercury	1	2022/05/11	2022/05/11	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	1	N/A	2022/05/12	CAM SOP-00447	EPA 6020B m
PAH Compounds in Water by GC/MS (SIM)	1	2022/05/11	2022/05/12	CAM SOP-00318	EPA 8270D m
Polychlorinated Biphenyl in Water	1	2022/05/10	2022/05/11	CAM SOP-00309	EPA 8082A m
Volatile Organic Compounds and F1 PHCs	1	N/A	2022/05/11	CAM SOP-00230	EPA 8260C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 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 CCME, MELCC, EPA, APHA. Where applicable, the analytical testing herein was performed in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Bureau Veritas is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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 samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of 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. Bureau Veritas is not responsible for the accuracy or any data impacts that result from the information provided by the customer or their agent.

Your Project #: 60646784
Site#: SITE 5
Site Location: PEEL REGION SNOW STORGAE
Your C.O.C. #: 877485-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/05/16
Report #: R7127331
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C2C4120
Received: 2022/05/09, 13:32

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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.
(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Marijane Cruz
Senior Project Manager
16 May 2022 17:15:50

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756
==========
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 Signature Page.

O.REG 153 METALS & INORGANICS PKG (WTR)

Bureau Veritas ID			SOL754			SOL754		
Sampling Date			2022/05/09 10:00			2022/05/09 10:00		
COC Number			877485-01-01			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch	BH5-3/MW Lab-Dup	RDL	QC Batch
Inorganics								
WAD Cyanide (Free)	ug/L	**66**	<1	1	7991656	<1	1	7991656
Dissolved Chloride (Cl-)	mg/L	**790**	1.1	1.0	7987615			
Metals								
Chromium (VI)	ug/L	**25**	<0.50	0.50	7983524			
Mercury (Hg)	ug/L	**0.29**	<0.10	0.10	7988165			
Dissolved Antimony (Sb)	ug/L	**6.0**	<0.50	0.50	7989687			
Dissolved Arsenic (As)	ug/L	**25**	2.9	1.0	7989687			
Dissolved Barium (Ba)	ug/L	**1000**	57	2.0	7989687			
Dissolved Beryllium (Be)	ug/L	**4.0**	<0.40	0.40	7989687			
Dissolved Boron (B)	ug/L	**5000**	72	10	7989687			
Dissolved Cadmium (Cd)	ug/L	**2.7**	<0.090	0.090	7989687			
Dissolved Chromium (Cr)	ug/L	**50**	<5.0	5.0	7989687			
Dissolved Cobalt (Co)	ug/L	**3.8**	1.1	0.50	7989687			
Dissolved Copper (Cu)	ug/L	**87**	0.92	0.90	7989687			
Dissolved Lead (Pb)	ug/L	**10**	<0.50	0.50	7989687			
Dissolved Molybdenum (Mo)	ug/L	**70**	7.2	0.50	7989687			
Dissolved Nickel (Ni)	ug/L	**100**	2.0	1.0	7989687			
Dissolved Selenium (Se)	ug/L	**10**	<2.0	2.0	7989687			
Dissolved Silver (Ag)	ug/L	**1.5**	<0.090	0.090	7989687			
Dissolved Sodium (Na)	ug/L	**490000**	26000	100	7989687			
Dissolved Thallium (Tl)	ug/L	**2.0**	<0.050	0.050	7989687			
Dissolved Uranium (U)	ug/L	**20**	0.70	0.10	7989687			
Dissolved Vanadium (V)	ug/L	**6.2**	1.4	0.50	7989687			
Dissolved Zinc (Zn)	ug/L	**1100**	<5.0	5.0	7989687			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

O.REG 153 PAHS (WATER)

Bureau Veritas ID			SOL754		
Sampling Date			2022/05/09 10:00		
COC Number			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch
Calculated Parameters					
Methylnaphthalene, 2-(1-)	ug/L	**3.2**	<0.071	0.071	7983964
Polyaromatic Hydrocarbons					
Acenaphthene	ug/L	**4.1**	<0.050	0.050	7989423
Acenaphthylene	ug/L	**1**	<0.050	0.050	7989423
Anthracene	ug/L	**2.4**	<0.050	0.050	7989423
Benzo(a)anthracene	ug/L	**1.0**	<0.050	0.050	7989423
Benzo(a)pyrene	ug/L	**0.01**	<0.0090	0.0090	7989423
Benzo(b/j)fluoranthene	ug/L	**0.1**	<0.050	0.050	7989423
Benzo(g,h,i)perylene	ug/L	**0.2**	<0.050	0.050	7989423
Benzo(k)fluoranthene	ug/L	**0.1**	<0.050	0.050	7989423
Chrysene	ug/L	**0.1**	<0.050	0.050	7989423
Dibenzo(a,h)anthracene	ug/L	**0.2**	<0.050	0.050	7989423
Fluoranthene	ug/L	**0.41**	<0.050	0.050	7989423
Fluorene	ug/L	**120**	<0.050	0.050	7989423
Indeno(1,2,3-cd)pyrene	ug/L	**0.2**	<0.050	0.050	7989423
1-Methylnaphthalene	ug/L	**3.2**	<0.050	0.050	7989423
2-Methylnaphthalene	ug/L	**3.2**	<0.050	0.050	7989423
Naphthalene	ug/L	**11**	<0.050	0.050	7989423
Phenanthrene	ug/L	**1**	<0.030	0.030	7989423
Pyrene	ug/L	**4.1**	<0.050	0.050	7989423
Surrogate Recovery (%)					
D10-Anthracene	%	-	95		7989423
D14-Terphenyl (FS)	%	-	84		7989423
D8-Acenaphthylene	%	-	89		7989423

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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O.REG 153 PCBS (WATER)

Bureau Veritas ID			SOL754		
Sampling Date			2022/05/09 10:00		
COC Number			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch
PCBs					
Aroclor 1242	ug/L	-	<0.05	0.05	7986811
Aroclor 1248	ug/L	-	<0.05	0.05	7986811
Aroclor 1254	ug/L	-	<0.05	0.05	7986811
Aroclor 1260	ug/L	-	<0.05	0.05	7986811
Total PCB	ug/L	**3.0**	<0.05	0.05	7986811
Surrogate Recovery (%)					
Decachlorobiphenyl	%	-	79		7986811

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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O.REG 153 VOCS BY HS & F1-F4 (WATER)

Bureau Veritas ID			SOL754		
Sampling Date			2022/05/09 10:00		
COC Number			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch
Calculated Parameters					
1,3-Dichloropropene (cis+trans)	ug/L	**0.5**	<0.50	0.50	7983481
Volatile Organics					
Acetone (2-Propanone)	ug/L	**2700**	<10	10	7986264
Benzene	ug/L	**5.0**	<0.17	0.17	7986264
Bromodichloromethane	ug/L	**16.0**	<0.50	0.50	7986264
Bromoform	ug/L	**25.0**	<1.0	1.0	7986264
Bromomethane	ug/L	**0.89**	<0.50	0.50	7986264
Carbon Tetrachloride	ug/L	**0.79**	<0.20	0.20	7986264
Chlorobenzene	ug/L	**30**	<0.20	0.20	7986264
Chloroform	ug/L	**2.4**	<0.20	0.20	7986264
Dibromochloromethane	ug/L	**25.0**	<0.50	0.50	7986264
1,2-Dichlorobenzene	ug/L	**3.0**	<0.50	0.50	7986264
1,3-Dichlorobenzene	ug/L	**59**	<0.50	0.50	7986264
1,4-Dichlorobenzene	ug/L	**1.0**	<0.50	0.50	7986264
Dichlorodifluoromethane (FREON 12)	ug/L	**590**	<1.0	1.0	7986264
1,1-Dichloroethane	ug/L	**5**	<0.20	0.20	7986264
1,2-Dichloroethane	ug/L	**1.6**	<0.50	0.50	7986264
1,1-Dichloroethylene	ug/L	**1.6**	<0.20	0.20	7986264
cis-1,2-Dichloroethylene	ug/L	**1.6**	<0.50	0.50	7986264
trans-1,2-Dichloroethylene	ug/L	**1.6**	<0.50	0.50	7986264
1,2-Dichloropropane	ug/L	**5.0**	<0.20	0.20	7986264
cis-1,3-Dichloropropene	ug/L	**0.5**	<0.30	0.30	7986264
trans-1,3-Dichloropropene	ug/L	**0.5**	<0.40	0.40	7986264
Ethylbenzene	ug/L	**2.4**	<0.20	0.20	7986264
Ethylene Dibromide	ug/L	**0.2**	<0.20	0.20	7986264
Hexane	ug/L	**51**	<1.0	1.0	7986264
Methylene Chloride(Dichloromethane)	ug/L	**50**	<2.0	2.0	7986264
Methyl Ethyl Ketone (2-Butanone)	ug/L	**1800**	<10	10	7986264
Methyl Isobutyl Ketone	ug/L	**640**	<5.0	5.0	7986264
Methyl t-butyl ether (MTBE)	ug/L	**15**	<0.50	0.50	7986264

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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O.REG 153 VOCS BY HS & F1-F4 (WATER)

Bureau Veritas ID			SOL754		
Sampling Date			2022/05/09 10:00		
COC Number			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch
Styrene	ug/L	**5.4**	<0.50	0.50	7986264
1,1,1,2-Tetrachloroethane	ug/L	**1.1**	<0.50	0.50	7986264
1,1,2,2-Tetrachloroethane	ug/L	**1.0**	<0.50	0.50	7986264
Tetrachloroethylene	ug/L	**1.6**	<0.20	0.20	7986264
Toluene	ug/L	**24**	<0.20	0.20	7986264
1,1,1-Trichloroethane	ug/L	**200**	<0.20	0.20	7986264
1,1,2-Trichloroethane	ug/L	**4.7**	<0.50	0.50	7986264
Trichloroethylene	ug/L	**1.6**	<0.20	0.20	7986264
Trichlorofluoromethane (FREON 11)	ug/L	**150**	<0.50	0.50	7986264
Vinyl Chloride	ug/L	**0.5**	<0.20	0.20	7986264
p+m-Xylene	ug/L	-	<0.20	0.20	7986264
o-Xylene	ug/L	-	<0.20	0.20	7986264
Total Xylenes	ug/L	**300**	<0.20	0.20	7986264
F1 (C6-C10)	ug/L	**750**	<25	25	7986264
F1 (C6-C10) - BTEX	ug/L	**750**	<25	25	7986264
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/L	**150**	<100	100	7989444
F3 (C16-C34 Hydrocarbons)	ug/L	**500**	<200	200	7989444
F4 (C34-C50 Hydrocarbons)	ug/L	**500**	<200	200	7989444
Reached Baseline at C50	ug/L	-	Yes		7989444
Surrogate Recovery (%)					
o-Terphenyl	%	-	98		7989444
4-Bromofluorobenzene	%	-	93		7986264
D4-1,2-Dichloroethane	%	-	104		7986264
D8-Toluene	%	-	98		7986264

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Textured Soil

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Bureau Veritas Job #: C2C4120
Report Date: 2022/05/16

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORGAE
Sampler Initials: DP

TEST SUMMARY

Bureau Veritas ID: SOL754
Sample ID: BH5-3/MW
Matrix: Water

Collected: 2022/05/09
Shipped:
Received: 2022/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7983964	N/A	2022/05/12	Automated Statchk
1,3-Dichloropropene Sum	CALC	7983481	N/A	2022/05/12	Automated Statchk
Chloride by Automated Colourimetry	KONE	7987615	N/A	2022/05/11	Alina Dobreanu
Chromium (VI) in Water	IC	7983524	N/A	2022/05/12	Theodora LI
Free (WAD) Cyanide	SKAL/CN	7991656	N/A	2022/05/12	Nimarta Singh
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7989444	2022/05/11	2022/05/11	Anna Stuglik-Rolland
Mercury	CV/AA	7988165	2022/05/11	2022/05/11	Jaswinder Kaur
Dissolved Metals by ICPMS	ICP/MS	7989687	N/A	2022/05/12	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7989423	2022/05/11	2022/05/12	Jonghan Yoon
Polychlorinated Biphenyl in Water	GC/ECD	7986811	2022/05/10	2022/05/11	Farag Mansour
Volatile Organic Compounds and F1 PHCs	GC/MSFD	7986264	N/A	2022/05/11	Xueming Jiang

Bureau Veritas ID: SOL754 Dup
Sample ID: BH5-3/MW
Matrix: Water

Collected: 2022/05/09
Shipped:
Received: 2022/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	SKAL/CN	7991656	N/A	2022/05/12	Nimarta Singh

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

GENERAL COMMENTS

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

Package 1	7.0°C

Revised Report (2022/05/16) : Results have been split onto separate reports per client request.

Cooler custody seal present and intact.

Results relate only to the items tested.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7986264	4-Bromofluorobenzene	2022/05/11	96	70 - 130	96	70 - 130	93	%		
7986264	D4-1,2-Dichloroethane	2022/05/11	103	70 - 130	101	70 - 130	102	%		
7986264	D8-Toluene	2022/05/11	102	70 - 130	103	70 - 130	99	%		
7986811	Decachlorobiphenyl	2022/05/11	76	60 - 130	68	60 - 130	78	%		
7989423	D10-Anthracene	2022/05/12	104	50 - 130	99	50 - 130	114	%		
7989423	D14-Terphenyl (FS)	2022/05/12	89	50 - 130	94	50 - 130	91	%		
7989423	D8-Acenaphthylene	2022/05/12	95	50 - 130	88	50 - 130	90	%		
7989444	o-Terphenyl	2022/05/11	96	60 - 130	95	60 - 130	95	%		
7983524	Chromium (VI)	2022/05/12	99	80 - 120	103	80 - 120	<0.50	ug/L	NC (1)	20
7986264	1,1,1,2-Tetrachloroethane	2022/05/11	98	70 - 130	95	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,1,1-Trichloroethane	2022/05/11	100	70 - 130	97	70 - 130	<0.20	ug/L	NC (1)	30
7986264	1,1,2,2-Tetrachloroethane	2022/05/11	98	70 - 130	93	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,1,2-Trichloroethane	2022/05/11	107	70 - 130	101	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,1-Dichloroethane	2022/05/11	97	70 - 130	93	70 - 130	<0.20	ug/L	NC (1)	30
7986264	1,1-Dichloroethylene	2022/05/11	102	70 - 130	99	70 - 130	<0.20	ug/L	NC (1)	30
7986264	1,2-Dichlorobenzene	2022/05/11	99	70 - 130	96	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,2-Dichloroethane	2022/05/11	97	70 - 130	92	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,2-Dichloropropane	2022/05/11	97	70 - 130	92	70 - 130	<0.20	ug/L	NC (1)	30
7986264	1,3-Dichlorobenzene	2022/05/11	99	70 - 130	96	70 - 130	<0.50	ug/L	NC (1)	30
7986264	1,4-Dichlorobenzene	2022/05/11	115	70 - 130	112	70 - 130	<0.50	ug/L	NC (1)	30
7986264	Acetone (2-Propanone)	2022/05/11	100	60 - 140	94	60 - 140	<10	ug/L	NC (1)	30
7986264	Benzene	2022/05/11	93	70 - 130	90	70 - 130	<0.17	ug/L	NC (1)	30
7986264	Bromodichloromethane	2022/05/11	100	70 - 130	95	70 - 130	<0.50	ug/L	NC (1)	30
7986264	Bromoform	2022/05/11	92	70 - 130	87	70 - 130	<1.0	ug/L	NC (1)	30
7986264	Bromomethane	2022/05/11	103	60 - 140	95	60 - 140	<0.50	ug/L	NC (1)	30
7986264	Carbon Tetrachloride	2022/05/11	97	70 - 130	95	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Chlorobenzene	2022/05/11	100	70 - 130	96	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Chloroform	2022/05/11	99	70 - 130	95	70 - 130	<0.20	ug/L	NC (1)	30
7986264	cis-1,2-Dichloroethylene	2022/05/11	98	70 - 130	94	70 - 130	<0.50	ug/L	NC (1)	30
7986264	cis-1,3-Dichloropropene	2022/05/11	90	70 - 130	81	70 - 130	<0.30	ug/L	NC (1)	30
7986264	Dibromochloromethane	2022/05/11	96	70 - 130	91	70 - 130	<0.50	ug/L	NC (1)	30

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7986264	Dichlorodifluoromethane (FREON 12)	2022/05/11	88	60 - 140	88	60 - 140	<1.0	ug/L	NC (1)	30
7986264	Ethylbenzene	2022/05/11	94	70 - 130	91	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Ethylene Dibromide	2022/05/11	97	70 - 130	91	70 - 130	<0.20	ug/L	NC (1)	30
7986264	F1 (C6-C10) - BTEX	2022/05/11					<25	ug/L	NC (1)	30
7986264	F1 (C6-C10)	2022/05/11	93	60 - 140	95	60 - 140	<25	ug/L	NC (1)	30
7986264	Hexane	2022/05/11	104	70 - 130	101	70 - 130	<1.0	ug/L	NC (1)	30
7986264	Methyl Ethyl Ketone (2-Butanone)	2022/05/11	100	60 - 140	95	60 - 140	<10	ug/L	NC (1)	30
7986264	Methyl Isobutyl Ketone	2022/05/11	87	70 - 130	83	70 - 130	<5.0	ug/L	NC (1)	30
7986264	Methyl t-butyl ether (MTBE)	2022/05/11	87	70 - 130	84	70 - 130	<0.50	ug/L	NC (1)	30
7986264	Methylene Chloride(Dichloromethane)	2022/05/11	105	70 - 130	101	70 - 130	<2.0	ug/L	NC (1)	30
7986264	o-Xylene	2022/05/11	92	70 - 130	90	70 - 130	<0.20	ug/L	NC (1)	30
7986264	p+m-Xylene	2022/05/11	96	70 - 130	94	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Styrene	2022/05/11	97	70 - 130	94	70 - 130	<0.50	ug/L	NC (1)	30
7986264	Tetrachloroethylene	2022/05/11	98	70 - 130	95	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Toluene	2022/05/11	92	70 - 130	90	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Total Xylenes	2022/05/11					<0.20	ug/L	NC (1)	30
7986264	trans-1,2-Dichloroethylene	2022/05/11	102	70 - 130	98	70 - 130	<0.50	ug/L	NC (1)	30
7986264	trans-1,3-Dichloropropene	2022/05/11	102	70 - 130	88	70 - 130	<0.40	ug/L	NC (1)	30
7986264	Trichloroethylene	2022/05/11	102	70 - 130	99	70 - 130	<0.20	ug/L	NC (1)	30
7986264	Trichlorofluoromethane (FREON 11)	2022/05/11	103	70 - 130	101	70 - 130	<0.50	ug/L	NC (1)	30
7986264	Vinyl Chloride	2022/05/11	98	70 - 130	96	70 - 130	<0.20	ug/L	NC (1)	30
7986811	Aroclor 1242	2022/05/11					<0.05	ug/L		
7986811	Aroclor 1248	2022/05/11					<0.05	ug/L		
7986811	Aroclor 1254	2022/05/11					<0.05	ug/L		
7986811	Aroclor 1260	2022/05/11	88	60 - 130	73	60 - 130	<0.05	ug/L		
7986811	Total PCB	2022/05/11	88	60 - 130	73	60 - 130	<0.05	ug/L	NC (1)	40
7987615	Dissolved Chloride (Cl-)	2022/05/11	115	80 - 120	104	80 - 120	<1.0	mg/L	1.1 (1)	20
7988165	Mercury (Hg)	2022/05/11	93	75 - 125	95	80 - 120	<0.10	ug/L	NC (1)	20
7989423	1-Methylnaphthalene	2022/05/12	93	50 - 130	83	50 - 130	<0.050	ug/L	NC (1)	30
7989423	2-Methylnaphthalene	2022/05/12	99	50 - 130	87	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Acenaphthene	2022/05/12	100	50 - 130	88	50 - 130	<0.050	ug/L	NC (1)	30

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7989423	Acenaphthylene	2022/05/12	100	50 - 130	88	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Anthracene	2022/05/12	98	50 - 130	88	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Benzo(a)anthracene	2022/05/12	101	50 - 130	86	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Benzo(a)pyrene	2022/05/12	101	50 - 130	86	50 - 130	<0.0090	ug/L	NC (1)	30
7989423	Benzo(b/j)fluoranthene	2022/05/12	93	50 - 130	85	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Benzo(g,h,i)perylene	2022/05/12	98	50 - 130	85	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Benzo(k)fluoranthene	2022/05/12	109	50 - 130	86	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Chrysene	2022/05/12	102	50 - 130	87	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Dibenzo(a,h)anthracene	2022/05/12	109	50 - 130	92	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Fluoranthene	2022/05/12	92	50 - 130	90	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Fluorene	2022/05/12	95	50 - 130	87	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Indeno(1,2,3-cd)pyrene	2022/05/12	99	50 - 130	86	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Naphthalene	2022/05/12	97	50 - 130	87	50 - 130	<0.050	ug/L	NC (1)	30
7989423	Phenanthrene	2022/05/12	100	50 - 130	89	50 - 130	<0.030	ug/L	NC (1)	30
7989423	Pyrene	2022/05/12	92	50 - 130	92	50 - 130	<0.050	ug/L	NC (1)	30
7989444	F2 (C10-C16 Hydrocarbons)	2022/05/11	95	60 - 130	96	60 - 130	<100	ug/L	NC (1)	30
7989444	F3 (C16-C34 Hydrocarbons)	2022/05/11	106	60 - 130	109	60 - 130	<200	ug/L	3.0 (1)	30
7989444	F4 (C34-C50 Hydrocarbons)	2022/05/11	105	60 - 130	106	60 - 130	<200	ug/L	NC (1)	30
7989687	Dissolved Antimony (Sb)	2022/05/12	105	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20
7989687	Dissolved Arsenic (As)	2022/05/12	99	80 - 120	99	80 - 120	<1.0	ug/L	NC (1)	20
7989687	Dissolved Barium (Ba)	2022/05/12	102	80 - 120	99	80 - 120	<2.0	ug/L	0.13 (1)	20
7989687	Dissolved Beryllium (Be)	2022/05/12	103	80 - 120	100	80 - 120	<0.40	ug/L	NC (1)	20
7989687	Dissolved Boron (B)	2022/05/12	102	80 - 120	100	80 - 120	<10	ug/L	0.38 (1)	20
7989687	Dissolved Cadmium (Cd)	2022/05/12	102	80 - 120	98	80 - 120	<0.090	ug/L	NC (1)	20
7989687	Dissolved Chromium (Cr)	2022/05/12	100	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
7989687	Dissolved Cobalt (Co)	2022/05/12	99	80 - 120	98	80 - 120	<0.50	ug/L	0.77 (1)	20
7989687	Dissolved Copper (Cu)	2022/05/12	105	80 - 120	97	80 - 120	<0.90	ug/L	0.66 (1)	20
7989687	Dissolved Lead (Pb)	2022/05/12	101	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20
7989687	Dissolved Molybdenum (Mo)	2022/05/12	108	80 - 120	103	80 - 120	<0.50	ug/L	2.7 (1)	20
7989687	Dissolved Nickel (Ni)	2022/05/12	95	80 - 120	93	80 - 120	<1.0	ug/L	3.1 (1)	20
7989687	Dissolved Selenium (Se)	2022/05/12	100	80 - 120	101	80 - 120	<2.0	ug/L	NC (1)	20

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7989687	Dissolved Silver (Ag)	2022/05/12	90	80 - 120	95	80 - 120	<0.090	ug/L	NC (1)	20
7989687	Dissolved Sodium (Na)	2022/05/12	NC	80 - 120	98	80 - 120	<100	ug/L	0.37 (1)	20
7989687	Dissolved Thallium (Tl)	2022/05/12	103	80 - 120	105	80 - 120	<0.050	ug/L	NC (1)	20
7989687	Dissolved Uranium (U)	2022/05/12	105	80 - 120	103	80 - 120	<0.10	ug/L	3.6 (1)	20
7989687	Dissolved Vanadium (V)	2022/05/12	96	80 - 120	94	80 - 120	<0.50	ug/L	7.8 (1)	20
7989687	Dissolved Zinc (Zn)	2022/05/12	97	80 - 120	97	80 - 120	<5.0	ug/L	1.9 (1)	20
7991656	WAD Cyanide (Free)	2022/05/12	94 (2)	80 - 120	95	80 - 120	<1	ug/L	NC (3)	20

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) Duplicate Parent ID

(2) Matrix Spike Parent ID [SOL754-10]

(3) Duplicate Parent ID [SOL754-10]

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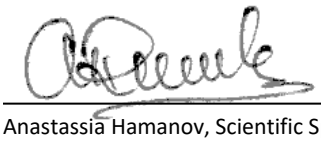
Bureau Veritas Job #: C2C4120
Report Date: 2022/05/16

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORGAE
Sampler Initials: DP

VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist

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 Signature Page.

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IMMEDIATE

Bureau Veritas
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvna.com

Page of

09-May-22 13:32
Marijane Cruz
C2C4120
KTN ENV-765
C#877485-01-01

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#23482 AECOM Canada Ltd	Company Name:	AECOM Canada Ltd.	Quotation #:	C20375
Attention:	Accounts Payable	Attention:	Brian Holden / Dhwanish Parikh	P.O. #:	
Address:	50 Sportsworld Crossing Rd Suite 290 Kitchener ON N2P 0A4	Address:	50 Sportsworld Crossing Rd Suite 290 Kitchener, ON N2P 0A4	Project:	60646784
Tel:	(519) 650-5313 Fax: (519) 650-3422 4	Tel:	(519) 340-1617 Fax:	Project Name:	Peel Region Snow Storage Site 5
Email:	CANSSC.E-billing@aecom.com	Email:	brian.holden@aecom.com ; dhwanish.parikh@aecom.com	Site #:	
				Sampled By:	Dhwanish Parikh

Le Order #: 377485
ct Manager: Marijane Cruz

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558. ☐ Storm Sewer Bylaw
- ☐ MISA Municipality _____
- ☐ PWQO ☐ Reg 406 Table _____
- ☐ Other _____

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? _____

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(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	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 VOCs by HS & F1-F4	O.Reg 153 PAHs	O.Reg 153 PCBs (Water)	O.Reg 153 Metals & Inorganics Pkg (Wtr)	Biochemical Oxygen Demand (BOD)	Total Suspended Solids	Dissolved Aluminum (0.2 u, clay free)	RCAp - Comprehensive			# of Bottles	Comments
1		BH5-3/MW	May 9, 22	10:00	GW	✓	✓	✓	✓	✓	✓	✓	✓	✓			18	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Dhwanish Parikh	22/05/09	11:00	ENVTRANS	22/05/09	12:32	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	6.7 9.6	Present		
		Intact		

* 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/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.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

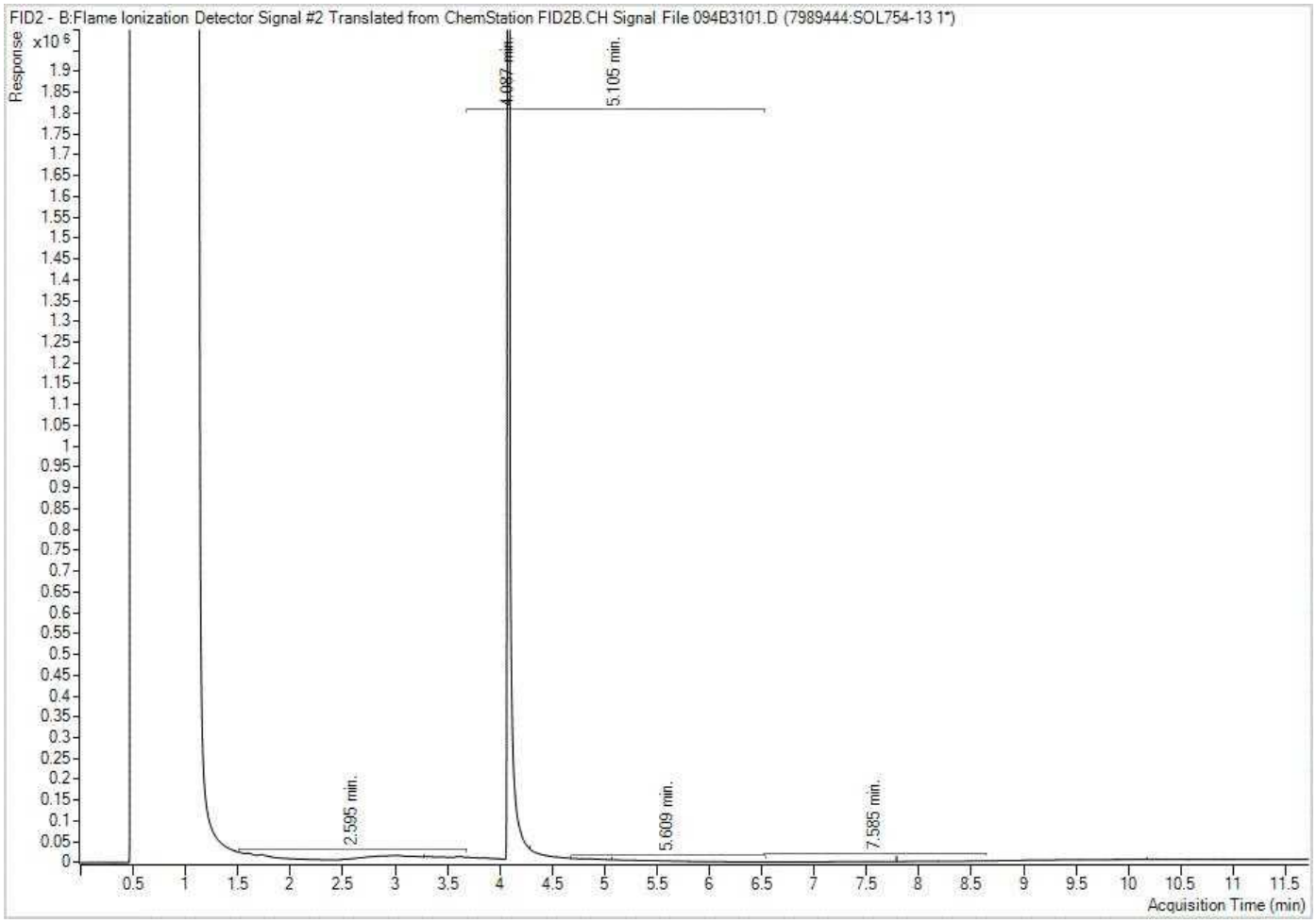
White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Job #: C2C4120
Report Date: 2022/05/16
Bureau Veritas Sample: SOL754

AECOM Canada Ltd
Client Project #: 60646784
Project name: PEEL REGION SNOW STORGAE
Client ID: BH5-3/MW

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Exceedance Summary Table – Reg153/04 T2-GW-C

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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Your Project #: 60646784
Site#: SITE 5
Site Location: PEEL REGION SNOW STORGAE
Your C.O.C. #: 877485-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/05/18
Report #: R7129673
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C2C4120
Received: 2022/05/09, 13:32

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Dissolved Aluminum (0.2 u, clay free)	1	N/A	2022/05/12	CAM SOP-00447	EPA 6020B m
Alkalinity	1	N/A	2022/05/11	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2022/05/12	CAM SOP-00102	APHA 4500-CO2 D
Biochemical Oxygen Demand (BOD)	1	2022/05/11	2022/05/16	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	1	N/A	2022/05/11	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	1	N/A	2022/05/11	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2022/05/11	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	1	N/A	2022/05/12	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	1	N/A	2022/05/12	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2022/05/13		
Anion and Cation Sum	1	N/A	2022/05/12		
Total Ammonia-N	1	N/A	2022/05/12	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2022/05/11	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2022/05/10	2022/05/11	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	1	N/A	2022/05/12	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2022/05/13		Auto Calc
Sat. pH and Langelier Index (@ 4C)	1	N/A	2022/05/13		Auto Calc
Sulphate by Automated Colourimetry	1	N/A	2022/05/12	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	1	N/A	2022/05/13		Auto Calc
Total Suspended Solids	1	2022/05/11	2022/05/12	CAM SOP-00428	SM 23 2540D m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 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 CCME, MELCC, EPA, APHA. Where applicable, the analytical testing herein was performed in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Bureau Veritas is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04.

