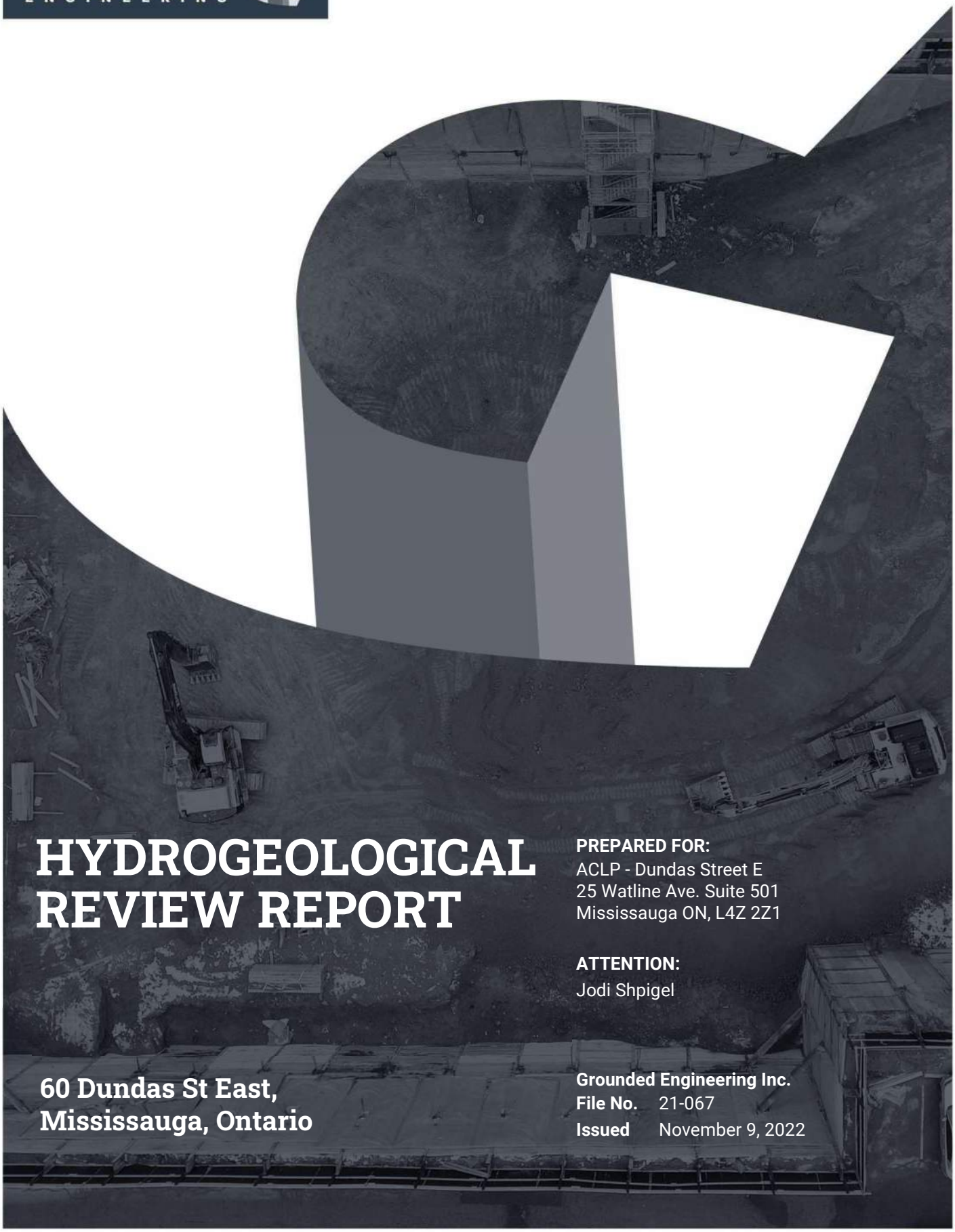

HYDROGEOLOGICAL REVIEW REPORT

PREPARED FOR:
ACLP - Dundas Street E
25 Watline Ave. Suite 501
Mississauga ON, L4Z 2Z1

ATTENTION:
Jodi Shpigel

60 Dundas St East, Mississauga, Ontario

Grounded Engineering Inc.
File No. 21-067
Issued November 9, 2022

Executive Summary

Grounded Engineering Inc. (Grounded) was retained by ACLP - Dundas Street E to conduct a Hydrogeological Review for the proposed redevelopment of 60 Dundas St East in Mississauga, Ontario (site). The conclusions of the investigation are summarized as follows:

Development Information

Current Development

Development Phase	Above Grade Levels	Below Grade Levels			
		Level #	Lowest Finished Floor		Approximate Base of Footings (masl)
			Depth (m)	Elevation (masl)	
60 Dundas St E	1	0	0	111.0 (approx.)	Unknown

Proposed Development

Development Phase	Above Grade Levels	Below Grade Levels			
		Level #	Lowest Finished Floor		Approximate Base of Footings (masl)
			Depth (m)	Elevation (masl)	
60 Dundas St E – Tower A	40	P5	17	94.0 (approx.)	93.0 (approx.)
60 Dundas St E – Tower B	35				
60 Dundas St E – Tower C	32				

Site Conditions

Site Stratigraphy

Stratum/Formation	Aquifer or Aquitard	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Earth Fill	Aquifer	0.1 – 4.0	110.8 – 106.0	1.0×10^{-5}**
Clayey Silt Glacial Till	Aquitard	1.7 – 7.2	108.9 – 102.7	6.8×10^{-8}*
Weathered Bedrock	Aquifer	4.4 – 10.1	104.6 – 99.7	1.0×10^{-7}**
Sound Bedrock	Aquitard	6.6 – 10.1	101.9 – 99.7	1.1×10^{-8}*

*Indicates conductivity was calculated by Slug Test
**Indicates conductivity was estimated using typical published values from Freeze and Cherry (1979)

Maximum Groundwater Elevation

Monitoring Well ID	Depth Below Grade (m)	Elevation (masl)
101	3.2	108.1
102	3.8	106.3
103	4.0	105.7
201	2.4	105.4
202	3.1	106.3

Maximum Groundwater Elevation		
203	2.8	103.4
204	3.5	106.8
205	4.6	103.3
206	3.2	105.2
207	3.9	105.1

Groundwater Quality				
Sample ID	**Sample Date**	**Sample Expiry Date**	**City of Mississauga Storm Sewer Limits**	**Region of Peel Sanitary Sewer Limits**
SW-UF-BH205	23 Mar 2022	23 Dec 2022	Exceeds	Meets

Groundwater Control

Stored Groundwater (pre-excavation/dewatering)					
Volume of Excavation (m^3)	**Volume of Excavation Below Water Table (m^3)**	**Volume of Stored Groundwater**		**Volume of Available Groundwater**	
		(m^3)	**(L)**	**(m^3)**	**(L)**
170,520	142,262	12,600	12,600,000	8,400	8,400,000

Short Term (Construction) Groundwater Quantity – Safety Factor of 2.0 Used					
Groundwater Seepage		**Design Rainfall Event (25mm)**		**Total Daily Water Takings**	
L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
90,000	62.5	244,000	169.4	334,000	231.9

Long Term (Permanent) Groundwater Quantity – Safety Factor of 2.0 Used					
Groundwater Seepage		**Infiltration Design Rainfall Event (25mm)**		**Total Daily Water Takings**	
L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
90,000	62.5	21,000	14.6	111,000	77.1

Zone of Influence	
Zone of Influence (m)	**Maximum Potential Settlement (mm)**
23	13

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

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APPENDICES

1 Introduction

ACLP - Dundas Street E has retained Grounded Engineering Inc. ("Grounded") to provide hydrogeological engineering design advice for their proposed development at 60 Dundas St East, in Mississauga, Ontario.

Property Information	
Location of Property	60 Dundas St East, Mississauga, Ontario, L5A 1W4
Ownership of Property	Gold Star Plaza Ltd.
Property Dimensions (m)	110 x 114 (irregular shape)
Property Area (m^2)	10,724

Existing Development	
Number of Building Structures	1
Number of Above Grade Levels	1
Number of Underground Levels	0
Sub-Grade Depth of Development (m)	0
Sub-Grade Area (m^2)	0
Land Use Classification	Commercial

Proposed Development	
Number of Building Structures	3
Number of Above Grade Levels	Building A = 40 Building B = 35 Building C = 32
Number of Underground Levels	5
Sub-Grade Depth of Development (m)	17
Sub-Grade Area (m^2)	9,685
Land Use Classification	Residential

Qualified Person and Hydrogeological Review Information	
Qualified Person	Matthew Bielaski, P.Eng., QP_{RA-ESA}
Consulting Firm	Grounded Engineering Inc.
Date of Hydrogeological Review	November 9, 2022
Scope of Work	▪ Review of MECP Water Well Records for the area ▪ Review of geological information for the area ▪ Review of topographic information for the area ▪ Advancement of 10 boreholes to a depth of 5.1 to 23.7 m, which were instrumented with monitoring wells ▪ Completion of slug tests in all available monitoring wells ▪ Ground water sampling and analysis to the City of Mississauga and Region of Peel Sewer Use Limits ▪ Assessment of groundwater controls and potential impacts ▪ Report preparation in accordance with Ontario Water Resources Act, Ontario Regulation 387/04

General Hydrogeological Characterization	
Property Topography	The site has an approximate ground surface elevation of 111.0± to 108± masl.
Local Physiographic Features	The site subsurface is composed of earth fill, clayey silt glacial till and bedrock.
Regional Physiographic Features	The West St Lawrence Lowland consists of a limestone plain (elevation 200–250 masl) that is separated by a broad, shale lowland from a broader dolomite and limestone plateau west of Lake Ontario. This plateau is bounded by the Niagara Escarpment. From the escarpment the plateau slopes gently southwest to lakes Huron and Erie (elevation 173 masl). Glaciation has mantled this region with several layers of glacial till (i.e., an unsorted mixture of clay, sand, etc.), the youngest forming extensive, undulating till plains, often enclosing rolling drumlin fields.
Watershed	The site is located within the Credit River Watershed. Locally, groundwater is anticipated to flow southeast towards Lake Ontario.
Surface Drainage	Surface water is expected to flow towards municipal catch basins located on the site.

2 Study Area Map

A map has been enclosed which shows the following information:

- All monitoring wells identified on site
- All monitoring wells identified off site within the study area
- All boreholes identified on site
- All buildings identified on site and within the study area
- The property boundaries of the site
- 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 are as follows:

Site Stratigraphy

Stratum/Formation	Aquifer or Aquitard	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Earth Fill	Aquifer	0.1 – 4.0	110.8 – 106.0	1.0×10^{-5}
Clayey Silt Glacial Till	Aquitard	1.7 – 7.2	108.9 – 102.7	6.8×10^{-8}

Bedrock

Stratum	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Weathered	4.4 – 10.1	104.6 – 99.7	1.0×10^{-7}
Sound	6.6 – 10.1	101.9 – 99.7	1.1×10^{-8}

Surface Water

Surface Water Body	Distance from site (m)	Hydraulically Connected to Property (yes/no)
Cooksville Creek	Adjacent to east boundary of site	No – the creek has been channelized hydraulically cut off from the site by a concrete retaining wall

4 Monitoring Well Information

Well ID	Well Diameter (mm)	Ground Surface (masl)	Top of Screen (masl)	Bottom of Screen (masl)	Screened Geological Unit
101	50	110.9	106.3	104.8	Clayey Silt Glacial Till
102	50	110.0	105.4	103.9	Clayey Silt Glacial Till /Bedrock
103	50	109.4	106.0	104.5	Clayey Silt Glacial Till
201	50	110.5	90.4	87.3	Bedrock
202	50	109.4	106.4	104.9	Clayey Silt Glacial Till
203	50	110.3	89.7	86.6	Bedrock
204	50	109.9	106.2	103.1	Clayey Silt Glacial Till /Bedrock
205	50	109.8	89.6	86.6	Bedrock
206	50	108.1	105.1	102.1	Clayey Silt Glacial Till /Bedrock
207	50	108.8	105.8	102.7	Glacial Till

5 Groundwater Elevations

Well ID	Groundwater Elevation (masl)								
	May 4, 2021	May 10, 2021	May 21, 2021	March 21, 2022	March 22, 2022	April 17, 2022	April 29, 2022	May 13, 2022	September 26, 2022
101	106.2	107.6	107.7	n/a	n/a	107.5	108.1	107.6	107.9
102	105.3	106.2	106.2	n/a	n/a	105.1	105.1	105.1	106.3
103	104.8	105.3	105.4	n/a	n/a	105.2	105.3	105.3	105.7
201	n/a	n/a	n/a	108.1	102.1	105.2	105.4	105.4	103.8
202	n/a	n/a	n/a	105.1	n/a	106.3	105.7	106.3	106.3
203	n/a	n/a	n/a	107.5	89.5	98.9	101.2	102.6	103.4
204	n/a	n/a	n/a	106.2	106.3	106.4	106.1	106.6	106.8
205	n/a	n/a	n/a	105.2	101.2	103.1	103.3	103.1	103.2
206	n/a	n/a	n/a	104.9	104.8	104.9	104.9	105	105.2
207	n/a	n/a	n/a	104.9	104.5	104.8	104.9	104.9	105.1

The groundwater table fluctuates from about 2.8 to 4.0 metres below grade, in the clayey silt till at Elev. 104.9 to 108.1 m with the groundwater sloping downwards from the west to the east towards Cooksville Creek. For design purposes, the groundwater table is assumed to be at

Elev. 108.1 m. The clayey silt till has a moderate to low permeability and will yield only minor seepage in the long term. There is also perched water in the earth fill, and groundwater within discrete fractures in the bedrock.

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.

6 Aquifer Testing

6.1 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)
101	106.3 - 104.8	Clayey Silt Glacial Till	6.8×10^{-8}
102	105.4 - 103.9	Clayey Silt Glacial Till /Bedrock	1.7×10^{-8}
103	106.0 - 104.5	Clayey Silt Glacial Till	6.2×10^{-8}
201	90.4 - 87.3	Bedrock	1.1×10^{-8}
202	106.4 - 104.8	Clayey Silt Glacial Till	1.5×10^{-8}
203	89.7 - 86.6	Bedrock	5.3×10^{-9}
204	106.2 - 103.1	Clayey Silt Glacial Till /Bedrock	1.1×10^{-8}
205	89.6 - 86.6	Bedrock	3.8×10^{-9}
206	105.1 - 102.0	Clayey Silt Glacial Till /Bedrock	6.8×10^{-8}
207	105.8 - 102.7	Glacial Till	2.0×10^{-8}

6.2 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)
BH103-SS4	Clayey silt glacial till	Alyamani and Sen, Barr, Sauerbrei	4.2×10^{-9}
BH201-SS5	Clayey silt glacial till	Alyamani and Sen, Barr, Sauerbrei	1.6×10^{-8}
BH202-SS6	Clayey silt glacial till	Alyamani and Sen, Barr, Kruger, Krumbein and Monk, Sauerbrei	5.1×10^{-7}
BH203-SS3	Sand	Alyamani and Sen, Barr, Krumbein and Monk, Sauerbrei	2.9×10^{-6}
BH204-SS2	Silty sand	Alyamani and Sen, Barr, Krumbein and Monk, Sauerbrei	5.9×10^{-8}
BH205-SS2	Silty sand	Alyamani and Sen, Barr, Krumbein and Monk, Sauerbrei	3.4×10^{-7}
BH206-SS4	Clayey silt glacial till	Alyamani and Sen, Barr, Sauerbrei	5.1×10^{-9}
BH207-SS4	Clayey silt glacial till	Alyamani and Sen, Barr, Sauerbrei	2.9×10^{-9}

The results of the analyses are presented in Appendix D.

6.3 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	1×10^{-3} to 1×10^{-7}
Clayey Silt Glacial Till	1×10^{-7} to 1×10^{-10}
Weathered Shale Bedrock	1×10^{-6} to 1×10^{-12}
Sound Shale Bedrock	1×10^{-7} to 1×10^{-12}

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 BH205 on March 23, 2022. The sample was analyzed for the following parameters:

- City of Mississauga Storm Sewer By-Law 0046-2022 – Limits for Storm Sewers Discharge
- Region of Peel By-Law 53-2010 Table 1 – Limits for Sanitary Sewer Discharge

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

- Total Suspended Solids (Limit 15 mg/L, Result 38.2 mg/L)
- Copper (Limit 0.04 mg/L, Result <0.040 mg/L)
- Manganese (Limit 2.0 mg/L, Result 2.09 mg/L)
- Zinc (Limit 0.3 mg/L, Result <0.30 mg/L)

The groundwater sample **met** the **Limits for Sanitary 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

The proposed shoring methodology at the site is currently undetermined. For the purposes of this report, numerical analyses were conducted employing conventional soldier piling and lagging in order to determine a “worst-case scenario” with respect to dewatering volumes and groundwater seepage at the site.

For design purposes, the stabilized groundwater table is at about Elev. 108.1± m. The water table is present in the clayey silt till soil units. The lowest (P5) FFE is at about Elev. 94± m. Therefore,

- Bulk excavation will extend down to the elevation of the prevailing groundwater table;
- Foundation excavations will extend below the prevailing groundwater table; and
- Foundation excavations will penetrate sound bedrock yielding minor seepage.

The groundwater table is in the clayey silt till deposits and bedrock. There is perched water in the earth fill above the clayey silt till. Dewatering will take some time to accomplish prior to the start of excavation. Stored water within the excavation will need to be considered prior to excavation/dewatering. The clayey silt till deposit has a moderate to low permeability and will yield minor seepage. Positive dewatering of soils may not be feasible at this site due to permeability of the soils present. Dewatering could potentially be achieved through conventional sump pump arrangements. Dewatering of the bedrock is not required, seepage can be allowed to drain into the excavation and pumped accordingly. Failure to dewater prior to excavation may result in unrecoverable disturbance of the subgrade, which will render advice provided for undisturbed subgrade conditions inapplicable.

It is recommended that a professional dewatering contractor be consulted to review the subsurface conditions and to design a site-specific dewatering system. It is the dewatering contractor’s responsibility to assess the factual data and to provide recommendations on dewatering system requirements.

The proposed structures will consist of drained foundations. The City of Mississauga and/or the 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. It should be noted that securing a permit to take water on a permanent basis may not be supported by regulatory agencies.

9 Private Water Drainage System (PWDS)

If the proposed development consists of drained foundations, then a private water drainage system will be required. The total sub floor drain area will be approximately 9,685 m^2 based on the drawings which have been provided.

If the development is designed with a private water drainage system, the drainage system is a critical structural element since it keeps water pressure from acting on the basement walls and floor slab. As such, the sump that ensures the performance of this system must have a duplexed pump arrangement for 100% pumping redundancy and these pumps must be on emergency power. The size of the sump should be adequate to accommodate the estimated groundwater seepage. It is anticipated that the groundwater seepage can be controlled with typical, widely available, commercial/residential sump pumps.

If the proposed development is designed as a leak tight structure, then a private water drainage system will not be required. However, the structure must then be designed to resist hydrostatic pressure and uplift forces.

10 Groundwater Extraction and Discharge

Numerical analyses were conducted for both short-term and long-term dewatering scenarios. The modeling was conducted using computer software, which deploys the finite element modelling method. The Finite Element Model (FEM) for groundwater seepage indicates the short term (construction) and long term (permanent) dewatering requirements as provided below. The finite element model results are presented in Appendix E.

The groundwater seepage estimates, which have been provided, represent the steady state groundwater seepage. There will be an initial drawdown of the groundwater before a steady state condition is reached. The rate of the initial drawdown, and therefore discharge, is dependent on the dewatering contractor and how the groundwater is being dealt with at the site. An estimated initial volume of stored groundwater which will require removal before steady state is reached has been provided below.

Please note that if 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 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 storm water from a 100-year storm. The additional volume that will be generated in the occurrence of a 100-year storm event is approximately 916,000 L.

Stored Groundwater (pre-excavation/dewatering)					
Volume of Excavation (m^3)	Volume of Excavation Below Water Table (m^3)	Volume of Stored Groundwater		Volume of Available Groundwater	
		(m^3)	(L)	(m^3)	(L)
170,520	142,262	12,600	12,600,000	8,400	8,400,000

Short Term (Construction) Groundwater Quantity – Safety Factor of 2.0 Used					
Groundwater Seepage		Design Rainfall Event (25mm)		Total Daily Water Takings	
L/day	L/min	L/day	L/min	L/day	L/min
90,000	62.5	244,000	169.4	334,000	231.9

Long Term (Permanent) Groundwater Quantity – Safety Factor of 2.0 Used					
Groundwater Seepage		Infiltration Design Rainfall Event (25mm)		Total Daily Water Takings	
L/day	L/min	L/day	L/min	L/day	L/min
90,000	62.5	21,000	14.6	111,000	77.1

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

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.
- The proposed pump schedule for long term permanent drainage has not been completed. As such the actual peak long term discharge rate is not available at the time writing of this report. The pump schedule must be specified by the mechanical consultant.
- A leak-tight structure (structure that has not included a private water drainage system) has not been considered as part of the proposed development at this time.
- 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).

11 Evaluation of Impact

11.1 Zone of Influence (ZOI)

The Zone of Influence (ZOI) with respect to groundwater was calculated based on the estimated groundwater taking rate and the hydraulic conductivity of the unit which water will be taken at the Property.

The ZOI was calculated using the Sichardt equation below.

Equation: $R_0 = 3000*dH*K^{0.5}$

Where:

dH is the dewatering thickness (m)

K is the hydraulic conductivity (m/s)

Calculation:

Geological Unit	dH (m)	K (m/s)	ZOI (m)
Earth Fill	2.1	1×10^{-5}	20
Clayey Silt Glacial Till	3.3	6.8×10^{-8}	3

The ZOI with respect to groundwater seepage at the site is 23 m.

11.2 Land Stability

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

- The proposed dewatering at the subject site locally lowers the groundwater table within the ZOI by a maximum of 5.4 m. This drawdown would create at increase in effective stress of approximately 53± kPa in the native soils.
- Based on the change in effective stress and the compressibility of the soil subjected to that change, the proposed dewatering activities will induce a theoretical maximum 5-10 mm of additional settlement in the adjacent lands.
- The maximum induced settlement occurs directly adjacent to the proposed excavation and decreases in a nonlinear fashion with distance away from the excavation.
- For the structures within the public realm adjacent to the site, the theoretical dewatering-induced settlement is calculated to be 2-4 mm or less (depending on the depth of the structure).

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

11.3 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 Sewer Discharge.

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

11.4 Natural Environment

Cooksville Creek is located adjacent to east boundary of site but is hydraulically cut off from the site by a concrete retaining wall that appears to be bearing on relatively low hydraulic conductivity clayey silt till or bedrock. Therefore, the creek will likely not be affected by the proposed construction and long-term dewatering. There are no other 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 sewer systems and not into any natural water body. As such, there will be no impact to the natural environment caused by the water takings at the site.

11.5 Local Drinking Water Wells

The site is located within the municipal boundaries of the City of Mississauga. 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 Mississauga. As such, there will be no impact to drinking water wells.

11.6 Contamination Source

The site and immediately surrounding area currently consist mostly of residential and commercial areas. These land uses are anticipated to be a source of potential contamination and are expected to provide an Area of Potential Environmental Concern for the site. As such, the pumping of groundwater at the site is anticipated to facilitate the movement of potential contaminants onto the site. Evaluation of the environmental condition of the site has been completed under a separate cover.

12 Proposed Mitigation Measures and Monitoring Plan

The extent of the negative impact identified in previous sections will be limited to the ZOI caused by the groundwater taking at the site.

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.

If adjacent buildings or municipal infrastructure are within the ZOI and will undergo settlement that may be considered unacceptable as identified the Land Stability Section, consideration should be given to implement a monitoring and mitigation program during dewatering activities.

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.

13 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.

13.1 Report Use

The authorized users of this report are ACLP - Dundas Street E 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 Mississauga may also make use of and rely upon this report, subject to the limitations as stated.

14 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.

