Tenblock
30 Soudan Avenue, Suite 200
Toronto, ON, M4S 1V6

File No. 21-195
March 18, 2022

Attention: Matthew Kelling

RE: HYDROGEOLOGICAL REVIEW REPORT
48 Grenoble Drive, Toronto, Ontario

Grounded Engineering Inc. ("Grounded") is pleased to provide you with this Hydrogeological Review for the site known as 48 Grenoble Drive, in Toronto, Ontario.

The following documents are provided as part of this package:

- City of Toronto Hydrogeological Review Summary Form
- Hydrogeological Review Report

As part of the development applications process, the City of Toronto requires that both documents are submitted together for review.

We trust that the information contained with this report is adequate for your present requirements. If we can be of further assistance, please do not hesitate to contact us.

Shelby Plant, EIT

Matthew Bielaski, P.Eng., QP_{ESA-RA}
Principal

August 2018

HYDROLOGICAL REVIEW SUMMARY

The form is to be completed by the Professional that prepared the Hydrological Review.
Use of the form by the City of Toronto is not to be construed as verification of engineering/hydrological content.

Refer to the Terms of Reference, Hydrological Review:
Link to Terms of Reference Hydrological Review

For City Staff Use Only:	
Name of ECS Case Manager (Please print)	
Date Review Summary provided to to TW, EM&P	

IF ANY OF THE REQUIREMENTS LISTED BELOW HAVE NOT BEEN INLCUDED IN THE HYDROLOGICAL REVIEW, THE REVIEW WILL BE CONSIDERED INCOMPLETE.
THE GREY SHADED BOXES WILL REQUIRE A CONSISTANCY CHECK BY THE ECS CASE MANAGER.

Summary of Key Information:

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Site Address	48 Grenoble Drive, Toronto, Ontario	Title, i (Exec Sum), 1 (Sec 1)	
Postal Code	M3C 1C8	1 (Sec 1)	
Property Owner (on request for comments memo)	Microbjo Properties Inc.	Title, i (Exec Sum), 1 (Sec 1)	
Proposed description of the project (if applicable) (point towers, number of podiums)	Towers: Tower A (41-storeys) and Tower B (43-storeys) Podium: 6 storeys	i (Exec Sum), 1 (Sec 1)	
Land Use (ex. commercial, residential, mixed, institutional, industrial)	Current: Residential Proposed: Residential with Parkland Conveyance	1 (Sec 1)	
Number of below grade levels for the proposed structure	4 levels of underground parking	i (Exec Sum), 1 (Sec 1)	
HYDROLOGICAL REVIEW INFORMATION			
Date Hydrological Review was prepared:	2022-03-18	Title, 2 (Sec 1)	
Who Performed the Hydrological Review (Consulting Firm)	Grounded Engineering Inc.	Title, i (Exec Sum), 1 & 2 (Sec 1)	
Name of Author of Hydrological Review	Matthew Bielaski, P.Eng., QP_{ESA-RA}	2 (Sec 1), 16 (Sec 14)	

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Check the directories on the website for Professional Geoscientists and/or Professional Engineers of Ontario been checked to ensure that the Hydrological Report has been prepared by a qualified person who is a licensed Professional Geoscientist as set out in the Professional Geoscientist Act of Ontario or a Professional Engineer? PEO: Professional Engineers of Ontario APGO: Association of Professional Geoscientists of Ontario	✓ Yes	N/A	
Has the Hydrological Review been prepared in accordance with all the following: • Ontario Water Resources Act • Ontario Regulation 387/04 • Toronto Municipal Code Chapter 681-Sewers	✓ Yes	2 (Sec 1)	
Total Volume (L/day) Short Term Discharge of groundwater (construction dewatering) **with safety factor included**	50,000 L/day What safety factor was used? 2	ii (Exec Sum), 10 (Sec 10) Appendix G	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Total Volume (L/day) Short Term Discharge of groundwater (construction dewatering) **without safety factor included**	25,000 L/day	Appendix G	
Total Volume (L/day) Long Term drainage of groundwater (from foundation drainage, weeping tiles, sub slab drainage) **with safety factor included** If the development is part of a multiple tower complex, include total volume for each separate tower	25,000 L/day What safety factor was used? 2	ii (Exec Sum), 11 (Sec 10) Appendix G	
List the nearest surface water (river, creek, lake)	The nearest waterbody is Don River, located approximately 500 m East of the Property.	4 (Sec 3)	
Lowest basement elevation	114.0 masl – finished floor elevation 113.5 masl – base of excavation	i (Exec Sum), Appendix F	
Foundation elevation	111.5 masl – base of footings	i (Exec Sum)	
Ground elevation	127.5 masl	Appendix F	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
STUDY AREA MAP			**Review Includes this Information City Staff (Check)**
Study area map(s) have been included in the report.	✓ Yes	Figures 1 & 2	N/A
Study area map(s) been prepared according to the Hydrological Review Terms of Reference.	✓ Yes	Figures 1 & 2 3 (Sec 2)	N/A
WATER LEVEL AND WELLS		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information (City Staff Initial)**
The groundwater level has been monitored using all wells located on site (within property boundary).	✓ Yes	4 (Sec 4), 5 (Sec 5), Figures 2 & 3	
The static water level measurements have been monitored at all monitoring wells for a minimum of 3 months with samples taken every 2 weeks for a minimum of 6 samples. The intent is for the qualified professional to use professional judgement to estimate the seasonally high groundwater level.	◯ No The required 3-months ground water level monitoring is currently ongoing for the Property. As such, additional water levels will continue to be collected.	5 (Sec 5), Appendix A	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
All water levels in the wells have been measured with respect to masl.	✓ Yes	5 (Sec 5), Appendix A	
A table of geology/soil stratigraphy for the property has been included.	✓ Yes	i (Exec Sum), 3 & 4 (Sec 3)	
GEOLOGY AND PHYSICAL HYDROLOGY		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information (City Staff Initial)**
The review has made reference to the soil materials including thickness, composition and texture, and bedrock environments.	✓ Yes	3 & 4 (Sec 3)	
Key aquifers and the site's proximity to nearby surface water has been identified.	✓ Yes	3 (Sec 3)	N/A
PUMP TEST/SLUG TEST/DRAWDOWN ANALYSIS		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**
A summary of the pumping test data and analysis is included in the review.	A pumping test was not conducted.	6 (Sec 6.1)	
The pump test been carried out for at least 24 hours if possible. If not, has a slug test been conducted?	✓ Yes A pump test was not conducted. Slug tests were conducted.	6 (Sec 6.2)	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Have the monitoring well(s) have been monitored using digital devices? If yes how frequently?	✓ Yes Yes, water level measurements have been taken using a digital water level meter. The frequency of the measurements will be every two weeks over the course of a 3 month period.	5 (Sec 5)	
If a slug or pump test has been conducted has the static groundwater level been monitored at all monitoring well(s) multiple times to measure recovery? -prior to the slug or pumping test(s)? -post slug or pumping test(s)?	✓ Yes ✓ Yes ✓ Yes	5 (Sec 5), 6 (Sec 6.2)	N/A
The above noted slug or pump tests have been included in the report.	✓ Yes	6 (Sec 6.2), Appendix B	
WATER QUALITY		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**
The report includes baseline water quality samples from a laboratory. The water quality must be analyzed for all parameters listed in Tables 1 and 2 of Chapter 681 Sewers of the Toronto Municipal Code (found in Appendix A) and the samples must have to be taken unfiltered within 9 months of the date of submission.	✓ Yes	8 (Sec 7), Appendix E	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
The water quality data templates in Appendix A have been completed for each sample taken for both sanitary/combined and storm sewer limits.	For sanitary discharge- See the sanitary/combined sewer parameter limit template For storm discharge- See the storm sewer parameter limit template	Pg. 11-14 of Hydrological Review Summary	
Qualified professional to list all sample parameters that have violated the Bylaw limits for each sample taken for the sanitary/combined Bylaw limits **If there are any sample parameter Exceedances the groundwater can't be discharged as is.**	The groundwater sample met the Limits for Sanitary and Combined Sewer Discharge for all parameters analyzed.	8 (Sec 7)	
Qualified professional to list all sample parameters that have violated the Bylaw limits for each sample taken for the storm Bylaw limits. **If there are any sample parameter exceedances the groundwater can't be discharged as is.**	Storm Sewer: • Total Suspended Solids (Result 246mg/L; Limit 15 mg/L; RDL 3 mg/L) • Total Cyanide (Result 0.0711 mg/L; Limit 0.02 mg/L; RDL 0.002 mg/L) • Total Manganese (Result 0.384 mg/L; Limit 0.05 mg/L; RDL 0.05 mg/L) • BOD (Result 40.5 mg/L; Limit 15 mg/L; RDL 2 mg/L)	8 (Sec 7)	
The water quality samples have been analyzed by a Canadian laboratory accredited and licensed by Standards Council of Canada and/or Canadian Association for Laboratory Accreditation. List of Canadian accredited laboratories: Standards Council of Canada	✓ Yes	Appendix E	N/A
A chain of custody record for the samples is included with the report.	✓ Yes	Appendix E	
Has the chain of custody reference any filtered sample? If yes, the report has to be amended and re-submitted to include only non-filtered samples.	✓ Yes	Appendix E	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
List any of the sample parameters that exceed the Bylaw limits with the reporting detection limit (RDL) included.	The groundwater sample met the Limits for Sanitary and Combined Sewer Discharge for all parameters analyzed. Storm Sewer: • Total Suspended Solids (Result 246mg/L; Limit 15 mg/L; RDL 3 mg/L) • Total Cyanide (Result 0.0711 mg/L; Limit 0.02 mg/L; RDL 0.002 mg/L) • Total Manganese (Result 0.384 mg/L; Limit 0.05 mg/L; RDL 0.05 mg/L) • BOD (Result 40.5 mg/L; Limit 15 mg/L; RDL 2 mg/L)	8 (Sec 7), Appendix E	
A true copy of the Certificate of Analysis report, is included with the report.	✓ Yes	Appendix E	
EVALUATION OF IMPACT		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**
Does the report recommend a back-up system or relief safety valve(s)?	✓ Yes	9-10 (Sec 9)	
Does the associated Geotechnical report recommend a back-up system or relief safety valve(s)?	✓ Yes	19 (Sec 3.5) of Geotech Report	
The taking and discharging of groundwater on site has been analyzed to ensure that no negative impacts will occur to: the City sewage works in terms of quality and quantity (including existing infrastructure), the natural environment, and settlement issues.	✓ Yes	12-14 (Sec 11)	N/A

