

# HYDROGEOLOGICAL REVIEW REPORT

**PREPARED FOR:**

Region of Peel c/o Diamond Schmitt  
384 Adelaide Street West, Suite 100  
Toronto, ON, M5V 1R7

**ATTENTION:**

Martin Gauthier

**Dixie and Dockstader Road,  
Brampton, Ontario**

**Grounded Engineering Inc.**

**File No.** 23-099

**Issued** October 11, 2023



## TABLE OF CONTENTS

1	INTRODUCTION .....	1
2	STUDY AREA MAP .....	3
3	GEOLOGY AND PHYSICAL HYDROGEOLOGY .....	3
4	GROUNDWATER ELEVATIONS.....	4
4.1	MONITORING WELL INFORMATION .....	4
4.2	WELL OBSERVATIONS.....	4
5	AQUIFER TESTING .....	5
5.1	SINGLE WELL RESPONSE TEST (SLUG TEST) .....	5
5.2	SOIL GRAIN SIZE DISTRIBUTION .....	5
5.3	LITERATURE.....	6
6	PRELIMINARY INFILTRATION RATES .....	6
7	WATER QUALITY .....	6
8	PROPOSED CONSTRUCTION METHOD.....	7
9	GROUNDWATER EXTRACTION AND DISCHARGE .....	7
10	EVALUATION OF IMPACT .....	10
10.1	ZONE OF INFLUENCE (ZOI).....	10
10.2	LAND STABILITY.....	10
10.3	CITY'S SEWAGE WORKS .....	10
10.4	NATURAL ENVIRONMENT .....	11
10.5	LOCAL DRINKING WATER WELLS .....	11
10.6	CONTAMINATION SOURCE.....	11
11	PROPOSED MITIGATION MEASURES AND MONITORING PLAN .....	11
12	LIMITATIONS .....	12
13	CLOSURE .....	13

## FIGURES

Figure 1 – Study Area Map

Figure 2 – Borehole and Monitoring Well Location Plan – Existing Site Condition

Figure 3 – Borehole and Monitoring Well Location Plan – Proposed Site Condition

Figure 4 – Subsurface Profile

## TABLES

Table 1 – Groundwater Level Measurements and Monitoring Well Information



## **APPENDICES**

Appendix A – Borehole Logs

Appendix B – Aquifer Response Tests

Appendix C – Grain Size Analysis

Appendix D – HydrogeoSieveXL Data

Appendix E – Laboratory Certificate of Analysis

Appendix F – Dewatering Calculations



# 1 Introduction

Region of Peel c/o Diamond Schmitt has retained Grounded Engineering Inc. to provide hydrogeological engineering design advice for their proposed development for Peel Region Paramedic Services at Dixie and Dockstader Road, in Brampton, Ontario.

The site is rectangular in shape, with a total area of approximately  $16,210 \pm \text{m}^2$ , and is currently vacant. The proposed project includes constructing a 2-storey building, resting on grade with no underground basement levels. Grounded has assumed the ground finished floor elevation (FFE) to be at Elev.  $253.0 \pm \text{m}$ .

Grounded has been provided with the following reports and drawings to assist in our scope of work:

- Site survey, prepared by KRCMAR (Jan 17, 2017).
- Architectural Drawings, "Dockstader PRPS, Brampton, Ontario"; Project P101B, dated Mar 3, 2021, prepared by Diamond Schmitt Architects.
- Geotechnical Desktop Review Report, "Geotechnical Desktop Review of Preliminary Geotechnical Investigation Report by Peto MacCullam Ltd. For Northwest of Dixie Rd & Dockstader Rd", File 221-02387-00, dated April 11, 2022, prepared by WSP.
- Phase Two Environmental Site Assessment, "Dixie Road and Dockstader Road, Brampton, ON", File 221-02387-00, dated April 2022 dated Aug 8, 2021, prepared by WSP.

Grounded has been provided with factual borehole information for the subject site from other consultants as listed above. Although borehole logs are provided in a report signed and sealed by professional engineers, the borehole logs themselves are marked as 'draft' within the report. As such, this borehole information (appended) is used for reference only.

## Property Information

Location of Site	Northwest of the intersection of Dixie Road and Dockstader Road in Brampton
Ownership of Site	Region of Peel
Site Dimensions (m)	145 x 112 $\pm$ m
Site Area (m <sup>2</sup> )	16,210 $\pm$ m <sup>2</sup>

## Proposed Development

Number of Building Structures	1
Number of Underground Levels	None
Lowest Finished Floor Elevation (FFE)	Depth 0 m / Elev. 253.0 $\pm$ masl





### Proposed Development

<b>Approx. Base of Foundations*</b>	Depth 3.0 m / Elev. 250.0± masl
<b>Sub-Grade Area (m<sup>2</sup>)</b>	6,560± m <sup>2</sup>
<b>Land Use Classification</b>	Commercial / Industrial / Institutional

\* Assumed: spread footings / pile caps for caissons

### Qualified Person and Hydrogeological Review Information

<b>Qualified Person</b>	Kyle Byckalo
<b>Consulting Firm</b>	Grounded Engineering Inc.
<b>Date of Hydrogeological Review</b>	October 11, 2023

<b>Scope of Work</b>	<ul style="list-style-type: none"> <li>▪ Review of MECP Water Well Records for the area</li> <li>▪ Review of geological information for the area</li> <li>▪ Review of topographic information for the area</li> <li>▪ Advancement of 14 boreholes to a maximum depth of 9.6± m, which were instrumented with 5 monitoring wells.</li> <li>▪ 11 boreholes by previous consultants were advanced at the site to a maximum depth of 10.0± m, and were instrumented with 7 monitoring wells. The boreholes/monitoring wells are not relied upon for stratigraphy, groundwater levels, or monitoring well construction data (Borehole Logs were marked as 'draft' in the report).</li> <li>▪ Completion of slug tests in all Grounded's monitoring wells. Monitoring wells installed by previous consultants are not being relied upon for stratigraphy and groundwater elevations, and hence, slug tests were not performed in those wells.</li> <li>▪ Groundwater elevation monitoring for (3) months as part of this scope</li> <li>▪ Groundwater sampling and analysis to the Region of Peel Sewer Use Limits</li> <li>▪ Assessment of groundwater controls and potential impacts</li> <li>▪ Report preparation in accordance with Ontario Water Resources Act and Ontario Regulation 387/04</li> </ul>
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### General Hydrogeological Characterization

<b>Site Topography</b>	The site has an approximate ground surface elevation of 252.5± masl.
<b>Local Physiographic Features</b>	The subsurface stratigraphy is composed of sandy, clayey silt till deposits.
	Physiographic Landform: Till Plains (Drumlinized)
<b>Regional Physiographic Features</b>	Physiographic Region: South Slope
	The South Slope is the southern slope of the Oak Ridges Moraine but includes the strip south of the Peel plain. It rises to the line of contact with the moraine at 800 to 1,000 feet a.s.l.



### General Hydrogeological Characterization

The western portion of the South slope of the Oak Ridges Moraine lies north of the Peel plain, but the Trafalgar Moraine and adjacent till plain to the south of the Peel plain is also included.

The South slope lies across the limestones of the Verulam and Lindsay Formations, the grey shales of the Georgian Bay Formation, and the reddish shales of the Queenston Formation. The material in the drift is related to the underlying rock, allowing for some importation by the glacier. The shale content increases west of Toronto until a till consisting nearly all of red and grey shale is reached west of the Credit River.

#### Watershed

The site is located within the Etobicoke Creek Watershed. Locally, groundwater is anticipated to flow south towards a tributary/branch of the Etobicoke Creek.

#### Surface Drainage

Surface water is expected to flow towards municipal catch basins located on or adjacent to the site, via Dockstader Road to the South / Dixie Road to the east.

## 2 Study Area Map

A map has been enclosed which shows the following information:

- All monitoring wells identified on site, and within the study area
- All boreholes identified on site
- All buildings identified on site and within the study area
- The site boundaries
- Any watercourses and drainage features within the study area

## 3 Geology and Physical Hydrogeology

The site stratigraphy, including soil materials, composition and texture are presented in detail on the borehole logs in Appendix A. A summary of stratigraphic units that were encountered at the site is outlined as follows:

### Site Stratigraphy

Stratum/Formation	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)	Method of Determination
Earth Fill	0.0 – 2.3	254.1 – 250.6	$1 \times 10^{-6}$	literature <sup>1</sup>
Glacial Till	0.8 – 6.1	253.3 – 246.4	$2.3 \times 10^{-8}$	slug test

<sup>1</sup> Freeze and Cherry (1979)



Site Stratigraphy				
Silts	3.0 – 9.6	242.7 – 249.9	$4.6 \times 10^{-7}$	slug test

Surface Water			
Surface Water Body	Distance from site (m)	Direction from site	Hydraulically Connected to Site (yes/no)
A tributary to Spring Creek	35	Northwest	No

## 4 Groundwater Elevations

### 4.1 Monitoring Well Information

Well ID	Well Diameter (mm)	Ground Surface (masl)	Top of Screen (masl)	Bottom of Screen (masl)	Screened Geological Unit
6	50	253.0	249.9	246.8	Silts
7	50	252.5	246.4	243.4	Silts
8	50	252.3	251.4	248.4	Glacial Till / Silts
10	50	252.9	249.5	248.0	Glacial Till
14	50	252.5	246.2	243.2	Silts

### 4.2 Well Observations

A detailed table of monitoring well observation data is appended.

For design purposes, the groundwater table is at Elev.  $252.1 \pm$  m in all of the native soil units. This deposit has a very low permeability and will yield only minor seepage in the long term.

Based on the measured groundwater elevations, the anticipated groundwater flow direction at this site is generally from north to south.

Groundwater levels fluctuate with time depending on the amount of precipitation and surface runoff and may be influenced by known or unknown dewatering activities at nearby sites.



## 5 Aquifer Testing

### 5.1 Single Well Response Test (Slug Test)

The hydraulic conductivities from the monitoring wells were determined based on slug tests (single-well response tests). These tests involve rapid removal of water or addition of a “slug” which displaces a known volume of water from a single well, and then monitoring the water level in the well until it recovers. The results of the slug tests were analyzed using the Bouwer and Rice method (1976).

The hydraulic properties of the strata applicable to the site are as follows:

Well ID	Well Screen Elevation (masl)	Screened Geological Unit	Hydraulic Conductivity (m/s)
6	3.0 - 6.1	Silts	$4.6 \times 10^{-7}$
7	6.1 - 9.1	Silts	$1.2 \times 10^{-8}$
8	1.5 - 4.6	Glacial Till / Silts	$6.4 \times 10^{-9}$
10	3.0 - 4.6	Glacial Till	$2.3 \times 10^{-8}$
14	6.1 - 9.1	Silts	$2.8 \times 10^{-7}$

### 5.2 Soil Grain Size Distribution

The hydraulic conductivities of various soil types can also be estimated from grain size analyses. An assessment of the grain sizes was conducted using the excel-based tool, HydrogeoSieve XL (*HydrogeoSieve XL ver.2.2, J.F. Devlin, University of Kansas, 2015*). HydrogeoSieve XL compares the results of the grain size analyses against fifteen (15) different analytical methods.

Given our experience in the area as well as published literature, some of the geometric means provided for the soil were biased low by one or more methods. In these instances, the values determined by these methods were excluded from the mean. The table below illustrates the hydraulic conductivity values estimated from the mean of the analytical methods where the soil met the applicable analysis criteria.

Sample ID	Soil Description	Applicable Analysis Methods	Hydraulic Conductivity (m/s)
BH7-SS3	Glacial Till	Alyamani and Sen, Barr, Sauerbrei	$1.1 \times 10^{-8}$
BH10-SS5	Glacial Till	Alyamani and Sen, Barr, Sauerbrei	$1.3 \times 10^{-8}$
BH6-SS6	Silts	Alyamani and Sen, Barr, Sauerbrei	$7.2 \times 10^{-10}$
BH14-SS7	Silts	Alyamani and Sen, Barr, Sauerbrei	$6.6 \times 10^{-9}$



The results of the analyses are presented in Appendix D.

## 5.3 Literature

According to Freeze and Cherry (1979), the typical hydraulic conductivity of the strata investigated at the site are:

Stratum/Formation	Hydraulic Conductivity (m/s)
Earth Fill	$10^{-2}$ to $10^{-6}$
Glacial Till	$10^{-6}$ to $10^{-12}$
Silts	$10^{-5}$ to $10^{-9}$

## 6 Preliminary Infiltration Rates

The permeability of soils on site was estimated based on grain size analysis. The grain size analyses carried out on samples recovered from Boreholes 7 and 10 are representative of the expected site conditions. T-time analysis was performed to estimate percolation rate for the soil, and an infiltration rate was calculated from this estimated percolation rate. The observations from the T-time tests were analyzed as per TRCA's Stormwater Management Criteria, Appendix C: Water Balance and Recharge (August 2012). A safety factor of 8.5 was used to obtain the factored infiltration rate, based on the above assumptions.

Test Location	Approximate Test Depth (m/masl)	Soil Type	Percolation rate estimated from T-Time (min/cm)	Infiltration Rate (mm/hr)	Factored Infiltration Rate* (mm/hr)
BH7-SS3	1.8 / 250.8	Sandy SILT, some clay, trace gravel	29.0	20.7	2.4
BH10-SS5	3.3 / 249.2		28.0	21.4	2.5

\*\*\*Calculated using Table C3: Safety correction factors for calculating design infiltration rates as defined in the TRCA's Stormwater Management Criteria, Appendix C: Water Balance and Recharge (August 2012). Hydraulic conductivity of underlying soil (sands and silts) determined from SWRTs and grain size analyses for the boreholes nearest the infiltration tests.

## 7 Water Quality

One (1) unfiltered groundwater sample was collected and analyzed by a Canadian laboratory accredited and licensed by Standards Council of Canada and or Canadian Association for Laboratory Accreditation.

The sample was collected directly from monitoring well (BH 7) on 29 June 2023. The sample was analyzed for the following parameters:



- Ontario Regional Municipality of Peel Sewer Bylaw #53-2010 (APR, 2019) – Peel Sanitary Sewer (53-2010)
- Ontario Regional Municipality of Peel Sewer Bylaw #53-2010 (APR, 2019) – Peel Storm Sewer (53-2010)

The groundwater sample **exceeded** the **Limits for Storm Sewer Discharge** for the following parameters:

- Total Suspended Solids (Limit 15 mg/L, Result 129 mg/L)
- Zinc, total (Limit 0.04 mg/L, Result 0.0554 mg/L)

The groundwater sample **met** the **Limits for Sanitary and Combined Sewer Discharge** for all parameters analyzed.

A true copy of the analysis report, Certificate of Analysis and a chain of custody record for the sample are enclosed.

## 8 Proposed Construction Method

For design purposes, the stabilized groundwater table is at about Elev. 252.1± m. The groundwater table is present in all of the native soil units. The lowest FFE is at about Elev. 253.0± m. Therefore,

- Bulk excavation will be at or above the elevation of the design groundwater table.
- Foundation excavations will extend below the design groundwater table.

Excavations will generally be made at or below the groundwater table, in relatively low permeability native soils that preclude the free flow of water into excavations. Within the zone of excavation, the boreholes are generally dry and open.

On this basis, seepage into excavations may be allowed to drain into the excavation and then controlled by a conventional sump pump arrangement. Nevertheless, delays in excavation will occur as the seepage is controlled and these should be anticipated in the construction schedule.

It is expected that groundwater from foundation excavations can be discharged at grade within the site property boundary and allowed to re-infiltrate. However, for the purpose of this report, we have conservatively considered that the groundwater will be discharged to the municipal / regional sewers.

## 9 Groundwater Extraction and Discharge

An estimated initial volume of stored groundwater has been provided below, which will require removal before steady state is reached. In addition to the stored groundwater, there will also be additional transient groundwater flow during the initial drawdown. Transient flow volumes (and





therefore discharge volumes) are a function of the rate of drawdown and will need to be accounted for in the dewatering plan for this site.

Please note that if excavation is exposed to the elements, stormwater will have to be managed. The short-term control of groundwater should consider stormwater management from rainfall events. A dewatering system should be designed to consider the removal of rainfall from excavation. A design storm of 25 mm has been used in the quantity estimates.

As required by Ontario Regulation 63/16, a plan for discharge must consider the conveyance of stormwater from a 100-year storm. The additional volume that will be generated in the occurrence of a 100-year storm event is approximately 1,000 L/day for each 1 m length of open trench.

The following design considerations and values have been incorporated into the numerical modelling:

- Foundation excavations (strip and spread footings) will extend below the design groundwater table.
- Short term (construction) dewatering analysis have been performed for a conservative assumption of 3 m wide trenches (for both strip and spread footings). The volumes provided are for a unit length (1 m) for 3 m wide trenches.
- A Factor of Safety of 2.0 was used for all groundwater seepage volume calculations.
- The design hydraulic conductivities for the site are:

Design Hydraulic Conductivity	
Stratum/Formation	K (m/s)
Earth Fill	$1.0 \times 10^{-6}$
Glacial Till	$2.3 \times 10^{-8}$
Silts	$4.6 \times 10^{-7}$

Stored Groundwater (pre-excavation/dewatering) for a 3 m wide trench per unit length (1 m) of trench					
Volume of Excavation (m <sup>3</sup> )	Volume of Excavation Below Water Table (m <sup>3</sup> )	Estimated Volume of Stored Groundwater		Estimated Volume of Available Groundwater	
		m <sup>3</sup>	L	m <sup>3</sup>	L
7	5	0.9	900	0.7	700

Analyses were conducted for both short-term and long-term dewatering scenarios. Excavations will generally be made at or below the groundwater table, in relatively low permeability native soils that preclude the free flow of water into excavations.



However, if the excavation is exposed to the elements, storm water will have to be managed. The short-term control of groundwater should consider stormwater management from rainfall events. A dewatering system should be designed to consider the removal of rainfall from the excavation. A design storm of 25 mm has been used in the quantity estimates.

The quantity estimates for both short- and long-term conditions are presented below and in the appendices.

<b>Short Term (Construction) Steady State Groundwater Quantity - per unit length of 3 m wide trench</b>					
<b>Estimated Groundwater Seepage</b>		<b>Design Rainfall Event (25mm)</b>		<b>Estimated Total Daily Water Takings</b>	
<b>L/day</b>	<b>L/min</b>	<b>L/day</b>	<b>L/min</b>	<b>L/day</b>	<b>L/min</b>
400	0.28	75	0.05	475	0.33

<b>Long Term (Permanent) Steady State Groundwater Quantity</b>					
<b>Estimated Groundwater Seepage</b>		<b>Estimated Infiltrated Stormwater – Design Rainfall Event (25mm)</b>		<b>Estimated Total Daily Water Takings</b>	
<b>L/day</b>	<b>L/min</b>	<b>L/day</b>	<b>L/min</b>	<b>L/day</b>	<b>L/min</b>
0	0	0	0	0	0

<b>Regulatory Requirements</b>	
<b>Environmental Activity and Sector Registry (EASR) Posting</b>	Not Required
<b>Short Term Permit to Take Water (PTTW)</b>	Not Required
<b>Long Term Permit to Take Water (PTTW)</b>	Not Required
<b>Short Term Discharge Agreement City of Brampton / Region of Peel</b>	Required
<b>Long Term Discharge Agreement City of Brampton / Region of Peel</b>	Not Required

The City of Brampton / Region of Peel will require Discharge Agreements in the short and long terms, if any water is to be discharged to the storm or sanitary sewers.

Please note:

- The proposed pump schedule for short term construction dewatering has not been completed. As such, the actual peak short term discharge rate is not available at the time of writing this report. The pump schedule must be specified by either the dewatering contractor retained or the mechanical consultant.
- On-site containment (infiltration gallery/dry well etc.) has not been considered as part of the proposed development at this time. If this option is considered, additional work will have to be conducted (i.e. infiltration testing).



## 10 Evaluation of Impact

### 10.1 Zone of Influence (ZOI)

The ZOI was calculated using the Sichardt equation below.

Equation:

$$R_0 = 3000(\Delta H)\sqrt{K}$$

$\Delta H$  = dewatering thickness (m)  
 $K$  = hydraulic conductivity (m/s)  
 $R_0$  = radius of influence (m)

The ZOI with respect to groundwater seepage at the site is summarized as follows.

Zone of Influence (ZOI)		
	Short Term (Construction)	Long Term (Permanent)
Maximum Zone of Influence (m)	1±	-

### 10.2 Land Stability

The impacts to land stability on adjacent structures due to the proposed short- and long-term dewatering at the site are summarized as follows:

Land Stability		
	Short Term (Construction)	Long Term (Permanent)
Dewatering Thickness (m)	1.5±	-
Increase in Effective Stress (kPa)	15±	-
Maximum Theoretical Settlement due to Dewatering (mm)	1±	-
Public Realm Theoretical Settlement due to Dewatering (mm)	< 1±	-

The maximum induced settlement (estimated) occurs directly adjacent to the proposed excavation and decreases in a nonlinear fashion with distance away from the excavation.

On this basis, the impact of the proposed dewatering on the existing adjacent structures is considered by Grounded to be within acceptable limits.

### 10.3 City's Sewage Works

Negative impacts to City's sewage works may occur in terms of the quantity or quality of the groundwater discharged. This report provided the estimated quantity of the water discharge.



However, this report does not speak to the sewer capacities. The sewer capacity analysis is provided under a separate cover by the civil consultant.

The quality of the proposed groundwater discharge is provided in Section 7. As noted in that section, the groundwater sample exceeded the Limits for Storm Sewer Discharge and met the Limits for Sanitary and Combined Sewer Discharge.

As such additional treatment will be required before the water can be discharged to the Storm Sewer and additional treatment will not be required before the water can be discharged to the Sanitary and Combined Sewer, to avoid impacts to the City's sewage works caused by groundwater quality.

## **10.4 Natural Environment**

There are no natural waterbodies within the ZOI that will be affected by the proposed construction dewatering or permanent drainage. Any groundwater which will be taken from the site will be discharged (if required) into the City's / Region's sewer systems and not into any natural waterbody. As such, there will be no impact to the natural environment caused by the water takings at the site.

## **10.5 Local Drinking Water Wells**

The site is located within the municipal boundaries of the City of Brampton. The site and surrounding area are provided with municipal piped water and sewer supply. There is no use of the groundwater for water supply in this area of Brampton. As such, there will be no impact to drinking water wells.

## **10.6 Contamination Source**

The site and immediately surrounding area currently consist mostly of residential and commercial areas. These land uses are not anticipated to be a source of potential contamination and are not expected to provide an Area of Potential Environmental Concern for the site. As such, the pumping of groundwater at the site is not anticipated to facilitate the movement of potential contaminants onto the site.

# **11 Proposed Mitigation Measures and Monitoring Plan**

As a result of dewatering and draining the soil, changes in groundwater level have the potential to cause settlement based on the change in the effective stresses within the ZOI. The extent of the negative impact identified in previous sections will be limited to the ZOI caused by the groundwater taking at the site.



Both the temporary construction dewatering system and the permanent building drainage system must be properly installed and screened to ensure sediments and fines will not be removed, which is typically a primary cause of dewatering related settlement.

## 12 Limitations

Natural occurrences, the passage of time, local construction, and other human activity all have the potential to directly or indirectly alter the subsurface conditions at or near the project site. Contractual obligations related to groundwater or stormwater control must be considered with attention and care as they relate this potential site alteration.

