PRELIMINARY HYDROGEOLOGICAL REVIEW REPORT

PREPARED FOR:
1095 Kingston Road Limited
22 St. Clair Avenue East, Suite 1203
Toronto, ON M4T 2S5

ATTENTION:
Nik Papapetrou

1095 Kingston Road, Pickering, Ontario

Grounded Engineering Inc.
File No. 22 279
Issued April 7, 2025

1 Banigan Drive, Toronto ON M4H 1G3 | (647) 264-7909 | groundedeng.ca | Grounded Engineering

TABLE OF CONTENTS

FIGURES

APPENDICES

1 Introduction

1095 Kingston Road Limited has retained Grounded Engineering Inc. to provide preliminary hydrogeological engineering design advice for their proposed development at 1095 Kingston Road, in Pickering, Ontario.

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

- Site Survey, "Lot 25, Concession 1, City of Pickering", Completed by Holding Jones Vanderveen Inc., Dated January 12, 2024.
- Architectural Drawings, "1095 Kingston Road, Pickering", Created by BDP Quadrangle, Dated March 20, 2025 (Issued for ZBA Submission).
- Grading Plan, "1095 Kingston Road, Pickering, ON L1 B15", by Counterpoint Engineering Inc., Dated Mar. 24, 2025 (Issued for ZBA #1).

Property Information	
Location of Site	1095 Kingston Road, Pickering, Ontario, L1V 1B5
Ownership of Site	1095 Kingston Road Limited
Site Dimensions (m)	86 m x 239± m
Site Area (m^2)	20,605± m^2

Proposed Development	
Number of Building Structures	4
Number of Underground Levels	1
Lowest Finished Floor Elevation (FFE)	Majority of the P1 set at Elev. 84.5 masl, small portion of the P1 set at 83.7 masl
Approx. Base of Foundations*	Elev. 82.5 masl / 83.5 masl
Sub-Grade Area (m^2)	14,892 m^2
Land Use Classification	Residential

* Assumed: Raft Foundation/ Pile Caps & Grade Beams and Spread Footings

Qualified Person and Hydrogeological Review Information	
Qualified Person	Sam Bastan, P.Eng.
Consulting Firm	Grounded Engineering Inc.
Date of Hydrogeological Review	April 7, 2025
Scope of Work	▪ Review of MECP Water Well Records for the area ▪ Review of geological information for the area

Qualified Person and Hydrogeological Review Information	
	▪ Review of topographic information for the area ▪ Advancement of 3 boreholes to a maximum depth of 19.4 m, which were instrumented with 3 monitoring wells. ▪ The preliminary engineering analysis provided here is based on available factual data from an investigation conducted by Grounded. The level of study presented in this report is consistent with the requirements for a Site Plan Control Application. Additional boreholes, wells, in-situ testing, and a detailed hydrogeological engineering report will be required for detailed design and building permit purposes. ▪ Completion of slug tests in all available monitoring wells ▪ Groundwater elevation monitoring on four (4) separate occasions ▪ Groundwater sampling and analysis to the Durham Region 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	
Site Topography	The site has an approximate ground surface elevation of 87.55 masl.
Local Physiographic Features	The site is generally composed of cohesionless till, overlying sands, overlying bedrock.
Regional Physiographic Features	The Iroquois plain on the north shore of Lake Ontario from Scarborough to Newcastle. A sand plain comprised of mosaic till plains and areas of silty lacustrine deposits. The two most important soils of the area are Darlington loam and Newcastle loam, the former developed on the upland areas of till and the latter on the lacustrine sediments in the lower lying areas. They are both good, well drained soils but in some areas can be poorly drained.
Watershed	The site is located within the Lake Ontario Waterfront. Watershed. Locally, groundwater is anticipated to flow south towards Lake Ontario.
Surface Drainage	Surface water is expected to flow towards municipal catch basins located on or adjacent to the site, via Kingston Road to the West or Dixie Road to the East.

1.1 Source Water Protection

The Site is part of the Credit Valley – Toronto and Region – Central Lake Ontario (CTC) Source Protection Area. The Site is located within a regulated area of Toronto Region Conservation Authority (TRCA). A portion of the Site is located within a Highly Vulnerable Aquifer (score of 6) and Significant Groundwater Recharge Area (MECP, 2023). The source protection area is presented in Appendix H.

Based on the soil encountered at the Site during the subsurface investigation and the results of the in-situ hydraulic conductivity tests, the predominant upper native soils within the Site and Study Area are low permeability glacial tills. While the larger, regional area is classified as a Highly

Vulnerable Aquifer, the surficial soils of the Site and Study Areas do not behave as a Highly Vulnerable Aquifer. The City of Pickering's drinking water is municipally serviced from Lake Ontario.

2 Study Area Map

A map has been enclosed which shows the following information:

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

3 Geology and Physical Hydrogeology

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

Site Stratigraphy				
Stratum/Formation	**Depth Range (mbgs)**	**Elevation Range (masl)**	**Hydraulic Conductivity (m/s)**	**Method of Determination**
Fill	0 – 3.0	88.5 – 84.4	1.0×10^{-3}	Literature[1]
Cohesionless Till	1.1 – 12.2	87.4 – 75.5	9.1×10^{-7}	Slug Test
Sands	9.1 – 16.8	79.1 – 71.7	9.6×10^{-5}	Slug Test
Bedrock	12.2 – 18.8	75.5 – 68.9	1.0×10^{-8}	Literature[1]

Surface Water			
Surface Water Body	**Distance from site (m)**	**Direction from site**	**Hydraulically Connected to Site (yes/no)**
Frenchman's Bay	235	South	Yes

[1] Freeze and Cherry (1979)

4 Groundwater Elevations

4.1 Monitoring Well Information

Well ID	Well Diameter (mm)	Ground Surface (masl)	Top of Screen (masl)	Bottom of Screen (masl)	Screened Geological Unit
BH1	50	87.4	76.7	73.4	Sand and Silt
BH2	50	87.7	78.5	75.3	Sand and Silt Till/ Silty Sand
BH3	50	88.5	76.3	73.1	Sand

4.2 Well Observations

Well ID	Groundwater Elevation (masl)				
	Nov. 23, 2022	Jan. 12, 2024	Jan. 16, 2024	Feb. 3, 2025	Maximum
BH1	82.1	82.4	82.5	82.1	**82.5**
BH2	81.9	82.4	82.3	81.9	
BH3	82.0	82.3	82.3	82.0	

For design purposes, the groundwater table is at Elev. 82.5 m in the cohesionless till deposits. This deposit has a moderate to high permeability and will yield free-flowing water when penetrated.

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

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

5 Aquifer Testing

5.1 Pumping Test

A pumping test was not attempted at the site. Slug tests were conducted and are presented in the section below.

5.2 Single Well Response Testing (Slug Tests)

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)
BH1	76.7 - 73.4	Sand and Silt	5.4×10^{-5}
BH2	78.5 - 75.3	Sand and Silt Till/ Silty Sand	9.1×10^{-7}
BH3	76.3 - 73.1	Sand	9.6×10^{-5}

5.3 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)
BH1-SS10	Sand and Silt Till	Alyamani and Sen, Barr, Sauerbrei, Krumbein and Monk	2.9×10^{-7}
BH2-SS9	Sandy Silt, Clayey Till	Alyamani and Sen, Barr, Sauerbrei	8.9×10^{-9}
BH3-SS4	Sand and Silt Till	Alyamani and Sen, Barr, Sauerbrei	1.2×10^{-8}
BH3-SS11	Sand	Alyamani and Sen, Barr, Sauerbrei, Krumbein and Monk	7.8×10^{-6}

The results of the analyses are presented in Appendix D.

5.4 Literature

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

Stratum/Formation	Hydraulic Conductivity (m/s)
Earth Fill	10^{-2} to 10^{-6}
Sands	10^{-2} to 10^{-7}
Silts	10^{-5} to 10^{-9}
Glacial Tills	10^{-6} to 10^{-12}
Clays	10^{-9} to 10^{-12}
Bedrock (Shale)	10^{-6} to 10^{-13}

6 Sump Monitoring

A new basement structure is proposed for the site. The monitoring of the existing sumps (where present) is excluded from the present scope.

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 BH3 on Nov. 23, 2022. The sample was analyzed for the following parameters:

- Durham Region Code Chapter 681 Table 1 – Limits for Sanitary and Combined Sewers Discharge
- Durham Region Code Chapter 681 Table 2 – Limits for Storm Sewer Discharge

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

- Total Suspended Solids (Limit 15 mg/L, Result 34 mg/L)
- Chloroform (Limit 0.002 mg/L, Result 0.0062 mg/L)

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

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

8 Water Balance Analysis

A water balance model was prepared for the Property to assess the distribution of rainfall run-off and infiltration for existing (pre- and post-development) conditions (Appendix F). The Thornthwaite method was used to evaluate the relative balance between rainfall, evaporation and evapotranspiration in the shallow soil zones. The water balance for pre-and post-development conditions is summarized below:

Pre-Development Water Balance

	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Proposed Development	20,975	18,290	218	205	17,868

The post-development water balance accounts for hard surfaced areas created by buildings and pavements and uses the proposed land use statistic information provided by [architect firm name].

Post-Development Water Balance

	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Proposed Development	20,975	18,290	2,784	2,620	12,886
Building Roof	10,260	8,947	-	-	8,947
Hard Surface Paving	3,230	2,817	-	-	2,817
Landscape Area	7,485	6,527	2,784	2,620	1,123

The volume of surface water run-off available from residential roof tops was calculated to be 7,926 m^3, as noted in the above table. This volume of water will be available as a resource, to maintain groundwater recharge and function. The volume of roof run-off available is compared to the difference in infiltration volume between pre-development and post-development, as noted below:

Potential Post-Development Infiltration Deficit (m^3)	Volume of Roof Run-off Available (m^3)
0	8,052

9 Proposed Construction Method

For design purposes, the stabilized groundwater table is at Elev. 82.5± m. The groundwater table is present in the cohesionless till and sands units. The majority of the lowest (P1) FFE is at about Elev. 84.5 m, with a relatively small portion lowered down to Elev. 83.7 m.

The proposed shoring at the site is assumed to consist of conventional soldier piling and lagging for present purposes.

9.1 Conventional Slab on Grade/ Grade Beam Option

Excavations for a convention slab on grade/ grade beams will generally be made above the groundwater table, in relatively low permeability native soils that preclude the free flow of water into excavations. Within the zone of excavation, the boreholes are generally dry and open.

Cohesionless wet zones were encountered in several of the boreholes. If these cohesionless zones are penetrated, some seepage from these wet zones should be anticipated. However, these zones are likely of limited extent and are not horizontally continuous layers.

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

9.2 Raft Foundation Option

Prior to excavation for a raft foundation, positive dewatering to lower the groundwater table will be required to facilitate construction as well as to maintain the integrity of the subgrade for foundation and slab-on-grade support. The water level must be kept at least 1.2 m below the lowest excavation elevation during construction. Failure to dewater prior to excavation will result in unrecoverable disturbance of the subgrade, which will render advice provided for undisturbed subgrade conditions inapplicable.

A professional dewatering contractor must 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.

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.

10 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 14,892 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.

11 Groundwater Extraction and Discharge

Numerical analyses were conducted for both short term and long term dewatering scenarios, by finite element modelling using the *Slide2* software package by Rocscience. 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 F.

The groundwater seepage estimates provided below represent the steady state groundwater seepage. There will also 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 has been provided below, which will require removal before steady state is reached.

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

As required by Ontario Regulation 63/16, a plan for discharge must consider the conveyance of stormwater from a 100-year storm. The additional volume that will be generated in the occurrence of a 100-year storm event is approximately 1,400,000 L.

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

- A Factor of Safety of 3.0 was used for all groundwater seepage volume calculations.

The design hydraulic conductivities for the site are:

Design Hydraulic Conductivity	
Stratum/Formation	**K (m/s)**
Earth Fill	1.0×10^{-3}
Sand and Silt, Clayey Till	9.1×10^{-7}
Sand	9.6×10^{-6}
Bedrock	1.0×10^{-8}

Stored Groundwater (pre-excavation/dewatering)						
Foundation Option	**Volume of Excavation (m^3)**	**Volume of Excavation Below Water Table (m^3)**	**Estimated Volume of Stored Groundwater**		**Estimated Volume of Available Groundwater**	
			m^3	**L**	**m^3**	**L**
Raft	58,079	0	3,600	3,600,000	2,700	2,700,000
Pile Caps & Grade Beams/ Spread Footings	58,079	0	-	-	-	-

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

Short Term (Construction) Steady State Groundwater Quantity						
Foundation Option	**Estimated Groundwater Seepage**		**Design Rainfall Event (25mm)**		**Estimated Total Daily Water Takings**	
	L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
Raft	1,265,000	878.5	373,000	259.0	1,638,000	1,137.5
Pile Caps & Grade Beams/ Spread Footings	5,000	3.5	373,000	259.0	378,000	262.5

Long Term (Permanent) Steady State Groundwater Quantity					
Estimated Groundwater Seepage		**Estimated Infiltrated Stormwater – Design Rainfall Event (25mm)**		**Estimated Total Daily Water Takings**	
L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
-	-	20,000*	13.9	20,000*	13.9*

**This long term total daily water takings applies to both foundation options.*

Regulatory Requirements	Raft Foundation	Pile Caps & Grade Beams/ Spread Footings
Environmental Activity and Sector Registry (EASR) Posting	N/A	Not Required
Short Term Permit to Take Water (PTTW)	Required	Not Required
Long Term Permit to Take Water (PTTW)	Not Required	Not Required

Regulatory Requirements	Raft Foundation	Pile Caps & Grade Beams/ Spread Footings
Short Term Discharge Agreement City of Pickering	Required	Not Required
Long Term Discharge Agreement City of Pickering	N/A	N/A

The City of Pickering/Durham Region will require Discharge Agreements in the short term, if any water is to be discharged to the storm or sanitary sewers.

Please note:

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

12 Evaluation of Impact

12.1 Zone of Influence

Localized dewatering of an aquifer produces a cone-shaped depression in the groundwater table that extends some distance away from the dewatering point. The lateral distance which the cone of depression extends (i.e., the distance to where drawdown is effectively zero) is known as the Zone of Influence (ZOI).

The ZOI was calculated using the Sichardt equation below.

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

ΔH	=	dewatering thickness (m)
K	=	hydraulic conductivity (m/s)
R_0	=	radius of influence (m)

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

Zone of Influence (ZOI)		
	Short Term (Construction), m	**Long Term (Permanent), m**
Raft - Pile and Lagging Scenario	3	0
Pile Caps & Grade Beams/ Spread Footings - Pile and Lagging Scenario	0	0

12.2 Land Stability

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

Land Stability			
	Short Term (Raft Construction)	**Short Term (Pile Caps & Grade Beams/ Spread Footings Construction)**	**Long Term (Permanent)**
Dewatering Thickness (m)	1.2	0	0
Increase in Effective Stress (kPa)	12	0	0
Maximum Theoretical Settlement due to Dewatering (mm)	<2	0	0
Public Realm Theoretical Settlement due to Dewatering (mm)	<2	0	0

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

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

12.3 City's Sewage Works

Negative impacts to City's sewage works may occur in terms of the quantity or quality of the groundwater discharged. This report provided the estimated quantity of the water discharge. However, this report does not speak to the sewer capacities. The sewer capacity analysis is provided under a separate cover by the civil consultant.

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

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

12.4 Natural Environment

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

12.5 Local Drinking Water Wells

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

12.6 Contamination Source

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

13 Proposed Mitigation Measures and Monitoring Plan

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

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

14 Limitations

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

The hydrogeological engineering advice provided in this report is based on the factual observations made from the site investigations as reported. It is intended for use by the owner

and their retained design team. If there are changes to the features of the development or to the scope, the interpreted subsurface information, geotechnical engineering design parameters, advice, and discussion on construction considerations may not be relevant or complete for the project. Grounded should be retained to review the implications of such changes with respect to the contents of this report.