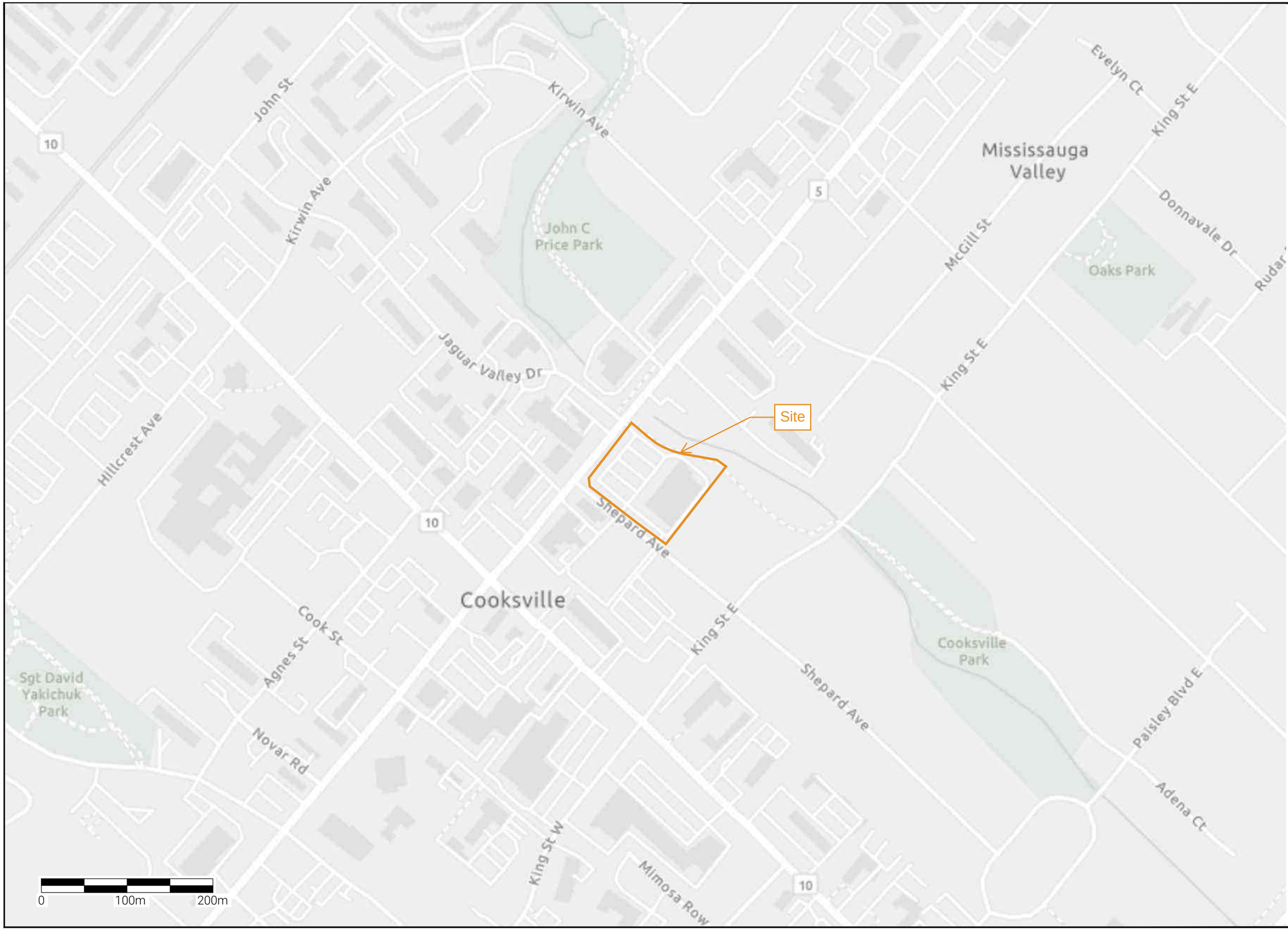
For and on behalf of our team,

GROUNDED ENGINEERING

Nico Piers, BASc
Project Coordinator

Matthew Bielaski, P.Eng., QP$_{RA-ESA}$
Principal

FIGURES



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www.groundedeng.ca

LEGEND

APROXIMATE PROPERTY BOUNDARY

Note

Reference

ArcGIS Map 2021

Project

60 DUNDAS STREET EAST, MISSISSAUGA, ON

Figure Title

SITE LOCATION PLAN

North

TRUE
PROJECT

Date

NOVEMBER 2022

Scale

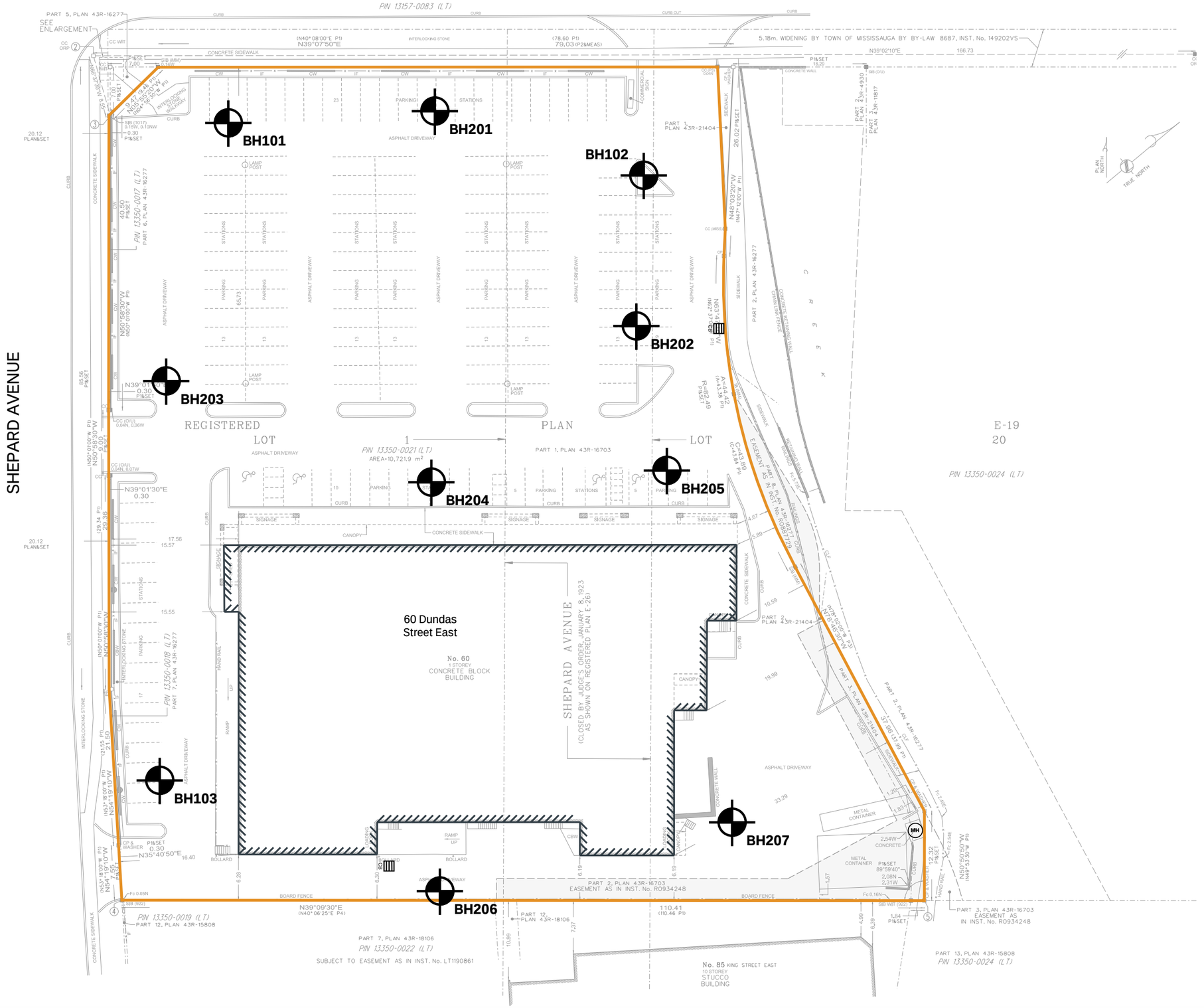
AS INDICATED

Job No

21-067

Figure No

FIGURE 1



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LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING BUILDING STRUCTURE
- MONITORING WELL BY GROUNDED
- CATCHBASIN
- MAINTENANCE HOLE

Note

Reference

Survey Drawing no. 20-21-14108-00.
Prepared by Aksan Piller Corporation Ltd.
Dated April 5, 2021.

Project

60 DUNDAS STREET EAST, MISSISSAUGA, ON

Figure Title

BOREHOLE LOCATION PLAN

North

PROJECT TRUE

Date

NOVEMBER 2022

Scale

AS INDICATED

Job No

21-067

Figure No

FIGURE 2

N

S

Assumed G/F FFE 111 ± m

Design GWT Elevation 108.1 ± m

Assumed P5 FFE 94± m

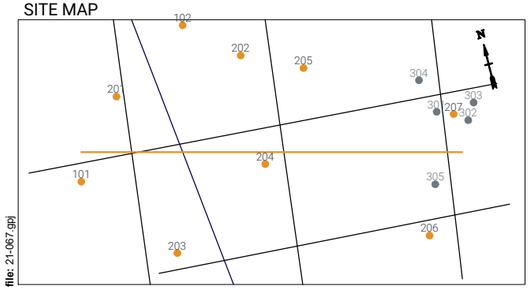
Elevation (m)

BH 101 | BH 201 | BH 203 | BH 102 | BH 202 | BH 204 | BH 205 | BH 103 | BH 206 | BH 207

UCS = 25.3 MPa
UCS = 145.9 MPa
UCS = 25.4 MPa
UCS = 22 MPa
UCS = 25.8 MPa
UCS = 24.6 MPa
UCS = 22.4 MPa
UCS = 13.6 MPa
UCS = 20.8 MPa

Boreholes Equally Spaced

SITE MAP



file: 21-067.gpj

LITHOLOGY GRAPHIC LEGEND

- Asphalt
- Aggregate
- Fill
- Clayey Silt Till
- Bedrock (inferred)
- Topsoil
- Shale

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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

- water level, unstabilized
- water level, stabilized (latest)
- water level, stabilized (highest)

Project
60 DUNDAS STREET EAST MISSISSAUGA, ON

Figure Title
SUBSURFACE PROFILE

Date
NOVEMBER 2022

Scale
AS INDICATED

Job No
21-067

Figure No
FIGURE 3

APPENDIX A

BOREHOLE LOG TERMINOLOGY

GROUNDED ENGINEERING

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

γ: soil unit weight (bulk)

G_s: specific gravity

S_u: undrained shear strength

▽ unstabilized 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

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

COMPOSITION

Term	% by weight
trace silt	<10
some silt	10 - 20
silt***y***	20 - 35
sand ***and*** silt	>35

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.

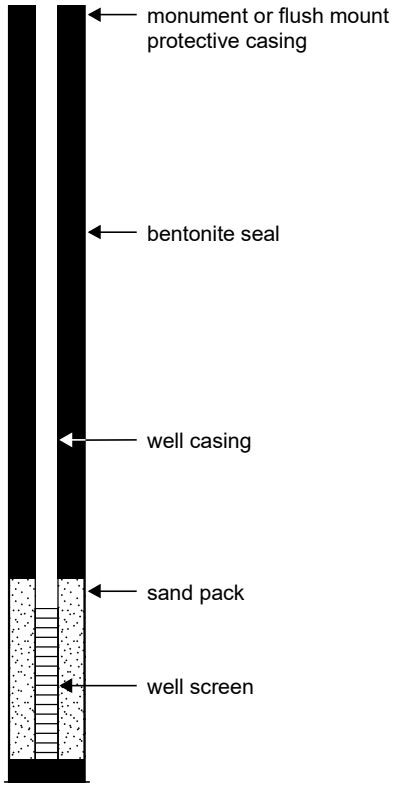
ASTM D3441 Cone Penetration Test (CPT)
Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm^2 into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

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



BOREHOLE LOG 101

Date Started : May 3, 2021
Position : E: 611836, N: 4826307 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*

solid stem augers OD=150 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
110.9	**GROUND SURFACE**				
	25mm **ASPHALT**				
	100mm **AGGREGATE**				
	FILL, sand, some silt, trace organics, organic odour, loose to compact, dark brown, moist		1	SS	11
			2	SS	9
	...at 1.5 m, dense, some gravel		3A	SS	36
108.9 / 2.0	...at 2.0 m, trace rock fragments, inferred cobbles		3B	SS	
	CLAYEY SILT, sandy, some gravel, stiff to very stiff, grey, moist (GLACIAL TILL)		4	SS	12
			5	SS	16
	...at 3.8 m, hard, trace rock fragments, inferred cobbles		6	SS	41
			7	SS	91 / 225mm
104.6			8A	SS	81 / 225mm
6.3	**INFERRED BEDROCK**, shale and limestone fragments, grey		8B	SS	
103.5 / 7.4			9	SS	70 / 75mm

depth scale (m): 0, 1, 2, 3, 4, 5, 6, 7

well details

elevation (m): 110, 109, 108, 107, 106, 105, 104

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40, 80, 120, 160

SPT N-values (bpf): dynamic cone; 10, 20, 30, 40

headspace vapour (ppm): hexane, isobutylene, methane; 100, 200, 300

moisture / plasticity: PL, MC, LL; 10, 20, 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT): GR SA SI CL

SS1: PAHs

SS2: H-Ms, Metals, ORPs

SS3B: PCBs

SS4: BTEX, PHCs

SS7: BTEX, VOCs

END OF BOREHOLE

Dry and open upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
May 4, 2021	4.7	106.2
May 6, 2021	3.5	107.4
May 10, 2021	3.3	107.6
May 21, 2021	3.2	107.7
Apr 17, 2022	3.4	107.5
Apr 29, 2022	2.8	108.1
May 13, 2022	3.3	107.6
Sep 26, 2022	3.0	107.9

file: 21-067.gpj

Tech : OM | **PM** : DK / JH | **Rev** : MD

GROUNDED ENGINEERING

Date Started : May 3, 2021
Position : E: 611879, N: 4826347 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 102

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*

elev depth (m)	description	graphic log	number	type	SPT N-value
110.0	**GROUND SURFACE**				
	100mm **TOPSOIL**				
	FILL, sand, some silt, trace clay, trace gravel, trace rootlets, trace organics, organic odour, loose to very loose, dark brown, moist		1	SS	6
	...at 0.8 m, trace cinders		2	SS	4
			3	SS	2
	...at 2.3 m, silty		4	SS	7
	...at 3.0 m, dark grey and black		5	SS	4
106.0			6A	SS	
4.0	**CLAYEY SILT**, sandy, some gravel, very stiff to hard, grey, moist (GLACIAL TILL)		6B	SS	28
			7	SS	64
103.9					
103.7	**INFERRED BEDROCK**, shale and limestone fragments, grey		8	SS	50 / 125mm
6.3			9	SS	50 / 50mm

solid stem augers OD=150 mm

depth scale (m): 0, 1, 2, 3, 4, 5, 6

well details

elevation (m): 109, 108, 107, 106, 105, 104

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40, 80, 120, 160

SPT N-values (bpf): dynamic cone; 10, 20, 30, 40

headspace vapour (ppm): hexane, isobutylene, methane; 100, 200, 300

moisture / plasticity: PL, MC, LL; 10, 20, 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT): GR SA SI CL

SS3: H-Ms, Metals, ORPs

SS5: PAHs

SS6B: BTEX, PCBs, PHCs

SS7: BTEX, VOCs

6.1m: Auger grinding for 10 mins; auger refusal

END OF BOREHOLE
Auger refusal on inferred bedrock

Dry and open upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
May 4, 2021	4.7	105.3
May 6, 2021	4.0	106.0
May 10, 2021	3.8	106.2
May 21, 2021	3.8	106.2
Apr 17, 2022	4.9	105.1
Apr 29, 2022	4.9	105.1
May 13, 2022	4.9	105.1
Sep 26, 2022	3.7	106.3

file: 21-067.gpj

Tech : OM | **PM** : DK / JH | **Rev** : MD

BOREHOLE LOG 103

Date Started : May 3, 2021
Position : E: 611901, N: 4826243 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*

solid stem augers OD=150 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
109.4	**GROUND SURFACE**				
109.2 / 0.2	50mm **ASPHALT**				
	100mm **AGGREGATE**				
	FILL, sand, some silt, trace clay, trace organics, organic odour, loose to compact, dark brown, moist		1	SS	8
	...at 0.8 m, brown		2	SS	13
	...at 1.5 m, clayey seams		3A	SS	
107.7 / 1.7	**CLAYEY SILT**, sandy, some gravel, very stiff to hard, grey, moist (GLACIAL TILL)		3B	SS	14
			4	SS	19
			5	SS	35
	...at 4.6 m, shale and limestone fragments		6	SS	96 / 275mm
104.3 / 5.1			7	SS	50 / 75mm

depth scale (m): 0, 1, 2, 3, 4, 5

well details

elevation (m): 109, 108, 107, 106, 105

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
▣ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1: H-Ms, Metals, ORPs

SS2: PAHs

SS3B: BTEX, PHCs

16 21 41 22

SS5: BTEX, VOCs

4.9m: Auger grinding for 10 mins; Auger refusal; shale powder on tip of auger and spoon

END OF BOREHOLE
Auger refusal on inferred bedrock

Dry and open upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
May 4, 2021	4.6	104.8
May 6, 2021	4.1	105.3
May 10, 2021	4.1	105.3
May 21, 2021	4.0	105.4
Apr 17, 2022	4.2	105.2
Apr 29, 2022	4.1	105.3
May 13, 2022	4.1	105.3
Sep 26, 2022	3.7	105.7

file: 21-067.gpj

Tech : OM | **PM** : DK / JH | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 15, 2022
Position : E: 611853, N: 4826330 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 201

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*

hollow stem augers OD=215 mm

Rock coring (HQ) OD=96 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
110.5	**GROUND SURFACE**				
110.3 / 0.2	50mm **ASPHALT** 100mm **AGGREGATE**		1A	SS	20
	FILL, sand, some silt, trace clay, trace gravel, trace asphalt, compact, brown to dark brown, moist		1B	SS	
			2	SS	12
	...at 1.5 m, trace rock fragments, wet		3	SS	21
108.2 / 2.3	**CLAYEY SILT**, sandy, some sand, trace gravel, hard to very stiff, grey, moist (GLACIAL TILL)		4	SS	30
	...at 3.0 m, sandy silt, some clay, some gravel		5	SS	26
	...at 4.6 m, trace rock fragments, inferred cobbles		6	SS	59
	...at 5.2 m, trace shale and limestone fragments		7	SS	54
104.1 / 6.4	**GEORGIAN BAY FORMATION** (See rock core log for details)		1	RUN	
			2	RUN	
			3	RUN	
			4	RUN	
			5	RUN	
			6	RUN	

depth scale (m) 0 1 2 3 4 5 6 7 8 9 10 11 12 13

well details

elevation (m) 110 109 108 107 106 105 104 103 102 101 100 99 98 97

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
⊠ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1A: PAHs, PCBs

SS1B: EC/SAR, H-Ms, Metals, ORPs

SS3: BTEX, PHCs, VOCs

SS4: EC/SAR, H-Ms, Metals, ORPs, PAHs

14 29 38 19

SS6: BTEX, PHCs, VOCs

...at 8.6 m, top of sound bedrock

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

(continued next page)

GROUNDED ENGINEERING

Date Started : Mar 15, 2022
Position : E: 611853, N: 4826330 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 201

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*

Rock coring (HQ) OD=96 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
	(continued)				
	GEORGIAN BAY FORMATION (See rock core log for details) *(continued)*		6	RUN	
			7	RUN	
			8	RUN	
			9	RUN	
			10	RUN	
			11	RUN	
			12	RUN	
87.3					
23.2	**END OF BOREHOLE**				

depth scale (m): 14, 15, 16, 17, 18, 19, 20, 21, 22, 23

elevation (m): 96, 95, 94, 93, 92, 91, 90, 89, 88

well details

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane — 40, 80, 120, 160

SPT N-values (bpf): dynamic cone — 10, 20, 30, 40

headspace vapour (ppm): hexane, isobutylene, methane — 100, 200, 300

moisture / plasticity: PL, MC, LL — 10, 20, 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT): GR SA SI CL

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Apr 17, 2022	5.3	105.2
Apr 29, 2022	5.1	105.4
May 13, 2022	5.1	105.4
Sep 26, 2022	6.7	103.8

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 18, 2022
Position : E: 611894, N: 4826333 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 202

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*

hollow stem augers OD=215 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
109.4	**GROUND SURFACE**				
109.2 / 0.2	50mm **ASPHALT**				
	100mm **AGGREGATE**		1A	SS	21
	FILL, sand, some silt, trace clay, trace gravel, trace construction debris, compact, light brown to dark brown, moist		1B	SS	
	...at 0.8 m, some clay, loose to very loose		2	SS	7
	...at 1.5 m, inferred cobble, wet		3A	SS	3
			3B	SS	
107.1 / 2.3	**FILL**, silt, some clay, some gravel, trace sand, trace construction debris, compact, brown to grey, wet		4	SS	11
106.4 / 3.0	**CLAYEY SILT**, some sand, trace gravel, trace rock fragments, hard, grey, moist (GLACIAL TILL)		5	SS	30
	...at 4.6 m, gravelly sand, silty, trace clay, trace shale and limestone fragments		6	SS	51
	...at 5.4 m, shale and limestone fragments		7A	SS	79 / 275mm
			7B		
103.8 / 5.6					

depth scale (m) 0 1 2 3 4 5

well details

elevation (m) 109 108 107 106 105 104

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
⊠ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1B: PCBs

SS2: EC/SAR, Metals, ORPs, PAHs

SS3B: BTEX, PHCs, VOCs

SS5: EC/SAR, H-Ms, Metals, ORPs, PAHs

30 32 29 9

SS6: BTEX, PHCs, VOCs

5.4m: Auger grinding

END OF BOREHOLE
Auger refusal on inferred bedrock

Water level and cave not measured upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Mar 21, 2022	4.3	105.1
Apr 17, 2022	3.1	106.3
Apr 29, 2022	3.7	105.7
May 13, 2022	3.1	106.3
Sep 26, 2022	3.1	106.3

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

BOREHOLE LOG 203

Date Started : Mar 7, 2022
Position : E: 611860, N: 4826278 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*

hollow stem augers OD=215 mm

Rock coring (HQ) OD=96 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
110.3	**GROUND SURFACE**				
110.1 / 0.2	50mm **ASPHALT** 100mm **AGGREGATE**		1	SS	13
	FILL, sand, trace silt, trace clay, trace gravel, compact to dense, brown, moist		2	SS	30
			3	SS	31
108.0 / 2.3	**CLAYEY SILT**, some sand, trace gravel, very stiff, grey, moist (GLACIAL TILL)		4	SS	20
	...at 3.0 m, trace rock fragments		5	SS	19
	...at 4.6 m, hard		6	SS	40
	...at 6.1 m, trace shale and limestone fragments		7	SS	73 / 200mm
			8	SS	50 / 125mm
103.1 / 7.2			9	SS	50 / 125mm
103.0 / 7.3	**INFERRED BEDROCK**, trace shale and limestone fragments				
	GEORGIAN BAY FORMATION (See rock core log for details)		1	RUN	
			2	RUN	
			3	RUN	
			4	RUN	
			5	RUN	

depth scale (m): 0 1 2 3 4 5 6 7 8 9 10 11 12 13

well details

elevation (m): 110 109 108 107 106 105 104 103 102 101 100 99 98 97

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
⊠ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1: EC/SAR, H-Ms, Metals, ORPs, PAHs, PCBs

SS2: BTEX, PHCs, VOCs

4 83 10 3

SS4: EC/SAR, H-Ms, Metals, ORPs, PAHs

SS6: BTEX, PHCs, VOCs

...at 9.7 m, top of sound bedrock

(continued next page)

Tech : AJ | **PM** : NP | **Rev** : MD

file: 21-067.gpj

GROUNDED ENGINEERING

Date Started : Mar 7, 2022
Position : E: 611860, N: 4826278 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 203

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*
Rock coring (HQ) OD=96 mm

elev depth (m)	description	graphic log	samples: number	samples: type	SPT N-value
	(continued)				
	GEORGIAN BAY FORMATION (See rock core log for details) *(continued)*		5	RUN	
			6	RUN	
			7	RUN	
			8	RUN	
			9	RUN	
			10	RUN	
			11	RUN	
86.6 23.7	**END OF BOREHOLE**				

depth scale (m): 14, 15, 16, 17, 18, 19, 20, 21, 22, 23
well details
elevation (m): 96, 95, 94, 93, 92, 91, 90, 89, 88, 87

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
⊠ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments
grain size distribution (%) (MIT)
GR SA SI CL

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Apr 17, 2022	11.4	98.9
Apr 29, 2022	9.1	101.2
May 13, 2022	7.7	102.6
Sep 26, 2022	6.9	103.4

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

BOREHOLE LOG 204

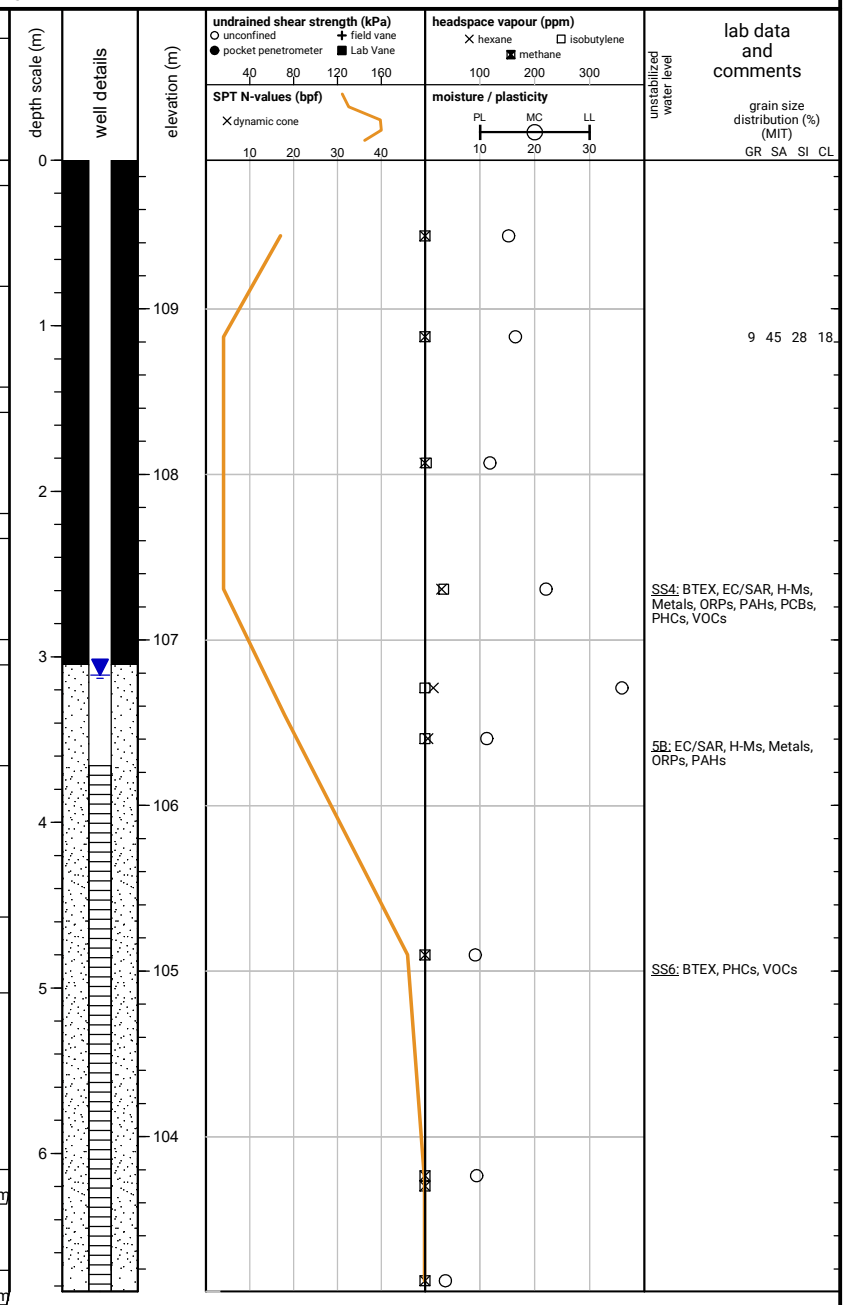
Date Started : Mar 7, 2022
Position : E: 611894, N: 4826298 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*

hollow stem augers OD=215 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
109.9	**GROUND SURFACE**				
109.7 / 0.2	50mm **ASPHALT** 100mm **AGGREGATE**				
	FILL, silty sand, some clay, trace gravel, trace construction debris, compact, orangey brown and grey, moist		1	SS	17
	...at 0.8 m, loose		2	SS	4
			3	SS	4
	...at 2.3 m, clayey silt seam, trace rootlets		4	SS	4
	...at 3.0 m, wet		5A	SS	18
106.6 / 3.3	**CLAYEY SILT**, some sand, trace gravel, very stiff, grey, moist (GLACIAL TILL)		5B		
	...at 4.6 m, trace rock fragments, hard		6	SS	46
103.7 / 6.2	**INFERRED BEDROCK**, trace shale and limestone fragments, grey		7A / 7B	SS	50 / 125mm
103.1 / 6.8			8	SS	50 / 125mm



END OF BOREHOLE

Water level and cave not measured upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Mar 21, 2022	3.7	106.2
Mar 22, 2022	3.6	106.3
Apr 17, 2022	3.5	106.4
Apr 29, 2022	3.8	106.1
May 13, 2022	3.3	106.6
Sep 26, 2022	3.1	106.8

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 10, 2022
Position : E: 611913, N: 4826325 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 205

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*

elev depth (m)	description	graphic log	number	type	SPT N-value
109.8	**GROUND SURFACE**				
109.6 / 0.2	50mm **ASPHALT** 100mm **AGGREGATE**		1	SS	18
	FILL, silty sand, some gravel, some clay, cobbles (inferred), trace construction debris, compact, dark brown to light brown, moist ...at 0.8 m, trace silt, loose		2	SS	8
	...at 1.5 m, clayey silt seam		3	SS	6
	...at 2.3 m, wet, compact		4	SS	13
			5	SS	14
106.0 / 3.8	**CLAYEY SILT**, some sand, trace gravel, hard, grey, moist (GLACIAL TILL) ...at 4.4 m, trace shale fragments		6A	SS	42
			6B		
			7	SS	79
			8	SS	73
103.0 / 6.8	**GEORGIAN BAY FORMATION** (See rock core log for details)		1	RUN	
			2	RUN	
			3	RUN	
			4	RUN	
			5	RUN	
			6	RUN	

hollow stem augers OD=215 mm

Rock coring (HQ) OD=96 mm

depth scale (m): 0 1 2 3 4 5 6 7 8 9 10 11 12 13

well details

elevation (m): 109 108 107 106 105 104 103 102 101 100 99 98 97 96

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
⊠ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL
16 51 22 11

SS2: EC/SAR, H-Ms, Metals, ORPs, PAHs, PCBs

SS3: BTEX, PHCs, VOCs

6A: BTEX, PHCs, VOCs

SS7: EC/SAR, H-Ms, Metals, ORPs, PAHs

...at 10.1 m, top of sound bedrock

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

(continued next page)