The hydrogeological engineering advice provided in this report is based on the factual observations made from the site investigations as reported. It is intended for use by the owner and their retained design team. If there are changes to the features of the development or to the scope, the interpreted subsurface information, geotechnical engineering design parameters, advice, and discussion on construction considerations may not be relevant or complete for the project. Grounded should be retained to review the implications of such changes with respect to the contents of this report.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Grounded accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report, including consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The authorized users of this report are Region of Peel c/o Diamond Schmitt and their design team, for whom this report has been prepared. Grounded Engineering Inc. maintains the copyright and ownership of this document. Reproduction of this report in any format or medium requires explicit prior authorization from Grounded Engineering Inc. The City of Toronto may also make use of and rely upon this report, subject to the limitations as stated.



## 13 Closure

If there are any questions regarding the discussion and advice provided, please do not hesitate to contact our office. We trust that this report meets your requirements at present.

For and on behalf of our team,



Deepak Kanraj, M.A.Sc, EIT  
Project Manager

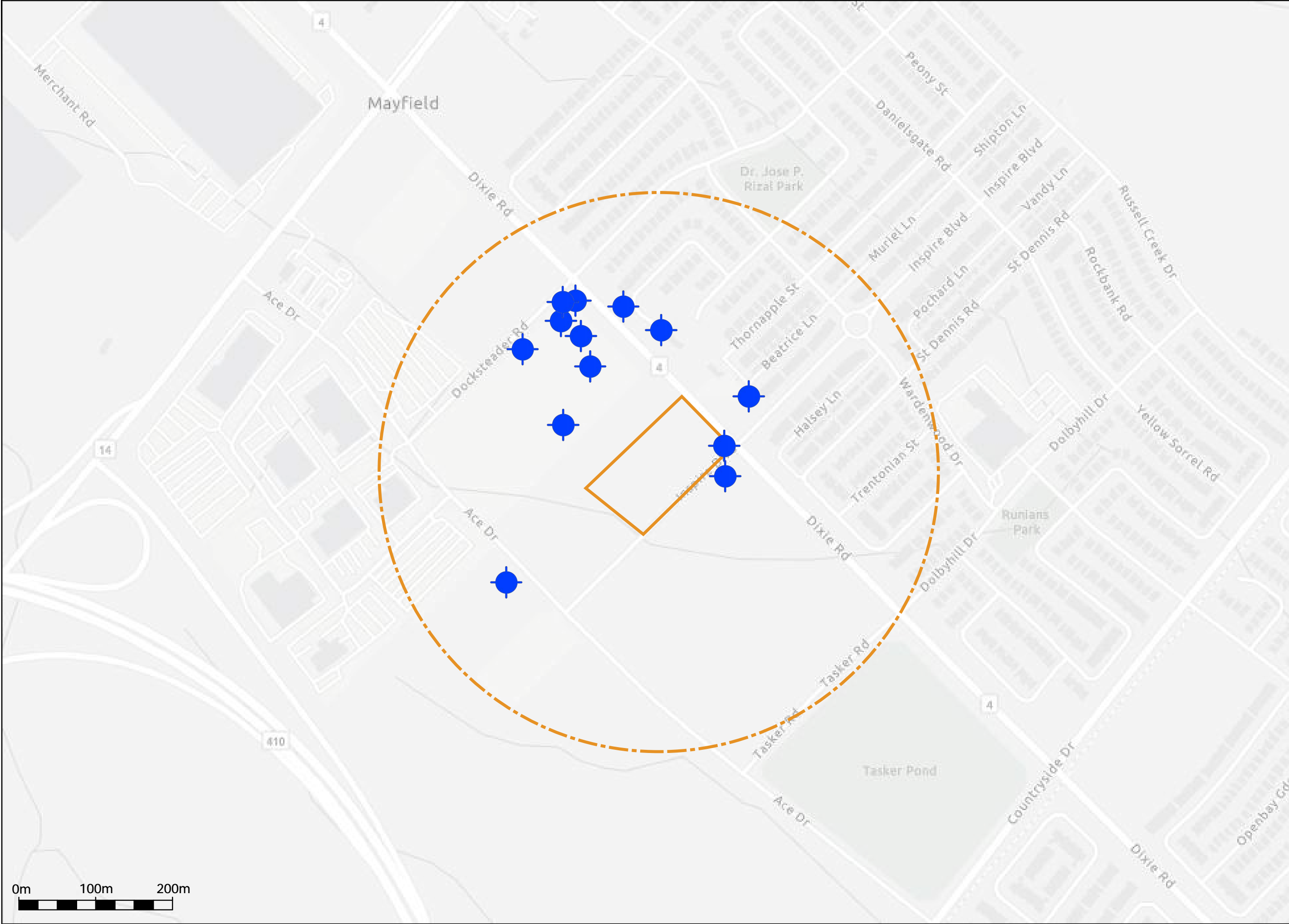
Kyle Byckalo, P.Eng.  
Senior Project Engineer

David MacGillivray, M.A.Sc., P.Geo., P.Eng., QP<sub>RA-ESA</sub>  
Associate



# FIGURES





**GROUND**  
ENGINEERING

1 BANIGAN DRIVE, TORONTO, ONT., M4H 1G3  
www.groundedeng.ca

**LEGEND**

- APPROXIMATE PROPERTY BOUNDARY
- STUDY AREA (250 m RADIUS)
- MECP WELL LOCATION

Note

Reference  
ArcGIS My Map.

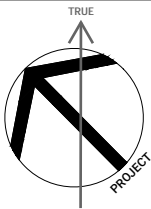
Project

**PRPS REPORTING  
STATION  
BRAMPTON, ONTARIO**

Figure Title

**SITE LOCATION PLAN**

North



Date

SEPTEMBER 2023

Scale

AS INDICATED

Job No

23-099

Figure No

**FIGURE 1**





**GROUNDED**  
ENGINEERING

**LEGEND**

- APPROXIMATE PROPERTY BOUNDARY
- MONITORING WELL/BOREHOLE BY GROUNDED
- MONITORING WELL/BOREHOLE BY OTHERS

Note

Reference

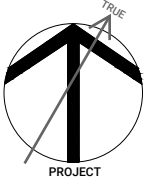
Project

**PRPS REPORTING  
STATION  
BRAMPTON, ONTARIO**

Figure Title

**BOREHOLE LOCATION PLAN -  
EXISTING CONDITION**

North



Date

OCTOBER 2023

Scale

AS INDICATED

Job No

23-099

Figure No

**FIGURE 2**





APPROXIMATE PROPERTY BOUNDARY

MONITORING WELL/BOREHOLE  
BY GROUNDED

MONITORING WELL/BOREHOLE  
BY OTHERS

## Reference

**PRPS REPORTING  
STATION  
BRAMPTON, ONTARIO**

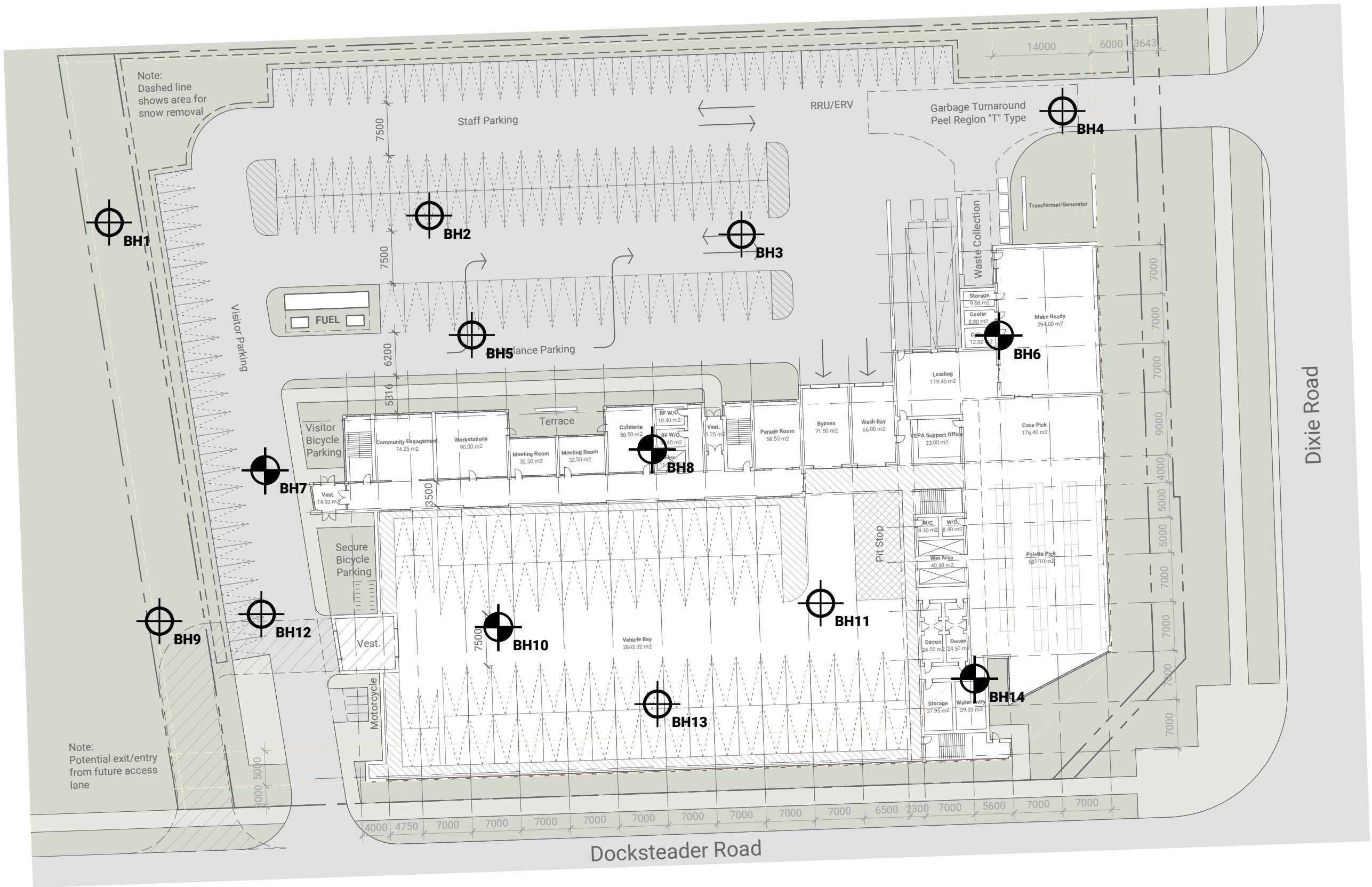
**BOREHOLE LOCATION PLAN  
PROPOSED SITE CONDITIONS**

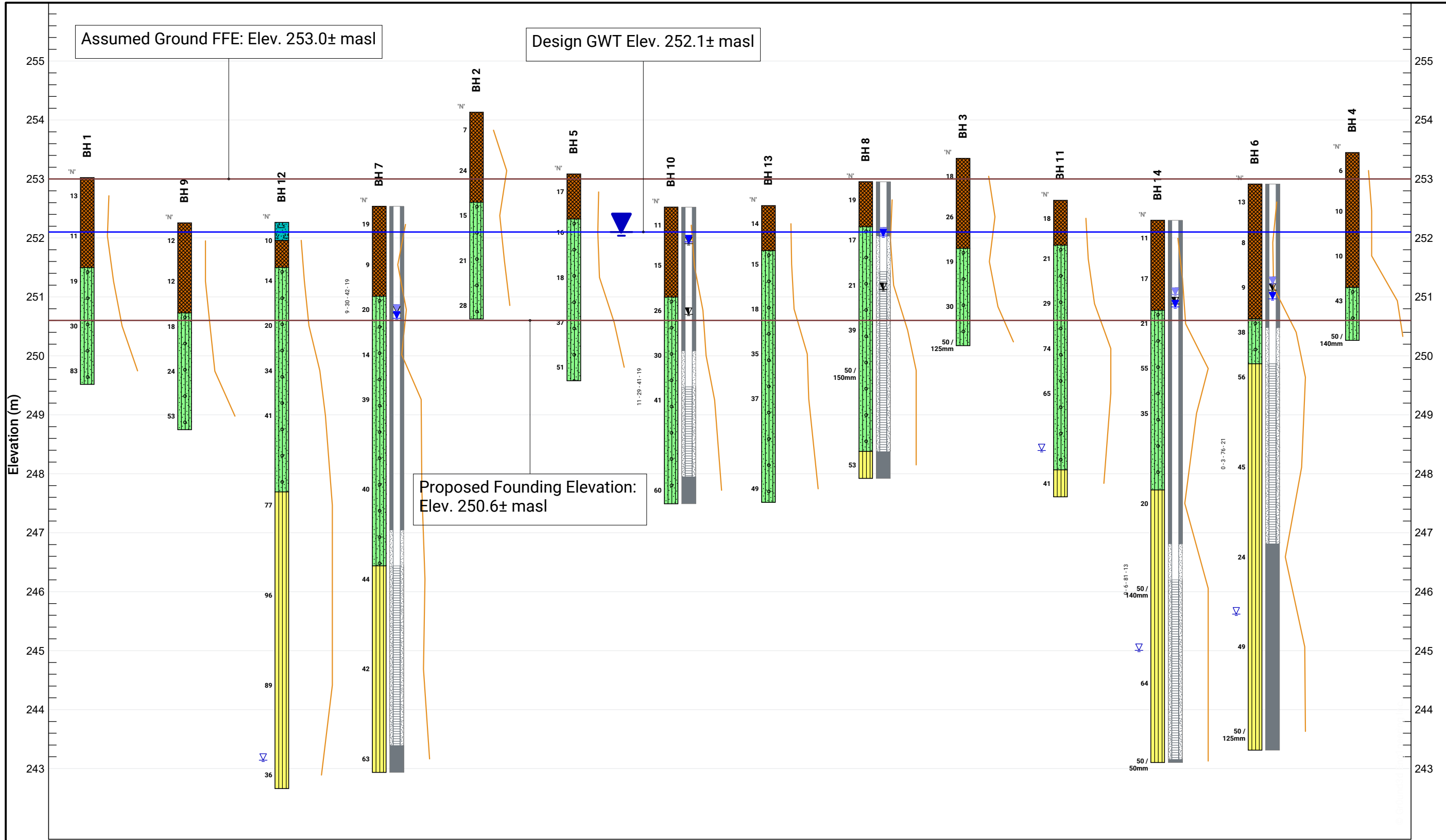
OCTOBER 2023

AS INDICATED

23-099

**FIGURE 3**





**LEGEND**

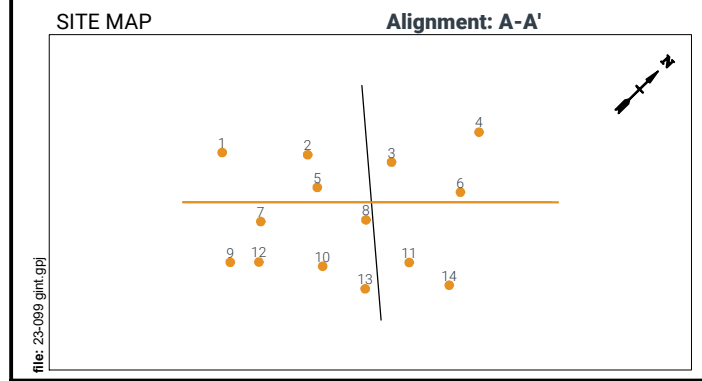
- FILL
- GRAVELS (gravel to gravelly sand)
- SILT TO SAND (not till)
- COHESIONLESS TILLS
- COHESIVE SOILS (clayey silt to clay, incl. tills)
- DISTURBED/REWORKED/ORGANIC

**BH 101** BOREHOLES BY GROUNDED  
*T-BH7* BOREHOLES BY OTHERS

▽ water level, unstabalized  
 ▼ water level, stabilized (latest)  
 ▽ water level, stabilized (highest)

Project  
**PRPS REPORTING STATION  
 BRAMPTON, ON**

Figure Title  
**SUBSURFACE PROFILE**  
**A-A'**



**Boreholes Equally Spaced**

**BOREHOLE STRATIGRAPHY LEGEND**

- Fill
- Sandy Silt Till
- Silt
- Topsoil

Date	OCTOBER 2023
Scale	AS INDICATED
Job No	23-099
Figure No	<b>FIGURE 4</b>

# TABLE 1





Well ID	Groundwater Elevation (masl)				
	June 29, 2023	July 21, 2023	August 11, 2023	September 1, 2023	Maximum
6	251.1	251.2	251.0	251.2	251.2
7	250.7	250.7	250.5	250.7	250.7
8	251.1	252.1	251.4	252.1	252.1
10	250.7	251.9	251.5	251.9	251.9
14	250.9	251.0	251.0	251.0	251.0





# APPENDIX A



## SAMPLING/TESTING METHODS

SS: split spoon sample  
AS: auger sample  
GS: grab sample  
FV: shear vane  
DP: direct push  
PMT: pressuremeter test  
ST: shelby tube  
CORE: soil coring  
RUN: rock coring

## SYMBOLS & ABBREVIATIONS

MC: moisture content  
LL: liquid limit  
PL: plastic limit  
NP: non-plastic  
 $\gamma$ : soil unit weight (bulk)  
 $G_s$ : specific gravity  
 $S_u$ : undrained shear strength  
 unstabalized water level  
 1st water level measurement  
 2nd water level measurement most recent  
 water level measurement

## ENVIRONMENTAL SAMPLES

M&I: metals and inorganic parameters  
PAH: polycyclic aromatic hydrocarbon  
PCB: polychlorinated biphenyl  
VOC: volatile organic compound  
PHC: petroleum hydrocarbon  
BTEX: benzene, toluene, ethylbenzene and xylene  
PPM: parts per million

## FIELD MOISTURE (based on tactile inspection)

**DRY:** no observable pore water  
**MOIST:** inferred pore water, not observable (i.e. grey, cool, etc.)  
**WET:** visible pore water

## COMPOSITION

Term	% by weight
<b>trace</b> silt	<10
<b>some</b> silt	10 - 20
silty	20 - 35
sand <b>and</b> silt	>35

## COHESIONLESS

Relative Density	N-Value
Very Loose	<4
Loose	4 - 10
Compact	10 - 30
Dense	30 - 50
Very Dense	>50

## COHESIVE

Consistency	N-Value	Su (kPa)
Very Soft	<2	<12
Soft	2 - 4	12 - 25
Firm	4 - 8	25 - 50
Stiff	8 - 15	50 - 100
Very Stiff	15 - 30	100 - 200
Hard	>30	>200

## ASTM STANDARDS

### **ASTM D1586 Standard Penetration Test (SPT)**

Driving a 51 mm O.D. split-barrel sampler ("split spoon") into soil with a 63.5 kg weight free falling 760 mm. The blows required to drive the split spoon 300 mm ("bpf") after an initial penetration of 150 mm is referred to as the N-Value.

### **ASTM D3441 Cone Penetration Test (CPT)**

Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm<sup>2</sup> into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

### **ASTM D2573 Field Vane Test (FVT)**

Pushing a four blade vane into soil and rotating it from the surface to determine the torque required to shear a cylindrical surface with the vane. The torque is converted to the shear strength of the soil using a limit equilibrium analysis.

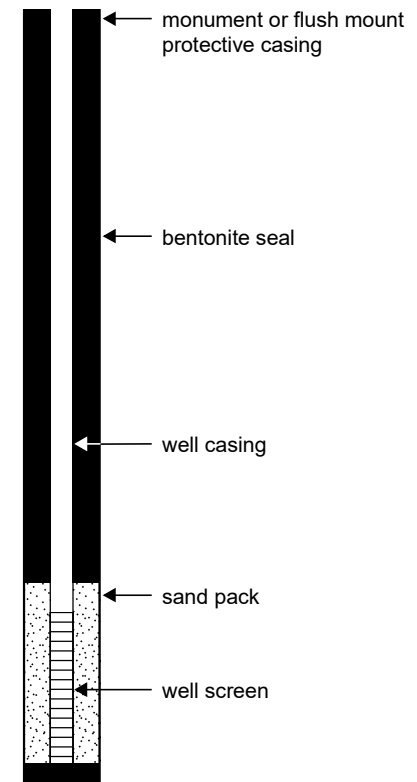
### **ASTM D1587 Shelby Tubes (ST)**

Pushing a thin-walled metal tube into the in-situ soil at the bottom of a borehole, removing the tube and sealing the ends to prevent soil movement or changes in moisture content for the purposes of extracting a relatively undisturbed sample.

### **ASTM D4719 Pressuremeter Test (PMT)**

Place an inflatable cylindrical probe into a pre-drilled hole and expanding it while measuring the change in volume and pressure in the probe. It is inflated under either equal pressure increments or equal volume increments. This provides the stress-strain response of the soil.

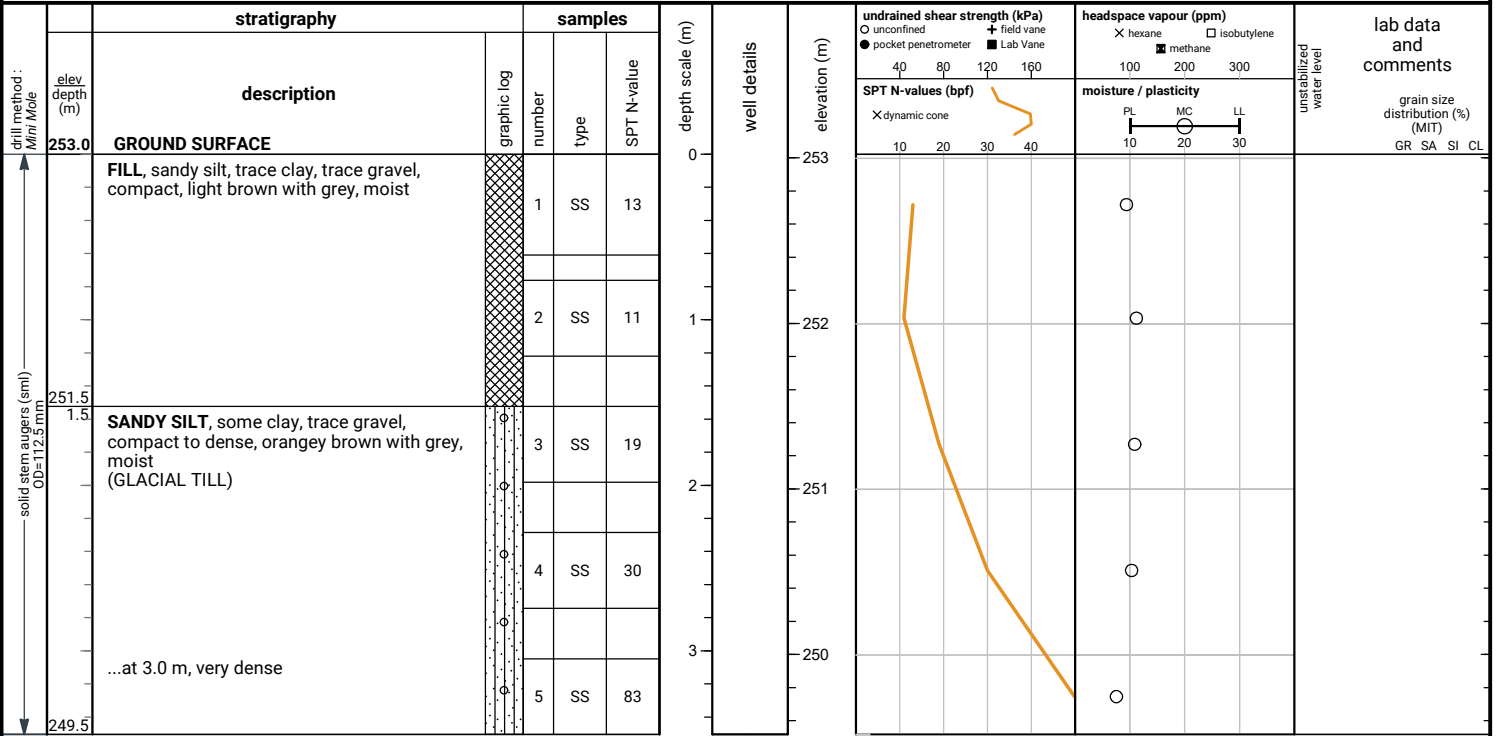
## WELL LEGEND



File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

Client : Region of Peel c/o Diamond Schmitt



END OF BOREHOLE

Dry and open upon completion of drilling.