Your Project #: 60646784
Site#: SITE 5
Site Location: PEEL REGION SNOW STORGAE
Your C.O.C. #: 877485-01-01

Attention: Brian Holden

AECOM Canada Ltd
50 Sportsworld Crossing Rd
Suite 290
Kitchener, ON
Canada N2P 0A4

Report Date: 2022/05/18
Report #: R7129673
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C2C4120

Received: 2022/05/09, 13:32

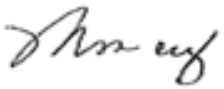
All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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 samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of 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. Bureau Veritas is not responsible for the accuracy or any data impacts that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



Marijane Cruz
Senior Project Manager
18 May 2022 11:17:48

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756

==========

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RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID			SOL754		
Sampling Date			2022/05/09 10:00		
COC Number			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch
Calculated Parameters					
Anion Sum	me/L	-	6.31	N/A	7984394
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	230	1.0	7983864
Calculated TDS	mg/L	-	340	1.0	7984402
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	3.0	1.0	7983864
Cation Sum	me/L	-	6.47	N/A	7984394
Hardness (CaCO3)	mg/L	-	260	1.0	7984331
Ion Balance (% Difference)	%	-	1.25	N/A	7984393
Langelier Index (@ 20C)	N/A	-	0.736		7984400
Langelier Index (@ 4C)	N/A	-	0.487		7984401
Saturation pH (@ 20C)	N/A	-	7.42		7984400
Saturation pH (@ 4C)	N/A	-	7.67		7984401
Inorganics					
Total Ammonia-N	mg/L	-	0.32	0.050	7989684
Conductivity	umho/cm	-	600	1.0	7987545
Dissolved Organic Carbon	mg/L	-	0.69	0.40	7987154
Orthophosphate (P)	mg/L	-	<0.010	0.010	7987624
pH	pH	**6.5:8.5**	8.15		7987549
Dissolved Sulphate (SO4)	mg/L	**-**	81	1.0	7987622
Alkalinity (Total as CaCO3)	mg/L	**-**	230	1.0	7987543
Dissolved Chloride (Cl-)	mg/L	**-**	1.1	1.0	7987615
Nitrite (N)	mg/L	**-**	<0.010	0.010	7987643
Nitrate (N)	mg/L	**-**	<0.10	0.10	7987643
Nitrate + Nitrite (N)	mg/L	**-**	<0.10	0.10	7987643
Metals					
Dissolved Aluminum (Al)	ug/L	**-**	<4.9	4.9	7989687
Dissolved Antimony (Sb)	ug/L	**20**	<0.50	0.50	7989687
Dissolved Arsenic (As)	ug/L	**100**	2.9	1.0	7989687
Dissolved Barium (Ba)	ug/L	**-**	57	2.0	7989687
Dissolved Beryllium (Be)	ug/L	**11**	<0.40	0.40	7989687
Dissolved Bismuth (Bi)	ug/L	**-**	<1.0	1.0	7989687
Dissolved Boron (B)	ug/L	**200**	72	10	7989687

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable

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RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID			SOL754		
Sampling Date			2022/05/09 10:00		
COC Number			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch
Dissolved Cadmium (Cd)	ug/L	**0.2**	<0.090	0.090	7989687
Dissolved Calcium (Ca)	ug/L	-	45000	200	7989687
Dissolved Cesium (Cs)	ug/L	-	<0.20	0.20	7989687
Dissolved Chromium (Cr)	ug/L	-	<5.0	5.0	7989687
Dissolved Cobalt (Co)	ug/L	**0.9**	**1.1**	0.50	7989687
Dissolved Copper (Cu)	ug/L	**5**	0.92	0.90	7989687
Dissolved Iron (Fe)	ug/L	**300**	<100	100	7989687
Dissolved Lead (Pb)	ug/L	**5**	<0.50	0.50	7989687
Dissolved Lithium (Li)	ug/L	-	9.3	5.0	7989687
Dissolved Magnesium (Mg)	ug/L	-	37000	50	7989687
Dissolved Manganese (Mn)	ug/L	-	39	2.0	7989687
Dissolved Molybdenum (Mo)	ug/L	**40**	7.2	0.50	7989687
Dissolved Nickel (Ni)	ug/L	**25**	2.0	1.0	7989687
Dissolved Phosphorus (P)	ug/L	-	<100	100	7989687
Dissolved Potassium (K)	ug/L	-	2400	200	7989687
Dissolved Rubidium (Rb)	ug/L	-	0.90	0.20	7989687
Dissolved Selenium (Se)	ug/L	**100**	<2.0	2.0	7989687
Dissolved Silicon (Si)	ug/L	-	4900	50	7989687
Dissolved Silver (Ag)	ug/L	**0.1**	<0.090	0.090	7989687
Dissolved Sodium (Na)	ug/L	-	26000	100	7989687
Dissolved Strontium (Sr)	ug/L	-	1200	1.0	7989687
Dissolved Tellurium (Te)	ug/L	-	<1.0	1.0	7989687
Dissolved Thallium (Tl)	ug/L	**0.3**	<0.050	0.050	7989687
Dissolved Thorium (Th)	ug/L	-	<2.0	2.0	7989687
Dissolved Tin (Sn)	ug/L	-	<1.0	1.0	7989687
Dissolved Titanium (Ti)	ug/L	-	<5.0	5.0	7989687
Dissolved Tungsten (W)	ug/L	**30**	1.1	1.0	7989687
Dissolved Uranium (U)	ug/L	**5**	0.70	0.10	7989687
Dissolved Vanadium (V)	ug/L	**6**	1.4	0.50	7989687
Dissolved Zinc (Zn)	ug/L	**30**	<5.0	5.0	7989687
Dissolved Zirconium (Zr)	ug/L	**4**	<1.0	1.0	7989687

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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Bureau Veritas Job #: C2C4120
Report Date: 2022/05/18

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORGAE
Sampler Initials: DP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		SOL754		
Sampling Date		2022/05/09 10:00		
COC Number		877485-01-01		
	UNITS	BH5-3/MW	RDL	QC Batch
Inorganics				
Total BOD	mg/L	<2	2	7988390
Total Suspended Solids	mg/L	57	10	7988366

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID			SOL754		
Sampling Date			2022/05/09 10:00		
COC Number			877485-01-01		
	UNITS	Criteria	BH5-3/MW	RDL	QC Batch
Metals					
Dissolved (0.2u) Aluminum (Al)	ug/L	**15**	<5	5	7988893

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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Bureau Veritas Job #: C2C4120
Report Date: 2022/05/18

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORGAE
Sampler Initials: DP

TEST SUMMARY

Bureau Veritas ID: SOL754
Sample ID: BH5-3/MW
Matrix: Water

Collected: 2022/05/09
Shipped:
Received: 2022/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	7988893	N/A	2022/05/12	Nan Raykha
Alkalinity	AT	7987543	N/A	2022/05/11	Yogesh Patel
Carbonate, Bicarbonate and Hydroxide	CALC	7983864	N/A	2022/05/12	Automated Statchk
Biochemical Oxygen Demand (BOD)	DO	7988390	2022/05/11	2022/05/16	Frank Zhang
Chloride by Automated Colourimetry	KONE	7987615	N/A	2022/05/11	Alina Dobreanu
Conductivity	AT	7987545	N/A	2022/05/11	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7987154	N/A	2022/05/11	Anna-Kay Gooden
Hardness (calculated as CaCO3)		7984331	N/A	2022/05/12	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7989687	N/A	2022/05/12	Arefa Dabhad
Ion Balance (% Difference)	CALC	7984393	N/A	2022/05/13	Automated Statchk
Anion and Cation Sum	CALC	7984394	N/A	2022/05/12	Automated Statchk
Total Ammonia-N	LACH/NH4	7989684	N/A	2022/05/12	Raiq Kashif
Nitrate & Nitrite as Nitrogen in Water	LACH	7987643	N/A	2022/05/11	Samuel Law
pH	AT	7987549	2022/05/10	2022/05/11	Yogesh Patel
Orthophosphate	KONE	7987624	N/A	2022/05/12	Chandra Nandlal
Sat. pH and Langelier Index (@ 20C)	CALC	7984400	N/A	2022/05/13	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7984401	N/A	2022/05/13	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7987622	N/A	2022/05/12	Chandra Nandlal
Total Dissolved Solids (TDS calc)	CALC	7984402	N/A	2022/05/13	Automated Statchk
Total Suspended Solids	BAL	7988366	2022/05/11	2022/05/12	Shaneil Hall

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GENERAL COMMENTS

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

Package 1	7.0°C

Revised Report (2022/05/18) : Results have been split onto separate reports per client request.

Cooler custody seal present and intact.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7987154	Dissolved Organic Carbon	2022/05/11	97	80 - 120	98	80 - 120	<0.40	mg/L	0.79 (1)	20		
7987543	Alkalinity (Total as CaCO3)	2022/05/12			93	85 - 115	<1.0	mg/L	0.66 (1)	20		
7987545	Conductivity	2022/05/11			103	85 - 115	<1.0	umho/cm	0.97 (1)	25		
7987549	pH	2022/05/11			101	98 - 103			0.78 (1)	N/A		
7987615	Dissolved Chloride (Cl-)	2022/05/11	115	80 - 120	104	80 - 120	<1.0	mg/L	1.1 (1)	20		
7987622	Dissolved Sulphate (SO4)	2022/05/12	NC	75 - 125	103	80 - 120	<1.0	mg/L	0.89 (1)	20		
7987624	Orthophosphate (P)	2022/05/12	119	75 - 125	100	80 - 120	<0.010	mg/L	NC (1)	25		
7987643	Nitrate (N)	2022/05/11	102	80 - 120	100	80 - 120	<0.10	mg/L	0.092 (1)	20		
7987643	Nitrite (N)	2022/05/11	107	80 - 120	105	80 - 120	<0.010	mg/L	7.8 (1)	20		
7988366	Total Suspended Solids	2022/05/12					<10	mg/L	5.2 (1)	25	96	85 - 115
7988390	Total BOD	2022/05/16					<2	mg/L	NC (1)	30	99	80 - 120
7988893	Dissolved (0.2u) Aluminum (Al)	2022/05/12	97	80 - 120	99	80 - 120	<5	ug/L	1.5 (1)	20		
7989684	Total Ammonia-N	2022/05/12	96	75 - 125	102	80 - 120	<0.050	mg/L	8.4 (1)	20		
7989687	Dissolved Aluminum (Al)	2022/05/12	96	80 - 120	96	80 - 120	<4.9	ug/L				
7989687	Dissolved Antimony (Sb)	2022/05/12	105	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20		
7989687	Dissolved Arsenic (As)	2022/05/12	99	80 - 120	99	80 - 120	<1.0	ug/L	NC (1)	20		
7989687	Dissolved Barium (Ba)	2022/05/12	102	80 - 120	99	80 - 120	<2.0	ug/L	0.13 (1)	20		
7989687	Dissolved Beryllium (Be)	2022/05/12	103	80 - 120	100	80 - 120	<0.40	ug/L	NC (1)	20		
7989687	Dissolved Bismuth (Bi)	2022/05/12	97	80 - 120	101	80 - 120	<1.0	ug/L				
7989687	Dissolved Boron (B)	2022/05/12	102	80 - 120	100	80 - 120	<10	ug/L	0.38 (1)	20		
7989687	Dissolved Cadmium (Cd)	2022/05/12	102	80 - 120	98	80 - 120	<0.090	ug/L	NC (1)	20		
7989687	Dissolved Calcium (Ca)	2022/05/12	NC	80 - 120	101	80 - 120	<200	ug/L				
7989687	Dissolved Cesium (Cs)	2022/05/12	97	80 - 120	94	80 - 120	<0.20	ug/L				
7989687	Dissolved Chromium (Cr)	2022/05/12	100	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20		
7989687	Dissolved Cobalt (Co)	2022/05/12	99	80 - 120	98	80 - 120	<0.50	ug/L	0.77 (1)	20		
7989687	Dissolved Copper (Cu)	2022/05/12	105	80 - 120	97	80 - 120	<0.90	ug/L	0.66 (1)	20		
7989687	Dissolved Iron (Fe)	2022/05/12	96	80 - 120	99	80 - 120	<100	ug/L				
7989687	Dissolved Lead (Pb)	2022/05/12	101	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20		
7989687	Dissolved Lithium (Li)	2022/05/12	110	80 - 120	112	80 - 120	<5.0	ug/L				
7989687	Dissolved Magnesium (Mg)	2022/05/12	97	80 - 120	102	80 - 120	<50	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7989687	Dissolved Manganese (Mn)	2022/05/12	NC	80 - 120	95	80 - 120	<2.0	ug/L				
7989687	Dissolved Molybdenum (Mo)	2022/05/12	108	80 - 120	103	80 - 120	<0.50	ug/L	2.7 (1)	20		
7989687	Dissolved Nickel (Ni)	2022/05/12	95	80 - 120	93	80 - 120	<1.0	ug/L	3.1 (1)	20		
7989687	Dissolved Phosphorus (P)	2022/05/12	101	80 - 120	116	80 - 120	<100	ug/L				
7989687	Dissolved Potassium (K)	2022/05/12	100	80 - 120	101	80 - 120	<200	ug/L				
7989687	Dissolved Rubidium (Rb)	2022/05/12	99	80 - 120	98	80 - 120	<0.20	ug/L				
7989687	Dissolved Selenium (Se)	2022/05/12	100	80 - 120	101	80 - 120	<2.0	ug/L	NC (1)	20		
7989687	Dissolved Silicon (Si)	2022/05/12	99	80 - 120	99	80 - 120	<50	ug/L				
7989687	Dissolved Silver (Ag)	2022/05/12	90	80 - 120	95	80 - 120	<0.090	ug/L	NC (1)	20		
7989687	Dissolved Sodium (Na)	2022/05/12	NC	80 - 120	98	80 - 120	<100	ug/L	0.37 (1)	20		
7989687	Dissolved Strontium (Sr)	2022/05/12	93	80 - 120	93	80 - 120	<1.0	ug/L				
7989687	Dissolved Tellurium (Te)	2022/05/12	102	80 - 120	98	80 - 120	<1.0	ug/L				
7989687	Dissolved Thallium (Tl)	2022/05/12	103	80 - 120	105	80 - 120	<0.050	ug/L	NC (1)	20		
7989687	Dissolved Thorium (Th)	2022/05/12	91	80 - 120	92	80 - 120	<2.0	ug/L				
7989687	Dissolved Tin (Sn)	2022/05/12	104	80 - 120	99	80 - 120	<1.0	ug/L				
7989687	Dissolved Titanium (Ti)	2022/05/12	98	80 - 120	98	80 - 120	<5.0	ug/L				
7989687	Dissolved Tungsten (W)	2022/05/12	107	80 - 120	101	80 - 120	<1.0	ug/L				
7989687	Dissolved Uranium (U)	2022/05/12	105	80 - 120	103	80 - 120	<0.10	ug/L	3.6 (1)	20		
7989687	Dissolved Vanadium (V)	2022/05/12	96	80 - 120	94	80 - 120	<0.50	ug/L	7.8 (1)	20		
7989687	Dissolved Zinc (Zn)	2022/05/12	97	80 - 120	97	80 - 120	<5.0	ug/L	1.9 (1)	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7989687	Dissolved Zirconium (Zr)	2022/05/12	101	80 - 120	96	80 - 120	<1.0	ug/L				

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.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

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.

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) Duplicate Parent ID

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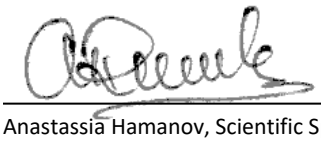
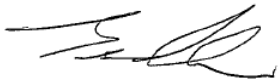
VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist



Brad Newman, B.Sc., C.Chem., Scientific Service Specialist

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IMMEDIATE

Bureau Veritas
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09-May-22 13:32
Marijane Cruz
C2C4120
KTN ENV-765
C#877485-01-01

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#23482 AECOM Canada Ltd	Company Name:	AECOM Canada Ltd.	Quotation #:	C20375
Attention:	Accounts Payable	Attention:	Brian Holden / Dhwanish Parikh	P.O. #:	
Address:	50 Sportsworld Crossing Rd Suite 290 Kitchener ON N2P 0A4	Address:	50 Sportsworld Crossing Rd Suite 290 Kitchener, ON N2P 0A4	Project:	60646784
Tel:	(519) 650-5313 Fax: (519) 650-3422 4	Tel:	(519) 340-1617 Fax:	Project Name:	Peel Region Snow Storage Site 5
Email:	CANSSC.E-billing@aecom.com	Email:	brian.holden@aecom.com ; dhwanish.parikh@aecom.com	Site #:	
				Sampled By:	Dhwanish Parikh

Ie Order #: 377485
ct Manager: Marijane Cruz

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558. ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ____
- ☐ PWQO ☐ Reg 406 Table ____
- ☐ Other ____

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ____

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 VOCs by HS & F1-F4	O.Reg 153 PAHs	O.Reg 153 PCBs (Water)	O.Reg 153 Metals & Inorganics Pkg (Wtr)	Biochemical Oxygen Demand (BOD)	Total Suspended Solids	Dissolved Aluminum (0.2 u, clay free)	RCAp - Comprehensive			# of Bottles	Comments
1		BH5-3/MW	May 9, 22	10:00	GW	✓	✓	✓	✓	✓	✓	✓	✓	✓			18	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(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 #)*

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Dhwanish Parikh	22/05/09	11:00	ENVTRANS	22/05/09	12:32	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	6.7 9.6	Present		
		Intact		

* 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/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.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Exceedance Summary Table – Prov. Water Quality Obj.

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
BH5-3/MW	SOL754-06	Dissolved Cobalt (Co)	0.9	1.1	0.50	ug/L

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

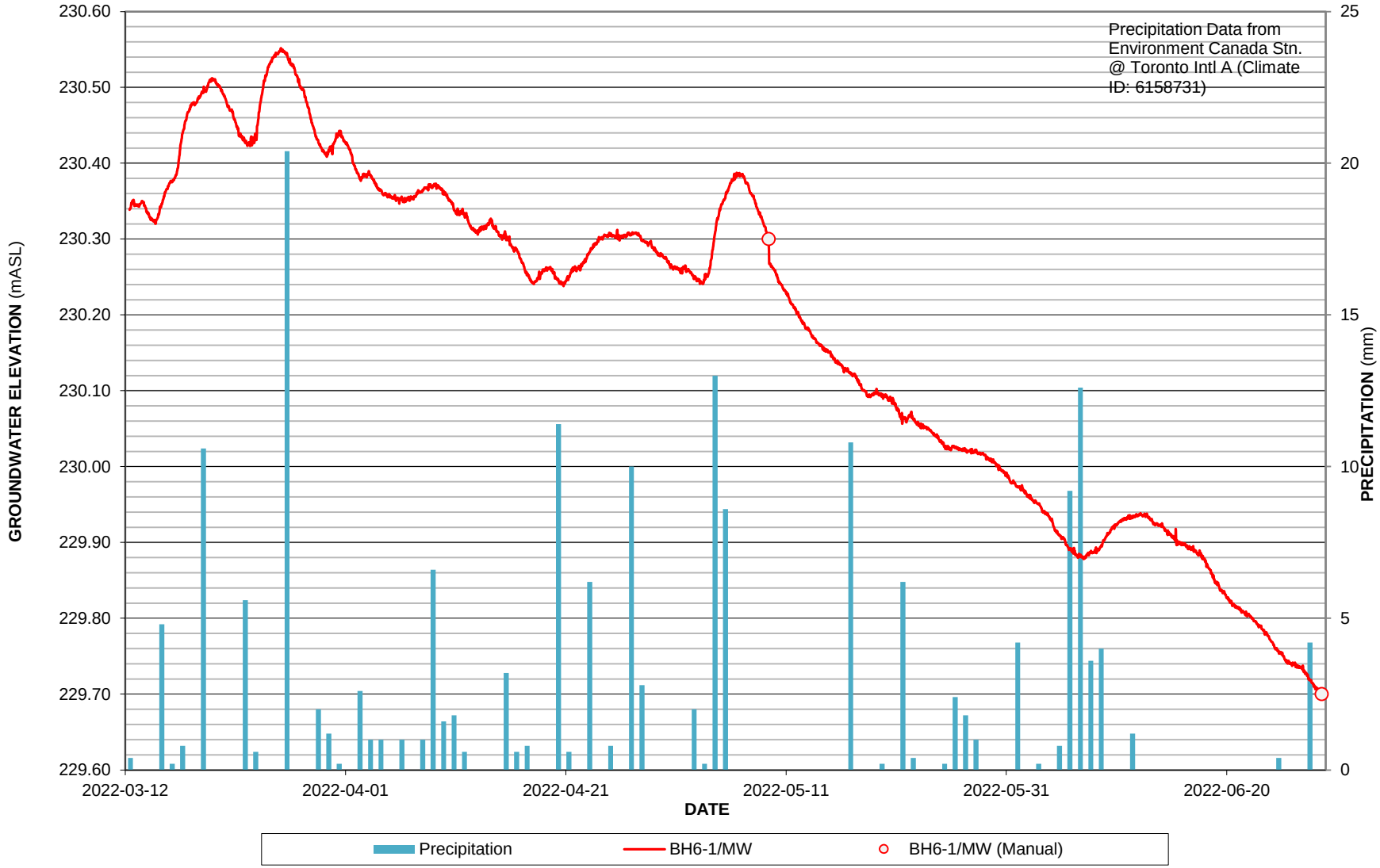
Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Appendix E

Groundwater Hydrographs

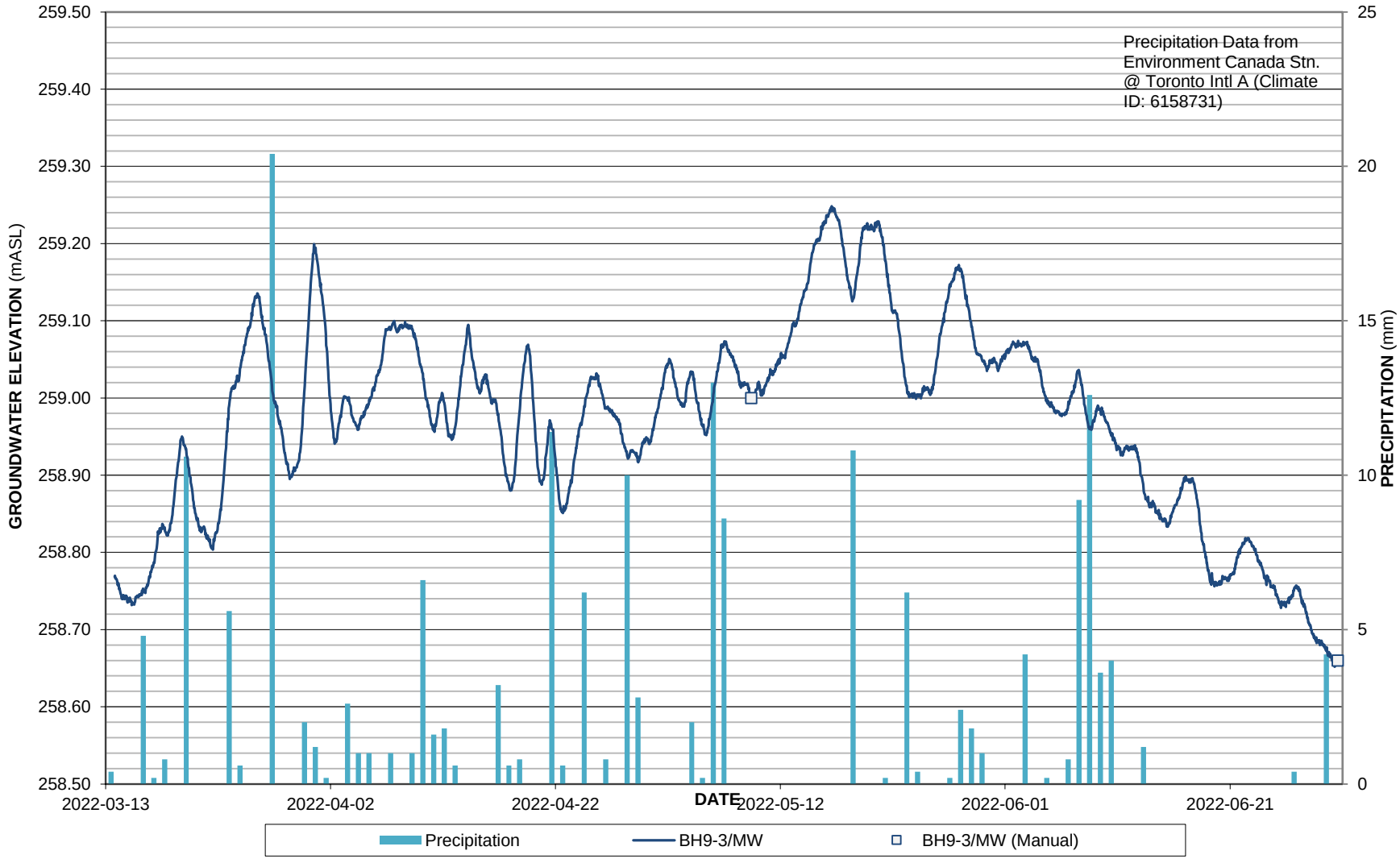
GROUNDWATER HYDROGRAPHS

Peel Region Snow Storage, Regional Municipality of Peel - Site#6 (BH6-1/MW)



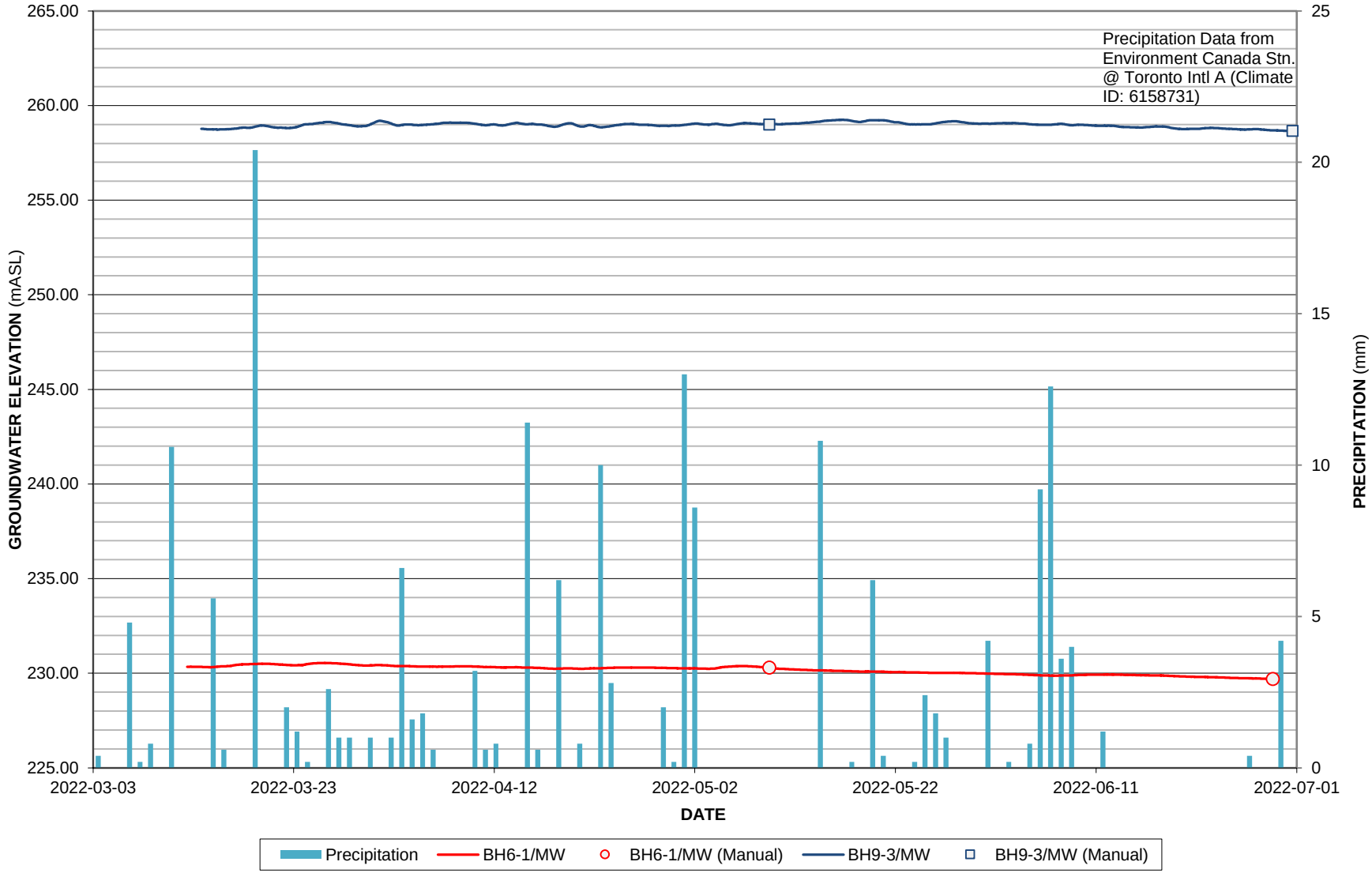
GROUNDWATER HYDROGRAPHS

Peel Region Snow Storage, Regional Municipality of Peel - Site#9 (BH9-3/MW)



GROUNDWATER HYDROGRAPHS

Peel Region Snow Storage, Regional Municipality of Peel (BH6-1/MW and BH9-3/MW)



AECOM Canada Ltd.
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To: Region Of Peel

Date: June 6, 2024

Project #: 60646784

From: Miln Harvey, Ph.D., P.Eng.
Brian Holden, M.Sc., P.Geo.

CC:

Memorandum

Subject: **Hydrogeological Memorandum – Peel Region Snow Storage, 7120 Hurontario Street, Region of Peel**

1. Introduction

The Regional Municipality of Peel (the Region) retained AECOM Canada Ltd. (AECOM) to provide Detailed Design engineering services for the proposed snow disposal location at 7120 Hurontario Street, in the City of Mississauga, Ontario (the Site). The location of the site is shown in **Figure 1.**

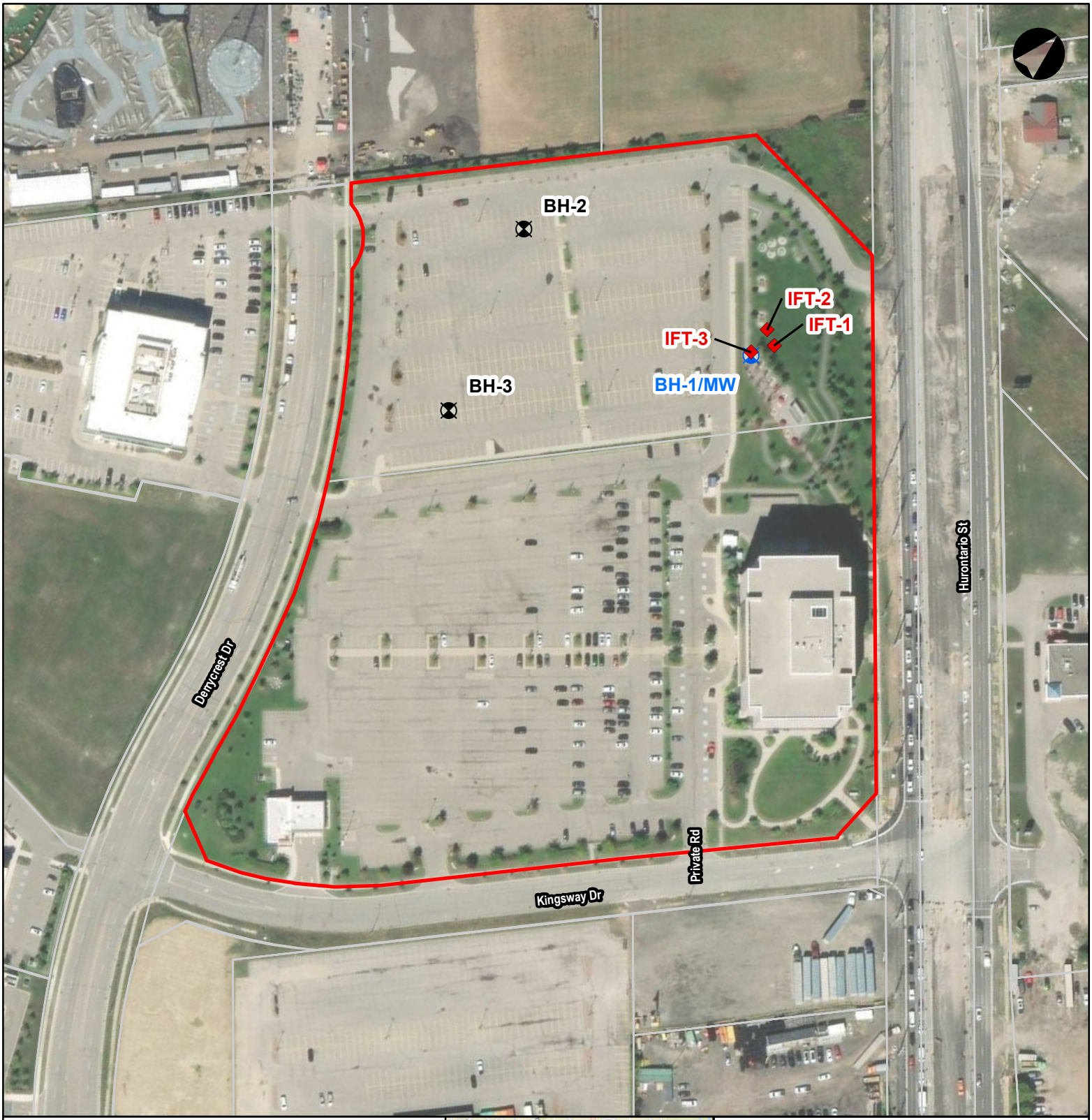
This technical memorandum represents the geotechnical investigation undertaken by the AECOM team for Peel Region. The geotechnical scope of work includes the completion of a field investigation program and the snow storage design recommendations.