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Has it been determined that there will be a negative impact to the natural environment, City sewage works, or surrounding properties has the study identified the following: the extent of the negative impact, the detail of the precondition state of all the infrastructure, City sewage works, and natural environment within the effected zone and the proposed remediation and monitoring plan?	◯ No **If yes, identify impact:**	12-15 (Sec 11-12)	N/A

Summary of Additional Information and Key Items (if applicable):

Appendix A:

SANITARY/COMBINED **Sample Location: BH2**

Inorganics		Sample Result (mg/L)	Sample Result with upper RDL included (mg/L)	
Parameter	mg/L			ug/L
BOD	300	40.5	40.5 (2)	300,000
Fluoride	10	<1.0	<1.0 (1)	10,000
TKN	100	3.55	3.55 (0.05)	100,000
pH	6.0 - 11.5	7.48	7.48 (0.10)	6.0 - 11.5
Phenolics 4AAP	1	<0.0010	<0.0010 (0.001)	1,000
TSS	350	246	246 (3)	350,000
Total Cyanide	2	0.0711	0.0711 (0.002)	2,000
Metals				
Chromium Hexavalent	2	<0.00050	<0.00050 (0.0005)	2,000
Mercury	0.01	<0.0000050	<0.0000050 (0.000005)	10
Total Aluminum	50	1.82	1.82 (0.5)	50,000
Total Antimony	5	<0.010	<0.010 (0.01)	5,000
Total Arsenic	1	<0.010	<0.010 (0.01)	1,000
Total Cadmium	0.7	<0.00050	<0.00050 (0.0005)	700
Total Chromium	4	<0.050	<0.050 (0.05)	4,000
Total Cobalt	5	<0.010	<0.010 (0.01)	5,000
Total Copper	2	<0.050	<0.050 (0.05)	2,000
Total Lead	1	<0.0050	<0.0050 (0.005)	1,000
Total Manganese	5	0.384	0.384 (0.05)	5,000
Total Molybdenum	5	0.0257	0.0257 (0.00004)	5,000
Total Nickel	2	<0.050	<0.050 (0.0001)	2,000
Total Phosphorus	10	<0.30	<0.30 (0.3)	10,000
Total Selenium	1	<0.0050	<0.0050 (0.005)	1,000
Total Silver	5	<0.0050	<0.0050 (0.005)	5,000
Total Tin	5	<0.010	<0.010 (0.01)	5,000
Total Titanium	5	0.050	0.050 (0.03)	5,000
Total Zinc	2	<0.30	<0.30 (0.3)	2,000
Petroleum Hydrocarbons				
Animal/Vegetable Oil & Grease	150	<5.0	<5.0 (5)	150,000
Mineral/Synthetic Oil & Grease	15	<2.5	<2.5 (2.5)	15,000

August 2018

Volatile Organics		Sample Result (mg/L)	Sample Result with upper RDL included (mg/L)	
Parameter	mg/L			ug/L
Benzene	0.01	<0.50	<0.50 (0.5)	10
Chloroform	0.04	1.1	1.1 (1.0)	40
1,2-Dichlorobenzene	0.05	<0.50	<0.50 (0.5)	50
1,4-Dichlorobenzene	0.08	<0.50	<0.50 (0.5)	80
Cis-1,2-Dichloroethylene	4	<0.50	<0.50 (0.5)	4,000
Trans-1,3-Dichloropropylene	0.14	<0.50	<0.50 (0.5)	140
Ethyl Benzene	0.16	<0.50	<0.50 (0.5)	160
Methylene Chloride	2			2,000
1,1,2,2-Tetrachloroethane	1.4	<0.50	<0.50 (0.5)	1,400
Tetrachloroethylene	1	<0.50	<0.50 (0.5)	1,000
Toluene	0.016	0.56	0.56 (0.5)	16
Trichloroethylene	0.4	<0.50	<0.50 (0.5)	400
Total Xylenes	1.4	<1.1	<1.1 (1.1)	1,400
Semi-Volatile **Organics**				
Di-n-butyl Phthalate	0.08	<1.0	<1.0 (1.0)	80
Bis (2-ethylhexyl) Phthalate	0.012	<2.0	<2.0 (2.0)	12
3,3'-Dichlorobenzidine	0.002	<0.40	<0.40 (0.40)	2
Pentachlorophenol	0.005	<2.0	<2.0 (2.0)	5
Total PAHs	0.005	<1.7	<1.7 (1.7)	5
Misc **Parameters**				
Nonylphenols	0.02	<1.0	<1.0 (1.0)	20
Nonylphenol Ethoxylates	0.2	<2.0	<2.0 (2.0)	200