File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

Client : Region of Peel c/o Diamond Schmitt

stratigraphy		samples			depth scale (m)	well details	elevation (m)	undrained shear strength (kPa)	headspace vapour (ppm)	lab data and comments
description	graphic log	number	type	SPT N-value				O unconfined ● pocket penetrometer X dynamic cone	+ field vane ■ Lab Vane X hexane □ isobutylene ■ methane	
254.1 <b>GROUND SURFACE</b>					0		254			
FILL, sandy silt, trace clay, trace gravel, trace rootlets, loose, dark brown, moist		1	SS	7						
...at 0.8 m, trace rock fragments, cobbles inferred		2	SS	24	1		253			0.8m: auger grinding
252.6 <b>SANDY SILT</b> , some clay, trace gravel, compact, orangey brown with grey, moist (GLACIAL TILL)		3	SS	15	2		252			
...at 2.3 m, mottled brown with orange		4	SS	21						
...at 3.0 m, sand seams, dense		5	SS	28	3		251			
250.6										

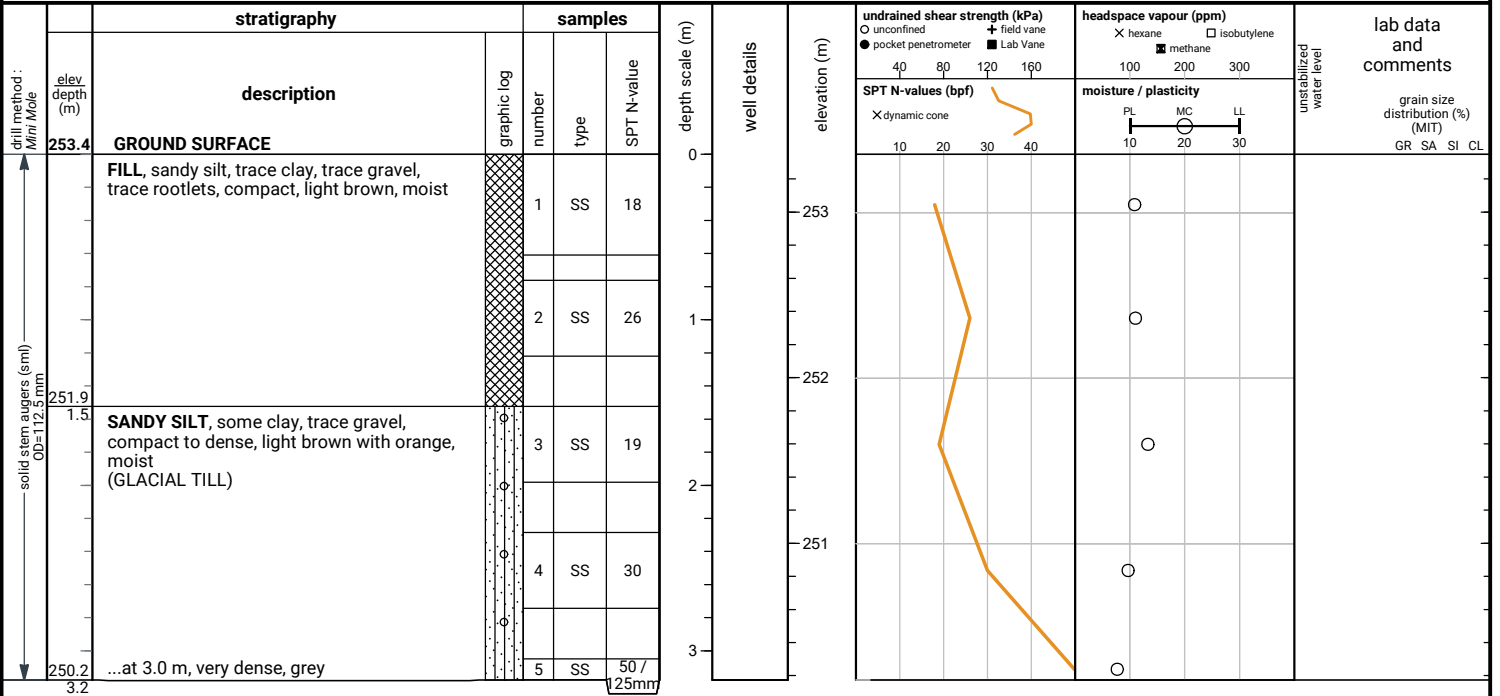
**END OF BOREHOLE**

Dry and open upon completion of drilling.

File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

Client : Region of Peel c/o Diamond Schmitt



**END OF BOREHOLE**

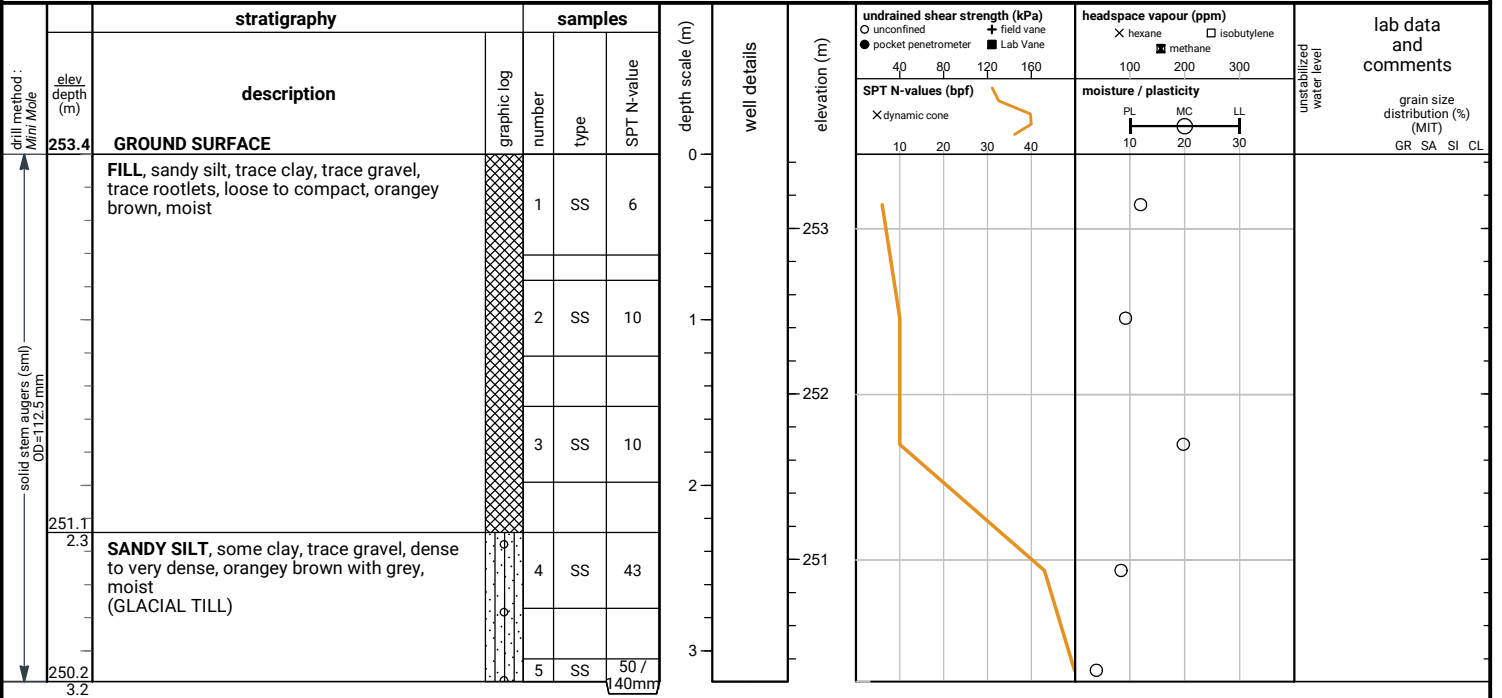
Dry and open upon completion of drilling.



File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

Client : Region of Peel c/o Diamond Schmitt



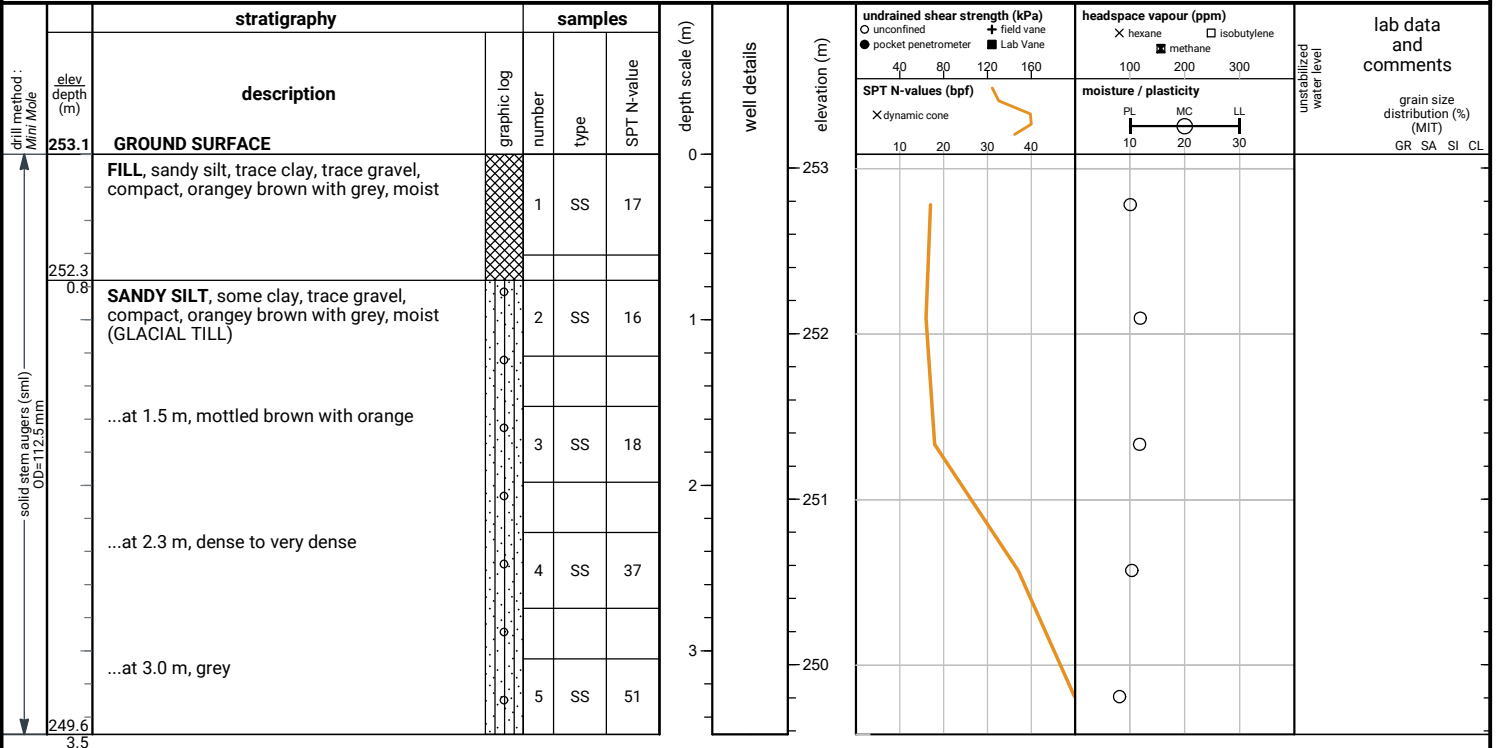
END OF BOREHOLE

Dry and open upon completion of drilling.

File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

Client : Region of Peel c/o Diamond Schmitt



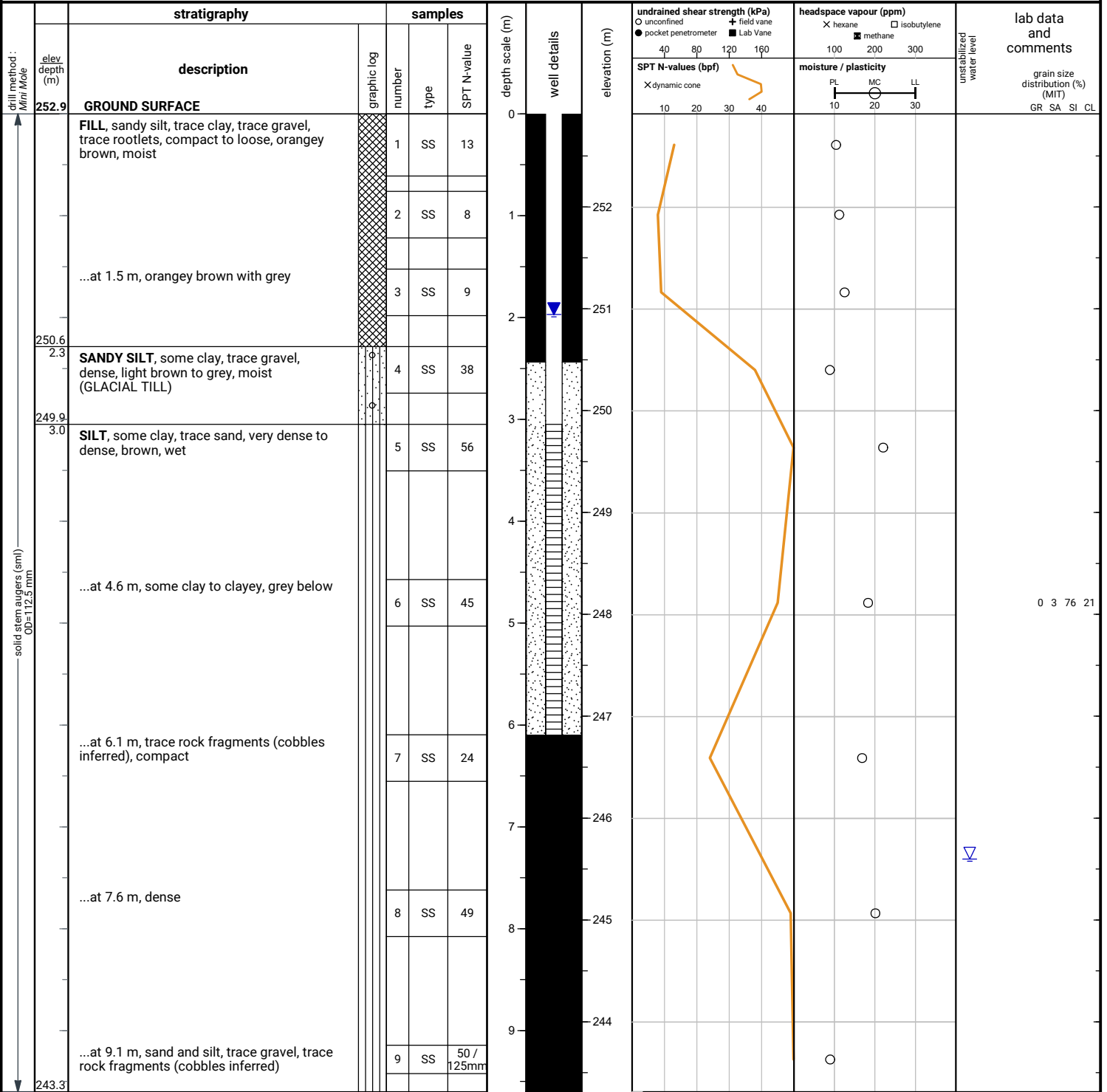
END OF BOREHOLE

Dry and open upon completion of drilling.

File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

Client : Region of Peel c/o Diamond Schmitt



**END OF BOREHOLE**

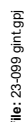
Unstabilized water level measured at 7.3 m below ground surface; open upon completion of drilling.

50 mm dia. monitoring well installed.  
No. 10 screen

**GROUNDWATER LEVELS**

date	depth (m)	elevation (m)
Jun 29, 2023	1.8	251.1
Jul 21, 2023	1.7	251.2
Aug 11, 2023	1.9	251.0
Sep 1, 2023	2.0	250.9

**Client :** Region of Peel c/o Diamond Schmitt

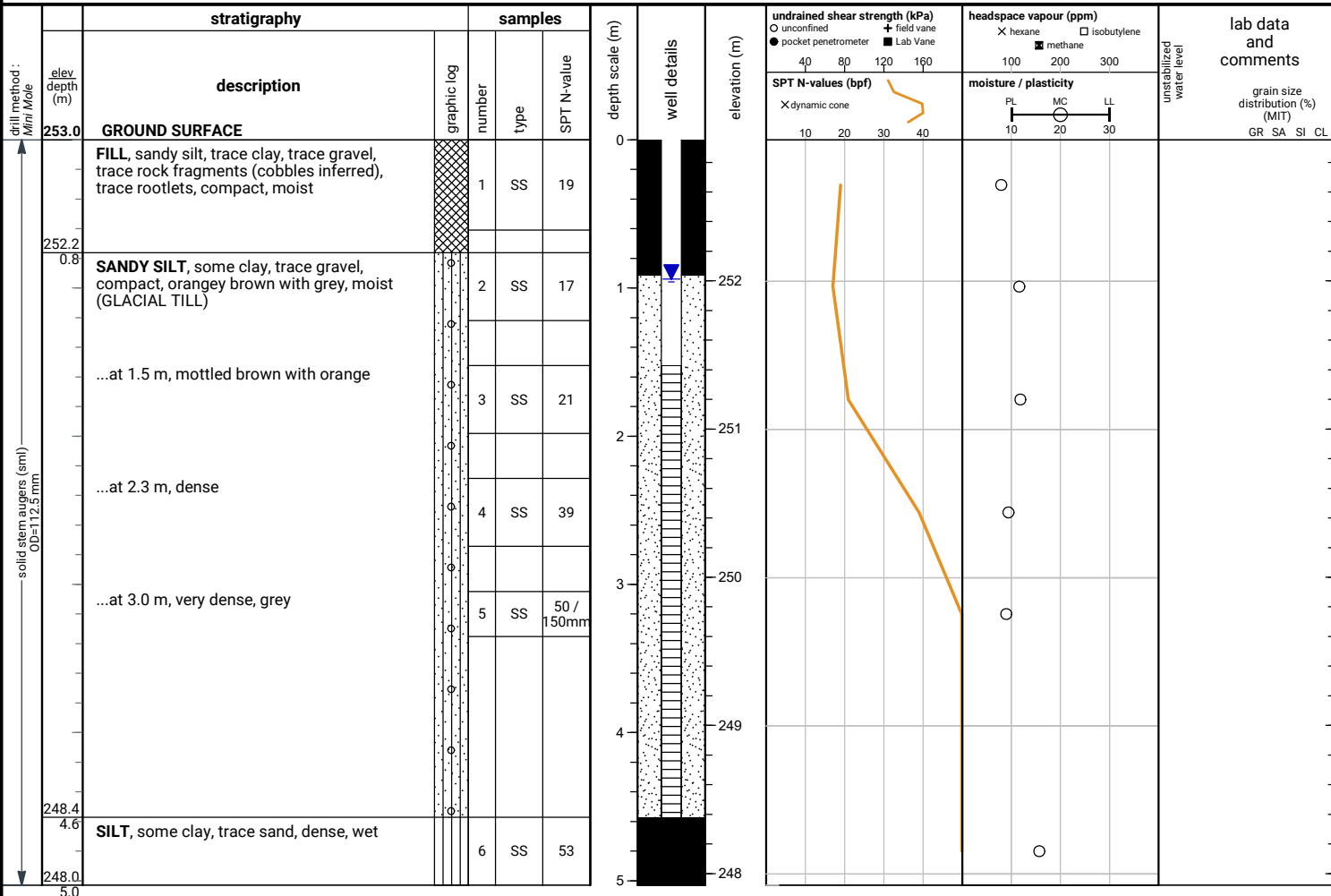


date	depth (m)	elevation (m)
Jun 29, 2023	1.8	250.7
Jul 21, 2023	1.8	250.7
Aug 11, 2023	2.0	250.5
Sep 1, 2023	1.9	250.6

File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

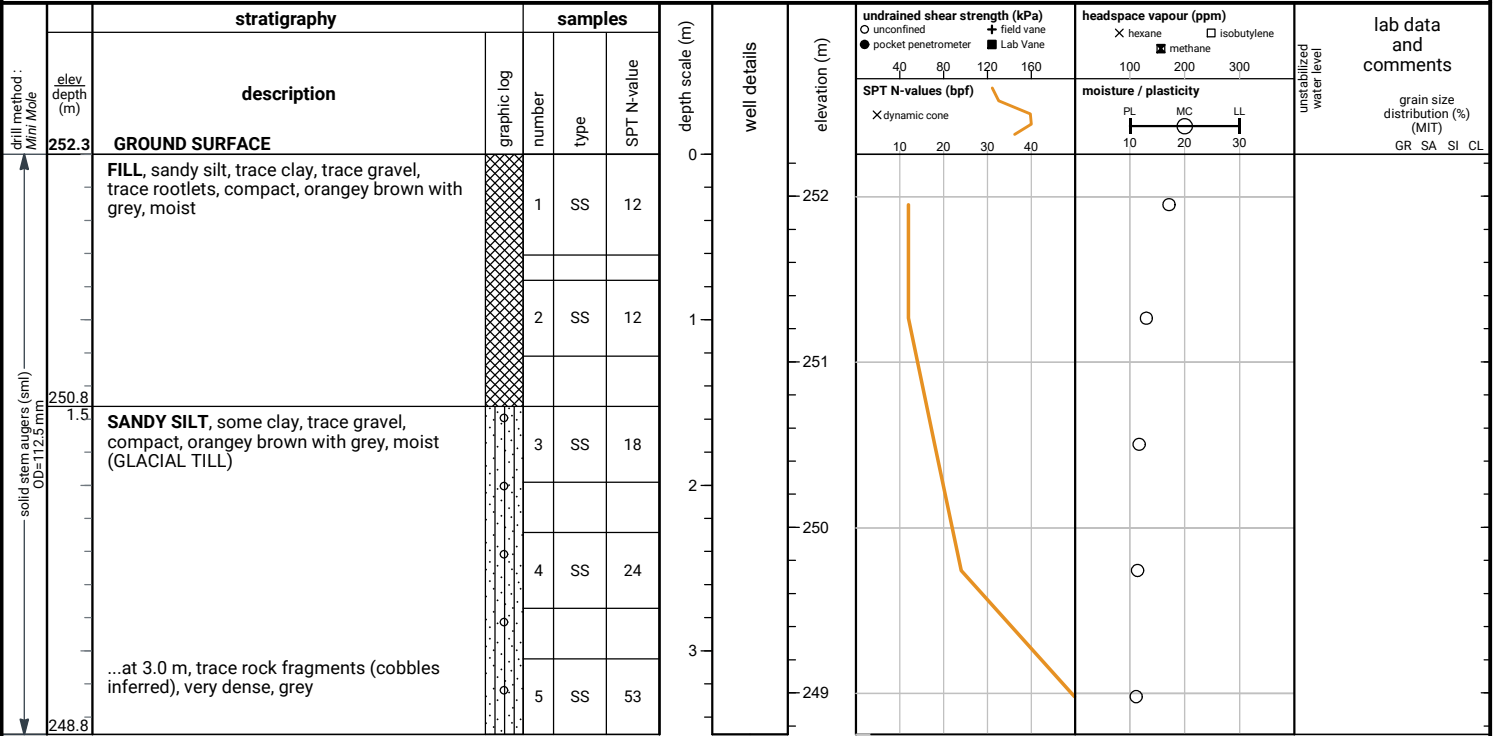
Client : Region of Peel c/o Diamond Schmitt