This technical memorandum also describes the hydrogeological conditions for the site including summarizing and characterizing the local physical and groundwater setting, estimating infiltration and movement of meltwater through the subsurface. A summary and interpretation, and discussion of the assessment results are provided in the report.

An environmental soil and groundwater sampling program was also completed as a part of the current geotechnical and hydrogeological investigation for evaluating the environmental quality of the fill material and the upper level of native subsurface soil as well as a baseline analysis of the groundwater for the future discharge options during the construction. This sampling/testing program was conducted for the future on-site waste management of excess soil for the waste disposal and re-use options during the construction. A summary, interpretation, and discussion of the environmental quality of soil and groundwater conditions of all the sites are provided in the report.

2. Field Investigation Methodology

This section describes the methods and specific procedures which were followed during the completion of geotechnical, hydrogeological and environmental assessment.



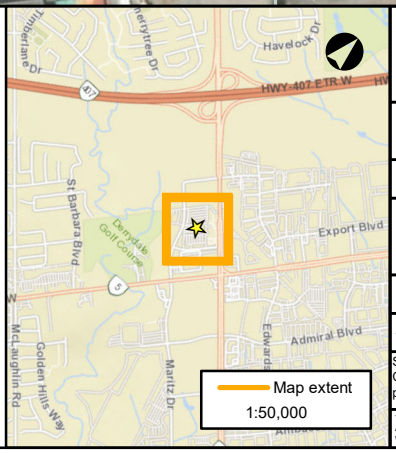
Borehole (BH)

Borehole (BH) / Monitoring Well (MW)

Infiltration Testing Location (IFT)

Potential Snow Storage Property Boundary

Parcels



Snow Storage Site Analysis and Conceptual Design Project 13-4007

Site: 7120 Hurontario St
Geotechnical Monitoring Locations

P #: 60646784

Figure 1

AECOM

Region of Peel
working with you

August 2023

Scale: 1:2,000

0 10 20 30 40 50
Meters

NAD 1983 UTM Zone 17N

Source: Contains information licensed under the Open Government Licence Ontario. Contains information provided by the Region of Peel. Aerial imagery and key base map provided by ESRI.

The borehole locations were established in the field on June 23, 2023 by AECOM staff. The public utility infrastructure owners were contracted through the Ontario One Call (On1Call) system to request marking of subsurface utilities in the investigation area. A private utility locating company, Altech Drilling and Investigative Services, located in Cambridge, Ontario, was subcontracted on June 30, 2023, to carry out private utility locating and borehole clearing.

2.1 Geotechnical Investigation Sampling Methodology and Monitoring Well Installation

The geotechnical investigation program was executed on June 30, 2023 under the full-time supervision of AECOM field staff. The geotechnical investigation program consisted of borehole drilling and monitoring well installation. To carry out the program, AECOM retained the drilling services from Altech Drilling & Investigation Services Ltd. (Altech) located in Cambridge, Ontario, a Ministry of the Environment, Conservation, and Parks (MECP) licensed drilling contractor.

The boreholes were advanced using a track-mounted D-50 drill rig using hollow stem augers. Upon completion of the drilling, a monitoring well was installed with stick-up protective casing and backfilled in accordance with Ontario Regulation 903, as amended. Excessive soil cuttings generated during the drilling were contained in steel drums with lids, sampled for Toxicity Characteristic Leachate Procedure (TCLP), and disposed of according to O.Reg. 406/19. Borehole and monitoring well installation locations are presented in **Appendix A**.

In general, the geotechnical field testing and sampling was carried out using ASTM standards modified based on site conditions. Standard Penetration Tests (SPT) were carried out at selected intervals to assess soil compactness/consistency to correlate its strength and to obtain samples for index (laboratory) testing purposes. SPTs were carried out in general accordance with ASTM D1586. The results of the geotechnical field testing and sampling are provided on the borehole logs in **Appendix B**.

2.2 Geotechnical Laboratory Testing

The soil samples were transported to the AECOM Laboratory in Etobicoke, ON for review and laboratory testing. Selected soil samples were tested for natural moisture content (ASTM D2216), particle size distribution of soils using sieve analysis (ASTM D6913), and Atterberg limit determination (ASTM D4318). The geotechnical laboratory test results are presented in **Appendix C**.

2.3 Groundwater Level Monitoring

The monitoring well was developed following installation for the purposes of removing sediment, rectifying possible damage caused to the target formation during the drilling process, and/or improving the hydraulic properties of the filter pack installed around the well screen. The well development process also ensures that collected groundwater samples are representative of in situ conditions of the screened aquifer formation surrounding the monitoring well.

In addition, groundwater level measurements were obtained at each monitoring well within a few weeks of their installation and following the completion of well development. Groundwater levels were subsequently monitored during each groundwater sampling event (where applicable) and at the time of single well response testing (SWRT).

Measured depth to groundwater and groundwater elevation are presented in **Table 1**. Additional groundwater level measurements were completed during subsequent groundwater level monitoring events.

2.4 Single Well Response Testing

Single Well Response Testing (SWRT) was carried out at monitoring wells to provide an estimate of the hydraulic conductivity of the screened geologic materials at each location.

Prior to SWRT the depth to water was measured within each monitoring well and used to determine the static water level for each well. The static water level represents the initial water levels for the single well response testing. The SWRT method involves causing a rapid change in the hydraulic head within a well and measuring the water level response back to a static water level condition. The SWRT method may include one or a combination of rising head or falling head tests, depending on the position of the static groundwater level within the monitoring well being tested. Prior to start of each test, a datalogger was installed within the target well and configured to obtain readings on a regular (i.e., 0.5 to 1 second) interval. Information collected by the datalogger was confirmed through the collection of manual groundwater level measurements using an electronic water level indicator.

Falling head tests were carried out using a solid slug, which was introduced into the well to a depth completely below the static water level causing the water level to initially rise and subsequently fall back to static, and rising head tests were carried out by completely removing the solid slug from the water column causing the water level to initially drop and subsequently rise back to static. Immediately following the introduction of the slug into the well, manual groundwater levels and elapsed time were measured as the water level recovered to its original static elevation. These measurements were supplemented with data collected by the installed datalogger. Each single well response test was concluded when the water level returned to its static elevation.

Analysis of the time-displacement data for confined aquifers is typically performed using the Hvorslev method (1951):

$$K = \frac{\pi {r_c}^2}{Ft} ln\left(\frac{h_0}{h_t}\right)$$

Where: K = hydraulic conductivity of the tested material (m/s)
F = a constant, referred to as the shape factor (m)
r_c = effective casing radius (m)
h_0 = water level displacement at time t_0 (m)
h_t = water level displacement at time t (m)
t = time (s)

The shape factor (F) is defined using the following equation for wells $L \gg D$:

$$F = \frac{2\pi L}{ln\left(\frac{2L}{D}\right)}$$

Where: D = casing diameter (m)
L = length of the screen interval (m)

Using the Hvorslev method, the time-displacement data are plotted on a semi-logarithmic scale. Values are then taken from the plot and input to the equation above to estimate the hydraulic conductivity (K) of the soil and/or rock formation(s) contacted along the well screen/sand pack length. SWRT results are summarized in **Table 2** with individual analysis reports contained in **Appendix D**.

2.5 Groundwater Quality Sampling

Groundwater samples were collected from the monitoring well between in July 2023 and submitted to Bureau Veritas Laboratories for water quality analysis. The results of the analyses were compared to the Provincial Water Quality Objectives (PWQO) criteria limits.

The analytical results received from Bureau Veritas Laboratories indicate that the tested groundwater samples were generally below most of the criteria limits for the applicable standards, with the exception of those parameters summarized in **Table 3**. Certificates of Analysis provided by Bureau Veritas Laboratories are included in **Appendix E**.

2.6 Soil Sampling Methodology

Fifteen (15) soil samples were submitted to laboratories for chemical analysis. This soil sampling program was designed to cover the general environmental quality of the soil at the Site.

Soil samples were collected at selected intervals and screened for potential impacts, with the intent of the most impacted samples from both fill and native material being submitted for analysis as worst-case conservative assessments. Soil samples were screened for combustible organic vapours using an RKI GX-6000 photoionization detector (PID), which was calibrated using isobutylene. Soil vapours readings were in a range of 0 to less than 10 ppm in all soil samples across the Site. In addition, field observation of impacts of soil contamination including staining or soil odours during the selection of samples, however, none were observed in the samples. Therefore, representative samples from each stratigraphic unit were submitted for laboratory analysis for selected inorganic parameters and metals, polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons F1 to F4 (PHCs), volatile organic compounds (VOCs), and polychlorinated biphenyls (PCBs).

AECOM staff wore new nitrile gloves during the collection of each soil sample to reduce the potential for cross-contamination. Samples for PHC F1 and VOCs analyses were collected immediately by placing roughly 2 cubic centimeters (cm^3) of soil material into an airtight vial containing 3 mL of methanol-based preservative. Samples for other parameters were transferred from the sample collection bag to appropriate laboratory-supplied jars once drilling was completed and PID vapour readings had been collected. All samples were placed on ice for preservation until received by the AGAT laboratories, which is certified to ISO 9001:2015 and accredited to ISO 17025:2005 UKAS ref 4028.

Chain-of-custody (COC) procedures were followed during the submission of samples to the laboratory. Sample packaging and submission procedures were followed per the project sampling procedures, to ensure sample integrity from the point of sampling up until submission to the analytical laboratory. Samples were packaged and submitted to the laboratory as outlined below:

- Sample name, project number, and date were written on each sample container.
- Caps on the sample containers were checked to ensure they are properly sealed.
- Chain-of-custody forms were completed with the required information and signed and dated to document the sample custody transfer.
- Sample containers were protected in bubble wrap in coolers.
- Sample containers were placed in a cooler with ice.
- All samples were delivered by field staff directly to AGAT Laboratories (Mississauga, ON) to be analyzed within the recommended hold times.
- Original chain-of-custody forms accompanied each submission, and copies were retained.

All analytical testing of soil samples was performed by AGAT Laboratory and the Certificates of Analysis are provided in **Appendix F**. The results of the analyses on the soil samples were compared with the Ministry of the Environment, Conservation and Parks (MECP) Table 2 Full Depth Generic Condition Standards (SCS) in a Potable Groundwater Conditions for Industrial/Commercial/Community (ICC) property use, for coarse-textured soil (Table 2 SCS). The SCS was selected based on the site location, the average thickness of the overburdened soil, groundwater conditions, the current property uses, and sieve and hydrometer test results carried out on soil samples.

3. 7120 Hurontario Street

The site is located at the intersection of Derrycrest Drive, Kingsway Drive, and Hurontario Street in the City of Mississauga, Ontario as shown in **Figure 1**. BH-1/MW was drilled on the east side of site through landscape areas while BH-2 and BH-3 were drilled through the asphalt in the parking areas. The site is developed with a large high-rise commercial building in the SW corner of site and an emergency service building in the SE corner of site.

3.1 Subsurface Conditions

The stratigraphic layers were inferred from non-continuous sampling and observation of drilling resistance and typically represents a transition from one soil type to another. These boundaries should not be interpreted to represent the actual planes of geological change. The subsurface conditions have been confirmed at the borehole locations only, and they may vary between and beyond the borehole locations. Refer to **Appendix B** for the borehole logs. Borehole locations are presented in **Appendix A**.

Generally, the subsurface conditions consist of surficial topsoil or asphalt overlying fill above the native clayey silt and silty clay till. The fill was variable in composition; sand and gravel fill was explored overlying gravelly sand fill in the parking lot and silty clay fill was explored in the landscaped area.

3.1.1 Asphalt

Asphalt was encountered at the ground surface in boreholes BH-2 and BH-3. The measured asphalt thickness was approximately 50 mm in BH-2 and 65 mm in BH-3.

3.1.2 Topsoil

Topsoil was encountered at the ground surface in borehole BH-1/MW. The measured topsoil thickness was approximately 50 mm.

Materials classified as topsoil were based on visual inspection only, as no organic content testing was conducted.

3.1.3 Sand and Gravel Fill (Parking Lot ‘Base’)

Sand and gravel fill, interpreted as parking lot ‘base’, was encountered beneath the asphalt in boreholes BH-2 and BH-3. The sand and gravel fill had some silt, some clay and had crushed granular material.

The sand and gravel fill was encountered from 0.5 to 0.6 mbgs and extended to 0.8 mbgs with an explored thickness of 0.7 m. SPT’s carried out on this layer had N values of 11 and greater than 50 blows per 0.3 m, indicating this layer was compact to very dense. Moisture contents were 15.3% and 26.9%. A grain size

distribution analysis was carried out on the sand and gravel fill and indicated gravel size of 18%, sand size of 52%, and a fines portion (combined silt and clay) of 30%. Results of the laboratory testing are present in **Appendix C**.

3.1.4 Gravelly Sand (Parking Lot 'Subbase')

Gravelly sand fill, interpreted as parking lot 'subbase', was encountered beneath the sand and gravel fill in boreholes BH-2 and BH-3. The gravelly sand fill had some silt and trace clay.

The gravelly sand fill was encountered at 0.8 mbgs and extended to 1.5 mbgs with an explored thickness of 0.8 m. SPT's carried out on this layer had N values of 16 and 17 blows per 0.3 m, indicating this layer was compact. Moisture contents were 13.0% and 13.5%. Results of the laboratory testing are present in **Appendix C**.

3.1.5 Silty Clay Fill

Silty clay fill was encountered beneath the topsoil in borehole BH-1. The silty clay fill had trace gravel, trace sand and buried organics.

The silty clay fill was encountered from 0.1 to 0.8 mbgs with an explored thickness of 0.7 m. A SPT carried out on this layer had a N value of 6 blows per 0.3 m, indicating this layer was firm. A moisture content carried out on this layer was 15.7%. Results of the laboratory testing are present in **Appendix C**.

3.1.6 Clayey Silt

A layer of clayey silt was encountered beneath the fill in all three boreholes. The clayey silt had no to trace gravel, was sandy to having some sand, and was reddish/brown in colour.

The clayey silt was encountered from 0.8 to 1.5 mbgs to 3.1 mbgs with an explored thickness ranging from 1.5 to 2.3 m. SPT's carried out on this layer had N values ranging from 9 to 29 blows per 0.3 m, indicating this layer was stiff to very stiff. Moisture contents carried out on this layer ranged from 10.4% to 26.5%. A grain size distribution test conducted on the clayey silt had a gravel content of 0%, sand content of 28%, silt content of 45%, and a clay content of 27%. Results of the laboratory testing are present in **Appendix C**.

3.1.7 Silty Clay Till

A layer of silty clay till was encountered beneath the clayey silt till in all three boreholes. The silty clay till had trace gravel, sandy to having some sand and was reddish-brown to reddish-grey in colour.

The silty clay till was encountered at 3.1 mbgs to the borehole terminated depths of 5.2 mbgs for explored thicknesses of 2.1 m. SPT's carried out on this layer had N values ranging from 8 to 56 blows per 0.3 m, indicating this layer was stiff to hard, but generally vert stiff. Moisture contents carried out on this layer ranged from 9.3% to 16.2%. Three grain size distribution tests carried out on the silty clay till had gravel contents ranging from 2% to 4%, sand contents ranging from 33% to 40%, silty contents ranging from 36% to 41%, and clay contents ranging from 20% to 24%. One Atterberg limits test carried out on the silty clay till had a plastic limit of 14% and a liquid limit of 19%, indicating a low plasticity soil.

3.2 Groundwater Conditions

No groundwater levels were observed in the open hole upon the completion of the drilling.

A groundwater monitoring well (BH/MW-1) was constructed at the site on June 30th, 2023 as part of the geotechnical investigation. Groundwater level monitoring at BH/MW-1 was conducted by AECOM between July 4th to August 11th, 2023. **Table 1** provides a summary of BH/MW-1 including groundwater levels, elevation data, depths, and screen intervals (in mBGS and mASL).

As shown in **Table 1**, observed static groundwater level elevations at BH/MW-1 were ranged from approximately 201.36 mASL to 203.83 mASL. It is expected that the groundwater levels within the Site will be subjected to seasonal fluctuations including response to spring freshet and localized precipitation events.

Table 1: Construction Details and Groundwater Level Measurements (BH/MW-1)

Monitoring Well ID	Ground Surface Elevation (mASL)[2]	Screen Interval Depth (mBGS)[1]		Screen Interval Elevation (mASL)[2]		Groundwater Level Depth and Elevation		
		Top	Bottom	Top	Bottom	Date	Depth to Groundwater (mBGS)	Groundwater Elevation (mASL)
BH/MW-1	205.00	3.10	4.62	201.90	200.38	July 4, 2023	DRY	DRY
						July 10, 2023[3]	2.53	202.47
						July 11, 2023[4]	3.13	201.87
						July 12, 2023[4]	3.64	201.36
						July 20, 2023	1.17	203.83
						July 21, 2023[5]	1.44	203.56
						July 27, 2023	1.22	203.78
						Aug 11, 2023	1.51	203.49

Notes: 1. mBGS = metres below ground surface
2. mASL = metres above mean sea level
3. Groundwater level data collected on July 10th, 2023 is pre-development.
4. Groundwater level data collected on July 11th and 12th are not static as the well was recovering from the following development and/or groundwater sampling.
5. Groundwater level data collected on July 21st are not static as the well was recovering from the following SWRT.

SWRT was conducted at BH/MW-1 on July 20th, 2023. Collected data were analyzed to provide an estimate of the hydraulic conductivity (K) of the stratum surrounding each respective monitoring well screen. SWRT results for BH/MW-1 are summarized in **Table 2**, with the individual analysis reports contained in **Appendix D** .

Table 2: Single Well Response Testing Results (BH/MW-1)

Monitoring Well ID	Test Date	Analytical Method [1]	Top of Test Interval (mBGS)[2]	Bottom of Test Interval (mBGS)[2]	Test Type	Hydraulic Conductivity (m/s)[3]	Geologic Formation
BH/MW-1	July 20th, 2023	Hvorslev	3.10	4.62	Rising Head	4.75×10^{-9}	Silty Clay

Notes: 1: Hvorslev (1951)
2: mBGS = metres Below Ground Surface
3: m/s = metre per second

Groundwater samples were collected from BH/MW-1 on July 11th and 12th, 2023 and submitted to Bureau Veritas Laboratories for geochemical analysis. The results of the analysis were compared to Provincial Water Quality Standards (PWQO) criteria limits. As shown in **Table 1**, dissolved boron and dissolved uranium exceeded the PWQO guidelines limits. Given these exceedances, the use of water treatment prior to the discharge to the natural environment should be included as part of the dewatering plan. Certificates of Analysis provided by Bureau Veritas Laboratories are included in **Appendix E**.

Table 3: Summary of Parameters Exceeding PWQO Guidelines (BH/MW-1)

Parameter Group	Monitoring Well	Parameter	PWQO Guideline (µg/L)	Reported Value (µg/L)
Metals	BH/MW-1	Dissolved Boron	200	260
		Dissolved Uranium	5	17

Notes: ug/L = micrograms per Litre

Based on the completed analysis it was determined that the field saturated vertical hydraulic conductivity of the surficial soils at the one (1) location of testing is 1.0 x 10^{-6} cm/sec (IFT2). The other two locations of test (IFT1 and IFT3) did not have any water level movement during the tests.

It was also determined that percolation rate is 13 mm/hour and percolation time is 44 min/cm at IFT2.

Analysis of field collected data was conducted using the Soil moisture Equipment Corporation Guelph Permeameter calculation worksheet and is provided in **Appendix G**. The testing and data analysis results are summarized in **Table 4**. If the measured steady state flow rate under the water head of 5 cm is lower than the steady state water flow rate under the water head of 10 cm, the single head method was used for data interpretation. Otherwise, the double head method was used for data interpretation. The normal average for the two methods was used in the calculations as shown in **Appendix G.**

The calculated infiltration rate for the site indicate that the local shallow soils generally are impermeable, as none locations meet the minimum 15 mm/hr percolation rate to consider multiple Low Impact Development (LID) technologies, as per guidance provided by Ministry of the Environment, Conservation and Parks (MECP) in their *Stormwater Management Planning and Design Manual* (Table 4.1, 2003), as well as by TRCA / Credit Valley Conservation Authority (CVC), within their *Low Impact Development Stormwater Management Planning and Design Guide* (Version 1.0, 2010, Table 3.4.1).

3.3 Environmental Sampling and Test Results

In total, five (5) soil samples were retrieved and submitted for chemical analysis of metals and inorganics, and PCBs.

All soil samples analyzed were either non-detect or detected with parameters well below the MECP Table 2 SCS for one or more contaminants of M&I and PCBs parameters at the borehole locations. Based on the review of the laboratory QA/QC program, sample results are considered acceptable.

Groundwater samples were collected from BH6-1/MW on March 7, 2022 and submitted to Bureau Veritas Laboratories for chemical analysis of metals, VOCs, PHCs F1 - F4, PAHs, and PCBs. The results of the analysis were compared to Table 2 SCS. The groundwater sample analyzed including metals, VOCs, PHCs F1 - F4, PAHs, and PCBs results indicated that the concentration of all analyzed parameters met the applicable MECP Table 2 SCS Standards.

Table 4: Infiltration Test Results

Site Name and Address	Test Location ID	Co-ordinates – Zone 17		Depth of Tested Borehole (mBGS)[1]	Dominant Soil Type	Interpretation Method	Field Saturated Hydraulic Conductivity[2] (K_{fs})	Calculations	
		Easting	Northing					Percolation Rate[3] (X)	Percolation Time (T Time)[4]
							(cm/sec)	(mm/hour)	min/cm
Region of Peel Office (7120 Hurontario Street, Mississauga, ON L5W 1N4)	IFT1	43.648125	-79.7100387	0.4	Clayey silt to silty clay, trace sand, trace gravel, occasional grass roots	Double Head	-	-	-
	IFT2	43.6481459	-79.7101135	0.5	Silty clay, trace sand, trace gravel, occasional grass roots	Double Head	1.0×10^{-6}	13	44
	IFT3	43.6480547	-79.7100947	0.5	Silty clay, trace sand, trace gravel, occasional grass roots	Double Head	-	-	-

4. Pavement Design Recommendations for Truck Route

Based on the current investigation, the following recommendation is provided for site for 7120 Hurontario Street. It is assumed based on current site conditions that no pavement reconstruction or removal of existing pavements is proposed at this time. If new pavement construction is proposed in the green landscape area, then the placement of the light duty pavement structure in **Table 5** as per the typical pavement structure requirements for the Peel Region is recommended.

Table 5: Flexible Pavement Design Recommendations

Pavement Structure	Light Duty Pavement Structure Layer [1)] Thickness (mm)	Heavy Duty Pavement Structure Layer [1)] Thickness (mm)	Compaction Minimum Requirement
HL3 or Superpave 12.5 mm Surface Course	50	50	92% MRD (OPSS 310)
HL8 or Superpave 19.0 Binder Course	70 (one lift)	110 (two lifts)	92% MRD (OPSS 310)
Granular Base: Granular 'A'	150	150	100% SPMDD (OPSS 501)
Granular Base: Granular 'B'	450	450	100% SPMDD (OPSS 501)
Total Thickness	**720**	**760**	

Pavement Design Notes: *1) Light Duty Pavement Structure shown in Table 2 is based on 15 years of service life*
2) PGAC Grade 58-28
3) Superpave mix design traffic, category B

5. Geotechnical Design Considerations

5.1 Bearing Capacity

This section of the report provides geotechnical design recommendations for the proposed snow storage structures. The recommendations are based on the subsurface conditions encountered during the current geotechnical investigation. It is assumed that shallow foundations (e.g., square or spread footing) will be the proposed foundation design to support new snow storage structures for site. The calculation does not consider any eccentric loading cases.

The following design values presented in **Table 6** are provided for a variety of typical shallow foundation sizes. The founding depth is assumed to be 1.2 mbgs frost depth below the final grade.

Table 6: Geotechnical Capacity of Shallow Foundation

Footing Size (m)	Founding Soil	Factored Geotechnical Resistance at ULS (kPa)*	Geotechnical Reaction at SLS (kPa)**
1 x 1	Stiff to very stiff clayey silt	200	175
2 x 2	Very stiff to hard silty clay till	240	150
Strip 4x1	Very stiff to hard silty clay till	210	230

Notes: ** - Factored Geotechnical Resistance at ULS uses a Geotechnical Resistance factor of 0.5.*
*** - The geotechnical resistance at SLS for 25 mm of settlement is considered.*

5.2 Lateral Earth Pressure on Structures

The peat type snow storage system, retaining wall and temporary roadway protection, if any, should be designed to resist lateral earth pressure. Where the snow storage system can be drained effectively to eliminated hydrostatic pressure on the walls, earth pressures equation can be simplified in accordance with the CHBDC.

The expression for calculating lateral earth pressure is given by:

$$P = K(\gamma//h + q) \text{ for non-braced cut}$$

Where: P = earth pressure intensity at depth h, kPa
K = earth pressure coefficient
γ = unit weight of retained soil, kN/m^3
q = surcharge near wall, kPa
H = depth of excavation (m)

The mobilization of full active or passive resistance requires a measurable and perhaps significant wall movement or rotation. Therefore, unless the structural element can tolerate these deflections, the at-rest earth pressure should be used in design.

The effect of compaction surcharge should be taken into account in the calculations of active and at- rest earth pressures. The lateral pressure due to compaction should be taken as at least 12 kPa at the surface, and its magnitude should be assumed to diminish linearly with depth to zero at the depth where the active (or at rest) pressure is equal to 12 kPa. This pressure distribution should be added to the calculated active (or at rest) pressure. Notwithstanding, lighter compaction equipment and smaller lifts should be used adjacent to walls to prevent overstressing.

For design purposes, the unfactored static earth pressure parameters given in **Table 7** can be used (assuming wall friction is neglected, the back wall is vertical and the ground surface is horizontal both on the retained side as well as in front of the toe):

Table 7: Material Types and Unfactored Earth Pressure Properties under Static Conditions

Material	Unfactored Friction Angle ϕ' (°)	Coefficient of Active Earth Pressure (K_a)	Coefficient of Passive Earth Pressure (K_p)	Coefficient of Earth Pressure at Rest (K_0)	Unit Weight γ (kN/m^3)
Granular A	35	0.27	3.69	0.43	22
Granular B, Type II	32	0.31	3.25	0.47	21
Firm to stiff silty clay fill	27	0.38	2.67	0.55	20
Very stiff to hard silty clay till	29	0.35	2.88	0.52	21

6. Construction Considerations

6.1 Site Preparation and Engineered Fill Construction

The area within the limits of the proposed snow storage locations should be stripped and cleared of surface vegetation, topsoil and debris prior to construction. Any soil containing excessive organics or loose/disturbed materials are not suitable for the subgrade of structure foundations or engineered fill. Therefore, the areas with

those soils should be excavated and replaced with engineered fill comprised of Granular A or Granular B, Type I or Type II. In order to prevent migration of fine soil particles, a geotextile can be used placed underneath the granular material.

Engineered fill could be placed after stripping all topsoil, organic matter, fill and other compressible, weak and deleterious material within an area extending at least 1.0 m beyond the outside edge of the founding level of any footings, after stripping, the entire area should be heavily proof-rolled inspected and approved by a Geotechnical Engineer. Engineered fill should be placed in accordance with OPSS 501. The fill material should be placed in thin layers not exceeding approximately 300 mm when loose, oversize particles larger than 120 mm should be discarded, and each fill layer should be uniformly compacted with heavy compactors, suitable for the type of fill used, the engineered fill below the footing and floor slab should be compacted to 100% of its SPMDD, while within outside/exterior paved areas, the fill should be compacted to 98% of its SPMDD.

Full-time geotechnical inspection and quality control (by means of frequent field density of laboratory testing) should be provided by the Geotechnical Engineer. Every lift should be evaluated by a sufficient number of tests to ensure that the level of compaction is constantly achieved, and the compaction procedure is applied.

6.2 Subgrade Preparation for Pavement

After all removals of incompetent soils including vegetation, topsoil and debris, the contractor shall compact and/or proof roll the remaining existing subgrade/fill. This material shall be inspected by a qualified Geotechnical Engineer prior to adding base or subbase material placement. any earth fill material below granular base or subbase shall be placed and compacted in lifts no more than 300 mm thick. The Geotechnical Engineer shall identify any poorly performing areas (i.e., wet areas, areas of poor compactness, areas of unsuitable cohesive material) and direct the contractor to remove the poorly performing areas by sub-excavating and backfilling with Granular A.

6.2.1 Granular Base/Subbase Placement

The granular base / subbase course(s) shall conform to the OPSS.MUNI 1010 for select granular materials and shall be compacted to at least 100% of the SPMDD as indicated in **Table 2**. The material lifts shall not exceed 300 mm in thickness.

Compaction testing of the granular base / subbase lift(s) shall be conducted according to OPSS.MUNI 501 and required document (i.e., gradation of materials, proctor test results, compaction reports) should be submitted to the Contract Admin (CA) and the region.

6.2.2 Hot Mix Asphaltic Concrete Pavement

Hot Mix Asphaltic Concrete (HMAC) used for the new pavement construction (whether new material or recycled material) shall conform to the OPSS.MUNI 310 requirements. The asphaltic concrete courses shall use Performance Grade Asphalt Cement (PGAC) PG 58-28 and be designed to traffic category C in case of Superior Performance Asphalt Pavement (Superpave) to be used.

The asphaltic concrete shall conform to OPSS.MUNI 1050 and be placed and compacted to at least 92% MRD as indicated in **Table 2**. The asphalt mix design shall be submitted to the consultant for their review prior to the start of pavement construction.

6.3 Temporary Excavation

All excavations should be carried out in accordance with the Ontario Occupational Health and Safety Act (OHSA). The soils of the Site can be classified as Type 1, 2, 3 or 4 depending on the subsurface soil conditions and groundwater conditions.

According to Section 3, for stiff, the native very stiff to stiff soil indicates Type 2 soil at the proposed snow storage area so a side slope of 1H: 1V is recommended for excavation slopes. The slope will be adjusted based on the site experienced conditions and should be evaluated during construction in accordance with the OHSA.

Stockpiles of excavated materials should be kept at least 3.0 m or the length of 1 excavation depth, whichever is larger, away from the edge of the excavation to avoid slope instability. The slope stability of any excavations is subject to confirmation by the geotechnical engineer onsite. Care should also be taken to avoid the overloading of any underground services/structures by stockpiles, where applicable.

6.4 Dewatering

The groundwater level needs to be controlled to 0.5 m below the final excavation level to avoid adverse effect such basal heave, foundation disturbance and any surface or groundwater seepage should be controlled from the excavation prior to any material being placed. In general, pumping using properly filtered sumps, and/or filtered drains placed along the base of the excavation should provide sufficient groundwater control during the construction.

Based on current expected groundwater levels as provided in Section 3 and proposed construction schedule, dewatering may be required during construction.

6.5 Frost Protection

The frost penetration depth for the Peel Region is considered as 1.2 m in accordance with Ontario Provincial Standard Drawing (OPSD) 3090.101.

The existing subgrade soil, clayey silt and silty clay till, based on the sieve and hydrometer analyses and the MTO Frost Protection Criteria (**Table 8**), is considered a moderately to highly frost susceptible soil. Therefore, a relatively thick granular base has been recommended. The installation of a sub-drain system would reduce the potential for frost heave.