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

The authorized users of this report are 1095 Kingston Road Limited and their design team, for whom this report has been prepared. Grounded Engineering Inc. maintains the copyright and ownership of this document. Reproduction of this report in any format or medium requires explicit prior authorization from Grounded Engineering Inc. The City of Toronto may also make use of and rely upon this report, subject to the limitations as stated.

15 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

LICENSED PROFESSIONAL ENGINEER
SB
S. BASTAN
100532430
2025-04-07
PROVINCE OF ONTARIO

Sam Bastan, P.Eng.
Intermediate Project Engineer

LICENSED PROFESSIONAL ENGINEER
KB
K. J. BYCKALO
100199873
2025-04-07
PROVINCE OF ONTARIO

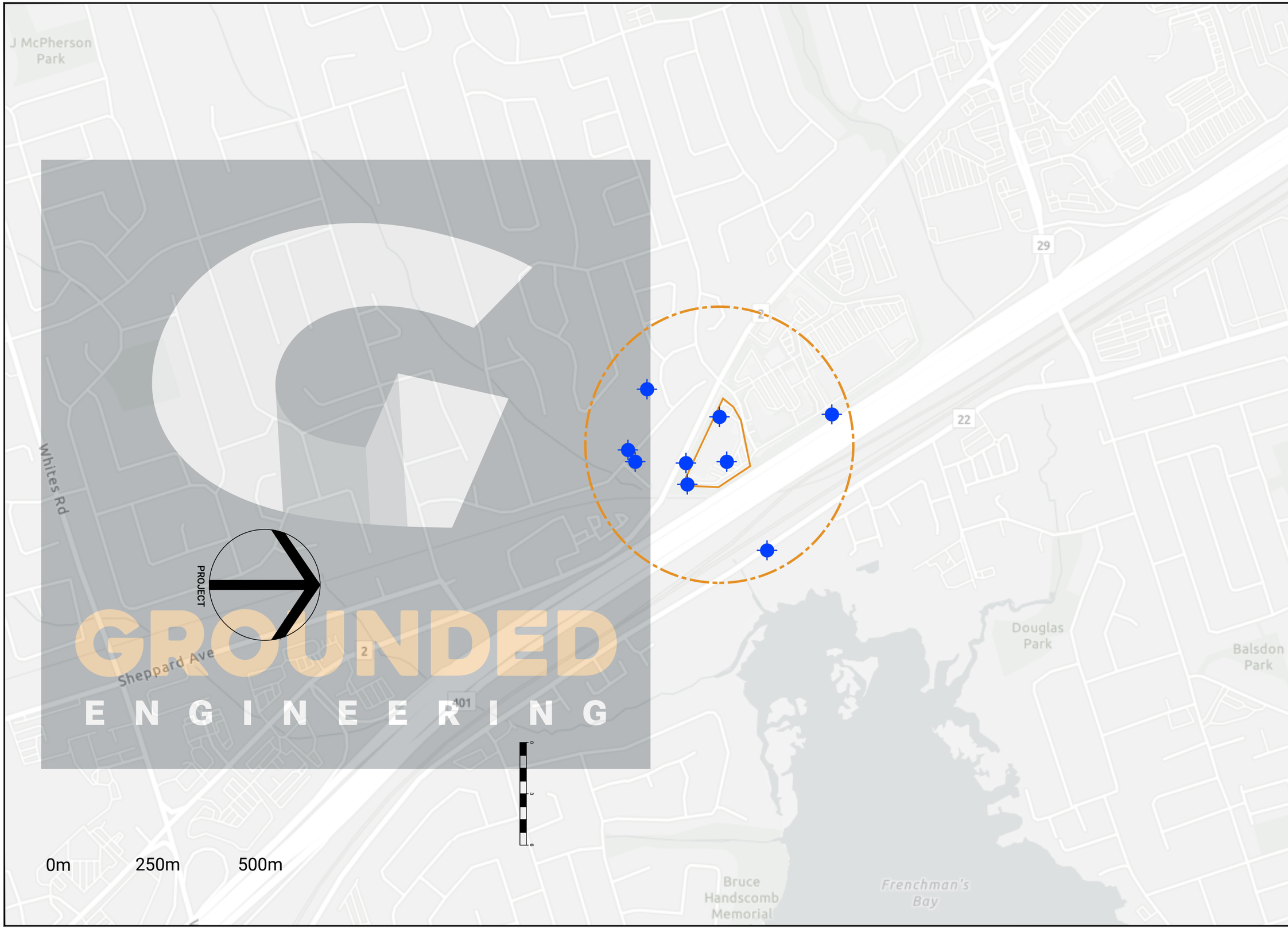
Kyle Byckalo, P.Eng.
Associate

LICENSED PROFESSIONAL ENGINEER
M. J. BIELASKI
100131738
PROVINCE OF ONTARIO

Matt Bielaski, P.Eng. QP RA-ESA
Principal

2025-04-08

FIGURES



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

LEGEND

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

Note

Reference

ArcGIS Online, 2025

Project

1095 KINGSTON ROAD PICKERING, ONTARIO

Figure Title

SITE LOCATION PLAN AND STUDY AREA MAP

North

TRUE

Date

MARCH 2025

Scale

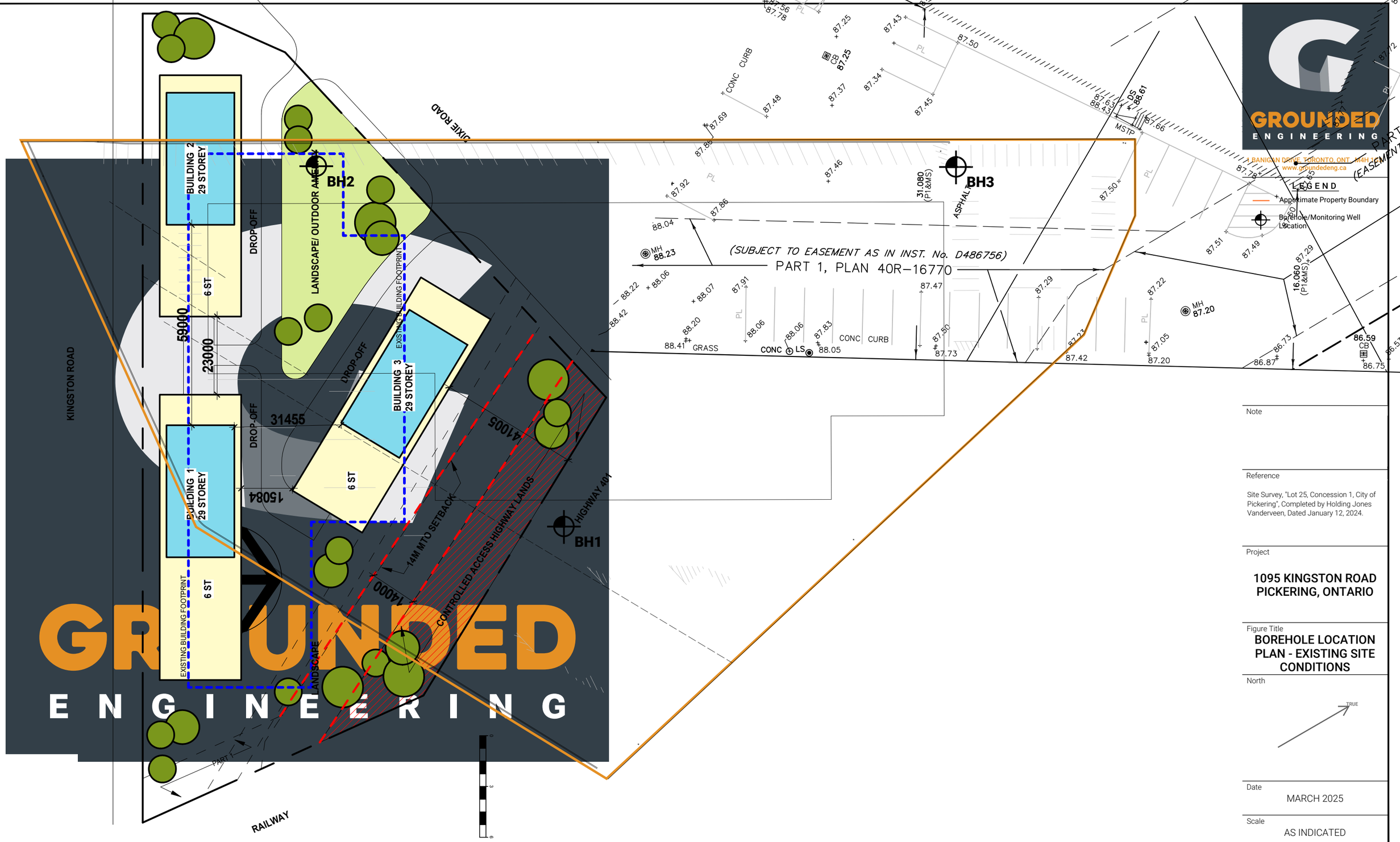
AS INDICATED

Job No

22-279

Figure No

FIGURE 1



1 BANIGAN DRIVE, TORONTO, ONT. M4H 1E5
www.groundedeng.ca

LEGEND

- Approximate Property Boundary
- Borehole/Monitoring Well Location

Note

Reference

Site Survey, "Lot 25, Concession 1, City of Pickering", Completed by Holding Jones Vanderveen, Dated January 12, 2024.

Project

1095 KINGSTON ROAD PICKERING, ONTARIO

Figure Title

BOREHOLE LOCATION PLAN - EXISTING SITE CONDITIONS

North

TRUE

Date

MARCH 2025

Scale

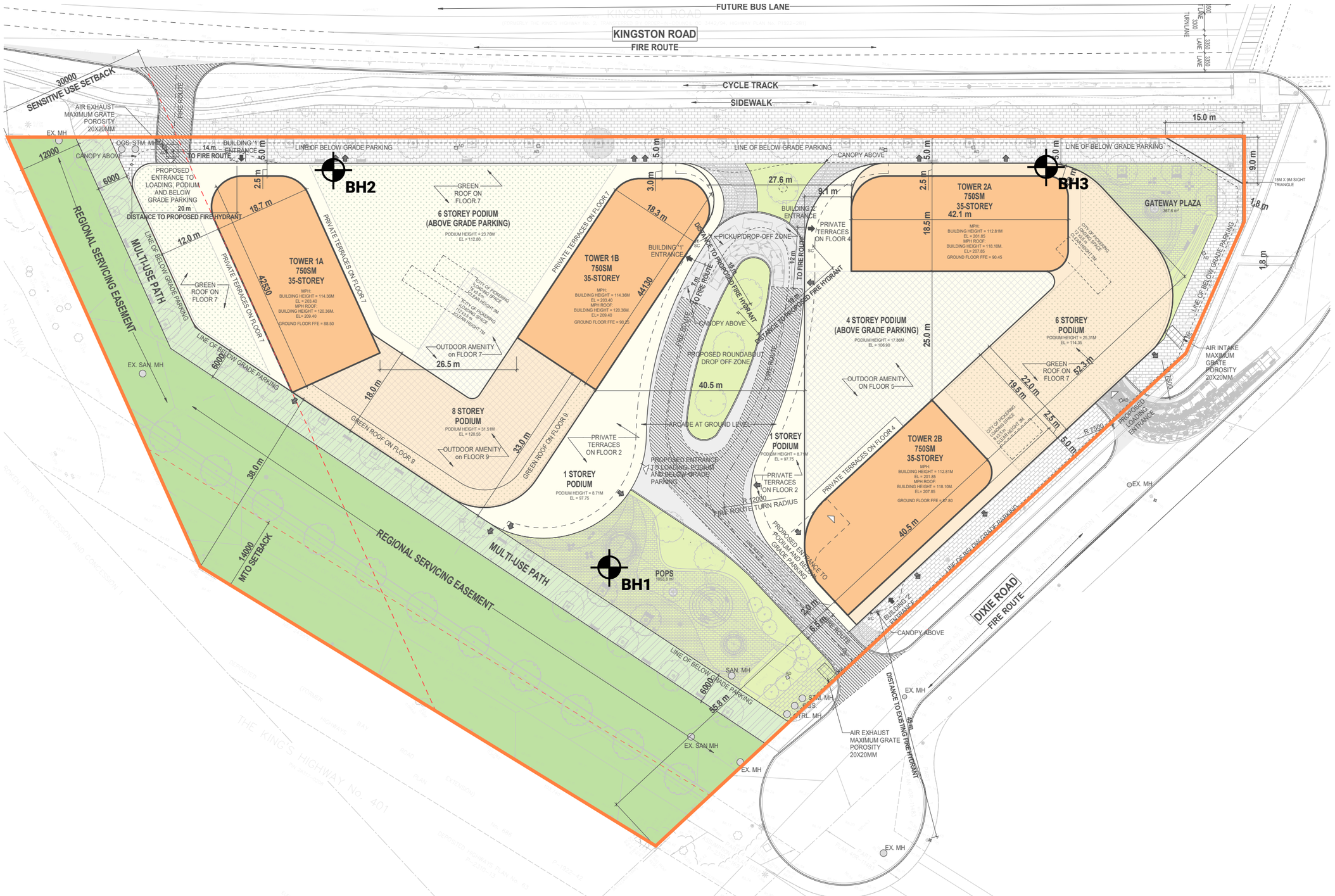
AS INDICATED

Job No

22-279

Figure No

FIGURE 2



GROUNDED ENGINEERING

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

LEGEND

- Appoximate Property Boundary
- Borehole/Monitoring Well Location

Note

Reference

Architectural Drawings, "1095 Kingston Road - Site Plan", Created by BDP Quadrangle, Dated March 2025.