Sample Collected: February 18, 2022

Temperature: 1.9°C

August 2018

HYDROLOGICAL REVIEW SUMMARY

STORM **Sample Location:**

Inorganics		Sample Result (mg/L)	Sample Result with upper RDL included (mg/L)	
Parameter	mg/L			ug/L
pH	6.0 - 9.5	7.48	7.48 (0.10)	
BOD	15	40.5	40.5 (2)	15,000
Phenolics 4AAP	0.008	<0.0010	<0.0010 (0.0010)	8
TSS	15	246	246 (3)	15,000
Total Cyanide	0.02	0.0711	0.0711 (0.002)	20
Metals				
Total Arsenic	0.02	<0.010	<0.010 (0.010)	20
Total Cadmium	0.008	<0.00050	<0.00050 (0.00050)	8
Total Chromium	0.08	<0.050	<0.050 (0.050)	80
Chromium Hexavalent	0.04	<0.00050	<0.00050 (0.00050)	40
Total Copper	0.04	<0.010	<0.010 (0.010)	40
Total Lead	0.12	<0.0050	<0.00050 (0.00050)	120
Total Manganese	0.05	0.384	0.384 (0.050)	50
Total Mercury	0.0004	<0.0000050	<0.0000050 (0.0000050)	0.4
Total Nickel	0.08	<0.050	<0.050 (0.050)	80
Total Phosphorus	0.4	<0.30	<0.30 (0.3)	400
Total Selenium	0.02	<0.0050	<0.0050 (0.0050)	20
Total Silver	0.12	<0.0050	<0.0050 (0.0050)	120
Total Zinc	0.04	<0.30	<0.30 (0.3)	40
Microbiology				
E.coli	200	0	0 (0)	200,000
Volatile Organics				
Parameter	mg/L			ug/L
Benzene	0.002	<0.50	<0.50 (0.5)	2
Chloroform	0.002	1.1	1.1 (1.0)	2
1,2-Dichlorobenzene	0.0056	<0.50	<0.50 (0.5)	6
1,4-Dichlorobenzene	0.0068	<0.50	<0.50 (0.5)	7
Cis-1,2-Dichloroethylene	0.0056	<0.50	<0.50 (0.5)	6
Trans-1,3-Dichloropropylene	0.0056	<0.50	<0.50 (0.5)	6
Ethyl Benzene	0.002	<0.50	<0.50 (0.5)	2
Methylene Chloride	0.0052			5
1,1,2,2-Tetrachloroethane	0.017	<0.50	<0.50 (0.5)	17
Tetrachloroethylene	0.0044	<0.50	<0.50 (0.5)	4
Toluene	0.002	0.56	0.56 (0.5)	2
Trichloroethylene	0.0076	<0.50	<0.50 (0.5)	8
Total Xylenes	0.0044	<1.1	<1.1 (1.1)	4

HYDROLOGICAL REVIEW SUMMARY

Semi-Volatile Organics		Sample Result (mg/L)	Sample Result with upper RDL included (mg/L)	
Di-n-butyl Phthalate	0.015	<1.0	<1.0 (1.0)	5
Bis (2-ethylhexyl) Phthalate	0.0088	<2.0	<2.0 (2.0)	8.8
3,3'-Dichlorobenzidine	0.0008	<0.40	<0.40 (0.40)	0.8
Pentachlorophenol	0.002	<2.0	<2.0 (2.0)	2
Total PAHs	0.002	<1.7	<1.7 (1.7)	2
PCBs	0.0004	<0.040	<0.040 (0.040)	0.4
Misc Parameters				
Nonylphenols	0.001	<1.0	<1.0 (1.0)	1
Nonylphenol Ethoxylates	0.01	<2.0	<2.0 (2.0)	10

Sample Collected: February 18, 2022

Temperature:1.9^{o}C

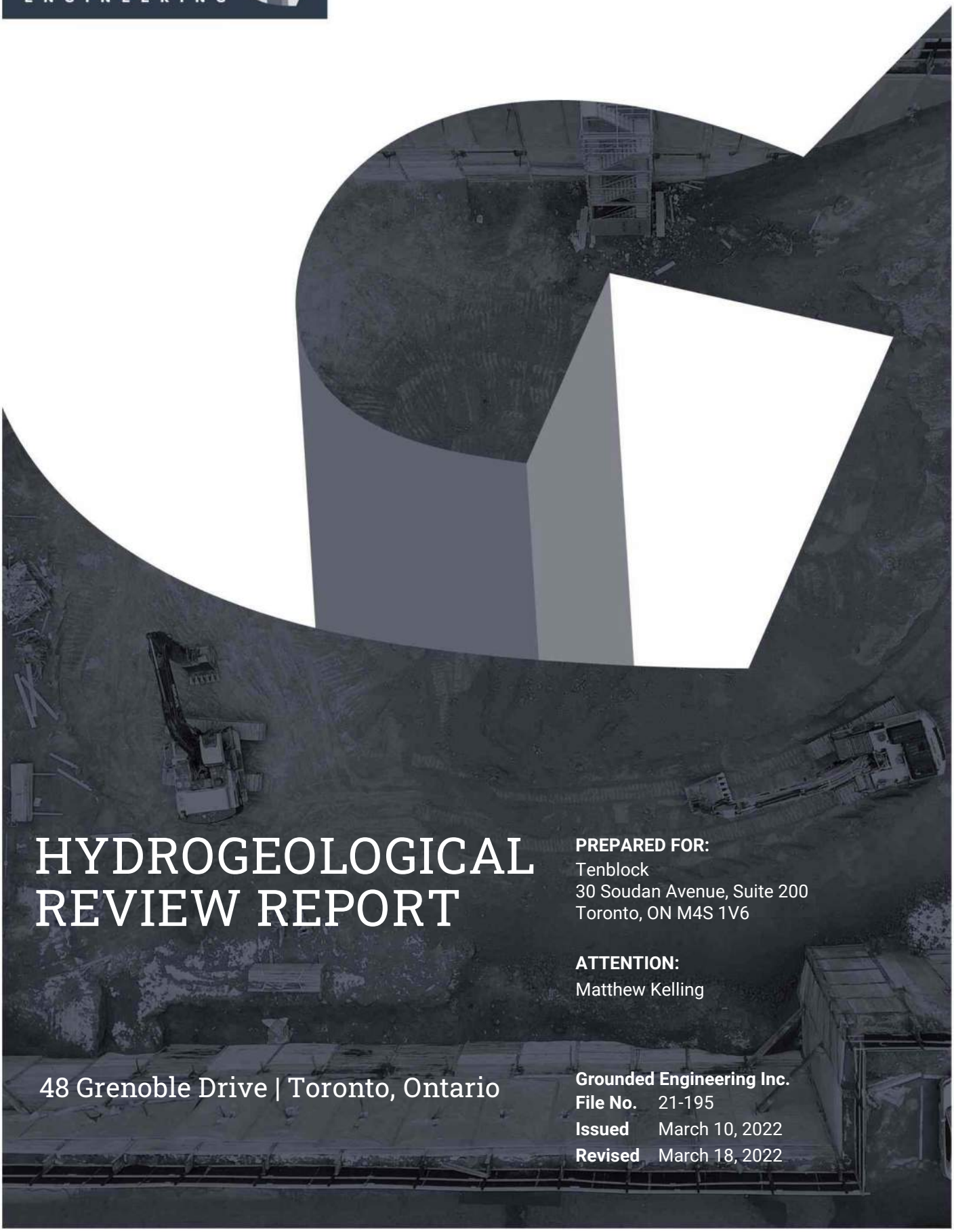
Consulting Firm that prepared Hydrological Report: Grounded Engineering Inc.