Table 8: Soil Frost Susceptibility (MTO)

Grain Size (Silt and Clay Portion)	Susceptibility to Frost heave
0 to 40%	Low
40 to 55%	Moderate
55 to 100%	High

6.6 Settlement Considerations

As the snow storage foundations will be founded on stiff to very stiff clayey silt, with the assumption of 10.0 m height snow piles last about 4 months storage period, the settlement will be minor (less than 25 mm) which will not be an issue. It is recommended to re-evaluate the potential for structure settlement during detailed design to account for an additional loading cases or property requirements.

6.7 Soil Storage and Disposal

Work included under this item shall be for the complete excavation, hauling, and disposal off-site of cut material as per the engineering plans. The material is to be tested and disposed of off-site at a suitable location based on the test results.

Quantities for all earth and topsoil items shall be calculated using the pre and post survey information and calculated using computer volume modelling software. The Contractor to ensure that CA is provided adequate notice a minimum of 48 hours, and ample time to conduct the required survey work.

The new Soil Storage Rules (Part I – the Rules for Soil Management and Part II – the Excess Soil Quality Standards) shall be followed. A procedure to manage soil that is encountered during excavation that is observed to be likely contaminated shall be applied. The excess soil generated shall follow transportation safety guidelines and transportation records shall be generated accurately to document the movement of the excess soil. The excess soil designated for reused must meet the Excess Soil Quality Standards or site-specific Soil Quality Standards and must be used for a Beneficial Purpose. Specific processing methods can be utilized to reduce concentrations of contaminates to levels that are suitable for reuse. All records generated under O. Reg. 406/19 must be kept on file for 7 years.

All excess earth excavation remaining after use as fill shall be removed from the site to locations arranged for and at the sole expense of the Contractor, all included in the unit price bid for these items.

The excess soil is to be disposed of off-site, at locations (reuse site, a Class 1 soil management site, a Class 2 soil management site or a local waste transfer facility) arranged for and at the sole expense of the Contractor. The unit price shall include excavation, loading, hauling, and disposing off-site at the sole expense of the Contractor, including any environmental or weigh ticket requirements.

Disposal locations will depend on the soil type as determined by the testing carried out as part of MOE O. Reg. 153/04 and MOE O. Reg. 406/19. Refer to the environmental report regarding the detailed requirements of contaminated and soil disposal.

As a part of this assignment, AECOM conducted the Toxicity Characteristics Leachate Procedure (TCLP) analysis results on composite soil sample (Com.SS-1, worst case scenario) as per O. Reg. 558 - Schedule IV Leachate Quality Criteria for all tested parameters. The TCLP on this composite soil sample were conducted on selected metals and inorganics, VOC, PCB and Benzo(a)pyrene for waste characterization prior to possible disposal soil off-site. The analytical results for the tested parameters met the Ontario Regulation 347 (as amended), Schedule 4 Leachate Quality Criteria for non-hazardous wastes.

6.8 Drainage and Meltwater Management

Site drainage and meltwater should be directed to a meltwater collection pond. Site meltwater should be directed away from the snow piles and dumping area to reduce ponding/rutting. The meltwater collection pond should be designed with an impermeable base, a forebay to collect litter and settle coarse sediments and a larger secondary area (polishing pond) to settle finer particles. The uncontaminated drainage should be isolated from the meltwater. the meltwater collection pond should be designed large enough to handle the expected meltwater volume, other site drainage and the periodic additional load from precipitation events. The outlet should be controlled to regulate the release to the receiving water body. The point of discharge should be protected to prevent scour. Adequate access to the pond needs to be provided to allow for periodic cleanout of

sediments. The polishing pond should be designed to encourage complete circulation to avoid salt stratification and the potential for higher releasees during wet weather flows.

7. Seismic Site Classification

Table 9 Site Classification for Seismic Site Response (CFEM 2006) summarizes the site classification based on the soil properties in the top 20 m of subsurface. Considering the undrained shear strength and SPT values of the stiff to very stiff clayey silt encountered, a seismic site classification of the building and proposed snow storage facilities at the site is Site Class D.

Table 9: Site Classification for Seismic Site Response (CFEM 2006)

Average Properties in top 20 m				
Site Class	**Ground Profile Name**	**Shear Wave Velocity $\overline{V_s}$ (m/s)**	**Standard Penetration Resistance $\overline{N}_{60}$**	**Soil Undrained Shear Strength s_u (kPa)**
A	Hard Rock	$\overline{V_s} > 1500$	Not Applicable	Not Applicable
B	Rock	$760 < \overline{V_s} \leq 1500$	Not Applicable	Not Applicable
C	Very Dense Soil and Soft Rock	$360 < \overline{V_s} \leq 760$	$\overline{N}_{60} > 50$	$s_u > 100$
D	Stiff Soil	$180 < \overline{V_s} \leq 360$	$15 \leq \overline{N}_{60} \leq 50$	$50 < s_u \leq 100$
E	Soft Soil	$\overline{V_s} \leq 180$	$\overline{N}_{60} < 15$	$s_u < 50$
		Any profile with more than 3 m of soil with the following characteristics: • Plasticity Index PI > 20; • Moisture Content w ≥ 40%; and • Undrained Shear Strength $s_u < 25$ kPa		
F	Other Soil	Site Specific Evaluation Required		

The adjust of the spectral accelerations and PGA values should be referred to Tables 4.2 to 4.9 in CHBDC S6-14. Design PGA and Sa (T), and these should be selected based on project specific requirements as described in the minimum performance level in CHBDC S6-14. Seismic earth pressures acting on the structure may be estimated using Mononobe-Okabe or Wood methods depending on the rigidity or tolerable movement of the structures.

8. Liquefaction Considerations

The subsurface soil at the proposed snow storage locations from approximately 0.2 to 6.7 m below the ground surface at this site mainly comprises silty clay till with SPT N-values ranging from 8 to over 50. Based on the observed SPT values, the subsoil could potentially be susceptible to liquefaction.

In addition, the clayey silt is classified as a fine-grained soil. As shown in the grain size distribution analysis, they have a significant portion (over 70%) of fines passing through the #200 sieve. To delineate liquefaction susceptibility, this report adopted the empirical criteria recommended in the CFEM:

- $w/w_L \geq 0.85$ and $I_P \leq 12$: Susceptible to liquefaction or cyclic mobility;
- $w/w_L \geq 0.80$ and $10 \leq I_P \leq 12$: Moderately susceptible to liquefaction;
- $w/w_L < 0.85$ and $I_P \geq 12$: No liquefaction or cyclic mobility.

Where w is the in situ soil water content, w_L is the liquid limit of the soil and I_P is the plasticity index of the soil.

The results of the soil liquefaction susceptibility encountered within the proposed structure are shown in **Figure 2**. Based on the above criteria, the liquefaction potential for the silty clay till is 'no liquefaction'.

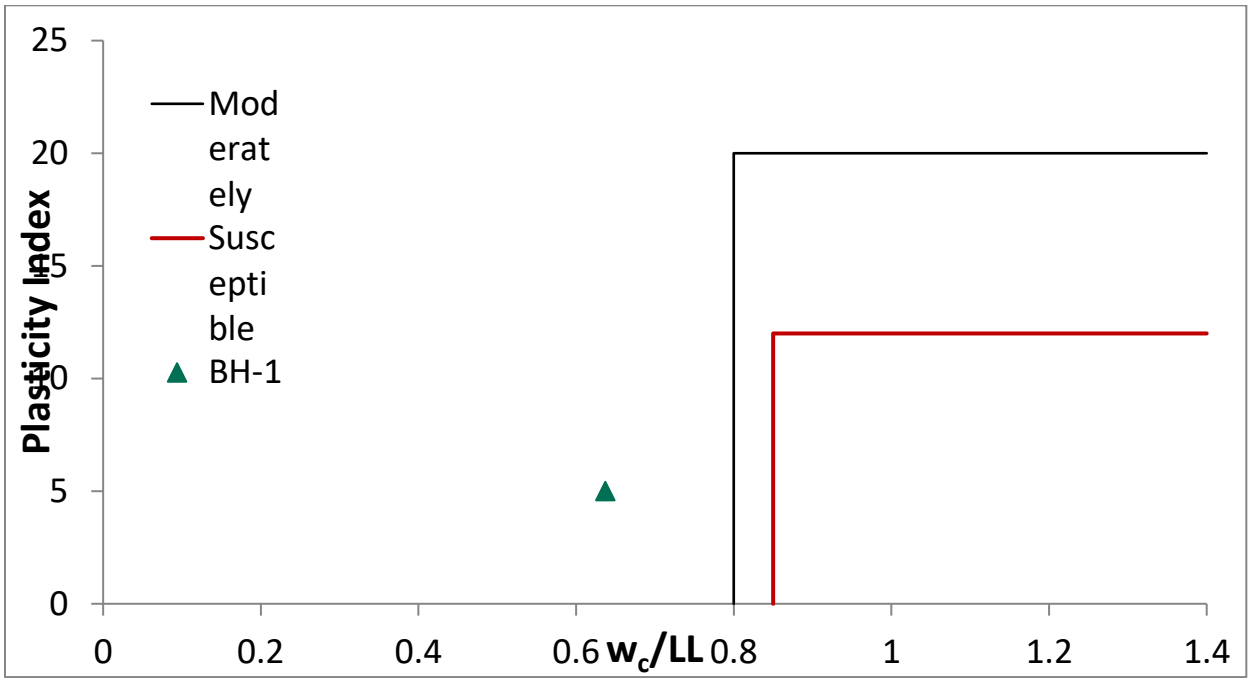


Figure 2: CFEM Recommended Criteria for Liquefaction Assessment of Fine-Grained Soils

9. Summary of Environmental Sampling

In total fifteen(15) soil samples were retrieved during Geotechnical and Hydrogeological Investigation to evaluate the general environmental quality of the fill material and the upper level of native subsurface soil as well as a baseline analysis of the groundwater for the future discharge options during the construction. This sampling/testing program was conducted for the future on-site waste management of excess soil for the waste disposal and re-use options during the construction.

Based on the background soil analytical results, all soil samples analyzed were either non-detect or detected with parameters well below the MECP Table 2 SCS for one or more contaminants of M&I, PAHs, PCBs, PHCs, and VOCs parameters, with some exceptions. Soil sample collected from borehole BH2 (BH2-SS2) was detected with elevated Electrical Conductivity (EC) and soil samples from BH3 (BH3-SS1 and BH3-SS3) were detected concentrations of benzo(a)pyrene and fluoranthene exceeded the MECP applicable Table 2 Standards, as well as elevated EC, respectively. However, laboratory results on composite soil sample Com.SS-1 (collected from soil samples from BH2 and BH3, worst case scenario) which was submitted for laboratory analysis of Toxicity Characteristic Leachate Procedure (TCLP) in accordance with O.Reg.347 (as amended) for soil waste classification and off-site possible disposal reviled that soil can be classified as non-hazardous waste material and could be disposal at off-site at the licensed facility which can accept this kind of waste.

Groundwater samples were collected from Sites #3, #5, #6, and #9, and submitted to Bureau Veritas Laboratories for chemical analysis. The results of the analysis were compared to Table 2 SCS. The groundwater

sample analyzed including metals, VOCs, PHCs F1 - F4, PAHs, and PCBs results indicated that the concentration of all analyzed parameters met the applicable MECP Table 2 SCS Standards.

Any monitoring wells that are not in use must be decommissioned as per applicable regulations.

As part of the project, construction activities may include excavation which may generate more soil than can be reused on the Site, material that is termed “excess soil”. It is noted that the quantity of soil to be excavated and the quantity of excess soil to be removed from the Project Sites are not known at this time. If the volume of excess soil exceeds 2000 m^3 a formal filing of a notice with MECP would be required.

Ontario Regulation 406/19 requires a project leader for a project to comply with specific requirements before removing excess soil from a project area. These obligations apply to the projects and in the circumstances set out in the regulation. Generally, the requirements include the following:

- Preparation of an assessment of past uses (APU);
- Preparation and implementation of a sampling and analysis plan (SAP);
- Preparation of a soil characterization report;
- Preparation of an excess soil destination assessment report; and
- Development and implementation of a tracking system, if client will require

10. References

AECOM, 2022:
Geotechnical investigation and design report, Peel Region Snow Storage. Peel Region. February 7, 2022.

Canadian council of Ministers of the Environment, 2010:
Canadian Water Quality guidelines for the Protection of Aquatic Life – Ammonia.

Florida Department of Environmental Protection, 2001:
Calculation of un-ionized ammonia in fresh water. February 12, 2001.

Ministry of the Environment, 1996:
Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario, May 1996 (MOE 1996 Guidance Manual)

Ministry of the Environment, Conservation, and Parks (MECP), 2011:
Environmental Protection Act – Ontario Regulation 153/04 (as amended) – Record of Site Condition regulation - Part XV.1 of the Environmental Protection Act

Ministry of the Environment, Conservation, and Parks (MECP), 2011:
Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011

Ministry of the Environment, Conservation, and Parks (MECP), 2021:
Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality March 9, 2004 (PIBS 4696), amended as of July 1, 2011 and as of February 19, 2021 Version 3.1

Appendix A

LEGEND

- AECOM - Geotechnical Boreholes
- AECOM - Monitoring Well Boreholes

NOTES:

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2023.06.15	BH Plan	BK	TA

CLIENT NAME:
City of Mississauga

PROJECT LOCATION:
7120 Hurontario St, Mississauga, ON L5S 1Z8

PROJECT NUMBER: 60646784

BOREHOLE LOCATION PLAN

DRAWN BY: BK	SCALE: 1:1000	DRAWING No. 1
CHECKED: TA	DATE: JUNE 2023	REVISION 0

C:\Users\william.hanson\AppData\Local\Temp\AcPublish_26416\60646784 SnowStorage.dwg

Appendix B

PROJECT: Region of Peel - Snow Storage
LOCATION: 7120 Hurontario St, Mississauga, ON L5S 1Z8
COORDINATES: N 4833591.7; E 604027.6
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH/MW-1

SHEET 1 OF 1

START DATE: June 30, 2023
END DATE: June 30, 2023
BORING METHOD: Hollow Stem Auger
CONTRACTOR: Altech Drilling and Investigative Services
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ND = Not Detected	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected	SHEAR STRENGTH Cu, kPa (nat V. + Q ●, rem V. ⊕ U △) / WATER CONTENT PERCENT (Wp, w, Wl)	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		TOPSOIL		205.0							GR SA SI CL	
0	Power Auger Drilling / Hollow Stem Auger	**TOPSOIL:** 50 mm **FILL:** silty clay, trace gravel, trace sand, brown, moist, firm to hard		0.1 204.2	1	SS	6					
1		**CLAYEY SILT:** sandy to some sand, grey to dark grey, moist, firm to very stiff		0.8	2	SS	13				0 28 45 27	
2		reddish brown, very stiff			3	SS	9					
3				201.9	4	SS	16					
4		**SILTY CLAY:** sandy, trace gravel, grey, moist, very stiff to hard, low plasticity **TILL** buried cobbles		3.1	5	SS	24					
5					6	SS	42				4 40 36 20	
				199.8	7	SS	24					
		END OF BOREHOLE		5.2								
6		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed at the depth of 5.18mbgs in the open hole.										
7												
8												
9												
10												

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

Region of Peel

AECOM

LOGGED: BK
CHECKED: TA

BH_LOG 60646784 SNOW STORAGE SITES - PEEL.GPJ GAL-MISS.GDT 23-8-28

PROJECT: Region of Peel - Snow Storage
LOCATION: 7120 Hurontario St, Mississauga, ON L5S 1Z8
COORDINATES: N 4833564.6; E 603932.9
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

RECORD OF BOREHOLE: BH-2

SHEET 1 OF 1

START DATE: June 30, 2023
END DATE: June 30, 2023
BORING METHOD: Hollow Stem Auger
CONTRACTOR: Altech Drilling and Investigative Services
PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (20 40 60 80) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (100 200 300 400)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - △) (20 40 60 80) / WATER CONTENT PERCENT (Wp — w — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		PAVEMENT SURFACE		203.3						GR SA SI CL	
0	Power Auger Drilling / Hollow Stem Auger	**ASPHALT:** 50 mm		0.1							
		FILL: sand and gravel, brown, moist, very dense with crushed granulars			1	SS	50/ 25mm				
				202.5							
1		**FILL:** gravelly sand, some silt, trace clay, brown, moist, very stiff		0.8	2	SS	17				
				201.7							
2		**CLAYEY SILT:** trace gravel, some sand, reddish/brown, moist, very stiff		1.5	3	SS	28				
		---------- trace sand			4	SS	29				
3				200.2							
		SILTY CLAY: trace gravel, sandy, grey, moist to wet, hard to stiff, low plasticity **TILL**		3.1	5	SS	56				
4		---------- sandy, very stiff			6	SS	20				
		---------- stiff			7	SS	14			2 33 41 24	▽ June 30, 2023
5				198.1							
		END OF BOREHOLE		5.2							
6		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. Groundwater was observed at the depth of 4.57mbgs in the open hole.									
7											
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

Region of Peel

AECOM

LOGGED: BK
CHECKED: TA

BH_LOG 60646784 SNOW STORAGE SITES - PEEL.GPJ GAL-MISS.GDT 23-8-28

RECORD OF BOREHOLE: BH-3

SHEET 1 OF 1

PROJECT: Region of Peel - Snow Storage
LOCATION: 7120 Hurontario St, Mississauga, ON L5S 1Z8
COORDINATES: N 4833496.0; E 603961.5
DATUM: Geodetic
AECOM PROJECT #: 60646784
CLIENT: Region of Peel

START DATE: June 30, 2023
END DATE: June 30, 2023
BORING METHOD: Hollow Stem Auger
CONTRACTOR: Altech Drilling and Investigative Services

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	N VALUE	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (20 40 60 80) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (100 200 300 400)	SHEAR STRENGTH Cu, kPa (nat V. + Q ●, rem V. ⊕ U △) (20 40 60 80) / WATER CONTENT PERCENT (Wp — w — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS
		PAVEMENT SURFACE		202.7						GR SA SI CL	
0	Power Auger Drilling / Hollow Stem Auger	**ASPHALT:** 65 mm		0.1							
		FILL: sand, some gravel, some silt, some clay, brown/grey, moist, compact			1	SS	11			18 52 (30)	
				201.9							
1		**FILL:** gravelly sand, some silt, trace clay, brown, moist, very stiff		0.8	2	SS	16				
				201.1							
2		**CLAYEY SILT:** trace gravel, sandy, reddish brown, moist, very stiff		1.5	3	SS	24				
		broken rock pieces			4	SS	26				
3				199.6							
		SILTY CLAY: trace gravel, sandy to some sand, reddish brown, moist, hard to very stiff **TILL**		3.1	5	SS	34				
4		sandy			6	SS	23			2 40 36 22	
					7A	SS	8				
5		grey		197.5	7B	SS	20				
		END OF BOREHOLE		5.2							
6		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed at the depth of 5.18mbgs in the open hole.									
7											
8											
9											
10											

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50

Region of Peel

AECOM

LOGGED: BK
CHECKED: TA

BH_LOG 60646784 SNOW STORAGE SITES - PEEL.GPJ GAL-MISS.GDT 23-8-28

Appendix C

AECOM CANADA LTD.

MOISTURE CONTENT DETERMINATION

CLIENT	AECOM	DATE	June 7, 2023
PROJECT NUMBER	60646784	TESTED BY	Dharmik
PROJECT NAME	Peel Snow Storage	REVIEWED BY	Ramana M
LOCATION	Normerica		

Borehole Name	Sample Id	Depth (feet)	Can Id	Observations			Formula		
				Weight of Empty Can (g) W_1	Weight of Wet Soil + Can (g) W_2	Weight of Dry Soil + Can (g) W_3	Weight of Water (g) $W_w = (W_2-W_3)$	Weight of Dry soil (g) $W_s = (W_3-W_1)$	Moisture Content (%) $w = (W_w/W_s)*100$
BH-1	SS1	0-2	171	13.60	90.10	79.70	10.40	66.10	15.73
	SS2	2.5-4.5	55	13.90	57.80	48.60	9.20	34.70	26.51
	SS3	5.7	173	13.40	72.80	66.20	6.60	52.80	12.50
	SS4	7.5-9.5	190	13.70	62.90	57.70	5.20	44.00	11.82
	SS5	10-12	124	13.80	65.70	60.10	5.60	46.30	12.10
	SS6	12.5-14.5	146	13.50	74.10	68.50	5.60	55.00	10.18
	SS7	15-17	78	13.90	67.80	63.20	4.60	49.30	9.33
BH-2	SS1		147	13.90	42.20	36.20	6.00	22.30	26.91
	SS2		60	13.70	41.50	38.30	3.20	24.60	13.01
	SS3		76	14.10	79.50	72.10	7.40	58.00	12.76
	SS4		66	13.70	78.30	72.20	6.10	58.50	10.43
	SS5		144	13.80	73.80	66.90	6.90	53.10	12.99
	SS6		168	13.70	62.50	58.20	4.30	44.50	9.66
	SS7		106	13.70	64.00	57.00	7.00	43.30	16.17
BH-3	SS1		80	13.90	66.70	59.70	7.00	45.80	15.28
	SS2		135	13.90	75.30	68.00	7.30	54.10	13.49
	SS3		164	13.70	60.00	54.60	5.40	40.90	13.20
	SS4		180	14.10	73.20	67.20	6.00	53.10	11.30
	SS5		85	13.60	73.40	67.20	6.20	53.60	11.57
	SS6		191	13.60	74.10	67.30	6.80	53.70	12.66
	SS7A		84	14.40	61.80	57.10	4.70	42.70	11.01
	SS7B		67	13.70	78.60	71.80	6.80	58.10	11.70

Total Samples	22

AECOM CANADA LTD.

Client	AECOM	**Borehole No**	BH -3	**Lab No**	202307006S
Project Number	60646784	**Sample ID**	SS1	**Date**	July 8, 2023
Project Name	Peel Snow Storage			**Depth (Feet)**	0.0'
Location	Peel Snow Storage			**Tested by**	SAM
Soil Classification	Silty Sand with Gravel(SM)			**Reviewed by**	Ramana M

Total Sample Mass (A) g	242.7	**% Coarse Aggregate (D)**	17.6	**% Fine Aggregate (E)**	82.4

COARSE AGGREGATE

Sieve (mm)	**Individual Mass Retained (g)**	**Cumultive Mass Retained (g) [X]**	**Coarse Aggegate Portion Only**		**% Passing (Total Sample**
			% Retained	**% Passing**	
106				**100.0**	**100.0**
75.0				**100.0**	**100.0**
63.0				**100.0**	**100.0**
53.0				**100.0**	**100.0**
37.5				**100.0**	**100.0**
26.5				**100.0**	**100.0**
22.4				**100.0**	**100.0**
19.0				**100.0**	**100.0**
16.0				**100.0**	**100.0**
13.2				**100.0**	**100.0**
9.5	**4.5**	**4.5**	**10.5**	**89.5**	**98.1**
6.7	**12.8**	**17.3**	**40.5**	**59.5**	**92.9**
4.75	**25.4**	**42.7**	**100.0**		**82.4**
Pan	**200.0**	**Pan + [B]**	**Mass Passing 4.75 mm (g) [C = A-B]**		**200**

FINE AGGREGATE

Sample Mass before washing (g) [F]	**190.1**	**Mass passing 75 µm sieve by washing (g)**	**69.8**
Sample Mass after washing (g)	**120.3**	**Mass passing 75 µm sieve by sieving (g)**	**0.1**

Sieve (mm)	**Cumultive Mass Retained (g) [Y]**	**Fine Aggregate Portion Only**		**% Passing (Total Sample**
		% Retained	**% Passing**	
4.75			100.0	82.41
2.36	26.9	14.2	85.8	70.75
1.18	53.3	28.0	72.0	59.30
0.600	75.4	39.7	60.3	49.72
0.425	85.1	44.8	55.2	45.52
0.300	94.6	49.8	50.2	41.40
0.150	110.2	58.0	42.0	34.64
0.075	120.2	63.2	36.8	30.30
Pan	0.1	**Total Mass passing 75 µm sieve (g)**	69.9	

Calculations:

D = (B/A) * 100
E= (C/A) * 100

Coarse Aggregate Portion:
% Retained =(X/B) * 100
% Passing = ((B-X) /B) * 100

Fine Aggregate Portion:
% Retained =(Y/F) * 100
% Passing = ((F-Y) /F) * 100

Total Mass Calculations

% Retained on Coarse Aggregate Sieves = (X/A) * 100

% Retained on Fine Aggregate Sieves = (Y/F) * E + % Ret. 4.75

% Passing Coarse Aggregate Sieves = ((A -X)/A)) * 100

% Passing on Fine Aggregate Sieves = ((F - Y)/F) * E

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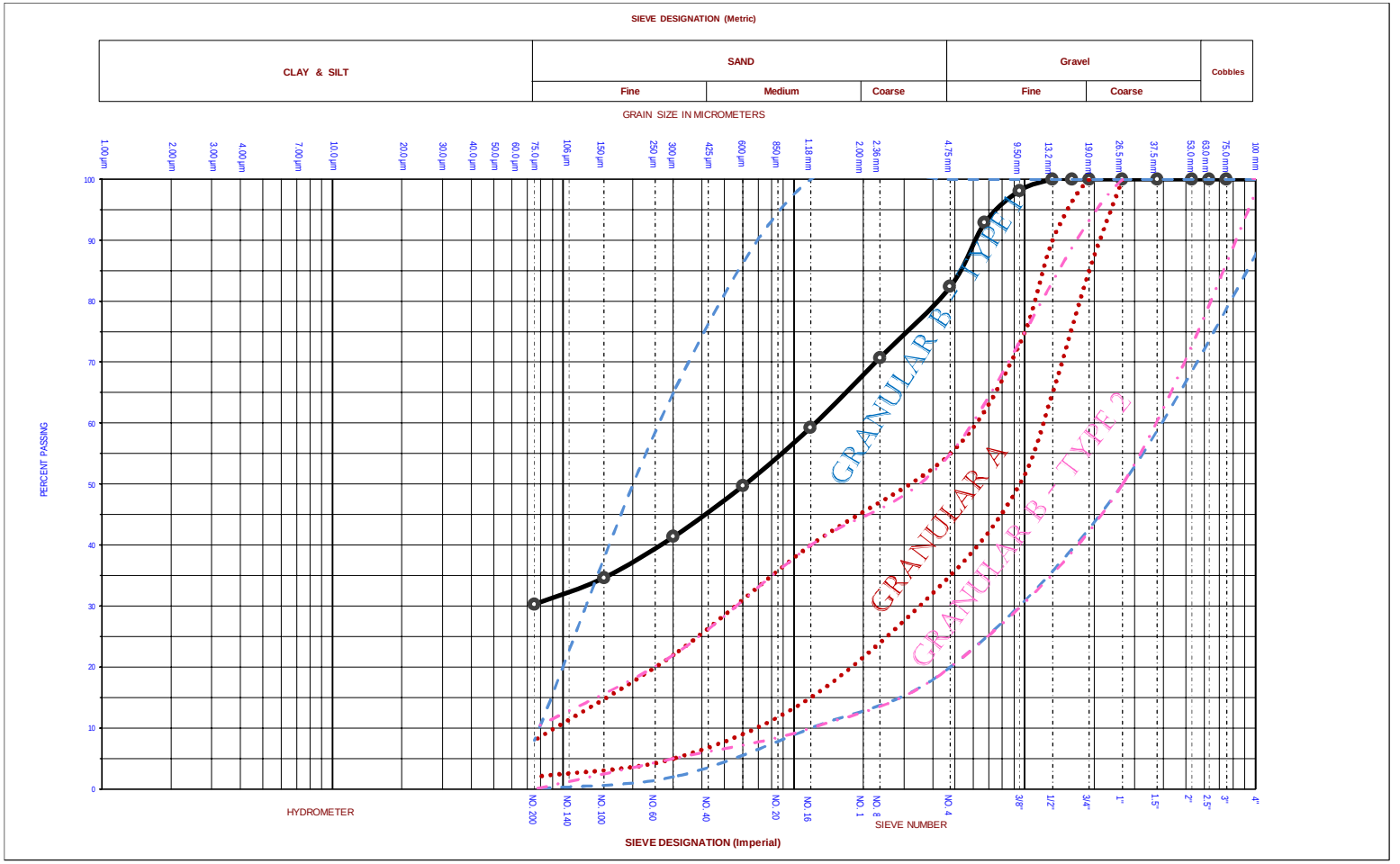


GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

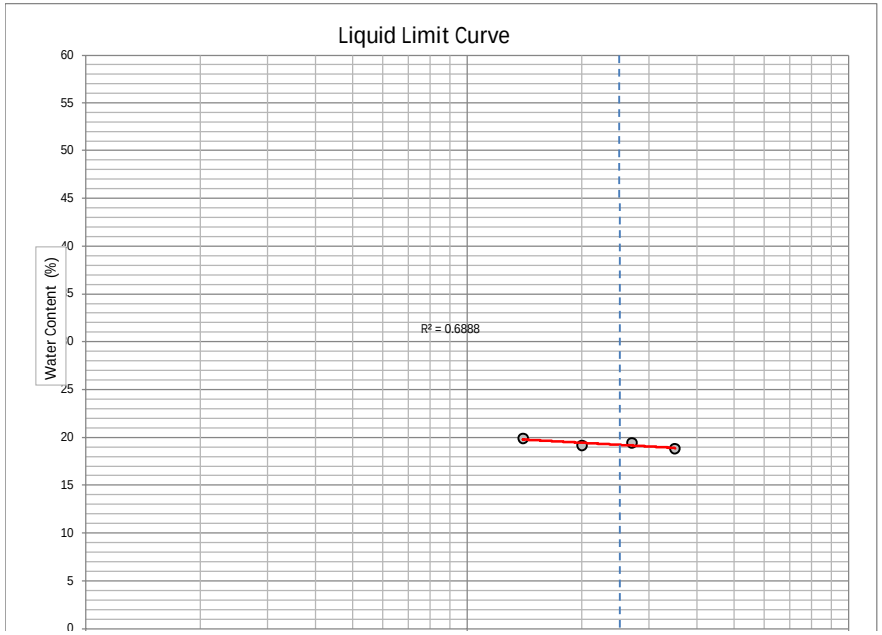
AECOM CANADA LTD. 33 Galaxy Blvd, Unit 6 Toronto, Ontario			Client		AECOM			Date	July 8, 2023		Project Number		60646784		
			Borehole No / Sample Id		BH -3	SS1		Depth (feet)	0.0'		Lab No		202307006S		
			Project Name		Peel Snow Storage						Project Location		Peel Snow Storage		
			Soil Classification		Silty Sand with Gravel(SM)						Figure No:				
Gravel(%)	18	Sand(%)	52	Fines(%)	30	D_{60} (mm)	1.252	D_{30} (mm)	N/A	D_{10} (mm)	N/A	C_U	N/A	C_C	N/A

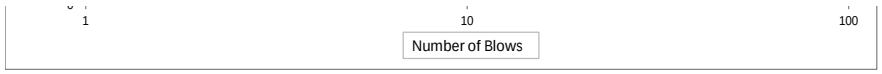
AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	July 9, 2023	
Project Name	Peel Snow Storage				Tested By		
Location	Peel Snow Storage				Reviewed By		
Borehole Number	BH-1	Sample Id	SS6	Depth (feet)		Lab Number	202307004S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		142	138	92	170		
Weight of Empty Container (g) W_1		13.84	13.66	13.52	13.54		
Weight of Container + Wet Soil (g) W_2		22.10	21.68	22.86	22.02		
Weight of Container + Dry Soil(g) W_3		20.73	20.41	21.36	20.64		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.37	1.27	1.50	1.38		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	6.89	6.75	7.84	7.10		
Water Content (%)	$w = (W_w / W_s) * 100$	19.88	18.81	19.13	19.44		
Number of Blows		14	35	20	27		
Liquid Limit (%) From Graph		19.2					




1
10
100
Number of Blows

AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	July 9, 2023	
Project Name	Peel Snow Storage				Tested By	0	
Location	Peel Snow Storage				Reviewed By	0	
Borehole Number	BH-1	Sample Id	SS6	Depth (feet)	0	Lab Number	202307004S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		58	108	140			
Weight of Empty Container (g) W_1		13.65	13.61	13.58			
Weight of Container + Wet Soil (g) W_2		20.38	18.99	21.15			
Weight of Container + Dry Soil(g) W_3		19.56	18.33	20.23			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	0.82	0.66	0.92			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	5.91	4.72	6.65			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	13.87	13.98	13.83			
Average Plastic Limit (%) w_p		13.90					

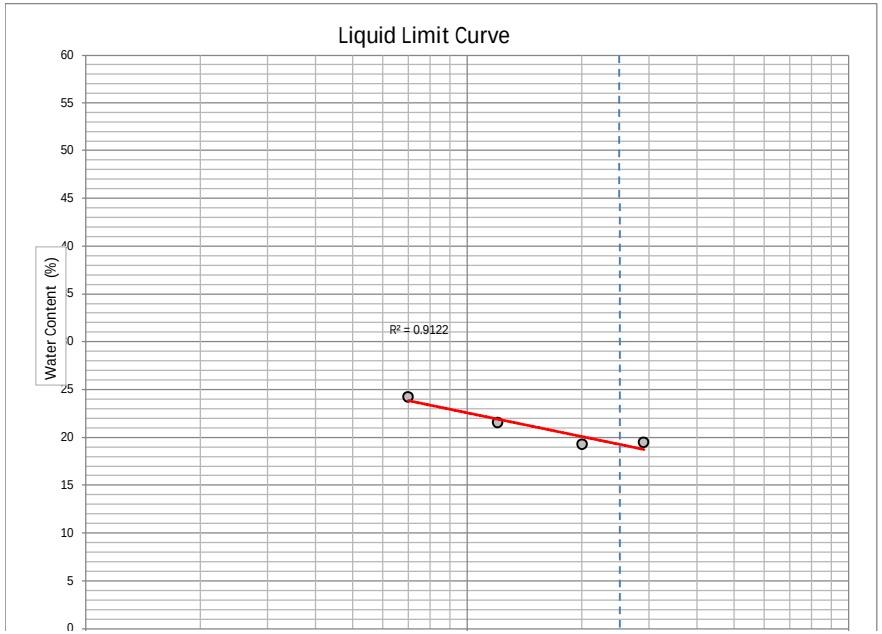
Result Summary	
Liquid Limit (%)	19
Plastic Limit (%)	14
Plasticity Index (%)	5
Sample status	Plastic

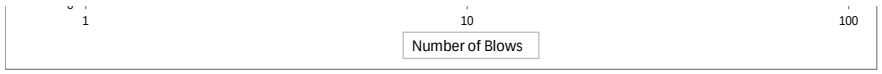
AECOM CANADA LTD.