GROUNDED ENGINEERING

Date Started : Mar 10, 2022
Position : E: 611913, N: 4826325 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 205

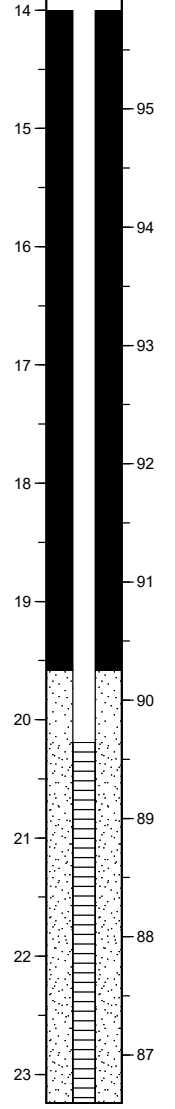
File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*

Rock coring (HQ) OD=96 mm

elev depth (m)	description	graphic log	samples: number	samples: type	samples: SPT N-value
	(continued)				
	GEORGIAN BAY FORMATION (See rock core log for details) *(continued)*		6	RUN	
			7	RUN	
			8	RUN	
			9	RUN	
			10	RUN	
			11	RUN	
			12	RUN	
86.6					
23.2	**END OF BOREHOLE**				

depth scale (m) | well details | elevation (m)



undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
⊠ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Apr 17, 2022	6.7	103.1
Apr 29, 2022	6.5	103.3
May 13, 2022	6.7	103.1
Sep 26, 2022	6.6	103.2

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 16, 2022
Position : E: 611938, N: 4826264 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 206

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

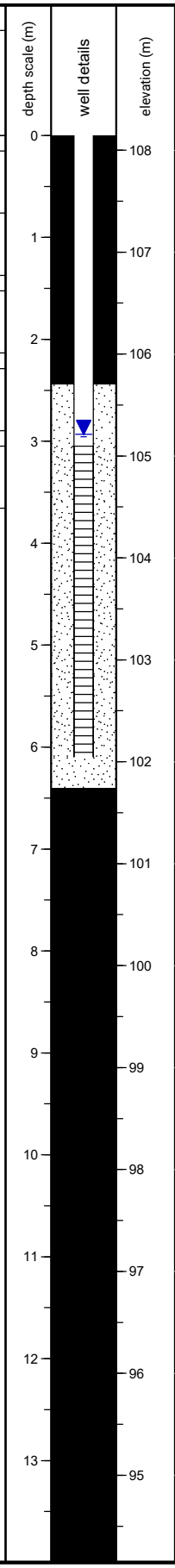
drill method : *Truck-mounted rig*

elev / depth (m)	description	graphic log	number	type	SPT N-value
108.1	**GROUND SURFACE**				
107.9 / 0.2	50mm **ASPHALT** 100mm **AGGREGATE**		1	SS	15
	FILL, sand, trace silt, trace gravel, compact, light brown to dark brown, moist ...at 0.8 m, loose to compact		2	SS	4
106.3 / 1.8	**CLAYEY SILT**, sandy, some gravel, stiff, brown to grey, moist (GLACIAL TILL) ...at 2.3 m, grey, hard		3A 3B	SS	12
			4	SS	30
	...at 3.0 m, trace rock fragments		5	SS	37
103.7 / 4.4	**GEORGIAN BAY FORMATION** (See rock core log for details)		1	RUN	
			2	RUN	
			3	RUN	
			4	RUN	
			5	RUN	
			6	RUN	
			7	RUN	

hollow stem augers OD=215 mm

Rock coring (HQ) OD=96 mm

depth scale (m) / well details / elevation (m)



undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
⊠ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1: PCBs

SS2: EC/SAR, H-Ms, Metals, ORPs, PAHs

3A: BTEX, PHCs, VOCs

3B: EC/SAR, H-Ms, Metals, ORPs, PAHs

16 24 39 21

SS5: BTEX, PHCs, VOCs

...at 6.6 m, top of sound bedrock

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

(continued next page)

GROUNDED ENGINEERING

Date Started : Mar 16, 2022
Position : E: 611938, N: 4826264 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 206

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*
Rock coring (HQ) OD=96 mm

elev depth (m)	description	graphic log	samples: number	samples: type	samples: SPT N-value
	(continued)				
	GEORGIAN BAY FORMATION (See rock core log for details) *(continued)*		7	RUN	
			8	RUN	
			9	RUN	
			10	RUN	
			11	RUN	
			12	RUN	
			13	RUN	
85.0 23.1					

depth scale (m): 14, 15, 16, 17, 18, 19, 20, 21, 22, 23
well details
elevation (m): 94, 93, 92, 91, 90, 89, 88, 87, 86

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40, 80, 120, 160
SPT N-values (bpf): dynamic cone; 10, 20, 30, 40
headspace vapour (ppm): hexane, isobutylene, methane; 100, 200, 300
moisture / plasticity: PL, MC, LL; 10, 20, 30
unstabilized water level
lab data and comments
grain size distribution (%) (MIT): GR SA SI CL

END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Mar 22, 2022	3.3	104.8
Apr 17, 2022	3.2	104.9
Apr 29, 2022	3.2	104.9
May 13, 2022	3.1	105.0
Sep 26, 2022	2.9	105.2

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 14, 2022
Position : E: 611955, N: 4826299 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 207

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : ACLP - Dundas St E

drill method : *Truck-mounted rig*

hollow stem augers OD=215 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
108.8	**GROUND SURFACE**				
108.6 / 0.2	50mm **ASPHALT** 100mm **AGGREGATE**				
	FILL, sand, some silt, trace gravel, compact, light grey, dry		1	SS	15
	...at 0.8 m, moist, grey to brown		2	SS	10
	...at 1.5 m, loose		3	SS	5
106.5 / 2.3	**CLAYEY SILT**, some sand, some gravel, trace rock fragments, hard, brown with orange, moist (GLACIAL TILL)		4	SS	33
	...at 3.0 m, grey		5	SS	50
	...at 4.6 m, trace shale fragments		6A / 6B	SS	50 / 75mm
			7	SS	66
102.7 / 6.1	**INFERRED BEDROCK**, trace shale and limestone fragments, grey		8	SS	50 / 50mm
102.4 / 6.4			9	SS	50 / 75mm

depth scale (m): 0, 1, 2, 3, 4, 5, 6

well details

elevation (m): 108, 107, 106, 105, 104, 103

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
⊠ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL
13 19 44 24

SS1: PCBs
SS2: BTEX, PHCs, VOCs
SS3: EC/SAR, H-Ms, Metals, ORPs, PAHs
SS4: EC/SAR, H-Ms, Metals, ORPs, PAHs
SS7: BTEX, PHCs, VOCs

END OF BOREHOLE

Water level and cave not measured upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Mar 21, 2022	3.9	104.9
Mar 22, 2022	4.3	104.5
Apr 17, 2022	4.0	104.8
Apr 29, 2022	3.9	104.9
May 13, 2022	3.9	104.9
Sep 26, 2022	3.7	105.1

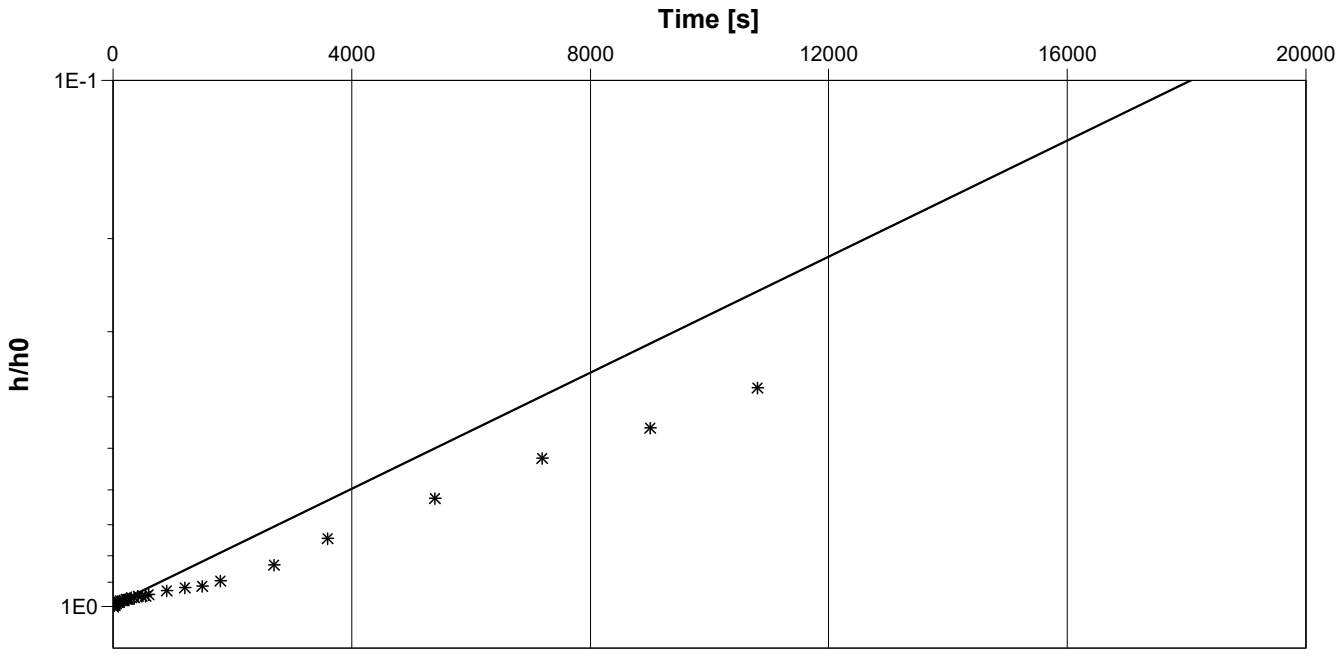
file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

APPENDIX B

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 60 Dundas St E, Mississauga
	Number: 21-067
	Client: ACLP - Dundas Street E

Location: 60 Dundas St E, Mississauga	Slug Test: BH101	Test Well: BH207
Test Conducted by: OM		Test Date: 2021-05-10
Analysis Performed by: DK	RHT-BH101	Analysis Date: 2021-05-13
Aquifer Thickness: 6.30 m		

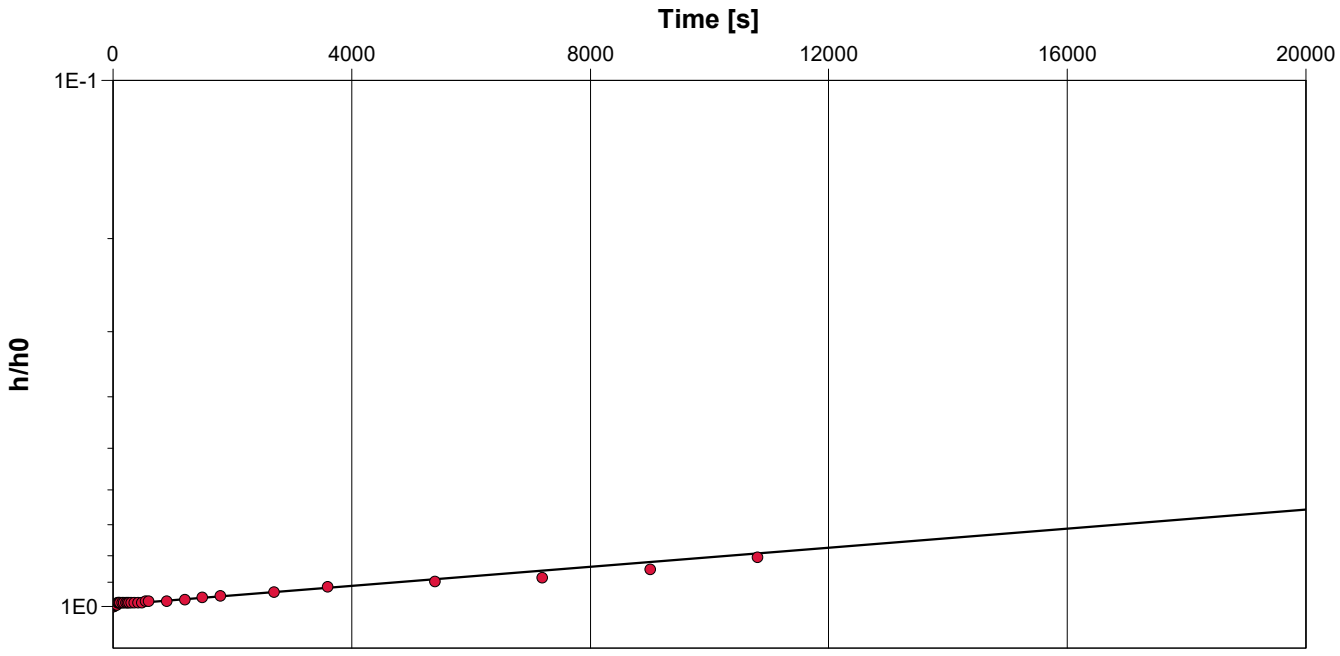


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH207	6.78×10^{-8}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 60 Dundas St E, Mississauga
	Number: 21-067
	Client: ACLP - Dundas Street E

Location: 60 Dundas St E, Mississauga	Slug Test: BH102	Test Well: BH102
Test Conducted by: OM		Test Date: 2021-05-10
Analysis Performed by: DK	RHT-BH102	Analysis Date: 2021-05-13
Aquifer Thickness: 6.30 m		

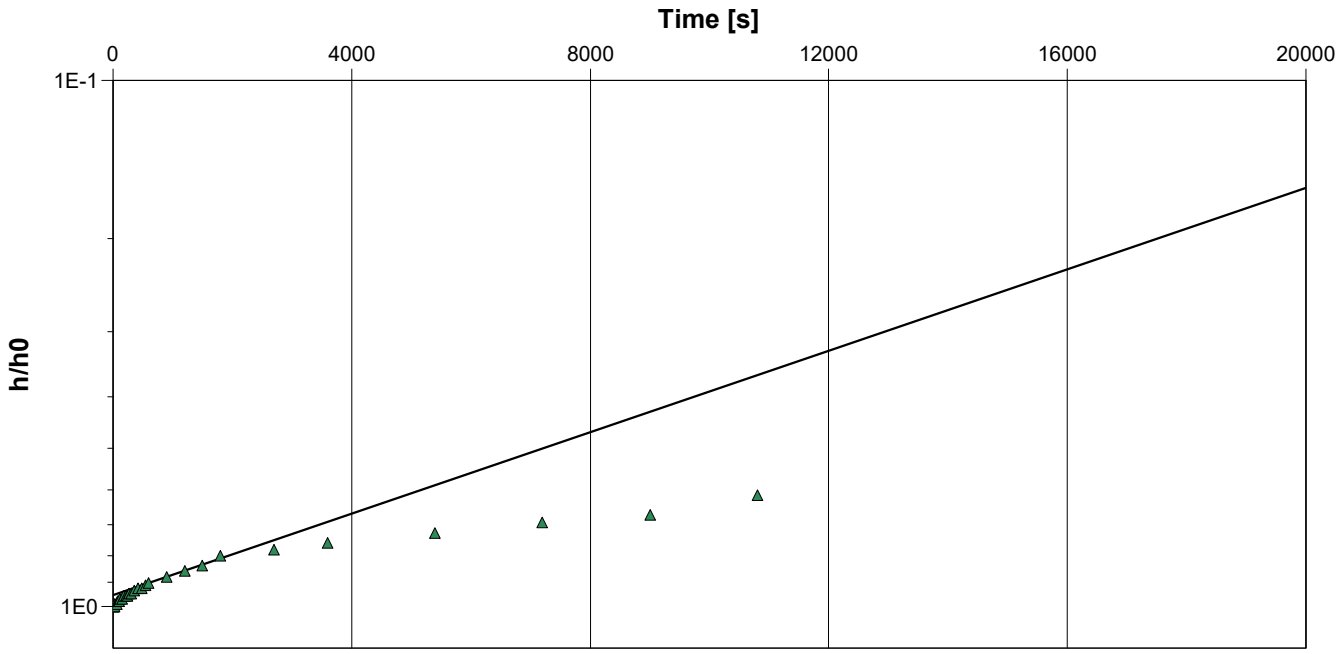


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH102	1.65×10^{-8}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 60 Dundas St E, Mississauga
	Number: 21-067
	Client: ACLP - Dundas Street E

Location: 60 Dundas St E, Mississauga	Slug Test: BH103	Test Well: BH103
Test Conducted by: OM		Test Date: 2021-05-11
Analysis Performed by: DK	RHT-BH103	Analysis Date: 2021-05-13
Aquifer Thickness: 6.30 m		

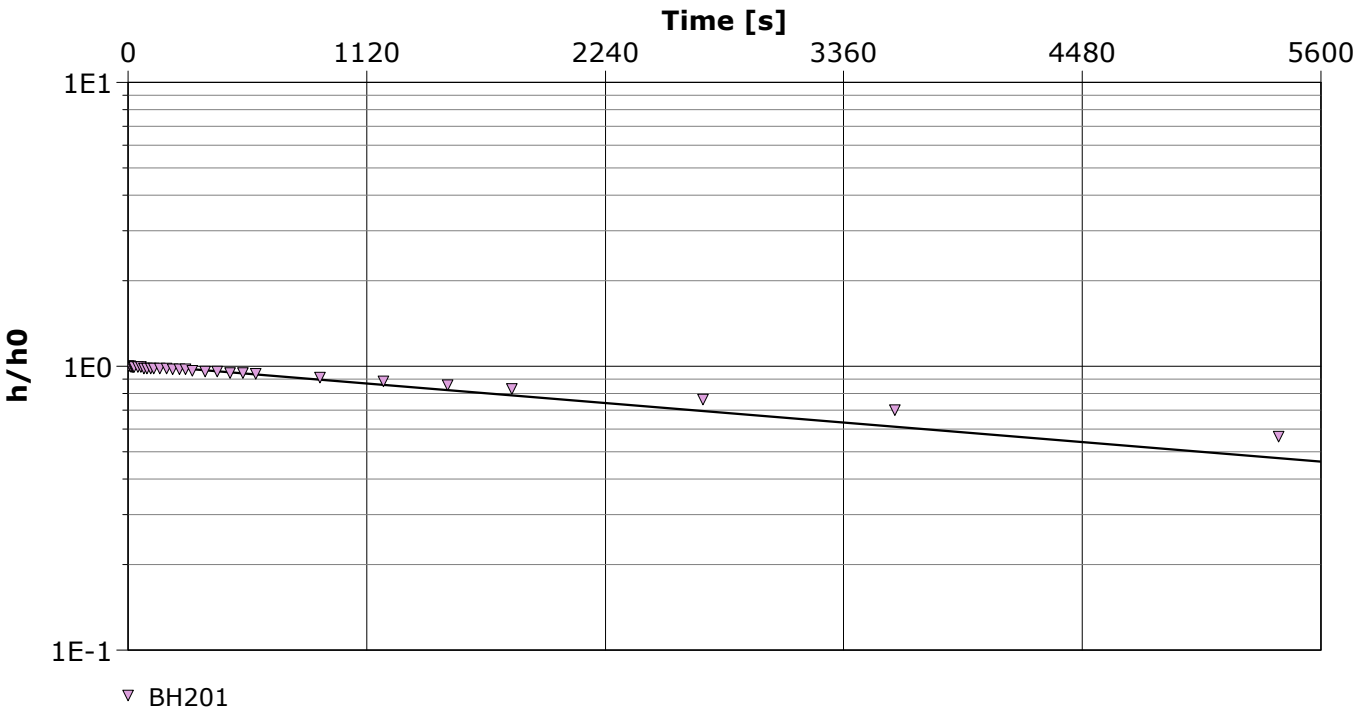


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH103	6.23×10^{-8}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 60 Dundas St E, Mississauga
	Number: 21-067
	Client: ACLP - Dundas Street E

Location: 60 Dundas St E, Mississauga	Slug Test: BH201	Test Well: BH201
Test Conducted by: FR		Test Date: 2022-03-30
Analysis Performed by: NP	BH201 RHT	Analysis Date: 2022-04-04
Aquifer Thickness: 25.00 m		

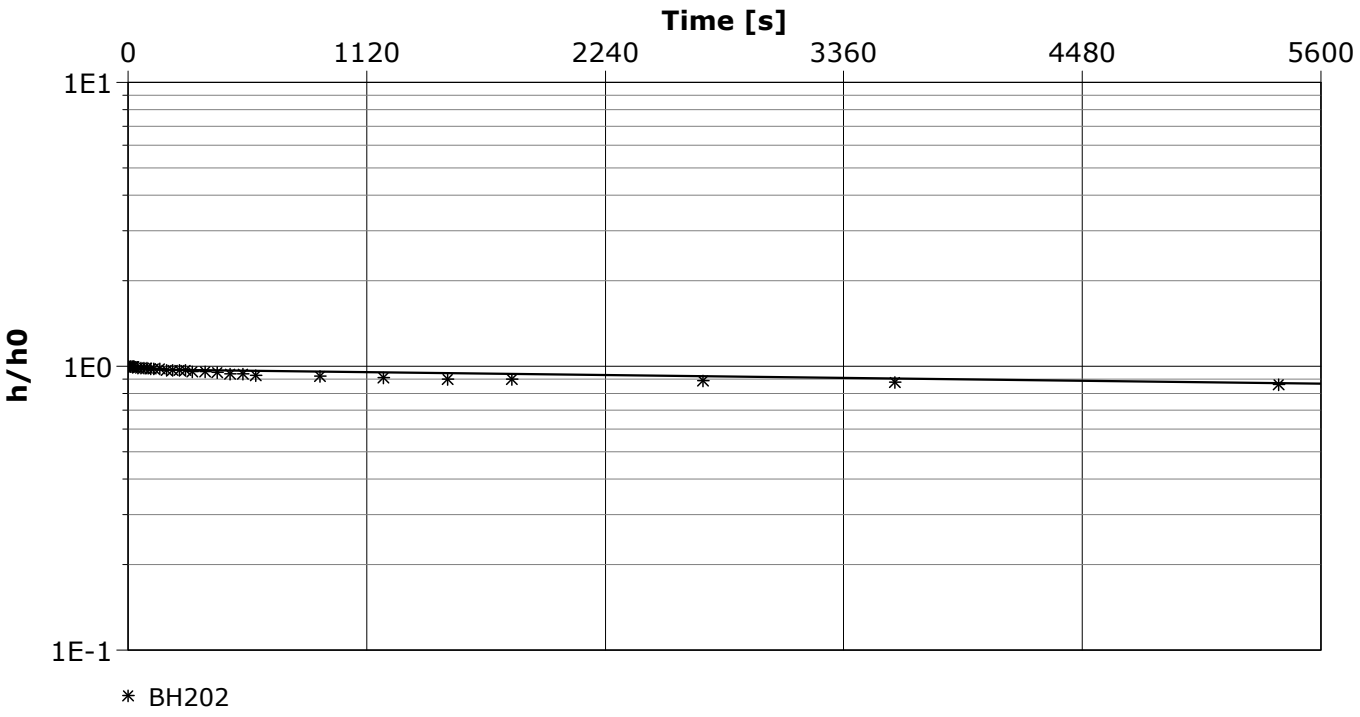


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH201	1.14×10^{-8}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 60 Dundas St E, Mississauga
	Number: 21-067
	Client: ACLP - Dundas Street E

Location: 60 Dundas St E, Mississauga	Slug Test: BH202	Test Well: BH202
Test Conducted by: NP		Test Date: 2022-04-04
Analysis Performed by: NP	BH202 RHT	Analysis Date: 2022-04-04
Aquifer Thickness: 4.70 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH202	1.54×10^{-8}	

GROUNDED ENGINEERING

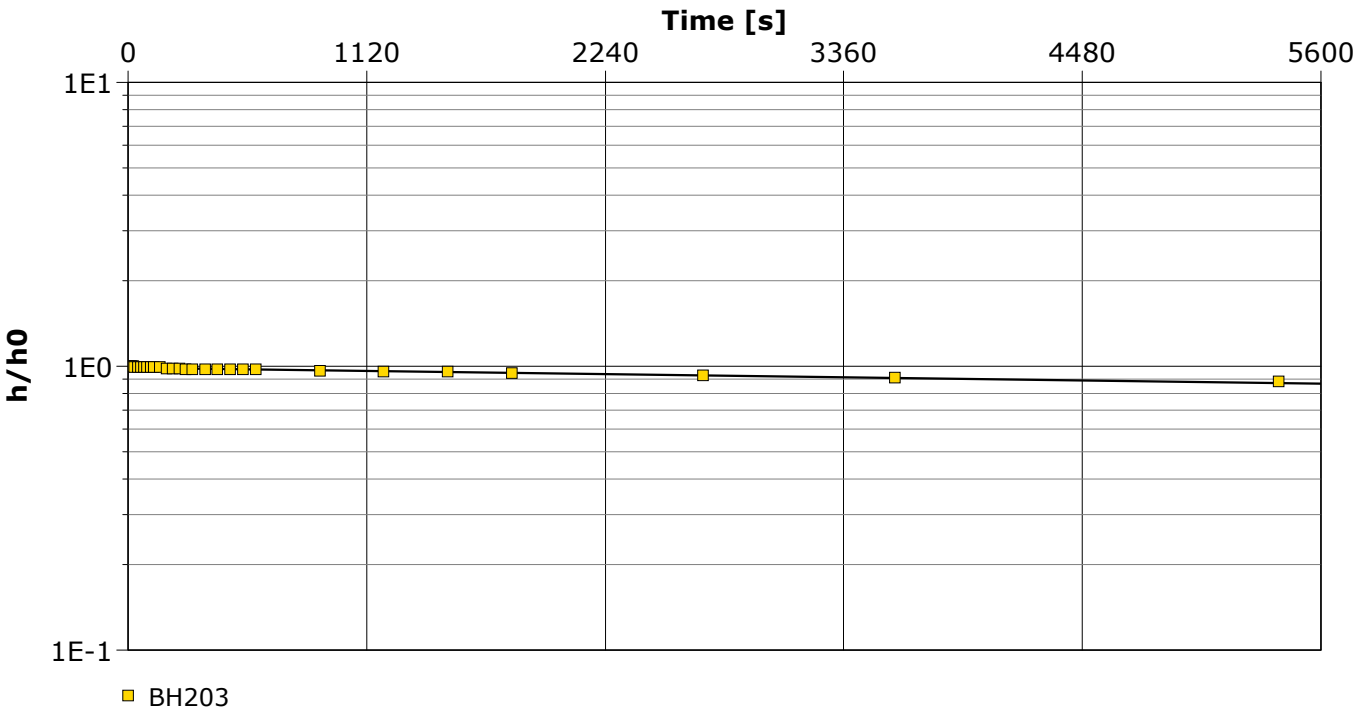
Slug Test Analysis Report

Project: 60 Dundas St E, Mississauga

Number: 21-067

Client: ACLP - Dundas Street E

Location: 60 Dundas St E, Mississauga	Slug Test: BH203	Test Well: BH203
Test Conducted by:		Test Date: 2022-03-31
Analysis Performed by: NP	BH203 RHT	Analysis Date: 2022-04-04
Aquifer Thickness: 25.00 m		