Project

1095 KINGSTON ROAD PICKERING, ONTARIO

Figure Title

BOREHOLE LOCATION PLAN - PROPOSED SITE CONDITIONS

North

TRUE

PROJECT

Date

MARCH 2025

Scale

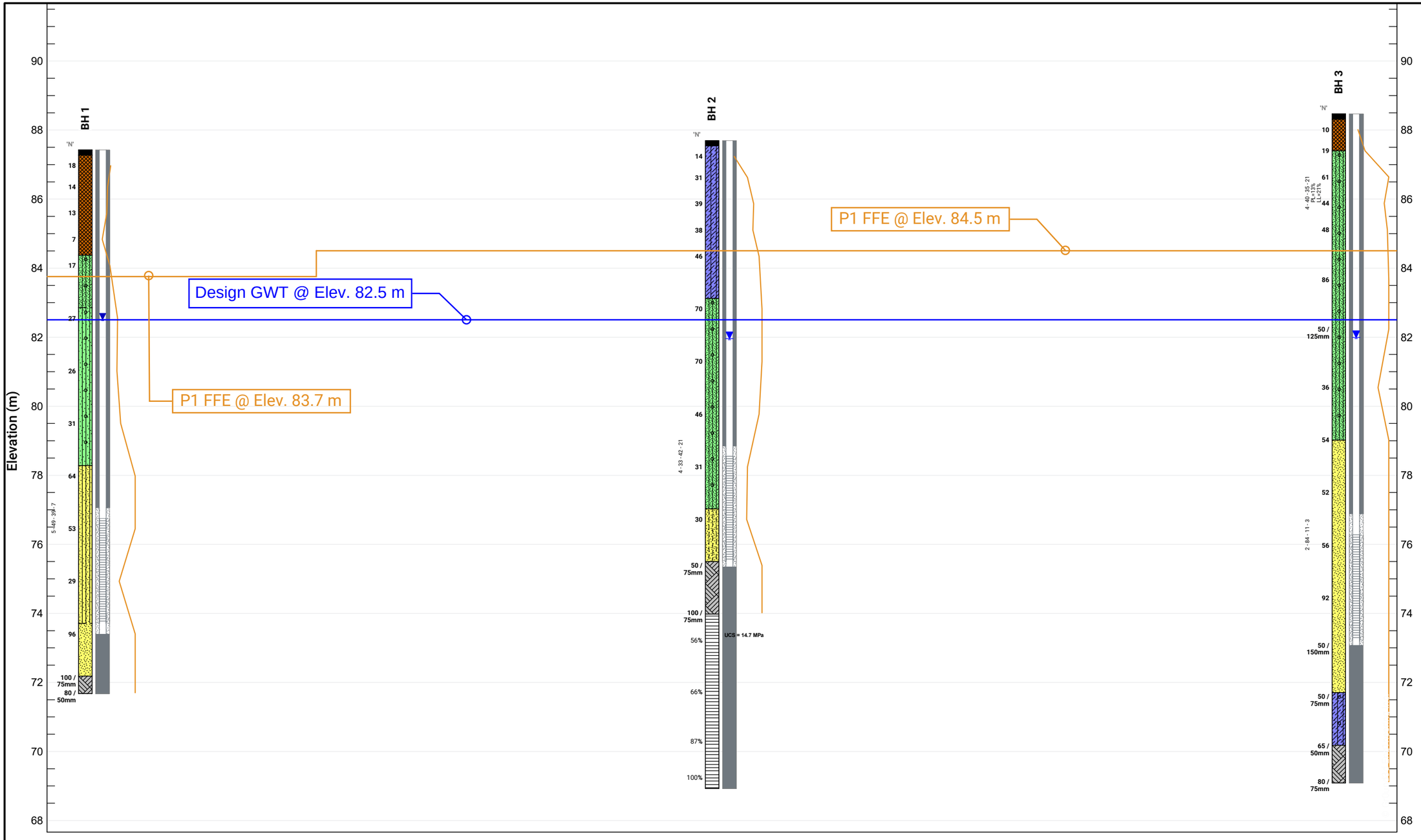
AS INDICATED

Job No

22-279

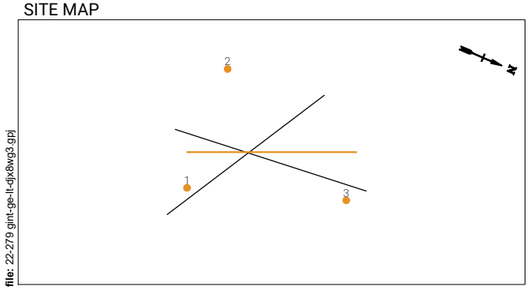
Figure No

FIGURE 3



Boreholes Equally Spaced

SITE MAP



BOREHOLE STRATIGRAPHY LEGEND

- Asphalt
- Fill
- Sand and Silt Till
- Sandy Silt Till
- Sand and Silt
- Sand
- Bedrock (inferred)
- Clayey Silt
- Silty Sand
- Bedrock (cored)
- Clayey Silt Till

file: 22-279 gint-ge-lt-djx8xvg3.gpj

GROUNDED ENGINEERING

1 Banigan Drive, Toronto, Ont., M4H 1G3
www.groundedeng.ca

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

1095 KINGSTON RD
PICKERING, ONTARIO

Figure Title

SUBSURFACE PROFILE

Date

DECEMBER 2025

Scale

AS INDICATED

Job No

22-279

Figure No

FIGURE 4

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

COMPOSITION

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

COHESIONLESS

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

COHESIVE

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

ASTM STANDARDS

ASTM D1586 Standard Penetration Test (SPT)
Driving a 51 mm O.D. split-barrel sampler ("split spoon") into soil with a 63.5 kg weight free falling 760 mm. The blows required to drive the split spoon 300 mm ("bpf") after an initial penetration of 150 mm is referred to as the N-Value.

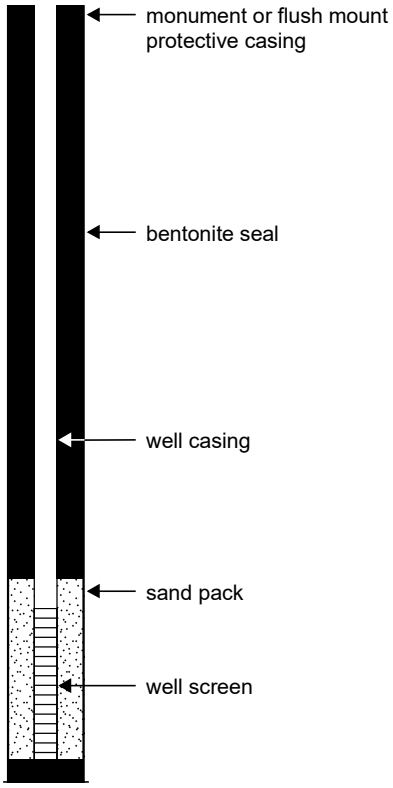
ASTM D3441 Cone Penetration Test (CPT)
Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm^2 into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

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



ROCK CORE TERMINOLOGY (MTO SHALE)

TCR **Total Core Recovery** the total length of recovery (soil or rock) per run, as a percentage of the drilled length
SCR **Solid Core Recovery** the total length of sound full-diameter rock core pieces per run, as a percentage of the drilled length
RQD **Rock Quality Designation** the sum of all pieces of sound rock core in a run which are 10 cm or greater in length, as a percentage of the drilled length

Natural Fracture Frequency (typically per 0.3 m) The number of natural discontinuities (joints, faults, etc.) which are present per 0.3m. Ignores mechanical or drill-induced breaks, and closed discontinuities (e.g. bedding planes).

LOGGING DISCONTINUITIES

Discontinuity Type

BP bedding parting
CL cleavage
CS crushed seam
FZ fracture zone
MB mechanical break
IS infilled seam
JT Joint
SS shear surface
SZ shear zone
VN vein
VO void

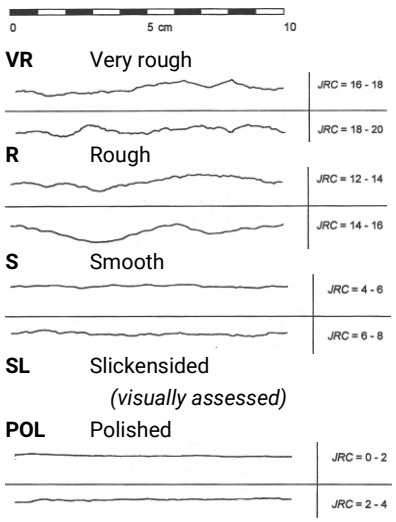
Coating

CN Clean
SN Stained
OX Oxidized
VN Veneer
CT Coating (>1 mm)

Dip Inclination

H	horizontal/flat	0 - 20°
D	dipping	20 - 50°
SV	sub-vertical	50 - 90°
V	vertical	90±°

Roughness (Barton et al.)



Spacing in Discontinuity Sets (*ISRM 1981*)

VC	very close	< 60 mm
C	close	60 – 200 mm
M	mod. close	0.2 to 0.6 m
W	wide	0.6 to 2 m
VW	very wide	> 2 m

Aperture Size

T	closed / tight	< 0.5 mm
GA	gapped	0.5 to 10 mm
OP	open	> 10 mm

Planarity

PR	Planar
UN	Undulating
ST	Stepped
IR	Irregular
DIS	Discontinuous
CU	Curved

GENERAL

Degree of Weathering (*after MTO, RR229 Evaluation of Shales for Construction Projects*)

Zone	Degree	Description
Z1	unweathered	shale, regular jointing
Z2	partially weathered	angular blocks of unweathered shale, no matrix, with chemically weathered but intact shale
Z3		soil-like matrix with frequent angular shale fragments < 25mm diameter
Z4a		soil-like matrix with occasional shale fragments < 3mm diameter
Z4b	fully weathered	soil-like matrix only

Strength classification (*after Marinos and Hoek, 2001; ISRM 1981b*)

Grade		UCS (MPa)	Field Estimate (Description)
R6	extremely strong	> 250	can only be chipped by geological hammer
R5	very strong	100 - 250	requires many blows from geological hammer
R4	strong	50 - 100	requires more than one blow from geological hammer
R3	medium strong	25 - 50	can't be scraped, breaks under one blow from geological hammer
R2	weak	5 - 25	can be peeled / scraped with knife with difficulty
R1	very weak	1 - 5	easily scraped / peeled, crumbles under firm blow of geo. hammer
R0	extremely weak	< 1	indented by thumbnail

Bedding Thickness (*Q. J. Eng. Geology, Vol 3, 1970*)

Very thickly bedded	> 2 m
Thickly bedded	0.6 – 2m
Medium bedded	200 – 600mm
Thinly bedded	60 – 200mm
Very thinly bedded	20 – 60mm
Laminated	6 – 20mm
Thinly Laminated	< 6mm

BOREHOLE LOG 1

Date Started : Nov 17, 2022
Position : E: 652908, N: 4854420 (UTM 17T)
Elev. Datum : Geodetic

File No. : 22-279 **Project** : 1095 Kingston Rd., Pickering **Client** : Plaza Partners

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
87.4	**GROUND SURFACE**				
	150mm **ASPHALT**				
	FILL, clayey silt, sandy, some gravel, trace rock fragments, trace construction debris, trace wood fragments, trace asphalt, very stiff to stiff, brown, moist		1	SS	18
	...at 0.8 m, light grey silt partings		2	SS	14
			3	SS	13
	...at 2.3 m, trace orange staining, trace cinders, firm		4	SS	7
84.4					
3.0	**SAND AND SILT**, some clay, trace rock fragments, trace gravel, compact, grey, moist (GLACIAL TILL)		5	SS	17
82.8					
4.6	**SANDY SILT**, clayey, trace gravel, compact, grey, moist (GLACIAL TILL)		6	SS	27
			7	SS	26
	...at 7.6 m, dense		8	SS	31
78.3					
9.1	**SAND AND SILT**, trace clay, trace gravel, very dense, grey, wet		9	SS	64
			10	SS	53
	...at 12.2 m, trace rock fragments, compact		11	SS	29
73.7					
13.7	**SAND**, trace silt, trace gravel, trace rock fragments, trace shale fragments, very dense, grey, wet		12	SS	96
72.2					
15.2	**INFERRED BEDROCK**		13	SS	100 / 75mm
71.7					
15.7			14	SS	80 / 50mm

mud rotary lg OD=135 mm

hollow stem augers OD=215 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: H-Ms, Metals, ORPs — 18 23 32 27
SS2: PAHs
SS4: BTEX, H-Ms, Metals, ORPs, PAHs, PHCs, VOCs
5 49 39 7
SS10: BTEX, PHCs, VOCs
14.6m: Auger grinding (1 min)
15.2m: Auger grinding (10min) **to 15.7m**
15.7m: Auger refusal

END OF BOREHOLE
Refusal on inferred bedrock

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)
Nov 23, 2022	5.3	82.1
Jan 12, 2024	5.0	82.4
Jan 16, 2024	4.9	82.5
Feb 3, 2025	5.3	82.1

file: 22-279 gint.gpj

Tech : AK | **PM** : SB/VT | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Nov 16, 2022
Position : E: 652819, N: 4854413 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 2

File No. : 22-279 **Project** : 1095 Kingston Rd., Pickering **Client** : Plaza Partners

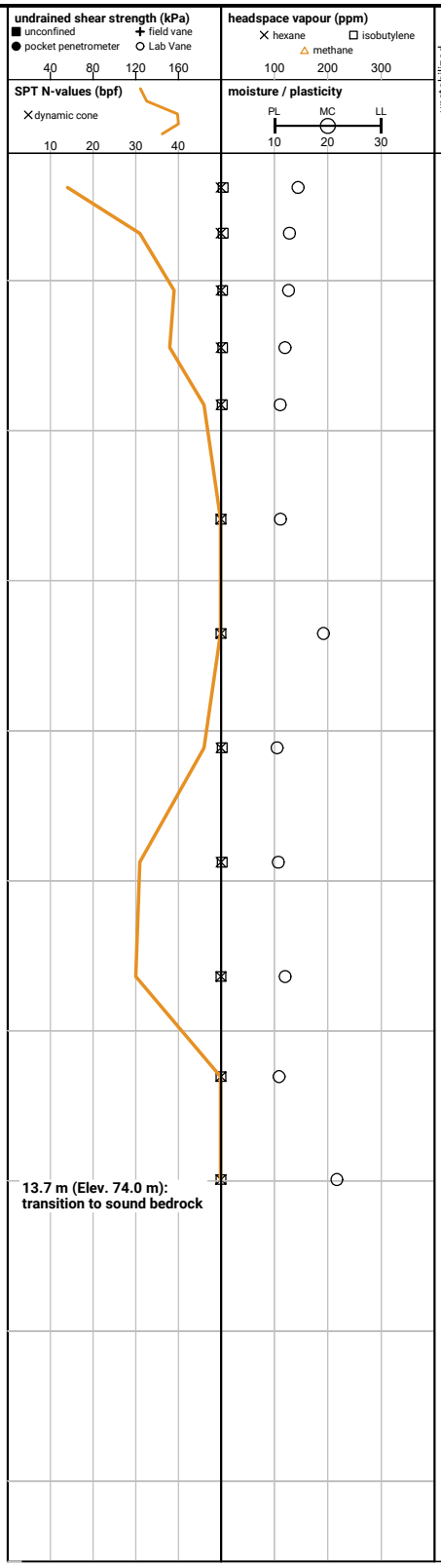
drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
87.7	**GROUND SURFACE**				
	150mm **ASPHALT**				
	CLAYEY SILT, some sand, trace gravel, light grey silt partings, stiff to hard, brownish grey, moist		1	SS	14
			2	SS	31
			3	SS	39
			4	SS	38
	...at 3.0 m, trace sand		5	SS	46
83.1					
4.6	**SAND AND SILT**, clayey, trace gravel, dense to very dense, grey, moist (GLACIAL TILL)		6	SS	70
			7	SS	70
			8	SS	46
	...at 9.1 m, sandy silt, clayey, trace rock fragments		9	SS	31
77.0					
10.7	**SILTY SAND**, trace clay, trace gravel, dense, grey, wet		10	SS	30
75.5					
12.2	**INFERRED BEDROCK**, shale fragments		11	SS	50 / 75mm
74.0					
13.7	**WHITBY FORMATION** (See rock core log for details)		12	SS	100 / 75mm
			1	RUN	
			2	RUN	
			3	RUN	
			4	RUN	
68.9					
18.8	**END OF BOREHOLE**				

hollow stem augers OD=215 mm

mud rotary lg OD=135 mm

rock coring (HQ) OD=96 mm



depth scale (m) 0 1 2 3 4 5 6 7 8 9 10 11 12 13 15 16 17 18

well details

elevation (m) 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)

	GR	SA	SI	CL
SS1: H-Ms, Metals, ORPs	10	11	49	30
SS2: BTEX, PAHs, PHCs, VOCs				
SS3: H-Ms, PAHs,				
	0	1	67	32
SS6: PHCs				
SS9: BTEX, PHCs, VOCs	4	33	42	21

12.2m: auger grinding

13.6 m: spoon bouncing

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)
Nov 23, 2022	5.8	81.9
Jan 12, 2024	5.3	82.4
Jan 16, 2024	5.4	82.3
Feb 3, 2025	5.8	81.9

file: 22-279 gint.gpj

Tech : AK | **PM** : SB/VT | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Nov 16, 2022
Position : E: 652819, N: 4854413 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 2

File No. : 22-279 **Project** : 1095 Kingston Rd., Pickering **Client** : Plaza Partners

depth (m)	graphic log	stratigraphy	Run elev depth (m)	recovery	elevation (m)	shale weathering zones	UCS (MPa) / estimated strength	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
		Rock coring started at 13.7m below grade	**74.0**			Z1 Z2 Z3 Z4	R1 R2 R3 R4 R5 R6				
14		**WHITBY FORMATION** **Shale**, black, thinly bedded to medium bedded, weak to medium strong; joints are horizontal, closed, clean;	13.7 R1 72.5	TCR = **100%** SCR = **80%** RQD = **56%**				1 1 0 3	**El. 73.4m**: UCS = 14.7 MPa E = 4.20 GPa γ = 25.5 kN/m^3	**14.1 / 73.5 - 14.2 / 73.5m:** IS clay **14.6 / 73.1 - 14.7 / 73.0m:** IS clay **14.7 / 73.0 - 14.7 / 73.0m:** FC SV	
15		**... at 13.7 m (Elev. 74.0 m), transition to sound rock**			73			1+RZ		**15.0 / 72.7 - 15.1 / 72.6m:** Rubbilized zone **15.1 / 72.6 - 15.1 / 72.6m:** IS clay	73
			15.2 R2 71.0	TCR = **100%** SCR = **91%** RQD = **66%**	72			1 2 1 0 0			72
16										**16.0 / 71.7 - 16.1 / 71.6m:** clay seam	
			16.7 R3 69.6	TCR = **99%** SCR = **99%** RQD = **87%**	71			1 1 1 2 0			71
17											
18			18.1 R4 68.9	TCR = **100%** SCR = **100%** RQD = **100%**	70			0 1		**17.8 / 69.9 - 17.8 / 69.9m:** IS clay	70
			18.8m		69						69