DETERMINATION OF LIQUID LIMIT

Client	AECOM	Project Number	60646784		Date	July 9, 2023	
Project Name	Peel Snow Storage				Tested By		
Location	Peel Snow Storage				Reviewed By		
Borehole Number	BH-2	Sample Id	SS7	Depth (feet)		Lab Number	202307004S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		90	53	184	68		
Weight of Empty Container (g) W_1		13.49	13.50	13.47	13.46		
Weight of Container + Wet Soil (g) W_2		23.17	21.22	21.51	22.30		
Weight of Container + Dry Soil(g) W_3		21.28	19.85	20.21	20.86		
Weight of Water (g) W_w	$W_w = W_2 - W_3$	1.89	1.37	1.30	1.44		
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	7.79	6.35	6.74	7.40		
Water Content (%)	$w = (W_w / W_s) * 100$	24.26	21.57	19.29	19.46		
Number of Blows		7	12	20	29		
Liquid Limit (%) From Graph		19.3					




1
10
100
Number of Blows

AECOM CANADA LTD.

DETERMINATION OF PLASTIC LIMIT

Client	AECOM	Project Number	60646784		Date	July 9, 2023	
Project Name	Peel Snow Storage				Tested By	0	
Location	Peel Snow Storage				Reviewed By	0	
Borehole Number	BH-2	Sample Id	SS7	Depth (feet)	0	Lab Number	202307004S

Description	Formula	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Container Number		131	163	88			
Weight of Empty Container (g) W_1		13.77	13.60	13.56			
Weight of Container + Wet Soil (g) W_2		17.17	20.06	16.30			
Weight of Container + Dry Soil(g) W_3		16.77	19.29	15.97			
Weight of Water (g) W_w	$W_w = W_2 - W_3$	0.40	0.77	0.33			
Weight of Dry Soil (g) W_s	$W_s = W_3 - W_1$	3.00	5.69	2.41			
Plastic Limit (%)	$w = (W_w / W_s) * 100$	13.33	13.53	13.69			
Average Plastic Limit (%) w_p		13.52					

Result Summary	
Liquid Limit (%)	19
Plastic Limit (%)	14
Plasticity Index (%)	5
Sample status	Plastic

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202307004S	Borehole No	BH -1	Tested by	0
Project Name	Peel Snow Storage	Sample Id	SS6	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)		Date	07-Jul-23
Location	Peel Snpow Storage	Soil Classification	Sandy Lean Clay,trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	●
	115105	○

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		481.5	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	63.1	cm^3
Length of Bulb	(L_2)	14.15	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.5	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.1351	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	35	g
Air Dried Mass	(Wa)	35.2	g
Hygroscopic Corr Factor	(F)	0.994	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.7	g
% Passing 2.0 mm Sieve	(P10)	92.1	
Sample Represented	(W)	54.0	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	15.1	466.4	96.9
2.0	38.2	443.3	92.1

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.7	92.1
0.850	3.6	46.1	85.3
0.425	6.4	43.3	80.2
0.25	9.3	40.4	74.8
0.106	16.8	32.9	60.9
0.075	19.3	30.4	56.3
Pass 0.075	0.4		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
08-Jul-23	9:51:00 AM	1.0	1.0200	0.0030	20.7	1.0170	50.0	10.81	9.92007	0.01336576	0.0440
	9:52:00 AM	2.0	1.0185	0.0030	20.6	1.0155	45.6	11.22	9.94418	0.01338199	0.0317
	9:55:00 AM	5.0	1.0170	0.0030	20.6	1.0140	41.2	11.62	9.94418	0.01338199	0.0204
	10:05:00 AM	15.0	1.0150	0.0030	20.6	1.0120	35.3	12.16	9.94418	0.01338199	0.0121
	10:20:00 AM	30.0	1.0140	0.0030	20.7	1.0110	32.4	12.43	9.92007	0.01336576	0.0086
	10:50:00 AM	60.0	1.0120	0.0030	20.7	1.0090	26.5	12.97	9.92007	0.01336576	0.0062
	2:00:00 PM	250.0	1.0100	0.0030	20.8	1.0070	20.6	13.51	9.89606	0.01334957	0.0031
09-Jul-23	9:50:00 AM	1440.0	1.0095	0.0030	20.3	1.0065	19.1	13.65	10.01711	0.01343097	0.0013

L1 cm	Viscosiity C	K (η/(Gs-1))
4.86	-0.398036	5.83533447
5.27	-0.395608	5.84951548
5.67	-0.395608	5.84951548
6.21	-0.395608	5.84951548
6.48	-0.398036	5.83533447
7.02	-0.398036	5.83533447
7.56	-0.400459	5.82121303
7.69	-0.388301	5.89241899

Mass Retained on Seive # 10	146.1
Mass Passed Seive # 10	335.4
Jar Number	

Hygroscopic Data		
	Can Id	118
	Empty Can Weight (g)	13.70
	Can+ Air Dried Soil (g)	48.90
	Can + Oven Dried Soil (g)	48.70

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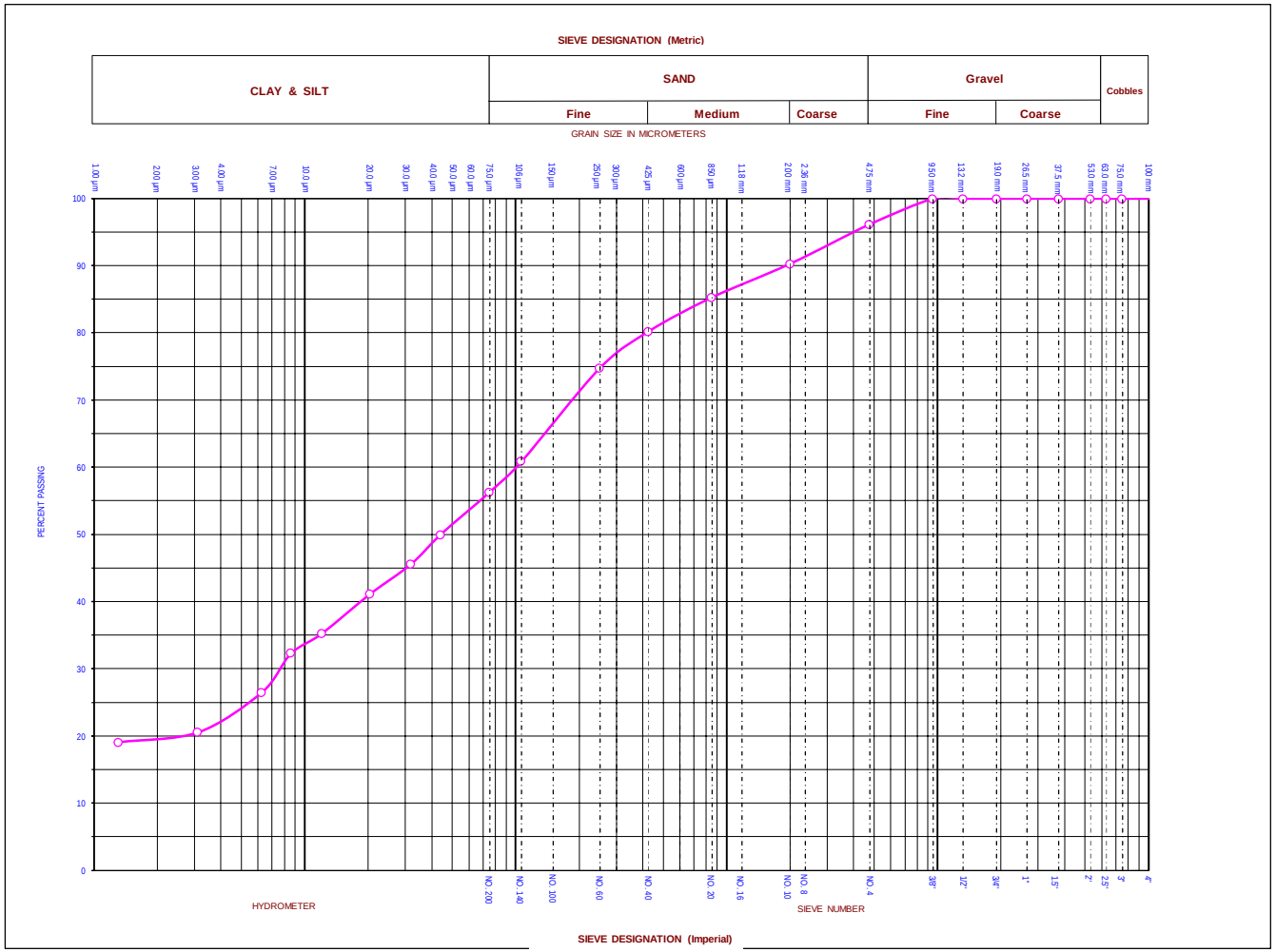


GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	July 7, 2023		Project Number	60646784		Gravel (%)	4
	Sample ID	BH -1	SS6	Depth (feet)	0		Project Name	Peel Snow Storage		Sand (%)	40
	Lab Sample No:	202307004S					Project Location	Peel Snpow Storage		Silt (%)	36
	Soil Classification	Sandy Lean Clay,trace gravel (CL)								Clay (%)	20
	Figure No.			D10	N/A	D30	0.008	D60	0.100	Cc	N/A
								Cu	N/A		

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202307007S	Borehole No	BH -3	Tested by	0
Project Name	Peel Snow Storage	Sample Id	SS6	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)		Date	07-Jul-23
Location	Peel Snpow Storage	Soil Classification	Sandy Lean Clay,trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	●
	115105	○

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		456.5	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	63.1	cm^3
Length of Bulb	(L_2)	14.15	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.5	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.1351	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	31.3	g
Air Dried Mass	(Wa)	31.4	g
Hygroscopic Corr Factor	(F)	0.997	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.8	g
% Passing 2.0 mm Sieve	(P10)	92.9	
Sample Represented	(W)	53.6	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	11.3	445.2	97.5
2.0	32.2	424.3	92.9

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.8	92.9
0.850	3.5	46.4	86.5
0.425	6.4	43.4	81.0
0.25	9.6	40.2	75.0
0.106	16.6	33.3	62.0
0.075	18.9	30.9	57.6
Pass 0.075	0.6		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
08-Jul-23	9:51:00 AM	1.0	1.0200	0.0030	20.8	1.0170	50.4	10.81	9.89606	0.01334957	0.0439
	9:52:00 AM	2.0	1.0180	0.0030	20.7	1.0150	44.4	11.35	9.92007	0.01336576	0.0318
	9:55:00 AM	5.0	1.0170	0.0030	20.7	1.0140	41.5	11.62	9.92007	0.01336576	0.0204
	10:05:00 AM	15.0	1.0150	0.0030	20.7	1.0120	35.5	12.16	9.92007	0.01336576	0.0120
	10:20:00 AM	30.0	1.0140	0.0030	20.7	1.0110	32.6	12.43	9.92007	0.01336576	0.0086
	10:50:00 AM	60.0	1.0130	0.0030	20.7	1.0100	29.6	12.70	9.92007	0.01336576	0.0062
	2:00:00 PM	250.0	1.0110	0.0030	20.8	1.0080	23.7	13.24	9.89606	0.01334957	0.0031
09-Jul-23	9:50:00 AM	1440.0	1.0100	0.0030	20.3	1.0070	20.7	13.51	10.01711	0.01343097	0.0013

L1 cm	Viscosiity C	K (η/(Gs-1)
4.86	-0.400459	5.82121303
5.40	-0.398036	5.83533447
5.67	-0.398036	5.83533447
6.21	-0.398036	5.83533447
6.48	-0.398036	5.83533447
6.75	-0.398036	5.83533447
7.29	-0.400459	5.82121303
7.56	-0.388301	5.89241899

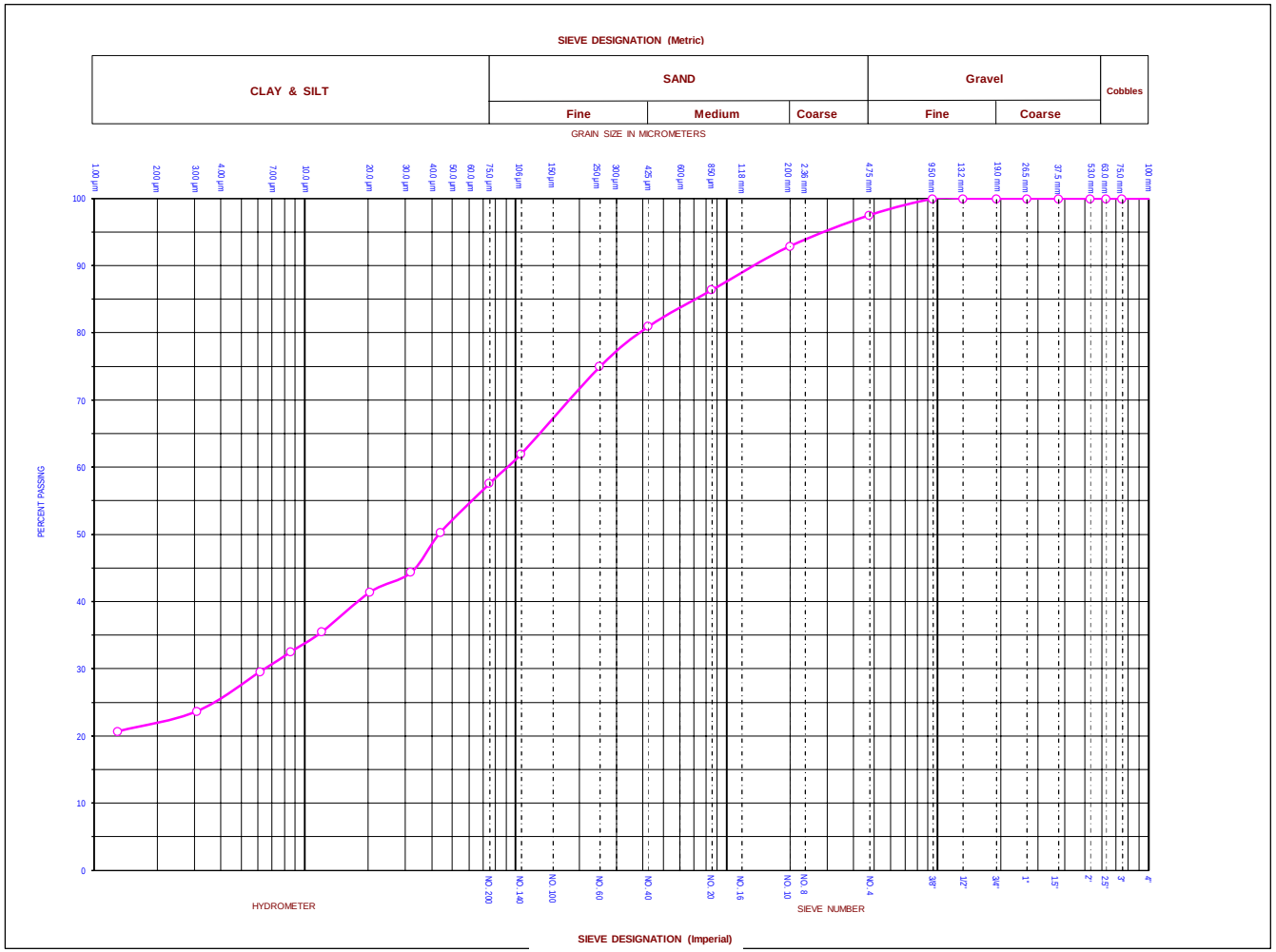
Mass Retained on Seive # 10	123.1
Mass Passed Seive # 10	333.4
Jar Number	

Hygroscopic Data		
	Can Id	141
	Empty Can Weight (g)	13.80
	Can+ Air Dried Soil (g)	45.20
	Can + Oven Dried Soil (g)	45.10

AECOM Canada Ltd.

AECOM

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	July 7, 2023		Project Number	60646784		Gravel (%)	2
	Sample ID	BH -3	SS6	Depth (feet)	0		Project Name	Peel Snow Storage		Sand (%)	40
	Lab Sample No:	202307007S					Project Location	Peel Snpow Storage		Silt (%)	36
	Soil Classification	Sandy Lean Clay,trace gravel (CL)								Clay (%)	22
	Figure No.			D10	N/A	D30	0.006	D60	0.092	Cc	N/A
								Cu	N/A		

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202307005S	Borehole No	BH -2	Tested by	0
Project Name	Peel Snow Storage	Sample Id	SS7	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)		Date	07-Jul-23
Location	Peel Snpow Storage	Soil Classification	Sandy Lean Clay,trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	●
	115105	○

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		393.3	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	63.1	cm^3
Length of Bulb	(L_2)	14.15	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.5	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.1351	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	41	g
Air Dried Mass	(Wa)	41.1	g
Hygroscopic Corr Factor	(F)	0.998	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.9	g
% Passing 2.0 mm Sieve	(P10)	93.0	
Sample Represented	(W)	53.6	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	11.2	382.1	97.2
2.0	27.5	365.8	93.0

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.9	93.0
0.850	2.9	47.0	87.7
0.425	5.1	44.8	83.6
0.25	7.4	42.4	79.2
0.106	12.8	37.1	69.1
0.075	14.9	35.0	65.3
Pass 0.075	0.6		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
08-Jul-23	9:51:00 AM	1.0	1.0230	0.0030	20.7	1.0200	59.2	10.00	9.92007	0.01336576	0.0423
	9:52:00 AM	2.0	1.0215	0.0030	20.7	1.0185	54.8	10.41	9.92007	0.01336576	0.0305
	9:55:00 AM	5.0	1.0195	0.0030	20.6	1.0165	48.9	10.95	9.94418	0.01338199	0.0198
	10:05:00 AM	15.0	1.0180	0.0030	20.6	1.0150	44.4	11.35	9.94418	0.01338199	0.0116
	10:20:00 AM	30.0	1.0170	0.0030	20.6	1.0140	41.5	11.62	9.94418	0.01338199	0.0083
	10:50:00 AM	60.0	1.0140	0.0030	20.7	1.0110	32.6	12.43	9.92007	0.01336576	0.0061
	2:00:00 PM	250.0	1.0120	0.0030	20.8	1.0090	26.7	12.97	9.89606	0.01334957	0.0030
09-Jul-23	9:50:00 AM	1440.0	1.0105	0.0030	20.4	1.0075	22.2	13.38	9.99270	0.0134146	0.0013

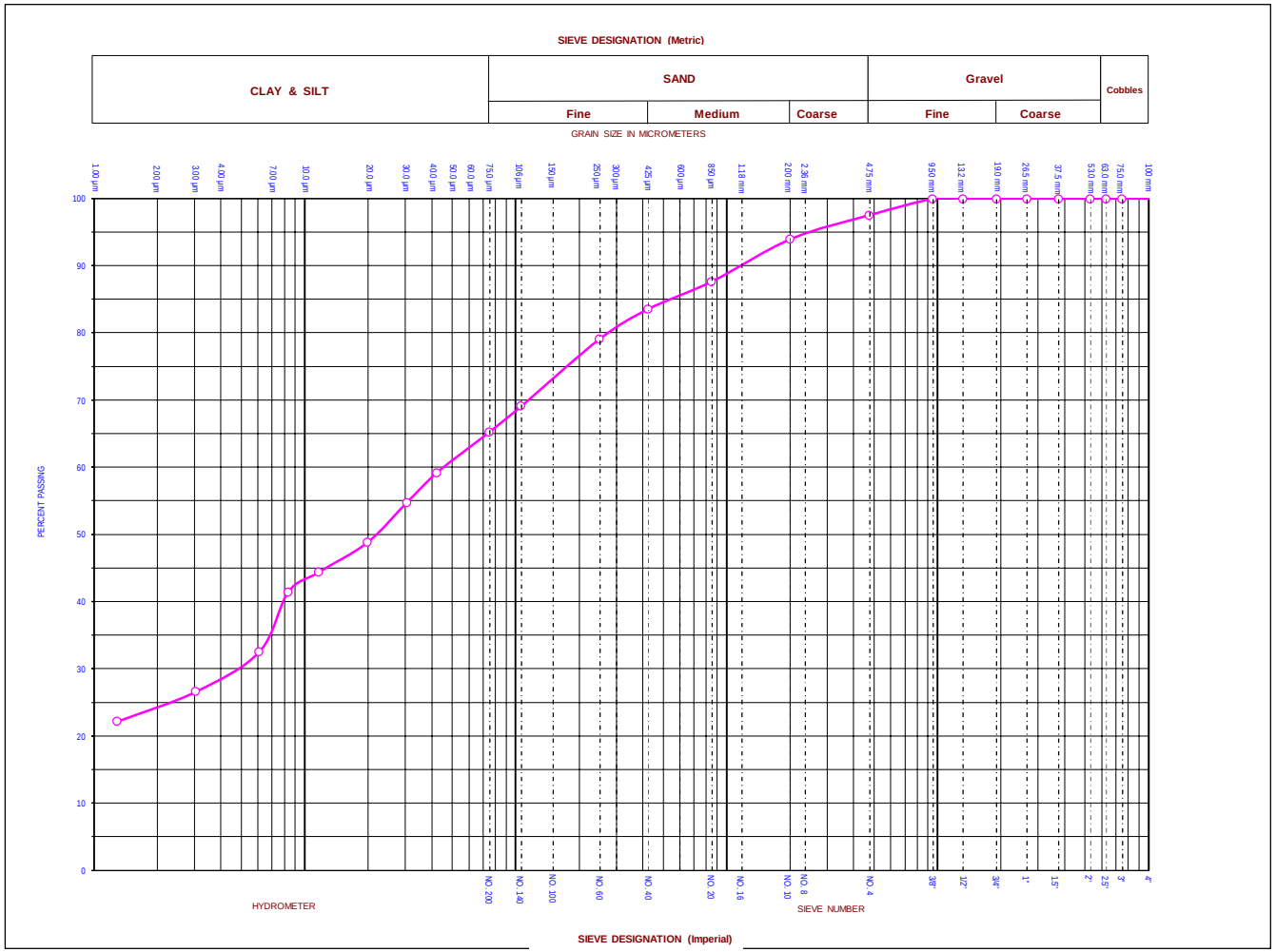
L1 cm	Viscosiity C	K (η/(Gs-1)
4.05	-0.398036	5.83533447
4.45	-0.398036	5.83533447
4.99	-0.395608	5.84951548
5.40	-0.395608	5.84951548
5.67	-0.395608	5.84951548
6.48	-0.398036	5.83533447
7.02	-0.400459	5.82121303
7.43	-0.390741	5.87805744

Mass Retained on Seive # 10	68.6
Mass Passed Seive # 10	324.7
Jar Number	

Hygroscopic Data		
	Can Id	99
	Empty Can Weight (g)	14.10
	Can+ Air Dried Soil (g)	55.20
	Can + Oven Dried Soil (g)	55.10

AECOM Canada Ltd.

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	July 7, 2023		Project Number	60646784		Gravel (%)	2
	Sample ID	BH -2	SS7	Depth (feet)	0		Project Name	Peel Snow Storage		Sand (%)	33
	Lab Sample No:	202307005S					Project Location	Peel Snpow Storage		Silt (%)	41
	Soil Classification	Sandy Lean Clay,trace gravel (CL)								Clay (%)	24
	Figure No.			D10	N/A	D30	0.005	D60	0.046	Cc	N/A
								Cu	N/A		

AECOM CANADA LTD.

Hydrometer Analysis

Lab No	202307007S	Borehole No	BH -3	Tested by	0
Project Name	Peel Snow Storage	Sample Id	SS6	Reviewed by	Ramana M
Project Number	60646784	Depth (feet)		Date	07-Jul-23
Location	Peel Snpow Storage	Soil Classification	Sandy Lean Clay,trace gravel (CL)		

Soil Hydrometer Used		
151 H SN#	993585	●
	115105	○

Soil Information

Liquid Limit	(LL)		
Plasticity Index	(PI)		
Specific Gravity of Soil	(Gs)	2.70	
Specific Gravity of Water	(Gw)	1	
Sg Correction Factor	(α)	0.989	
Total Mass of sample		456.5	g
Soil Particles Greater Than This Are Excluded From Graph		9.50	mm

Hydrometer Details

Volume of Bulb	(V_B)	63.1	cm^3
Length of Bulb	(L_2)	14.15	cm
Length from '1.0' reading to top of Bulb	(Ls)	10.5	cm
Scale Dimension	(hs)	0.27	cm/Div
Cross-sectional Area of Cylinder	(A)	28.1351	cm^2
Meniscus Correction	(Hm)	0.0005	Divisions

Calculation of Dry Soil Mass

Oven Dried Mass	(Wo)	31.3	g
Air Dried Mass	(Wa)	31.4	g
Hygroscopic Corr Factor	(F)	0.997	
Air Dried Mass in Analysis	(Ma)	50	g
Oven Dried Mass in Analysis	(Mo)	49.8	g
% Passing 2.0 mm Sieve	(P10)	92.9	
Sample Represented	(W)	53.6	g

Sieve Analysis of Retained on 2.0 mm Sieve (M2)

Sieve Size (mm)	Cummulative Mass Retained (g)	Mass Passing (g)	% Passing
75.0			
63.0			
53.0			
37.5			
26.5			
19.0			
13.2			
9.5			
4.75	11.3	445.2	97.5
2.0	32.2	424.3	92.9

Sieve Analysis of Hydrometer Material (M7)

Sieve Size (mm)	Comulative Mass Retained (g)	Mass Passing (g)	% Passing
2.00	0.0	49.8	92.9
0.850	3.5	46.4	86.5
0.425	6.4	43.4	81.0
0.25	9.6	40.2	75.0
0.106	16.6	33.3	62.0
0.075	18.9	30.9	57.6
Pass 0.075	0.6		

Percent In Suspension (P) as per Section 14.3 of ASTM D 422

P = [(100000/W) * (Gs/(Gs -Gw))] * (R - Gw) in percent (for Soil Hydrometer 151 H)

Where R = Corrected Hydrometer Reading = Hs - Hc

Hs = Actual Hydrometer Reading
Hc= Composite Correction to be determined as per Section 7 of ASTM D 422

Diameter of Soil Particles (D) as per Section 15 of ASTM D 422

D = SQRT of {[(30*η)/(980*(Gs-Gw)] * (L/T)} in mm

Where η= Viscosity of suspending Medium (Water) in poises
L = Effective Depth = L1+ 0.5*[L_2 - V_B /A)] in cm
L1 = distance from the top of the bulb to Recorded Hydrometer Reading in cm
T = Time in minutes

Date	Time	Elaspsed Time (minutes)	Hs in Divisions	Hc in Divisions	Temp Tc in C	R=Hs-Hc	P in %	L in cm	η in Poise	K	D in mm
08-Jul-23	9:51:00 AM	1.0	1.0200	0.0030	20.8	1.0170	50.4	10.81	9.89606	0.01334957	0.0439
	9:52:00 AM	2.0	1.0180	0.0030	20.7	1.0150	44.4	11.35	9.92007	0.01336576	0.0318
	9:55:00 AM	5.0	1.0170	0.0030	20.7	1.0140	41.5	11.62	9.92007	0.01336576	0.0204
	10:05:00 AM	15.0	1.0150	0.0030	20.7	1.0120	35.5	12.16	9.92007	0.01336576	0.0120
	10:20:00 AM	30.0	1.0140	0.0030	20.7	1.0110	32.6	12.43	9.92007	0.01336576	0.0086
	10:50:00 AM	60.0	1.0130	0.0030	20.7	1.0100	29.6	12.70	9.92007	0.01336576	0.0062
	2:00:00 PM	250.0	1.0110	0.0030	20.8	1.0080	23.7	13.24	9.89606	0.01334957	0.0031
09-Jul-23	9:50:00 AM	1440.0	1.0100	0.0030	20.3	1.0070	20.7	13.51	10.01711	0.01343097	0.0013

L1 cm	Viscosiity C	K (η/(Gs-1)
4.86	-0.400459	5.82121303
5.40	-0.398036	5.83533447
5.67	-0.398036	5.83533447
6.21	-0.398036	5.83533447
6.48	-0.398036	5.83533447
6.75	-0.398036	5.83533447
7.29	-0.400459	5.82121303
7.56	-0.388301	5.89241899

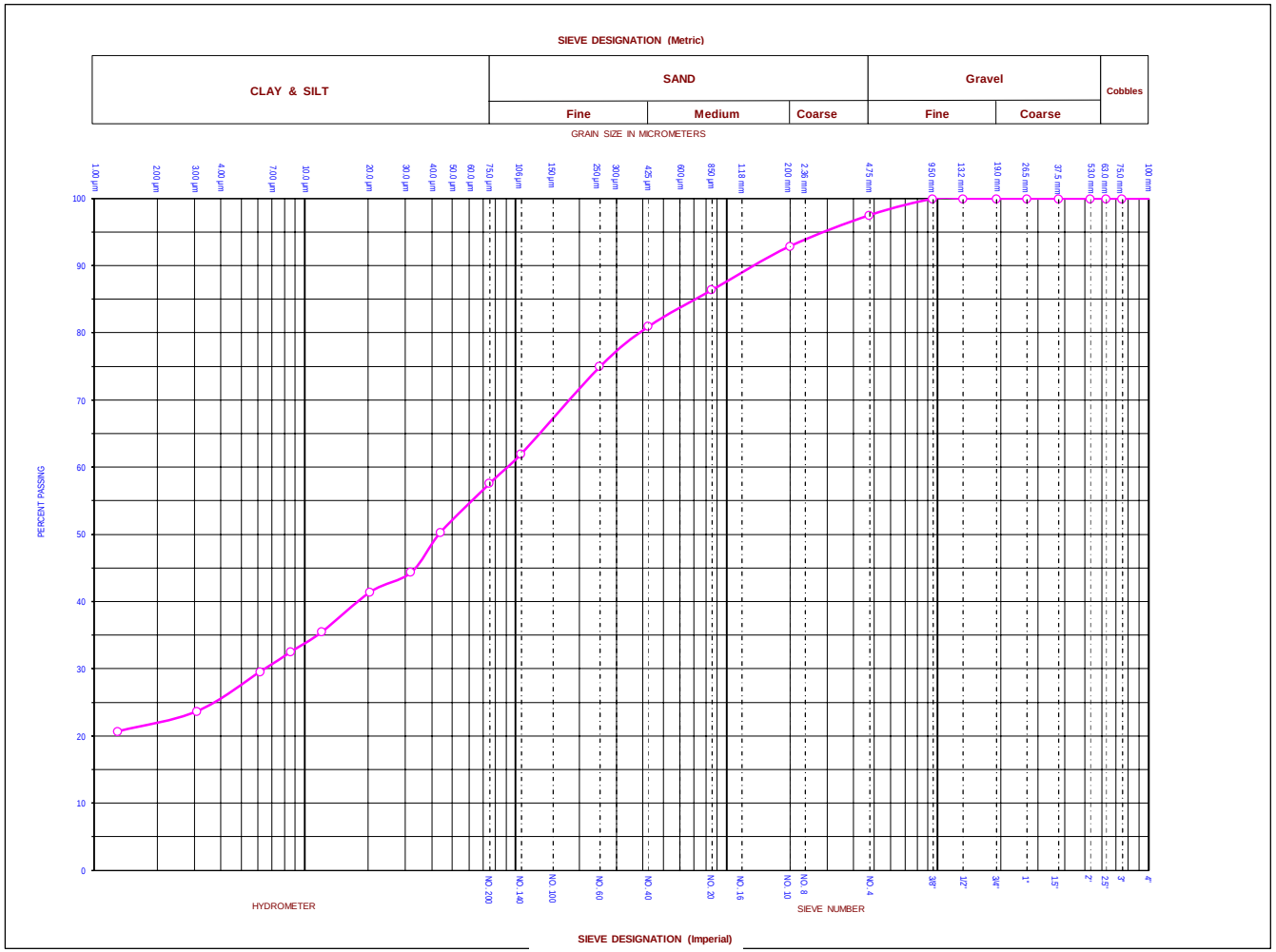
Mass Retained on Seive # 10	123.1
Mass Passed Seive # 10	333.4
Jar Number	

Hygroscopic Data		
	Can Id	141
	Empty Can Weight (g)	13.80
	Can+ Air Dried Soil (g)	45.20
	Can + Oven Dried Soil (g)	45.10

AECOM Canada Ltd.