Qualified Professional who completed the report summary: Matthew Bielaski, P.Eng., QP$_{RA-ESA}$

Print Name

Qualified Professional who completed the report summary: _____

Signature Date & Stamp



HYDROGEOLOGICAL REVIEW REPORT

PREPARED FOR:
Tenblock
30 Soudan Avenue, Suite 200
Toronto, ON M4S 1V6

ATTENTION:
Matthew Kelling

48 Grenoble Drive | Toronto, Ontario

Grounded Engineering Inc.
File No. 21-195
Issued March 10, 2022
Revised March 18, 2022

Executive Summary

Grounded Engineering Inc. (Grounded) was retained by Tenblock to conduct a Hydrogeological Review for the proposed redevelopment of 48 Grenoble Drive in Toronto, 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)	
1 Building	9	1	*Unknown*	*Unknown*	*Unknown*

Proposed Development

Development Phase	Above Grade Levels	Below Grade Levels			
		Level #	Lowest Finished Floor		Approximate Base of Footings (masl)
			Depth (m)	Elevation (masl)	
1 Building (2 towers and associated podium)	Podium - 6 Tower A - 41 Tower B - 43	4	13.5	114.0	111.5

Site Conditions

Site Stratigraphy

Stratum/Formation	Aquifer or Aquitard	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Fill	Aquifer	0.0 – 3.1	127.5 – 124.4	$1.0 \times 10^{-5***}$
Gravelly Sands	Aquifer	3.1 – 6.9	124.4 – 120.6	$3.6 \times 10^{-6**}$
Upper Glacial Till	Aquifer	6.9 – 20.2	120.6 – 107.3	$5.5 \times 10^{-8*}$
Clayey Silt	Aquitard	20.2 – 26.3	107.3 – 101.2	$1.6 \times 10^{-8*}$
Lower Sands	Aquifer	26.3 – 36.7	101.2 – 90.8	$1.5 \times 10^{-6*}$
Lower Glacial Till	Aquifer	36.7 – 39.7	90.8 – 87.8	$1.0 \times 10^{-7***}$

*Indicates conductivity was calculated by Slug Test
**Indicates conductivity was estimated using grain size analysis
***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)
BH1	13.1	113.8
BH2	15.2	111.9
BH3	16.2	111.5
BH4	14.8	112.8
BH5	10.6	117.0

Maximum Groundwater Elevation		
BH6	17.5	107.7
BH7	30.2	96.9
BH8	30.7	96.8
BH9	30.4	97.0

Groundwater Quality				
Sample ID	**Sample Date**	**Sample Expiry Date**	**City of Toronto Storm Sewer Limits**	**City of Toronto Sanitary and Combined Sewer Limits**
SW-UF-BH2	Feb 16, 2022	Aug 16, 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)**
86,940	21,735	12,500	12,500,000	7,100	7,100,000

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**
50,000	34.7	156,000	108.3	206,000	143.1

Long Term (Permanent) Groundwater Quantity – Safety Factor of 2.0 Used						
Scenario	**Groundwater Seepage**		**Infiltration Design Rainfall Event (25mm)**		**Total Daily Water Takings**	
	L/day	**L/day**	**L/min**	**L/day**	**L/day**	**L/min**
Drained Structure	25,000	17.4	23,000	16.0	48,000	33.3
Fully Watertight Structure	0	0	0	0	0	0

Land Stability	
Maximum Zone of Influence (m)	**Maximum Potential Settlement (mm)**
5	Drained Structure - 32
	Fully Watertight Structure - 0

Regulatory Requirements	Drained Structure	Fully Watertight Structure
Environmental Activity and Sector Registry (EASR) Posting	Required	Required
Short Term Permit to Take Water (PTTW)	Not Required	Not Required
Long Term Permit to Take Water (PTTW)	Not Required	Not Required
Short Term Discharge Agreement City of Toronto	Required	Required
Long Term Discharge Agreement City of Toronto	Required	Not Required

TABLE OF CONTENTS

FIGURES

APPENDICES

1 Introduction

Tenblock has retained Grounded Engineering Inc. ("Grounded") to provide hydrogeological engineering design advice for their proposed development at 48 Grenoble Drive, in Toronto, Ontario.

Property Information	
Location of Property	48 Grenoble Drive, Toronto, Ontario, M3C 1C8
Ownership of Property	Microbjo Properties Inc.
Property Dimensions (m)	Approximately 96 by 70 (irregular shape)
Property Area (m^2)	Approximately 6,749

Existing Development	
Number of Building Structures	1 Building
Number of Above Grade Levels	9
Number of Underground Levels	1
Sub-Grade Depth of Development (m)	Unknown
Sub-Grade Area (m^2)	Approximately 1,200
Land Use Classification	Residential

Proposed Development	
Number of Building Structures	1 Building (2 towers and associated podium)
Number of Above Grade Levels	Towers: Tower A – 41 & Tower B - 43 Podium: 6
Number of Underground Levels	4
Sub-Grade Depth of Development (m)	13.5
Sub-Grade Area (m^2)	Approx. 6,000
Land Use Classification	Residential with Parkland Conveyance

Qualified Person and Hydrogeological Review Information	
Qualified Person	Matthew Bielaski, P.Eng., QP_{ESA-RA}
Consulting Firm	Grounded Engineering Inc.
Date of Hydrogeological Review	March 18, 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 3 environmental boreholes to a maximum depth of 1 m (BH10 to BH12) along the proposed parkland conveyance, with no monitoring wells. ▪ Advancement of 6 boreholes to an approximate depth of 20 m, which were instrumented with monitoring wells (BH1 to BH6) ▪ Advancement of 3 boreholes to an approximate depth of 45 m, which were instrumented with monitoring wells (BH7 to BH9) ▪ Completion of a 24 hour pump test (if feasible) ▪ Completion of slug tests in all available monitoring wells ▪ Groundwater elevation monitoring for three (3) months ▪ Groundwater sampling and analysis to the City of Toronto Sewer Use Limits ▪ Assessment of groundwater controls and potential impacts ▪ Report preparation in accordance with Ontario Water Resources Act, Ontario Regulation 387/04 and Toronto Municipal Code Chapter 681

General Hydrogeological Characterization	
Property Topography	The site has an approximate ground surface elevation of 127.5 masl.
Local Physiographic Features	The site is composed of sandy silt till and clayey silt till deposits, as well as a clayey silt strata and lower sands.
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 Don River Watershed. Locally, groundwater is anticipated to flow East towards a branch of the Don River.

General Hydrogeological Characterization	
Surface Drainage	Surface water is expected to flow towards municipal catch basins located on or adjacent to the site, via Grenoble Dr and Deauville Ln to the South and East.