END OF COREHOLE

file: 22-279 gint.gpj

Tech : AK | **PM** : SB/VT | **Rev** : MD

BOREHOLE LOG 3

Date Started : Nov 14, 2022
Position : E: 652872, N: 4854527 (UTM 17T)
Elev. Datum : Geodetic

File No. : 22-279 **Project** : 1095 Kingston Rd., Pickering **Client** : Plaza Partners

drill method : CME 55

hollow stem augers OD=215 mm

mud rotary lg OD=135 mm

elev depth (m)	description	number	type	SPT N-value	lab data and comments
88.5	**GROUND SURFACE**				
	150mm **ASPHALT**				
	FILL, clayey silt, sandy, some gravel, trace asphalt, orange staining, stiff, brown, moist	1	SS	10	
87.4 / 1.1	...at 0.8 m, sandy silt, compact	2	SS	19	
	SAND AND SILT, clayey, trace gravel, orange staining, dense to very dense, grey, moist (GLACIAL TILL)	3	SS	61	
	...at 2.3 m, no staining	4	SS	44	
		5	SS	48	
		6	SS	86	
		7	SS	50 / 125mm	
		8	SS	36	
79.1	...at 9.1 m, sandy	9A	SS	54	SS9A: BTEX, PHCs, VOCs
9.4	**SAND**, some silt, trace clay, trace gravel, very dense, grey, wet	9B	SS		
		10	SS	52	
		11	SS	56	2 84 11 3
	...at 13.7 m, some gravel	12	SS	92	
	...at 15.2 m, trace shale fragments	13	SS	50 / 150mm	
71.7 / 16.8	**CLAYEY SILT**, some sand, trace gravel, trace shale fragments, hard, grey, moist (GLACIAL TILL)	14	SS	50 / 75mm	**16.8m:** Auger refusal
70.2 / 18.3	**INFERRED BEDROCK**	15	SS	65 / 50mm	**17.7m:** Auger grinding (15min) **to 18.3m** **18.3m:** Auger grinding (20min) **to 19.3m**
69.1 / 19.4		16	SS	80 / 75mm	**19.3m:** Auger refusal

depth scale (m) 0–19; elevation (m) 88–70

well details

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

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

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

moisture / plasticity: PL MC LL; 10 20 30

unstabilized water level

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

SS1: H-Ms, Metals, ORPs

SS2: BTEX, PAHs, PHCs, VOCs

SS3: H-Ms, Metals, ORPs 4 40 35 21

SS4: PAHs

END OF BOREHOLE
Refusal on inferred bedrock

Borehole was filled with drill water upon completion of drilling.

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

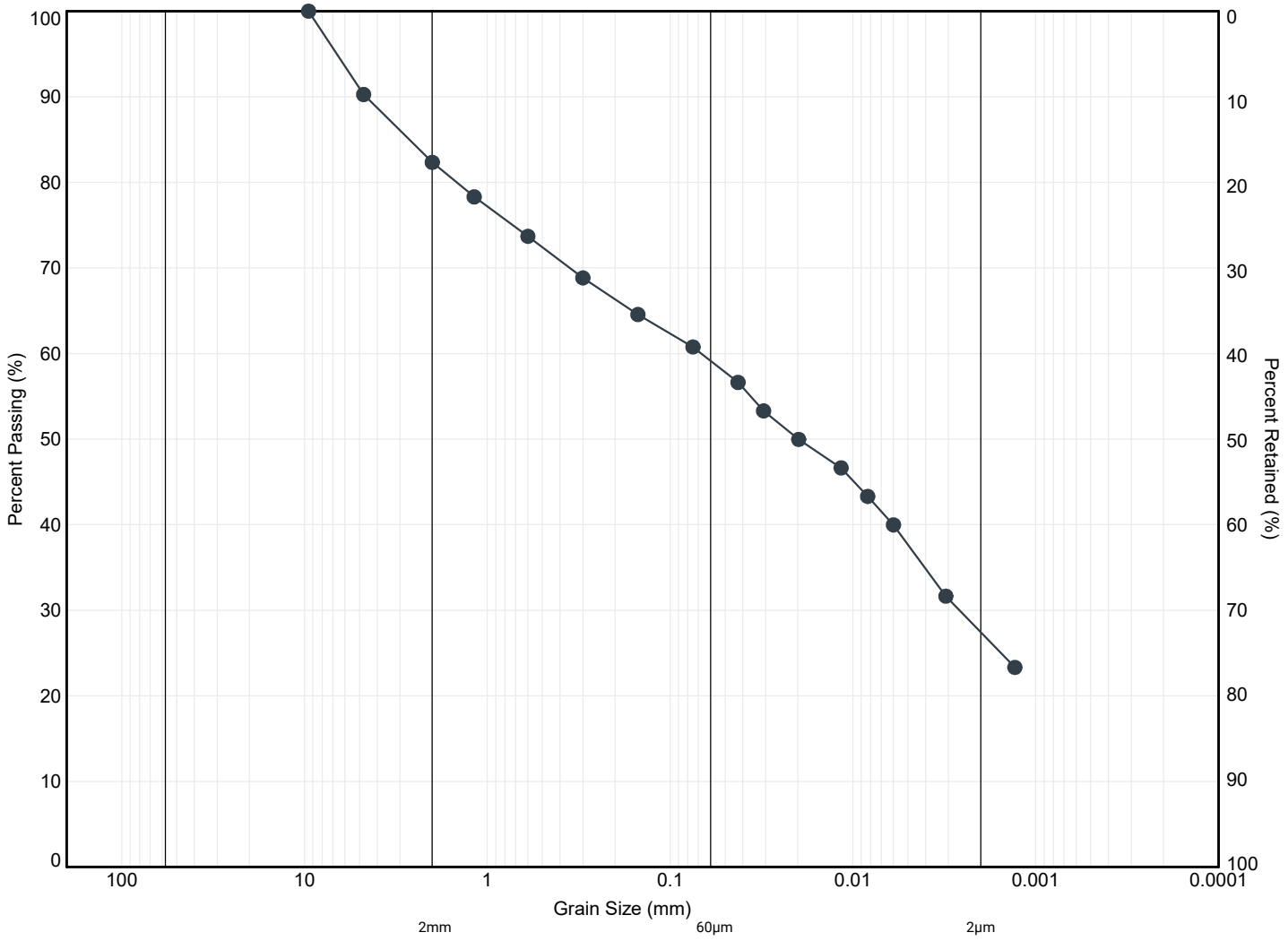
GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Nov 30, 2022	6.5	82.0
Jan 12, 2024	6.2	82.3
Jan 16, 2024	6.2	82.3
Feb 3, 2505	6.5	82.0

file: 22-279 gint.gpj

Tech : AK | **PM** : SB/VT | **Rev** : MD

APPENDIX B



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

MIT SYSTEM

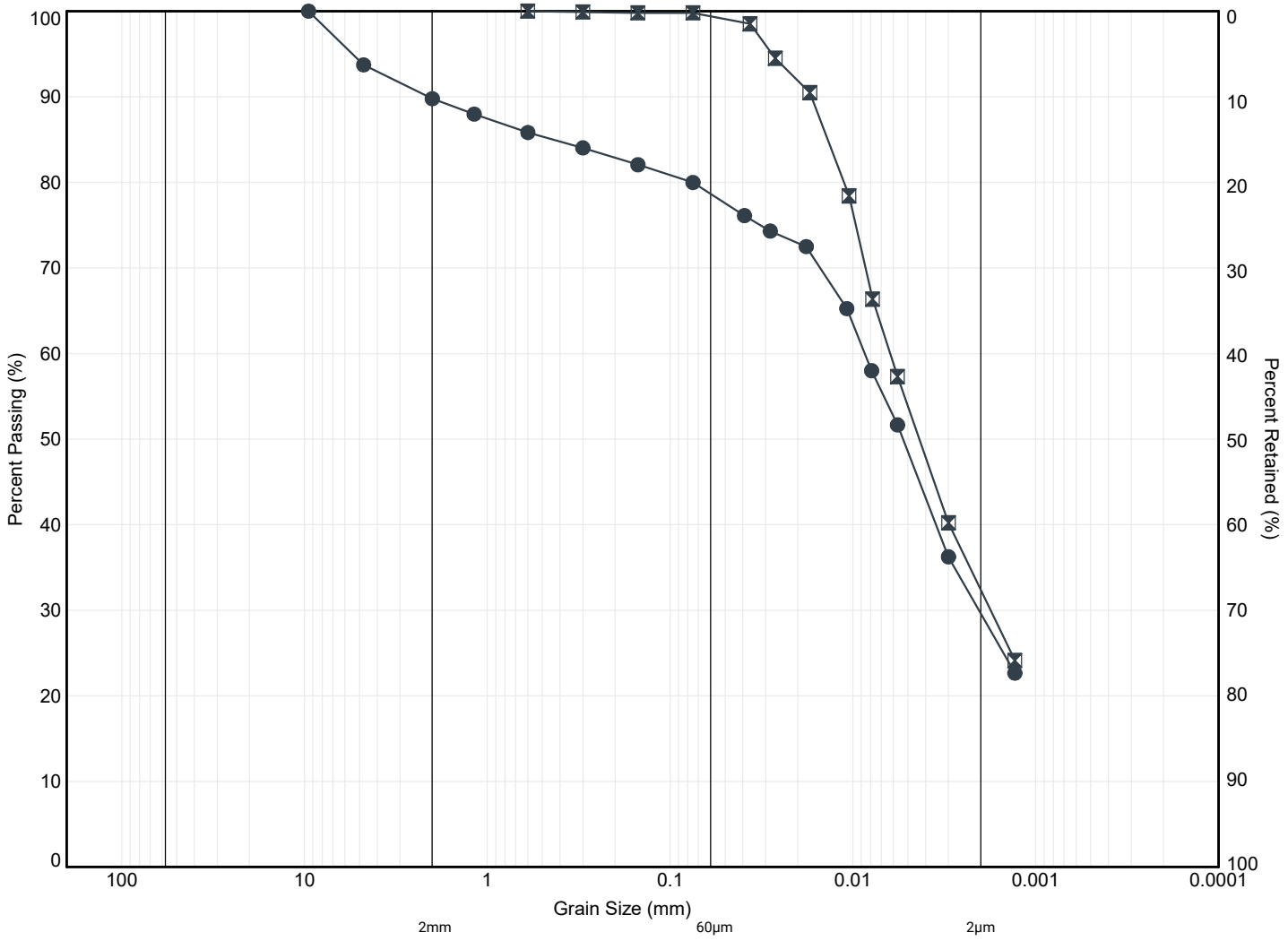
	Location	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**BH 1**	SS2	1.1	86.4	18	23	32	27

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION**
EARTH FILL

File No.: **22-279**

file: 22-279 gint.gpj



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

MIT SYSTEM

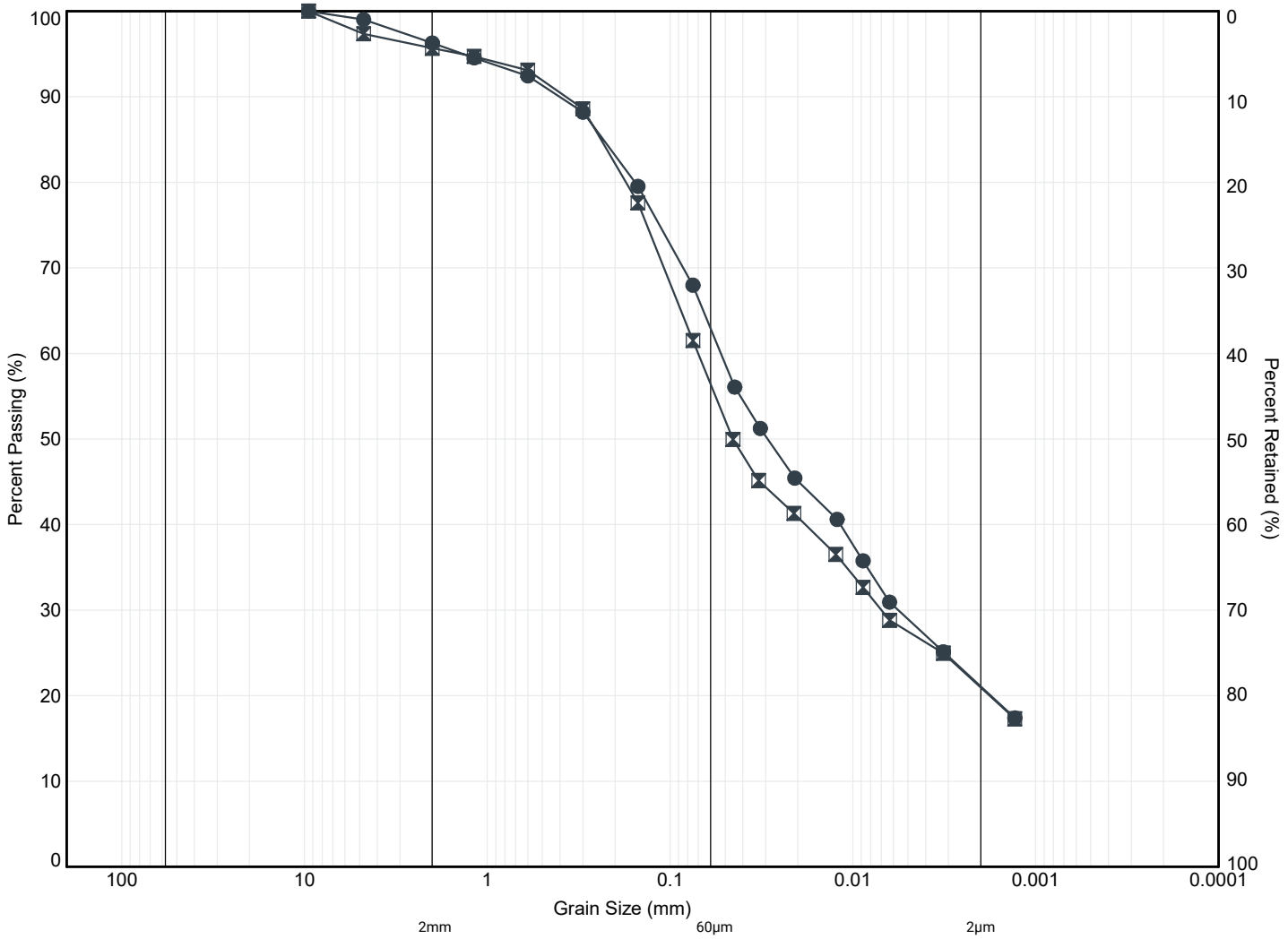
	Location	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**BH 2**	SS1	0.5	87.2	10	11	49	30
⊠	**BH 2**	SS5	3.4	84.3	0	1	67	32