AECOM

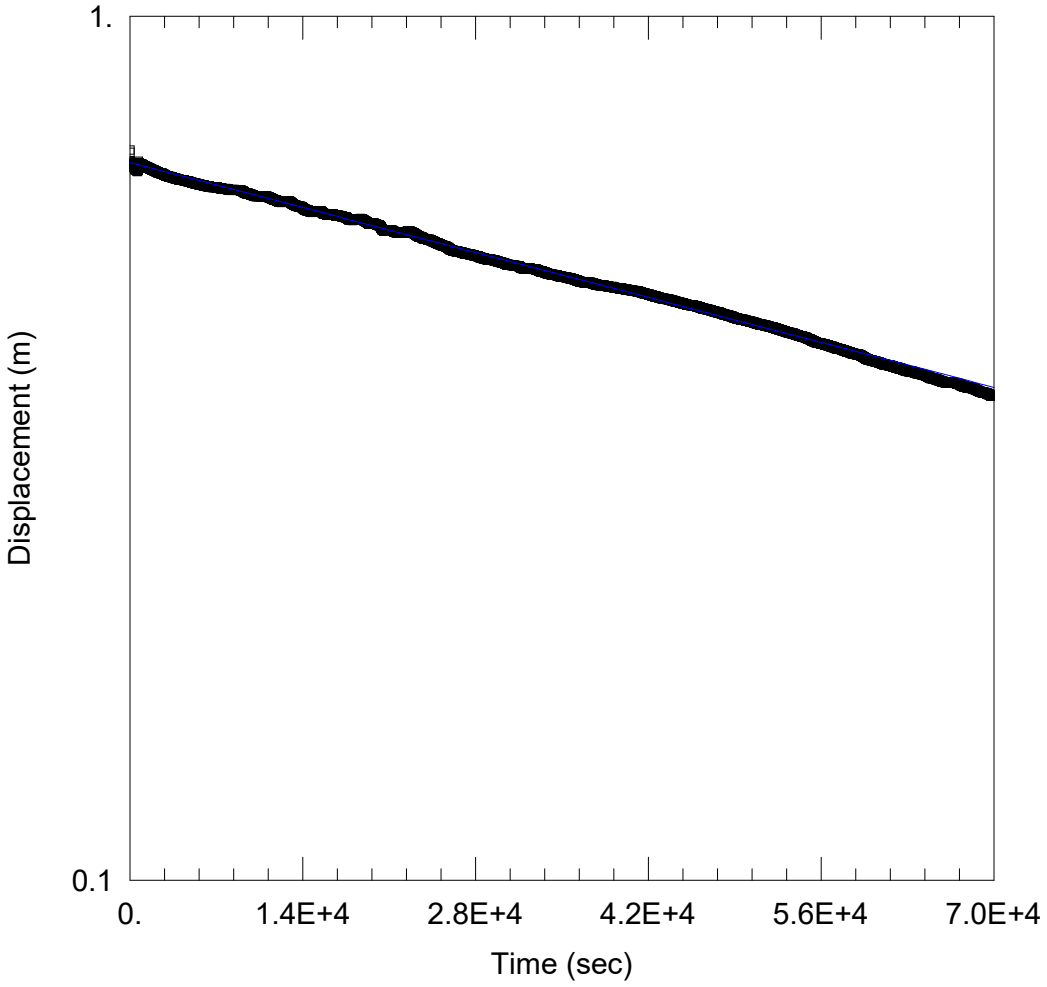
UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION CURVE (SIEVE AND HYDROMETER ANALYSIS)

AECOM CANADA LTD. 83 Galaxy Blvd, Unit 6 Toronto, Ontario	Client	AECOM		Date	July 7, 2023		Project Number	60646784		Gravel (%)	2
	Sample ID	BH -3	SS6	Depth (feet)	0		Project Name	Peel Snow Storage		Sand (%)	40
	Lab Sample No:	202307007S					Project Location	Peel Snpow Storage		Silt (%)	36
	Soil Classification	Sandy Lean Clay,trace gravel (CL)								Clay (%)	22
	Figure No.			D10	N/A	D30	0.006	D60	0.092	Cc	N/A
								Cu	N/A		

Appendix D



7120 HURONTARIO ST., MISSISSAUGA - BH/MW-1 - RISING HEAD TEST

Data Set: C:\...\BHMW-1 RHT.aqt
Date: 07/24/23 Time: 16:43:15

PROJECT INFORMATION

Company: AECOM Canada Ltd.
Client: Peel Region
Project: 60646784
Test Well: BH/MW-1
Test Date: 2023-07-20

AQUIFER DATA

Saturated Thickness: 4.03 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH/MW-1)

Initial Displacement: 0.7 m Static Water Column Height: 3.45 m
Total Well Penetration Depth: 3.45 m Screen Length: 1.52 m
Casing Radius: 0.025 m Well Radius: 0.103 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 4.746E-9 m/sec y0 = 0.6771 m

Appendix E

Your Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Your C.O.C. #: 942407-01-01

Attention: Brian Holden

AECOM Canada Ltd
105 Commerce Valley Dr West
7th Floor
Markham, ON
CANADA L3T 7W3

Report Date: 2023/07/20
Report #: R7727197
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3K5466
Received: 2023/07/12, 10:43

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Dissolved Aluminum (0.2 u, clay free)	1	N/A	2023/07/14	CAM SOP-00447	EPA 6020B m
Alkalinity	1	N/A	2023/07/14	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2023/07/17	CAM SOP-00102	APHA 4500-CO2 D
Biochemical Oxygen Demand (BOD)	1	2023/07/14	2023/07/19	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	1	N/A	2023/07/14	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	1	N/A	2023/07/14	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2023/07/14	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	1	N/A	2023/07/18	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	1	N/A	2023/07/18	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2023/07/18		
Anion and Cation Sum	1	N/A	2023/07/18		
Total Ammonia-N	1	N/A	2023/07/17	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2023/07/14	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2023/07/13	2023/07/14	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	1	N/A	2023/07/14	CAM SOP-00461	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2023/07/18		Auto Calc
Sat. pH and Langelier Index (@ 4C)	1	N/A	2023/07/18		Auto Calc
Sulphate by Automated Turbidimetry	1	N/A	2023/07/14	CAM SOP-00464	SM 23 4500-SO42- E m
Total Dissolved Solids (TDS calc)	1	N/A	2023/07/18		Auto Calc
Total Suspended Solids	1	2023/07/14	2023/07/17	CAM SOP-00428	SM 23 2540D m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 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 CCME, MELCC, EPA, APHA. Where applicable, the analytical testing herein was performed in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Bureau Veritas is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04.

Your Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Your C.O.C. #: 942407-01-01

Attention: Brian Holden

AECOM Canada Ltd
105 Commerce Valley Dr West
7th Floor
Markham, ON
CANADA L3T 7W3

Report Date: 2023/07/20
Report #: R7727197
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3K5466
Received: 2023/07/12, 10:43

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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 samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of 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. Bureau Veritas is not responsible for the accuracy or any data impacts that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Marijane Cruz
Senior Project Manager
20 Jul 2023 19:34:18

Please direct all questions regarding this Certificate of Analysis to:
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756

==========

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 Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID			WJA466		
Sampling Date			2023/07/11 12:00		
COC Number			942407-01-01		
	UNITS	Criteria	BH/MW-1	RDL	QC Batch
Calculated Parameters					
Anion Sum	me/L	-	18.4	N/A	8785388
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	360	1.0	8783653
Calculated TDS	mg/L	-	1100	1.0	8784782
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	3.9	1.0	8783653
Cation Sum	me/L	-	20.1	N/A	8785388
Hardness (CaCO3)	mg/L	-	810	1.0	8784331
Ion Balance (% Difference)	%	-	4.57	N/A	8785386
Langelier Index (@ 20C)	N/A	-	1.16		8784779
Langelier Index (@ 4C)	N/A	-	0.918		8784780
Saturation pH (@ 20C)	N/A	-	6.90		8784779
Saturation pH (@ 4C)	N/A	-	7.15		8784780
Inorganics					
Total Ammonia-N	mg/L	-	1.6	0.050	8790401
Conductivity	umho/cm	-	1700	1.0	8788537
Dissolved Organic Carbon	mg/L	-	6.1	0.40	8789399
Orthophosphate (P)	mg/L	-	<0.010	0.010	8788516
pH	pH	**6.5:8.5**	8.06		8788539
Dissolved Sulphate (SO4)	mg/L	-	390	2.0	8788517
Alkalinity (Total as CaCO3)	mg/L	-	360	1.0	8788538
Nitrite (N)	mg/L	-	<0.010	0.010	8788424
Nitrate (N)	mg/L	-	<0.10	0.10	8788424
Nitrate + Nitrite (N)	mg/L	-	<0.10	0.10	8788424

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WJA466		
Sampling Date		2023/07/11 12:00		
COC Number		942407-01-01		
	UNITS	BH/MW-1	RDL	QC Batch
Inorganics				
Total BOD	mg/L	<2	2	8788743
Total Suspended Solids	mg/L	23000	200	8789653

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID			WJA466		
Sampling Date			2023/07/11 12:00		
COC Number			942407-01-01		
	UNITS	Criteria	BH/MW-1	RDL	QC Batch
Metals					
Dissolved (0.2u) Aluminum (Al)	ug/L	**15**	<5	5	8787967

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

O.REG 153 METALS & INORGANICS PKG (WTR)

Bureau Veritas ID			WJA466		
Sampling Date			2023/07/11 12:00		
COC Number			942407-01-01		
	UNITS	Criteria	BH/MW-1	RDL	QC Batch
Inorganics					
Dissolved Chloride (Cl-)	mg/L	-	110	1.0	8788518
Metals					
Dissolved Aluminum (Al)	ug/L	-	9.5	4.9	8789008
Dissolved Antimony (Sb)	ug/L	**20**	<0.50	0.50	8789008
Dissolved Arsenic (As)	ug/L	**100**	<1.0	1.0	8789008
Dissolved Barium (Ba)	ug/L	-	75	2.0	8789008
Dissolved Beryllium (Be)	ug/L	**11**	<0.40	0.40	8789008
Dissolved Bismuth (Bi)	ug/L	-	<1.0	1.0	8789008
Dissolved Boron (B)	ug/L	**200**	**260**	10	8789008
Dissolved Cadmium (Cd)	ug/L	**0.2**	<0.090	0.090	8789008
Dissolved Calcium (Ca)	ug/L	-	130000	200	8789008
Dissolved Cesium (Cs)	ug/L	-	<0.20	0.20	8789008
Dissolved Chromium (Cr)	ug/L	-	<5.0	5.0	8789008
Dissolved Cobalt (Co)	ug/L	**0.9**	0.78	0.50	8789008
Dissolved Copper (Cu)	ug/L	**5**	0.99	0.90	8789008
Dissolved Iron (Fe)	ug/L	**300**	<100	100	8789008
Dissolved Lead (Pb)	ug/L	**5**	<0.50	0.50	8789008
Dissolved Lithium (Li)	ug/L	-	140	5.0	8789008
Dissolved Magnesium (Mg)	ug/L	-	120000	50	8789008
Dissolved Manganese (Mn)	ug/L	-	330	2.0	8789008
Dissolved Molybdenum (Mo)	ug/L	**40**	34	0.50	8789008
Dissolved Nickel (Ni)	ug/L	**25**	1.9	1.0	8789008
Dissolved Phosphorus (P)	ug/L	-	<100	100	8789008
Dissolved Potassium (K)	ug/L	-	53000	200	8789008
Dissolved Rubidium (Rb)	ug/L	-	12	0.20	8789008
Dissolved Selenium (Se)	ug/L	**100**	<2.0	2.0	8789008
Dissolved Silicon (Si)	ug/L	-	8400	50	8789008
Dissolved Silver (Ag)	ug/L	**0.1**	<0.090	0.090	8789008
Dissolved Sodium (Na)	ug/L	-	55000	100	8789008
Dissolved Strontium (Sr)	ug/L	-	1000	1.0	8789008
Dissolved Tellurium (Te)	ug/L	-	<1.0	1.0	8789008
Dissolved Thallium (Tl)	ug/L	**0.3**	<0.050	0.050	8789008

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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O.REG 153 METALS & INORGANICS PKG (WTR)

Bureau Veritas ID			WJA466		
Sampling Date			2023/07/11 12:00		
COC Number			942407-01-01		
	UNITS	Criteria	BH/MW-1	RDL	QC Batch
Dissolved Thorium (Th)	ug/L	-	<2.0	2.0	8789008
Dissolved Tin (Sn)	ug/L	-	1.2	1.0	8789008
Dissolved Titanium (Ti)	ug/L	-	<5.0	5.0	8789008
Dissolved Tungsten (W)	ug/L	**30**	<1.0	1.0	8789008
Dissolved Uranium (U)	ug/L	**5**	**17**	0.10	8789008
Dissolved Vanadium (V)	ug/L	**6**	0.58	0.50	8789008
Dissolved Zinc (Zn)	ug/L	**30**	<5.0	5.0	8789008
Dissolved Zirconium (Zr)	ug/L	**4**	<1.0	1.0	8789008

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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Bureau Veritas Job #: C3K5466
Report Date: 2023/07/20

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Sampler Initials: JC

TEST SUMMARY

Bureau Veritas ID: WJA466
Sample ID: BH/MW-1
Matrix: Water

Collected: 2023/07/11
Shipped:
Received: 2023/07/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	8787967	N/A	2023/07/14	Arefa Dabhad
Alkalinity	AT	8788538	N/A	2023/07/14	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8783653	N/A	2023/07/17	Automated Statchk
Biochemical Oxygen Demand (BOD)	DO	8788743	2023/07/14	2023/07/19	Gurjot Kaur
Chloride by Automated Colourimetry	KONE	8788518	N/A	2023/07/14	Alina Dobreanu
Conductivity	AT	8788537	N/A	2023/07/14	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8789399	N/A	2023/07/14	Gyulshen Idriz
Hardness (calculated as CaCO3)		8784331	N/A	2023/07/18	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8789008	N/A	2023/07/18	Prempal Bhatti
Ion Balance (% Difference)	CALC	8785386	N/A	2023/07/18	Automated Statchk
Anion and Cation Sum	CALC	8785388	N/A	2023/07/18	Automated Statchk
Total Ammonia-N	LACH/NH4	8790401	N/A	2023/07/17	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8788424	N/A	2023/07/14	Viorica Rotaru
pH	AT	8788539	2023/07/13	2023/07/14	Kien Tran
Orthophosphate	KONE	8788516	N/A	2023/07/14	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	8784779	N/A	2023/07/18	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8784780	N/A	2023/07/18	Automated Statchk
Sulphate by Automated Turbidimetry	KONE	8788517	N/A	2023/07/14	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	8784782	N/A	2023/07/18	Automated Statchk
Total Suspended Solids	BAL	8789653	2023/07/14	2023/07/17	Tina Teng

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Bureau Veritas Job #: C3K5466
Report Date: 2023/07/20

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Sampler Initials: JC

GENERAL COMMENTS

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

Package 1	11.3°C

Revised Report (2023/07/20) : Client sample ID corrected to BH/MW-1 per client request. Results have been split onto separate files per client request.

The sample was collected July11-12, 2023.

Results relate only to the items tested.

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Bureau Veritas Job #: C3K5466
Report Date: 2023/07/20

QUALITY ASSURANCE REPORT

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Sampler Initials: JC

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8787967	Dissolved (0.2u) Aluminum (Al)	2023/07/14	102	80 - 120	102	80 - 120	<5	ug/L	4.1 (1)	20		
8788424	Nitrate (N)	2023/07/14	88	80 - 120	92	80 - 120	<0.10	mg/L	NC (1)	20		
8788424	Nitrite (N)	2023/07/14	103	80 - 120	105	80 - 120	<0.010	mg/L	NC (1)	20		
8788516	Orthophosphate (P)	2023/07/14	89	75 - 125	90	80 - 120	<0.010	mg/L	1.0 (1)	20		
8788517	Dissolved Sulphate (SO4)	2023/07/14	84	75 - 125	96	80 - 120	<1.0	mg/L	1.1 (1)	20		
8788518	Dissolved Chloride (Cl-)	2023/07/14	NC	80 - 120	93	80 - 120	<1.0	mg/L	0.35 (1)	20		
8788537	Conductivity	2023/07/14			102	85 - 115	<1.0	umho/cm	0.17 (1)	10		
8788538	Alkalinity (Total as CaCO3)	2023/07/14			97	85 - 115	<1.0	mg/L	0.34 (1)	20		
8788539	pH	2023/07/14			102	98 - 103			0.18 (1)	N/A		
8788743	Total BOD	2023/07/19					<2	mg/L	9.6 (1)	30	97	80 - 120
8789008	Dissolved Aluminum (Al)	2023/07/18	116	80 - 120	100	80 - 120	<4.9	ug/L				
8789008	Dissolved Antimony (Sb)	2023/07/18	109	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20		
8789008	Dissolved Arsenic (As)	2023/07/18	106	80 - 120	99	80 - 120	<1.0	ug/L	NC (1)	20		
8789008	Dissolved Barium (Ba)	2023/07/18	109	80 - 120	97	80 - 120	<2.0	ug/L	0.42 (1)	20		
8789008	Dissolved Beryllium (Be)	2023/07/18	112	80 - 120	99	80 - 120	<0.40	ug/L	NC (1)	20		
8789008	Dissolved Bismuth (Bi)	2023/07/18	94	80 - 120	97	80 - 120	<1.0	ug/L				
8789008	Dissolved Boron (B)	2023/07/18	112	80 - 120	102	80 - 120	<10	ug/L	3.7 (1)	20		
8789008	Dissolved Cadmium (Cd)	2023/07/18	102	80 - 120	98	80 - 120	<0.090	ug/L	7.5 (1)	20		
8789008	Dissolved Calcium (Ca)	2023/07/18	NC	80 - 120	104	80 - 120	<200	ug/L				
8789008	Dissolved Cesium (Cs)	2023/07/18	107	80 - 120	98	80 - 120	<0.20	ug/L				
8789008	Dissolved Chromium (Cr)	2023/07/18	108	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20		
8789008	Dissolved Cobalt (Co)	2023/07/18	102	80 - 120	100	80 - 120	<0.50	ug/L	1.1 (1)	20		
8789008	Dissolved Copper (Cu)	2023/07/18	111	80 - 120	102	80 - 120	<0.90	ug/L	6.3 (1)	20		
8789008	Dissolved Iron (Fe)	2023/07/18	108	80 - 120	103	80 - 120	<100	ug/L				
8789008	Dissolved Lead (Pb)	2023/07/18	97	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20		
8789008	Dissolved Lithium (Li)	2023/07/18	112	80 - 120	104	80 - 120	<5.0	ug/L				
8789008	Dissolved Magnesium (Mg)	2023/07/18	NC	80 - 120	103	80 - 120	<50	ug/L				
8789008	Dissolved Manganese (Mn)	2023/07/18	NC	80 - 120	99	80 - 120	<2.0	ug/L				
8789008	Dissolved Molybdenum (Mo)	2023/07/18	120	80 - 120	103	80 - 120	<0.50	ug/L	6.6 (1)	20		
8789008	Dissolved Nickel (Ni)	2023/07/18	98	80 - 120	99	80 - 120	<1.0	ug/L	1.7 (1)	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8789008	Dissolved Phosphorus (P)	2023/07/18	114	80 - 120	107	80 - 120	<100	ug/L				
8789008	Dissolved Potassium (K)	2023/07/18	124 (2)	80 - 120	104	80 - 120	<200	ug/L				
8789008	Dissolved Rubidium (Rb)	2023/07/18	106	80 - 120	99	80 - 120	<0.20	ug/L				
8789008	Dissolved Selenium (Se)	2023/07/18	97	80 - 120	100	80 - 120	<2.0	ug/L	NC (1)	20		
8789008	Dissolved Silicon (Si)	2023/07/18	118	80 - 120	101	80 - 120	<50	ug/L				
8789008	Dissolved Silver (Ag)	2023/07/18	100	80 - 120	100	80 - 120	<0.090	ug/L	NC (1)	20		
8789008	Dissolved Sodium (Na)	2023/07/18	NC	80 - 120	104	80 - 120	<100	ug/L	0.98 (1)	20		
8789008	Dissolved Strontium (Sr)	2023/07/18	NC	80 - 120	99	80 - 120	<1.0	ug/L				
8789008	Dissolved Tellurium (Te)	2023/07/18	102	80 - 120	99	80 - 120	<1.0	ug/L				
8789008	Dissolved Thallium (Tl)	2023/07/18	96	80 - 120	100	80 - 120	<0.050	ug/L	NC (1)	20		
8789008	Dissolved Thorium (Th)	2023/07/18	102	80 - 120	101	80 - 120	<2.0	ug/L				
8789008	Dissolved Tin (Sn)	2023/07/18	112	80 - 120	101	80 - 120	<1.0	ug/L				
8789008	Dissolved Titanium (Ti)	2023/07/18	112	80 - 120	97	80 - 120	<5.0	ug/L				
8789008	Dissolved Tungsten (W)	2023/07/18	107	80 - 120	105	80 - 120	<1.0	ug/L				
8789008	Dissolved Uranium (U)	2023/07/18	101	80 - 120	100	80 - 120	<0.10	ug/L	11 (1)	20		
8789008	Dissolved Vanadium (V)	2023/07/18	113	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20		
8789008	Dissolved Zinc (Zn)	2023/07/18	97	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20		
8789008	Dissolved Zirconium (Zr)	2023/07/18	127 (2)	80 - 120	105	80 - 120	<1.0	ug/L				
8789399	Dissolved Organic Carbon	2023/07/14	96	80 - 120	96	80 - 120	<0.40	mg/L	0.39 (1)	20		
8789653	Total Suspended Solids	2023/07/17			96	85 - 115	<10	mg/L	NC (1)	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8790401	Total Ammonia-N	2023/07/17	107	75 - 125	102	80 - 120	<0.050	mg/L	NC (1)	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.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

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.

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) Duplicate Parent ID

(2) Matrix spike exceedes acceptance limits. Probable matrix interference.

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Bureau Veritas Job #: C3K5466
Report Date: 2023/07/20

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Sampler Initials: JC

VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, Scientific Specialist

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 {0}, {1} responsible for {2} {3} laboratory operations.

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Page of

12-Jul-23 10:43
Marijane Cruz
C3K5466
AJH ENV-1300

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#1020 AECOM Canada Ltd	Company Name:	AECOM	Quotation #:	B91379
Attention:	Accounts Payable	Attention:	Brian Holden	P.O. #:	
Address:	105 Commerce Valley Dr West 7th Floor Markham ON L3T 7W3	Address:		Project:	60646784
Tel:	(905) 886-7022 Fax: (905) 886-9494	Tel:	Fax:	Project Name:	
Email:	CANSSC.E-billing@aecom.com	Email:	brian.holden@aecom.com; dhwanish.parikh@aecom.co	Site #:	Peel Region Snow Storage
				Sampled By:	

C#942407-01-01

Bottle Order #: 942407
Project Manager: Marijane Cruz

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___	☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☐ Reg 406 Table ___ ☐ Other ___	

Include Criteria on Certificate of Analysis (Y/N)? ___

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 Metals & Inorganics Pkg (Wtr)	O.Reg 153 PAHs	O.Reg 153 PCBs (Water)	O.Reg 153 VOCs by HS & F1-F4	RCAp - Comprehensive	Dissolved Aluminum (0.2 u, clay free)	Total Suspended Solids	Biochemical Oxygen Demand (BOD)			# of Bottles	Comments
1	BH1/MW-1	Peel Reg. Park	07/11	12PM	GW		✓	✓	✓	✓	✓	✓	✓	✓			7	
2	BH1/MW-1	- - - -	07/12	10AM	GW	X	✓	✓	✓	✓	✓	✓	✓	✓			3	
3	BH1/MW-1	- - - -	07/12	10AM	GW		✓	✓	✓	✓	✓	✓	✓	✓			5	
4																		
5																		
6																		
7																		
8																		
9																		
10																		

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(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 #)

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
June Chen	23/07/12	11AM		07/07/12	1043	

Laboratory Use Only
Time Sensitive | Temperature (°C) on Receipt: 7/19/13 | Custody Seal Present / Intact: Yes ☐ No ☐

* 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.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

ON ice

Bureau Veritas Canada (2019) Inc.

Exceedance Summary Table – Prov. Water Quality Obj.

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
BH/MW-1	WJA466-08	Dissolved Boron (B)	200	260	10	ug/L
BH/MW-1	WJA466-08	Dissolved Uranium (U)	5	17	0.10	ug/L

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Your Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Your C.O.C. #: 942407-01-01

Attention: Brian Holden

AECOM Canada Ltd
105 Commerce Valley Dr West
7th Floor
Markham, ON
CANADA L3T 7W3

Report Date: 2023/07/20
Report #: R7727197
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3K5466
Received: 2023/07/12, 10:43

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Dissolved Aluminum (0.2 u, clay free)	1	N/A	2023/07/14	CAM SOP-00447	EPA 6020B m
Alkalinity	1	N/A	2023/07/14	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2023/07/17	CAM SOP-00102	APHA 4500-CO2 D
Biochemical Oxygen Demand (BOD)	1	2023/07/14	2023/07/19	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	1	N/A	2023/07/14	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	1	N/A	2023/07/14	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2023/07/14	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	1	N/A	2023/07/18	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	1	N/A	2023/07/18	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2023/07/18		
Anion and Cation Sum	1	N/A	2023/07/18		
Total Ammonia-N	1	N/A	2023/07/17	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2023/07/14	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2023/07/13	2023/07/14	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	1	N/A	2023/07/14	CAM SOP-00461	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2023/07/18		Auto Calc
Sat. pH and Langelier Index (@ 4C)	1	N/A	2023/07/18		Auto Calc
Sulphate by Automated Turbidimetry	1	N/A	2023/07/14	CAM SOP-00464	SM 23 4500-SO42- E m
Total Dissolved Solids (TDS calc)	1	N/A	2023/07/18		Auto Calc
Total Suspended Solids	1	2023/07/14	2023/07/17	CAM SOP-00428	SM 23 2540D m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 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 CCME, MELCC, EPA, APHA. Where applicable, the analytical testing herein was performed in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Bureau Veritas is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04.

Your Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Your C.O.C. #: 942407-01-01

Attention: Brian Holden

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CANADA L3T 7W3

Report Date: 2023/07/20
Report #: R7727197
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3K5466
Received: 2023/07/12, 10:43

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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 samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of 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. Bureau Veritas is not responsible for the accuracy or any data impacts that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Marijane Cruz
Senior Project Manager
20 Jul 2023 19:34:18

Please direct all questions regarding this Certificate of Analysis to:
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756

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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 Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID			WJA466		
Sampling Date			2023/07/11 12:00		
COC Number			942407-01-01		
	UNITS	Criteria	BH/MW-1	RDL	QC Batch
Calculated Parameters					
Anion Sum	me/L	-	18.4	N/A	8785388
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	360	1.0	8783653
Calculated TDS	mg/L	-	1100	1.0	8784782
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	3.9	1.0	8783653
Cation Sum	me/L	-	20.1	N/A	8785388
Hardness (CaCO3)	mg/L	-	810	1.0	8784331
Ion Balance (% Difference)	%	-	4.57	N/A	8785386
Langelier Index (@ 20C)	N/A	-	1.16		8784779
Langelier Index (@ 4C)	N/A	-	0.918		8784780
Saturation pH (@ 20C)	N/A	-	6.90		8784779
Saturation pH (@ 4C)	N/A	-	7.15		8784780
Inorganics					
Total Ammonia-N	mg/L	-	1.6	0.050	8790401
Conductivity	umho/cm	-	1700	1.0	8788537
Dissolved Organic Carbon	mg/L	-	6.1	0.40	8789399
Orthophosphate (P)	mg/L	-	<0.010	0.010	8788516
pH	pH	**6.5:8.5**	8.06		8788539
Dissolved Sulphate (SO4)	mg/L	-	390	2.0	8788517
Alkalinity (Total as CaCO3)	mg/L	-	360	1.0	8788538
Nitrite (N)	mg/L	-	<0.010	0.010	8788424
Nitrate (N)	mg/L	-	<0.10	0.10	8788424
Nitrate + Nitrite (N)	mg/L	-	<0.10	0.10	8788424

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WJA466		
Sampling Date		2023/07/11 12:00		
COC Number		942407-01-01		
	UNITS	BH/MW-1	RDL	QC Batch
Inorganics				
Total BOD	mg/L	<2	2	8788743
Total Suspended Solids	mg/L	23000	200	8789653

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID			WJA466		
Sampling Date			2023/07/11 12:00		
COC Number			942407-01-01		
	UNITS	Criteria	BH/MW-1	RDL	QC Batch
Metals					
Dissolved (0.2u) Aluminum (Al)	ug/L	**15**	<5	5	8787967

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

O.REG 153 METALS & INORGANICS PKG (WTR)

Bureau Veritas ID			WJA466		
Sampling Date			2023/07/11 12:00		
COC Number			942407-01-01		
	UNITS	Criteria	BH/MW-1	RDL	QC Batch
Inorganics					
Dissolved Chloride (Cl-)	mg/L	-	110	1.0	8788518
Metals					
Dissolved Aluminum (Al)	ug/L	-	9.5	4.9	8789008
Dissolved Antimony (Sb)	ug/L	**20**	<0.50	0.50	8789008
Dissolved Arsenic (As)	ug/L	**100**	<1.0	1.0	8789008
Dissolved Barium (Ba)	ug/L	-	75	2.0	8789008
Dissolved Beryllium (Be)	ug/L	**11**	<0.40	0.40	8789008
Dissolved Bismuth (Bi)	ug/L	-	<1.0	1.0	8789008
Dissolved Boron (B)	ug/L	**200**	**260**	10	8789008
Dissolved Cadmium (Cd)	ug/L	**0.2**	<0.090	0.090	8789008
Dissolved Calcium (Ca)	ug/L	-	130000	200	8789008
Dissolved Cesium (Cs)	ug/L	-	<0.20	0.20	8789008
Dissolved Chromium (Cr)	ug/L	-	<5.0	5.0	8789008
Dissolved Cobalt (Co)	ug/L	**0.9**	0.78	0.50	8789008
Dissolved Copper (Cu)	ug/L	**5**	0.99	0.90	8789008
Dissolved Iron (Fe)	ug/L	**300**	<100	100	8789008
Dissolved Lead (Pb)	ug/L	**5**	<0.50	0.50	8789008
Dissolved Lithium (Li)	ug/L	-	140	5.0	8789008
Dissolved Magnesium (Mg)	ug/L	-	120000	50	8789008
Dissolved Manganese (Mn)	ug/L	-	330	2.0	8789008
Dissolved Molybdenum (Mo)	ug/L	**40**	34	0.50	8789008
Dissolved Nickel (Ni)	ug/L	**25**	1.9	1.0	8789008
Dissolved Phosphorus (P)	ug/L	-	<100	100	8789008
Dissolved Potassium (K)	ug/L	-	53000	200	8789008
Dissolved Rubidium (Rb)	ug/L	-	12	0.20	8789008
Dissolved Selenium (Se)	ug/L	**100**	<2.0	2.0	8789008
Dissolved Silicon (Si)	ug/L	-	8400	50	8789008
Dissolved Silver (Ag)	ug/L	**0.1**	<0.090	0.090	8789008
Dissolved Sodium (Na)	ug/L	-	55000	100	8789008
Dissolved Strontium (Sr)	ug/L	-	1000	1.0	8789008
Dissolved Tellurium (Te)	ug/L	-	<1.0	1.0	8789008
Dissolved Thallium (Tl)	ug/L	**0.3**	<0.050	0.050	8789008

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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O.REG 153 METALS & INORGANICS PKG (WTR)

Bureau Veritas ID			WJA466		
Sampling Date			2023/07/11 12:00		
COC Number			942407-01-01		
	UNITS	Criteria	BH/MW-1	RDL	QC Batch
Dissolved Thorium (Th)	ug/L	-	<2.0	2.0	8789008
Dissolved Tin (Sn)	ug/L	-	1.2	1.0	8789008
Dissolved Titanium (Ti)	ug/L	-	<5.0	5.0	8789008
Dissolved Tungsten (W)	ug/L	**30**	<1.0	1.0	8789008
Dissolved Uranium (U)	ug/L	**5**	**17**	0.10	8789008
Dissolved Vanadium (V)	ug/L	**6**	0.58	0.50	8789008
Dissolved Zinc (Zn)	ug/L	**30**	<5.0	5.0	8789008
Dissolved Zirconium (Zr)	ug/L	**4**	<1.0	1.0	8789008

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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Bureau Veritas Job #: C3K5466
Report Date: 2023/07/20

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Sampler Initials: JC

TEST SUMMARY

Bureau Veritas ID: WJA466
Sample ID: BH/MW-1
Matrix: Water

Collected: 2023/07/11
Shipped:
Received: 2023/07/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	8787967	N/A	2023/07/14	Arefa Dabhad
Alkalinity	AT	8788538	N/A	2023/07/14	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8783653	N/A	2023/07/17	Automated Statchk
Biochemical Oxygen Demand (BOD)	DO	8788743	2023/07/14	2023/07/19	Gurjot Kaur
Chloride by Automated Colourimetry	KONE	8788518	N/A	2023/07/14	Alina Dobreanu
Conductivity	AT	8788537	N/A	2023/07/14	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8789399	N/A	2023/07/14	Gyulshen Idriz
Hardness (calculated as CaCO3)		8784331	N/A	2023/07/18	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8789008	N/A	2023/07/18	Prempal Bhatti
Ion Balance (% Difference)	CALC	8785386	N/A	2023/07/18	Automated Statchk
Anion and Cation Sum	CALC	8785388	N/A	2023/07/18	Automated Statchk
Total Ammonia-N	LACH/NH4	8790401	N/A	2023/07/17	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8788424	N/A	2023/07/14	Viorica Rotaru
pH	AT	8788539	2023/07/13	2023/07/14	Kien Tran
Orthophosphate	KONE	8788516	N/A	2023/07/14	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	8784779	N/A	2023/07/18	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8784780	N/A	2023/07/18	Automated Statchk
Sulphate by Automated Turbidimetry	KONE	8788517	N/A	2023/07/14	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	8784782	N/A	2023/07/18	Automated Statchk
Total Suspended Solids	BAL	8789653	2023/07/14	2023/07/17	Tina Teng

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Bureau Veritas Job #: C3K5466
Report Date: 2023/07/20

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Sampler Initials: JC

GENERAL COMMENTS

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

Package 1	11.3°C

Revised Report (2023/07/20) : Client sample ID corrected to BH/MW-1 per client request. Results have been split onto separate files per client request.