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)
Fill	Aquifer	0.0 – 3.1	127.5 – 124.4	$1.0 \times 10^{-5***}$
Gravelly Sands	Aquifer	3.1 – 6.9	124.4 – 120.6	$3.6 \times 10^{-6**}$
Upper Glacial Till	Aquifer	6.9 – 20.2	120.6 – 107.3	$5.5 \times 10^{-8*}$
Clayey Silt	Aquitard	20.2 – 26.3	107.3 – 101.2	$1.6 \times 10^{-8*}$
Lower Sands	Aquifer	26.3 – 36.7	101.2 – 90.8	$1.5 \times 10^{-6*}$
Lower Glacial Till	Aquifer	36.7 – 39.7	90.8 – 87.8	$1.0 \times 10^{-7***}$

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

Bedrock			
Stratum	**Depth Range (mbgs)**	**Elevation Range (masl)**	**Hydraulic Conductivity (m/s)**
Weathered	39.6 – 41.6	87.9 – 85.8	1.0×10^{-6}
Sound	41.6 – 46.1	85.8 – 81.3	2.5×10^{-7}

Surface Water		
Surface Water Body	**Distance from site (m)**	**Hydraulically Connected to Property (yes/no)**
Don River	500 (East)	No

4 Monitoring Well Information

Well ID	Well Diameter (mm)	Ground Surface (masl)	Top of Screen (masl)	Bottom of Screen (masl)	Screened Geological Unit
BH1	51	126.9	114.7	111.7	Upper Glacial Till
BH2	51	127.1	111.2	108.2	Upper Glacial Till
BH3	51	127.7	112.4	109.4	Upper Glacial Till
BH4	51	127.6	110.9	107.8	Clayey Silt
BH5	51	127.6	113.9	110.9	Upper Glacial Till
BH6	51	125.2	110.0	106.9	Clayey Silt
BH7	51	127.1	87.3	84.2	Bedrock
BH8	51	127.5	97.0	94.0	Lower Sands
BH9	51	127.4	84.3	81.3	Bedrock

5 Groundwater Elevations

Well ID	Groundwater Elevation (masl)				
	Feb 18, 2022	Feb 23, 2022	Feb 24, 2022	Mar 4, 2022	Mar 14, 2022
BH1	113.4	-	-	113.8	113.9
BH2	111.0	-	-	111.9	111.7
BH3	-	111.2	-	111.5	111.8
BH4	-	112.8	-	111.8	111.8
BH5	-	117.0	-	116.5	116.7
BH6	107.7	-	-	107.5	107.8
BH7	95.5	-	96.8	96.9	97.0
BH8	96.8	96.5	-	96.4	96.5
BH9	97.1	-	97.0	-	-

For basement wall design purposes, the groundwater table is approximately Elev. 117.0 m, in the upper glacial till. This deposit has a low permeability and will yield moderate seepage in the long term. There is also groundwater in the lower sands at about Elev. 97± m. This unit will yield free-flowing water when penetrated. There is water within discrete fractures in the bedrock, as well as infiltrated stormwater perched in the earth fill and upper native soils which over time, will infiltrate and migrate down towards the groundwater table.

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.

Per the City of Toronto, Toronto Water Infrastructure Management's Foundation Drainage Policy (November 1, 2021), long-term discharge of foundation drainage to the City's sanitary sewer system will not be permitted. A temporary, emergency foundation drainage connection to the City's sewer systems **may** be granted if the lowest elevation of any proposed structure is higher than the Maximum Anticipated Groundwater Level at the site. The MAGWL was determined based on the following equation:

Maximum Anticipated GWL = Peak Static GWL Observed + Fluctuation Allowance

The Peak Static GWL Observed was at Elev. 117 m at BH5 in February 2022. The Fluctuation Allowance for February, based on the Option 1 - Table 1 approach, is 2.1 m. Therefore, the MAGWL for the site is Elev. 119.1 m.

As proposed foundations extend below the observed maximum groundwater level at the Property, the elevation of the lowest structure will be below the MAGWL. As such, long term discharge of groundwater to the City's sewer systems is unlikely to be permitted. Pre-consultation with Toronto Water is encouraged to determine the feasibility for a Long-Term Storm/Sanitary Discharge Exemption.

6 Aquifer Testing

6.1 Pump Test

A pumping test was not completed at the site. Due to the nature of the soil materials present and slow ground recharge of the aquifer it was not feasible to complete a 24 hour pumping test. Please note however that in-situ single well response tests were completed on each of the monitoring wells installed at the site.

6.2 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)
BH1	114.7 - 111.6	Upper Glacial Till	2.5×10^{-8}
BH2	111.2 - 108.2	Upper Glacial Till	2.7×10^{-7}
BH4	112.4 - 109.4	Clayey Silt	1.0×10^{-8}
BH5	110.9 - 107.8	Upper Glacial Till	2.5×10^{-8}
BH6	113.9 - 110.9	Clayey Silt	2.5×10^{-8}
BH7	110.0 - 106.9	Bedrock	2.5×10^{-7}
BH8	87.3 - 84.2	Lower Sands	1.5×10^{-6}
BH9	97.0 - 94.0	Bedrock	2.3×10^{-8}

6.3 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 SS4	Gravelly Sands	Hazen, Slichter, Beyer, Sauerbrei, Kruger, Zunker, Zamarin, Barr, Alyamani and Sen, Krumbein and Monk	3.6×10^{-6}
BH2 SS8	Upper Glacial Till	Hazen, Slichter, Beyer, Sauerbrei, Kruger, Zunker, Zamarin, Barr, Alyamani and Sen, Krumbein and Monk	1.7×10^{-8}
BH3 SS12	Upper Glacial Till	Hazen, Slichter, Beyer, Sauerbrei, Kruger, Zunker, Zamarin, Barr, Alyamani and Sen, Krumbein and Monk	1.0×10^{-7}
BH4 SS15	Clayey Silt	Hazen, Slichter, Beyer, Sauerbrei, Kruger, Zunker, Zamarin, Barr, Alyamani and Sen, Krumbein and Monk	1.0×10^{-8}
BH7 SS17	Clayey Silt	Hazen, Slichter, Beyer, Sauerbrei, Kruger, Zunker, Zamarin, Barr, Alyamani and Sen, Krumbein and Monk	3.3×10^{-9}
BH7 SS22	Lower Sands	Hazen, Slichter, Beyer, Sauerbrei, Kruger, Zunker, Zamarin, Barr, Alyamani and Sen, Krumbein and Monk	4.6×10^{-9}
BH7 SS26	Lower Glacial Till	Hazen, Slichter, Beyer, Sauerbrei, Kruger, Zunker, Zamarin, Barr, Alyamani and Sen, Krumbein and Monk	3.6×10^{-8}

The results of the analyses are presented in Appendix D.

6.4 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}
Gravelly Sands	10^{-2} to 10^{-7}
Upper Glacial Till	10^{-6} to 10^{-12}
Clayey Silt	10^{-6} to 10^{-12}

Stratum/Formation	Hydraulic Conductivity (m/s)
Lower Sands	10^{-2} to 10^{-7}
Lower Glacial Till	10^{-6} to 10^{-12}
Bedrock (Shale)	10^{-6} to 10^{-13}

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 BH2 on February 16, 2022. The sample was analyzed for the following parameters:

- City of Toronto Municipal Code Chapter 681 Table 1 – Limits for Sanitary and Combined Sewers Discharge
- City of Toronto Municipal 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 246 mg/L)
- Total Cyanide (Limit 0.02 mg/L, Result 0.0711 mg/L)
- Total Manganese (Limit 0.05 mg/L, Result 0.384 mg/L)
- BOD (Limit 15 mg/L, Result 40.5 mg/L)

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

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

8 Proposed Construction Method

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. 117.0± m. The water table is present in all of the native soil units. The lowest (P4) FFE is at about Elev. 114.0 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
- Base of footings is estimated at 111.5 masl which is conservative for the present purposes. This depth may be revised once the final structural design becomes available for review.
- Foundation excavations are anticipated to extend to 111.5 masl, which will penetrate the upper glacial till and may yield moderate groundwater seepage.

Prior to excavation, 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.

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.