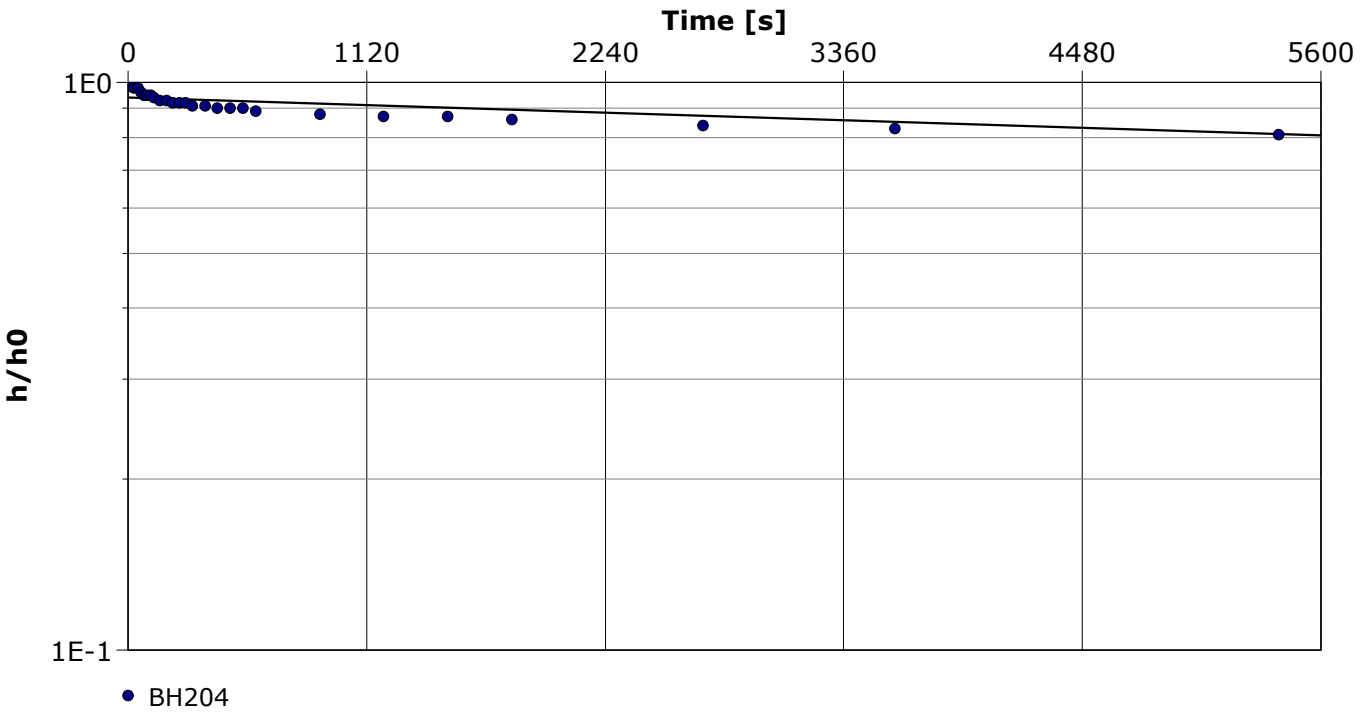


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH203	5.33×10^{-9}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 60 Dundas St E, Mississauga
	Number: 21-067
	Client: ACLP - Dundas Street E

Location: 60 Dundas St E, Mississauga	Slug Test: BH204	Test Well: BH204
Test Conducted by: DI		Test Date: 2022-03-31
Analysis Performed by: NP	B204 RHT	Analysis Date: 2022-04-04
Aquifer Thickness: 7.00 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH204	1.05×10^{-8}	

GROUNDED ENGINEERING

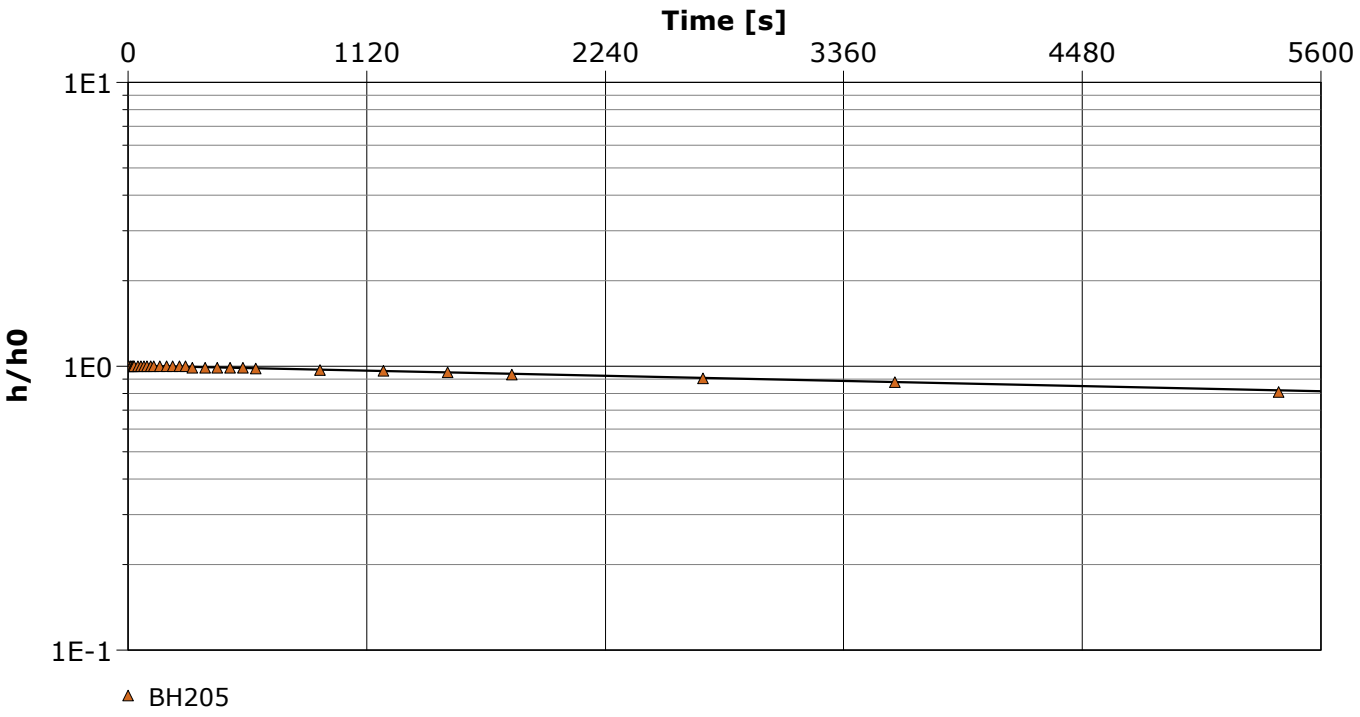
Slug Test Analysis Report

Project: 60 Dundas St E, Mississauga

Number: 21-067

Client: ACLP - Dundas Street E

Location: 60 Dundas St E, Mississauga	Slug Test: BH205	Test Well: BH205
Test Conducted by: DI		Test Date: 2022-03-31
Analysis Performed by: NP	BH205 RHT	Analysis Date: 2022-04-04
Aquifer Thickness: 25.00 m		

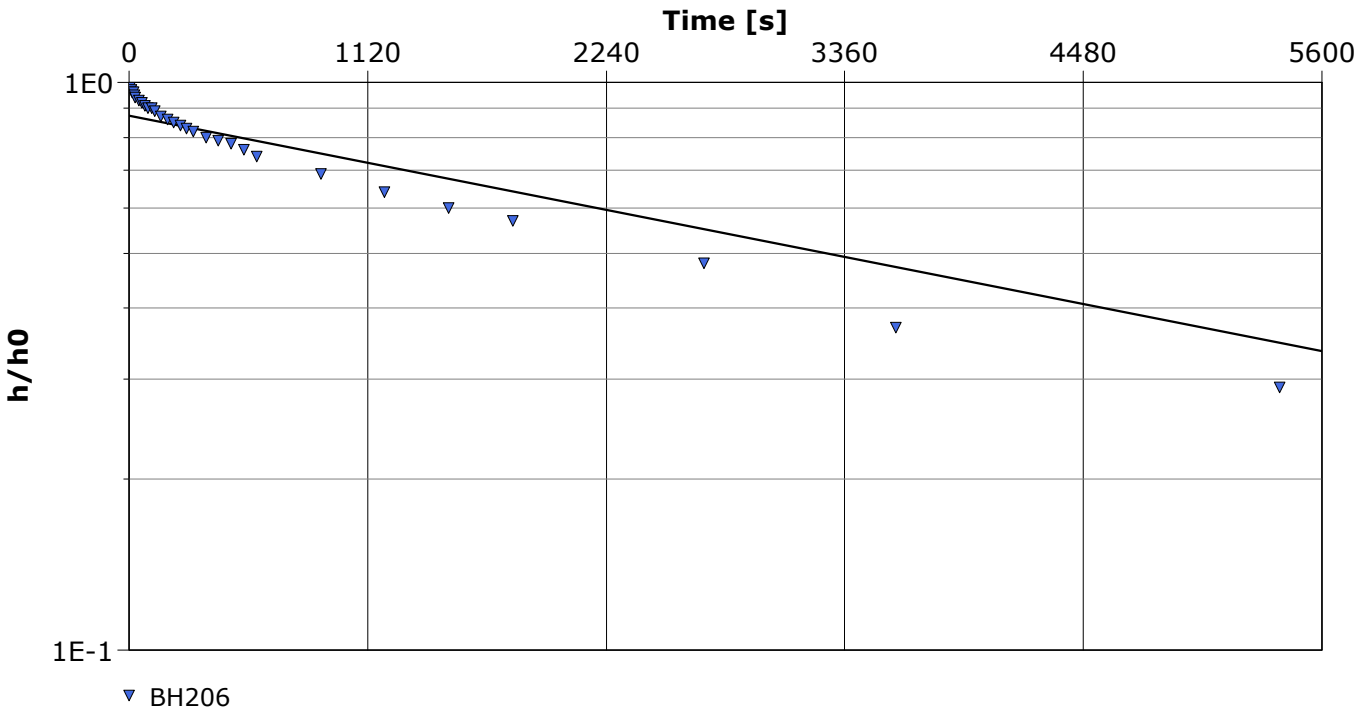


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH205	3.82×10^{-9}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 60 Dundas St E, Mississauga
	Number: 21-067
	Client: ACLP - Dundas Street E

Location: 60 Dundas St E, Mississauga	Slug Test: BH206	Test Well: BH206
Test Conducted by: DI		Test Date: 2022-03-31
Analysis Performed by: NP	BH206 RHT	Analysis Date: 2022-04-04
Aquifer Thickness: 6.50 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH206	6.83×10^{-8}	

GROUNDED ENGINEERING

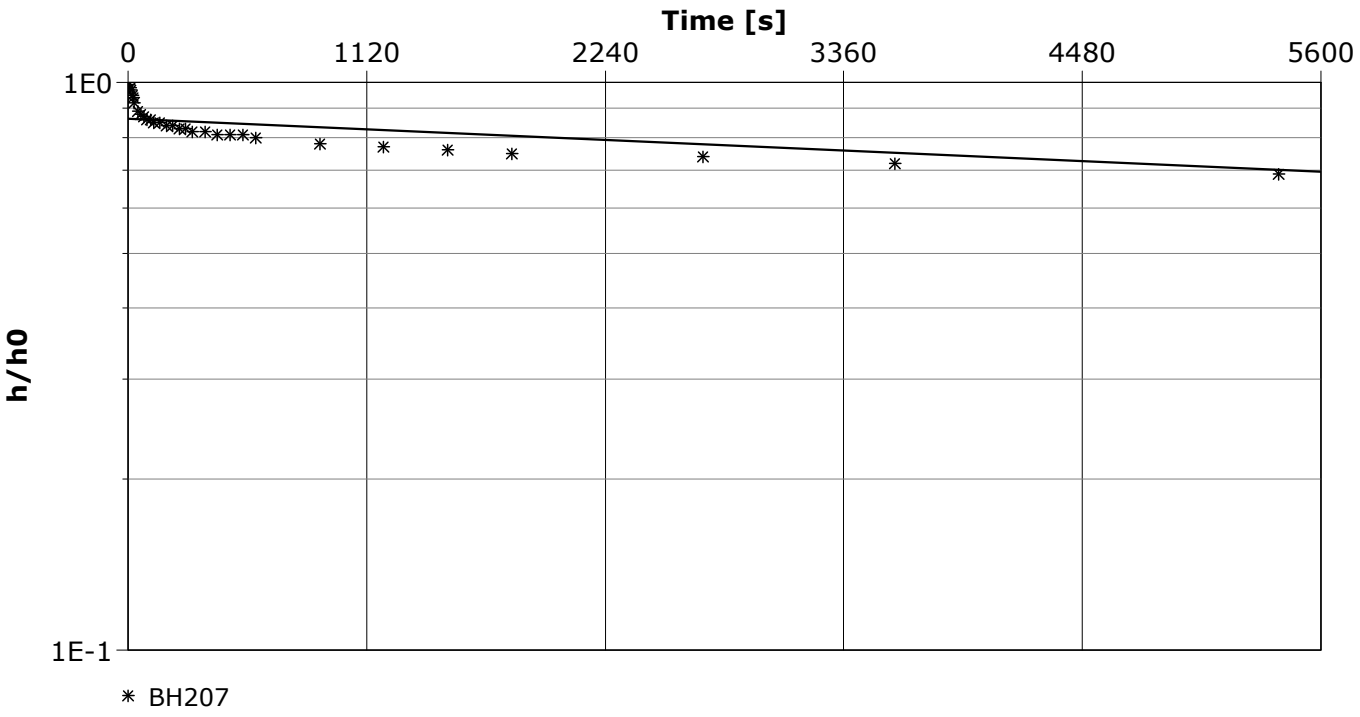
Slug Test Analysis Report

Project: 60 Dundas St E, Mississauga

Number: 21-067

Client: ACLP - Dundas Street E

Location: 60 Dundas St E, Mississauga	Slug Test: BH207	Test Well: BH207
Test Conducted by: DI		Test Date: 2022-03-31
Analysis Performed by: NP	BH207 RHT	Analysis Date: 2022-04-04
Aquifer Thickness: 7.00 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH207	1.97×10^{-8}	

APPENDIX C

Peto MacCallum Ltd.
CONSULTING ENGINEERS

ATTERBERG LIMITS - LIQUID AND PLASTIC

LABORATORY NO.:	2102782 B	PROJECT NO.:	21TM720	DATE:	May 18, 2021
BOREHOLE NO.:	103	SAMPLE NO.:	SS4	TESTED BY:	L. Gowry
SAMPLE DEPTH:	7.5-9 ft	DESCRIPTION:		CHECKED BY:	J. Noor

LIQUID LIMIT					
TRIAL	1	2	3	4	5
NUMBER OF BLOWS	30	20	15		
TARE NUMBER	H1	P4	N4		
WT. TARE & WET SOIL	43.42	42.92	39.09		
WT. TARE & DRY SOIL	38.79	38.21	35.09		
WT. OF WATER	4.63	4.71	4.00		
WT. OF TARE	19.96	19.98	20.14		
WT. OF DRY SAMPLE	18.83	18.23	14.95		
MOISTURE CONTENT	24.6	25.8	26.8		

ATTERBERG LIMITS	
LIQUID LIMIT	25
PLASTIC LIMIT	16
PLASTICITY INDEX	9

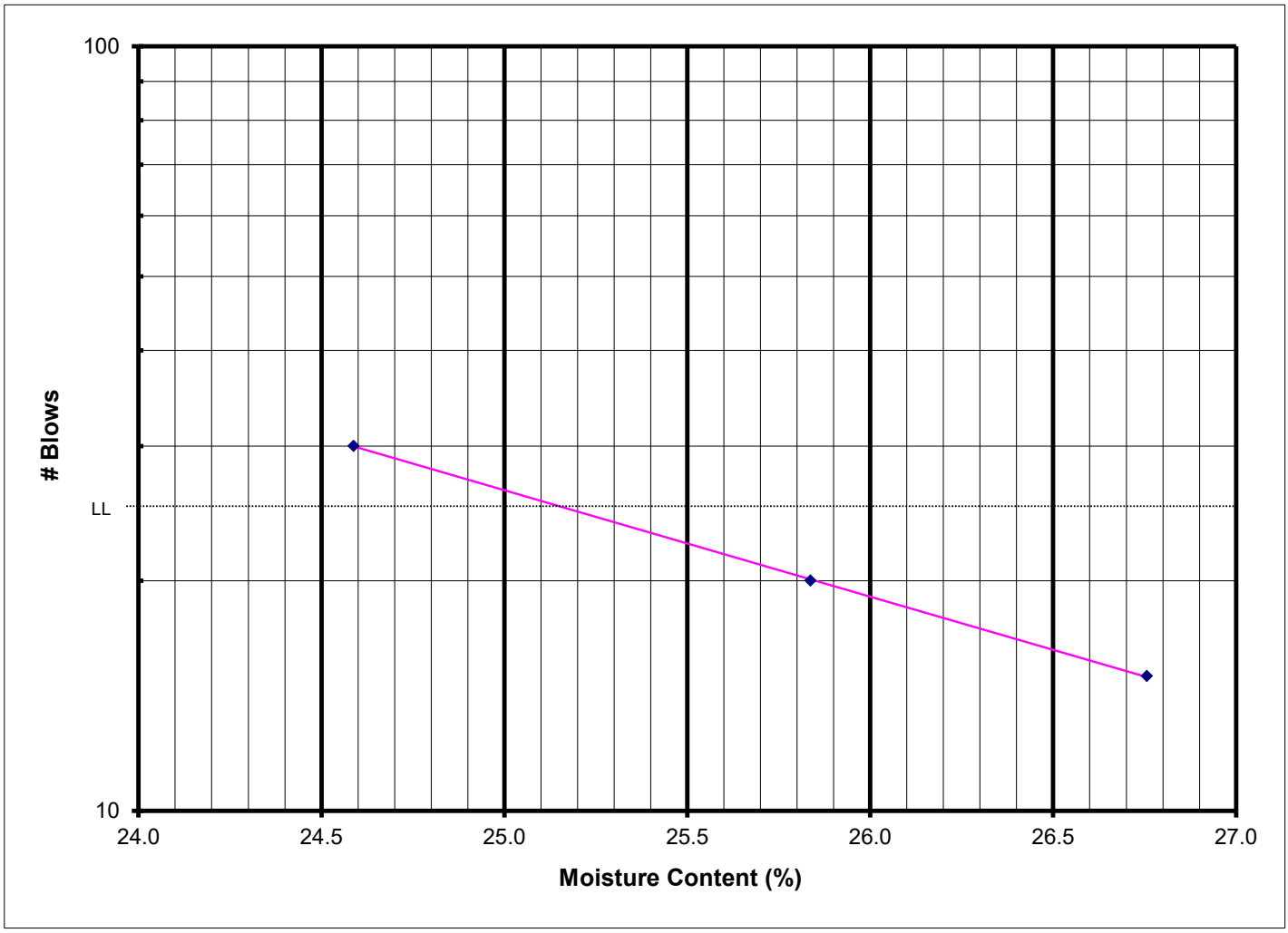
PLASTIC LIMIT		
TRIAL	1	2
TARE NUMBER	P10	x23
WT. TARE & WET SOIL	27.75	27.57
WT. TARE & DRY SOIL	26.65	26.53
WT. OF WATER	1.10	1.04
WT. OF TARE	19.83	20.03
WT. OF DRY SAMPLE	6.82	6.50
MOISTURE CONTENT	16.1	16.0

LIQUID LIMIT BEST-LINE CALCULATION & ASSESSMENT						
LOG OF BLOWS	MOISTURE CONTENTS		ERROR EVALUATION			
			BLOW COUNT	MOISTURE CONTENT	DIFFERENCE	WITHIN 1%?
1.4771213	24.6					
1.30103	25.8		30	24.6	0.0	TRUE
1.1760913	26.8		20	25.8	0.0	TRUE
			15	26.7	0.0	TRUE
SLOPE	INTERCEPT					
-7.19268	35.20747		ERROR ASSESSMENT			PASSES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

ATTERBERG LIMITS - LIQUID AND PLASTIC

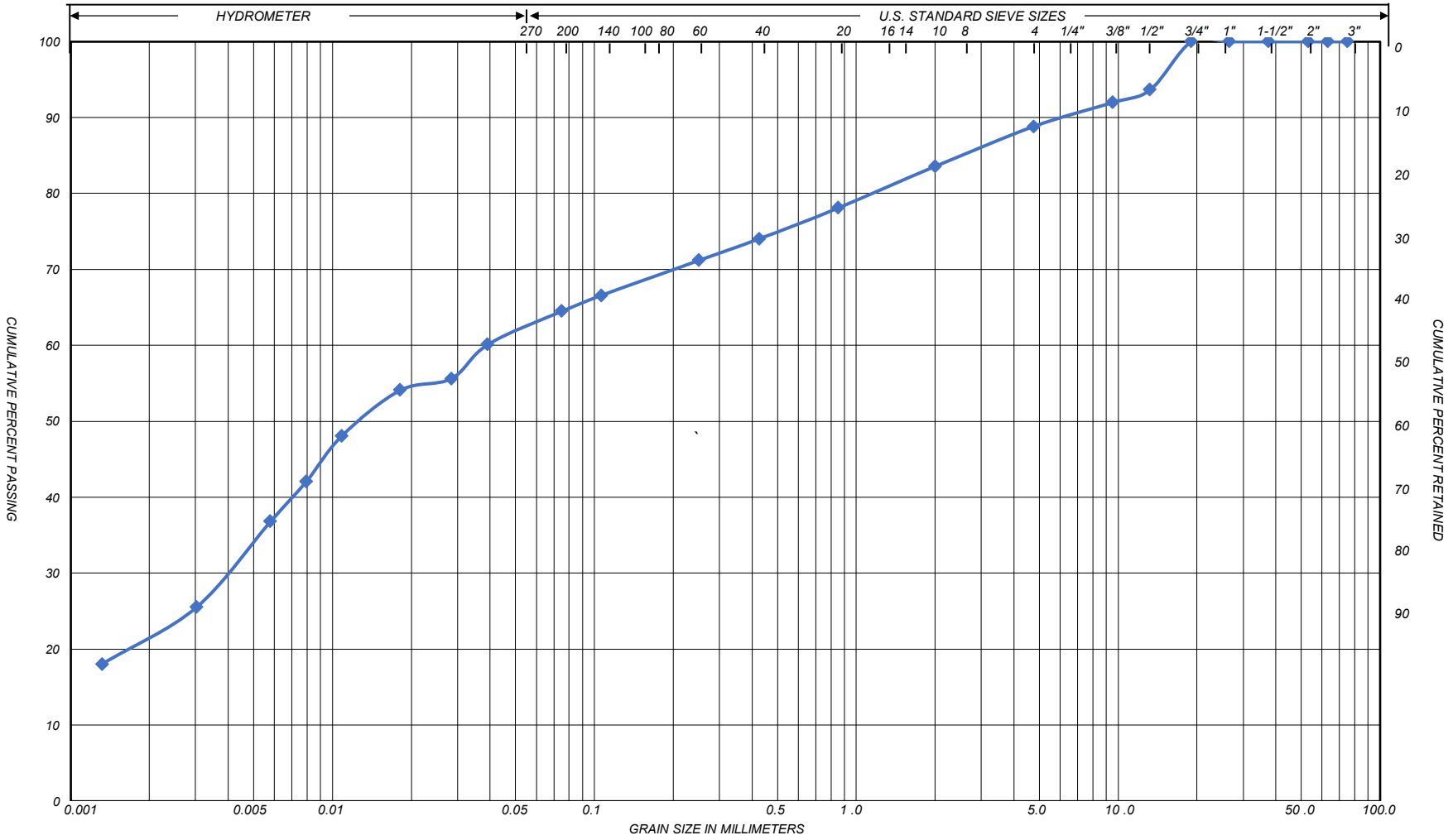
LABORATORY NO.:	2102782 B	PROJECT NO.:	21TM720	DATE:	May 18, 2021
BOREHOLE NO.:	103	SAMPLE NO.:	SS4	TESTED BY:	L. Gowry
SAMPLE DEPTH:	7.5-9 ft	DESCRIPTION:		CHECKED BY:	J. Noor



Peto MacCallum Ltd.
CONSULTING ENGINEERS

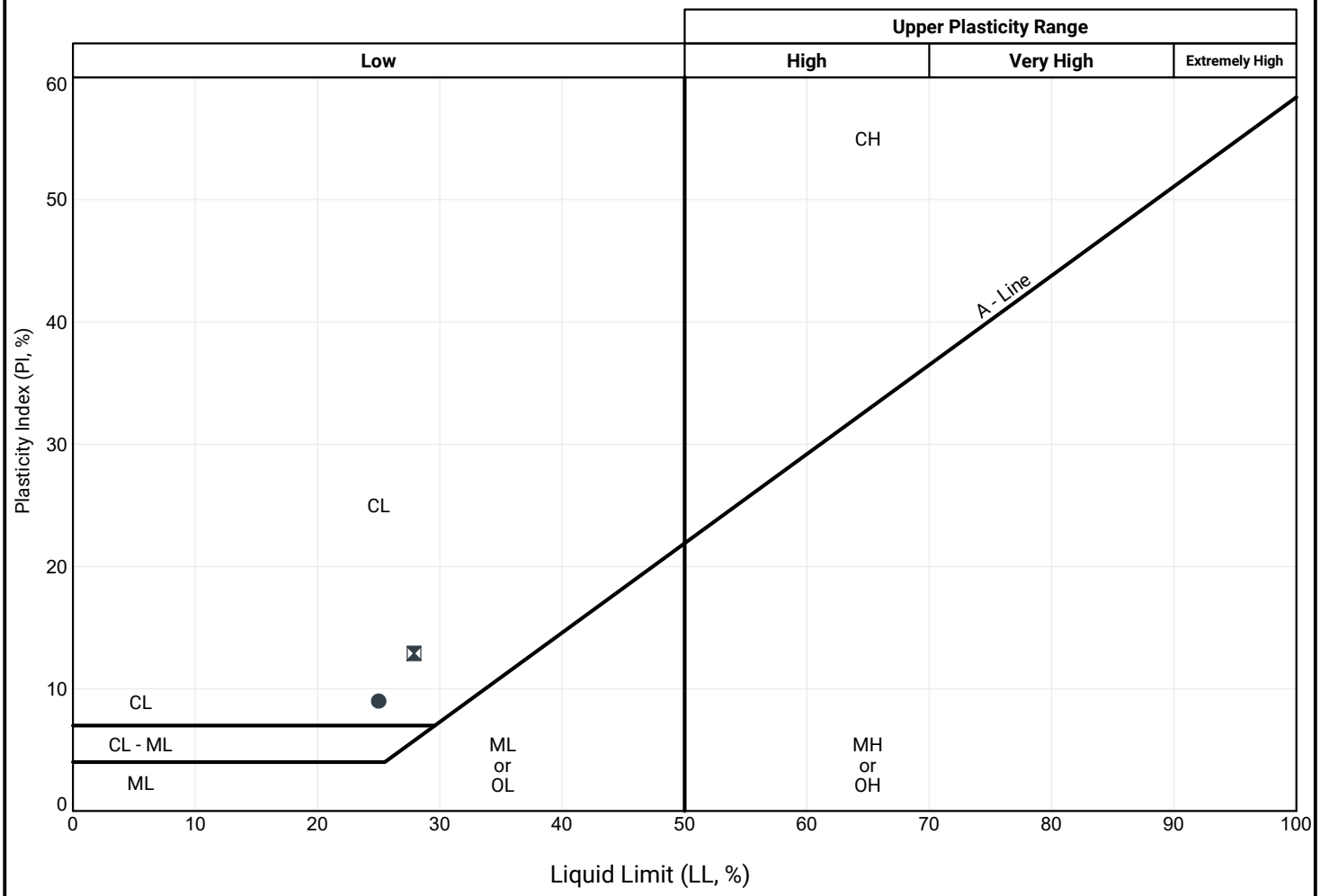
PML REF. 21TM720
REPORT NO.
ENCLOSURE

PARTICLE SIZE DISTRIBUTION CHART



SILT & CLAY			FINE	MEDIUM	COARSE	GRAVEL		COBBLES	UNIFIED
			SAND						
CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	GRAVEL		COBBLES	M.I.T.
	SILT			SAND						
CLAY	SILT		VERY FINE	FINE	MEDIUM	COARSE	GRAVEL			U.S. BUREAU
			SAND							