The sample was collected July11-12, 2023.

Results relate only to the items tested.

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Bureau Veritas Job #: C3K5466
Report Date: 2023/07/20

QUALITY ASSURANCE REPORT

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Sampler Initials: JC

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8787967	Dissolved (0.2u) Aluminum (Al)	2023/07/14	102	80 - 120	102	80 - 120	<5	ug/L	4.1 (1)	20		
8788424	Nitrate (N)	2023/07/14	88	80 - 120	92	80 - 120	<0.10	mg/L	NC (1)	20		
8788424	Nitrite (N)	2023/07/14	103	80 - 120	105	80 - 120	<0.010	mg/L	NC (1)	20		
8788516	Orthophosphate (P)	2023/07/14	89	75 - 125	90	80 - 120	<0.010	mg/L	1.0 (1)	20		
8788517	Dissolved Sulphate (SO4)	2023/07/14	84	75 - 125	96	80 - 120	<1.0	mg/L	1.1 (1)	20		
8788518	Dissolved Chloride (Cl-)	2023/07/14	NC	80 - 120	93	80 - 120	<1.0	mg/L	0.35 (1)	20		
8788537	Conductivity	2023/07/14			102	85 - 115	<1.0	umho/cm	0.17 (1)	10		
8788538	Alkalinity (Total as CaCO3)	2023/07/14			97	85 - 115	<1.0	mg/L	0.34 (1)	20		
8788539	pH	2023/07/14			102	98 - 103			0.18 (1)	N/A		
8788743	Total BOD	2023/07/19					<2	mg/L	9.6 (1)	30	97	80 - 120
8789008	Dissolved Aluminum (Al)	2023/07/18	116	80 - 120	100	80 - 120	<4.9	ug/L				
8789008	Dissolved Antimony (Sb)	2023/07/18	109	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20		
8789008	Dissolved Arsenic (As)	2023/07/18	106	80 - 120	99	80 - 120	<1.0	ug/L	NC (1)	20		
8789008	Dissolved Barium (Ba)	2023/07/18	109	80 - 120	97	80 - 120	<2.0	ug/L	0.42 (1)	20		
8789008	Dissolved Beryllium (Be)	2023/07/18	112	80 - 120	99	80 - 120	<0.40	ug/L	NC (1)	20		
8789008	Dissolved Bismuth (Bi)	2023/07/18	94	80 - 120	97	80 - 120	<1.0	ug/L				
8789008	Dissolved Boron (B)	2023/07/18	112	80 - 120	102	80 - 120	<10	ug/L	3.7 (1)	20		
8789008	Dissolved Cadmium (Cd)	2023/07/18	102	80 - 120	98	80 - 120	<0.090	ug/L	7.5 (1)	20		
8789008	Dissolved Calcium (Ca)	2023/07/18	NC	80 - 120	104	80 - 120	<200	ug/L				
8789008	Dissolved Cesium (Cs)	2023/07/18	107	80 - 120	98	80 - 120	<0.20	ug/L				
8789008	Dissolved Chromium (Cr)	2023/07/18	108	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20		
8789008	Dissolved Cobalt (Co)	2023/07/18	102	80 - 120	100	80 - 120	<0.50	ug/L	1.1 (1)	20		
8789008	Dissolved Copper (Cu)	2023/07/18	111	80 - 120	102	80 - 120	<0.90	ug/L	6.3 (1)	20		
8789008	Dissolved Iron (Fe)	2023/07/18	108	80 - 120	103	80 - 120	<100	ug/L				
8789008	Dissolved Lead (Pb)	2023/07/18	97	80 - 120	100	80 - 120	<0.50	ug/L	NC (1)	20		
8789008	Dissolved Lithium (Li)	2023/07/18	112	80 - 120	104	80 - 120	<5.0	ug/L				
8789008	Dissolved Magnesium (Mg)	2023/07/18	NC	80 - 120	103	80 - 120	<50	ug/L				
8789008	Dissolved Manganese (Mn)	2023/07/18	NC	80 - 120	99	80 - 120	<2.0	ug/L				
8789008	Dissolved Molybdenum (Mo)	2023/07/18	120	80 - 120	103	80 - 120	<0.50	ug/L	6.6 (1)	20		
8789008	Dissolved Nickel (Ni)	2023/07/18	98	80 - 120	99	80 - 120	<1.0	ug/L	1.7 (1)	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8789008	Dissolved Phosphorus (P)	2023/07/18	114	80 - 120	107	80 - 120	<100	ug/L				
8789008	Dissolved Potassium (K)	2023/07/18	124 (2)	80 - 120	104	80 - 120	<200	ug/L				
8789008	Dissolved Rubidium (Rb)	2023/07/18	106	80 - 120	99	80 - 120	<0.20	ug/L				
8789008	Dissolved Selenium (Se)	2023/07/18	97	80 - 120	100	80 - 120	<2.0	ug/L	NC (1)	20		
8789008	Dissolved Silicon (Si)	2023/07/18	118	80 - 120	101	80 - 120	<50	ug/L				
8789008	Dissolved Silver (Ag)	2023/07/18	100	80 - 120	100	80 - 120	<0.090	ug/L	NC (1)	20		
8789008	Dissolved Sodium (Na)	2023/07/18	NC	80 - 120	104	80 - 120	<100	ug/L	0.98 (1)	20		
8789008	Dissolved Strontium (Sr)	2023/07/18	NC	80 - 120	99	80 - 120	<1.0	ug/L				
8789008	Dissolved Tellurium (Te)	2023/07/18	102	80 - 120	99	80 - 120	<1.0	ug/L				
8789008	Dissolved Thallium (Tl)	2023/07/18	96	80 - 120	100	80 - 120	<0.050	ug/L	NC (1)	20		
8789008	Dissolved Thorium (Th)	2023/07/18	102	80 - 120	101	80 - 120	<2.0	ug/L				
8789008	Dissolved Tin (Sn)	2023/07/18	112	80 - 120	101	80 - 120	<1.0	ug/L				
8789008	Dissolved Titanium (Ti)	2023/07/18	112	80 - 120	97	80 - 120	<5.0	ug/L				
8789008	Dissolved Tungsten (W)	2023/07/18	107	80 - 120	105	80 - 120	<1.0	ug/L				
8789008	Dissolved Uranium (U)	2023/07/18	101	80 - 120	100	80 - 120	<0.10	ug/L	11 (1)	20		
8789008	Dissolved Vanadium (V)	2023/07/18	113	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20		
8789008	Dissolved Zinc (Zn)	2023/07/18	97	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20		
8789008	Dissolved Zirconium (Zr)	2023/07/18	127 (2)	80 - 120	105	80 - 120	<1.0	ug/L				
8789399	Dissolved Organic Carbon	2023/07/14	96	80 - 120	96	80 - 120	<0.40	mg/L	0.39 (1)	20		
8789653	Total Suspended Solids	2023/07/17			96	85 - 115	<10	mg/L	NC (1)	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8790401	Total Ammonia-N	2023/07/17	107	75 - 125	102	80 - 120	<0.050	mg/L	NC (1)	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.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

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.

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) Duplicate Parent ID

(2) Matrix spike exceedes acceptance limits. Probable matrix interference.

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Bureau Veritas Job #: C3K5466
Report Date: 2023/07/20

AECOM Canada Ltd
Client Project #: 60646784
Site Location: PEEL REGION SNOW STORAGE
Sampler Initials: JC

VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, Scientific Specialist

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 {0}, {1} responsible for {2} {3} laboratory operations.

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Page of

12-Jul-23 10:43
Marijane Cruz
C3K5466
AJH ENV-1300

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#1020 AECOM Canada Ltd	Company Name:	AECOM	Quotation #:	B91379
Attention:	Accounts Payable	Attention:	Brian Holden	P.O. #:	
Address:	105 Commerce Valley Dr West 7th Floor Markham ON L3T 7W3	Address:		Project:	60646784
Tel:	(905) 886-7022 Fax: (905) 886-9494	Tel:	Fax:	Project Name:	
Email:	CANSSC.E-billing@aecom.com	Email:	brian.holden@aecom.com; dhwanish.parikh@aecom.co	Site #:	Peel Region Snow Storage
				Sampled By:	

C#942407-01-01

Bottle Order #: 942407
Project Manager: Marijane Cruz

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___	☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☐ Reg 406 Table ___ ☐ Other ___	

Include Criteria on Certificate of Analysis (Y/N)? ___

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 Metals & Inorganics Pkg (Wtr)	O.Reg 153 PAHs	O.Reg 153 PCBs (Water)	O.Reg 153 VOCs by HS & F1-F4	RCAp - Comprehensive	Dissolved Aluminum (0.2 u, clay free)	Total Suspended Solids	Biochemical Oxygen Demand (BOD)			# of Bottles	Comments
1	BH1/MW-1	Peel Reg. Park	07/11	12PM	GW		✓	✓	✓	✓	✓	✓	✓	✓			7	
2	BH1/MW-1	- - - -	07/12	10AM	GW	X	✓	✓	✓	✓	✓	✓	✓	✓			3	
3	BH1/MW-1	- - - -	07/12	10AM	GW		✓	✓	✓	✓	✓	✓	✓	✓			5	
4																		
5																		
6																		
7																		
8																		
9																		
10																		

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(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 #)

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
June Chen	23/07/12	11AM		07/07/12	1043	

Laboratory Use Only
Time Sensitive | Temperature (°C) on Receipt: 7/19/13 | Custody Seal Present / Intact: Yes ☐ No ☐

* 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.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

ON ice

Bureau Veritas Canada (2019) Inc.

Exceedance Summary Table – Prov. Water Quality Obj.

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
BH/MW-1	WJA466-08	Dissolved Boron (B)	200	260	10	ug/L
BH/MW-1	WJA466-08	Dissolved Uranium (U)	5	17	0.10	ug/L

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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Appendix F

AGAT Laboratories

5835 COOPERS AVENUE
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CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: AECOM CANADA LTD
105 COMMERCE VALLEY DR.W 7TH FLOOR
MARKHAM, ON L3T7W3
(905) 886-7022

ATTENTION TO: Sergiy Tchernikov

PROJECT: 60646784

AGAT WORK ORDER: 23T043079

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Jul 12, 2023

PAGES (INCLUDING COVER): 20

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.
- For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.

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Certificate of Analysis

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:Hurontario

SAMPLED BY:K.M.

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2023-07-04

DATE REPORTED: 2023-07-12

					SAMPLE DESCRIPTION:	BH1-SS2	BH1-SS6	BH3-SS2	BH2-SS2
					SAMPLE TYPE:	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2023-06-30	2023-06-30	2023-06-30	2023-06-30
Parameter	Unit	G / S: A	G / S: B	RDL		5114690	5114692	5114693	5114696
Antimony	µg/g	40	7.5	0.8		<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	11	1		5[<B]	4[<B]	5[<B]	5[<B]
Barium	µg/g	670	390	2.0		133[<B]	54.5[<B]	80.6[<B]	93.4[<B]
Beryllium	µg/g	8	4	0.5		0.9[<B]	0.5[<B]	0.7[<B]	0.8[<B]
Boron	µg/g	120	120	5		11[<A]	12[<A]	12[<A]	11[<A]
Boron (Hot Water Soluble)	µg/g	2	1.5	0.10		0.50[<B]	0.17[<B]	<0.10	0.18[<B]
Cadmium	µg/g	1.9	1	0.5		<0.5	<0.5	<0.5	<0.5
Chromium	µg/g	160	160	5		29[<A]	16[<A]	22[<A]	25[<A]
Cobalt	µg/g	80	22	0.8		11.9[<B]	9.1[<B]	10.7[<B]	11.0[<B]
Copper	µg/g	230	140	1.0		27.5[<B]	22.6[<B]	24.6[<B]	26.9[<B]
Lead	µg/g	120	45	1		17[<B]	6[<B]	7[<B]	10[<B]
Molybdenum	µg/g	40	6.9	0.5		<0.5	<0.5	0.6[<B]	<0.5
Nickel	µg/g	270	100	1		27[<B]	20[<B]	25[<B]	34[<B]
Selenium	µg/g	5.5	2.4	0.8		0.9[<B]	<0.8	<0.8	<0.8
Silver	µg/g	40	20	0.5		<0.5	<0.5	<0.5	<0.5
Thallium	µg/g	3.3	1	0.5		<0.5	<0.5	<0.5	<0.5
Uranium	µg/g	33	23	0.50		0.69[<B]	0.54[<B]	0.58[<B]	0.64[<B]
Vanadium	µg/g	86	86	2.0		38.9[<A]	23.0[<A]	30.0[<A]	35.6[<A]
Zinc	µg/g	340	340	5		87[<A]	42[<A]	51[<A]	61[<A]
Chromium, Hexavalent	µg/g	8	8	0.2		<0.2	<0.2	<0.2	<0.2
Cyanide, WAD	µg/g	0.051	0.051	0.040		<0.040	<0.040	<0.040	<0.040
Mercury	µg/g	3.9	0.25	0.10		<0.10	<0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	1.4	0.7	0.005		0.645[<B]	0.165[<B]	0.813[B-A]	0.755[B-A]
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	12	5	N/A		2.02[<B]	0.334[<B]	1.84[<B]	2.68[<B]
pH, 2:1 CaCl2 Extraction	pH Units	5.0-9.0	5.0-9.0	NA		7.60	7.45	7.90	7.58

Certified By:

AGAT Laboratories

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FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:Hurontario

SAMPLED BY:K.M.

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2023-07-04

DATE REPORTED: 2023-07-12

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils, B Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Agricultural or Other Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5114690-5114696 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:Hurontario

SAMPLED BY:K.M.

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2023-07-04

DATE REPORTED: 2023-07-12

					SAMPLE DESCRIPTION:	BH1-SS2	BH3-SS1
					SAMPLE TYPE:	Soil	Soil
					DATE SAMPLED:	2023-06-30	2023-06-30
Parameter	Unit	G / S: A	G / S: B	RDL		5114690	5114705
Naphthalene	µg/g	9.6	0.6	0.05		<0.05	<0.05
Acenaphthylene	µg/g	0.15	0.15	0.05		<0.05	<0.05
Acenaphthene	µg/g	21	7.9	0.05		<0.05	<0.05
Fluorene	µg/g	62	62	0.05		<0.05	<0.05
Phenanthrene	µg/g	12	6.2	0.05		<0.05	0.53[<B]
Anthracene	µg/g	0.67	0.67	0.05		<0.05	0.10[<A]
Fluoranthene	µg/g	9.6	0.69	0.05		<0.05	0.92[B-A]
Pyrene	µg/g	96	78	0.05		<0.05	0.68[<B]
Benz(a)anthracene	µg/g	0.96	0.5	0.05		<0.05	0.28[<B]
Chrysene	µg/g	9.6	7	0.05		<0.05	0.20[<B]
Benzo(b)fluoranthene	µg/g	0.96	0.78	0.05		<0.05	0.21[<B]
Benzo(k)fluoranthene	µg/g	0.96	0.78	0.05		<0.05	0.11[<B]
Benzo(a)pyrene	µg/g	0.3	0.078	0.05		<0.05	0.11[B-A]
Indeno(1,2,3-cd)pyrene	µg/g	0.76	0.38	0.05		<0.05	0.05[<B]
Dibenz(a,h)anthracene	µg/g	0.1	0.1	0.05		<0.05	<0.05
Benzo(g,h,i)perylene	µg/g	9.6	6.6	0.05		<0.05	0.07[<B]
1 and 2 Methlynaphthalene	µg/g	30	0.99	0.05		<0.05	<0.05
Moisture Content	%			0.1		22.2	11.1
Surrogate	Unit		Acceptable Limits				
Naphthalene-d8	%		50-140			100	75
Acridine-d9	%		50-140			115	115
Terphenyl-d14	%		50-140			95	110

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils, B Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Agricultural or Other Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5114690-5114705 Results are based on the dry weight of the soil.
Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: NPopnikolof

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:Hurontario

SAMPLED BY:K.M.

O. Reg. 153(511) - PCBs (Soil)

DATE RECEIVED: 2023-07-04

DATE REPORTED: 2023-07-12

					SAMPLE DESCRIPTION:	BH2-SS2	BH1-SS1
					SAMPLE TYPE:	Soil	Soil
					DATE SAMPLED:	2023-06-30	2023-06-30
Parameter	Unit	G / S: A	G / S: B	RDL		5114696	5114702
Polychlorinated Biphenyls	µg/g	1.1	0.35	0.1		<0.1	<0.1
Moisture Content	%			0.1		11.3	12.5
Surrogate	Unit		Acceptable Limits				
Decachlorobiphenyl	%		50-140			92	80

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils, B Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Agricultural or Other Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5114696-5114702 Results are based on the dry weight of soil extracted.
PCB total is a calculated parameter. The calculated value is the sum of Aroclor 1242, Aroclor 1248, Aroclor 1254 and Aroclor 1260.
The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

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Certificate of Analysis

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:Hurontario

SAMPLED BY:K.M.

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2023-07-04

DATE REPORTED: 2023-07-12

					SAMPLE DESCRIPTION:	BH3-SS4	BH2-SS3	BH1-SS4
					SAMPLE TYPE:	Soil	Soil	Soil
					DATE SAMPLED:	2023-06-30 10:40	2023-06-30 10:40	2023-06-29 13:30
Parameter	Unit	G / S: A	G / S: B	RDL		5114698	5114699	5114700
Benzene	µg/g	0.32	0.21	0.02		<0.02	<0.02	<0.02
Toluene	µg/g	6.4	2.3	0.05		<0.05	<0.05	<0.05
Ethylbenzene	µg/g	1.1	1.1	0.05		<0.05	<0.05	<0.05
m & p-Xylene	µg/g			0.05		<0.05	<0.05	<0.05
o-Xylene	µg/g			0.05		<0.05	<0.05	<0.05
Xylenes (Total)	µg/g	26	3.1	0.05		<0.05	<0.05	<0.05
F1 (C6 - C10)	µg/g	55	55	5		<5	<5	<5
F1 (C6 to C10) minus BTEX	µg/g	55	55	5		<5	<5	<5
F2 (C10 to C16)	µg/g	230	98	10		<10	<10	<10
F3 (C16 to C34)	µg/g	1700	300	50		<50	<50	<50
F4 (C34 to C50)	µg/g	3300	2800	50		<50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g	3300	2800	50		NA	NA	NA
Moisture Content	%			0.1		11.8	12.0	12.0
Surrogate	Unit	Acceptable Limits						
Toluene-d8	% Recovery	60-140				96	82	78
Terphenyl	%	60-140				88	83	90

Certified By:

AGAT Laboratories

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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Certificate of Analysis

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:Hurontario

SAMPLED BY:K.M.

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2023-07-04

DATE REPORTED: 2023-07-12

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils, B Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Agricultural or Other Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5114698-5114700 Results are based on sample dry weight.
The C6-C10 fraction is calculated using Toluene response factor.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.
Quality Control Data is available upon request.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:Hurontario

SAMPLED BY:K.M.

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2023-07-04

DATE REPORTED: 2023-07-12

SAMPLE DESCRIPTION:					BH2-SS4	BH3-SS3	BH1-SS3	BH2-SS7
SAMPLE TYPE:					Soil	Soil	Soil	Soil
DATE SAMPLED:					2023-06-30 11:40	2023-06-30 10:30	2023-06-30 13:10	2023-06-30 12:20
Parameter	Unit	G / S: A	G / S: B	RDL	5114712	5114713	5114714	5114715
Dichlorodifluoromethane	µg/g	16	16	0.05	<0.05	<0.05	<0.05	<0.05
Vinyl Chloride	ug/g	0.032	0.02	0.02	<0.02	<0.02	<0.02	<0.02
Bromomethane	ug/g	0.05	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Trichlorofluoromethane	ug/g	4	4	0.05	<0.05	<0.05	<0.05	<0.05
Acetone	ug/g	16	16	0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	ug/g	0.064	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Methylene Chloride	ug/g	1.6	0.1	0.05	<0.05	<0.05	<0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g	1.3	0.084	0.05	<0.05	<0.05	<0.05	<0.05
Methyl tert-butyl Ether	ug/g	1.6	0.75	0.05	<0.05	<0.05	<0.05	<0.05
1,1-Dichloroethane	ug/g	0.47	0.47	0.02	<0.02	<0.02	<0.02	<0.02
Methyl Ethyl Ketone	ug/g	70	16	0.50	<0.50	<0.50	<0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g	1.9	1.9	0.02	<0.02	<0.02	<0.02	<0.02
Chloroform	ug/g	0.47	0.05	0.04	<0.04	<0.04	<0.04	<0.04
1,2-Dichloroethane	ug/g	0.05	0.05	0.03	<0.03	<0.03	<0.03	<0.03
1,1,1-Trichloroethane	ug/g	6.1	0.38	0.05	<0.05	<0.05	<0.05	<0.05
Carbon Tetrachloride	ug/g	0.21	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Benzene	ug/g	0.32	0.21	0.02	<0.02	<0.02	<0.02	<0.02
1,2-Dichloropropane	ug/g	0.16	0.05	0.03	<0.03	<0.03	<0.03	<0.03
Trichloroethylene	ug/g	0.55	0.061	0.03	<0.03	<0.03	<0.03	<0.03
Bromodichloromethane	ug/g	1.5	1.5	0.05	<0.05	<0.05	<0.05	<0.05
Methyl Isobutyl Ketone	ug/g	31	1.7	0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	ug/g	0.05	0.05	0.04	<0.04	<0.04	<0.04	<0.04
Toluene	ug/g	6.4	2.3	0.05	<0.05	<0.05	<0.05	<0.05
Dibromochloromethane	ug/g	2.3	2.3	0.05	<0.05	<0.05	<0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.05	0.04	<0.04	<0.04	<0.04	<0.04
Tetrachloroethylene	ug/g	1.9	0.28	0.05	<0.05	<0.05	<0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g	0.087	0.058	0.04	<0.04	<0.04	<0.04	<0.04
Chlorobenzene	ug/g	2.4	2.4	0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	ug/g	1.1	1.1	0.05	<0.05	<0.05	<0.05	<0.05

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:Hurontario

SAMPLED BY:K.M.

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2023-07-04

DATE REPORTED: 2023-07-12

					SAMPLE DESCRIPTION:	BH2-SS4	BH3-SS3	BH1-SS3	BH2-SS7
					SAMPLE TYPE:	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2023-06-30 11:40	2023-06-30 10:30	2023-06-30 13:10	2023-06-30 12:20
Parameter	Unit	G / S: A	G / S: B	RDL		5114712	5114713	5114714	5114715
m & p-Xylene	ug/g			0.05		<0.05	<0.05	<0.05	<0.05
Bromoform	ug/g	0.61	0.27	0.05		<0.05	<0.05	<0.05	<0.05
Styrene	ug/g	34	0.7	0.05		<0.05	<0.05	<0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	0.05		<0.05	<0.05	<0.05	<0.05
o-Xylene	ug/g			0.05		<0.05	<0.05	<0.05	<0.05
1,3-Dichlorobenzene	ug/g	9.6	4.8	0.05		<0.05	<0.05	<0.05	<0.05
1,4-Dichlorobenzene	ug/g	0.2	0.083	0.05		<0.05	<0.05	<0.05	<0.05
1,2-Dichlorobenzene	ug/g	1.2	1.2	0.05		<0.05	<0.05	<0.05	<0.05
Xylenes (Total)	ug/g	26	3.1	0.05		<0.05	<0.05	<0.05	<0.05
1,3-Dichloropropene (Cis + Trans)	µg/g	0.059	0.05	0.04		<0.04	<0.04	<0.04	<0.04
n-Hexane	µg/g	46	2.8	0.05		<0.05	<0.05	<0.05	<0.05
Moisture Content	%			0.1		10.7	10.7	18.6	9.5
Surrogate	Unit	Acceptable Limits							
Toluene-d8	% Recovery	50-140				94	95	95	94
4-Bromofluorobenzene	% Recovery	50-140				89	88	90	89

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Industrial/Commercial/Community Property Use - Coarse Textured Soils, B Refers to Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Soil - Agricultural or Other Property Use - Coarse Textured Soils
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5114712-5114715 The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: NPopnikolof

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Exceedance Summary

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
5114693	BH3-SS2	ON T2 S AG CT	O. Reg. 153(511) - Metals & Inorganics (Soil)	Electrical Conductivity (2:1)	mS/cm	0.7	0.813
5114696	BH2-SS2	ON T2 S AG CT	O. Reg. 153(511) - Metals & Inorganics (Soil)	Electrical Conductivity (2:1)	mS/cm	0.7	0.755
5114705	BH3-SS1	ON T2 S AG CT	O. Reg. 153(511) - PAHs (Soil)	Benzo(a)pyrene	µg/g	0.078	0.11
5114705	BH3-SS1	ON T2 S AG CT	O. Reg. 153(511) - PAHs (Soil)	Fluoranthene	µg/g	0.69	0.92

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD
PROJECT: 60646784
SAMPLING SITE:Hurontario

AGAT WORK ORDER: 23T043079
ATTENTION TO: Sergiy Tchernikov
SAMPLED BY:K.M.

Soil Analysis

RPT Date: Jul 12, 2023			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	5119106		<0.8	<0.8	NA	< 0.8	100%	70%	130%	102%	80%	120%	96%	70%	130%
Arsenic	5119106		6	6	0.0%	< 1	109%	70%	130%	102%	80%	120%	117%	70%	130%
Barium	5119106		18.5	18.8	1.6%	< 2.0	92%	70%	130%	101%	80%	120%	118%	70%	130%
Beryllium	5119106		<0.5	<0.5	NA	< 0.5	78%	70%	130%	106%	80%	120%	113%	70%	130%
Boron	5119106		9	10	NA	< 5	88%	70%	130%	111%	80%	120%	123%	70%	130%
Boron (Hot Water Soluble)	5114690	5114690	0.50	0.49	NA	< 0.10	92%	60%	140%	95%	70%	130%	103%	60%	140%
Cadmium	5119106		<0.5	<0.5	NA	< 0.5	112%	70%	130%	103%	80%	120%	104%	70%	130%
Chromium	5119106		7	7	NA	< 5	110%	70%	130%	105%	80%	120%	129%	70%	130%
Cobalt	5119106		3.8	4.3	NA	< 0.8	103%	70%	130%	99%	80%	120%	119%	70%	130%
Copper	5119106		9.6	10.5	9.0%	< 1.0	93%	70%	130%	102%	80%	120%	114%	70%	130%
Lead	5119106		10	10	0.0%	< 1	101%	70%	130%	99%	80%	120%	89%	70%	130%
Molybdenum	5119106		0.7	0.7	NA	< 0.5	104%	70%	130%	109%	80%	120%	116%	70%	130%
Nickel	5119106		14	16	13.3%	< 1	104%	70%	130%	108%	80%	120%	121%	70%	130%
Selenium	5119106		<0.8	<0.8	NA	< 0.8	132%	70%	130%	103%	80%	120%	98%	70%	130%
Silver	5119106		<0.5	<0.5	NA	< 0.5	104%	70%	130%	115%	80%	120%	96%	70%	130%
Thallium	5119106		<0.5	<0.5	NA	< 0.5	104%	70%	130%	106%	80%	120%	92%	70%	130%
Uranium	5119106		<0.50	<0.50	NA	< 0.50	113%	70%	130%	97%	80%	120%	91%	70%	130%
Vanadium	5119106		10.7	11.3	5.5%	< 2.0	114%	70%	130%	102%	80%	120%	130%	70%	130%
Zinc	5119106		79	66	17.9%	< 5	101%	70%	130%	104%	80%	120%	110%	70%	130%
Chromium, Hexavalent	5110045		<0.2	<0.2	NA	< 0.2	89%	70%	130%	90%	80%	120%	84%	70%	130%
Cyanide, WAD	5123005		<0.040	<0.040	NA	< 0.040	100%	70%	130%	97%	80%	120%	100%	70%	130%
Mercury	5119106		<0.10	<0.10	NA	< 0.10	101%	70%	130%	97%	80%	120%	98%	70%	130%
Electrical Conductivity (2:1)	5114690	5114690	0.645	0.649	0.6%	< 0.005	109%	80%	120%						
Sodium Adsorption Ratio (2:1) (Calc.)	5114690	5114690	2.02	1.98	2.0%	NA									
pH, 2:1 CaCl2 Extraction	5124295		7.77	7.59	2.3%	NA	100%	80%	120%						

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD
PROJECT: 60646784
SAMPLING SITE:Hurontario

AGAT WORK ORDER: 23T043079
ATTENTION TO: Sergiy Tchernikov
SAMPLED BY:K.M.