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 may consist of either drained foundations or a fully leak tight structure. Per the City of Toronto, Toronto Water Infrastructure Management's Foundation Drainage Policy (November 1, 2021), long-term discharge of groundwater to the City's sewer systems is unlikely to be permitted. Pre-consultation with Toronto Water is encouraged to determine the feasibility for a Long-Term Storm/Sanitary Discharge Exemption, as applicable.

The City of Toronto 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 6, 073 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 584,000 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)**
86,940	21,735	12,500	12,500,000	7,100	7,100,000

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**
50,000	34.7	156,000	108.3	206,000	143.1

Long Term (Permanent) Groundwater Quantity – Safety Factor of 2.0 Used						
Scenario	Groundwater Seepage		Infiltration Design Rainfall Event (25mm)		Total Daily Water Takings	
	L/day	L/day	L/min	L/day	L/day	L/min
Drained Structure	25,000	17.4	23,000	16.0	48,000	33.3
Fully Watertight Structure	0	0	0	0	0	0

Regulatory Requirements	Drained Structure	Fully Watertight Structure
Environmental Activity and Sector Registry (EASR) Posting	Required	Required
Short Term Permit to Take Water (PTTW)	Not Required	Not Required
Long Term Permit to Take Water (PTTW)	Not Required	Not Required
Short Term Discharge Agreement City of Toronto	Required	Required
Long Term Discharge Agreement City of Toronto	Required	Not Required

Please note:

- The native soils must be dewatered a minimum of 1.2 m below the footing elevation prior to excavation to preserve the in-situ integrity of the native soils during construction dewatering activities. It is anticipated that the groundwater table will rise to the elevation of the subfloor drainage in the event of a drained structure or the waterproofing in the event of a leak tight structure.
- 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 the dewatering contractor retained.
- 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 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).

- Per the City of Toronto, Toronto Water Infrastructure Management's Foundation Drainage Policy (November 1, 2021), long-term discharge of groundwater to the City's sewer systems is unlikely to be permitted. Pre-consultation with Toronto Water is encouraged to determine the feasibility for a Long-Term Storm/Sanitary Discharge Exemption, where applicable.

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:

The ZOI with respect to groundwater seepage at the site is:

$R_0 = 3000*6.7\ m*(5.5 \times 10^{-8})^{0.5}\ m/s$

$R_0 = 5 \pm m$

The ZOI with respect to groundwater construction dewatering at the site is 5 m. This represents the maximum zone of influence with respect to groundwater at the site.

If all underground structures are constructed to be fully watertight, the ZOI with respect to groundwater seepage in the long term is 0 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 6.7 m. This drawdown would create at increase in effective stress of approximately 66 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 maximum 8 mm of additional settlement in the adjacent soils.
- 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 dewatering-induced settlement is calculated to be 8 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 and Combined 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 and Combined Sewer.

Per the City of Toronto, Toronto Water Infrastructure Management's Foundation Drainage Policy (November 1, 2021), long-term discharge of groundwater to the City's sewer systems is unlikely to be permitted. Discharge to the City's sewers may only be accomplished via a Long-Term Storm/Sanitary Discharge Exemption.

11.4 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 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 Toronto. 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 Toronto. 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 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 will be 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 ground water level have the potential to cause settlement based on the change in the effective stresses within the ZOI. Per Section 11.2 of this report, the impact of the proposed dewatering on the existing adjacent structures is considered by Grounded to be within acceptable limits. Groundwater quality and quantity monitoring during dewatering activities will be conducted, as outlined below:

- Monitoring of groundwater quality on an ongoing basis per the requirements of the City of Toronto Discharge Agreement and also at the discretion of the Toronto Water Environmental Monitoring & Protection Unit (Toronto Water EM&P).
- Daily monitoring and metering of groundwater taking/discharge volumes per the City of Toronto Discharge Agreement.
- Groundwater will be discharged at the rate specified in the Discharge Agreement as approved by the City. This rate will not be exceeded.
- Any additional storm water accumulated on the Property will be managed on site and discharged in a controlled manner, not in excess of the agreed upon maximum daily volumes set out in the Discharge Agreement.
- Reporting of groundwater quality and quantity per the requirements of the applicable regulatory bodies (City of Toronto for the Discharge Agreement and MECP for the EASR Posting/Permit to Take Water requirements).
- The dewatering system including any applicable treatment system will be reviewed and inspected by Toronto Water – EM&P prior to connection to the City's municipal sewer system and after installation before discharge commences.
- Vibration and settlement monitoring during construction will be part of the shoring monitoring program at the site, as required by the Ontario Building Code and applicable City of Toronto By-Laws.

- If settlement outside of the acceptable limits is observed, dewatering at the site will be temporarily suspended.
- A Professional Engineer will be called to the Property to evaluate site conditions, determine cause of settlement, and provide remedial action.

Both the temporary construction dewatering system and the permanent building drainage system (if applicable) must be properly installed and screened to ensure sediments and fines will not be removed which would cause loss of ground. This 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 Tenblock 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.

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.