REMARKS Bore Hole 103, Sample No.SS4, Depth 7.5-9, Lab No.2102782-B,



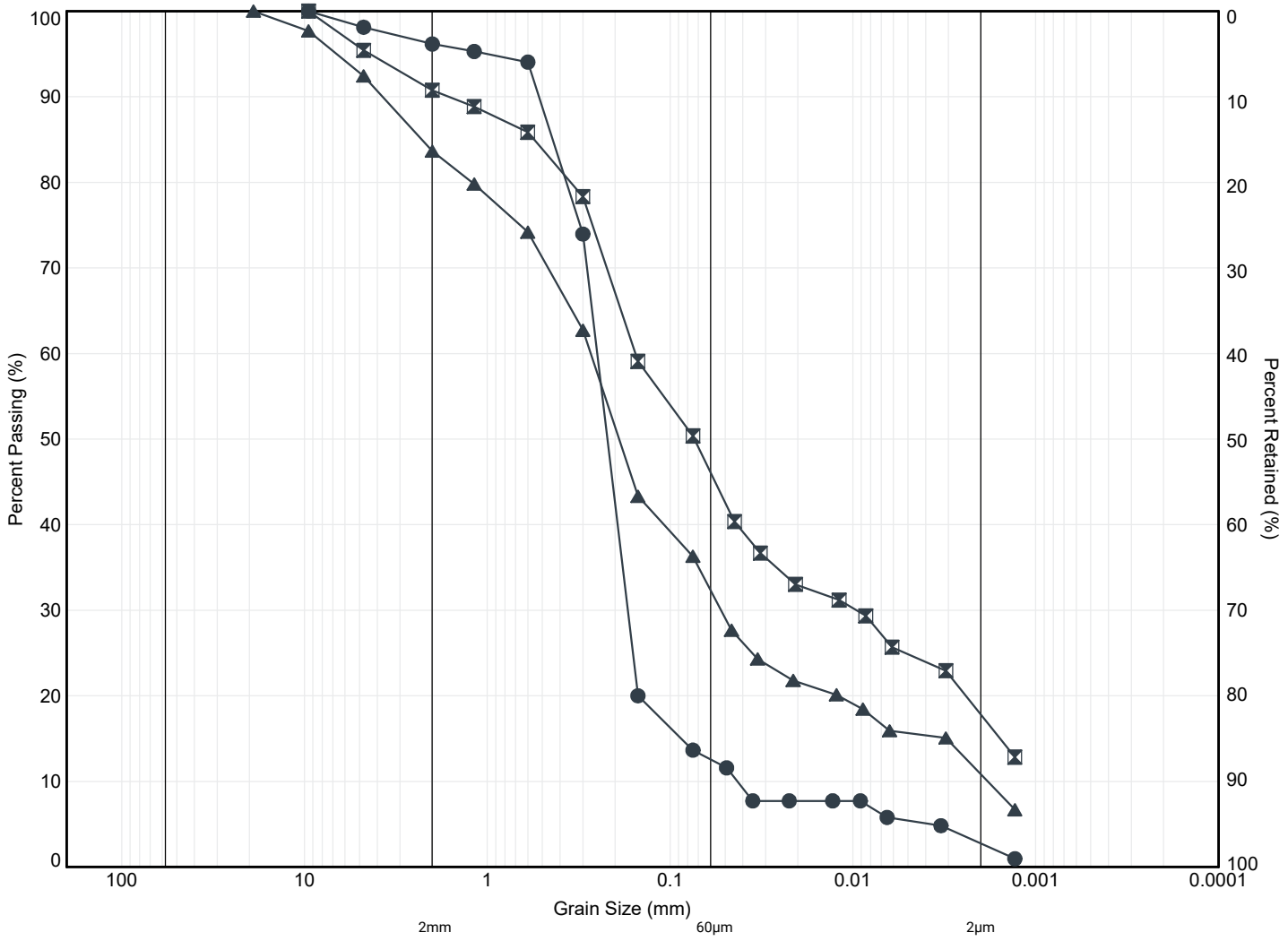
	Borehole	Sample	Depth (m)	Elev. (m)	LL (%)	PL (%)	PI (%)
●	**103**	SS4	2.6	106.8	25	16	9
⊠	**206**	SS4	2.6	105.6	28	15	13

GROUNDED ENGINEERING

Title: **ATTERBERG LIMITS CHART**

File No.: **21-067**

file: 21-067.gpj



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

MIT SYSTEM

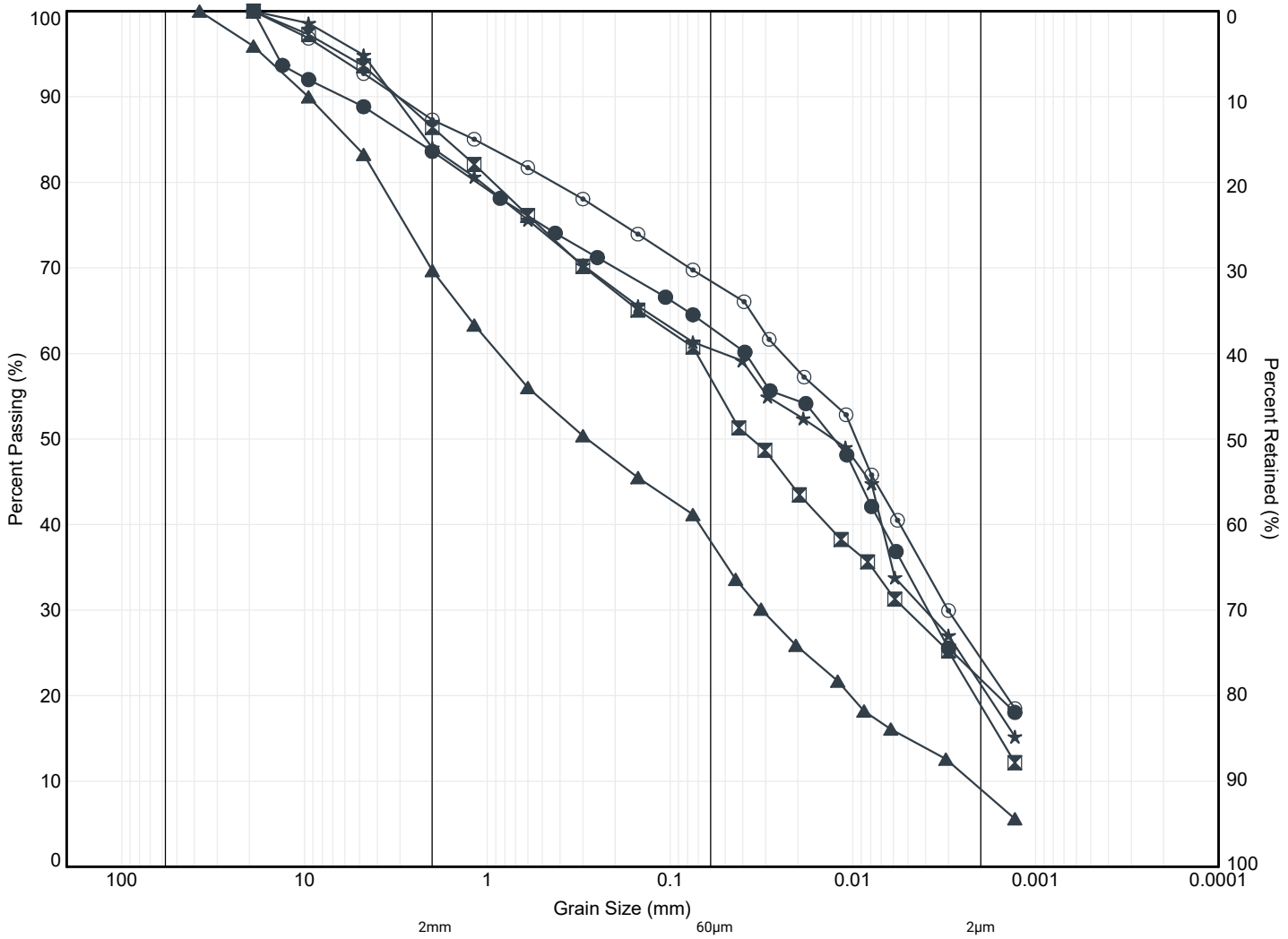
	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**203**	SS3	1.8	108.5	4	83	10	3
⊠	**204**	SS2	1.1	108.8	9	45	28	18
▲	**205**	SS2	1.1	108.8	16	51	22	11

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION - FILL**

File No.: **21-067**

file: 21-067.gpj



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

MIT SYSTEM

	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**103**	SS4	2.6	106.8	16	21	41	22
⊠	**201**	SS5	3.4	107.2	14	29	38	19
▲	**202**	SS6	4.9	104.5	30	32	29	9
★	**206**	SS4	2.6	105.6	16	24	39	21
⊙	**207**	SS4	2.6	106.2	13	19	44	24

GROUNDED ENGINEERING

Title:

GRAIN SIZE DISTRIBUTION - GLACIAL TILL

File No.:

21-067

file: 21-067.gpj

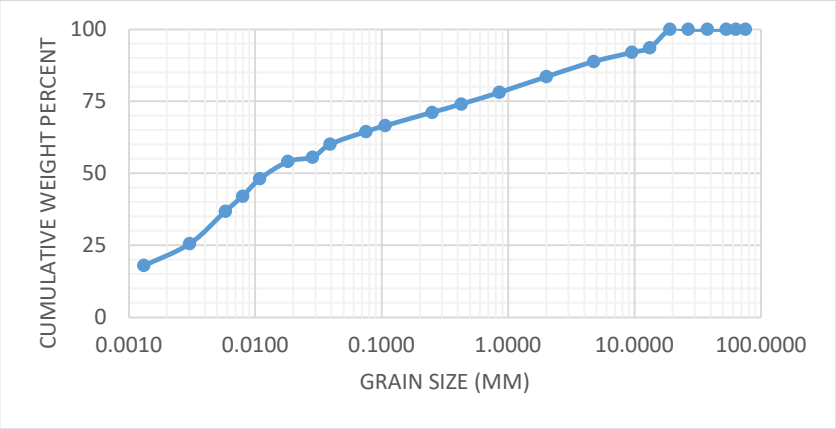
APPENDIX D

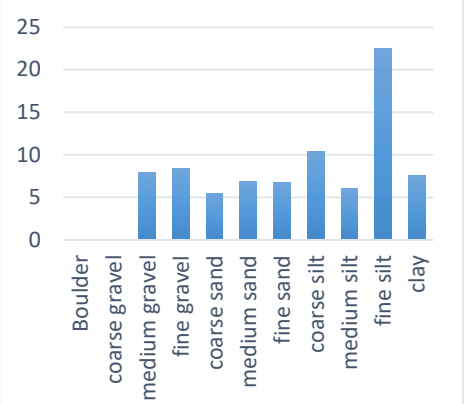
Grain Size Analysis Report Date: May 18, 2021

Sample Name: BH103-SS4

Mass Sample (g): 100 T (oC): 20

Poorly sorted clay with fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
75	0	0	100
63	0	0	100
53	0	0	100
37.5	0	0	100
26.5	0	0	100
19	0	0	100
13.2	6.343888	0.063439	93.65611193
9.5	1.66053	0.016605	91.99558174
4.75	3.166421	0.031664	88.82916053
2	5.231959	0.05232	83.59720177
0.85	5.474125	0.054741	78.12307656
0.425	4.075182	0.040752	74.04789446
0.25	2.843504	0.028435	71.20439053
0.106	4.637801	0.046378	66.56659001
0.075	2.052797	0.020528	64.51379305
0.039035	4.369257	0.043693	60.14453568
0.028373	4.51084	0.045108	55.6336955
0.018105	1.503613	0.015036	54.13008211
0.01084	6.014454	0.060145	48.11562854
0.007931	6.014454	0.060145	42.10117498
0.005785	5.262647	0.052626	36.8385281
0.003019	11.2771	0.112771	25.56142766

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.001	Uniformity Coef.	53.04
d17	0.001	n computed	0.26
d20	0.002	g (cm/s^2)	980.00
d50	0.013	ρ (g/cm^3)	0.9981
d60	0.039	μ (g/cm s)	0.0098
de (Kruger)	0.012	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.005	tau (Sauerbrei)	1.053
de (Zunker)	0.005	$d_{geometric\ mean}$	0.127
de (Zamarin)	0.005	σ_ϕ	5.036
Io (Alyameni)	-0.002		

mm	0	% in sample
>64	Boulder	0
16 - 64	coarse gravel	0
8 - 16	medium gravel	8.004418262
2 - 8	fine gravel	8.398379971
0.5 - 2	coarse sand	5.474125209
0.25 - 0.5	medium sand	6.918686028
0.063 - 0.25	fine sand	6.690597478
0.016 - 0.063	coarse silt	10.38371094
0.008 - 0.016	medium silt	6.014453568
0.002 - 0.008	fine silt	22.55420088
<0.002	clay	7.51806696

Data continue, additional pages required ...

K from Grain Size Analysis Report

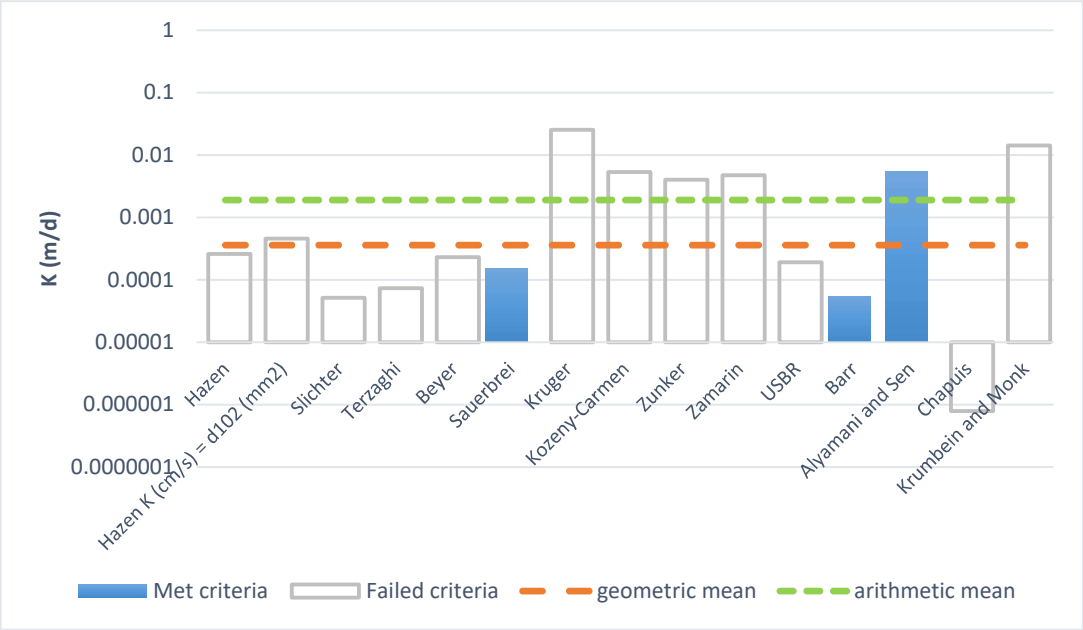
Date: 20-May-21

Sample Name: BH103 SS4

Mass Sample (g): 100

T (oC) 20

Poorly sorted clay with fines



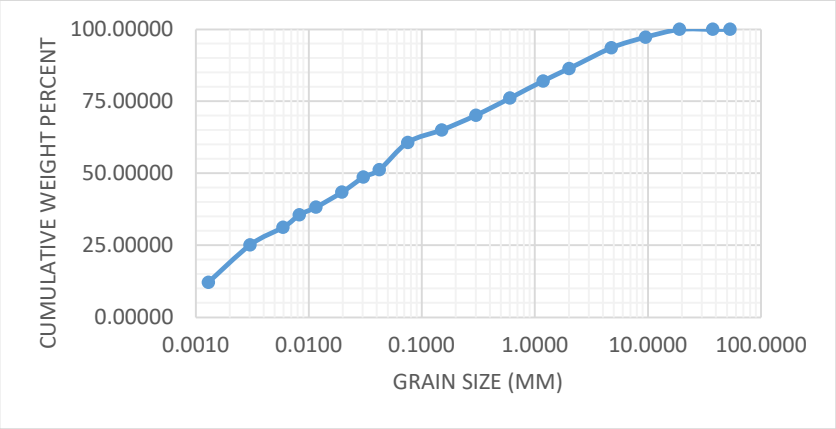
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	3.0E-07	3.0E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	5.3E-07	5.3E-09	0.00	
Slichter	5.9E-08	5.9E-10	0.00	
Terzaghi	8.4E-08	8.4E-10	0.00	
Beyer	2.7E-07	2.7E-09	0.00	
Sauerbrei	1.8E-07	1.8E-09	0.00	
Kruger	3.0E-05	3.0E-07	0.03	
Kozeny-Carmen	6.1E-06	6.1E-08	0.01	
Zunker	4.7E-06	4.7E-08	0.00	
Zamarin	5.5E-06	5.5E-08	0.00	
USBR	2.2E-07	2.2E-09	0.00	
Barr	6.4E-08	6.4E-10	0.00	
Alyamani and Sen	6.4E-06	6.4E-08	0.01	
Chapuis	9.1E-10	9.1E-12	0.00	
Krumbein and Monk	1.6E-05	1.6E-07	0.01	
geometric mean	4.2E-07	4.2E-09	0.00	
arithmetic mean	2.2E-06	2.2E-08	0.00	

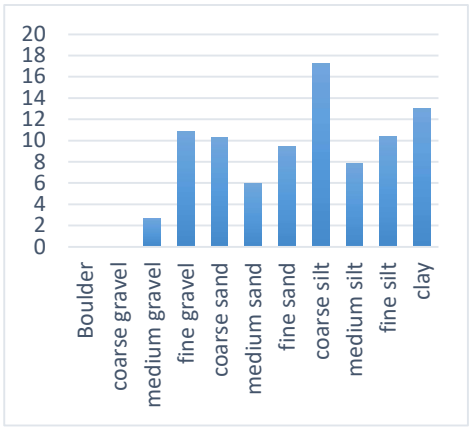
Grain Size Analysis Report Date: 12-Apr-22

Sample Name: BH201-SS5

Mass Sample (g): 278.45 T (oC): 20

Poorly sorted sandy gravelly silt with fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
53	0	0	100
37.5	0	0	100
19	0	0	100
9.5	7.56	0.02715	97.28497037
4.75	10.26	0.036847	93.6002873
2	20.01	0.071862	86.41407793
1.18	12.031	0.043207	82.09337403
0.6	16.60278	0.059626	76.13080266
0.3	16.60278	0.059626	70.16823128
0.15	14.19658	0.050984	65.06980068
0.075	12.031	0.043207	60.74909679
0.042081	26.34265	0.094605	51.28863886
0.030324	7.261689	0.026079	48.68074197
0.019601	14.52338	0.052158	43.46494819
0.011555	14.52338	0.052158	38.2491544
0.008254	7.261689	0.026079	35.64125751
0.005933	12.10281	0.043465	31.29476269
0.003033	16.94394	0.060851	25.20966995
0.001294	36.30844	0.130395	12.17018549

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.001	Uniformity Coef.	68.07
d17	0.002	n computed	0.26
d20	0.002	g (cm/s^2)	980.00
d50	0.036	ρ (g/cm^3)	0.9981
d60	0.072	μ (g/cm s)	0.0098
de (Kruger)	0.011	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.006	tau (Sauerbrei)	1.053
de (Zunker)	0.006	$d_{geometric\ mean}$	0.105
de (Zamarin)	0.006	σ_ϕ	4.494
Io (Alyameni)	-0.008		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	0
8 - 16	medium gravel	2.715029628
2 - 8	fine gravel	10.87089244
0.5 - 2	coarse sand	10.28327527
0.25 - 0.5	medium sand	5.962571377
0.063 - 0.25	fine sand	9.419134495
0.016 - 0.063	coarse silt	17.2841486
0.008 - 0.016	medium silt	7.823690673
0.002 - 0.008	fine silt	10.43158756
<0.002	clay	13.03948446

K from Grain Size Analysis Report

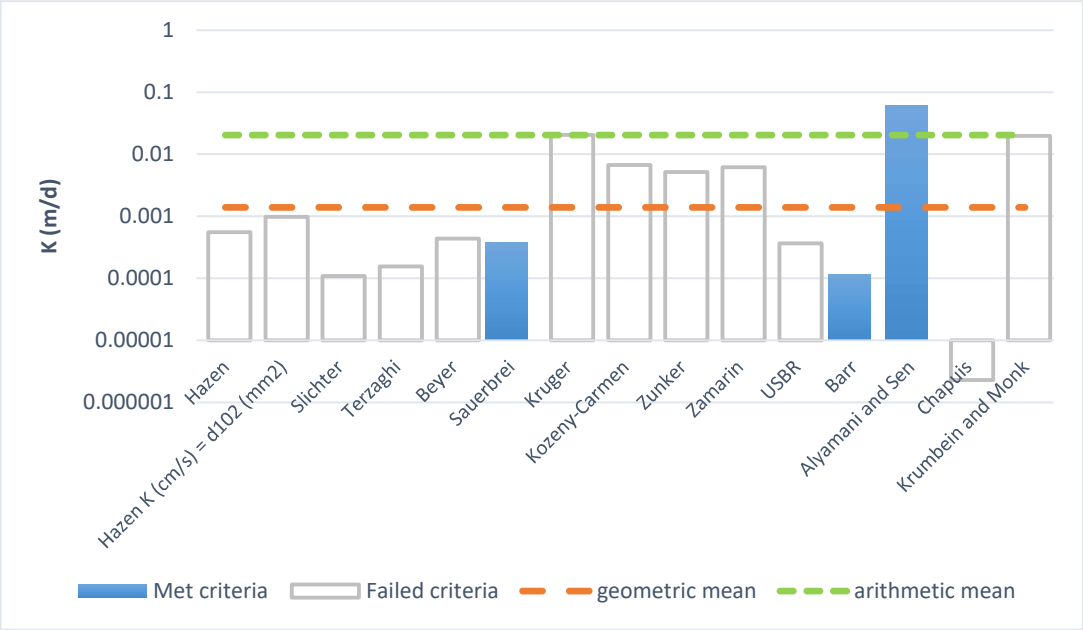
Date: 12-Apr-22

Sample Name: BH201-SS5

Mass Sample (g): 278.45

T (oC) 20

Poorly sorted sandy gravelly silt with fines



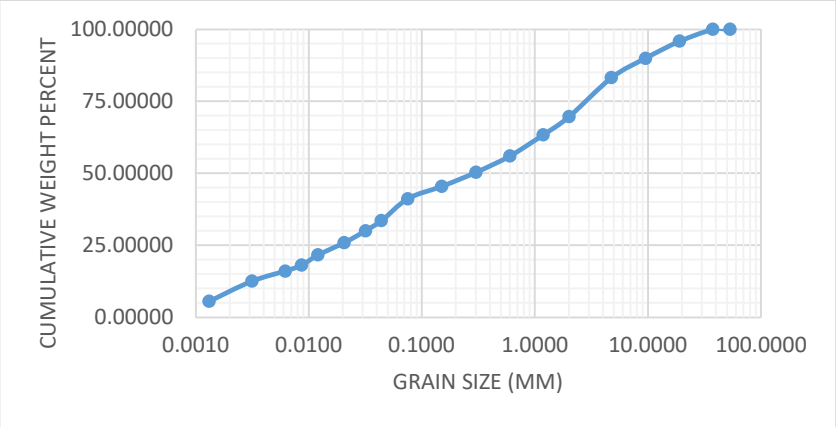
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	6.4E-07	6.4E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	1.1E-06	1.1E-08	0.00	
Slichter	1.3E-07	1.3E-09	0.00	
Terzaghi	1.8E-07	1.8E-09	0.00	
Beyer	5.1E-07	5.1E-09	0.00	
Sauerbrei	4.4E-07	4.4E-09	0.00	
Kruger	2.4E-05	2.4E-07	0.02	
Kozeny-Carmen	7.7E-06	7.7E-08	0.01	
Zunker	6.0E-06	6.0E-08	0.01	
Zamarin	7.2E-06	7.2E-08	0.01	
USBR	4.2E-07	4.2E-09	0.00	
Barr	1.3E-07	1.3E-09	0.00	
Alyamani and Sen	7.1E-05	7.1E-07	0.06	
Chapuis	2.6E-09	2.6E-11	0.00	
Krumbein and Monk	2.3E-05	2.3E-07	0.02	
geometric mean	1.6E-06	1.6E-08	0.00	
arithmetic mean	2.4E-05	2.4E-07	0.02	

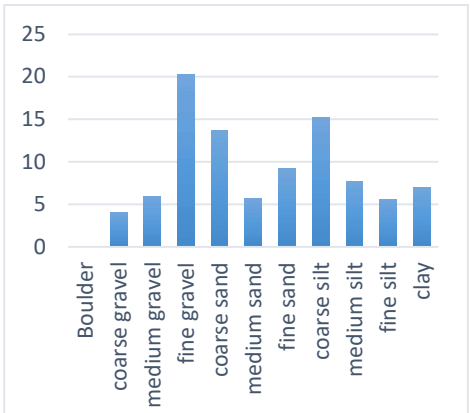
Grain Size Analysis Report Date: 12-Apr-22

Sample Name: BH202-SS6

Mass Sample (g): 214.37 T (oC): 20

Poorly sorted gravelly sand with fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
53	0	0	100
37.5	0	0	100
19	8.77	0.040911	95.90894248
9.5	12.72	0.059337	89.97527639
4.75	14.39	0.067127	83.26258338
2	29.14	0.135933	69.66926342
1.18	13.59085	0.063399	63.32936045
0.6	15.68175	0.073153	56.01408779
0.3	12.09735	0.056432	50.37087745
0.15	10.4545	0.048768	45.49402902
0.075	9.2597	0.043195	41.17453468
0.043829	16.24654	0.075787	33.59579741
0.031753	7.502012	0.034996	30.09623518
0.020486	9.002414	0.041995	25.89676051
0.012056	9.002414	0.041995	21.69728583
0.008658	7.502012	0.034996	18.1977236
0.006177	4.501207	0.020997	16.09798626
0.003134	7.502012	0.034996	12.59842403
0.001316	15.00402	0.069991	5.599299569

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.002	Uniformity Coef.	372.47
d17	0.007	n computed	0.26
d20	0.010	g (cm/s^2)	980.00
d50	0.289	ρ (g/cm^3)	0.9981
d60	0.916	μ (g/cm s)	0.0098
de (Kruger)	0.019	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.011	tau (Sauerbrei)	1.053
de (Zunker)	0.011	$d_{geometric\ mean}$	0.306
de (Zamarin)	0.011	σ_ϕ	4.540
lo (Alyameni)	-0.069		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	4.091057517
8 - 16	medium gravel	5.933666091
2 - 8	fine gravel	20.30601297
0.5 - 2	coarse sand	13.65517563
0.25 - 0.5	medium sand	5.643210337
0.063 - 0.25	fine sand	9.196342772
0.016 - 0.063	coarse silt	15.27777418
0.008 - 0.016	medium silt	7.699036908
0.002 - 0.008	fine silt	5.599299569
<0.002	clay	6.999124461