File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

Client : Region of Peel c/o Diamond Schmitt



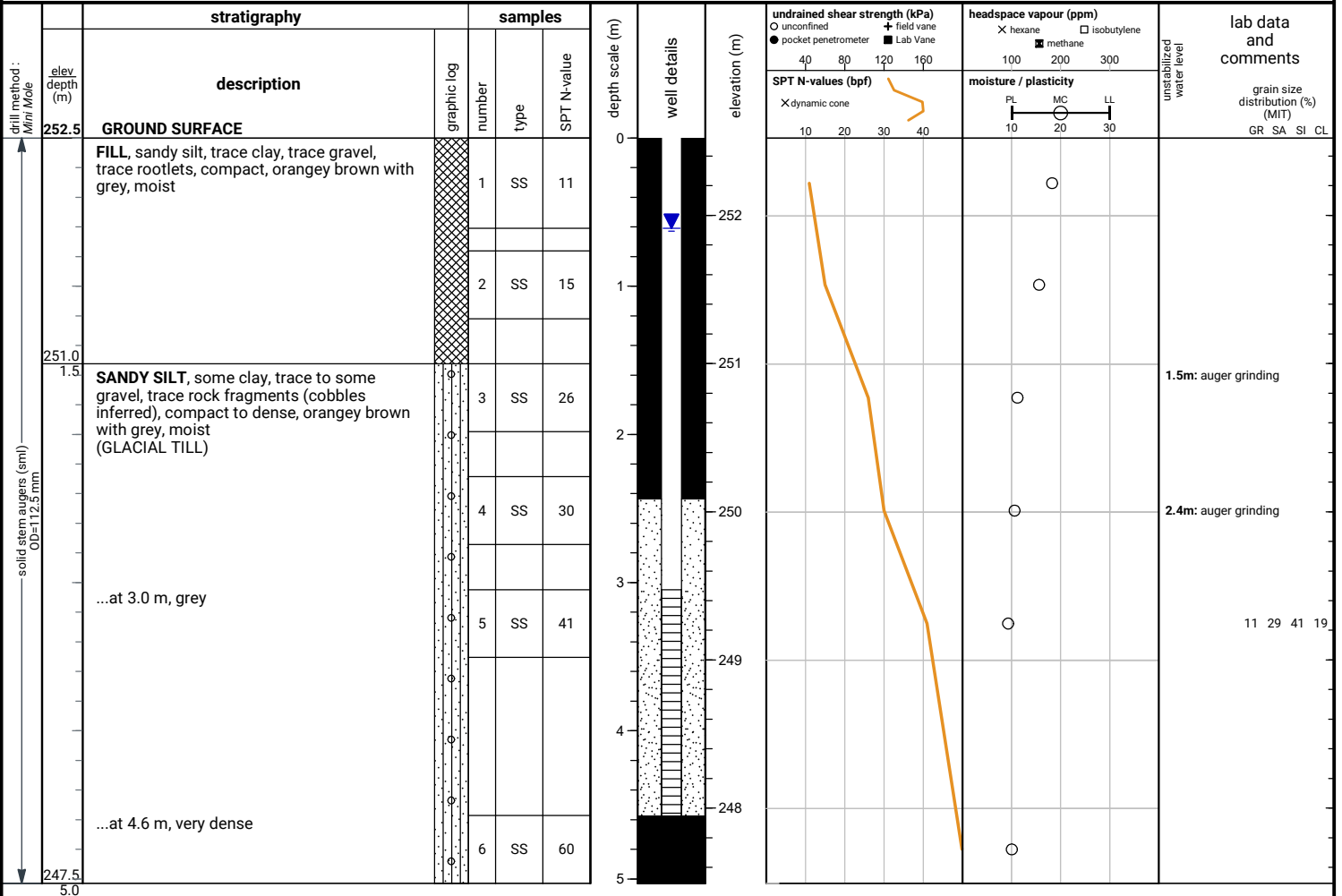
END OF BOREHOLE

Dry and open upon completion of drilling.

File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

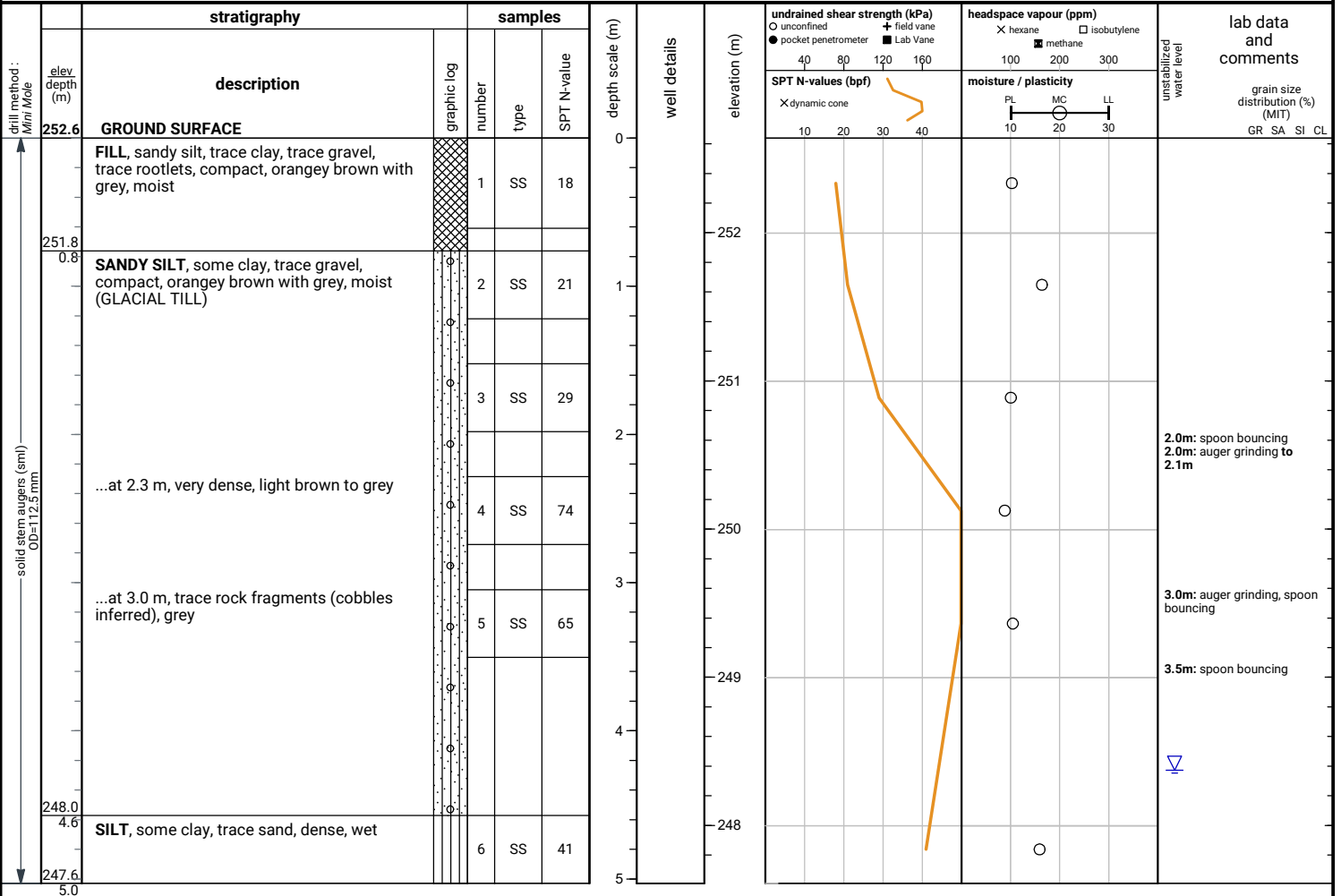
Client : Region of Peel c/o Diamond Schmitt



File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

Client : Region of Peel c/o Diamond Schmitt



**END OF BOREHOLE**

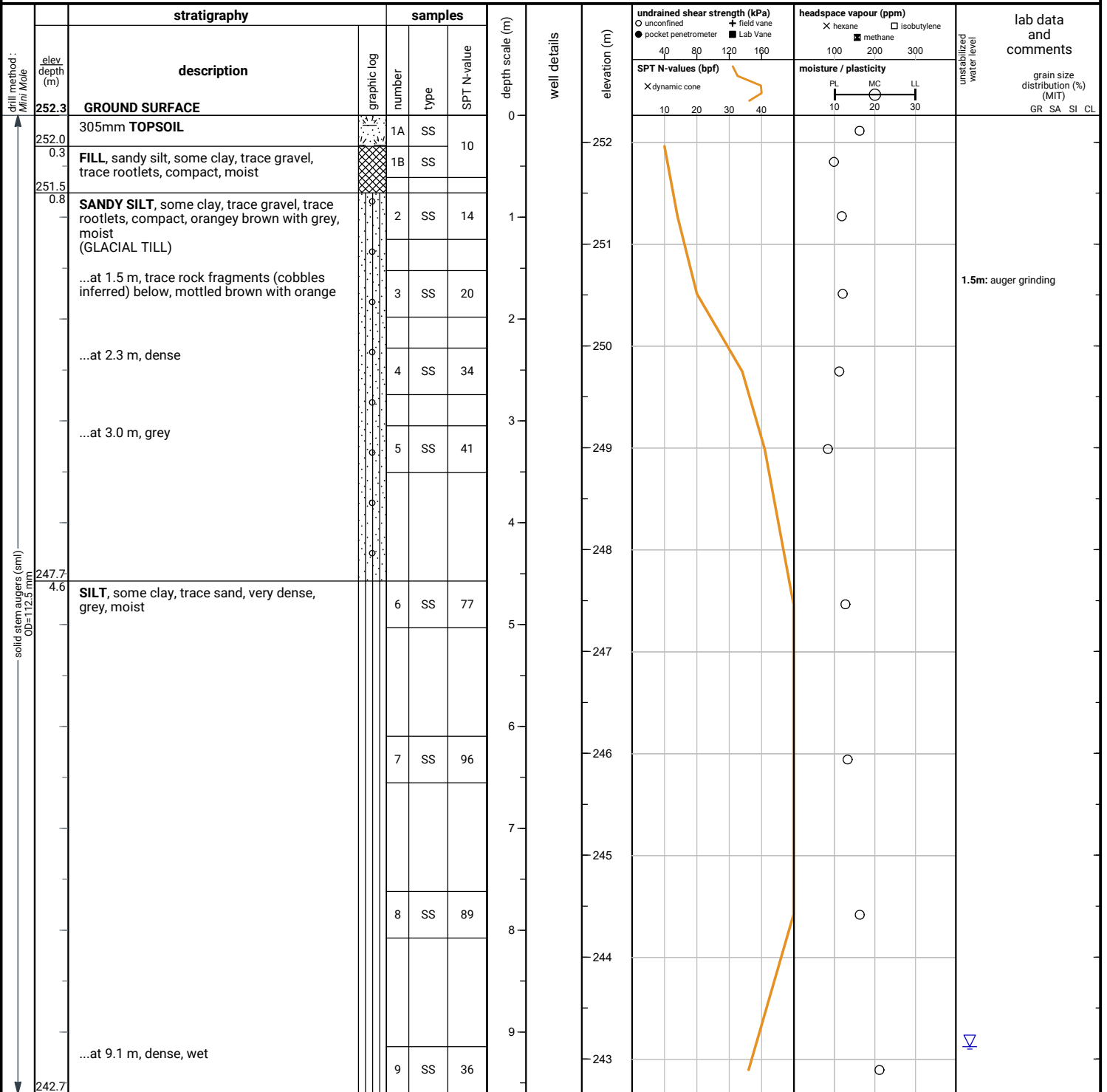
Unstabilized water level measured at 4.3 m below ground surface; open upon completion of drilling.



File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

Client : Region of Peel c/o Diamond Schmitt



**END OF BOREHOLE**

Unstabilized water level measured at 9.1 m below ground surface; open upon completion of drilling.

File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

Client : Region of Peel c/o Diamond Schmitt

stratigraphy		samples			depth scale (m)	well details	elevation (m)	undrained shear strength (kPa)	headspace vapour (ppm)	lab data and comments
description	graphic log	number	type	SPT N-value				○ unconfined ● pocket penetrometer X dynamic cone	X hexane □ isobutylene ■ methane	
252.5 <b>GROUND SURFACE</b>					0					
<b>FILL</b> , sandy silt, trace clay, trace gravel, compact, orangey brown with grey, moist		1	SS	14						
251.7										
0.8 <b>SANDY SILT</b> , some clay, trace gravel, compact, orangey brown with grey, moist (GLACIAL TILL)		2	SS	15	1					
...at 1.5 m, mottled brown with orange		3	SS	18	2					
...at 2.3 m, trace rock fragments (cobbles inferred), dense, light grey		4	SS	35	3					2.3m: auger grinding
...at 3.0 m, grey below		5	SS	37	4					
		6	SS	49	5					4.3m: auger grinding
247.5										
5.0										

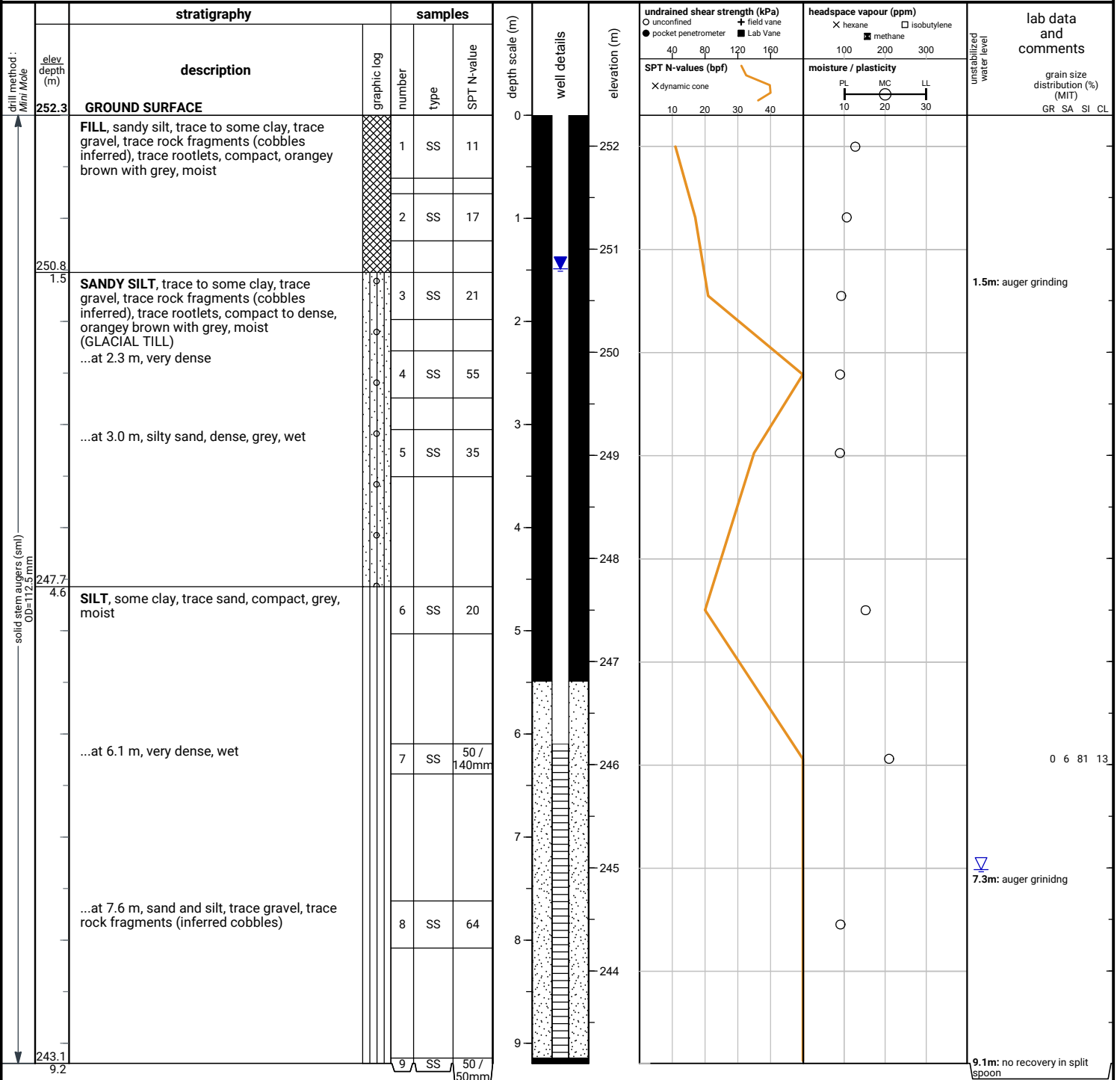
END OF BOREHOLE

Dry and open upon completion of drilling.

File No. : 23-099

Project : PRPS Reporting Station, Brampton, ON

Client : Region of Peel c/o Diamond Schmitt



END OF BOREHOLE

Unstabilized water level measured at 7.3 m below ground surface; open upon completion of drilling.

50 mm dia. monitoring well installed.  
No. 10 screen

**GROUNDWATER LEVELS**

date	depth (m)	elevation (m)
Jun 29, 2023	1.4	250.9
Jul 21, 2023	1.3	251.0
Aug 11, 2023	1.3	251.0
Sep 1, 2023	1.5	250.8

# APPENDIX B





## **Slug Test Analysis Report**

Project: Peel Region Paramedic Service

Number: 23-099

Client:

Location: Brampton, ON

Slug Test: RHT-BH6

Test Well: BH6

Test Conducted by: NA

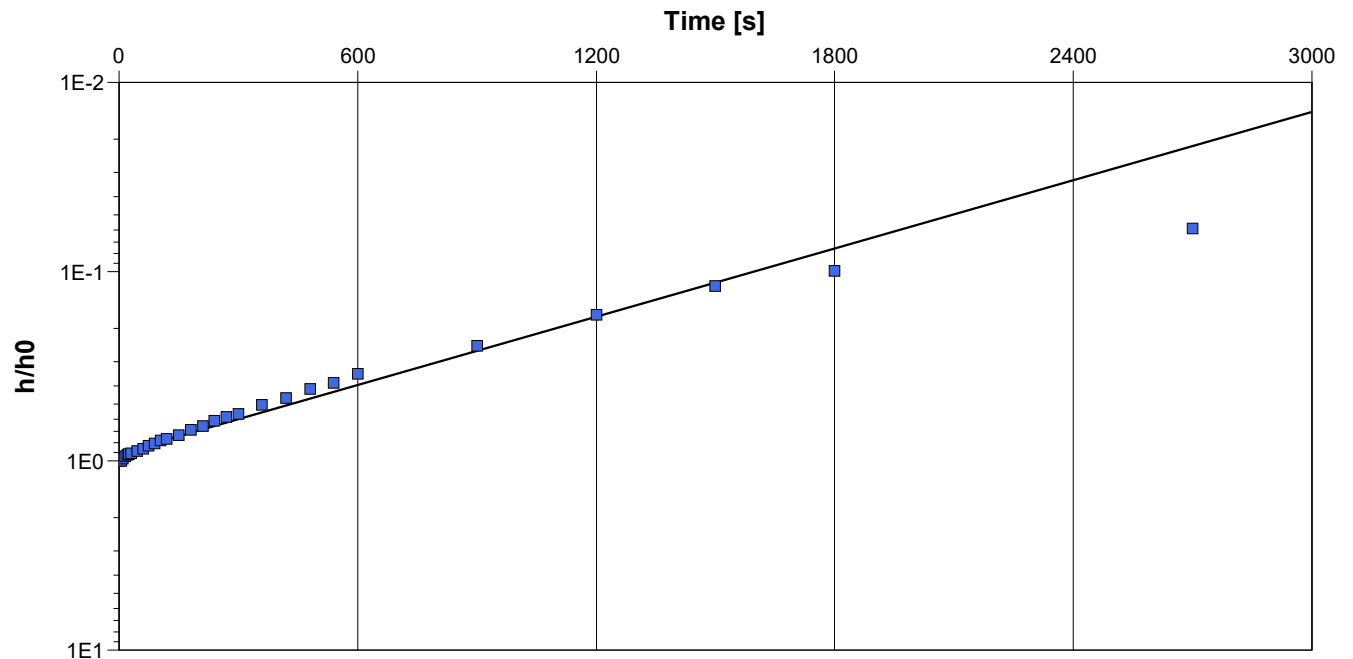
Test Date: 2023-06-23

Analysis Performed by: DK

RHT-BH6

Analysis Date: 2023-07-21

Aquifer Thickness: 7.00 m



Calculation using Bouwer & Rice

Observation Well

Hydraulic Conductivity  
[m/s]

BH6

$4.63 \times 10^{-7}$



## **Slug Test Analysis Report**

Project: Peel Region Paramedic Service

Number: 23-099

Client:

Location: Brampton, ON

Slug Test: RHT-BH7

Test Well: BH7

Test Conducted by: NA

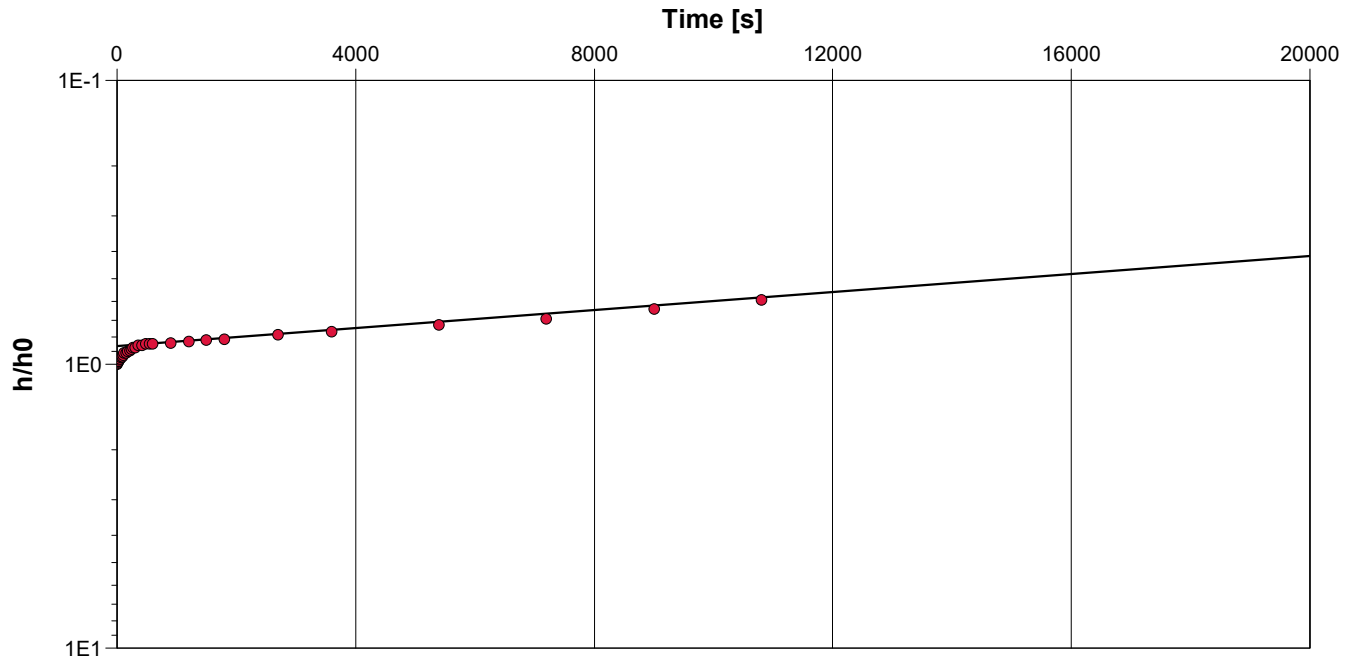
Test Date: 2023-07-21

Analysis Performed by: DK

RHT-BH7

Analysis Date: 2023-07-21

Aquifer Thickness: 7.00 m



Calculation using Bouwer & Rice

Observation Well

Hydraulic Conductivity  
[m/s]