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION**
CLAYEY SILT

File No.: **22-279**

file: 22-279 gint.gpj



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

MIT SYSTEM

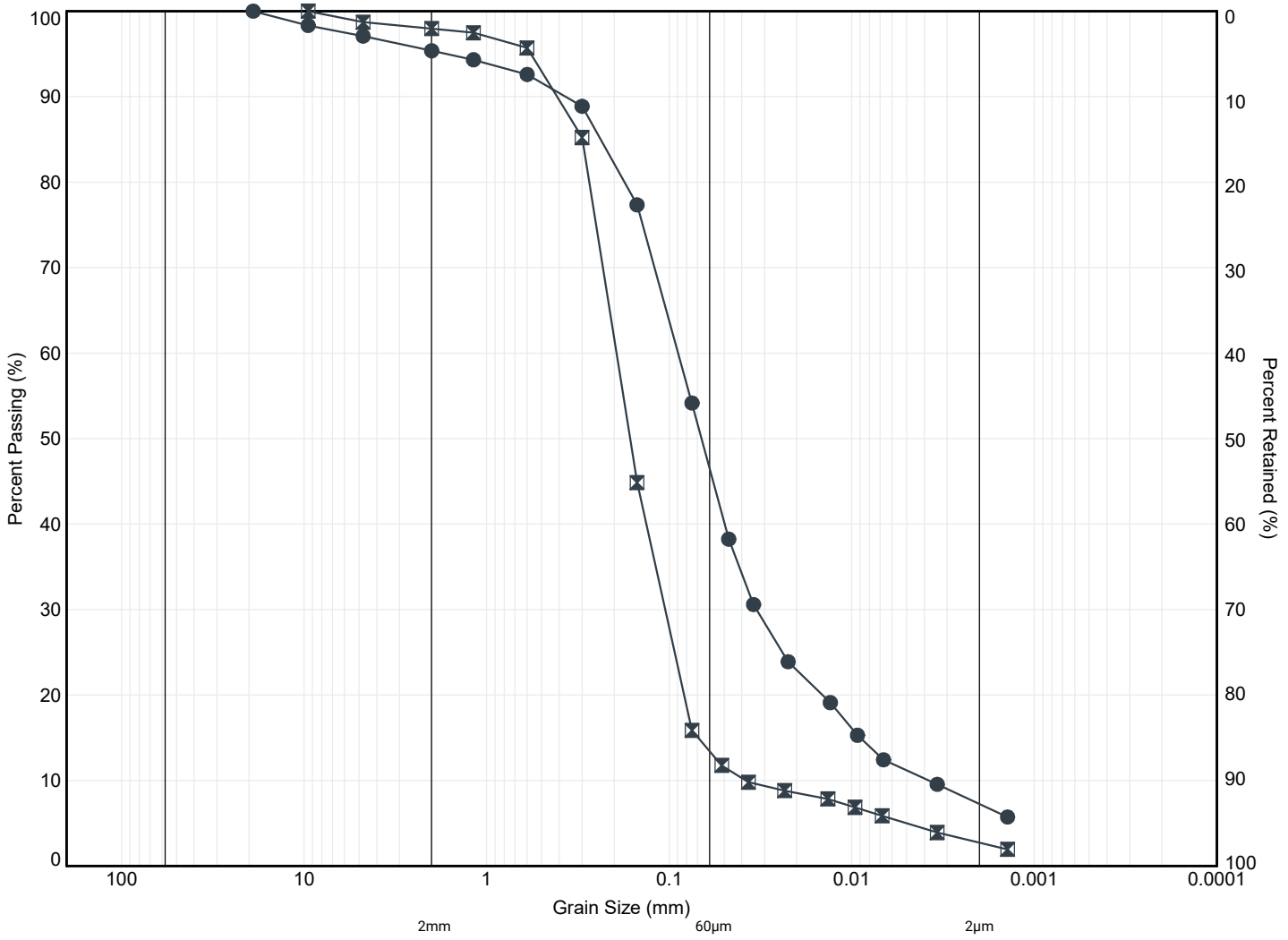
	Location	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**BH 2**	SS9	9.4	78.2	4	33	42	21
⊠	**BH 3**	SS4	2.6	85.9	4	40	35	21

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION COHESIONLESS GLACIAL TILL**

File No.: **22-279**

file: 22-279 gint.gpj



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

MIT SYSTEM

	Location	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**BH 1**	SS10	11.0	76.5	5	49	39	7
⊠	**BH 3**	SS11	12.5	76.0	2	84	11	3

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION SANDS**

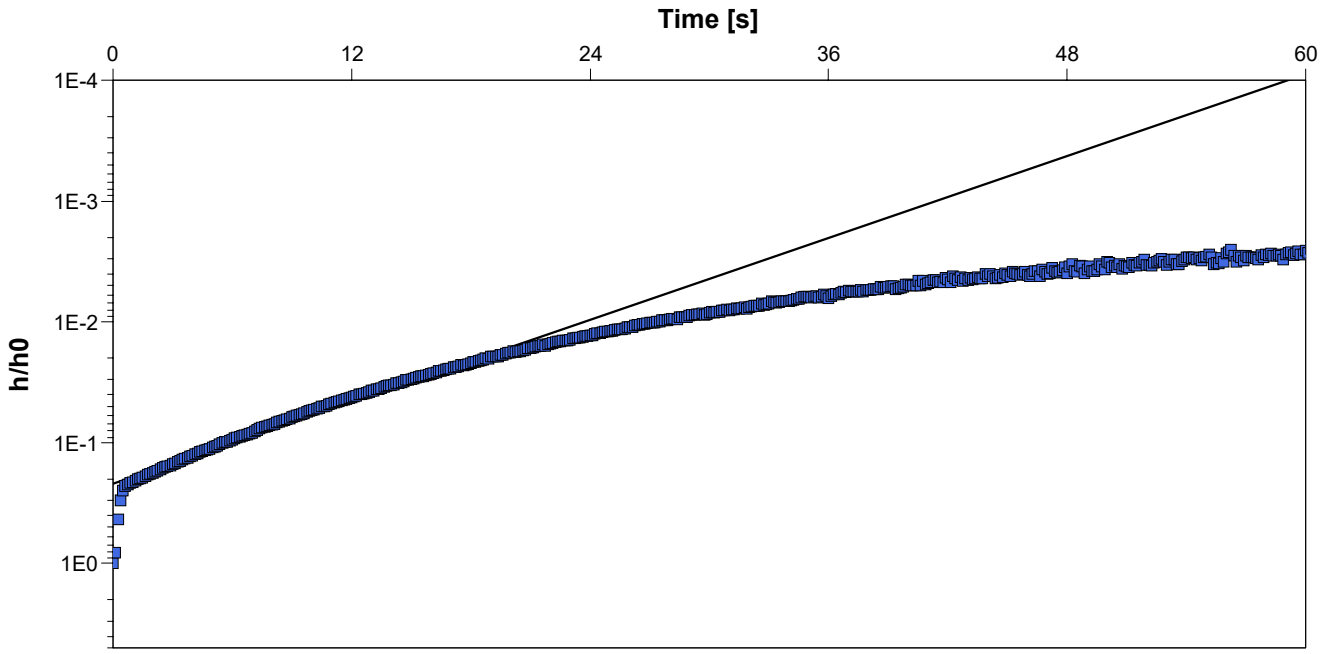
File No.: **22-279**

file: 22-279 gint.gpj

APPENDIX C

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 1095 Kingston Rd.
	Number: 22-279
	Client: Plaza Partners

Location: Pickering, ON	Slug Test: BH1	Test Well: BH1
Test Conducted by: MC		Test Date: 2022-11-23
Analysis Performed by: SB	BH1	Analysis Date: 2022-11-30
Aquifer Thickness: 15.24 m		

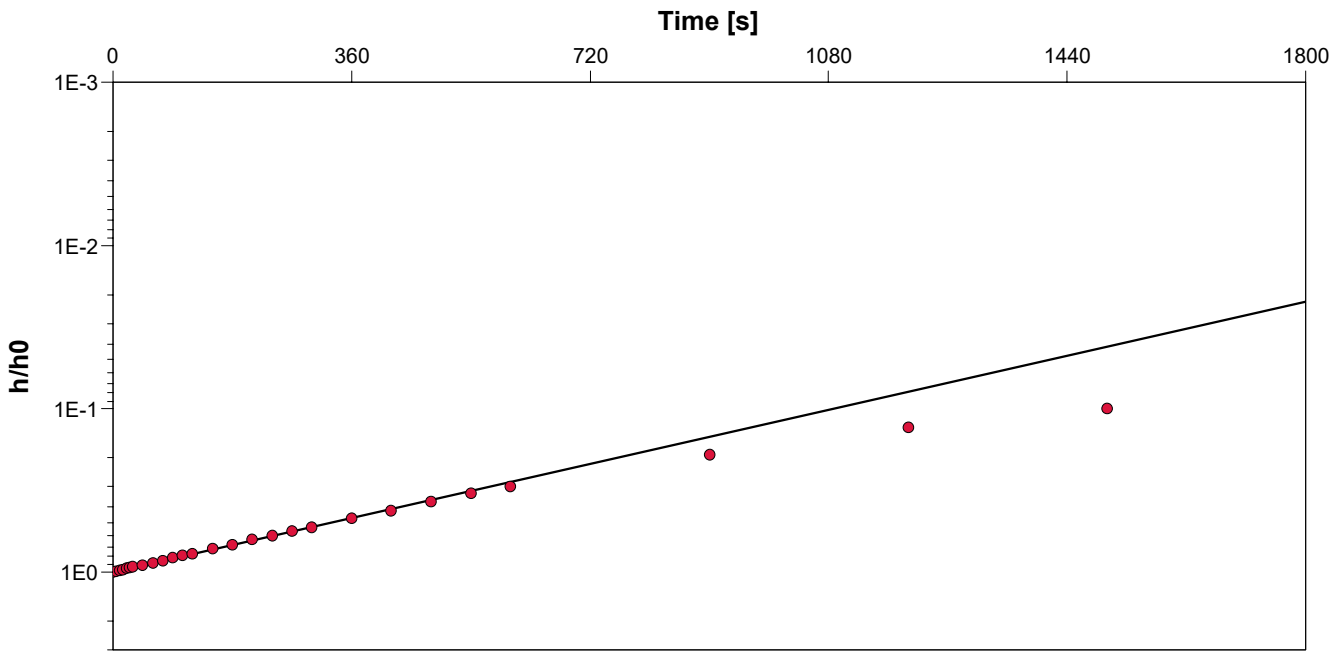


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH1	5.43×10^{-5}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 1095 Kingston Rd.
	Number: 22-279
	Client: Plaza Partners

Location: Pickering, ON	Slug Test: BH2	Test Well: BH2
Test Conducted by: AK		Test Date: 2022-11-23
Analysis Performed by:	BH2	Analysis Date: 2022-11-30
Aquifer Thickness: 12.50 m		

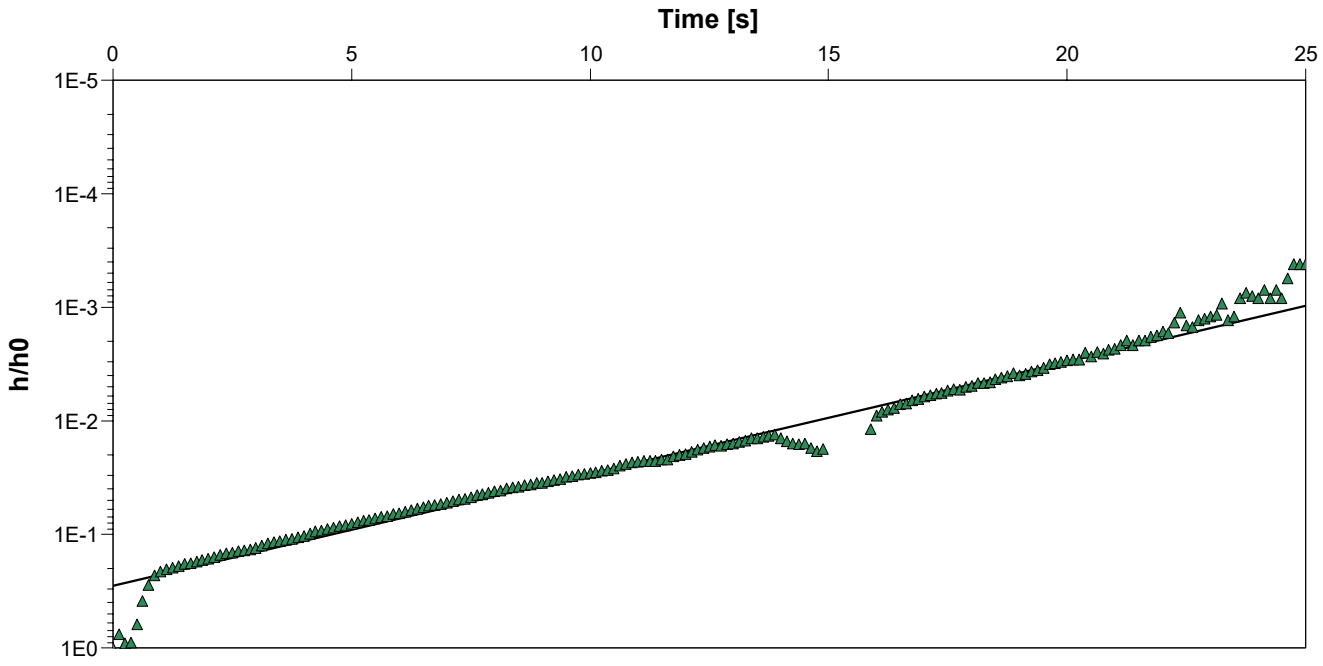


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH2	9.09×10^{-7}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 1095 Kingston Rd.
	Number: 22-279
	Client: Plaza Partners

Location: Pickering, ON	Slug Test: BH3	Test Well: BH3
Test Conducted by: MC		Test Date: 2022-11-23
Analysis Performed by: SB	BH3	Analysis Date: 2022-11-30
Aquifer Thickness: 16.76 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH3	9.61×10^{-5}	

APPENDIX D

K from Grain Size Analysis Report

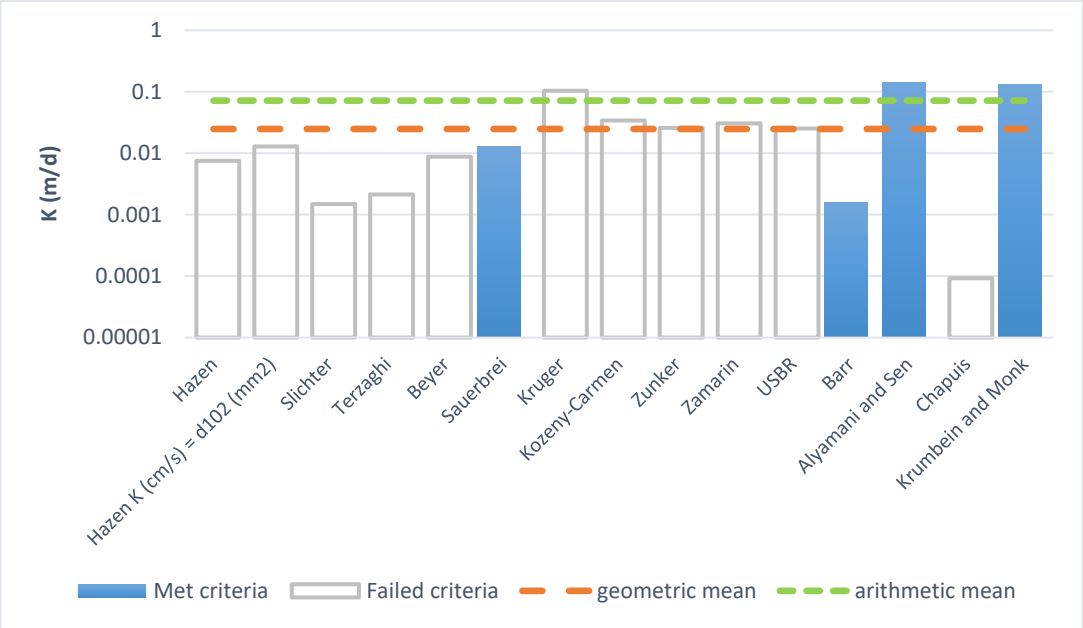
Date: 21-Nov-22

Sample Name: BH 1 SS10

Mass Sample (g): 347.51

T (oC) 20

Poorly sorted sand with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	8.7E-06	8.7E-08	0.01	
Hazen K (cm/s) = d_{10} (mm)	1.5E-05	1.5E-07	0.01	
Slichter	1.7E-06	1.7E-08	0.00	
Terzaghi	2.5E-06	2.5E-08	0.00	
Beyer	1.0E-05	1.0E-07	0.01	
Sauerbrei	1.5E-05	1.5E-07	0.01	
Kruger	1.2E-04	1.2E-06	0.10	
Kozeny-Carmen	3.9E-05	3.9E-07	0.03	
Zunker	3.0E-05	3.0E-07	0.03	
Zamarin	3.5E-05	3.5E-07	0.03	
USBR	2.9E-05	2.9E-07	0.03	
Barr	1.9E-06	1.9E-08	0.00	
Alyamani and Sen	1.7E-04	1.7E-06	0.14	
Chapuis	1.1E-07	1.1E-09	0.00	
Krumbein and Monk	1.5E-04	1.5E-06	0.13	
geometric mean	2.9E-05	2.9E-07	0.02	
arithmetic mean	8.3E-05	8.3E-07	0.07	