K from Grain Size Analysis Report

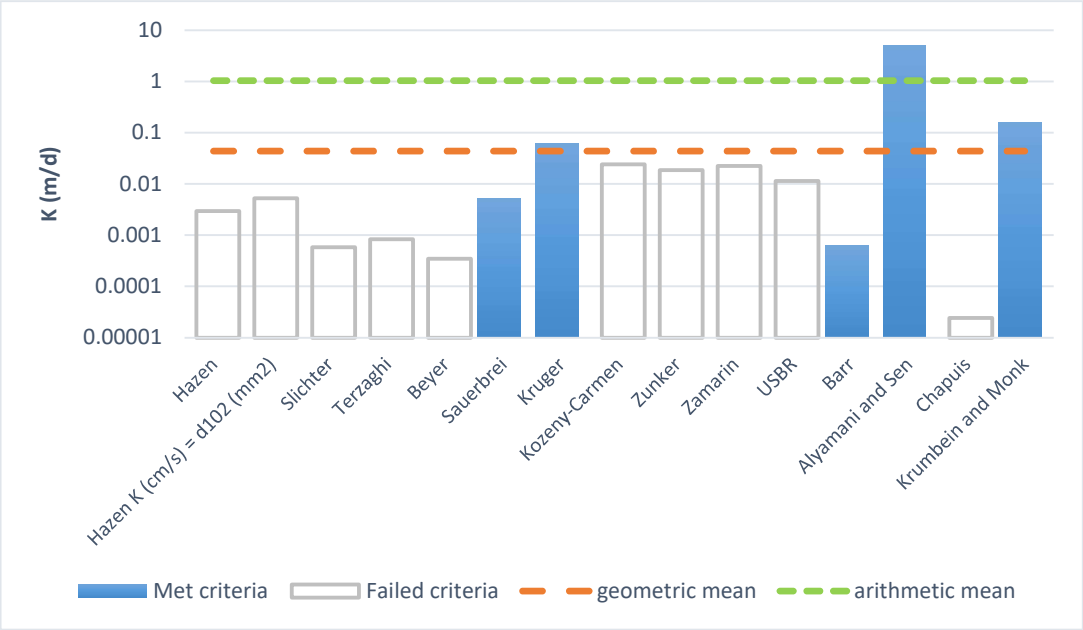
Date: 12-Apr-22

Sample Name: BH202-SS6

Mass Sample (g): 214.37

T (oC) 20

Poorly sorted gravelly sand with fines



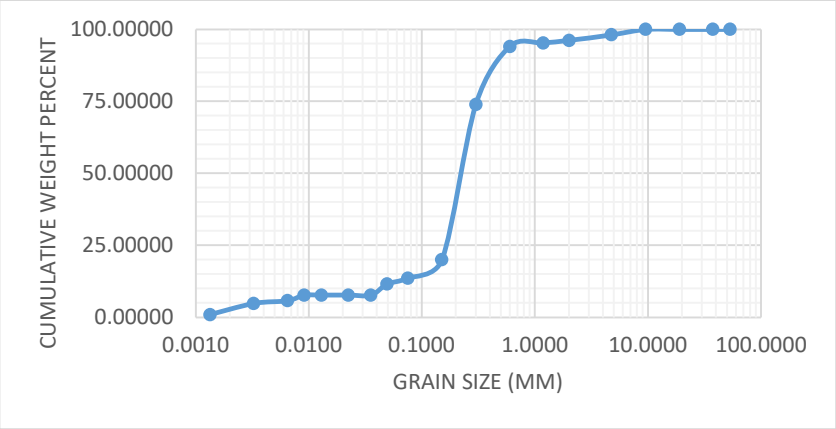
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	3.4E-06	3.4E-08	0.00	
Hazen K (cm/s) = d_{10} (mm)	6.0E-06	6.0E-08	0.01	
Slichter	6.7E-07	6.7E-09	0.00	
Terzaghi	9.6E-07	9.6E-09	0.00	
Beyer	4.0E-07	4.0E-09	0.00	
Sauerbrei	6.1E-06	6.1E-08	0.01	
Kruger	7.2E-05	7.2E-07	0.06	
Kozeny-Carmen	2.8E-05	2.8E-07	0.02	
Zunker	2.2E-05	2.2E-07	0.02	
Zamarin	2.6E-05	2.6E-07	0.02	
USBR	1.3E-05	1.3E-07	0.01	
Barr	7.2E-07	7.2E-09	0.00	
Alyamani and Sen	5.8E-03	5.8E-05	4.98	
Chapuis	2.8E-08	2.8E-10	0.00	
Krumbein and Monk	1.8E-04	1.8E-06	0.16	
geometric mean	5.1E-05	5.1E-07	0.04	
arithmetic mean	1.2E-03	1.2E-05	1.04	

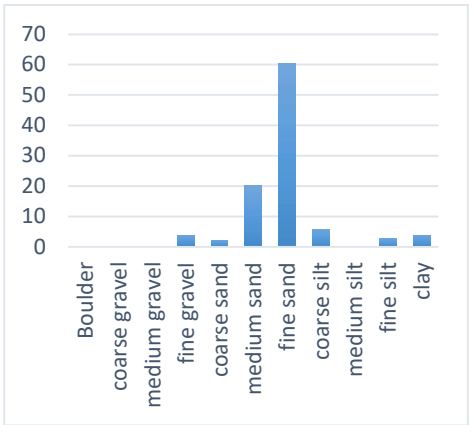
Grain Size Analysis Report Date: 12-Apr-22

Sample Name: BH203-SS3

Mass Sample (g): 164.57 T (oC): 20

Poorly sorted sand with fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
53	0	0	100
37.5	0	0	100
19	0	0	100
9.5	0	0	100
4.75	3.09	0.018776	98.12237953
2	3.23	0.019627	96.15968889
1.18	1.42425	0.008654	95.29425169
0.6	2.05725	0.012501	94.04417573
0.3	33.07425	0.200974	73.94680075
0.15	88.77825	0.539456	20.00121529
0.075	10.4445	0.063465	13.65467582
0.049116	3.419259	0.020777	11.57698333
0.035315	6.350747	0.03859	7.717988889
0.022335	0	0	7.717988889
0.012895	0	0	7.717988889
0.009118	0	0	7.717988889
0.006483	3.175374	0.019295	5.788491667
0.00325	1.587687	0.009647	4.823743056
0.001341	6.350747	0.03859	0.964748611

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.043	Uniformity Coef.	6.01
d17	0.115	n computed	0.34
d20	0.150	g (cm/s^2)	980.00
d50	0.233	ρ (g/cm^3)	0.9981
d60	0.261	μ (g/cm s)	0.0098
de (Kruger)	0.039	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.028	tau (Sauerbrei)	1.053
de (Zunker)	0.029	$d_{geometric\ mean}$	0.191
de (Zamarin)	0.030	σ_ϕ	1.758
lo (Alyameni)	-0.004		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	0
8 - 16	medium gravel	0
2 - 8	fine gravel	3.840311114
0.5 - 2	coarse sand	2.115513155
0.25 - 0.5	medium sand	20.09737498
0.063 - 0.25	fine sand	60.29212493
0.016 - 0.063	coarse silt	5.936686933
0.008 - 0.016	medium silt	0
0.002 - 0.008	fine silt	2.894245833
<0.002	clay	3.858994444

K from Grain Size Analysis Report

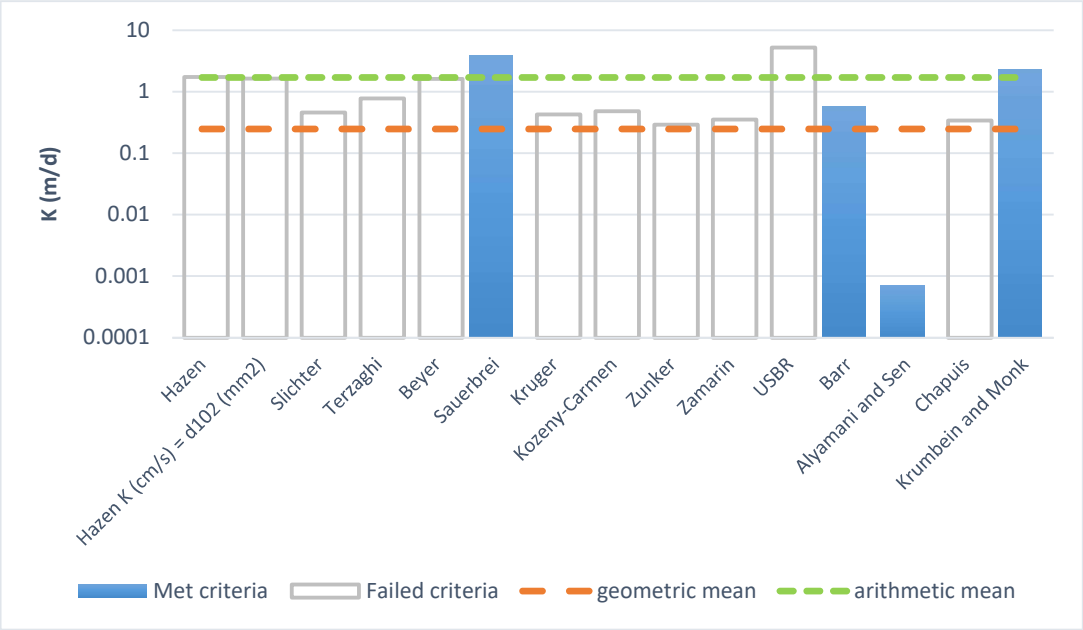
Date: 12-Apr-22

Sample Name: BH203-SS3

Mass Sample (g): 164.57

T (oC) 20

Poorly sorted sand with fines



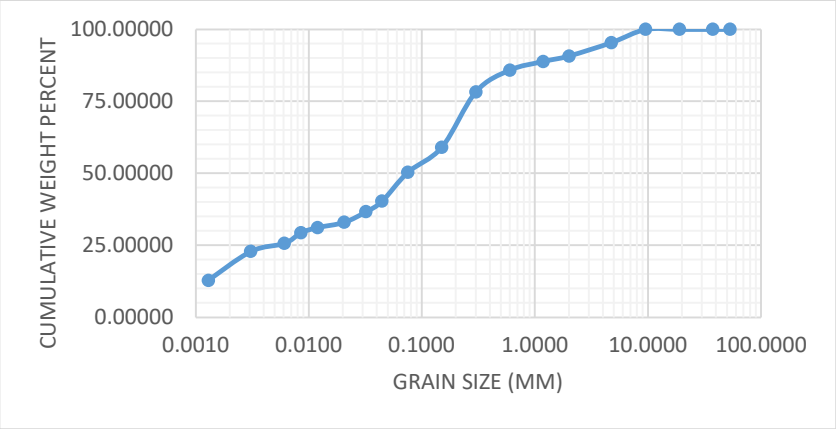
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	2.0E-03	2.0E-05	1.73	
Hazen K (cm/s) = d_{10} (mm)	1.9E-03	1.9E-05	1.63	
Slichter	5.3E-04	5.3E-06	0.46	
Terzaghi	9.0E-04	9.0E-06	0.78	
Beyer	1.9E-03	1.9E-05	1.62	
Sauerbrei	4.5E-03	4.5E-05	3.93	
Kruger	5.0E-04	5.0E-06	0.43	
Kozeny-Carmen	5.6E-04	5.6E-06	0.48	
Zunker	3.4E-04	3.4E-06	0.29	
Zamarin	4.1E-04	4.1E-06	0.35	
USBR	6.1E-03	6.1E-05	5.24	
Barr	6.7E-04	6.7E-06	0.58	
Alyamani and Sen	8.3E-07	8.3E-09	0.00	
Chapuis	3.9E-04	3.9E-06	0.34	
Krumbein and Monk	2.7E-03	2.7E-05	2.34	
geometric mean	2.9E-04	2.9E-06	0.25	
arithmetic mean	2.0E-03	2.0E-05	1.71	

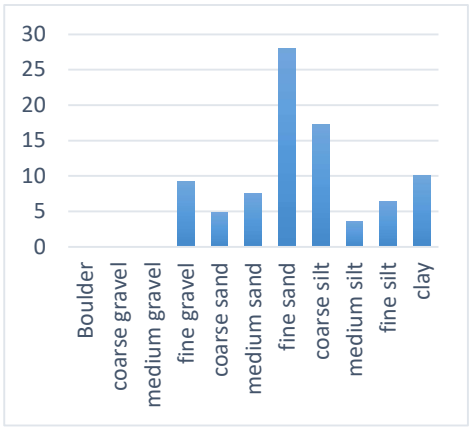
Grain Size Analysis Report Date: 12-Apr-22

Sample Name: BH204-SS2

Mass Sample (g): 185.97 T (oC): 20

Poorly sorted sand with fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
53	0	0	100
37.5	0	0	100
19	0	0	100
9.5	0	0	100
4.75	8.5	0.045706	95.42937033
2	8.7	0.046782	90.75119643
1.18	3.54417	0.019058	88.8454213
0.6	5.56941	0.029948	85.85063182
0.3	14.00791	0.075323	78.31828252
0.15	35.77924	0.192393	59.07902888
0.075	16.20192	0.087121	50.36691402
0.044448	18.61292	0.100086	40.3583535
0.032074	6.82313	0.036689	36.68941227
0.020553	6.82313	0.036689	33.02047104
0.011943	3.411565	0.018345	31.18600043
0.008498	3.411565	0.018345	29.35152982
0.006085	6.82313	0.036689	25.68258859
0.00307	5.117348	0.027517	22.93088267
0.001294	18.76361	0.100896	12.84129429

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.001	Uniformity Coef.	155.94
d17	0.002	n computed	0.26
d20	0.003	g (cm/s^2)	980.00
d50	0.074	ρ (g/cm^3)	0.9981
d60	0.157	μ (g/cm s)	0.0098
de (Kruger)	0.015	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.007	tau (Sauerbrei)	1.053
de (Zunker)	0.007	$d_{geometric\ mean}$	0.126
de (Zamarin)	0.007	σ_ϕ	4.026
Io (Alyameni)	-0.017		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	0
8 - 16	medium gravel	0
2 - 8	fine gravel	9.24880357
0.5 - 2	coarse sand	4.900564607
0.25 - 0.5	medium sand	7.532349304
0.063 - 0.25	fine sand	27.9513685
0.016 - 0.063	coarse silt	17.34644297
0.008 - 0.016	medium silt	3.668941227
0.002 - 0.008	fine silt	6.420647147
<0.002	clay	10.08958837

K from Grain Size Analysis Report

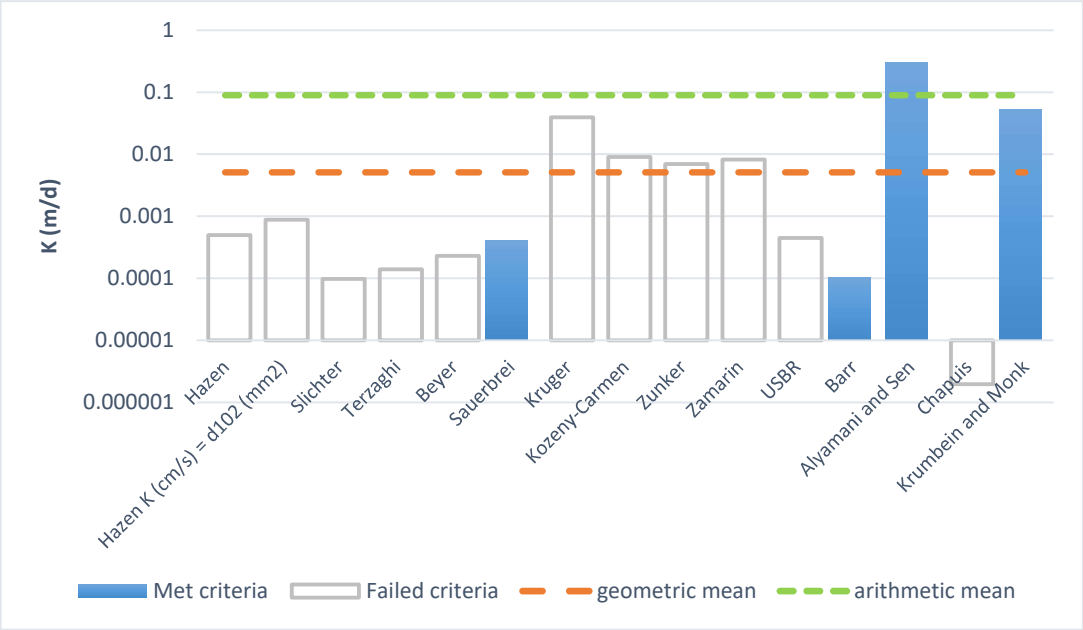
Date: 12-Apr-22

Sample Name: BH204-SS2

Mass Sample (g): 185.97

T (oC) 20

Poorly sorted sand with fines



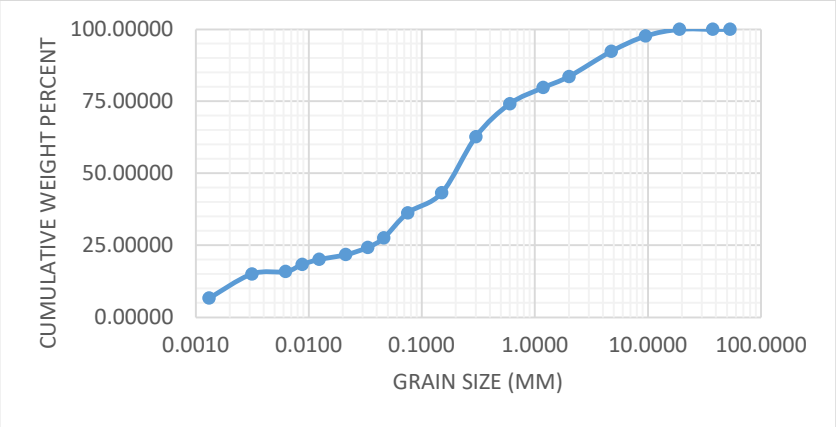
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	5.8E-07	5.8E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	1.0E-06	1.0E-08	0.00	
Slichter	1.1E-07	1.1E-09	0.00	
Terzaghi	1.6E-07	1.6E-09	0.00	
Beyer	2.7E-07	2.7E-09	0.00	
Sauerbrei	4.8E-07	4.8E-09	0.00	
Kruger	4.5E-05	4.5E-07	0.04	
Kozeny-Carmen	1.0E-05	1.0E-07	0.01	
Zunker	8.0E-06	8.0E-08	0.01	
Zamarin	9.5E-06	9.5E-08	0.01	
USBR	5.2E-07	5.2E-09	0.00	
Barr	1.2E-07	1.2E-09	0.00	
Alyamani and Sen	3.6E-04	3.6E-06	0.31	
Chapuis	2.3E-09	2.3E-11	0.00	
Krumbein and Monk	6.0E-05	6.0E-07	0.05	
geometric mean	5.9E-06	5.9E-08	0.01	
arithmetic mean	1.0E-04	1.0E-06	0.09	

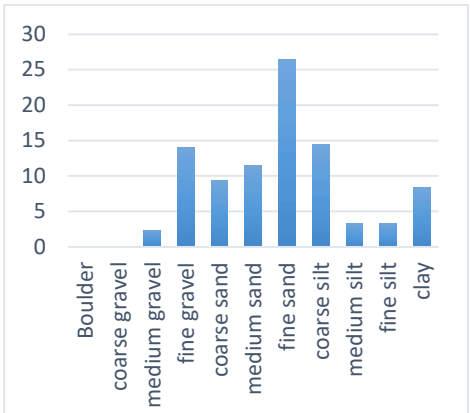
Grain Size Analysis Report Date: 12-Apr-22

Sample Name: BH205-SS2

Mass Sample (g): 157.26 T (oC): 20

Poorly sorted gravelly sand with fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
53	0	0	100
37.5	0	0	100
19	0	0	100
9.5	3.64	0.023146	97.68536182
4.75	8.27	0.052588	92.42655475
2	13.82	0.08788	83.63856035
1.18	6.05038	0.038474	79.79118657
0.6	8.81251	0.056038	74.18740303
0.3	18.01961	0.114585	62.72892026
0.15	30.51496	0.194041	43.32477426
0.075	11.04852	0.070256	36.29913519
0.046106	13.59504	0.086449	27.65419325
0.033224	5.271392	0.03352	24.30216983
0.021207	3.953544	0.02514	21.78815226
0.012318	2.635696	0.01676	20.11214055
0.008762	2.635696	0.01676	18.43612883
0.006251	3.953544	0.02514	15.92211127
0.003134	1.317848	0.00838	15.08410541
0.001316	13.17848	0.083801	6.704046849

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.002	Uniformity Coef.	137.31
d17	0.007	n computed	0.26
d20	0.012	g (cm/s^2)	980.00
d50	0.202	ρ (g/cm^3)	0.9981
d60	0.279	μ (g/cm s)	0.0098
de (Kruger)	0.020	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.010	tau (Sauerbrei)	1.053
de (Zunker)	0.010	$d_{geometric\ mean}$	0.208
de (Zamarin)	0.011	σ_ϕ	4.038
lo (Alyameni)	-0.048		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	0
8 - 16	medium gravel	2.314638179
2 - 8	fine gravel	14.04680148
0.5 - 2	coarse sand	9.451157319
0.25 - 0.5	medium sand	11.45848277
0.063 - 0.25	fine sand	26.42978507
0.016 - 0.063	coarse silt	14.51098293
0.008 - 0.016	medium silt	3.352023425
0.002 - 0.008	fine silt	3.352023425
<0.002	clay	8.380058561

K from Grain Size Analysis Report

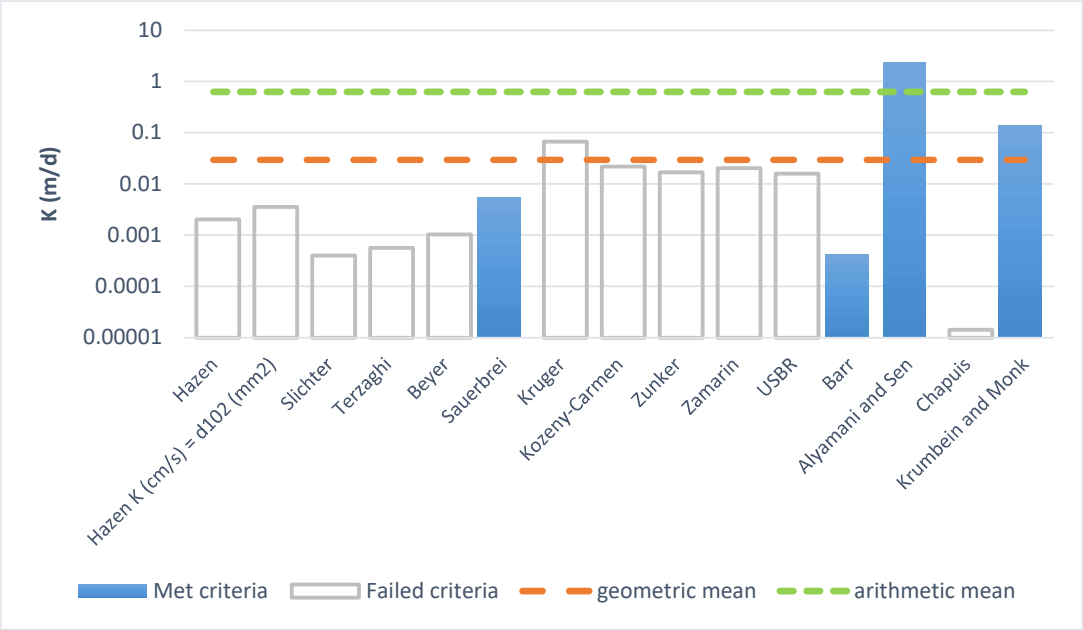
Date: 12-Apr-22

Sample Name: BH205-SS2

Mass Sample (g): 157.26

T (oC) 20

Poorly sorted gravelly sand with fines



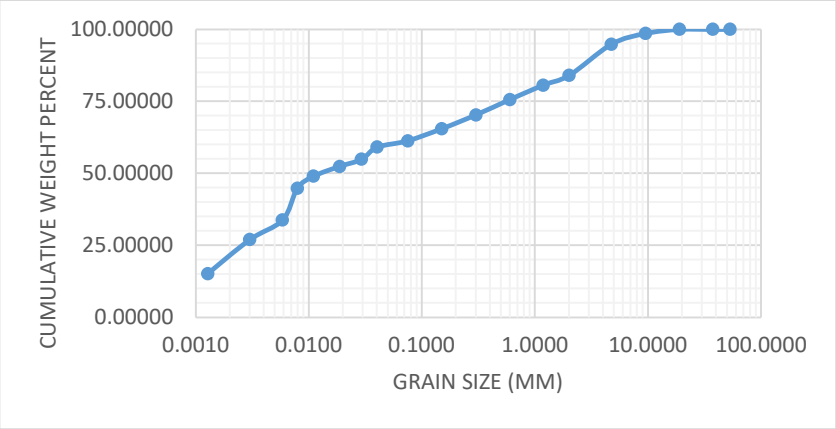
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	2.3E-06	2.3E-08	0.00	
Hazen K (cm/s) = d_{10} (mm)	4.1E-06	4.1E-08	0.00	
Slichter	4.6E-07	4.6E-09	0.00	
Terzaghi	6.5E-07	6.5E-09	0.00	
Beyer	1.2E-06	1.2E-08	0.00	
Sauerbrei	6.3E-06	6.3E-08	0.01	
Kruger	7.8E-05	7.8E-07	0.07	
Kozeny-Carmen	2.5E-05	2.5E-07	0.02	
Zunker	2.0E-05	2.0E-07	0.02	
Zamarin	2.4E-05	2.4E-07	0.02	
USBR	1.8E-05	1.8E-07	0.02	
Barr	4.9E-07	4.9E-09	0.00	
Alyamani and Sen	2.8E-03	2.8E-05	2.39	
Chapuis	1.6E-08	1.6E-10	0.00	
Krumbein and Monk	1.6E-04	1.6E-06	0.14	
geometric mean	3.4E-05	3.4E-07	0.03	
arithmetic mean	7.3E-04	7.3E-06	0.63	

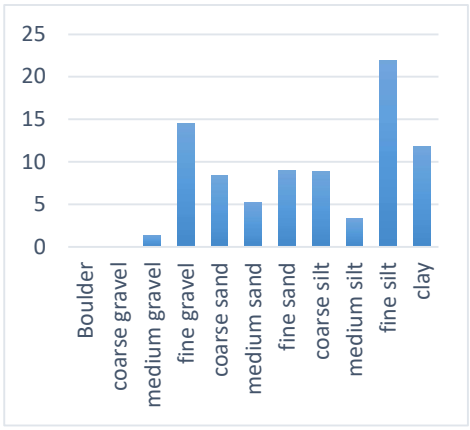
Grain Size Analysis Report Date: 12-Apr-22

Sample Name: BH206-SS4

Mass Sample (g): 225.5 T (oC): 20

Poorly sorted clay with fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
53	0	0	100
37.5	0	0	100
19	0	0	100
9.5	3.18	0.014102	98.58980044
4.75	8.38	0.037162	94.87361419
2	24.51	0.108692	84.00443459
1.18	7.5772	0.033602	80.64425721
0.6	11.3658	0.050403	75.60399113
0.3	11.93409	0.052923	70.31171175
0.15	10.79751	0.047883	65.52345898
0.075	9.4715	0.042002	61.32323725
0.040257	4.891385	0.021691	59.15410866
0.029293	9.528037	0.042253	54.92881518
0.018747	5.716822	0.025352	52.3936391
0.01099	7.622429	0.033802	49.01340432
0.007916	9.528037	0.042253	44.78811084
0.005856	24.7729	0.109858	33.8023478
0.003005	15.24486	0.067605	27.04187824
0.00128	26.6785	0.118308	15.21105651