BH7

$1.21 \times 10^{-8}$



## **Slug Test Analysis Report**

Project: Peel Region Paramedic Service

Number: 23-099

Client:

Location: Brampton, ON

Slug Test: RHT-BH8

Test Well: BH8

Test Conducted by: NA

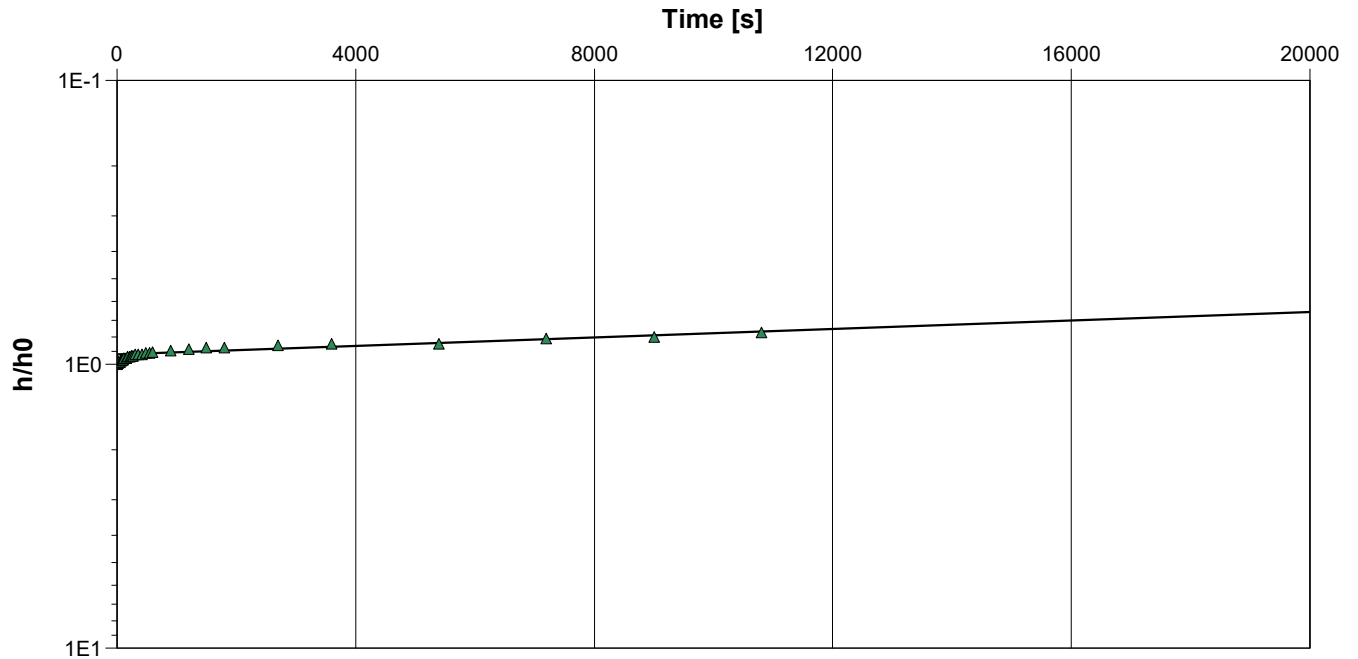
Test Date: 2023-07-21

Analysis Performed by: DK

RHT-BH8

Analysis Date: 2023-07-21

Aquifer Thickness: 5.00 m



Calculation using Bouwer & Rice

Observation Well

Hydraulic Conductivity  
[m/s]

BH8

$6.37 \times 10^{-9}$



## **Slug Test Analysis Report**

Project: Peel Region Paramedic Service

Number: 23-099

Client:

Location: Brampton, ON

Slug Test: RHT-BH10

Test Well: BH10

Test Conducted by: NA

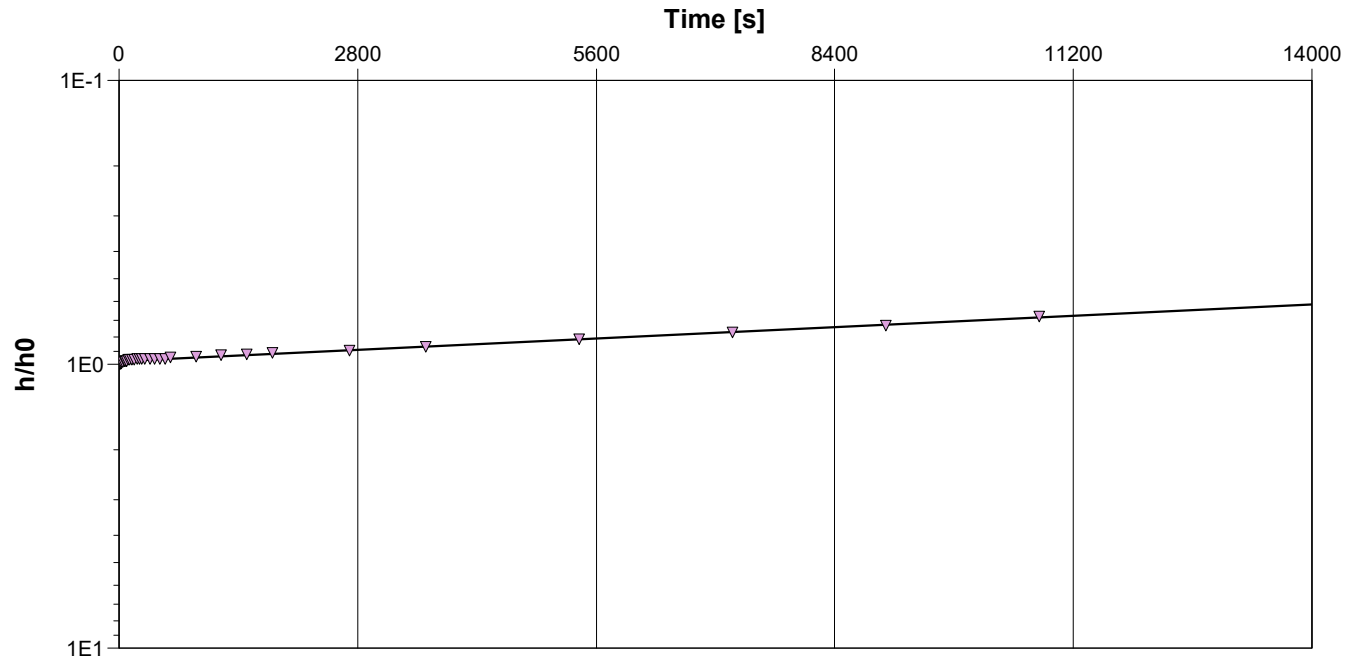
Test Date: 2023-07-21

Analysis Performed by: DK

RHT-BH10

Analysis Date: 2023-07-21

Aquifer Thickness: 5.00 m



Calculation using Bouwer & Rice

Observation Well

Hydraulic Conductivity  
[m/s]

BH10

$2.33 \times 10^{-8}$





## **Slug Test Analysis Report**

Project: Peel Region Paramedic Service

Number: 23-099

Client:

Location: Brampton, ON

Slug Test: RHT-BH14

Test Well: BH14

Test Conducted by: NA

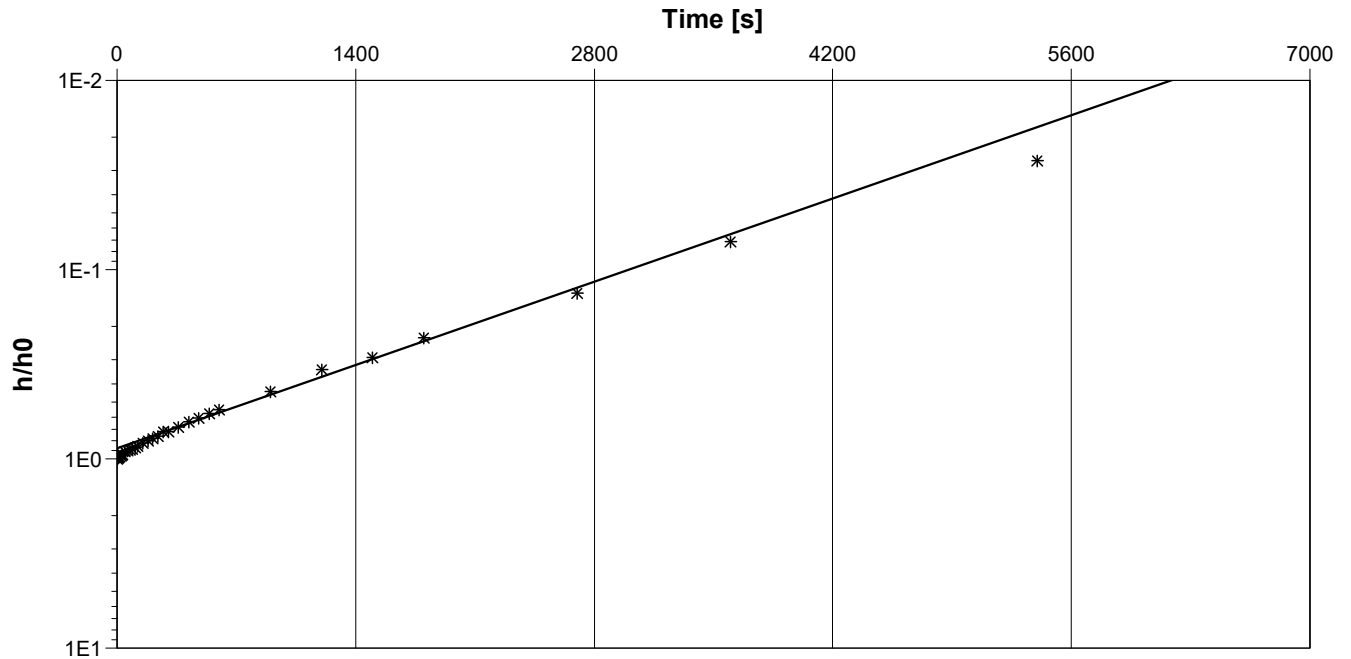
Test Date: 2023-07-21

Analysis Performed by: DK

RHT-BH14

Analysis Date: 2023-07-21

Aquifer Thickness: 7.00 m



Calculation using Bouwer & Rice

Observation Well

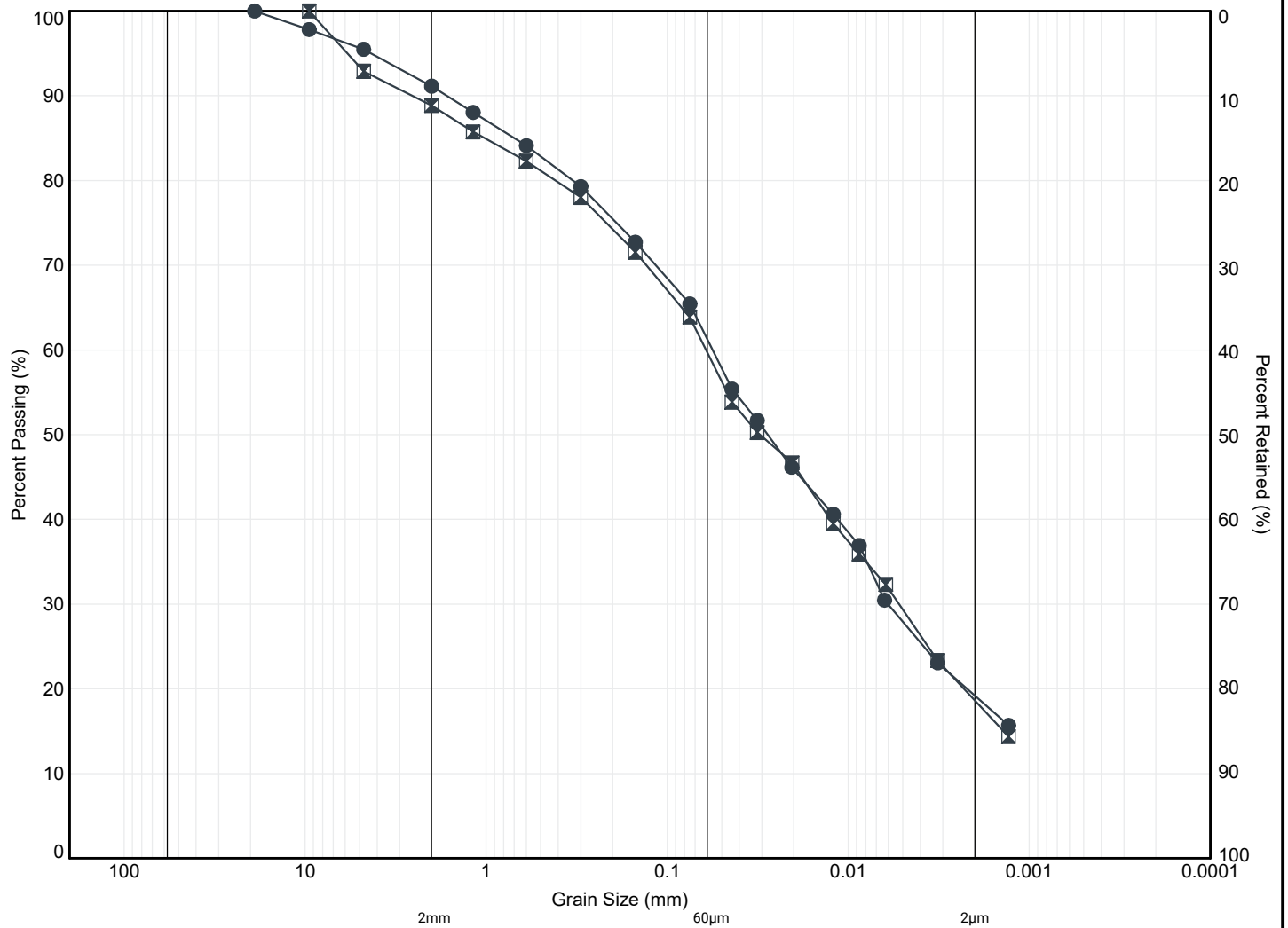
Hydraulic Conductivity  
[m/s]

BH14

$2.77 \times 10^{-7}$

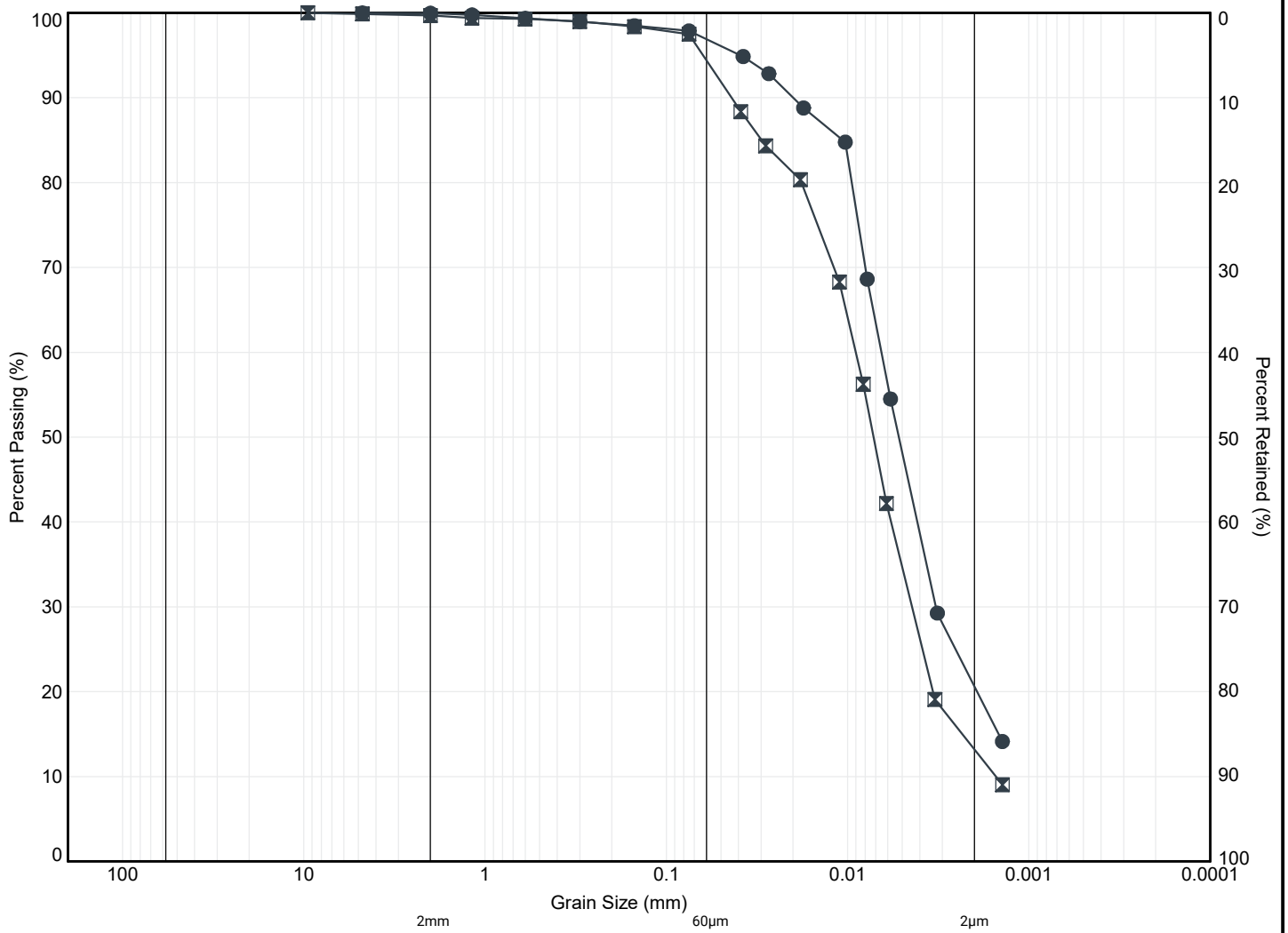
# APPENDIX C





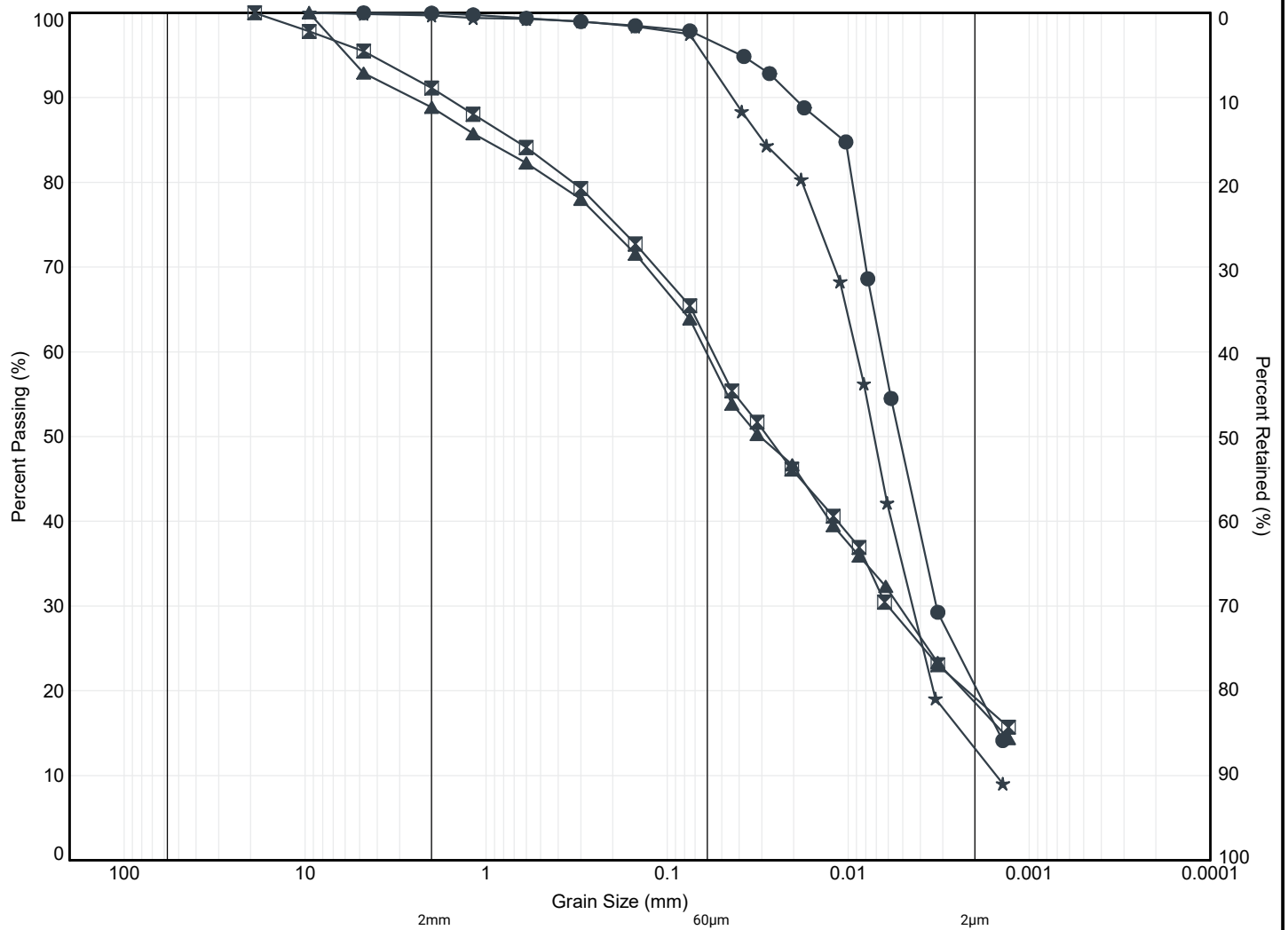
#### MIT SYSTEM

Location	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
● BH 7	SS3	1.8	250.8	9	30	42	19
⊠ BH 10	SS5	3.3	249.2	11	29	41	19



#### MIT SYSTEM

Location	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH 6	SS6	4.8	248.1	0	3	76	21
BH 14	SS7	6.2	246.1	0	6	81	13



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

#### MIT SYSTEM

Location	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
● BH 6	SS6	4.8	248.1	0	3	76	21
⊠ BH 7	SS3	1.8	250.8	9	30	42	19
▲ BH 10	SS5	3.3	249.2	11	29	41	19
★ BH 14	SS7	6.2	246.1	0	6	81	13

Title:

**GRAIN SIZE DISTRIBUTION**

File No.:

**23-099**

# APPENDIX D







K from Grain Size Analysis Report

Date: 15-Aug-23

Sample Name:

BH7-SS3

Glacial Till

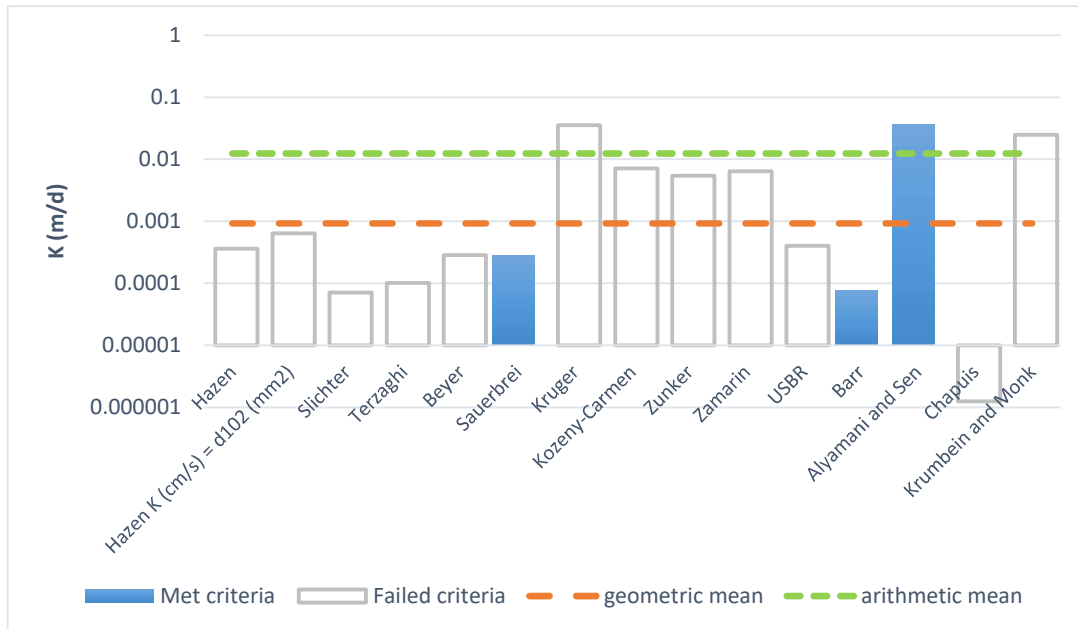
Mass Sample (g):

134.9

T (oC)

20

Poorly sorted sandy silt with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	4.2E-07	4.2E-09	0.00	
Hazen K (cm/s) = d <sub>10</sub> (mm)	7.3E-07	7.3E-09	0.00	
Slichter	8.2E-08	8.2E-10	0.00	
Terzaghi	1.2E-07	1.2E-09	0.00	
Beyer	3.3E-07	3.3E-09	0.00	
Sauerbrei	3.3E-07	3.3E-09	0.00	
Kruger	4.1E-05	4.1E-07	0.04	
Kozeny-Carmen	8.2E-06	8.2E-08	0.01	
Zunker	6.3E-06	6.3E-08	0.01	
Zammarin	7.4E-06	7.4E-08	0.01	
USBR	4.7E-07	4.7E-09	0.00	
Barr	8.8E-08	8.8E-10	0.00	
Alyamani and Sen	4.3E-05	4.3E-07	0.04	
Chapuis	1.4E-09	1.4E-11	0.00	
Krumbein and Monk	2.9E-05	2.9E-07	0.02	
geometric mean	1.1E-06	1.1E-08	0.00	
arithmetic mean	1.4E-05	1.4E-07	0.01	



K from Grain Size Analysis Report

Date: 15-Aug-23

Sample Name:

BH10-SS5

Glacial Till

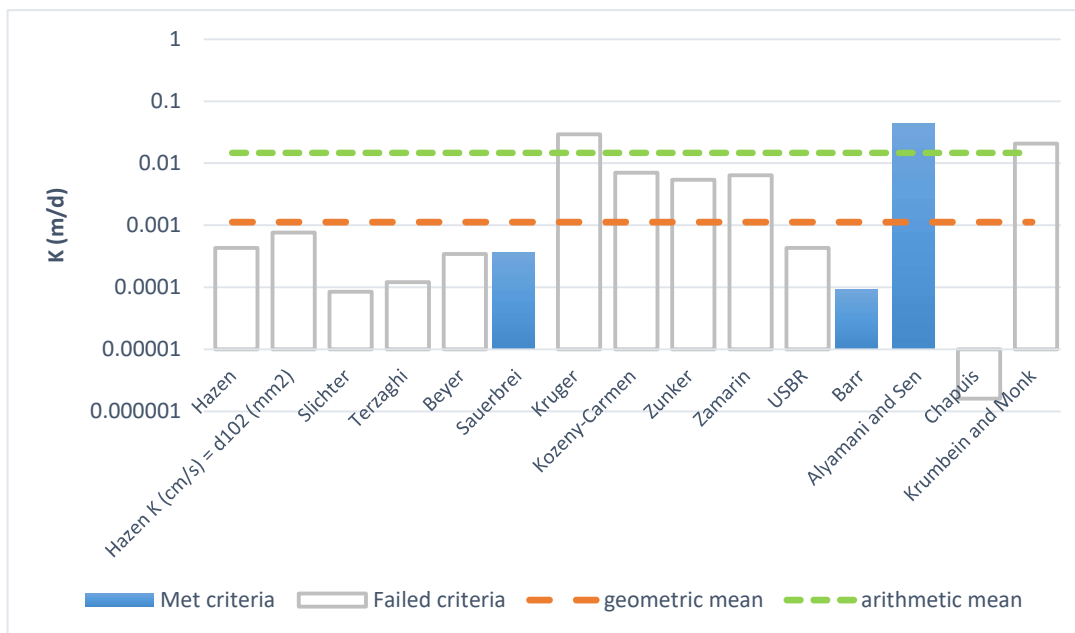
Mass Sample (g):

127.7

T (oC)

20

Poorly sorted sandy gravelly silt with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	5.0E-07	5.0E-09	0.00	
Hazen K (cm/s) = d <sub>10</sub> (mm)	8.8E-07	8.8E-09	0.00	
Slichter	9.8E-08	9.8E-10	0.00	
Terzaghi	1.4E-07	1.4E-09	0.00	
Beyer	4.0E-07	4.0E-09	0.00	
Sauerbrei	4.2E-07	4.2E-09	0.00	
Kruger	3.4E-05	3.4E-07	0.03	
Kozeny-Carmen	8.2E-06	8.2E-08	0.01	
Zunker	6.3E-06	6.3E-08	0.01	
Zammarin	7.4E-06	7.4E-08	0.01	
USBR	5.0E-07	5.0E-09	0.00	
Barr	1.1E-07	1.1E-09	0.00	
Alyamani and Sen	5.1E-05	5.1E-07	0.04	
Chapuis	1.9E-09	1.9E-11	0.00	
Krumbein and Monk	2.4E-05	2.4E-07	0.02	
geometric mean	1.3E-06	1.3E-08	0.00	
arithmetic mean	1.7E-05	1.7E-07	0.01	



K from Grain Size Analysis Report

Date: 15-Aug-23

Sample Name:

BH6-SS6

Silts

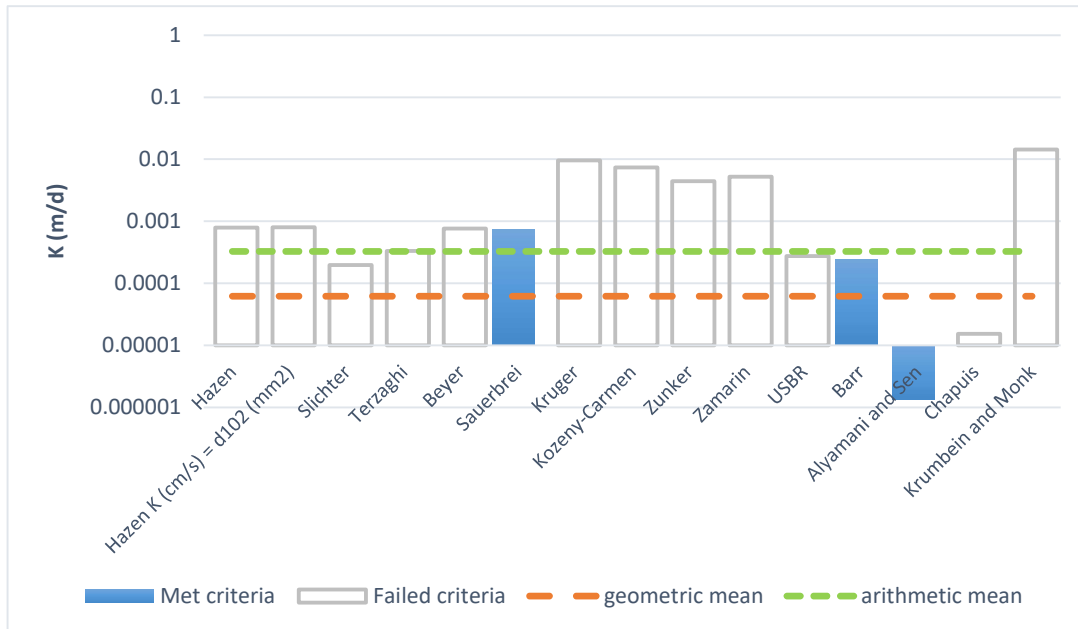
Mass Sample (g):

141.7

T (oC)

20

Poorly sorted clay with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	9.1E-07	9.1E-09	0.00	
Hazen K (cm/s) = d <sub>10</sub> (mm)	9.2E-07	9.2E-09	0.00	
Slichter	2.3E-07	2.3E-09	0.00	
Terzaghi	3.8E-07	3.8E-09	0.00	
Beyer	8.9E-07	8.9E-09	0.00	
Sauerbrei	8.6E-07	8.6E-09	0.00	
Kruger	1.1E-05	1.1E-07	0.01	
Kozeny-Carmen	8.5E-06	8.5E-08	0.01	
Zunker	5.1E-06	5.1E-08	0.00	
Zammarin	6.1E-06	6.1E-08	0.01	
USBR	3.2E-07	3.2E-09	0.00	
Barr	2.8E-07	2.8E-09	0.00	
Alyamani and Sen	1.6E-09	1.6E-11	0.00	
Chapuis	1.8E-08	1.8E-10	0.00	
Krumbein and Monk	1.7E-05	1.7E-07	0.01	
geometric mean	7.2E-08	7.2E-10	0.00	
arithmetic mean	3.8E-07	3.8E-09	0.00	



K from Grain Size Analysis Report

Date: 15-Aug-23

Sample Name:

BH14-SS7

Silts

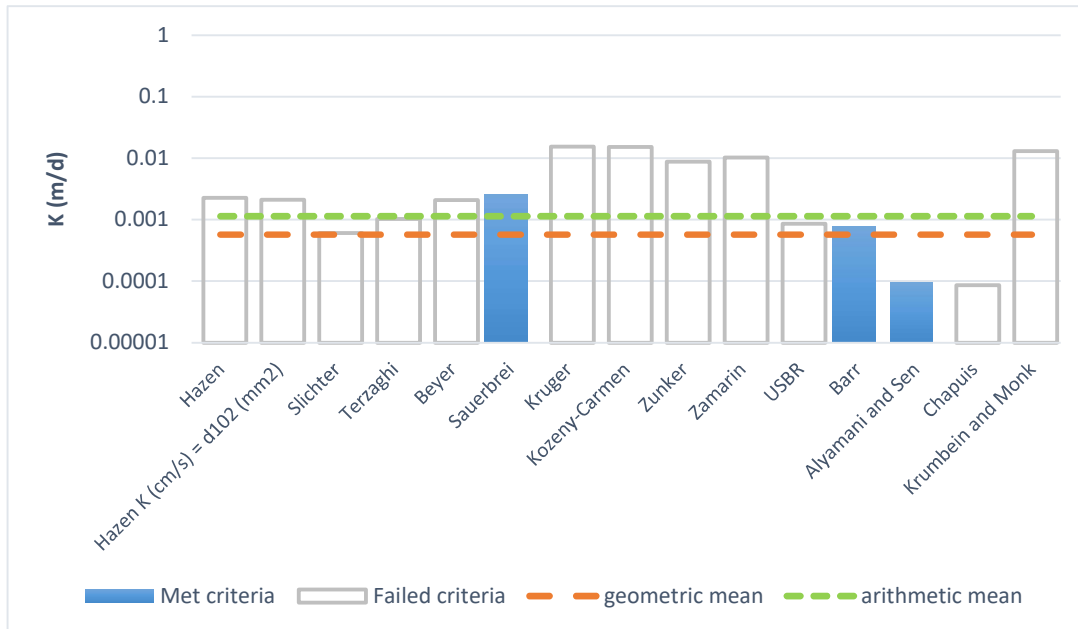
Mass Sample (g):

167.9

T (oC)

20

Poorly sorted clay with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	2.6E-06	2.6E-08	0.00	
Hazen K (cm/s) = $d_{10}$ (mm)	2.4E-06	2.4E-08	0.00	
Slichter	7.0E-07	7.0E-09	0.00	
Terzaghi	1.2E-06	1.2E-08	0.00	
Beyer	2.4E-06	2.4E-08	0.00	
Sauerbrei	3.0E-06	3.0E-08	0.00	
Kruger	1.8E-05	1.8E-07	0.02	
Kozeny-Carmen	1.8E-05	1.8E-07	0.02	
Zunker	1.0E-05	1.0E-07	0.01	
Zamarin	1.2E-05	1.2E-07	0.01	
USBR	9.9E-07	9.9E-09	0.00	
Barr	8.8E-07	8.8E-09	0.00	
Alyamani and Sen	1.1E-07	1.1E-09	0.00	
Chapuis	9.9E-08	9.9E-10	0.00	
Krumbein and Monk	1.5E-05	1.5E-07	0.01	
geometric mean	6.6E-07	6.6E-09	0.00	
arithmetic mean	1.3E-06	1.3E-08	0.00	

# APPENDIX E



# T-TIME ANALYSIS



PROJECT: **Peel Region Paramedic Station**

FILE NO.: **23-099**

LOCATION: **Brampton, ON**

SAMPLE DATE: -

CLIENT: **Region of Peel c/o DSA**

SAMPLED BY: -

Borehole: **7**

MIT DESCRIPTION: **Sandy Silt, some clay, trace gravel**

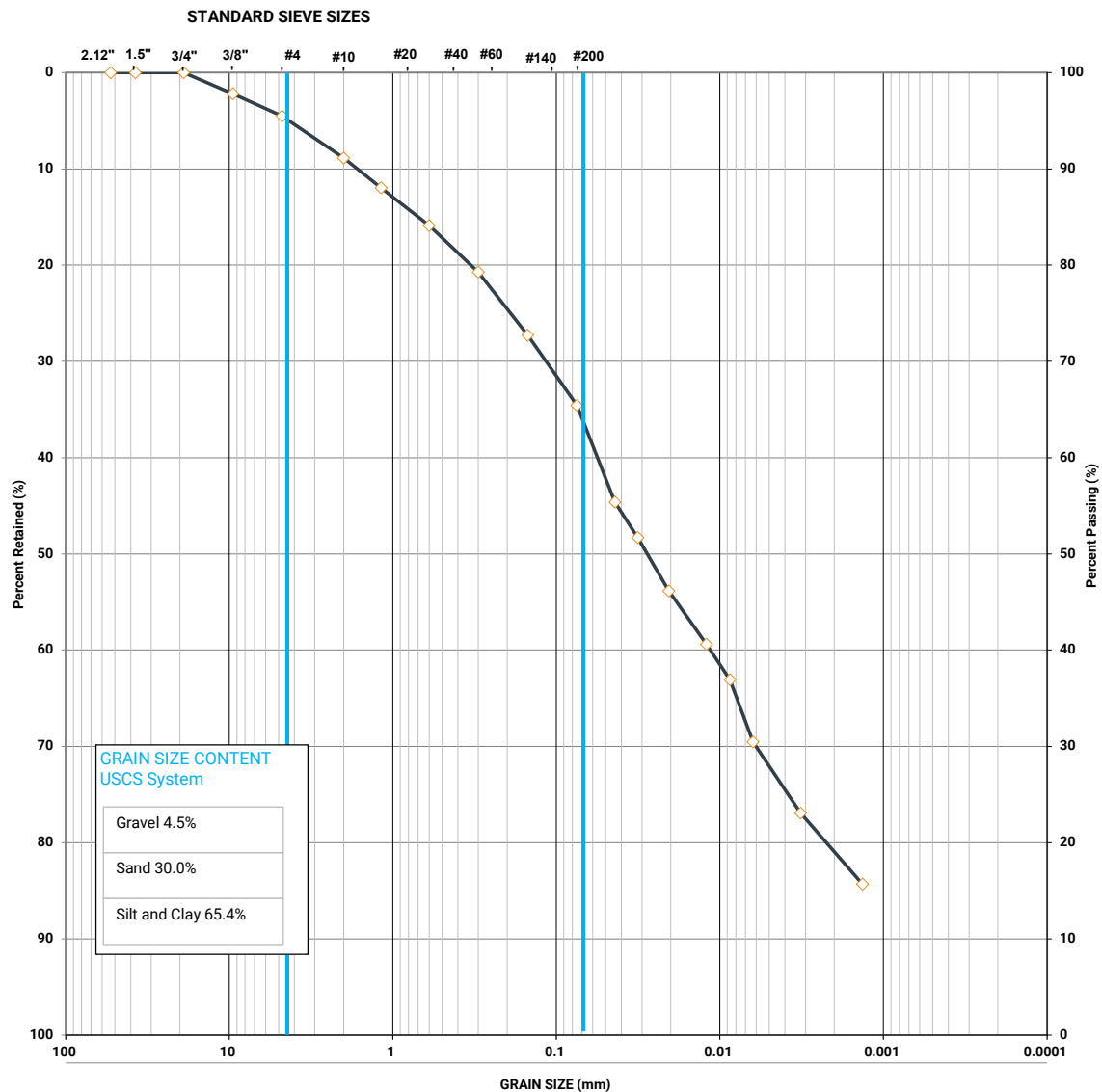
Sample: **SS3**

UCSC SYMBOL: **SM**

Sample Depth (m): **1.8**

*Estimated rate of Percolation = 29 min/cm*

## GRAIN SIZE DISTRIBUTION



UNIFIED SYSTEM	GRAVEL	SAND	SILT AND CLAY
----------------	--------	------	---------------

**NOTE:** T-time infiltration rates are indirectly inferred from grain size measurements, and are not measured directly in situ. They represent the unsaturated condition. In situ measurement of the infiltration rate in the saturated condition is recommended for detailed design.



# T-TIME ANALYSIS



PROJECT: **Peel Region Paramedic Station**

FILE NO.: **23-099**

LOCATION: **Brampton, ON**

SAMPLE DATE: -

CLIENT: **Region of Peel c/o DSA**

SAMPLED BY: -

Borehole: **10**

MIT DESCRIPTION: **Sandy Silt, some clay, trace gravel**

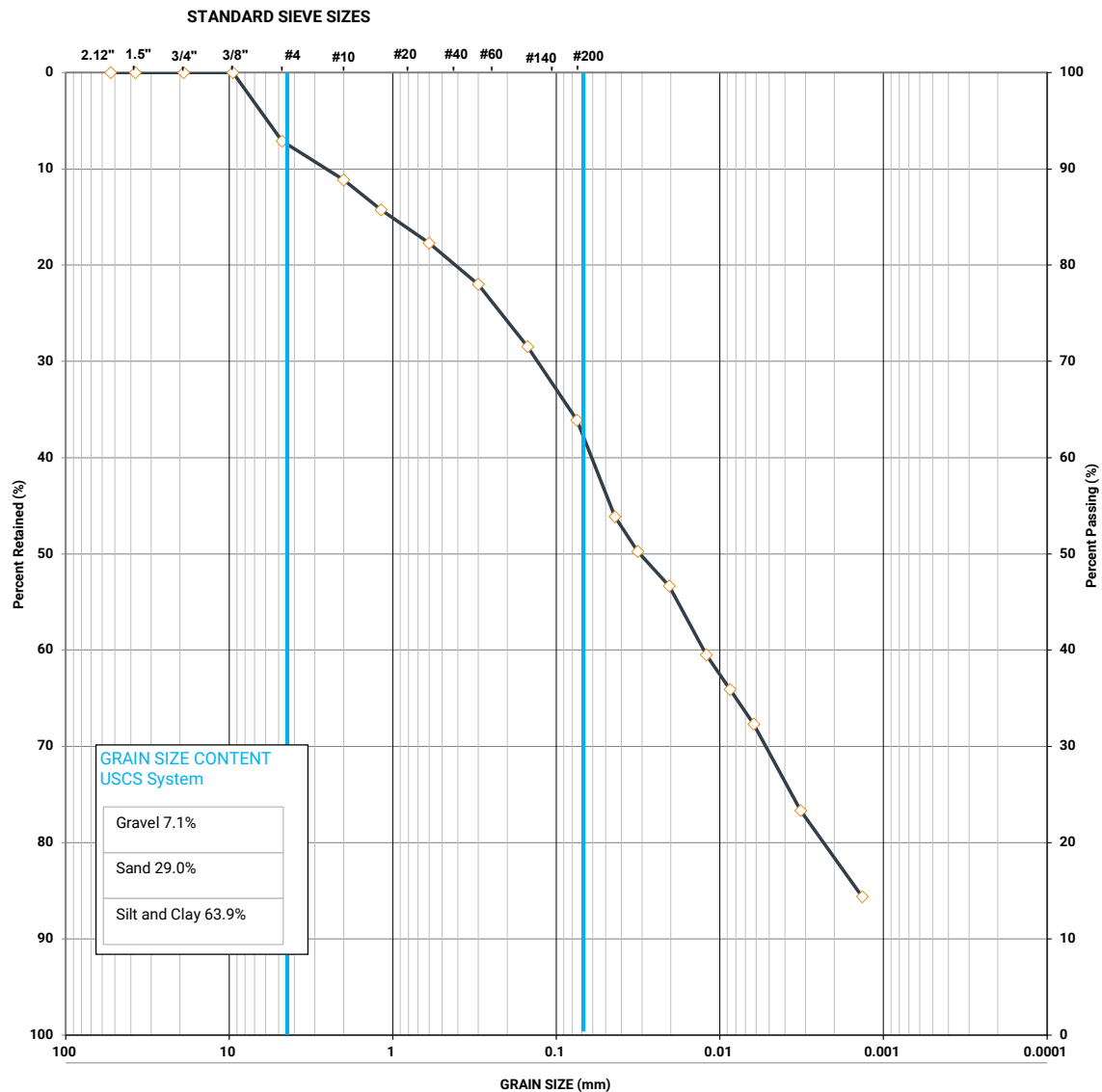
Sample: **SS5**

UCSC SYMBOL: **SM**

Sample Depth (m): **3.3**

*Estimated rate of Percolation = 28 min/cm*

## GRAIN SIZE DISTRIBUTION



UNIFIED SYSTEM	GRAVEL	SAND	SILT AND CLAY
----------------	--------	------	---------------

**NOTE:** T-time infiltration rates are indirectly inferred from grain size measurements, and are not measured directly in situ. They represent the unsaturated condition. In situ measurement of the infiltration rate in the saturated condition is recommended for detailed design.