K from Grain Size Analysis Report

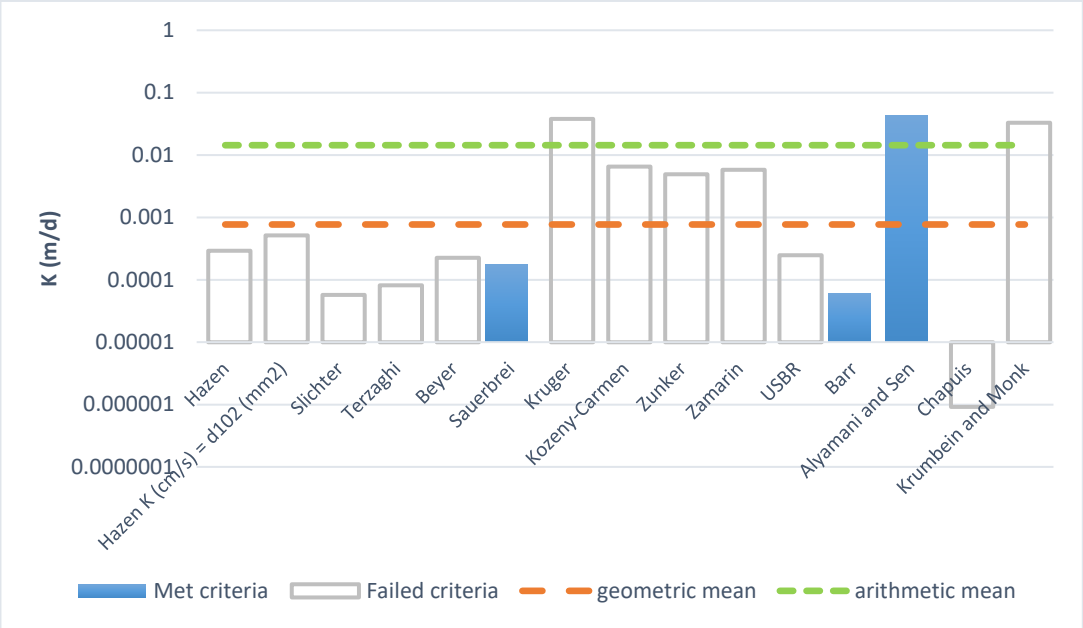
Date: 21-Nov-22

Sample Name: BH 2 SS9

Mass Sample (g): 154.45

T (oC) 20

Poorly sorted sandy silt with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	3.4E-07	3.4E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	5.9E-07	5.9E-09	0.00	
Slichter	6.6E-08	6.6E-10	0.00	
Terzaghi	9.4E-08	9.4E-10	0.00	
Beyer	2.6E-07	2.6E-09	0.00	
Sauerbrei	2.0E-07	2.0E-09	0.00	
Kruger	4.4E-05	4.4E-07	0.04	
Kozeny-Carmen	7.5E-06	7.5E-08	0.01	
Zunker	5.7E-06	5.7E-08	0.00	
Zamarin	6.7E-06	6.7E-08	0.01	
USBR	2.8E-07	2.8E-09	0.00	
Barr	7.1E-08	7.1E-10	0.00	
Alyamani and Sen	5.0E-05	5.0E-07	0.04	
Chapuis	1.1E-09	1.1E-11	0.00	
Krumbein and Monk	3.8E-05	3.8E-07	0.03	
geometric mean	8.9E-07	8.9E-09	0.00	
arithmetic mean	1.7E-05	1.7E-07	0.01	

K from Grain Size Analysis Report

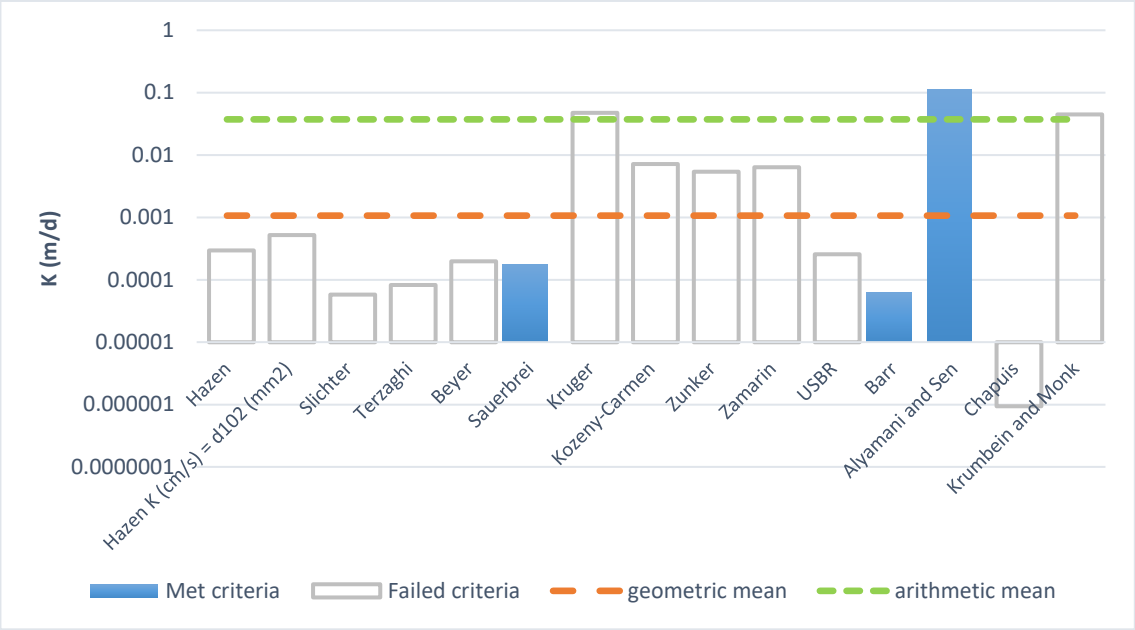
Date: 21-Nov-22

Sample Name: BH 3 SS4

Mass Sample (g): 270.7

T (oC) 20

Poorly sorted sandy silt with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	3.4E-07	3.4E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	6.0E-07	6.0E-09	0.00	
Slichter	6.7E-08	6.7E-10	0.00	
Terzaghi	9.5E-08	9.5E-10	0.00	
Beyer	2.3E-07	2.3E-09	0.00	
Sauerbrei	2.0E-07	2.0E-09	0.00	
Kruger	5.5E-05	5.5E-07	0.05	
Kozeny-Carmen	8.3E-06	8.3E-08	0.01	
Zunker	6.3E-06	6.3E-08	0.01	
Zamarin	7.4E-06	7.4E-08	0.01	
USBR	3.0E-07	3.0E-09	0.00	
Barr	7.2E-08	7.2E-10	0.00	
Alyamani and Sen	1.3E-04	1.3E-06	0.11	
Chapuis	1.1E-09	1.1E-11	0.00	
Krumbein and Monk	5.2E-05	5.2E-07	0.04	
geometric mean	1.2E-06	1.2E-08	0.00	
arithmetic mean	4.3E-05	4.3E-07	0.04	

K from Grain Size Analysis Report

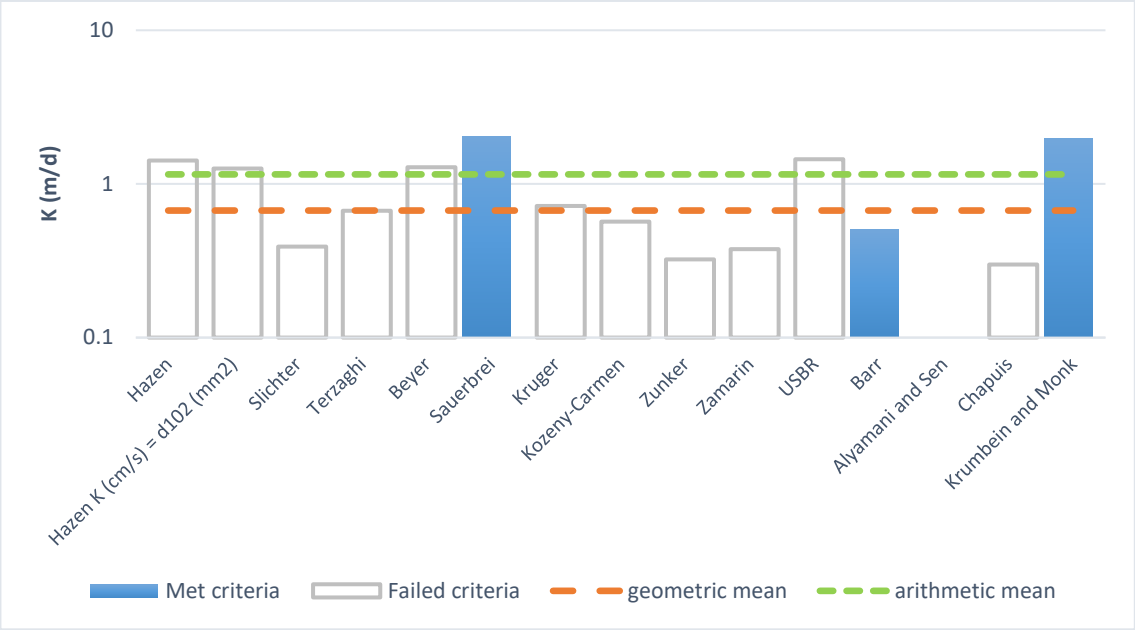
Date: 21-Nov-22

Sample Name: BH 3 SS11

Mass Sample (g): 290.81

T (oC) 20

Poorly sorted sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	1.6E-03	1.6E-05	1.42	
Hazen K (cm/s) = d_{10} (mm)	1.5E-03	1.5E-05	1.26	
Slichter	4.5E-04	4.5E-06	0.39	
Terzaghi	7.7E-04	7.7E-06	0.67	
Beyer	1.5E-03	1.5E-05	1.28	
Sauerbrei	2.4E-03	2.4E-05	2.05	
Kruger	8.3E-04	8.3E-06	0.72	
Kozeny-Carmen	6.6E-04	6.6E-06	0.57	
Zunker	3.7E-04	3.7E-06	0.32	
Zamarin	4.4E-04	4.4E-06	0.38	
USBR	1.7E-03	1.7E-05	1.45	
Barr	5.8E-04	5.8E-06	0.50	
Alyamani and Sen	1.2E-04	1.2E-06	0.10	
Chapuis	3.5E-04	3.5E-06	0.30	
Krumbein and Monk	2.3E-03	2.3E-05	1.97	
geometric mean	7.8E-04	7.8E-06	0.67	
arithmetic mean	1.3E-03	1.3E-05	1.15	

APPENDIX E

FINAL REPORT

CA40286-NOV22 R1

22-279, 1095 Kingston Rd. Pickering

Prepared for

Grounded Engineering Inc.

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	Grounded Engineering Inc.	Project Specialist	Brad Moore Hon. B.Sc
		Laboratory	SGS Canada Inc.
Address	1 Banigan Drive Toronto, Ontario M4H1G3. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Vivi Tran	Telephone	705-652-2143
Telephone	647-264-7928	Facsimile	705-652-6365
Facsimile		Email	brad.moore@sgs.com
Email	vtran@groundedeng.ca	SGS Reference	CA40286-NOV22
Project	22-279, 1095 Kingston Rd. Pickering	Received	11/23/2022
Order Number		Approved	11/30/2022
Samples	Ground Water (1)	Report Number	CA40286-NOV22 R1
		Date Reported	11/30/2022

COMMENTS

RL - SGS Reporting Limit

Nonylphenol Ethoxylates is the sum of nonylphenol monoethoxylate and nonylphenol diethoxylate.

Total PAH is the sum of anthracene, benzo(a)pyrene, benzo(a)anthracene, benzo(e)pyrene, benzo(b,j)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, dibenzo(a,i)pyrene, dibenzo(a,j)acridine, 7H-dibenzo(c,g)carbazole, fluoranthene, indeno(1,2,3-c,d)pyrene, perylene, phenanthrene and pyrene..

Temperature of Sample upon Receipt: 9 degrees C
Cooling Agent Present: Yes
Custody Seal Present: Yes

Chain of Custody Number: 030196

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

Client: Grounded Engineering Inc.
Project: 22-279, 1095 Kingston Rd. Pickering
Project Manager: Vivi Tran
Samplers: Andrew Kernerman

MATRIX: WATER

L1 = SANSEW / WATER / - - Durham Sewer Use ByLaw - Sanitary Sewer Discharge - BL_55_2013

L2 = SANSEW / WATER / - - Durham Sewer Use ByLaw - Storm Sewer Discharge - BL_55_2013

Sample Number	8
Sample Name	SW-uf-BH3
Sample Matrix	Ground Water
Sample Date	23/11/2022

Parameter	Units	RL	L1	L2	Result
General Chemistry					
Biochemical Oxygen Demand (BOD5)	mg/L	2	300	15	< 4 ↑
Total Suspended Solids	mg/L	2	350	15	34
Total Kjeldahl Nitrogen	as N mg/L	0.5	100	1	< 0.5
Metals and Inorganics					
Sulphate	mg/L	2	1500		39
Cyanide (total)	mg/L	0.01	2	0.02	< 0.01
Fluoride	mg/L	0.06	10		0.55
Aluminum (total)	mg/L	0.001	50		0.564
Antimony (total)	mg/L	0.0009	5		0.0011
Arsenic (total)	mg/L	0.0002	1	0.02	0.0008
Cadmium (total)	mg/L	0.000003	0.7	0.008	0.000025
Chromium (total)	mg/L	0.00008	2	0.08	0.00114
Cobalt (total)	mg/L	0.000004	5		0.000241
Copper (total)	mg/L	0.0002	3	0.05	0.0014
Lead (total)	mg/L	0.00009	1	0.12	0.00055
Manganese (total)	mg/L	0.00001	5	0.15	0.0428
Molybdenum (total)	mg/L	0.00004	5		0.00443
Nickel (total)	mg/L	0.0001	2	0.08	0.0009
Phosphorus (total)	mg/L	0.003	10	0.4	0.055
Selenium (total)	mg/L	0.00004	1	0.02	0.00042
Silver (total)	mg/L	0.00005	5	0.12	< 0.00005
Tin (total)	mg/L	0.00006	5		0.00528

Client: Grounded Engineering Inc.
Project: 22-279, 1095 Kingston Rd. Pickering
Project Manager: Vivi Tran
Samplers: Andrew Kernerman

MATRIX: WATER

Sample Number	8
Sample Name	SW-uf-BH3
Sample Matrix	Ground Water
Sample Date	23/11/2022

L1 = SANSEW / WATER / - - Durham Sewer Use ByLaw - Sanitary Sewer Discharge - BL_55_2013

L2 = SANSEW / WATER / - - Durham Sewer Use ByLaw - Storm Sewer Discharge - BL_55_2013