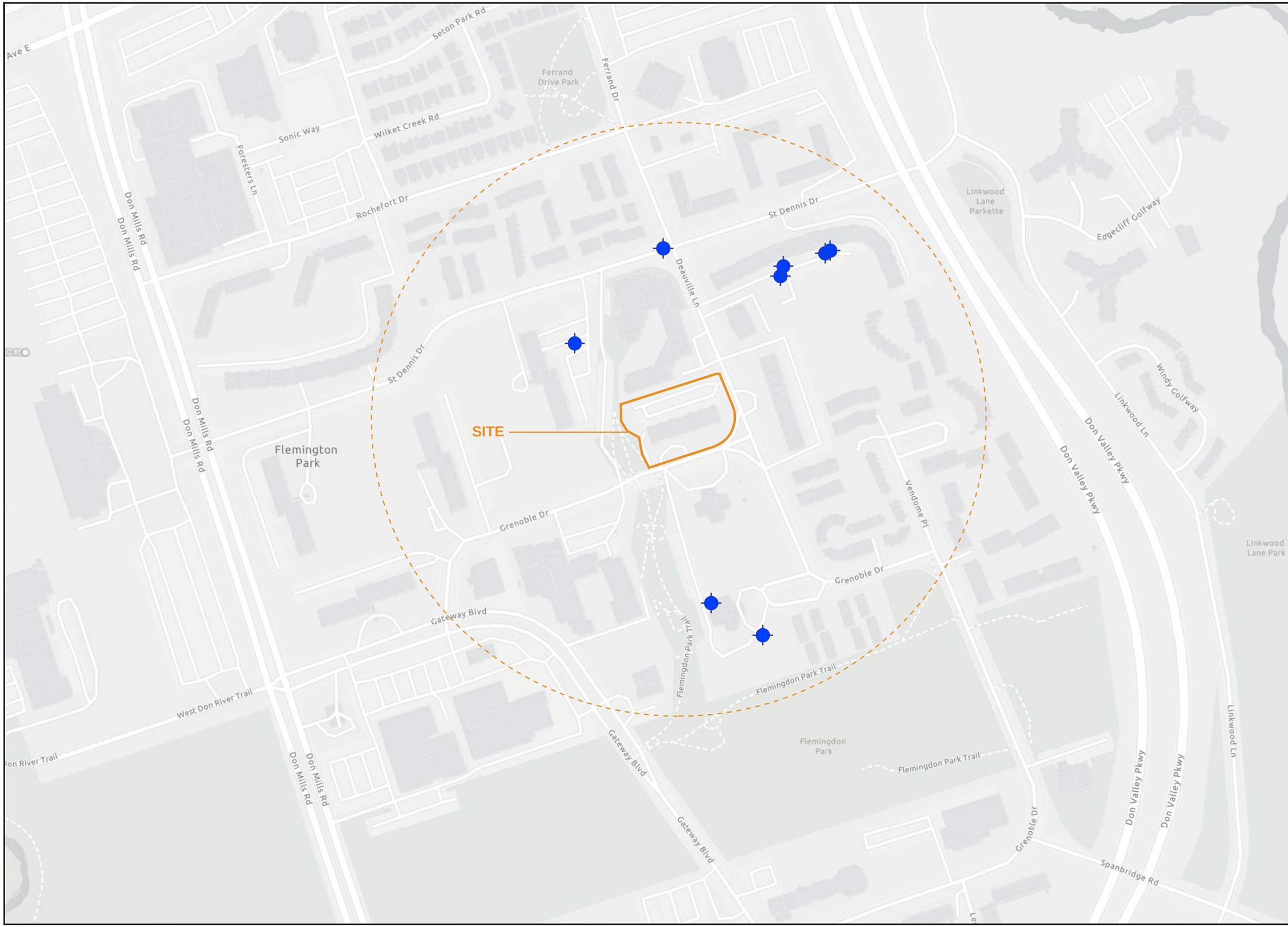
For and on behalf of our team,

GROUNDED ENGINEERING

Shelby Plant, EIT

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

FIGURES



GROUNDED ENGINEERING
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www.groundedeng.ca

LEGEND

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

Note

Reference

ArcGIS My Map 2021

Project

48 GRENOBLE DRIVE, TORONTO, ONTARIO

Figure Title

STUDY AREA MAP

North

TRUE PROJECT

Date

MARCH 2022

Scale

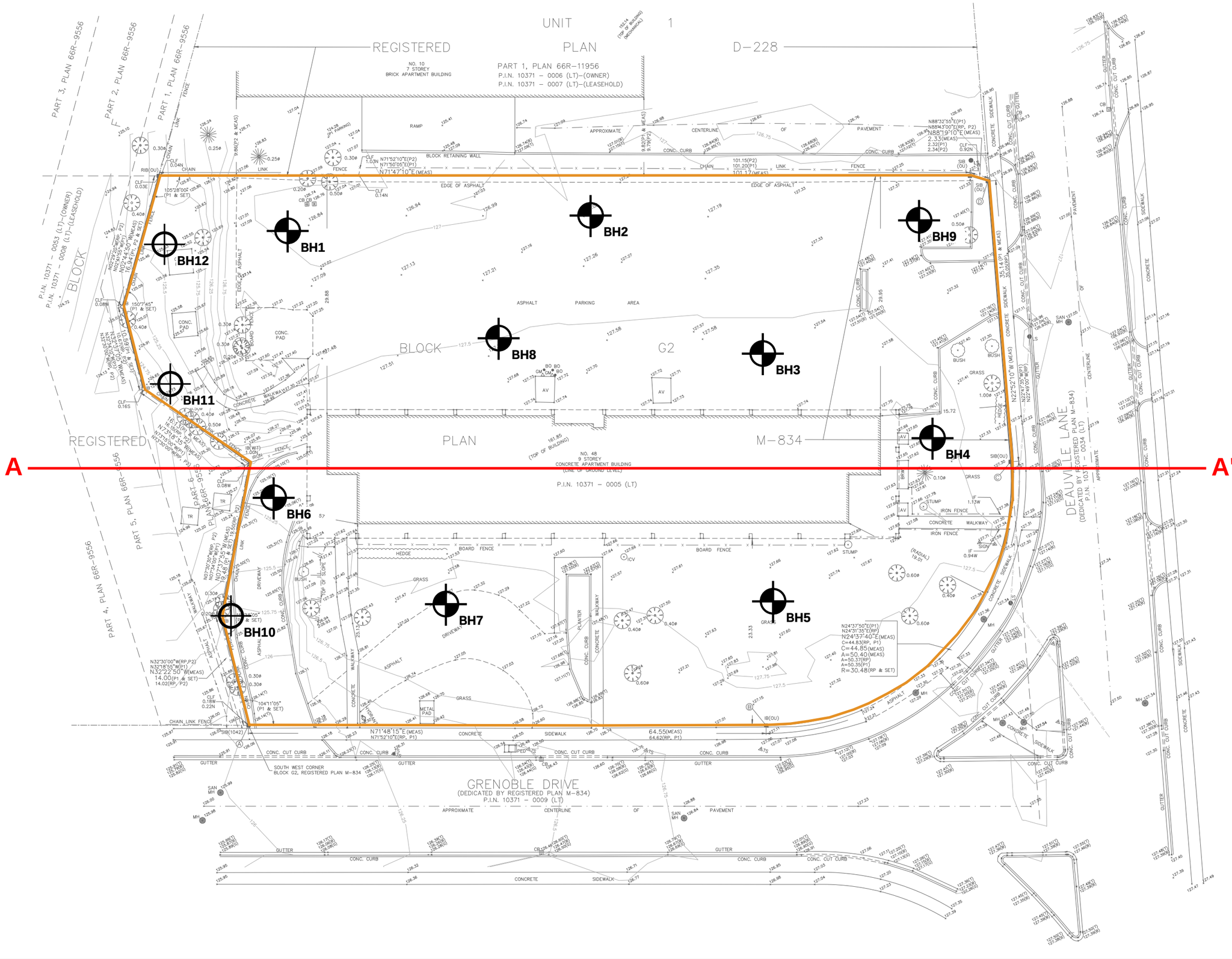
0m 50m 100m

Job No

21-195

Figure No

FIGURE 1



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LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- MONITORING WELL/BOREHOLE BY GROUNDED

Note

Reference

Survey Drawing no. 3487-OT.
Project no. 3487-0.
Dated August 4, 2021.
Prepared by R.AVIS Surveying Inc.

Project

48 GRENOBLE DRIVE
TORONTO, ONTARIO

Figure Title

BOREHOLE LOCATION PLAN (Existing Condition)

North

TRUE
PROJECT

Date

MARCH 2022

Scale

0m 5m 10m

Job No

21-195

Figure No

FIGURE 2

MONITORING WELL/BOREHOLE BY GROUNDED

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LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- MONITORING WELL/BOREHOLE BY GROUNDED

Note

Reference

Arch Drawings
Project no. 211033.
March 18, 2022.
Prepared by Diamond Schmitt.

Project

48 GRENOBLE DRIVE
TORONTO, ONTARIO

Figure Title

BOREHOLE LOCATION PLAN (Proposed Condition)

North

TRUE
PROJECT

Date

MARCH 2022

Scale

0m 5m 10m

Job No

21-195

Figure No

FIGURE 3

A (West) — A' (East)

Average Ground Surface Elev. 127.5 m

Proposed P4 Elev. 114.0m

Groundwater Table Elev. 117.0m

Lower Groundwater Table Elev. 97.0 m

Elevation (m)

BH 1 | BH 6 | BH 8 | BH 7 | BH 2 | BH 3 | BH 5 | BH 9 | BH 4

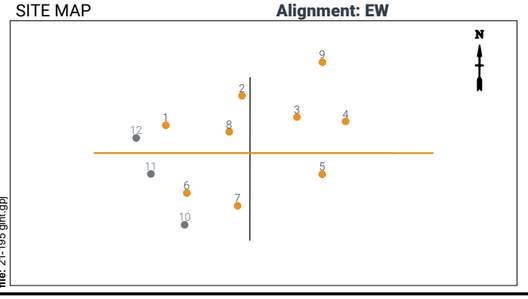
PMT: 20.0 MPa | PMT: 36.0 MPa | PMT: 115.0 MPa | PMT: 250.0 MPa | PMT: 130.0 MPa | PMT: 76.0 MPa

UCS = 10.6 MPa | UCS = 9.8 MPa

Boreholes Equally Spaced

SITE MAP

Alignment: EW



LITHOLOGY GRAPHIC LEGEND

- Asphalt
- Aggregate
- Fill
- Sand
- Clayey Silt Till
- Silty Till
- Silt and Clay
- Gravelly Sand
- Sandy Silt Till
- Topsoil
- Silty Clay
- Sand and Gravel
- Bedrock (inferred)
- Bedrock (cored)
- Silty Sand
- Shale

LEGEND

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

- water level, unstabilized
- water level, stabilized

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

Project
48 GRENOBLE DRIVE TORONTO, ON

Figure Title
SUBSURFACE CROSS-SECTION

EW

Date
MARCH 2022

Scale
AS INDICATED

Job No
21-195

Figure No
FIGURE 4

file: 21-195 gint.gpj

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

PI: plasticity index

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.