# APPENDIX F



## CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: WT2319403	Page	: 1 of 9
Client	: Grounded Engineering Inc.	Laboratory	: ALS Environmental - Waterloo
Contact	: Deepak Kanraj	Account Manager	: Amanda Overholster
Address	: 1 Banigan Drive Toronto ON Canada M4H 1G3	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 647 264 7928	Telephone	: 1 416 817 2944
Project	: 23-099-150	Date Samples Received	: 29-Jun-2023 16:00
PO	: ----	Date Analysis Commenced	: 29-Jun-2023
C-O-C number	: 20-1046424	Issue Date	: 10-Jul-2023 19:02
Sampler	: NA/SN		
Site	: BRAMPTON PRPS		
Quote number	: 2023 SOA Pricing		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario
Manuel Tavaratello	Supervisor - Semi-Volatile Extractions	Organics, Waterloo, Ontario
Ruby Sujeepan		Microbiology, Waterloo, Ontario
Sanja Risticvic	Department Manager - LCMS	LCMS, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	VOC, Waterloo, Ontario
Wayne Smith	Client Services Specialist	Inorganics, Waterloo, Ontario
Wayne Smith	Client Services Specialist	Metals, Waterloo, Ontario



## Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
SW-UF-BH7	Water	Solids, total suspended [TSS]		RMPSUB	STM	43.3 mg/L	15 mg/L
	Water	Zinc, total		RMPSUB	STM	0.0554 mg/L	0.04 mg/L

## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	Description
µg/L	micrograms per litre
CFU/100mL	colony forming units per hundred millilitres
mg/L	milligrams per litre
pH units	pH units

>: greater than.

<: less than.

Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).

For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

## Qualifiers

Qualifier	Description
BODL	Limit of Reporting for BOD was increased to account for the largest volume of sample tested.



### Analytical Results Evaluation

Matrix: Water				Client sample ID	SW-UF-BH7	----	----	----	----	----	----
				Sampling date/time	29-Jun-2023 10:00	----	----	----	----	----	----
				Sub-Matrix	Water	----	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit	WT2319403-001	-----	-----	-----	-----	-----	-----	-----
Physical Tests											
pH	----	E108/WT		8.60	----	----	----	----	----	----	----
Solids, total suspended [TSS]	----	E160/WT	mg/L	43.3	----	----	----	----	----	----	----
Anions and Nutrients											
Fluoride	16984-48-8	E235.F/WT		0.161	----	----	----	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318/WT	mg/L	0.476	----	----	----	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/WT		0.296	----	----	----	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	mg/L	2.59	----	----	----	----	----	----	----
Cyanides											
Cyanide, strong acid dissociable (Total)	----	E333/WT		<0.0020	----	----	----	----	----	----	----
Microbiological Tests											
Coliforms, Escherichia coli [E. coli]	----	E012A.EC/WT	CFU/100 mL	Not Detected	----	----	----	----	----	----	----
Total Metals											
Aluminum, total	7429-90-5	E420/WT		0.818	----	----	----	----	----	----	----
Antimony, total	7440-36-0	E420/WT	mg/L	0.00036	----	----	----	----	----	----	----
Arsenic, total	7440-38-2	E420/WT		0.00254	----	----	----	----	----	----	----
Cadmium, total	7440-43-9	E420/WT	mg/L	0.0000938	----	----	----	----	----	----	----
Chromium, total	7440-47-3	E420/WT		0.00210	----	----	----	----	----	----	----
Cobalt, total	7440-48-4	E420/WT	mg/L	0.00056	----	----	----	----	----	----	----
Copper, total	7440-50-8	E420/WT		0.00410	----	----	----	----	----	----	----
Lead, total	7439-92-1	E420/WT	mg/L	0.00175	----	----	----	----	----	----	----
Manganese, total	7439-96-5	E420/WT		0.0347	----	----	----	----	----	----	----
Mercury, total	7439-97-6	E508/WT	mg/L	<0.0000050	----	----	----	----	----	----	----
Molybdenum, total	7439-98-7	E420/WT		0.00328	----	----	----	----	----	----	----
Nickel, total	7440-02-0	E420/WT	mg/L	0.00143	----	----	----	----	----	----	----
Selenium, total	7782-49-2	E420/WT		0.000092	----	----	----	----	----	----	----
Silver, total	7440-22-4	E420/WT	mg/L	0.000011	----	----	----	----	----	----	----
Tin, total	7440-31-5	E420/WT		0.00190	----	----	----	----	----	----	----



## Analytical Results Evaluation

Matrix: Water				Client sample ID	SW-UF-BH7	----	----	----	----	----	----
				Sampling date/time	29-Jun-2023 10:00	----	----	----	----	----	----
				Sub-Matrix	Water	----	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit	WT2319403-001	-----	-----	-----	-----	-----	-----	-----
Total Metals											
Titanium, total	7440-32-6	E420/WT	mg/L	0.0213	----	----	----	----	----	----	----
Zinc, total	7440-66-6	E420/WT		0.0554	----	----	----	----	----	----	----
Aggregate Organics											
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/WT	mg/L	<3.0 <sup>BODL</sup>	----	----	----	----	----	----	----
Oil & grease (gravimetric)	----	E567/WT		<5.0	----	----	----	----	----	----	----
Oil & grease, animal/vegetable (gravimetric)	----	EC567A.SG/WT	mg/L	<5.0	----	----	----	----	----	----	----
Oil & grease, mineral (gravimetric)	----	E567SG/WT		<5.0	----	----	----	----	----	----	----
Phenols, total (4AAP)	----	E562/WT	mg/L	<0.0010	----	----	----	----	----	----	----
Volatile Organic Compounds											
Benzene	71-43-2	E611D/WT		<0.50	----	----	----	----	----	----	----
Chloroform	67-66-3	E611D/WT	µg/L	<0.50	----	----	----	----	----	----	----
Dichlorobenzene, 1,2-	95-50-1	E611D/WT		<0.50	----	----	----	----	----	----	----
Dichlorobenzene, 1,4-	106-46-7	E611D/WT	µg/L	<0.50	----	----	----	----	----	----	----
Dichloroethylene, cis-1,2-	156-59-2	E611D/WT		<0.50	----	----	----	----	----	----	----
Dichloromethane	75-09-2	E611D/WT	µg/L	<1.0	----	----	----	----	----	----	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D/WT		<0.30	----	----	----	----	----	----	----
Ethylbenzene	100-41-4	E611D/WT	µg/L	<0.50	----	----	----	----	----	----	----
Methyl ethyl ketone [MEK]	78-93-3	E611D/WT		<20	----	----	----	----	----	----	----
Styrene	100-42-5	E611D/WT	µg/L	<0.50	----	----	----	----	----	----	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D/WT		<0.50	----	----	----	----	----	----	----
Tetrachloroethylene	127-18-4	E611D/WT	µg/L	<0.50	----	----	----	----	----	----	----
Toluene	108-88-3	E611D/WT		<0.50	----	----	----	----	----	----	----
Trichloroethylene	79-01-6	E611D/WT	µg/L	<0.50	----	----	----	----	----	----	----
Xylene, m+p-	179601-23-1	E611D/WT		<0.40	----	----	----	----	----	----	----
Xylene, o-	95-47-6	E611D/WT	µg/L	<0.30	----	----	----	----	----	----	----
Xylenes, total	1330-20-7	E611D/WT		<0.50	----	----	----	----	----	----	----
Volatile Organic Compounds Surrogates											



## Analytical Results Evaluation

Matrix: Water				Client sample ID	SW-UF-BH7	----	----	----	----	----	----
				Sampling date/time	29-Jun-2023 10:00	----	----	----	----	----	----
				Sub-Matrix	Water	----	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit	WT2319403-001	-----	-----	-----	-----	-----	-----	-----
<b>Volatile Organic Compounds Surrogates</b>											
Bromofluorobenzene, 4-	460-00-4	E611D/WT	%	87.4	----	----	----	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611D/WT		94.2	----	----	----	----	----	----	----
<b>Phthalate Esters</b>											
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E655F/WT	µg/L	<2.0	----	----	----	----	----	----	----
Di-n-butyl phthalate	84-74-2	E655F/WT		<1.0	----	----	----	----	----	----	----
<b>Semi-Volatile Organics Surrogates</b>											
Fluorobiphenyl, 2-	321-60-8	E655F/WT	%	85.4	----	----	----	----	----	----	----
Terphenyl-d14, p-	1718-51-0	E655F/WT		74.8	----	----	----	----	----	----	----
<b>Phenolics Surrogates</b>											
Tribromophenol, 2,4,6-	118-79-6	E655F/WT	%	103	----	----	----	----	----	----	----
<b>Nonylphenols</b>											
Nonylphenol diethoxylates [NP2EO]	n/a	E749B/WT		<0.10	----	----	----	----	----	----	----
Nonylphenol ethoxylates, total	n/a	E749B/WT	µg/L	<2.0	----	----	----	----	----	----	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B/WT		<2.0	----	----	----	----	----	----	----
Nonylphenols [NP]	84852-15-3	E749A/WT	µg/L	<1.0	----	----	----	----	----	----	----
<b>Polychlorinated Biphenyls</b>											
Aroclor 1016	12674-11-2	E687/WT		<0.020	----	----	----	----	----	----	----
Aroclor 1221	11104-28-2	E687/WT	µg/L	<0.020	----	----	----	----	----	----	----
Aroclor 1232	11141-16-5	E687/WT		<0.020	----	----	----	----	----	----	----
Aroclor 1242	53469-21-9	E687/WT	µg/L	<0.020	----	----	----	----	----	----	----
Aroclor 1248	12672-29-6	E687/WT		<0.020	----	----	----	----	----	----	----
Aroclor 1254	11097-69-1	E687/WT	µg/L	<0.020	----	----	----	----	----	----	----
Aroclor 1260	11096-82-5	E687/WT		<0.020	----	----	----	----	----	----	----
Aroclor 1262	37324-23-5	E687/WT	µg/L	<0.020	----	----	----	----	----	----	----
Aroclor 1268	11100-14-4	E687/WT		<0.020	----	----	----	----	----	----	----
Polychlorinated biphenyls [PCBs], total	----	E687/WT	µg/L	<0.060	----	----	----	----	----	----	----
<b>Polychlorinated Biphenyls Surrogates</b>											
Decachlorobiphenyl	2051-24-3	E687/WT		70.4	----	----	----	----	----	----	----



Analytical Results Evaluation

Matrix: Water

				Client sample ID	SW-UF-BH7	----	----	----	----	----	----
				Sampling date/time	29-Jun-2023 10:00	----	----	----	----	----	----
				Sub-Matrix	Water	----	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit	WT2319403-001	-----	-----	-----	-----	-----	-----	-----
Polychlorinated Biphenyls Surrogates											
Tetrachloro-m-xylene	877-09-8	E687/WT	%	89.9	----	----	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.





## Summary of Guideline Limits

Analyte	CAS Number	Unit	RMPSUB SAN	RMPSUB STM					
<b>Physical Tests</b>									
pH	----	pH units	5.5 - 10 pH units	6 - 9 pH units					
Solids, total suspended [TSS]	----	mg/L	350 mg/L	15 mg/L					
<b>Anions and Nutrients</b>									
Fluoride	16984-48-8	mg/L	10 mg/L	--					
Kjeldahl nitrogen, total [TKN]	----	mg/L	100 mg/L	1 mg/L					
Phosphorus, total	7723-14-0	mg/L	10 mg/L	0.4 mg/L					
Sulfate (as SO <sub>4</sub> )	14808-79-8	mg/L	1500 mg/L	--					
<b>Cyanides</b>									
Cyanide, strong acid dissociable (Total)	----	mg/L	2 mg/L	0.02 mg/L					
<b>Microbiological Tests</b>									
Coliforms, Escherichia coli [E. coli]	----	CFU/100mL	--	200 CFU/100mL					
<b>Total Metals</b>									
Aluminum, total	7429-90-5	mg/L	50 mg/L	--					
Antimony, total	7440-36-0	mg/L	5 mg/L	--					
Arsenic, total	7440-38-2	mg/L	1 mg/L	0.02 mg/L					
Cadmium, total	7440-43-9	mg/L	0.7 mg/L	0.008 mg/L					
Chromium, total	7440-47-3	mg/L	5 mg/L	0.08 mg/L					
Cobalt, total	7440-48-4	mg/L	5 mg/L	--					
Copper, total	7440-50-8	mg/L	3 mg/L	0.05 mg/L					
Lead, total	7439-92-1	mg/L	3 mg/L	0.12 mg/L					
Manganese, total	7439-96-5	mg/L	5 mg/L	0.05 mg/L					
Mercury, total	7439-97-6	mg/L	0.01 mg/L	0.0004 mg/L					
Molybdenum, total	7439-98-7	mg/L	5 mg/L	--					
Nickel, total	7440-02-0	mg/L	3 mg/L	0.08 mg/L					
Selenium, total	7782-49-2	mg/L	1 mg/L	0.02 mg/L					
Silver, total	7440-22-4	mg/L	5 mg/L	0.12 mg/L					
Tin, total	7440-31-5	mg/L	5 mg/L	--					
Titanium, total	7440-32-6	mg/L	5 mg/L	--					
Zinc, total	7440-66-6	mg/L	3 mg/L	0.04 mg/L					
<b>Aggregate Organics</b>									
Carbonaceous biochemical oxygen demand [CBOD]	----	mg/L	300 mg/L	15 mg/L					
Oil & grease (gravimetric)	----	mg/L	--	--					
Oil & grease, animal/vegetable (gravimetric)	----	mg/L	150 mg/L	--					
Oil & grease, mineral (gravimetric)	----	mg/L	15 mg/L	--					
Phenols, total (4AAP)	----	mg/L	1 mg/L	0.008 mg/L					



Analyte	CAS Number	Unit	RMPSUB SAN	RMPSUB STM					
<b>Volatile Organic Compounds</b>									
Benzene	71-43-2	µg/L	10 µg/L	2 µg/L					
Chloroform	67-66-3	µg/L	40 µg/L	2 µg/L					
Dichlorobenzene, 1,2-	95-50-1	µg/L	50 µg/L	5.6 µg/L					
Dichlorobenzene, 1,4-	106-46-7	µg/L	80 µg/L	6.8 µg/L					
Dichloroethylene, cis-1,2-	156-59-2	µg/L	4000 µg/L	5.6 µg/L					
Dichloromethane	75-09-2	µg/L	2000 µg/L	5.2 µg/L					
Dichloropropylene, trans-1,3-	10061-02-6	µg/L	140 µg/L	5.6 µg/L					
Ethylbenzene	100-41-4	µg/L	160 µg/L	2 µg/L					
Methyl ethyl ketone [MEK]	78-93-3	µg/L	8000 µg/L	--					
Styrene	100-42-5	µg/L	200 µg/L	--					
Tetrachloroethane, 1,1,2,2-	79-34-5	µg/L	1400 µg/L	17 µg/L					
Tetrachloroethylene	127-18-4	µg/L	1000 µg/L	4.4 µg/L					
Toluene	108-88-3	µg/L	270 µg/L	2 µg/L					
Trichloroethylene	79-01-6	µg/L	400 µg/L	8 µg/L					
Xylene, m+p-	179601-23-1	µg/L	--	--					
Xylene, o-	95-47-6	µg/L	--	--					
Xylenes, total	1330-20-7	µg/L	1400 µg/L	4.4 µg/L					
<b>Volatile Organic Compounds Surrogates</b>									
Bromofluorobenzene, 4-	460-00-4	%							
Difluorobenzene, 1,4-	540-36-3	%							
<b>Phthalate Esters</b>									
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	µg/L	12 µg/L	8.8 µg/L					
Di-n-butyl phthalate	84-74-2	µg/L	80 µg/L	15 µg/L					
<b>Semi-Volatile Organics Surrogates</b>									
Fluorobiphenyl, 2-	321-60-8	%							
Terphenyl-d14, p-	1718-51-0	%							
<b>Phenolics Surrogates</b>									
Tribromophenol, 2,4,6-	118-79-6	%							
<b>Nonylphenols</b>									
Nonylphenol diethoxylates [NP2EO]	n/a	µg/L	--	--					
Nonylphenol ethoxylates, total	n/a	µg/L	200 µg/L	--					
Nonylphenol monoethoxylates [NP1EO]	n/a	µg/L	--	--					
Nonylphenols [NP]	84852-15-3	µg/L	20 µg/L	--					
<b>Polychlorinated Biphenyls</b>									
Aroclor 1016	12674-11-2	µg/L	--	--					
Aroclor 1221	11104-28-2	µg/L	--	--					
Aroclor 1232	11141-16-5	µg/L	--	--					
Aroclor 1242	53469-21-9	µg/L	--	--					
Aroclor 1248	12672-29-6	µg/L	--	--					



Analyte	CAS Number	Unit	RMPSUB SAN	RMPSUB STM					
<b>Polychlorinated Biphenyls - Continued</b>									
Aroclor 1254	11097-69-1	µg/L	--	--					
Aroclor 1260	11096-82-5	µg/L	--	--					
Aroclor 1262	37324-23-5	µg/L	--	--					
Aroclor 1268	11100-14-4	µg/L	--	--					
Polychlorinated biphenyls [PCBs], total	----	µg/L	1 µg/L	0.4 µg/L					
Decachlorobiphenyl	2051-24-3	%							
Tetrachloro-m-xylene	877-09-8	%							

Please refer to the General Comments section for an explanation of any qualifiers detected.

**Key:**

RMPSUB	Ontario Reg.Mun. of Peel Sewer Bylaw #53-2010 (APR, 2019)
SAN	Peel Sanitary Sewer (53-2010)
STM	Peel Storm Sewer (53-2010)

## QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: WT2319403	Page	: 1 of 11
Client	: Grounded Engineering Inc.	Laboratory	: ALS Environmental - Waterloo
Contact	: Deepak Kanraj	Account Manager	: Amanda Overholster
Address	: 1 Banigan Drive Toronto ON Canada M4H 1G3	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 647 264 7928	Telephone	: 1 416 817 2944
Project	: 23-099-150	Date Samples Received	: 29-Jun-2023 16:00
PO	: ----	Issue Date	: 10-Jul-2023 19:02
C-O-C number	: 20-1046424		
Sampler	: NA/SN		
Site	: BRAMPTON PRPS		
Quote number	: 2023 SOA Pricing		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

### Key

**Anonymous:** Refers to samples which are not part of this work order, but which formed part of the QC process lot.

**CAS Number:** Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

**DQO:** Data Quality Objective.

**LOR:** Limit of Reporting (detection limit).

**RPD:** Relative Percent Difference.

### Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

### Summary of Outliers

#### Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

#### Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

### ***Outliers : Analysis Holding Time Compliance (Breaches)***

- No Analysis Holding Time Outliers exist.

### ***Outliers : Frequency of Quality Control Samples***

- No Quality Control Sample Frequency Outliers occur.



## Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
<b>Method Blank (MB) Values</b>								
Total Metals	QC-1016971-001	----	Manganese, total	7439-96-5	E420	0.00011 <sup>B</sup> mg/L	0.0001 mg/L	Blank result exceeds permitted value
Volatile Organic Compounds	QC-1017284-001	----	Dichloromethane	75-09-2	E611D	1.0 µg/L <sup>B</sup>	1 µg/L	Blank result exceeds permitted value

## Result Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.



## Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT-4d] SW-UF-BH7	E555	29-Jun-2023	----	----	----		30-Jun-2023	4 days	1 days	✓
Aggregate Organics : Mineral Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) SW-UF-BH7	E567SG	29-Jun-2023	03-Jul-2023	28 days	4 days	✓	04-Jul-2023	40 days	1 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) SW-UF-BH7	E567	29-Jun-2023	03-Jul-2023	28 days	4 days	✓	04-Jul-2023	40 days	1 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid) [ON MECP] SW-UF-BH7	E562	29-Jun-2023	30-Jun-2023	----	----		30-Jun-2023	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP] SW-UF-BH7	E235.F	29-Jun-2023	04-Jul-2023	----	----		04-Jul-2023	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP] SW-UF-BH7	E235.SO4	29-Jun-2023	04-Jul-2023	----	----		04-Jul-2023	28 days	5 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) [ON MECP] SW-UF-BH7	E318	29-Jun-2023	30-Jun-2023	----	----		04-Jul-2023	28 days	5 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) [ON MECP] SW-UF-BH7	E372-U	29-Jun-2023	30-Jun-2023	----	----		03-Jul-2023	28 days	4 days	✓
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide) SW-UF-BH7	E333	29-Jun-2023	10-Jul-2023	----	----		10-Jul-2023	14 days	11 days	✓
Microbiological Tests : E. coli (MF-mFC-BCIG)										
Sterile HDPE (Sodium thiosulphate) [ON MECP] SW-UF-BH7	E012A.EC	29-Jun-2023	----	----	----		01-Jul-2023	48 hrs	48 hrs	✓
Nonylphenols : Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode										
Amber glass/Teflon lined cap - LCMS SW-UF-BH7	E749B	29-Jun-2023	04-Jul-2023	7 days	5 days	✓	04-Jul-2023	7 days	0 days	✓
Nonylphenols : Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode										
Amber glass/Teflon lined cap - LCMS SW-UF-BH7	E749A	29-Jun-2023	04-Jul-2023	7 days	5 days	✓	04-Jul-2023	7 days	0 days	✓
Phthalate Esters : BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS										
Amber glass/Teflon lined cap [ON MECP] SW-UF-BH7	E655F	29-Jun-2023	06-Jul-2023	14 days	8 days	✓	07-Jul-2023	40 days	1 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP] SW-UF-BH7	E108	29-Jun-2023	04-Jul-2023	----	----		06-Jul-2023	14 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP] SW-UF-BH7	E160	29-Jun-2023	----	----	----		05-Jul-2023	7 days	6 days	✓
Polychlorinated Biphenyls : PCB Aroclors by GC-MS										
Amber glass/Teflon lined cap [ON MECP] SW-UF-BH7	E687	29-Jun-2023	04-Jul-2023	14 days	5 days	✓	05-Jul-2023	40 days	1 days	✓





Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP] SW-UF-BH7	E508	29-Jun-2023	04-Jul-2023	----	----		04-Jul-2023	28 days	5 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-UF-BH7	E420	29-Jun-2023	29-Jun-2023	----	----		30-Jun-2023	180 days	1 days	✓
Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS										
Glass vial (sodium bisulfate) SW-UF-BH7	E611D	29-Jun-2023	30-Jun-2023	----	----		30-Jun-2023	14 days	1 days	✓

**Legend & Qualifier Definitions**

Rec. HT: ALS recommended hold time (see units).



## Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
Analytical Methods			QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1017454	1	20	5.0	5.0	✔
E. coli (MF-mFC-BCIG)	E012A.EC	1019561	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	1020895	1	16	6.2	5.0	✔
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	1021212	1	20	5.0	5.0	✔
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	1021213	1	20	5.0	5.0	✔
pH by Meter	E108	1020890	1	20	5.0	5.0	✔
Phenols (4AAP) in Water by Colorimetry	E562	1017312	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1020894	1	15	6.6	5.0	✔
Total Cyanide	E333	1030556	1	15	6.6	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1017310	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1020688	1	19	5.2	5.0	✔
Total metals in Water by CRC ICPMS	E420	1016971	1	17	5.8	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1017311	1	20	5.0	5.0	✔
TSS by Gravimetry	E160	1022899	1	20	5.0	4.7	✔
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	1017284	1	20	5.0	5.0	✔
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1017454	1	20	5.0	5.0	✔
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	1026758	1	12	8.3	5.0	✔
Fluoride in Water by IC	E235.F	1020895	1	16	6.2	5.0	✔
Mineral Oil & Grease by Gravimetry	E567SG	1020506	1	12	8.3	5.0	✔
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	1021212	1	20	5.0	5.0	✔
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	1021213	1	20	5.0	5.0	✔
Oil & Grease by Gravimetry	E567	1020505	1	18	5.5	5.0	✔
PCB Aroclors by GC-MS	E687	1020682	1	18	5.5	4.7	✔
pH by Meter	E108	1020890	1	20	5.0	5.0	✔
Phenols (4AAP) in Water by Colorimetry	E562	1017312	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1020894	1	15	6.6	5.0	✔
Total Cyanide	E333	1030556	1	15	6.6	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1017310	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1020688	1	19	5.2	5.0	✔
Total metals in Water by CRC ICPMS	E420	1016971	1	17	5.8	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1017311	1	20	5.0	5.0	✔
TSS by Gravimetry	E160	1022899	1	20	5.0	4.7	✔
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	1017284	1	20	5.0	5.0	✔
Method Blanks (MB)							



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
<b>Method Blanks (MB) - Continued</b>							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1017454	1	20	5.0	5.0	✔
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	1026758	1	12	8.3	5.0	✔
E. coli (MF-mFC-BCIG)	E012A.EC	1019561	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	1020895	1	16	6.2	5.0	✔
Mineral Oil & Grease by Gravimetry	E567SG	1020506	1	12	8.3	5.0	✔
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	1021212	1	20	5.0	5.0	✔
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	1021213	1	20	5.0	5.0	✔
Oil & Grease by Gravimetry	E567	1020505	1	18	5.5	5.0	✔
PCB Aroclors by GC-MS	E687	1020682	1	18	5.5	4.7	✔
Phenols (4AAP) in Water by Colorimetry	E562	1017312	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1020894	1	15	6.6	5.0	✔
Total Cyanide	E333	1030556	1	15	6.6	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1017310	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1020688	1	19	5.2	5.0	✔
Total metals in Water by CRC ICPMS	E420	1016971	1	17	5.8	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1017311	1	20	5.0	5.0	✔
TSS by Gravimetry	E160	1022899	1	20	5.0	4.7	✔
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	1017284	1	20	5.0	5.0	✔
<b>Matrix Spikes (MS)</b>							
Fluoride in Water by IC	E235.F	1020895	1	16	6.2	5.0	✔
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	1021212	1	20	5.0	5.0	✔
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	1021213	1	20	5.0	5.0	✔
Phenols (4AAP) in Water by Colorimetry	E562	1017312	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1020894	1	15	6.6	5.0	✔
Total Cyanide	E333	1030556	1	15	6.6	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1017310	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1020688	1	19	5.2	5.0	✔
Total metals in Water by CRC ICPMS	E420	1016971	1	17	5.8	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1017311	1	20	5.0	5.0	✔
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	1017284	1	20	5.0	5.0	✔



## Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MF-mFC-BCIG)	E012A.EC  ALS Environmental - Waterloo	Water	ON E3433 (mod)	Following filtration (0.45 µm), and incubation at 44.5±0.2°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated.
pH by Meter	E108  ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160  ALS Environmental - Waterloo	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Fluoride in Water by IC	E235.F  ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4  ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318  ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Cyanide	E333  ALS Environmental - Waterloo	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourimetric analysis.  Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U  ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total metals in Water by CRC ICPMS	E420  ALS Environmental - Waterloo	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Mercury in Water by CVAAS	E508 ALS Environmental - Waterloo	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 ALS Environmental - Waterloo	Water	APHA 5210 B (mod)	<p>Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method.</p> <p>Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.</p>
Phenols (4AAP) in Water by Colorimetry	E562 ALS Environmental - Waterloo	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide (K <sub>3</sub> Fe(CN) <sub>6</sub> ) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.
Mineral Oil & Grease by Gravimetry	E567SG ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
VOCs (Eastern Canada List) by Headspace GC-MS	E611D ALS Environmental - Waterloo	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F ALS Environmental - Waterloo	Water	EPA 8270E (mod)	BNA are analyzed by GC-MS.
PCB Aroclors by GC-MS	E687 ALS Environmental - Waterloo	Water	EPA 8270E (mod)	PCB Aroclors are analyzed by GC-MS
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A ALS Environmental - Waterloo	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D <sub>4</sub> , Nonylphenol Diethoxylate 13C <sub>6</sub> , and Bisphenol A 13C <sub>12</sub> internal standards and analyzed by LC-MS/MS.
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B ALS Environmental - Waterloo	Water	J. Chrom A849 (1999) p.467-482	Water samples are filtered and analyzed on LCMS/MS by direct injection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG  ALS Environmental - Waterloo	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318  ALS Environmental - Waterloo	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372  ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Oil & Grease Extraction for Gravimetry	EP567  ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
VOCs Preparation for Headspace Analysis	EP581  ALS Environmental - Waterloo	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
BNA Extraction	EP655  ALS Environmental - Waterloo	Water	EPA 3510C (mod)	SVOCs are extracted from aqueous sample using DCM liquid-liquid extraction.
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660  ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.
Preparation of Nonylphenol and Nonylphenol Ethoxylates	EP749  ALS Environmental - Waterloo	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.

## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: WT2319403</b>	<b>Page</b>	<b>: 1 of 12</b>
<b>Client</b>	: Grounded Engineering Inc.	<b>Laboratory</b>	: ALS Environmental - Waterloo
<b>Contact</b>	: Deepak Kanraj	<b>Account Manager</b>	: Amanda Overholster
<b>Address</b>	: 1 Banigan Drive Toronto ON Canada M4H 1G3	<b>Address</b>	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
<b>Telephone</b>	:	<b>Telephone</b>	: 1 416 817 2944
<b>Project</b>	: 23-099-150	<b>Date Samples Received</b>	: 29-Jun-2023 16:00
<b>PO</b>	: ----	<b>Date Analysis Commenced</b>	: 29-Jun-2023
<b>C-O-C number</b>	: 20-1046424	<b>Issue Date</b>	: 10-Jul-2023 19:02
<b>Sampler</b>	: NA/SN 647 264 7928		
<b>Site</b>	: BRAMPTON PRPS		
<b>Quote number</b>	: 2023 SOA Pricing		
<b>No. of samples received</b>	: 1		
<b>No. of samples analysed</b>	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Waterloo Organics, Waterloo, Ontario
Manuel TavaraTello	Supervisor - Semi-Volatile Extractions	Waterloo Organics, Waterloo, Ontario
Ruby Sujeepan		Waterloo Microbiology, Waterloo, Ontario
Sanja Risticvic	Department Manager - LCMS	Waterloo LCMS, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo VOC, Waterloo, Ontario
Wayne Smith	Client Services Specialist	Waterloo Inorganics, Waterloo, Ontario
Wayne Smith	Client Services Specialist	Waterloo Metals, Waterloo, Ontario



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## General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

### Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

# = Indicates a QC result that did not meet the ALS DQO.

## Workorder Comments

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Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1020890)											
WT2319505-021	Anonymous	pH	----	E108	0.10	pH units	7.72	7.55	2.23%	4%	----
Physical Tests (QC Lot: 1022899)											
WT2319571-001	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1017310)											
WT2318812-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.252	0.232	0.020	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1017311)											
WT2318949-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.123	0.122	0.987%	20%	----
Anions and Nutrients (QC Lot: 1020894)											
WT2319505-021	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<0.30	<0.30	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1020895)											
WT2319505-021	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.052	0.053	0.002	Diff <2x LOR	----
Cyanides (QC Lot: 1030556)											
CG2308585-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 1019561)											
WT2319533-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 1016971)											
WT2319236-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0300	mg/L	0.212	0.198	0.0142	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000500	mg/L	0.000286	0.000259	0.0000270	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	0.0372	0.0355	0.00167	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	0.00296	0.00273	0.000228	Diff <2x LOR	----
		Manganese, total	7439-96-5	E420	0.00100	mg/L	0.0536	0.0542	1.13%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.0212	0.0200	5.90%	20%	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----

Page : 4 of 12  
 Work Order : WT2319403  
 Client : Grounded Engineering Inc.  
 Project : 23-099-150



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 1016971) - continued											
WT2319236-001	Anonymous	Tin, total	7440-31-5	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00600	mg/L	<0.00600	0.00658	0.00058	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0300	mg/L	0.109	0.108	0.0010	Diff <2x LOR	----
Total Metals (QC Lot: 1020688)											
HA2300344-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	0.0000062	0.0000012	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1017312)											
WT2318949-002	Anonymous	Phenols, total (4AAP)	----	E562	0.0010	mg/L	0.0022	0.0022	0.00004	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1017454)											
WT2319401-002	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Volatile Organic Compounds (QC Lot: 1017284)											
HA2300309-001	Anonymous	Benzene	71-43-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Chloroform	67-66-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611D	1.0	µg/L	39.1	39.6	1.30%	30%	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	<20	<20	0	Diff <2x LOR	----
		Styrene	100-42-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611D	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Nonylphenols (QC Lot: 1021212)											
WT2319240-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.10	µg/L	<0.10	<0.10	0	Diff <2x LOR	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2.0	µg/L	<2.0	<2.0	0	Diff <2x LOR	----
Nonylphenols (QC Lot: 1021213)											
WT2319240-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----



## Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Physical Tests (QCLot: 1022899)</b>						
Solids, total suspended [TSS]	---	E160	3	mg/L	<3.0	---
<b>Anions and Nutrients (QCLot: 1017310)</b>						
Kjeldahl nitrogen, total [TKN]	---	E318	0.05	mg/L	<0.050	---
<b>Anions and Nutrients (QCLot: 1017311)</b>						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	---
<b>Anions and Nutrients (QCLot: 1020894)</b>						
Sulfate (as SO <sub>4</sub> )	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
<b>Anions and Nutrients (QCLot: 1020895)</b>						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	---
<b>Cyanides (QCLot: 1030556)</b>						
Cyanide, strong acid dissociable (Total)	---	E333	0.002	mg/L	<0.0020	---
<b>Microbiological Tests (QCLot: 1019561)</b>						
Coliforms, Escherichia coli [E. coli]	---	E012A.EC	1	CFU/100mL	<1	---
<b>Total Metals (QCLot: 1016971)</b>						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	---
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	---
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	---
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	---
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	---
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	---
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	---
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	---
Manganese, total	7439-96-5	E420	0.0001	mg/L	# 0.00011	B
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	---
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	---
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	---
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	---
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	---
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	---
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	---
<b>Total Metals (QCLot: 1020688)</b>						



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Total Metals (QCLot: 1020688) - continued</b>						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
<b>Aggregate Organics (QCLot: 1017312)</b>						
Phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
<b>Aggregate Organics (QCLot: 1017454)</b>						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
<b>Aggregate Organics (QCLot: 1020505)</b>						
Oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
<b>Aggregate Organics (QCLot: 1020506)</b>						
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	<5.0	----
<b>Volatile Organic Compounds (QCLot: 1017284)</b>						
Benzene	71-43-2	E611D	0.5	µg/L	<0.50	----
Chloroform	67-66-3	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	<0.50	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	<0.50	----
Dichloromethane	75-09-2	E611D	1	µg/L	# 1.0	B
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	<0.30	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	<0.50	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	<20	----
Styrene	100-42-5	E611D	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	<0.50	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611D	0.5	µg/L	<0.50	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	<0.30	----
<b>Phthalate Esters (QCLot: 1026758)</b>						
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	<2.0	----
Di-n-butyl phthalate	84-74-2	E655F	1	µg/L	<1.0	----
<b>Nonylphenols (QCLot: 1021212)</b>						
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	<0.10	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	<2.0	----
<b>Nonylphenols (QCLot: 1021213)</b>						
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	<1.0	----
<b>Polychlorinated Biphenyls (QCLot: 1020682)</b>						



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polychlorinated Biphenyls (QCLot: 1020682) - continued						
Aroclor 1016	12674-11-2	E687	0.02	µg/L	<0.020	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	<0.020	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	<0.020	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	<0.020	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	<0.020	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	<0.020	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	<0.020	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	<0.020	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	<0.020	----

Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1020890)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 1022899)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	96.8	85.0	115	----
Anions and Nutrients (QCLot: 1017310)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 1017311)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.845 mg/L	100	80.0	120	----
Anions and Nutrients (QCLot: 1020894)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1020895)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	103	90.0	110	----
Cyanides (QCLot: 1030556)									
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	0.25 mg/L	85.7	80.0	120	----
Total Metals (QCLot: 1016971)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	96.9	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	98.0	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	104	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	101	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.0125 mg/L	102	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.0125 mg/L	100	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.0125 mg/L	99.8	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	101	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.0125 mg/L	102	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.0125 mg/L	97.3	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	100	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	102	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	92.7	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	98.6	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.0125 mg/L	99.0	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	98.6	80.0	120	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1020688)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	98.7	80.0	120	----
Aggregate Organics (QCLot: 1017312)									
Phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	105	85.0	115	----
Aggregate Organics (QCLot: 1017454)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	91.4	85.0	115	----
Aggregate Organics (QCLot: 1020505)									
Oil & grease (gravimetric)	----	E567	5	mg/L	200 mg/L	87.1	70.0	130	----
Aggregate Organics (QCLot: 1020506)									
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	100 mg/L	78.2	70.0	130	----
Volatile Organic Compounds (QCLot: 1017284)									
Benzene	71-43-2	E611D	0.5	µg/L	100 µg/L	109	70.0	130	----
Chloroform	67-66-3	E611D	0.5	µg/L	100 µg/L	105	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	100 µg/L	102	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	100 µg/L	106	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	100 µg/L	101	70.0	130	----
Dichloromethane	75-09-2	E611D	1	µg/L	100 µg/L	110	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	100 µg/L	102	70.0	130	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	100 µg/L	108	70.0	130	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	100 µg/L	87.9	70.0	130	----
Styrene	100-42-5	E611D	0.5	µg/L	100 µg/L	98.7	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	100 µg/L	117	70.0	130	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	100 µg/L	110	70.0	130	----
Toluene	108-88-3	E611D	0.5	µg/L	100 µg/L	106	70.0	130	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	100 µg/L	104	70.0	130	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	200 µg/L	103	70.0	130	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	100 µg/L	102	70.0	130	----
Phthalate Esters (QCLot: 1026758)									
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	6.4 µg/L	114	50.0	140	----
Di-n-butyl phthalate	84-74-2	E655F	1	µg/L	6.4 µg/L	102	50.0	140	----
Nonylphenols (QCLot: 1021212)									
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	1 µg/L	100	75.0	125	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	20 µg/L	98.0	75.0	125	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit					
Nonylphenols (QCLot: 1021213)									
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	10 µg/L	122	75.0	125	----
Polychlorinated Biphenyls (QCLot: 1020682)									
Aroclor 1016	12674-11-2	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	0.2 µg/L	89.3	60.0	140	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	0.2 µg/L	90.9	60.0	140	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	0.2 µg/L	111	60.0	140	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	0.2 µg/L	111	60.0	140	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	0.2 µg/L	111	60.0	140	----





Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1017310)										
WT2318812-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.98 mg/L	2.5 mg/L	119	70.0	130	----
Anions and Nutrients (QCLot: 1017311)										
WT2318949-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	ND mg/L	0.1 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 1020894)										
WT2319505-021	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	97.2 mg/L	100 mg/L	97.2	75.0	125	----
Anions and Nutrients (QCLot: 1020895)										
WT2319505-021	Anonymous	Fluoride	16984-48-8	E235.F	0.985 mg/L	1 mg/L	98.5	75.0	125	----
Cyanides (QCLot: 1030556)										
CG2308585-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.220 mg/L	0.25 mg/L	88.1	75.0	125	----
Total Metals (QCLot: 1016971)										
WT2319237-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0929 mg/L	0.1 mg/L	92.9	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0503 mg/L	0.05 mg/L	100	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0543 mg/L	0.05 mg/L	108	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00484 mg/L	0.005 mg/L	96.7	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0124 mg/L	0.0125 mg/L	99.2	70.0	130	----
		Cobalt, total	7440-48-4	E420	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Copper, total	7440-50-8	E420	0.0114 mg/L	0.0125 mg/L	91.0	70.0	130	----
		Lead, total	7439-92-1	E420	0.0234 mg/L	0.025 mg/L	93.6	70.0	130	----
		Manganese, total	7439-96-5	E420	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0114 mg/L	0.0125 mg/L	91.1	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0232 mg/L	0.025 mg/L	92.9	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0477 mg/L	0.05 mg/L	95.4	70.0	130	----
		Silver, total	7440-22-4	E420	0.00439 mg/L	0.005 mg/L	87.9	70.0	130	----
		Tin, total	7440-31-5	E420	0.0252 mg/L	0.025 mg/L	101	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0122 mg/L	0.0125 mg/L	97.8	70.0	130	----
		Zinc, total	7440-66-6	E420	ND mg/L	0.025 mg/L	ND	70.0	130	----
Total Metals (QCLot: 1020688)										
HA2300344-002	Anonymous	Mercury, total	7439-97-6	E508	0.0000908 mg/L	0.0001 mg/L	90.8	70.0	130	----
Aggregate Organics (QCLot: 1017312)										



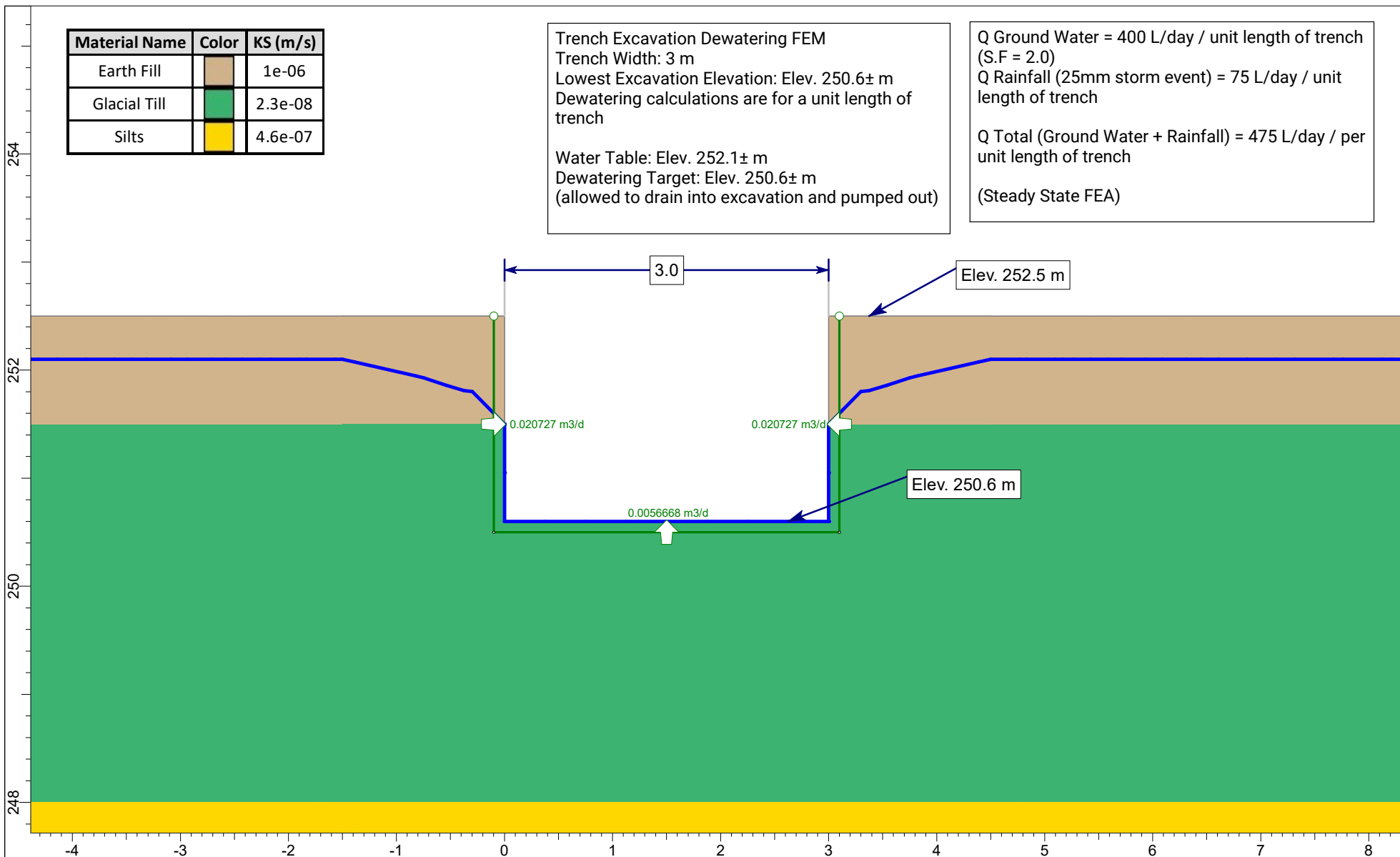
Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Aggregate Organics (QCLot: 1017312) - continued										
WT2318949-002	Anonymous	Phenols, total (4AAP)	----	E562	0.0202 mg/L	0.02 mg/L	101	75.0	125	----
Volatile Organic Compounds (QCLot: 1017284)										
HA2300309-001	Anonymous	Benzene	71-43-2	E611D	113 µg/L	100 µg/L	113	60.0	140	----
		Chloroform	67-66-3	E611D	110 µg/L	100 µg/L	110	60.0	140	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	105 µg/L	100 µg/L	105	60.0	140	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	107 µg/L	100 µg/L	107	60.0	140	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	105 µg/L	100 µg/L	105	60.0	140	----
		Dichloromethane	75-09-2	E611D	113 µg/L	100 µg/L	113	60.0	140	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	107 µg/L	100 µg/L	107	60.0	140	----
		Ethylbenzene	100-41-4	E611D	108 µg/L	100 µg/L	108	60.0	140	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	95 µg/L	100 µg/L	95.3	60.0	140	----
		Styrene	100-42-5	E611D	101 µg/L	100 µg/L	101	60.0	140	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	123 µg/L	100 µg/L	123	60.0	140	----
		Tetrachloroethylene	127-18-4	E611D	109 µg/L	100 µg/L	109	60.0	140	----
		Toluene	108-88-3	E611D	106 µg/L	100 µg/L	106	60.0	140	----
		Trichloroethylene	79-01-6	E611D	106 µg/L	100 µg/L	106	60.0	140	----
		Xylene, m+p-	179601-23-1	E611D	208 µg/L	200 µg/L	104	60.0	140	----
		Xylene, o-	95-47-6	E611D	103 µg/L	100 µg/L	103	60.0	140	----
Nonylphenols (QCLot: 1021212)										
WT2319240-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	1.01 µg/L	1 µg/L	101	60.0	140	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	12.1 µg/L	20 µg/L	60.6	60.0	140	----
Nonylphenols (QCLot: 1021213)										
WT2319240-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	12.5 µg/L	10 µg/L	125	60.0	140	----





# APPENDIX G





<b>GROUND</b> ENGINEERING	File	23-099   Peel Region Paramedic Station, Brampton, ON		
	Analysis	Steady State FEM: Trench excavation - 3 m wide, Short Term		
	Ref.			
	RS2 File	23-099 FEM.slmd	Scale	1:50
SLIDEINTERPRET 9.026			Eng	DK

# APPENDIX H



SHORT TERM - 3 m wide excavation - per 1 m length						
Excavation Dimensions [m]		Rainfall Data				
N-S	1	Year	2	100		
E-W	3	Hour	3	12		
Area (m2)	3	Depth (mm)	25	94		
Perimeter (m)	8	Depth (m)	0.025	0.094		
Section		Flow [m3/day]	Length [m]	Volume [L/day]		
Base		0.00566	1	6		
Sides		0.0207	8	166		
Total				171		
Factor of Safety		2.0		343		
Storm Events		Summary				
2 Year [L/day]	100 Year [L/day]	L/day		L/min		
75	1,000	Groundwater		400		
		Rainfall		75		
		Total		475		
				0.33		

LONG TERM Discharge						
Excavation Dimensions [m]		Rainfall Data				
N-S	1	Year	2	100		
E-W	3	Hour	3	12		
Area (m2)	3	Depth (mm)	25	94		
Perimeter (m)	8	Depth (m)	0.025	0.094		
Section		Flow [m3/day]	Length [m]	Volume [L/day]		
Base		0	1	-		
Sides		0	8	-		
Total				-		
Factor of Safety		2.0		-		
Infiltration [L/day]		Summary	L/day	L/min		
0		Groundwater	-	-		
		Infiltration	-	-		
		Total	-	-		