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.001	Uniformity Coef.	63.96
d17	0.002	n computed	0.26
d20	0.002	g (cm/s^2)	980.00
d50	0.013	ρ (g/cm^3)	0.9981
d60	0.054	μ (g/cm s)	0.0098
de (Kruger)	0.010	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.005	tau (Sauerbrei)	1.053
de (Zunker)	0.005	$d_{geometric\ mean}$	0.103
de (Zamarin)	0.005	σ_ϕ	4.668
lo (Alyameni)	-0.002		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	0
8 - 16	medium gravel	1.410199557
2 - 8	fine gravel	14.58536585
0.5 - 2	coarse sand	8.400443459
0.25 - 0.5	medium sand	5.292279379
0.063 - 0.25	fine sand	8.988474501
0.016 - 0.063	coarse silt	8.929598154
0.008 - 0.016	medium silt	3.38023478
0.002 - 0.008	fine silt	21.97152607
<0.002	clay	11.83082173

K from Grain Size Analysis Report

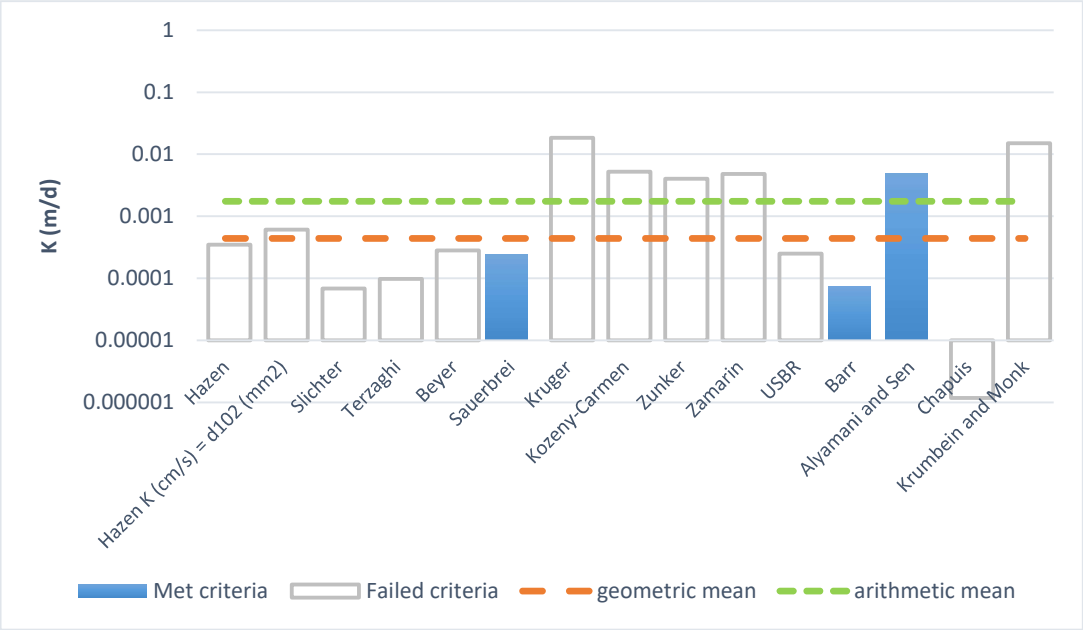
Date: 12-Apr-22

Sample Name: BH206-SS4

Mass Sample (g): 225.5

T (oC) 20

Poorly sorted clay with fines



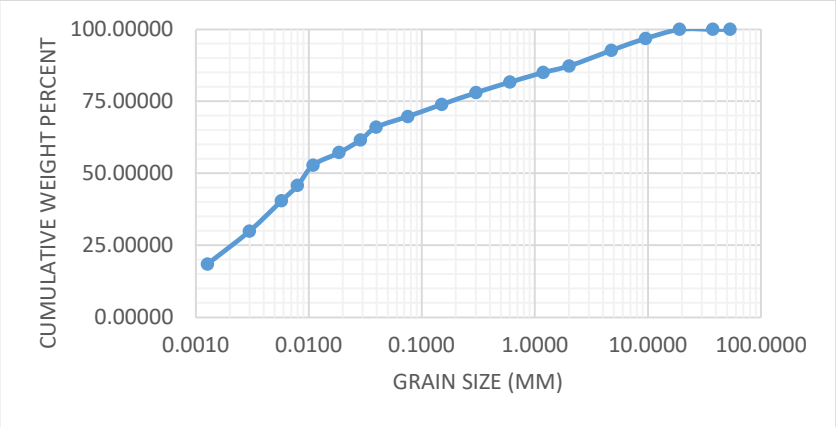
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	4.0E-07	4.0E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	7.1E-07	7.1E-09	0.00	
Slichter	7.9E-08	7.9E-10	0.00	
Terzaghi	1.1E-07	1.1E-09	0.00	
Beyer	3.3E-07	3.3E-09	0.00	
Sauerbrei	2.8E-07	2.8E-09	0.00	
Kruger	2.1E-05	2.1E-07	0.02	
Kozeny-Carmen	6.1E-06	6.1E-08	0.01	
Zunker	4.7E-06	4.7E-08	0.00	
Zamarin	5.5E-06	5.5E-08	0.00	
USBR	2.9E-07	2.9E-09	0.00	
Barr	8.4E-08	8.4E-10	0.00	
Alyamani and Sen	5.7E-06	5.7E-08	0.00	
Chapuis	1.4E-09	1.4E-11	0.00	
Krumbein and Monk	1.7E-05	1.7E-07	0.01	
geometric mean	5.1E-07	5.1E-09	0.00	
arithmetic mean	2.0E-06	2.0E-08	0.00	

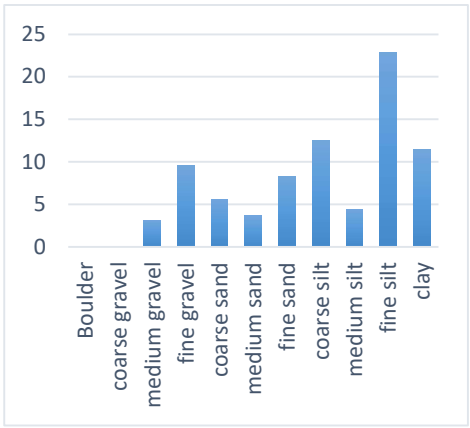
Grain Size Analysis Report Date: 12-Apr-22

Sample Name: BH207-SS4

Mass Sample (g): 172.38 T (oC): 20

Poorly sorted clay with fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
53	0	0	100
37.5	0	0	100
19	0	0	100
9.5	5.47	0.031732	96.82677805
4.75	7.09	0.04113	92.7137719
2	9.34	0.054183	87.29550992
1.18	3.91248	0.022697	85.02582666
0.6	5.71824	0.033172	81.70859729
0.3	6.32016	0.036664	78.04218587
0.15	7.07256	0.041029	73.9392969
0.075	7.22304	0.041902	69.74911243
0.0394	6.394439	0.037095	66.03961096
0.028705	7.589272	0.044026	61.63697023
0.018527	7.589272	0.044026	57.2343295
0.010907	7.589272	0.044026	52.83168877
0.007945	12.14284	0.070442	45.7874636
0.005738	9.107127	0.052832	40.50429472
0.002986	18.21425	0.105663	29.93795697
0.001268	19.73211	0.114469	18.49109107

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.001	Uniformity Coef.	36.33
d17	0.001	n computed	0.26
d20	0.001	g (cm/s^2)	980.00
d50	0.010	ρ (g/cm^3)	0.9981
d60	0.025	μ (g/cm s)	0.0098
de (Kruger)	0.010	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.004	tau (Sauerbrei)	1.053
de (Zunker)	0.005	$d_{geometric\ mean}$	0.085
de (Zamarin)	0.005	σ_ϕ	4.639
Io (Alyameni)	-0.002		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	0
8 - 16	medium gravel	3.173221952
2 - 8	fine gravel	9.531268129
0.5 - 2	coarse sand	5.586912635
0.25 - 0.5	medium sand	3.666411417
0.063 - 0.25	fine sand	8.293073442
0.016 - 0.063	coarse silt	12.51478293
0.008 - 0.016	medium silt	4.402640731
0.002 - 0.008	fine silt	22.8937318
<0.002	clay	11.4468659

K from Grain Size Analysis Report

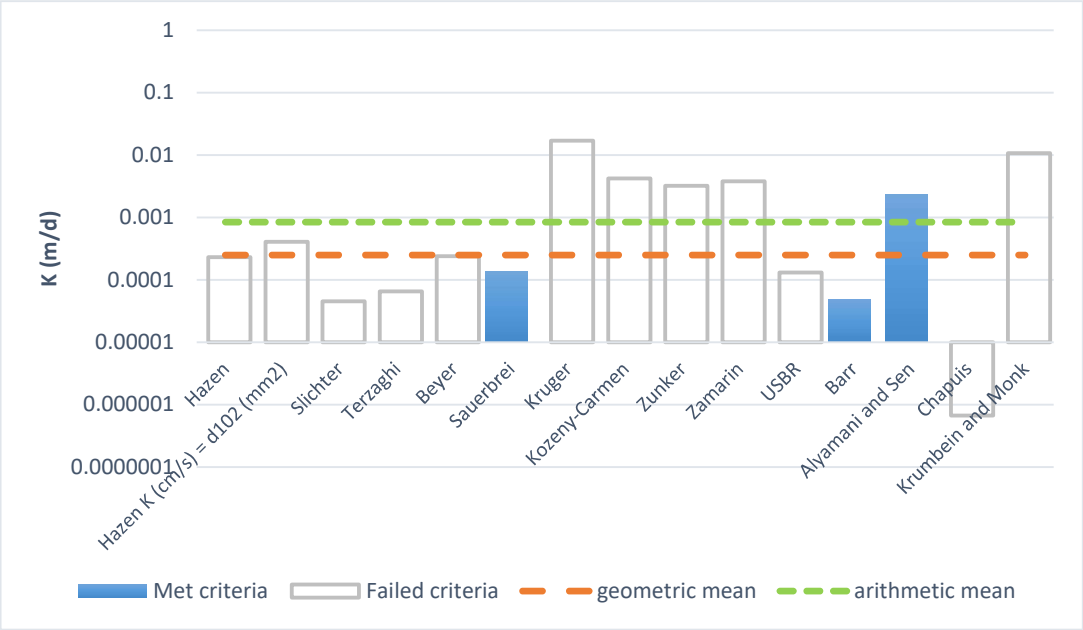
Date: 12-Apr-22

Sample Name: BH207-SS4

Mass Sample (g): 172.38

T (oC) 20

Poorly sorted clay with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	2.7E-07	2.7E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	4.7E-07	4.7E-09	0.00	
Slichter	5.3E-08	5.3E-10	0.00	
Terzaghi	7.5E-08	7.5E-10	0.00	
Beyer	2.8E-07	2.8E-09	0.00	
Sauerbrei	1.6E-07	1.6E-09	0.00	
Kruger	2.0E-05	2.0E-07	0.02	
Kozeny-Carmen	4.9E-06	4.9E-08	0.00	
Zunker	3.7E-06	3.7E-08	0.00	
Zamarin	4.4E-06	4.4E-08	0.00	
USBR	1.5E-07	1.5E-09	0.00	
Barr	5.6E-08	5.6E-10	0.00	
Alyamani and Sen	2.7E-06	2.7E-08	0.00	
Chapuis	7.7E-10	7.7E-12	0.00	
Krumbein and Monk	1.2E-05	1.2E-07	0.01	
geometric mean	2.9E-07	2.9E-09	0.00	
arithmetic mean	9.8E-07	9.8E-09	0.00	

APPENDIX E

Grounded Engineering Inc
ATTN: Nicholas Piers
1 Banigan Drive
TORONTO ON M4H 1G3

Date Received: 24-MAR-22
Report Date: 19-APR-22 08:37 (MT)
Version: FINAL REV. 2

Client Phone: 647-264-7932

Certificate of Analysis

Lab Work Order #: L2694356

Project P.O. #:	NOT SUBMITTED
Job Reference:	21-067
C of C Numbers:	20-954694
Legal Site Desc:	60 DUNDAS ST. E.

Comments: 14-APR-22 Report revision to compare to City of Mississauga Storm Sewer and Region of Peel Sanitary Sewer per client request. -A.Overholster

Amanda Overholster
Account Manager

Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Guideline						
Ontario Sewer Use Bylaws - Peel Sanitary Sewer (53-2010)						
(No parameter exceedances)						
Ontario Sewer Use Bylaws - Mississauga Storm Sewer (0046-2022)						
L2694356-1	SW-UF-BH205	Physical Tests	Total Suspended Solids	38.2	15	mg/L
		Total Metals	Copper (Cu)-Total	<0.050	0.04	mg/L
			Manganese (Mn)-Total	2.09	2.0	mg/L
			Zinc (Zn)-Total	<0.30	0.2	mg/L

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2694356-1 Sample Date: 23-MAR-22 Sample ID: SW-UF-BH205
pH	pH units	5.5-10	6-9	7.63
Total Suspended Solids	mg/L	350	15	38.2

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Anions and Nutrients - WATER

			Lab ID	L2694356-1
			Sample Date	23-MAR-22
			Sample ID	SW-UF-BH205
Analyte	**Unit**	**Guide Limits #1**	**#2**	
Fluoride (F)	mg/L	10	-	<2.0 DLDS
Total Kjeldahl Nitrogen	mg/L	100	-	13.3 DLHC
Phosphorus, Total	mg/L	10	0.4	0.0165
Sulfate (SO4)	mg/L	1500	-	813 DLDS

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Cyanides - WATER

			Lab ID	L2694356-1
			Sample Date	23-MAR-22
			Sample ID	SW-UF-BH205
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Cyanide, Total	mg/L	2	0.02	<0.0020

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Bacteriological Tests - WATER

			Lab ID	L2694356-1
			Sample Date	23-MAR-22
			Sample ID	SW-UF-BH205
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
E. Coli	CFU/100mL	-	200	0
Fecal Coliforms	CFU/100mL	-	-	0

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Total Metals - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2694356-1 Sample Date: 23-MAR-22 Sample ID: SW-UF-BH205
Aluminum (Al)-Total	mg/L	50	1.0	0.52 DLHC
Antimony (Sb)-Total	mg/L	5	-	<0.010 DLHC
Arsenic (As)-Total	mg/L	1	0.02	<0.010 DLHC
Cadmium (Cd)-Total	mg/L	0.7	0.008	<0.00050 DLHC
Chromium (Cr)-Total	mg/L	5	0.08	<0.050 DLHC
Cobalt (Co)-Total	mg/L	5	-	<0.010 DLHC
Copper (Cu)-Total	mg/L	3	0.04	<0.050 DLHC
Lead (Pb)-Total	mg/L	3	0.120	<0.0050 DLHC
Manganese (Mn)-Total	mg/L	5	2.0	2.09 DLHC
Mercury (Hg)-Total	mg/L	0.01	0.0004	<0.0000050
Molybdenum (Mo)-Total	mg/L	5	-	0.0087 DLHC
Nickel (Ni)-Total	mg/L	3	0.08	<0.050 DLHC
Selenium (Se)-Total	mg/L	1	0.02	<0.0050 DLHC
Silver (Ag)-Total	mg/L	5	0.12	<0.0050 DLHC
Tin (Sn)-Total	mg/L	5	-	<0.010 DLHC
Titanium (Ti)-Total	mg/L	5	-	<0.030 DLHC
Zinc (Zn)-Total	mg/L	3	0.2	<0.30 DLHC

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Aggregate Organics - WATER

			Lab ID	L2694356-1
			Sample Date	23-MAR-22
			Sample ID	SW-UF-BH205
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
BOD Carbonaceous	mg/L	300	-	19.3
Oil and Grease, Total	mg/L	-	-	<5.0
Animal/Veg Oil & Grease	mg/L	150	-	<5.0
Mineral Oil and Grease	mg/L	15	-	<2.5
Phenols (4AAP)	mg/L	1	0.008	<0.0010

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Volatile Organic Compounds - WATER

			Lab ID	L2694356-1
			Sample Date	23-MAR-22
			Sample ID	SW-UF-BH205
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Acetone	ug/L	-	-	<20
Benzene	ug/L	10	2	<0.50
Bromodichloromethane	ug/L	-	-	1.3
Bromoform	ug/L	-	-	<1.0
Bromomethane	ug/L	-	-	<0.50
Carbon Disulfide	ug/L	-	-	<1.0
Carbon tetrachloride	ug/L	-	-	<0.20
Chlorobenzene	ug/L	-	-	<0.50
Dibromochloromethane	ug/L	-	-	<1.0
Chloroethane	ug/L	-	-	<1.0
Chloroform	ug/L	40	-	2.4
Chloromethane	ug/L	-	-	<2.0
1,2-Dibromoethane	ug/L	-	-	<0.20
1,2-Dichlorobenzene	ug/L	50	5.6	<0.50
1,3-Dichlorobenzene	ug/L	-	-	<0.50
1,4-Dichlorobenzene	ug/L	80	6.8	<0.50
Dichlorodifluoromethane	ug/L	-	-	<1.0
1,1-Dichloroethane	ug/L	-	-	<0.50
1,2-Dichloroethane	ug/L	-	-	<0.50
1,1-Dichloroethylene	ug/L	-	-	<0.50
cis-1,2-Dichloroethylene	ug/L	4000	-	<0.50
trans-1,2-Dichloroethylene	ug/L	-	-	<0.50
Dichloromethane	ug/L	2000	5.2	<2.0
1,2-Dichloropropane	ug/L	-	-	<0.50
cis-1,3-Dichloropropene	ug/L	-	-	<0.30
trans-1,3-Dichloropropene	ug/L	140	-	<0.30
Ethylbenzene	ug/L	160	2	<0.50
n-Hexane	ug/L	-	-	<0.50
2-Hexanone	ug/L	-	-	<20
Methyl Ethyl Ketone	ug/L	8000	-	<20

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Volatile Organic Compounds - WATER

			Lab ID	L2694356-1
			Sample Date	23-MAR-22
			Sample ID	SW-UF-BH205
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Methyl Isobutyl Ketone	ug/L	-	-	<20
MTBE	ug/L	-	-	<0.50
Styrene	ug/L	200	-	<0.50
1,1,1,2-Tetrachloroethane	ug/L	-	-	<0.50
1,1,2,2-Tetrachloroethane	ug/L	1400	-	<0.50
Tetrachloroethylene	ug/L	1000	4.4	<0.50
Toluene	ug/L	270	2	0.40
1,1,1-Trichloroethane	ug/L	-	-	<0.50
1,1,2-Trichloroethane	ug/L	-	-	<0.50
Trichloroethylene	ug/L	400	7.6	<0.50
Trichlorofluoromethane	ug/L	-	-	<1.0
Vinyl chloride	ug/L	-	-	<0.50
o-Xylene	ug/L	-	-	<0.30
m+p-Xylenes	ug/L	-	-	<0.40
Xylenes (Total)	ug/L	1400	4.4	<0.50
Surrogate: 4-Bromofluorobenzene	%	-	-	89.5
Surrogate: 1,4-Difluorobenzene	%	-	-	97.5

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Phthalate Esters - WATER

			Lab ID	L2694356-1
			Sample Date	23-MAR-22
			Sample ID	SW-UF-BH205
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Bis(2-ethylhexyl)phthalate	ug/L	12	-	<2.0
Surrogate: 2-fluorobiphenyl	%	-	-	88.9
Surrogate: p-Terphenyl d14	%	-	-	83.4

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Semi-Volatile Organics - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2694356-1 Sample Date: 23-MAR-22 Sample ID: SW-UF-BH205
Di-n-butylphthalate	ug/L	80	-	<1.0
Surrogate: 2-Fluorobiphenyl	%	-	-	88.9
Surrogate: p-Terphenyl d14	%	-	-	83.4

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Polychlorinated Biphenyls - WATER

			Lab ID	L2694356-1
			Sample Date	23-MAR-22
			Sample ID	SW-UF-BH205
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Aroclor 1242	ug/L	-	-	<0.020
Aroclor 1248	ug/L	-	-	<0.020
Aroclor 1254	ug/L	-	-	<0.020
Aroclor 1260	ug/L	-	-	<0.020
Surrogate: Decachlorobiphenyl	%	-	-	107.5
Total PCBs	ug/L	1	0.4	<0.040
Surrogate: Tetrachloro-m-xylene	%	-	-	91.8

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Organic Parameters - WATER

			Lab ID	L2694356-1
			Sample Date	23-MAR-22
			Sample ID	SW-UF-BH205
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Nonylphenol	ug/L	20	-	3.8
Nonylphenol Diethoxylates	ug/L	-	-	<0.10
Total Nonylphenol Ethoxylates	ug/L	200	-	<2.0
Nonylphenol Monoethoxylates	ug/L	-	-	<2.0

Guide Limit #1: Peel Sanitary Sewer (53-2010)
Guide Limit #2: Mississauga Storm Sewer (0046-2022)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
625-BIS-2-PHTH-WT	Water	Bis(2-ethylhexyl)phthalate	SW846 8270
Aqueous samples are extracted and extracts are analyzed on GC/MSD.			
625-DNB-PHTH-WT	Water	Di-n-Butyl Phthalate	SW846 8270
Aqueous samples are extracted and extracts are analyzed on GC/MSD.			
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2
Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference			
EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
EC-WW-MF-WT	Water	E. Coli	SM 9222D
A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 °C for 24 – 2 h. Method ID: WT-TM-1200			
F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
FC-WW-MF-WT	Water	Fecal Coliforms	APHA 9223B
FC-WW-MF-WT	Water	Fecal Coliforms	SM 9222D
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
			Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).
NP,NPE-LCMS-WT	Water	Nonylphenols and Ethoxylates by LC/MS-MS	J. Chrom A849 (1999) p.467-482
			Water samples are filtered and analyzed on LCMS/MS by direct injection.
OGG-SPEC-CALC-WT	Water	Speciated Oil and Grease A/V Calc	CALCULATION
			Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.
OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B
			The procedure involves an extraction of the entire water sample with hexane. Sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
			This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.
PCB-WT	Water	Polychlorinated Biphenyls	EPA 8082
			PCBs are extracted from an aqueous sample at neutral pH with aliquots of dichloromethane using a modified separatory funnel technique. The extracts are analyzed by GC/MSD.
PH-WT	Water	pH	APHA 4500 H-Electrode
			Water samples are analyzed directly by a calibrated pH meter.
			Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
			An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.
SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)
			Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric
			A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.
TKN-F-WT	Water	TKN in Water by Fluorescence	J. ENVIRON. MONIT., 2005,7,37-42,RSC
			Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection
VOC-ROU-HS-WT	Water	Volatile Organic Compounds	SW846 8260
			Aqueous samples are analyzed by headspace-GC/MS.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

20-954694

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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. Guideline limits 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.

Quality Control Report

Workorder: L2694356 Report Date: 19-APR-22

Client: Grounded Engineering Inc
1 Banigan Drive
TORONTO ON M4H 1G3
Contact: Nicholas Piers

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
625-BIS-2-PHTH-WT	**Water**							
Batch R5750578								
WG3709937-2 LCS								
Bis(2-ethylhexyl)phthalate			108.0		%		50-140	26-MAR-22
WG3709937-1 MB								
Bis(2-ethylhexyl)phthalate			<2.0		ug/L		2	26-MAR-22
Surrogate: 2-fluorobiphenyl			78.0		%		40-130	26-MAR-22
Surrogate: p-Terphenyl d14			94.2		%		40-130	26-MAR-22
625-DNB-PHTH-WT	**Water**							
Batch R5750578								
WG3709937-2 LCS								
Di-n-butylphthalate			95.0		%		50-150	26-MAR-22
WG3709937-1 MB								
Di-n-butylphthalate			<1.0		ug/L		1	26-MAR-22
Surrogate: 2-Fluorobiphenyl			78.0		%		40-130	26-MAR-22
Surrogate: p-Terphenyl d14			94.2		%		40-130	26-MAR-22
BOD-C-WT	**Water**							
Batch R5751353								
WG3709807-2 DUP		**L2694213-1**						
BOD Carbonaceous		<3.0	<3.0	RPD-NA	mg/L	N/A	30	24-MAR-22
WG3709807-3 LCS								
BOD Carbonaceous			92.4		%		85-115	24-MAR-22
WG3709807-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	24-MAR-22
CN-TOT-WT	**Water**							
Batch R5750806								
WG3710141-3 DUP		**WG3710141-5**						
Cyanide, Total		0.0100	0.0097		mg/L	2.4	20	25-MAR-22
WG3710141-2 LCS								
Cyanide, Total			105.5		%		80-120	25-MAR-22
WG3710141-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	25-MAR-22
WG3710141-4 MS		**WG3710141-5**						
Cyanide, Total			102.7		%		70-130	25-MAR-22
EC-WW-MF-WT	**Water**							
Batch R5750580								
WG3709707-1 MB								
E. Coli			0		CFU/100mL		1	24-MAR-22

Quality Control Report

Workorder: L2694356 Report Date: 19-APR-22

Client: Grounded Engineering Inc
1 Banigan Drive
TORONTO ON M4H 1G3

Contact: Nicholas Piers

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT	**Water**							
Batch R5750845								
WG3710310-19 DUP		**WG3710310-18**						
Fluoride (F)		0.053	0.052		mg/L	2.8	20	25-MAR-22
WG3710310-17 LCS								
Fluoride (F)			102.7		%		90-110	25-MAR-22
WG3710310-16 MB								
Fluoride (F)			<0.020		mg/L		0.02	25-MAR-22
WG3710310-20 MS		**WG3710310-18**						
Fluoride (F)			97.8		%		75-125	25-MAR-22
FC-WW-MF-WT	**Water**							
Batch R5750576								
WG3709714-1 MB								
Fecal Coliforms			0		CFU/100mL		1	24-MAR-22
HG-T-CVAA-WT	**Water**							
Batch R5750289								
WG3709889-7 DUP		**WG3709889-9**						
Mercury (Hg)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	25-MAR-22
WG3709889-6 LCS								
Mercury (Hg)-Total			89.4		%		80-120	25-MAR-22
WG3709889-5 MB								
Mercury (Hg)-Total			<0.000005(		mg/L		0.000005	25-MAR-22
WG3709889-8 MS		**WG3709889-10**						
Mercury (Hg)-Total			87.0		%		70-130	25-MAR-22
MET-T-CCMS-WT	**Water**							
Batch R5749909								
WG3709877-4 DUP		**WG3709877-3**						
Aluminum (Al)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	24-MAR-22
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-MAR-22
Arsenic (As)-Total		0.00016	0.00016		mg/L	2.6	20	24-MAR-22
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	24-MAR-22
Chromium (Cr)-Total		0.00064	0.00057		mg/L	11	20	24-MAR-22
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-MAR-22
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-MAR-22
Lead (Pb)-Total		0.000099	0.000100		mg/L	1.2	20	24-MAR-22
Manganese (Mn)-Total		0.0121	0.0123		mg/L	1.6	20	24-MAR-22
Molybdenum (Mo)-Total		0.000697	0.000692		mg/L	0.8	20	24-MAR-22

Quality Control Report

Client: Grounded Engineering Inc
1 Banigan Drive
TORONTO ON M4H 1G3
Contact: Nicholas Piers