Parameter	Units	RL	L1	L2	Result
Metals and Inorganics (continued)					
Titanium (total)	mg/L	0.00005	5		0.0128
Zinc (total)	mg/L	0.002	2	0.04	0.003
Microbiology					
E. Coli	cfu/100mL	0		200	0
Nonylphenol and Ethoxylates					
Nonylphenol	mg/L	0.001	0.02		< 0.001
Nonylphenol Ethoxylates	mg/L	0.01	0.2		< 0.01
Nonylphenol diethoxylate	mg/L	0.01			< 0.01
Nonylphenol monoethoxylate	mg/L	0.01			< 0.01
Oil and Grease					
Oil & Grease (total)	mg/L	2			< 2
Oil & Grease (animal/vegetable)	mg/L	4	150		< 4
Oil & Grease (mineral/synthetic)	mg/L	4	15		< 4

Client: Grounded Engineering Inc.
Project: 22-279, 1095 Kingston Rd. Pickering
Project Manager: Vivi Tran
Samplers: Andrew Kernerman

MATRIX: WATER

L1 = SANSEW / WATER / - - Durham Sewer Use ByLaw - Sanitary Sewer Discharge - BL_55_2013

L2 = SANSEW / WATER / - - Durham Sewer Use ByLaw - Storm Sewer Discharge - BL_55_2013

Sample Number	8
Sample Name	SW-uf-BH3
Sample Matrix	Ground Water
Sample Date	23/11/2022

Parameter	Units	RL	L1	L2	Result
Other (ORP)					
pH	No unit	0.05	10.5	9	8.01
Mercury (total)	mg/L	0.00001	0.01	0.004	< 0.00001
PCBs					
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001	0.001	0.0004	< 0.0001
Phenols					
4AAP-Phenolics	mg/L	0.002	1	0.008	< 0.002
SVOCs					
di-n-Butyl Phthalate	mg/L	0.002	0.08	0.015	< 0.002
Bis(2-ethylhexyl)phthalate	mg/L	0.002	0.012	0.0088	< 0.002
VOCs					
Chloroform	mg/L	0.0005	0.04	0.002	0.0062
1,2-Dichlorobenzene	mg/L	0.0005	0.05	0.0056	< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005	0.08	0.0068	< 0.0005
cis-1,2-Dichloroethene	mg/L	0.0005			< 0.0005
trans-1,3-Dichloropropene	mg/L	0.0005	0.14	0.0056	< 0.0005
Methylene Chloride	mg/L	0.0005	2	0.0052	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	1.4	0.017	< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	1	0.0044	< 0.0005
Trichloroethylene	mg/L	0.0005	0.4	0.008	< 0.0005
Methyl ethyl ketone	mg/L	0.02	8		< 0.02
Styrene	mg/L	0.0005	0.2		< 0.0005

Client: Grounded Engineering Inc.
Project: 22-279, 1095 Kingston Rd. Pickering
Project Manager: Vivi Tran
Samplers: Andrew Kernerman

MATRIX: WATER

Sample Number	8
Sample Name	SW-uf-BH3
Sample Matrix	Ground Water
Sample Date	23/11/2022

L1 = SANSEW / WATER / - - Durham Sewer Use ByLaw - Sanitary Sewer Discharge - BL_55_2013

L2 = SANSEW / WATER / - - Durham Sewer Use ByLaw - Storm Sewer Discharge - BL_55_2013

Parameter	Units	RL	L1	L2	Result
VOCs - BTEX					
Benzene	mg/L	0.0005	0.01	0.002	< 0.0005
Ethylbenzene	mg/L	0.0005	0.16	0.002	< 0.0005
Toluene	mg/L	0.0005	0.27	0.002	< 0.0005
Xylene (total)	mg/L	0.0005	1.4	0.0044	< 0.0005
m-p-xylene	mg/L	0.0005			< 0.0005
o-xylene	mg/L	0.0005			< 0.0005

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	SANSEW / WATER / - - Durham Sewer Use ByLaw - Sanitary Sewer Discharge - BL_55_2013 L1	SANSEW / WATER / - - Durham Sewer Use ByLaw - Storm Sewer Discharge - BL_55_2013 L2
SW-uf-BH3					
Chloroform	EPA 5030B/8260C	mg/L	0.0062		0.002
Total Suspended Solids	SM 2540D	mg/L	34		15

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 375.4 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphate	DIO5119-NOV22	mg/L	2	<2	ND	20	108	80	120	112	75	125

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0042-NOV22	mg/L	2	< 2	3	30	101	70	130	NV	70	130

Cyanide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENVISFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0254-NOV22	mg/L	0.01	<0.01	ND	10	105	90	110	88	75	125

QC SUMMARY

Fluoride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-[ENVIEWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0558-NOV22	mg/L	0.06	<0.06	0	10	97	90	110	98	75	125

Mercury by CVAAS

Method: EPA 7471A/SM 3112B I Internal ref.: ME-CA-[ENVISPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0061-NOV22	mg/L	0.00001	< 0.00001	0	20	101	80	120	124	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0238-NOV22	mg/L	0.00005	<0.00005	ND	20	102	90	110	86	70	130
Aluminum (total)	EMS0238-NOV22	mg/L	0.001	<0.001	1	20	104	90	110	106	70	130
Arsenic (total)	EMS0238-NOV22	mg/L	0.0002	<0.0002	ND	20	103	90	110	98	70	130
Cadmium (total)	EMS0238-NOV22	mg/L	0.000003	<0.000003	ND	20	102	90	110	92	70	130
Cobalt (total)	EMS0238-NOV22	mg/L	0.000004	<0.000004	10	20	103	90	110	93	70	130
Chromium (total)	EMS0238-NOV22	mg/L	0.00008	<0.00008	ND	20	106	90	110	106	70	130
Copper (total)	EMS0238-NOV22	mg/L	0.0002	<0.0002	8	20	105	90	110	79	70	130
Manganese (total)	EMS0238-NOV22	mg/L	0.00001	<0.00001	4	20	103	90	110	75	70	130
Molybdenum (total)	EMS0238-NOV22	mg/L	0.00004	<0.00004	ND	20	97	90	110	99	70	130
Nickel (total)	EMS0238-NOV22	mg/L	0.0001	<0.0001	6	20	102	90	110	91	70	130
Lead (total)	EMS0238-NOV22	mg/L	0.00009	<0.00001	ND	20	103	90	110	105	70	130
Phosphorus (total)	EMS0238-NOV22	mg/L	0.003	<0.003	18	20	98	90	110	NV	70	130
Antimony (total)	EMS0238-NOV22	mg/L	0.0009	<0.0009	3	20	103	90	110	128	70	130
Selenium (total)	EMS0238-NOV22	mg/L	0.00004	<0.00004	ND	20	104	90	110	75	70	130
Tin (total)	EMS0238-NOV22	mg/L	0.00006	<0.00006	ND	20	96	90	110	NV	70	130
Titanium (total)	EMS0238-NOV22	mg/L	0.00005	<0.00005	10	20	101	90	110	NV	70	130
Zinc (total)	EMS0238-NOV22	mg/L	0.002	<0.002	ND	20	108	90	110	93	70	130

QC SUMMARY

Microbiology

Method: SM 9222D | Internal ref.: ME-CA-IENVIMIC-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
E. Coli	BAC9415-NOV22	cfu/100mL	-	ACCEPTED	ACCEPTED							

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-IENVIGC-LAK-AN-015

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nonylphenol diethoxylate	GCM0505-NOV22	mg/L	0.01	<0.01			91	55	120			
Nonylphenol Ethoxylates	GCM0505-NOV22	mg/L	0.01	< 0.01								
Nonylphenol monoethoxylate	GCM0505-NOV22	mg/L	0.01	<0.01			90	55	120			
Nonylphenol	GCM0505-NOV22	mg/L	0.001	<0.001			92	55	120			

QC SUMMARY

Oil & Grease

Method: MOE E3401 | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (total)	GCM0514-NOV22	mg/L	2	<2	NSS	20	100	75	125			

Oil & Grease-AV/MS

Method: MOE E3401/SM 5520F | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (animal/vegetable)	GCM0514-NOV22	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0514-NOV22	mg/L	4	< 4	NSS	20	NA	70	130			

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0559-NOV22	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0266-NOV22	mg/L	0.002	<0.002	4	10	104	80	120	86	75	125

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-[ENV]GC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Polychlorinated Biphenyls (PCBs) - Total	GCM0512-NOV22	mg/L	0.0001	<0.0001	NSS	30	96	60	140	NSS	60	140

QC SUMMARY

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bis(2-ethylhexyl)phthalate	GCM0495-NOV22	mg/L	0.002	< 0.002	NSS	30	120	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0495-NOV22	mg/L	0.002	< 0.002	NSS	30	104	50	140	NSS	50	140

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0594-NOV22	mg/L	2	< 2	0	10	96	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0256-NOV22	as N mg/L	0.5	<0.5	ND	10	101	90	110	104	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,2,2-Tetrachloroethane	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	100	60	130	95	50	140
1,2-Dichlorobenzene	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	101	60	130	96	50	140
1,4-Dichlorobenzene	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	101	60	130	95	50	140
Benzene	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	102	60	130	99	50	140
Chloroform	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	100	60	130	97	50	140
cis-1,2-Dichloroethene	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	102	60	130	98	50	140
Ethylbenzene	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	104	60	130	98	50	140
m-p-xylene	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	103	60	130	96	50	140
Methyl ethyl ketone	GCM0441-NOV22	mg/L	0.02	<0.02	ND	30	99	50	140	93	50	140
Methylene Chloride	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	100	60	130	97	50	140
o-xylene	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	102	60	130	97	50	140
Styrene	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	105	60	130	98	50	140
Tetrachloroethylene (perchloroethylene)	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	100	60	130	97	50	140
Toluene	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	102	60	130	98	50	140
trans-1,3-Dichloropropene	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	100	60	130	96	50	140
Trichloroethylene	GCM0441-NOV22	mg/L	0.0005	<0.0005	ND	30	102	60	130	97	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

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

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

SGS Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

No: 030196 Page 1 of 1

Laboratory Information Section - Lab use only

Received By: B. Cannon Sw
Received Date: 11 / 23 / 22 (mm/dd/yy)
Received Time: 17 : 30 (hr : min)
Received By (signature):
Custody Seal Present: Yes ☐ No ☐
Custody Seal Intact: Yes ☐ No ☐
Cooling Agent Present: Yes ☒ No ☐ Type: ICE.
Temperature Upon Receipt (°C) 9.9.9
LAB LIMS #: CA-40286-Nov22

REPORT INFORMATION	INVOICE INFORMATION
Company: Grounded Engineering	☒ (same as Report Information)
Contact: VIVI TRAN	Company:
Address: 1 Banigan Dr	Contact:
	Address:
Phone:	
Fax:	Phone:
Email: Vtran@groundedeng.ca	Email: Sbaston@groundedeng.ca

Quotation #: P.O. #:
Project #: 22-279 Site Location/ID: 1095 Kingston Rd. Pickering

TURNAROUND TIME (TAT) REQUIRED

☒ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

***NOTE:** DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
☐ Table 1 ☐ Res/Park Soil Texture: ☐ Coarse
☐ Table 2 ☐ Ind/Com ☐ Medium/Fine
☐ Table 3 ☐ Agri/Other
☐ Table _____ Appx. _____
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☐ ODWS Not Reportable *See note

Sewer By-Law:
☒ Sanitary
☒ Storm
Municipality: Durham

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX
1	SW-VF-BH 3	11-23-22	10:00	15	GW
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

	M & I				SVOC		PCB	PHC		VOC		Pest	Other (please specify)						SPLP	TCLP	
	Field Filtered (Y/N)	Metals & Inorganics incl CrVI, CN, Hg pH,(B(HWS),EC,SAR–soil) (Cl, Na–water)	Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI	ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn	PAHs only	SVOCs all incl PAHs, ABNs, CPs	PCBs Total ☐ Aroclor ☐	F1-F4 + BTEX	F1-F4 only no BTEX	VOCs all incl BTEX	BTEX only	Pesticides Organochlorine or specify other					Sewer Use: Durham & Storm Specify pkg:	Water Characterization Pkg General ☐ Extended ☐	Specify tests ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN	Specify tests ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.	COMMENTS:
1																	✓				
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

Observations/Comments/Special Instructions

Sampled By (NAME): Andrew McFarlane **Signature:** Date: 11 / 23 / 22 (mm/dd/yy) Pink Copy - Client

Relinquished by (NAME): **Signature:** Date: 11 / 23 / 22 (mm/dd/yy) Yellow & White Copy - SGS

Revision #: 1.6
Date of Issue: 02 May 2022

APPENDIX F

Material Name	Color	KS (m/s)
Fill		0.001
Sand and Silt, Clayey Till		9.10e-07
Sand		9.60e-05
Bedrock		1e-08

P1 - Level

Excavation Dimensions: 68 m x 219 m (equivalent square)
Section Cut: N-S

P1 Level Finished Floor: Elev. 84.5 m
P1 Level Base of Excavation: Elev. 82.5 m
P1 Level Drainage Layer: Elev. 84.0 m

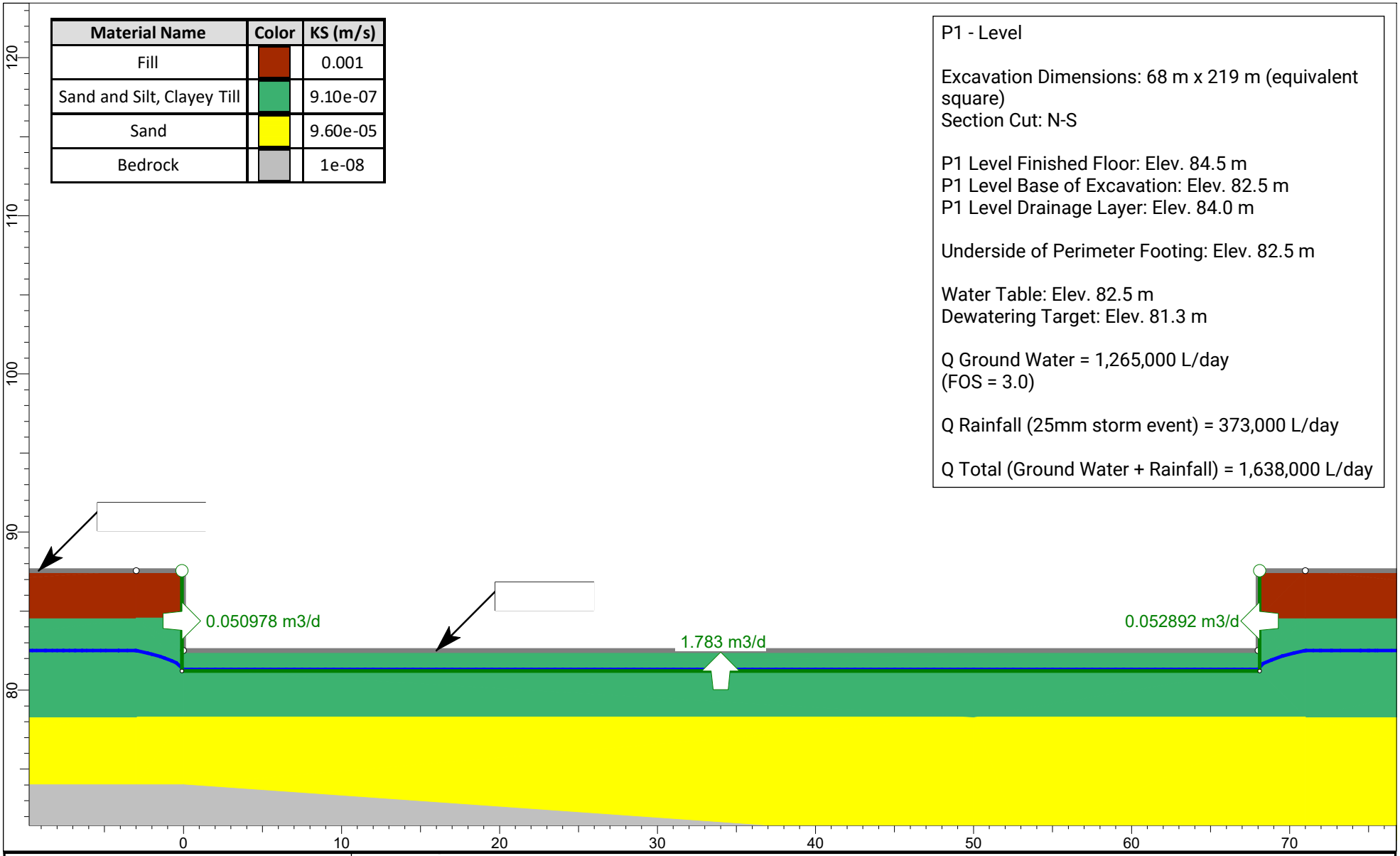
Underside of Perimeter Footing: Elev. 82.5 m