Trace Organics Analysis

RPT Date: Jul 12, 2023

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	5119146		<0.05	<0.05	NA	< 0.05	108%	50%	140%	98%	50%	140%	115%	50%	140%
Acenaphthylene	5119146		<0.05	<0.05	NA	< 0.05	83%	50%	140%	75%	50%	140%	75%	50%	140%
Acenaphthene	5119146		<0.05	<0.05	NA	< 0.05	105%	50%	140%	78%	50%	140%	73%	50%	140%
Fluorene	5119146		<0.05	<0.05	NA	< 0.05	106%	50%	140%	80%	50%	140%	80%	50%	140%
Phenanthrene	5119146		<0.05	<0.05	NA	< 0.05	87%	50%	140%	90%	50%	140%	78%	50%	140%
Anthracene	5119146		<0.05	<0.05	NA	< 0.05	69%	50%	140%	83%	50%	140%	83%	50%	140%
Fluoranthene	5119146		<0.05	<0.05	NA	< 0.05	96%	50%	140%	78%	50%	140%	88%	50%	140%
Pyrene	5119146		<0.05	<0.05	NA	< 0.05	92%	50%	140%	80%	50%	140%	85%	50%	140%
Benz(a)anthracene	5119146		<0.05	<0.05	NA	< 0.05	93%	50%	140%	88%	50%	140%	80%	50%	140%
Chrysene	5119146		<0.05	<0.05	NA	< 0.05	102%	50%	140%	75%	50%	140%	83%	50%	140%
Benzo(b)fluoranthene	5119146		<0.05	<0.05	NA	< 0.05	117%	50%	140%	73%	50%	140%	108%	50%	140%
Benzo(k)fluoranthene	5119146		<0.05	<0.05	NA	< 0.05	111%	50%	140%	90%	50%	140%	85%	50%	140%
Benzo(a)pyrene	5119146		<0.05	<0.05	NA	< 0.05	95%	50%	140%	83%	50%	140%	85%	50%	140%
Indeno(1,2,3-cd)pyrene	5119146		<0.05	<0.05	NA	< 0.05	86%	50%	140%	80%	50%	140%	85%	50%	140%
Dibenz(a,h)anthracene	5119146		<0.05	<0.05	NA	< 0.05	77%	50%	140%	83%	50%	140%	75%	50%	140%
Benzo(g,h,i)perylene	5119146		<0.05	<0.05	NA	< 0.05	67%	50%	140%	78%	50%	140%	85%	50%	140%
O. Reg. 153(511) - PHCs F1 - F4 (Soil)															
Benzene	5114700	5114700	<0.02	<0.02	NA	< 0.02	100%	60%	140%	103%	60%	140%	108%	60%	140%
Toluene	5114700	5114700	<0.05	<0.05	NA	< 0.05	87%	60%	140%	105%	60%	140%	103%	60%	140%
Ethylbenzene	5114700	5114700	<0.05	<0.05	NA	< 0.05	108%	60%	140%	103%	60%	140%	106%	60%	140%
m & p-Xylene	5114700	5114700	<0.05	<0.05	NA	< 0.05	110%	60%	140%	118%	60%	140%	105%	60%	140%
o-Xylene	5114700	5114700	<0.05	<0.05	NA	< 0.05	113%	60%	140%	102%	60%	140%	85%	60%	140%
F1 (C6 - C10)	5114700	5114700	<5	<5	NA	< 5	89%	60%	140%	99%	60%	140%	99%	60%	140%
F2 (C10 to C16)	5110256		< 10	< 10	NA	< 10	104%	60%	140%	103%	60%	140%	104%	60%	140%
F3 (C16 to C34)	5110256		< 50	< 50	NA	< 50	108%	60%	140%	97%	60%	140%	92%	60%	140%
F4 (C34 to C50)	5110256		< 50	< 50	NA	< 50	91%	60%	140%	104%	60%	140%	103%	60%	140%
O. Reg. 153(511) - VOCs (Soil)															
Dichlorodifluoromethane	5106140		<0.05	<0.05	NA	< 0.05	105%	50%	140%	104%	50%	140%	113%	50%	140%
Vinyl Chloride	5106140		<0.02	<0.02	NA	< 0.02	88%	50%	140%	110%	50%	140%	83%	50%	140%
Bromomethane	5106140		<0.05	<0.05	NA	< 0.05	87%	50%	140%	72%	50%	140%	92%	50%	140%
Trichlorofluoromethane	5106140		<0.05	<0.05	NA	< 0.05	105%	50%	140%	85%	50%	140%	84%	50%	140%
Acetone	5106140		<0.50	<0.50	NA	< 0.50	83%	50%	140%	87%	50%	140%	78%	50%	140%
1,1-Dichloroethylene	5106140		<0.05	<0.05	NA	< 0.05	89%	50%	140%	91%	60%	130%	99%	50%	140%
Methylene Chloride	5106140		<0.05	<0.05	NA	< 0.05	75%	50%	140%	84%	60%	130%	83%	50%	140%
Trans- 1,2-Dichloroethylene	5106140		<0.05	<0.05	NA	< 0.05	107%	50%	140%	81%	60%	130%	84%	50%	140%
Methyl tert-butyl Ether	5106140		<0.05	<0.05	NA	< 0.05	92%	50%	140%	76%	60%	130%	75%	50%	140%
1,1-Dichloroethane	5106140		<0.02	<0.02	NA	< 0.02	119%	50%	140%	89%	60%	130%	81%	50%	140%
Methyl Ethyl Ketone	5106140		<0.50	<0.50	NA	< 0.50	85%	50%	140%	76%	50%	140%	75%	50%	140%

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Quality Assurance

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PROJECT: 60646784
SAMPLING SITE:Hurontario

AGAT WORK ORDER: 23T043079
ATTENTION TO: Sergiy Tchernikov
SAMPLED BY:K.M.

Trace Organics Analysis (Continued)

RPT Date: Jul 12, 2023

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Cis- 1,2-Dichloroethylene	5106140		<0.02	<0.02	NA	< 0.02	96%	50%	140%	71%	60%	130%	73%	50%	140%
Chloroform	5106140		<0.04	<0.04	NA	< 0.04	98%	50%	140%	73%	60%	130%	103%	50%	140%
1,2-Dichloroethane	5106140		<0.03	<0.03	NA	< 0.03	91%	50%	140%	87%	60%	130%	89%	50%	140%
1,1,1-Trichloroethane	5106140		<0.05	<0.05	NA	< 0.05	78%	50%	140%	72%	60%	130%	98%	50%	140%
Carbon Tetrachloride	5106140		<0.05	<0.05	NA	< 0.05	78%	50%	140%	75%	60%	130%	103%	50%	140%
Benzene	5106140		<0.02	<0.02	NA	< 0.02	91%	50%	140%	70%	60%	130%	73%	50%	140%
1,2-Dichloropropane	5106140		<0.03	<0.03	NA	< 0.03	87%	50%	140%	75%	60%	130%	81%	50%	140%
Trichloroethylene	5106140		<0.03	<0.03	NA	< 0.03	92%	50%	140%	93%	60%	130%	90%	50%	140%
Bromodichloromethane	5106140		<0.05	<0.05	NA	< 0.05	78%	50%	140%	104%	60%	130%	90%	50%	140%
Methyl Isobutyl Ketone	5106140		<0.50	<0.50	NA	< 0.50	89%	50%	140%	95%	50%	140%	81%	50%	140%
1,1,2-Trichloroethane	5106140		<0.04	<0.04	NA	< 0.04	118%	50%	140%	108%	60%	130%	119%	50%	140%
Toluene	5106140		<0.05	<0.05	NA	< 0.05	118%	50%	140%	101%	60%	130%	92%	50%	140%
Dibromochloromethane	5106140		<0.05	<0.05	NA	< 0.05	100%	50%	140%	74%	60%	130%	95%	50%	140%
Ethylene Dibromide	5106140		<0.04	<0.04	NA	< 0.04	114%	50%	140%	94%	60%	130%	85%	50%	140%
Tetrachloroethylene	5106140		<0.05	<0.05	NA	< 0.05	100%	50%	140%	95%	60%	130%	92%	50%	140%
1,1,1,2-Tetrachloroethane	5106140		<0.04	<0.04	NA	< 0.04	112%	50%	140%	79%	60%	130%	71%	50%	140%
Chlorobenzene	5106140		<0.05	<0.05	NA	< 0.05	113%	50%	140%	102%	60%	130%	95%	50%	140%
Ethylbenzene	5106140		<0.05	<0.05	NA	< 0.05	111%	50%	140%	97%	60%	130%	95%	50%	140%
m & p-Xylene	5106140		<0.05	<0.05	NA	< 0.05	114%	50%	140%	102%	60%	130%	94%	50%	140%
Bromoform	5106140		<0.05	<0.05	NA	< 0.05	88%	50%	140%	72%	60%	130%	102%	50%	140%
Styrene	5106140		<0.05	<0.05	NA	< 0.05	115%	50%	140%	84%	60%	130%	90%	50%	140%
1,1,2,2-Tetrachloroethane	5106140		<0.05	<0.05	NA	< 0.05	100%	50%	140%	104%	60%	130%	82%	50%	140%
o-Xylene	5106140		<0.05	<0.05	NA	< 0.05	106%	50%	140%	102%	60%	130%	94%	50%	140%
1,3-Dichlorobenzene	5106140		<0.05	<0.05	NA	< 0.05	101%	50%	140%	108%	60%	130%	100%	50%	140%
1,4-Dichlorobenzene	5106140		<0.05	<0.05	NA	< 0.05	91%	50%	140%	107%	60%	130%	99%	50%	140%
1,2-Dichlorobenzene	5106140		<0.05	<0.05	NA	< 0.05	110%	50%	140%	103%	60%	130%	100%	50%	140%
n-Hexane	5106140		<0.05	<0.05	NA	< 0.05	112%	50%	140%	73%	60%	130%	77%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

O. Reg. 153(511) - PCBs (Soil)															
Polychlorinated Biphenyls	5112608		< 0.1	< 0.1	NA	< 0.1	99%	50%	140%	93%	50%	140%	96%	50%	140%

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
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http://www.agatlabs.com

QC Exceedance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

ATTENTION TO: Sergiy Tchernikov

RPT Date: Jul 12, 2023

PARAMETER	Sample Id	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
			Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)										
Selenium		132%	70%	130%	103%	80%	120%	98%	70%	130%

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:Hurontario

SAMPLED BY:K.M.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, WAD	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	SEGMENTED FLOW ANALYSIS
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6075	modified from MSA PART 3, CH 14 and SM 2510 B	PC TITRATE
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6075	modified from EPA 9045D, MCKEAGUE 3.11 E3137	PC TITRATE

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Method Summary

CLIENT NAME: AECOM CANADA LTD
AGAT WORK ORDER: 23T043079
PROJECT: 60646784
ATTENTION TO: Sergiy Tchernikov
SAMPLING SITE:Hurontario
SAMPLED BY:K.M.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluorene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benz(a)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
1 and 2 Methlynaphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Moisture Content	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Polychlorinated Biphenyls	ORG-91-5113	modified from EPA SW-846 3570 & 8082A	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA SW-846 3541 & 8082A	GC/ECD
Benzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Toluene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Ethylbenzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
m & p-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
o-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Xylenes (Total)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
F1 (C6 - C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID

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ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:Hurontario

SAMPLED BY:K.M.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 23T043079

PROJECT: 60646784

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:Hurontario

SAMPLED BY:K.M.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Ethylene Dibromide	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Bromoform	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5002	modified from EPA 5035A & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	modified from EPA 5035A & EPA 8260D	(P&T)GC/MS

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Mississauga, Ontario L4Z 1Y2
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webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 23T043079

Cooler Quantity: 1 large

Arrival Temperatures: 8.6 | 9.4 | 8.4

Custody Seal Intact: ☑ Yes ☐ No ☐ N/A

Notes: loose ice

Report Information:

Company: AECOM Canada

Contact: Katie Malki / Sergiy Tchernikov

Address: 105 Commerce Valley, Markham, ON

Phone: Fax:

Reports to be sent to:

1. Email: Katie.Malki@aecom.com
2. Email: Sergiy.Tchernikov@aecom.com

Regulatory Requirements:

(Please check all applicable boxes)

☑ Regulation 153/04 — Table 2 (Indicate One) ☑ Ind/Com ☑ Res/Park ☑ Agriculture

Soil Texture (Check One) ☑ Coarse ☐ Fine

☑ Regulation 406 — Table 2 (Indicate One)

☐ Regulation 558

☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm — Region

☐ Prov. Water Quality Objectives (PWQO)

☐ Other — Indicate One

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT

*TAT is exclusive of weekends and statutory holidays

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 60646784

Site Location: ~~[illegible]~~ Hurontario

Sampled By: K.M.

AGAT Quote #: PO:

Please note: If quotation number is not provided, client will be billed full price for analysis.

Is this submission for a Record of Site Condition? ☐ Yes ☑ No

Report Guideline on Certificate of Analysis ☑ Yes ☐ No

Invoice Information:

Bill To Same: Yes ☐ No ☐

Company: AECOM Canada Inc.

Contact: Katie Malki

Address: as above

Email: as above

Sample Matrix Legend

GW Ground Water
O Oil
P Paint
S Soil (circled)
SD Sediment
SW Surface Water

Sample Identification	Date Sampled (2023)	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	BTEX, F1-F4 PHCs	VOC	PAHs	PCBs	PCBs: Aroclors ☐	O. Reg 558: Landfill Disposal Characterization TCLP: TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Regulation 406 SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	Regulation 406 Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Corrosivity: ☐ Moisture ☐ Sulphide						Potentially Hazardous or High Concentration (Y/N)
1. BH1-SS2	June 30	AM PM		Soil	M&I, PAH		✓				✓												
2. BH1-SS6		AM PM			M&I		✓																
3. BH3-SS2		AM PM			M&I		✓																
4. BH2-SS2		AM PM			M&I, PCB		✓					✓											
5. BH3-SS4		10:40 AM			PHC				✓														
6. BH2-SS3		10:40 AM			PHC				✓														
7. BH1-SS4		1:30 PM			PHC				✓														
8. BH1-SS1		AM PM			PCB																		
9. BH3-SS1		AM PM			PAH						✓												
10. BH2-SS4		11:40 AM			VOC					✓													
11. BH3-SS3		10:30 AM			VOC					✓													

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
			GWYNET V [signature]	7/4/23	17:01

Page 1 of 2

Nº: T-145460

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

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Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only
Work Order #: 23T043079
Cooler Quantity:
Arrival Temperatures: See page 1
Custody Seal Intact: ☐Yes ☐No ☐N/A
Notes:

Report Information:
Company: AECOM Canada
Contact: Katie Maleki / Sergiy Tchernikov
Address: 105 Commerce Valley, Markham ON
Phone: Fax:
Reports to be sent to:
1. Email: Katie.Maleki@aecom.com
2. Email: Sergiy.Tchernikov@aecom.com

Regulatory Requirements:
(Please check all applicable boxes)

☑ Regulation 153/04
Table 2 (Indicate One)
☑ Ind/Com ☑ Res/Park ☑ Agriculture
Soil Texture (Check One): ☑ Coarse ☐ Fine

☑ Regulation 406
Table 2 (Indicate One)

☐ Regulation 558
☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm
Region
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
Indicate One

Turnaround Time (TAT) Required:
Regular TAT ☑ 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day
OR Date Required (Rush Surcharges May Apply):
Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*
For 'Same Day' analysis, please contact your AGAT CPM

Project Information:
Project: 60646784
Site Location: Hurontario
Sampled By: K.M.
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☐ No

Invoice Information:
Bill To Same: Yes ☐ No ☐
Company: AECOM Canada
Contact: Katie Maleki
Address: as above
Email: as above

Sample Matrix Legend
GW Ground Water
O Oil
P Paint
(S) Soil
SD Sediment
SW Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y/N	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs	VOC	PAHs	PCBs	PCBs: Aroclors ☐	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Regulation 406 SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	Regulation 406 Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Corrosivity: ☐ Moisture ☐ Sulphide	Potentially Hazardous or High Concentration (Y/N)
1. BH1 - SS3	June 30	1:10 PM	2	Soil	VOC					✓								
2. BH2 - SS7	"	12:20 PM	2	Soil	VOC					✓								
3.		AM PM																
4.		AM PM																
5.		AM PM																
6.		AM PM																
7.		AM PM																
8.		AM PM																
9.		AM PM																
10.		AM PM																
11.		AM PM																

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
			GAYNET	7/4/23	17:01

Page 2 of 2
№: T - 145062

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: AECOM CANADA LTD
105 COMMERCE VALLEY DR.W 7TH FLOOR
MARKHAM, ON L3T7W3
(905) 886-7022

ATTENTION TO: Sergiy Tchernikov

PROJECT: 60646784

AGAT WORK ORDER: 23T074610

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

DATE REPORTED: Oct 03, 2023

PAGES (INCLUDING COVER): 10

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.
- For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 23T074610

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:

SAMPLED BY:

O. Reg. 558 - Metals & Inorganics

DATE RECEIVED: 2023-09-28

DATE REPORTED: 2023-10-03

		SAMPLE DESCRIPTION:		Com.SS-1
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2023-06-30
Parameter	Unit	G / S	RDL	5324963
Arsenic Leachate	mg/L	2.5	0.010	<0.010
Barium Leachate	mg/L	100	0.020	0.475
Boron Leachate	mg/L	500	0.050	0.062
Cadmium Leachate	mg/L	0.5	0.010	<0.010
Chromium Leachate	mg/L	5	0.050	<0.050
Lead Leachate	mg/L	5	0.010	0.013
Mercury Leachate	mg/L	0.1	0.01	<0.01
Selenium Leachate	mg/L	1	0.020	<0.020
Silver Leachate	mg/L	5	0.010	<0.010
Uranium Leachate	mg/L	10	0.050	<0.050
Fluoride Leachate	mg/L	150	0.10	<0.10
Cyanide Leachate	mg/L	20	0.05	<0.05
(Nitrate + Nitrite) as N Leachate	mg/L	1000	0.70	<0.70

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 23T074610

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:

SAMPLED BY:

O. Reg. 558 - Benzo(a) pyrene

DATE RECEIVED: 2023-09-28

DATE REPORTED: 2023-10-03

		SAMPLE DESCRIPTION:		Com.SS-1
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2023-06-30
Parameter	Unit	G / S	RDL	5324963
Benzo(a)pyrene Leachate	mg/L	0.001	0.001	<0.001
Surrogate	Unit	Acceptable Limits		
Acridine-d9	%	50-140		85
Naphthalene-d8	%	50-140		65
Terphenyl-d14	%	50-140		78

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5324963 The sample was leached according to Regulation 558 protocol. Analysis was performed on the leachate.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 23T074610

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:

SAMPLED BY:

O. Reg. 558 - PCBs

DATE RECEIVED: 2023-09-28

DATE REPORTED: 2023-10-03

		SAMPLE DESCRIPTION:		Com.SS-1
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2023-06-30
Parameter	Unit	G / S	RDL	5324963
PCB's Leachate	mg/L	0.3	0.005	<0.005
Surrogate	Unit	Acceptable Limits		
Decachlorobiphenyl	%	50-140		92

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5324963 The soil sample was leached using the Regulation 558 procedure. Analysis was performed on the leachate.
PCB total is a calculated parameter. The calculated value is the sum of Aroclor 1242, Aroclor 1248, Aroclor 1254 and Aroclor 1260.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 23T074610

PROJECT: 60646784

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:

SAMPLED BY:

O. Reg. 558 - VOCs

DATE RECEIVED: 2023-09-28

DATE REPORTED: 2023-10-03

		SAMPLE DESCRIPTION:		Com.SS-1
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2023-06-30
Parameter	Unit	G / S	RDL	5324963
Vinyl Chloride Leachate	mg/L	0.2	0.030	<0.030
1,1 Dichloroethene Leachate	mg/L	1.4	0.020	<0.020
Dichloromethane Leachate	mg/L	5.0	0.030	<0.030
Methyl Ethyl Ketone Leachate	mg/L	200	0.090	<0.090
Chloroform Leachate	mg/L	10.0	0.020	<0.020
1,2-Dichloroethane Leachate	mg/L	0.5	0.020	<0.020
Carbon Tetrachloride Leachate	mg/L	0.5	0.020	<0.020
Benzene Leachate	mg/L	0.5	0.020	<0.020
Trichloroethene Leachate	mg/L	5.0	0.020	<0.020
Tetrachloroethene Leachate	mg/L	3.0	0.050	<0.050
Chlorobenzene Leachate	mg/L	8.0	0.010	<0.010
1,2-Dichlorobenzene Leachate	mg/L	20.0	0.010	<0.010
1,4-Dichlorobenzene Leachate	mg/L	0.5	0.010	<0.010
Surrogate	Unit	Acceptable Limits		
Toluene-d8	% Recovery	50-140		106
4-Bromofluorobenzene	% Recovery	50-140		78

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5324963 Sample was prepared using Regulation 558 protocol and a zero headspace extractor.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 23T074610

PROJECT: 60646784

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Oct 03, 2023			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 558 - Metals & Inorganics															
Arsenic Leachate	5313576		<0.010	<0.010	NA	< 0.010	102%	70%	130%	106%	80%	120%	102%	70%	130%
Barium Leachate	5313576		0.495	0.563	12.9%	< 0.020	100%	70%	130%	107%	80%	120%	112%	70%	130%
Boron Leachate	5313576		0.077	0.075	NA	< 0.050	100%	70%	130%	105%	80%	120%	110%	70%	130%
Cadmium Leachate	5313576		<0.010	<0.010	NA	< 0.010	101%	70%	130%	115%	80%	120%	115%	70%	130%
Chromium Leachate	5313576		<0.050	<0.050	NA	< 0.050	99%	70%	130%	110%	80%	120%	111%	70%	130%
Lead Leachate	5313576		0.010	0.011	NA	< 0.010	96%	70%	130%	99%	80%	120%	105%	70%	130%
Mercury Leachate	5313576		<0.01	<0.01	NA	< 0.01	98%	70%	130%	83%	80%	120%	95%	70%	130%
Selenium Leachate	5313576		<0.020	<0.020	NA	< 0.020	101%	70%	130%	112%	80%	120%	127%	70%	130%
Silver Leachate	5313576		<0.010	<0.010	NA	< 0.010	101%	70%	130%	116%	80%	120%	109%	70%	130%
Uranium Leachate	5313576		<0.050	<0.050	NA	< 0.050	95%	70%	130%	111%	80%	120%	115%	70%	130%
Fluoride Leachate	5313576		0.16	0.17	NA	< 0.10	109%	90%	110%	101%	90%	110%	100%	70%	130%
Cyanide Leachate	5313576		<0.05	<0.05	NA	< 0.05	92%	70%	130%	92%	80%	120%	108%	70%	130%
(Nitrate + Nitrite) as N Leachate	5313576		<0.70	<0.70	NA	< 0.70	97%	80%	120%	101%	80%	120%	104%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:

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Quality Assurance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 23T074610

PROJECT: 60646784

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:

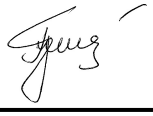
SAMPLED BY:

Trace Organics Analysis

RPT Date: Oct 03, 2023			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 558 - Benzo(a) pyrene															
Benzo(a)pyrene Leachate	5315874		< 0.001	< 0.001	NA	< 0.001	104%	50%	140%	93%	50%	140%	88%	50%	140%
O. Reg. 558 - PCBs															
PCB's Leachate	5327171		< 0.005	< 0.005	NA	< 0.005	106%	50%	140%	107%	50%	140%	102%	50%	140%
O. Reg. 558 - VOCs															
Vinyl Chloride Leachate	5325620		<0.030	<0.030	NA	< 0.030	107%	50%	140%	99%	50%	140%	110%	50%	140%
1,1 Dichloroethene Leachate	5325620		<0.020	<0.020	NA	< 0.020	98%	50%	140%	125%	60%	130%	110%	50%	140%
Dichloromethane Leachate	5325620		<0.030	<0.030	NA	< 0.030	117%	50%	140%	107%	60%	130%	103%	50%	140%
Methyl Ethyl Ketone Leachate	5325620		<0.090	<0.090	NA	< 0.090	118%	50%	140%	111%	50%	140%	102%	50%	140%
Chloroform Leachate	5325620		<0.020	<0.020	NA	< 0.020	101%	50%	140%	107%	60%	130%	97%	50%	140%
1,2-Dichloroethane Leachate	5325620		<0.020	<0.020	NA	< 0.020	84%	50%	140%	114%	60%	130%	108%	50%	140%
Carbon Tetrachloride Leachate	5325620		<0.020	<0.020	NA	< 0.020	76%	50%	140%	78%	60%	130%	80%	50%	140%
Benzene Leachate	5325620		<0.020	<0.020	NA	< 0.020	103%	50%	140%	100%	60%	130%	118%	50%	140%
Trichloroethene Leachate	5325620		<0.020	<0.020	NA	< 0.020	105%	50%	140%	117%	60%	130%	107%	50%	140%
Tetrachloroethene Leachate	5325620		<0.050	<0.050	NA	< 0.050	111%	50%	140%	102%	60%	130%	108%	50%	140%
Chlorobenzene Leachate	5325620		<0.010	<0.010	NA	< 0.010	113%	50%	140%	109%	60%	130%	103%	50%	140%
1,2-Dichlorobenzene Leachate	5325620		<0.010	<0.010	NA	< 0.010	114%	50%	140%	111%	60%	130%	100%	50%	140%
1,4-Dichlorobenzene Leachate	5325620		<0.010	<0.010	NA	< 0.010	111%	50%	140%	101%	60%	130%	92%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:



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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 23T074610

PROJECT: 60646784

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Arsenic Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Barium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Boron Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Cadmium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Chromium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Lead Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Mercury Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Selenium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Silver Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Uranium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Fluoride Leachate	INOR-93-6000	EPA SW 846-1311; SM 4500F-C	ION SELECTIVE ELECTRODE
Cyanide Leachate	INOR-93-6052	EPA 1311 modified from MOE 3015 SM 4500 CN-I,G387	SEGMENTED FLOW ANALYSIS
(Nitrate + Nitrite) as N Leachate	INOR-93-6053	EPA SW 846-1311 & modified from SM 4500 - NO3- I	LACHAT FIA

AGAT Laboratories

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Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 23T074610

PROJECT: 60646784

ATTENTION TO: Sergiy Tchernikov

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzo(a)pyrene Leachate	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
PCB's Leachate	ORG-91-5112	Regulation 558, EPA SW846 3510C/8082	GC/ECD
Decachlorobiphenyl	ORG-91-5112	EPA SW846 3510C/8082	GC/ECD
Vinyl Chloride Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,1 Dichloroethene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Dichloromethane Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Chloroform Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Benzene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Trichloroethene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Tetrachloroethene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Chlorobenzene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91- 5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

AGAT Laboratories

Have feedback? Scan here for a quick survey!

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webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: AECOM Canada Inc
Contact: ~~Katie Maleki / Sergiy Tchernikov~~
Address: ~~105 Commerce Valley Dr Markham~~

Phone: _____ Fax: _____

Reports to be sent to:
1. Email: Katie.Maleki@aecom.com
2. Email: Sergiy.Tchernikov@aecom.com

Project Information:

Project: 60696784
Site Location: ~~Snow Storage - Huronia, Mississauga~~
Sampled By: B.K.
AGAT Quote #: _____ PO: _____
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company: as above
Contact:
Address:
Email:

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04
Table _____ *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture *(Check One)*
☐ Coarse
☐ Fine

☑ Regulation 406
Table _____ *Indicate One*
☐ Regulation 558
☐ CCME

☐ Sewer Use
☐ Sanitary ☐ Storm
_____ *Region*
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
_____ *Indicate One*

Is this submission for a **Record of Site Condition**? ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☐ No

Laboratory Use Only

Work Order #: 23T074610

Cooler Quantity: 1 large
Arrival Temperatures: 2.3 | 2.9 | 3.0
Custody Seal Intact: ☐ Yes ☐ No ☑ N/A
Notes: loose ice

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☑ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

rush

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Sample Matrix Legend

GW	Ground Water
O	Oil
P	Paint
(S)	(Soil)
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled (2023)	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs	VOC	PAHs	PCBs	PCBs: Aroclors ☐	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Regulation 406 SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Regulation 406 Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Corrosivity: ☐ Moisture ☐ Sulphide	TCLP on M&I, VOC, PCBs & Benzo(a)Pyrene (O. Reg. 406)				Potentially Hazardous or High Concentration (Y/N)
1. Com.SS-1	June 30	AM PM	4	Soil	TCLP													✓					
2.		AM PM																					
3.		AM PM																					
4.		AM PM																					
5.		AM PM																					
6.		AM PM																					
7.		AM PM																					
8.		AM PM																					
9.		AM PM																					
10.		AM PM																					
11.		AM PM																					

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
R.M.	Sep. 28, 2023		T.K	Sep 28	1:28 pm
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

Page 1 of 1

N°: T-147452

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

Appendix G

IFT2

Site: 7120 Hurontario Street, Mississauga, ON L5W 1N4

Guelph Permeameter Calculations

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 15

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 1

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0100

Res Type 35.22
H 15
a 3
H/a 5
a* 0.01
C0.01 1.518
C0.04 1.629
C0.12 1.667
C0.36 1.667
C 1.518
R 0.010
Q 0.006
pi 3.142

α^*= 0.01 cm^{-1}

C = 1.518269

Q = 0.00587

K_{fs} = 8.19E-07 cm/sec
4.91E-05 cm/min
8.19E-09 m/sec
1.93E-05 inch/min
3.22E-07 inch/sec

Φ_m = 8.19E-05 cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 24.5

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 1

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0200

Res Type 35.22
H 24.5
a 3
H/a 8.16667
a* 0.01
C0.01 1.93026
C0.04 2.1109
C0.12 2.22142
C0.36 2.22142
C 1.93026
R 0.020
Q 0.01174
pi 3.1415

α^*= 0.01 cm^{-1}

C = 1.930262

Q = 0.01174

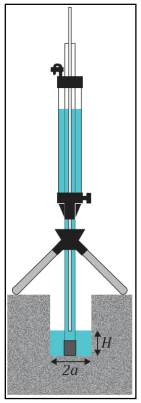
K_{fs} = 1.18E-06 cm/sec
7.07E-05 cm/min
1.18E-08 m/ses
2.79E-05 inch/min
4.64E-07 inch/sec

Φ_m = 1.18E-04 cm^2/min

Average

K_{fs} = 9.99E-07 cm/sec
5.99E-05 cm/min
9.99E-09 m/s
2.36E-05 inch/min
3.93E-07 inch/sec

Φ_m = 9.99E-05 cm^2/min



Double Head Method

Reservoir Cross-sectional area in cm^2

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter the first water Head Height ("H1" in cm): 15

Enter the second water Head Height ("H2" in cm): 24.5

Enter the Borehole Radius ("a" in cm): 3

Enter the soil texture-structure category (enter one of the below numbers): 1

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

α^*= 0.01 cm^{-1}

α= 0.7012

Steady State Rate of Water Level Change ("R1" in cm/min): 0.01

Steady State Rate of Water Level Change ("R2" in cm/min): 0.02

Q_1 = 0.00587

Q_2 = 0.01174

Res Type: 35.22
H1/a: 5
H2/a: 8.166667
C1-0.01: 1.518269
C2-0.01: 1.930262
C1-0.04: 1.629144
C2-0.04: 2.110895
C1-0.12: 1.666893
C2-0.12: 2.221417
C1-0.36: 1.666893
C2-0.36: 2.221417
G-Denominator: 21702.45

C_1 = 1.518269

C_2 = 1.930262

G_1 = 0.001714

G_2 = 0.001334

G_3 = 0.0426

G_4 = 0.02062

K_{fs} = 5.60E-06 cm/sec
3.36E-04 cm/min
5.60E-08 m/sec
1.32E-04 inch/min
2.21E-06 inch/sec

Φ_m = 7.99E-06 cm^2/min

Θ_{fs} = N/A cm^3/cm^3

Θ_1 = N/A cm^3/cm^3

Sorptivity #VALUE! ($cm\ min^{-½}$)

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121\left(H_2/a\right)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091\left(H_1/a\right)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091\left(H_2/a\right)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093\left(H_1/a\right)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093\left(H_2/a\right)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{a^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)a^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_2 = \frac{H_1 C_2}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $\Phi_m = G_3Q_1 - G_4Q_2$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	