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5749909								
WG3709877-4 DUP		**WG3709877-3**						
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-MAR-22
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-MAR-22
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-MAR-22
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-MAR-22
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	24-MAR-22
Zinc (Zn)-Total		0.0639	0.0641		mg/L	0.4	20	24-MAR-22
WG3709877-2 LCS								
Aluminum (Al)-Total			105.8		%		80-120	24-MAR-22
Antimony (Sb)-Total			99.6		%		80-120	24-MAR-22
Arsenic (As)-Total			105.1		%		80-120	24-MAR-22
Cadmium (Cd)-Total			101.1		%		80-120	24-MAR-22
Chromium (Cr)-Total			101.7		%		80-120	24-MAR-22
Cobalt (Co)-Total			99.3		%		80-120	24-MAR-22
Copper (Cu)-Total			102.0		%		80-120	24-MAR-22
Lead (Pb)-Total			97.6		%		80-120	24-MAR-22
Manganese (Mn)-Total			101.5		%		80-120	24-MAR-22
Molybdenum (Mo)-Total			95.9		%		80-120	24-MAR-22
Nickel (Ni)-Total			101.9		%		80-120	24-MAR-22
Selenium (Se)-Total			103.5		%		80-120	24-MAR-22
Silver (Ag)-Total			91.2		%		80-120	24-MAR-22
Tin (Sn)-Total			98.7		%		80-120	24-MAR-22
Titanium (Ti)-Total			101.9		%		80-120	24-MAR-22
Zinc (Zn)-Total			105.0		%		80-120	24-MAR-22
WG3709877-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	24-MAR-22
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	24-MAR-22
Arsenic (As)-Total			<0.00010		mg/L		0.0001	24-MAR-22
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	24-MAR-22
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	25-MAR-22
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	24-MAR-22
Copper (Cu)-Total			<0.00050		mg/L		0.0005	24-MAR-22
Lead (Pb)-Total			<0.000050		mg/L		0.00005	24-MAR-22
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	24-MAR-22
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	24-MAR-22

Quality Control Report

Client: Grounded Engineering Inc
1 Banigan Drive
TORONTO ON M4H 1G3
Contact: Nicholas Piers

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5749909								
WG3709877-1 MB								
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	24-MAR-22
Selenium (Se)-Total			<0.000050		mg/L		0.00005	24-MAR-22
Silver (Ag)-Total			<0.000050		mg/L		0.00005	24-MAR-22
Tin (Sn)-Total			<0.00010		mg/L		0.0001	24-MAR-22
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	24-MAR-22
Zinc (Zn)-Total			<0.0030		mg/L		0.003	24-MAR-22
WG3709877-5 MS		**WG3709877-6**						
Aluminum (Al)-Total			96.8		%		70-130	24-MAR-22
Antimony (Sb)-Total			93.8		%		70-130	24-MAR-22
Arsenic (As)-Total			99.2		%		70-130	24-MAR-22
Cadmium (Cd)-Total			95.6		%		70-130	24-MAR-22
Chromium (Cr)-Total			95.0		%		70-130	24-MAR-22
Cobalt (Co)-Total			91.9		%		70-130	24-MAR-22
Copper (Cu)-Total			85.8		%		70-130	24-MAR-22
Lead (Pb)-Total			88.9		%		70-130	24-MAR-22
Manganese (Mn)-Total			N/A	MS-B	%		-	24-MAR-22
Molybdenum (Mo)-Total			90.1		%		70-130	24-MAR-22
Nickel (Ni)-Total			72.0		%		70-130	24-MAR-22
Selenium (Se)-Total			98.9		%		70-130	24-MAR-22
Silver (Ag)-Total			70.3		%		70-130	24-MAR-22
Tin (Sn)-Total			91.5		%		70-130	24-MAR-22
Titanium (Ti)-Total			96.6		%		70-130	24-MAR-22
Zinc (Zn)-Total			89.9		%		70-130	24-MAR-22
NP,NPE-LCMS-WT	**Water**							
Batch R5750387								
WG3709872-3 DUP		**L2694288-1**						
Nonylphenol		<1.0	<1.0	RPD-NA	ug/L	N/A	30	24-MAR-22
Nonylphenol Monoethoxylates		<2.0	<2.0	RPD-NA	ug/L	N/A	30	24-MAR-22
Nonylphenol Diethoxylates		0.36	0.29		ug/L	19	30	24-MAR-22
WG3709872-2 LCS								
Nonylphenol			98.4		%		75-125	24-MAR-22
Nonylphenol Monoethoxylates			93.9		%		75-125	24-MAR-22
Nonylphenol Diethoxylates			99.1		%		75-125	24-MAR-22
WG3709872-1 MB								

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NP,NPE-LCMS-WT	**Water**							
Batch R5750387								
WG3709872-1 MB								
Nonylphenol			<1.0		ug/L		1	24-MAR-22
Nonylphenol Monoethoxylates			<2.0		ug/L		2	24-MAR-22
Nonylphenol Diethoxylates			<0.10		ug/L		0.1	24-MAR-22
WG3709872-4 MS		**L2694288-1**						
Nonylphenol			121.8		%		60-140	24-MAR-22
Nonylphenol Monoethoxylates			118.5		%		60-140	24-MAR-22
Nonylphenol Diethoxylates			94.5		%		60-140	24-MAR-22
OGG-SPEC-WT	**Water**							
Batch R5750305								
WG3709731-2 LCS								
Oil and Grease, Total			95.0		%		70-130	24-MAR-22
Mineral Oil and Grease			89.8		%		70-130	24-MAR-22
WG3709731-1 MB								
Oil and Grease, Total			<5.0		mg/L		5	24-MAR-22
Mineral Oil and Grease			<2.5		mg/L		2.5	24-MAR-22
P-T-COL-WT	**Water**							
Batch R5751788								
WG3711029-3 DUP		**L2694309-5**						
Phosphorus, Total		0.0119	0.0124		mg/L	3.6	20	30-MAR-22
WG3711029-2 LCS								
Phosphorus, Total			98.4		%		80-120	30-MAR-22
WG3711029-1 MB								
Phosphorus, Total			0.0033	RRQC	mg/L		0.003	30-MAR-22
COMMENTS: RRQC: Reported Total Phosphorus samples are not affected by observed Method Blank background								
WG3711029-4 MS		**L2694309-5**						
Phosphorus, Total			79.9		%		70-130	30-MAR-22
PCB-WT	**Water**							
Batch R5750900								
WG3709840-2 LCS								
Aroclor 1242			104.9		%		65-130	28-MAR-22
Aroclor 1248			121.2		%		65-130	28-MAR-22
Aroclor 1254			102.5		%		65-130	28-MAR-22
Aroclor 1260			107.5		%		65-130	28-MAR-22
WG3709840-1 MB								
Aroclor 1242			<0.020		ug/L		0.02	28-MAR-22
							0.02	

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PCB-WT	**Water**							
Batch R5750900								
WG3709840-1 MB								
Aroclor 1248			<0.020		ug/L		0.02	28-MAR-22
Aroclor 1254			<0.020		ug/L		0.02	28-MAR-22
Aroclor 1260			<0.020		ug/L		0.02	28-MAR-22
Surrogate: Decachlorobiphenyl			113.2		%		50-150	28-MAR-22
Surrogate: Tetrachloro-m-xylene			82.8		%		50-150	28-MAR-22
PH-WT	**Water**							
Batch R5750564								
WG3710133-4 DUP		**WG3710133-3**						
pH		8.15	8.01	J	pH units	0.14	0.2	25-MAR-22
WG3710133-2 LCS								
pH			6.99		pH units		6.9-7.1	25-MAR-22
PHENOLS-4AAP-WT	**Water**							
Batch R5750872								
WG3710102-3 DUP		**L2694356-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	25-MAR-22
WG3710102-2 LCS								
Phenols (4AAP)			95.3		%		85-115	25-MAR-22
WG3710102-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	25-MAR-22
WG3710102-4 MS		**L2694356-1**						
Phenols (4AAP)			106.1		%		75-125	25-MAR-22
SO4-IC-N-WT	**Water**							
Batch R5750845								
WG3710310-19 DUP		**WG3710310-18**						
Sulfate (SO4)		8.28	8.28		mg/L	0.0	20	25-MAR-22
WG3710310-17 LCS								
Sulfate (SO4)			104.0		%		90-110	25-MAR-22
WG3710310-16 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	25-MAR-22
WG3710310-20 MS		**WG3710310-18**						
Sulfate (SO4)			103.3		%		75-125	25-MAR-22
SOLIDS-TSS-WT	**Water**							
Batch R5751303								
WG3710756-3 DUP		**L2694778-1**						
Total Suspended Solids		680	660		mg/L	3.0	20	29-MAR-22
WG3710756-2 LCS								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	**Water**							
Batch R5751303								
WG3710756-2 LCS								
Total Suspended Solids			87.7		%		85-115	29-MAR-22
WG3710756-1 MB								
Total Suspended Solids			<3.0		mg/L		3	29-MAR-22
TKN-F-WT	**Water**							
Batch R5751694								
WG3711026-3 DUP		**L2695017-1**						
Total Kjeldahl Nitrogen		51.4	49.3		mg/L	4.1	20	30-MAR-22
WG3711026-2 LCS								
Total Kjeldahl Nitrogen			114.9		%		75-125	29-MAR-22
WG3711026-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	29-MAR-22
WG3711026-4 MS		**L2695017-1**						
Total Kjeldahl Nitrogen			N/A	MS-B	%		-	30-MAR-22
VOC-ROU-HS-WT	**Water**							
Batch R5751540								
WG3711016-4 DUP		**WG3711016-3**						
1,1,1,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
1,1,1-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
1,1,2-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
1,2-Dibromoethane		<0.20	<0.20	RPD-NA	ug/L	N/A	30	30-MAR-22
1,1-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
1,1-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
1,2-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
1,2-Dichloropropane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
1,3-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
2-Hexanone		<20	<20	RPD-NA	ug/L	N/A	30	30-MAR-22
Acetone		<20	<20	RPD-NA	ug/L	N/A	30	30-MAR-22
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
Bromodichloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	30-MAR-22
Bromoform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	30-MAR-22
Bromomethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5751540								
WG3711016-4 DUP		**WG3711016-3**						
Carbon Disulfide		<1.0	<1.0	RPD-NA	ug/L	N/A	30	30-MAR-22
Carbon tetrachloride		<0.50	<0.20	RPD-NA	ug/L	N/A	30	30-MAR-22
Chlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
Chloroethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	30-MAR-22
Chloroform		1.1	<1.0	RPD-NA	ug/L	N/A	30	30-MAR-22
Chloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	30-MAR-22
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
cis-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	30-MAR-22
Dibromochloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	30-MAR-22
Dichlorodifluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	30-MAR-22
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	30-MAR-22
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
m+p-Xylenes		<0.40	<0.40	RPD-NA	ug/L	N/A	30	30-MAR-22
Methyl Ethyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	30-MAR-22
Methyl Isobutyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	30-MAR-22
n-Hexane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
MTBE		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
o-Xylene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	30-MAR-22
Styrene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
trans-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
trans-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	30-MAR-22
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
Trichlorofluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	30-MAR-22
Vinyl chloride		<0.50	<0.50	RPD-NA	ug/L	N/A	30	30-MAR-22
WG3711016-1 LCS								
1,1,1,2-Tetrachloroethane			97.0		%		70-130	30-MAR-22
1,1,2,2-Tetrachloroethane			94.0		%		70-130	30-MAR-22
1,1,1-Trichloroethane			106.1		%		70-130	30-MAR-22
1,1,2-Trichloroethane			102.9		%		70-130	30-MAR-22
1,2-Dibromoethane			99.8		%		70-130	30-MAR-22
1,1-Dichloroethane			100.1		%		70-130	30-MAR-22
1,1-Dichloroethylene			103.4		%		70-130	30-MAR-22

Quality Control Report

Client: Grounded Engineering Inc
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TORONTO ON M4H 1G3
Contact: Nicholas Piers

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5751540								
WG3711016-1 LCS								
1,2-Dichlorobenzene			109.1		%		70-130	30-MAR-22
1,2-Dichloroethane			104.5		%		70-130	30-MAR-22
1,2-Dichloropropane			108.3		%		70-130	30-MAR-22
1,3-Dichlorobenzene			109.9		%		70-130	30-MAR-22
1,4-Dichlorobenzene			109.7		%		70-130	30-MAR-22
2-Hexanone			102.1		%		60-140	30-MAR-22
Acetone			107.0		%		60-140	30-MAR-22
Benzene			100.9		%		70-130	30-MAR-22
Bromodichloromethane			110.2		%		70-130	30-MAR-22
Bromoform			102.4		%		70-130	30-MAR-22
Bromomethane			97.0		%		60-140	30-MAR-22
Carbon Disulfide			93.2		%		70-130	30-MAR-22
Carbon tetrachloride			103.9		%		70-130	30-MAR-22
Chlorobenzene			99.2		%		70-130	30-MAR-22
Chloroethane			111.4		%		70-130	30-MAR-22
Chloroform			107.2		%		70-130	30-MAR-22
Chloromethane			101.0		%		60-140	30-MAR-22
cis-1,2-Dichloroethylene			107.8		%		70-130	30-MAR-22
cis-1,3-Dichloropropene			100.6		%		70-130	30-MAR-22
Dibromochloromethane			98.2		%		70-130	30-MAR-22
Dichlorodifluoromethane			93.5		%		50-140	30-MAR-22
Dichloromethane			102.6		%		70-130	30-MAR-22
Ethylbenzene			103.5		%		70-130	30-MAR-22
m+p-Xylenes			105.9		%		70-130	30-MAR-22
Methyl Ethyl Ketone			98.9		%		60-140	30-MAR-22
Methyl Isobutyl Ketone			103.9		%		50-150	30-MAR-22
n-Hexane			97.6		%		70-130	30-MAR-22
MTBE			108.3		%		70-130	30-MAR-22
o-Xylene			102.5		%		70-130	30-MAR-22
Styrene			94.7		%		70-130	30-MAR-22
Tetrachloroethylene			97.9		%		70-130	30-MAR-22
trans-1,2-Dichloroethylene			105.1		%		70-130	30-MAR-22
trans-1,3-Dichloropropene			98.1		%		70-130	30-MAR-22

Quality Control Report

Client: Grounded Engineering Inc
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Contact: Nicholas Piers

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5751540								
WG3711016-1 LCS								
Trichloroethylene			103.8		%		70-130	30-MAR-22
Trichlorofluoromethane			101.8		%		60-140	30-MAR-22
Vinyl chloride			95.7		%		60-140	30-MAR-22
WG3711016-2 MB								
1,1,1,2-Tetrachloroethane			<0.50		ug/L		0.5	30-MAR-22
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	30-MAR-22
1,1,1-Trichloroethane			<0.50		ug/L		0.5	30-MAR-22
1,1,2-Trichloroethane			<0.50		ug/L		0.5	30-MAR-22
1,2-Dibromoethane			<0.20		ug/L		0.2	30-MAR-22
1,1-Dichloroethane			<0.50		ug/L		0.5	30-MAR-22
1,1-Dichloroethylene			<0.50		ug/L		0.5	30-MAR-22
1,2-Dichlorobenzene			<0.50		ug/L		0.5	30-MAR-22
1,2-Dichloroethane			<0.50		ug/L		0.5	30-MAR-22
1,2-Dichloropropane			<0.50		ug/L		0.5	30-MAR-22
1,3-Dichlorobenzene			<0.50		ug/L		0.5	30-MAR-22
1,4-Dichlorobenzene			<0.50		ug/L		0.5	30-MAR-22
2-Hexanone			<20		ug/L		20	30-MAR-22
Acetone			<20		ug/L		20	30-MAR-22
Benzene			<0.50		ug/L		0.5	30-MAR-22
Bromodichloromethane			<1.0		ug/L		1	30-MAR-22
Bromoform			<1.0		ug/L		1	30-MAR-22
Bromomethane			<0.50		ug/L		0.5	30-MAR-22
Carbon Disulfide			<1.0		ug/L		1	30-MAR-22
Carbon tetrachloride			<0.20		ug/L		0.2	30-MAR-22
Chlorobenzene			<0.50		ug/L		0.5	30-MAR-22
Chloroethane			<1.0		ug/L		1	30-MAR-22
Chloroform			<1.0		ug/L		1	30-MAR-22
Chloromethane			<2.0		ug/L		2	30-MAR-22
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	30-MAR-22
cis-1,3-Dichloropropene			<0.30		ug/L		0.3	30-MAR-22
Dibromochloromethane			<1.0		ug/L		1	30-MAR-22
Dichlorodifluoromethane			<1.0		ug/L		1	30-MAR-22
Dichloromethane			<2.0		ug/L		2	30-MAR-22
Ethylbenzene			<0.50		ug/L		0.5	30-MAR-22

Quality Control Report

Client: Grounded Engineering Inc
1 Banigan Drive
TORONTO ON M4H 1G3
Contact: Nicholas Piers

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5751540								
WG3711016-2 MB								
m+p-Xylenes			<0.40		ug/L		0.4	30-MAR-22
Methyl Ethyl Ketone			<20		ug/L		20	30-MAR-22
Methyl Isobutyl Ketone			<20		ug/L		20	30-MAR-22
n-Hexane			<0.50		ug/L		0.5	30-MAR-22
MTBE			<0.50		ug/L		0.5	30-MAR-22
o-Xylene			<0.30		ug/L		0.3	30-MAR-22
Styrene			<0.50		ug/L		0.5	30-MAR-22
Tetrachloroethylene			<0.50		ug/L		0.5	30-MAR-22
trans-1,2-Dichloroethylene			<0.50		ug/L		0.5	30-MAR-22
trans-1,3-Dichloropropene			<0.30		ug/L		0.3	30-MAR-22
Trichloroethylene			<0.50		ug/L		0.5	30-MAR-22
Trichlorofluoromethane			<1.0		ug/L		1	30-MAR-22
Vinyl chloride			<0.50		ug/L		0.5	30-MAR-22
Surrogate: 1,4-Difluorobenzene			99.8		%		70-130	30-MAR-22
Surrogate: 4-Bromofluorobenzene			92.8		%		70-130	30-MAR-22
WG3711016-5 MS		**WG3711016-3**						
1,1,1,2-Tetrachloroethane			95.4		%		50-150	30-MAR-22
1,1,2,2-Tetrachloroethane			99.0		%		50-150	30-MAR-22
1,1,1-Trichloroethane			106.3		%		50-150	30-MAR-22
1,1,2-Trichloroethane			107.8		%		50-150	30-MAR-22
1,2-Dibromoethane			103.3		%		50-150	30-MAR-22
1,1-Dichloroethane			104.2		%		50-150	30-MAR-22
1,1-Dichloroethylene			104.5		%		50-150	30-MAR-22
1,2-Dichlorobenzene			109.4		%		50-150	30-MAR-22
1,2-Dichloroethane			112.4		%		50-150	30-MAR-22
1,2-Dichloropropane			112.5		%		50-150	30-MAR-22
1,3-Dichlorobenzene			109.1		%		50-150	30-MAR-22
1,4-Dichlorobenzene			109.4		%		50-150	30-MAR-22
2-Hexanone			107.1		%		50-150	30-MAR-22
Acetone			116.0		%		50-150	30-MAR-22
Benzene			102.1		%		50-150	30-MAR-22
Bromodichloromethane			114.2		%		50-150	30-MAR-22
Bromoform			99.8		%		50-150	30-MAR-22
Bromomethane			94.8		%		50-150	30-MAR-22

Quality Control Report

Client: Grounded Engineering Inc
1 Banigan Drive
TORONTO ON M4H 1G3
Contact: Nicholas Piers

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5751540								
WG3711016-5 MS		**WG3711016-3**						
Carbon Disulfide			91.4		%		50-150	30-MAR-22
Carbon tetrachloride			99.7		%		50-150	30-MAR-22
Chlorobenzene			98.9		%		50-150	30-MAR-22
Chloroethane			111.4		%		50-150	30-MAR-22
Chloroform			110.0		%		50-150	30-MAR-22
Chloromethane			100.3		%		50-150	30-MAR-22
cis-1,2-Dichloroethylene			109.1		%		50-150	30-MAR-22
cis-1,3-Dichloropropene			100.7		%		50-150	30-MAR-22
Dibromochloromethane			97.3		%		50-150	30-MAR-22
Dichlorodifluoromethane			89.2		%		50-150	30-MAR-22
Dichloromethane			104.4		%		50-150	30-MAR-22
Ethylbenzene			103.4		%		50-150	30-MAR-22
m+p-Xylenes			106.8		%		50-150	30-MAR-22
Methyl Ethyl Ketone			100.1		%		50-150	30-MAR-22
Methyl Isobutyl Ketone			108.3		%		50-150	30-MAR-22
n-Hexane			96.1		%		50-150	30-MAR-22
MTBE			110.1		%		50-150	30-MAR-22
o-Xylene			103.2		%		50-150	30-MAR-22
Styrene			93.1		%		50-150	30-MAR-22
Tetrachloroethylene			90.6		%		50-150	30-MAR-22
trans-1,2-Dichloroethylene			105.8		%		50-150	30-MAR-22
trans-1,3-Dichloropropene			97.7		%		50-150	30-MAR-22
Trichloroethylene			98.9		%		50-150	30-MAR-22
Trichlorofluoromethane			100.1		%		50-150	30-MAR-22
Vinyl chloride			94.3		%		50-150	30-MAR-22
Batch R5751668								
WG3711510-4 DUP		**WG3711510-3**						
Toluene		<0.40	<0.40	RPD-NA	ug/L	N/A	30	31-MAR-22
WG3711510-1 LCS								
Toluene			93.2		%		70-130	30-MAR-22
WG3711510-2 MB								
Toluene			<0.40		ug/L		0.4	30-MAR-22
WG3711510-5 MS		**WG3711510-3**						
Toluene			89.6		%		50-150	31-MAR-22

Quality Control Report

Workorder: L2694356 Report Date: 19-APR-22

Client: Grounded Engineering Inc
1 Banigan Drive
TORONTO ON M4H 1G3
Contact: Nicholas Piers

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
RRQC	Refer to report remarks for information regarding this QC result.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS www.alsglobal.com

L2694356-COFC

orm

COC Number: 20 - 954694

Page of

Report To	Contact and company name below will appear on the final report
Company:	GROUNDED ENGINEERING
Contact:	NICHOLAS PIERS
Phone:	416-784-5234
	Company address below will appear on the final report
Street:	1 BANIGAN DR
City/Province:	TORONTO, ON
Postal Code:	M4H 1G3
Invoice To	Same as Report To ☒ YES ☐ NO
	Copy of Invoice with Report ☒ YES ☐ NO
Company:	
Contact:	

Reports / Recipients	
Select Report Format:	☒ PDF ☒ EXCEL ☒ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☒ YES ☐ NO ☐ N/A
☒ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	

Turnaround Time (TAT) Requested
☒ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information	
ALS Account # / Quote #:	21-067
Job #:	
PO / AFE:	
LSD:	60 DUNDAS ST E
ALS Lab Work Order # (ALS use only):	L2694356

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler: ALEXANDER JOHNSON

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Complete sewer set	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	SW-UF-BH205	23-MAR-22		GW	17	X			

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☒ NO	Compare to Peel region sanitary and storm/combined
Are samples for human consumption/ use? ☐ YES ☒ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				1.4			

SHIPMENT RELEASE (client use)		
Released by:	Date:	Time:
	23-MAR-22	17:45

INITIAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:
AP	24-MAR-22	9:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

APPENDIX F

Excavation Dimensions: 112 m x 90 m
Section Cut: E-W

P5 Level Finished Floor: Elev. 94± m
P5 Base of Excavation/Drainage Layer: Elev. 93.5± m

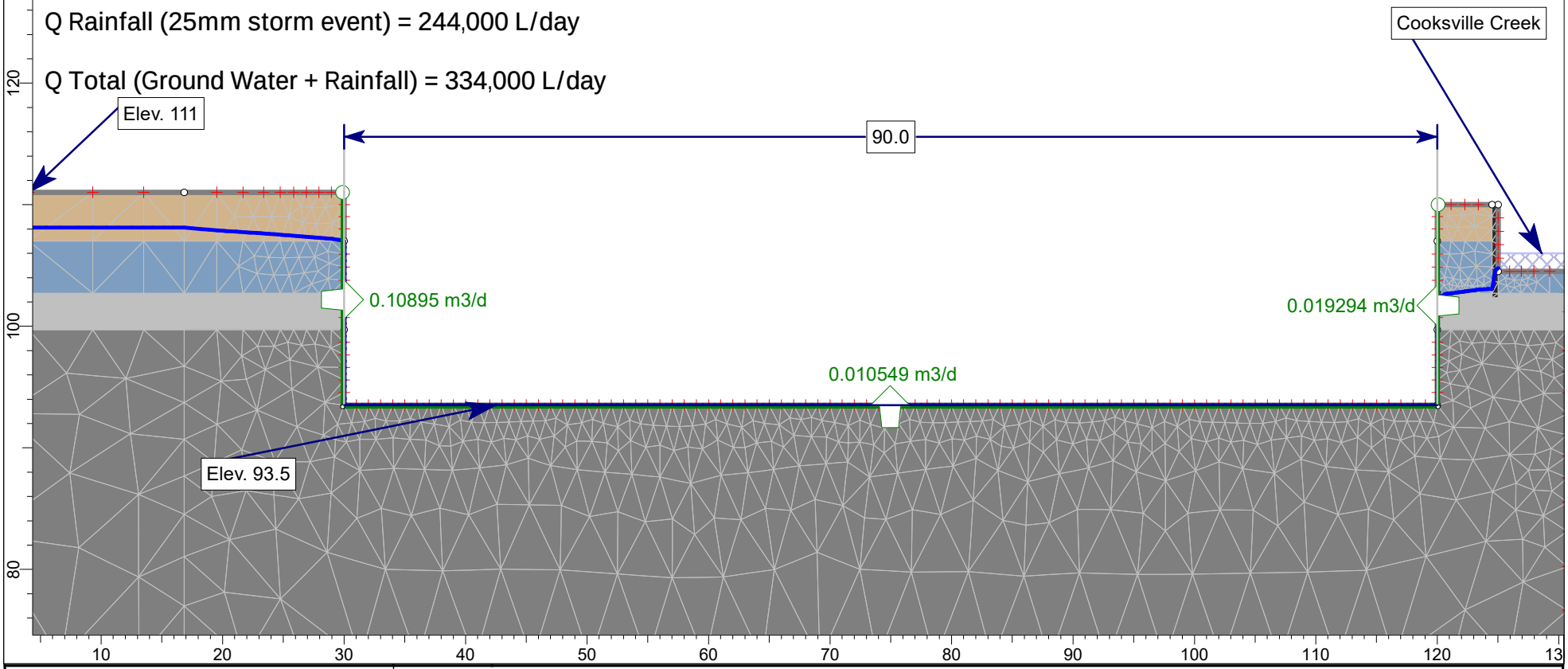
Water Table: Elev. 108.1 m

Q Ground Water = 90,000 L/day (S.F = 2)

Q Rainfall (25mm storm event) = 244,000 L/day

Q Total (Ground Water + Rainfall) = 334,000 L/day

Material Name	Color	KS (m/s)
Fill		1e-05
Glacial Till		6.8e-08
Weathered Bedrock		1e-07
Sound Bedrock		1.1e-08
Concrete Wall		1e-10



GROUNDED ENGINEERING

File	21-067 60 Dundas St E			
Analysis	Seepage model: Group 5			
Ref.				
RS2 File	21-067 60 Dundas St E Seepage model.slmd	Scale	1:495	Eng NP

SLIDEINTERPRET 9.018

APPENDIX G

SHORT TERM - PERMEABLE SHORING

Excavation Dimensions [m]	
N-S	112
E-W	87
Area (m2)	9744
Perimeter (m)	398

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	25	94
Depth (m)	0.025	0.094

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		0.010549	112	1,181
Sides		0.10895	398	43,362
Total				44,544
Factor of Safety	2.0			89,087

Storm Events	
2 Year [L/day]	100 Year [L/day]
243,600	916,000

Summary	L/day	L/min
Groundwater	90,000	62.5
Rainfall	244,000	169.4
Total	334,000	231.9

LONG TERM - DRAINED FOUNDATIONS

Excavation Dimensions [m]	
N-S	112
E-W	90
Area (m2)	10080
Perimeter (m)	404

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	25	94
Depth (m)	0.025	0.094

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		0.010549	112	1,181
Sides		0.10895	398	43,362
Total				44,544
Factor of Safety	2.0			89,087

Infiltration [L/day]
20319

Summary	L/day	L/min
Groundwater	90,000	62.5
Infiltration	21,000	14.6
Total	111,000	77.1