Water Table: Elev. 82.5 m
Dewatering Target: Elev. 81.3 m

Q Ground Water = 1,265,000 L/day
(FOS = 3.0)

Q Rainfall (25mm storm event) = 373,000 L/day

Q Total (Ground Water + Rainfall) = 1,638,000 L/day



GROUNDED ENGINEERING

File	1095 Kingston Rd., Pickering			
Analysis	P1 - ST Permeable Shoring - Raft Foundation			
Ref.				
RS2 File	22-279 FEM.slmd	Scale	1:340	Eng SB

SLIDEINTERPRET 9.036

SHORT TERM - P1 - PERMEABLE SHORING - RAFT

Excavation Dimensions [m]	
N-S	68
E-W	219
Area (m2)	14892
Perimeter (m)	574

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		1.783	219	390,477
Sides		0.052892	574	30,360
Total				420,837
Factor of Safety	3.0			1,262,511

Storm Events	
2 Year [L/day]	100 Year [L/day]
372,300	1,400,000

Summary	L/day	L/min
Groundwater	1,265,000	878.5
Rainfall	373,000	259.0
Total	1,638,000	1,137.5

LONG TERM - P1 - RAFT

Excavation Dimensions [m]	
N-S	68
E-W	219
Area (m2)	14892
Perimeter (m)	574

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	219	-
Sides		0	574	-
Total				-
Factor of Safety	3.0			-

Infiltration [L/day]
19027.5

Summary	L/day	L/min
Groundwater	-	-
Infiltration	20,000	13.9
Total	20,000	13.9

Material Name	Color	KS (m/s)
Fill		0.001
Sand and Silt, Clayey Till		9.10e-07
Sand		9.60e-05
Bedrock		1e-08

P1 - Level

Excavation Dimensions: 68 m x 219 m (equivalent square)
Section Cut: N-S

P1 Level Finished Floor: Elev. 84.5 m
P1 Level Base of Excavation: Elev. 83.5 m
P1 Level Drainage Layer: Elev. 84.0 m

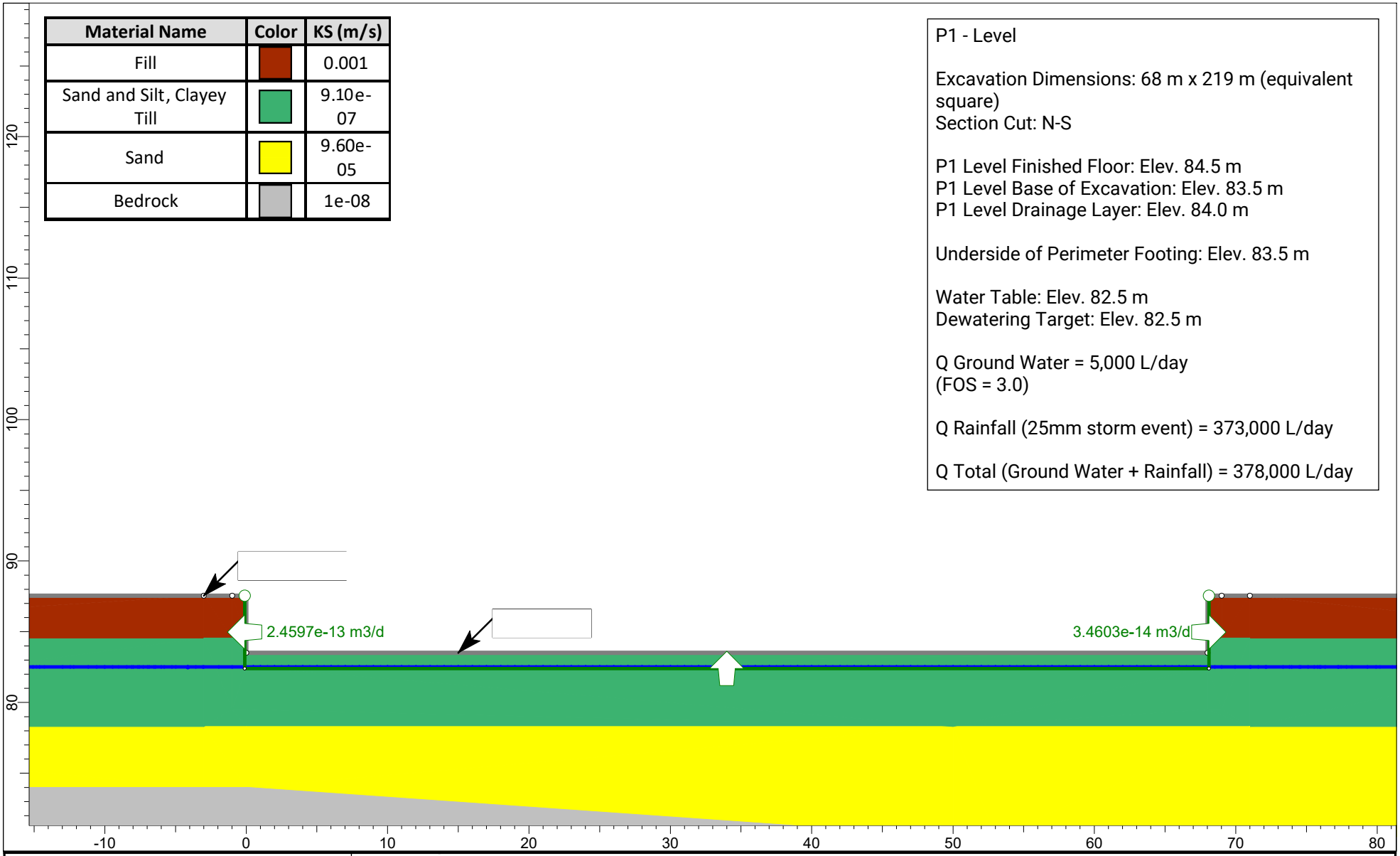
Underside of Perimeter Footing: Elev. 83.5 m

Water Table: Elev. 82.5 m
Dewatering Target: Elev. 82.5 m

Q Ground Water = 5,000 L/day
(FOS = 3.0)

Q Rainfall (25mm storm event) = 373,000 L/day

Q Total (Ground Water + Rainfall) = 378,000 L/day



GROUNDED ENGINEERING

SLIDEINTERPRET 9.036

File: **1095 Kingston Rd., Pickering**

Analysis: P1 - ST Permeable Shoring - Pile Caps and Grade Beams/Spread Footings

Ref.

RS2 File: 22-279 FEM.slmd

Scale: 1:380

Eng: SB

ST - P1 - PERMEABLE SHORING - PILE CAPS & GRADE BEAMS/ SPREAD FOOTINGS

Excavation Dimensions [m]	
N-S	68
E-W	219
Area (m2)	14892
Perimeter (m)	574

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		1.2768E-12	219	0
Sides		2.4597E-13	574	0
Total				0
Factor of Safety	3.0			0

Storm Events	
2 Year [L/day]	100 Year [L/day]
372,300	1,400,000

Summary	L/day	L/min
Groundwater	5,000	3.5
Rainfall	373,000	259.0
Total	378,000	262.5

LT - P1 - PILE CAPS & GRADE BEAMS/ SPREAD FOOTINGS

Excavation Dimensions [m]	
N-S	68
E-W	219
Area (m2)	14892
Perimeter (m)	574

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	219	-
Sides		0	574	-
Total				-
Factor of Safety	3.0			-

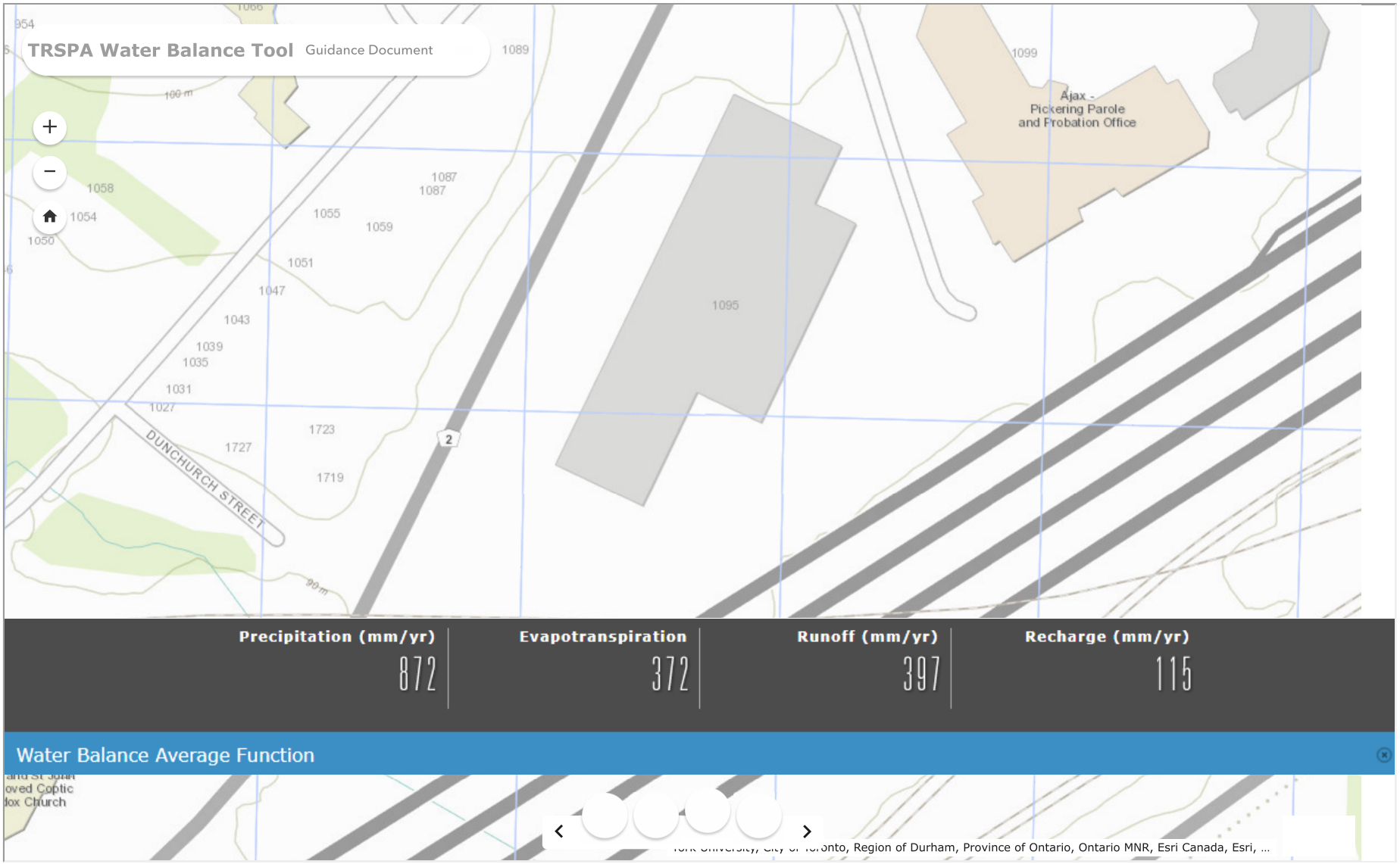
Infiltration [L/day]
19027.5

Summary	L/day	L/min
Groundwater	-	-
Infiltration	20,000	13.9
Total	20,000	13.9

APPENDIX G

NOTICE: TRCA's P Desk s ow ope for -perso P d Perm ts e qu r es t 5 Shoreh m Dr ve Toro to. We recomme d th t you **book a consultation with our planning staff**(https://trc .c /p -perm ts/co t ct- form t o /) dv ce by pho e.

TRSPA WATER BALANCE TOOL



Water Balance - 1095 Kingston Rd.

1. Climate Information

Precipitation	872	mm/a	0.87	m/a *
Evapotranspiration	372	mm/a	0.37	m/a *
Water Surplus	500	mm/a	0.50	m/a

2. Infiltration Rates

Table 2 Approach - Infiltration Factors

Topography - (Flat land, rolling land, hilly land)	0.3	*
Soil - (Tight impervious clay, etc...)	0.3	*
Cover - (Cultivated lands, woodland)	0.1	*
TOTAL:	0.7	

Infiltration (Infiltration Factor x Water Surplus)	350	mm/a	0.35	m/a
Run-off (Water Surplus - Infiltration)	150	mm/a	0.15	m/a

Table 3 Approach - Typical Recharge Rates

coarse sand and gravel	250+	mm/a *
fine to medium sand	200 - 250	mm/a *
silty sand to sandy silt	150 - 200	mm/a *
silt	125 - 150	mm/a *
clayey silt	100 - 125	mm/a *
clay	< 100	mm/a *

The site development area is underlain by cohesionless till.

Based on the above, the recharge rate is	115	mm/a	0.115	m/a
with runoff of	385	mm/a	0.385	m/a

3. Property Statistics Pre-development

Area Covered by Existing Building	8,460	m^2	0.85	ha
Area Covered by Existing Hard Surface Paving	11,930	m^2	1.19	ha
Area Covered by Existing Landscaped area	585	m^2	0.06	ha
TOTAL	20,975	m^2	2.10	ha

4. Property Statistics Post development

Area Covered by Building with Additions	10,260	m^2	1.03	ha
Area Covered by Hard Surface Paving	3,230	m^2	0.32	ha
Area Covered by Landscaped Area	7,485	m^2	0.75	ha
TOTAL:	20,975	m^2	2.10	ha

*Based on published information

Water Balance - 1095 Kingston Rd.

5. Annual Water Balance Before Building Additions

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building (entire site)	8,460	7,377	-	-	-	7,377
Hard Surface Paving	11,930	10,403	-	-	-	10,403
Landscape Area (entire site)	585	510	218	-	205	88
TOTAL	**20,975**	**18,290**	**218**	**0**	**205**	**17,868**

6. Annual Water Balance After Building Additions

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building (entire site)	10,260	8,947	-	-	-	8,947
Hard Surface Paving	3,230	2,817	-	-	-	2,817
Landscape Area (entire site)	7,485	6,527	2,784	-	2,620	1,123
TOTAL	**20,975**	**18,290**	**2,784**	**0**	**2,620**	**12,886**

7. Comparison of Pre-Development (before buidling additions) and Post Development (after building additions)

	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	18,290	218	-	205	17,868
Post-Development	18,290	2,784	-	2,620	12,886

8. Requirement for Infiltration of Roof Runoff

Volume of roof (building additions) run-off captured (90%)	8,052	m^3
Volume of post-development infiltration without roof run-off	2,620	m^3
Volume of roof run-off required to match pre-development infiltration rates	0	m^3
Percentage of roof run-off (building additions roof) required to match pre-development infiltration	0%	

APPENDIX H

1095 Kingston Rd., Pickering

Legend

- Issue Contributing Areas
- Highly Vulnerable Aquifers
- WHPA-E
- Wellhead Protection Area
  - A
  - B
  - C
  - C1
  - D
  - F
- Intake Protection Zone 1
- Event Based Areas
- Intake Protection Zone 2
- Source Protection Areas

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Environment, Conservation and Parks (MECP) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

Ontario

Map Created: 2/20/2025
Map Center: 43.82747 N, -79.09876 W