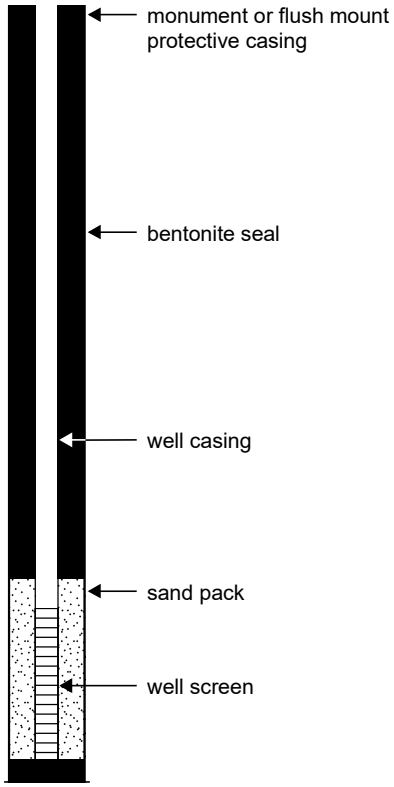
ASTM D3441 Cone Penetration Test (CPT)
Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm^2 into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

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



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

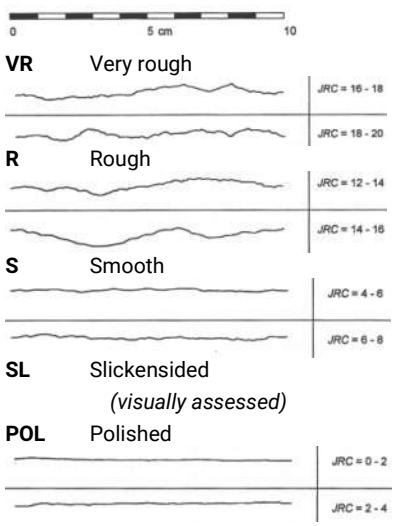
Coating

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.)



VR Very rough
R Rough
S Smooth
SL Slickensided *(visually assessed)*
POL Polished

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 : Jan 24, 2022
Position : E: 634377, N: 4841782 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : CME 75

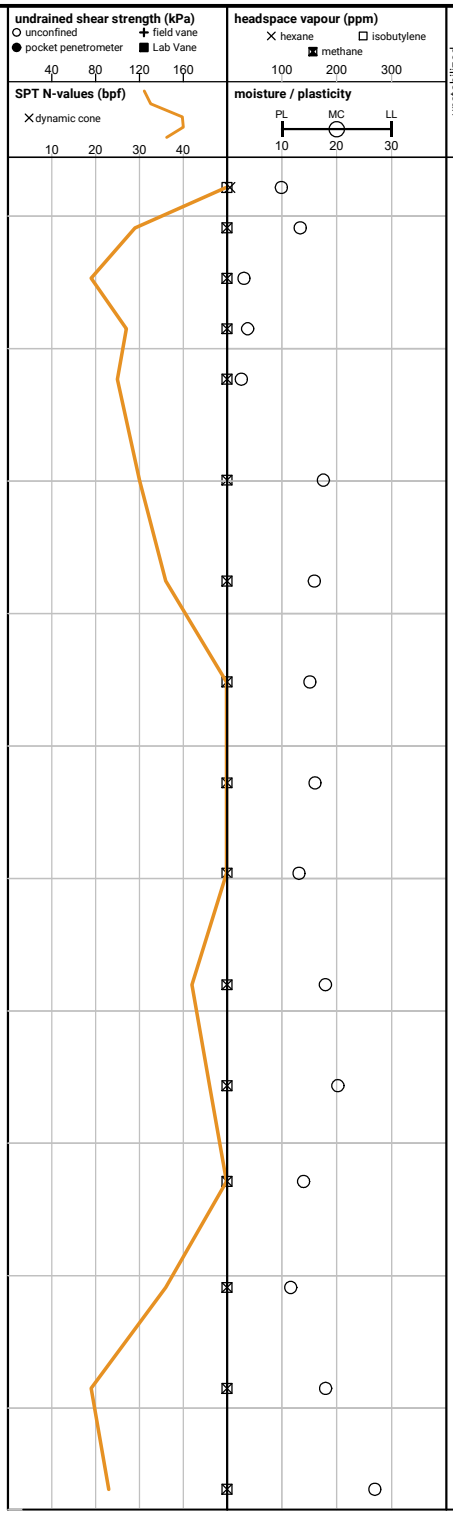
elev depth (m)	description	number	type	SPT N-value
126.9	**GROUND SURFACE**			
	125mm **ASPHALT**	1	SS	57
	100mm **AGGREGATE**	2	SS	29
125.4 / 1.5	**FILL**, sandy silt, trace clay, trace gravel, trace rock fragments, trace organics, very dense, brown, moist ...at 0.8 m, compact	3	SS	19
	SAND, trace silt, trace clay, some gravel to gravelly, compact, brown, moist	4	SS	27
		5	SS	25
	...at 4.6 m, wet, dense	6	SS	30
120.8 / 6.1	**CLAYEY SILT**, some sand, trace gravel, hard, grey, moist (GLACIAL TILL)	7	SS	36
		8	SS	67
	...at 9.1 m, trace sand	9	SS	61
	...at 10.7 m, silt partings	10	SS	50 / 140mm
		11	SS	42
		12	SS	46
111.7 / 15.2	**SILT**, trace clay, trace sand, trace gravel, very dense, grey, wet (GLACIAL TILL)	13	SS	80
110.1 / 16.8	**SILT AND CLAY**, trace sand, hard, grey, moist	14	SS	36
	...at 18.3 m, very stiff	15	SS	19
	...at 19.8 m, wet	16	SS	23
106.5 / 20.4	**END OF BOREHOLE**			

hollow stem augers OD=215 mm

mud rotary small OD=100 mm

Borehole was filled with drill water upon completion of drilling.

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



lab data and comments

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

SS1: BTEX, PAHs, PHCs

SS2: EC/SAR, H-Ms, Metals, ORPs, pH, VOCs
11 78 6 5

SS3: PAHs
25 62 10 3

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

SS7: BTEX, PHCs

SS8: VOCs

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Feb 2, 2022	10.5	116.4
Feb 18, 2022	13.5	113.4

file: 21-195 gint.gpj

Tech : FR/AJ | **PM** : KM/SP | **Rev** : KB

GROUNDED ENGINEERING

Date Started : Jan 26, 2022
Position : E: 634413, N: 4841796 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 2

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

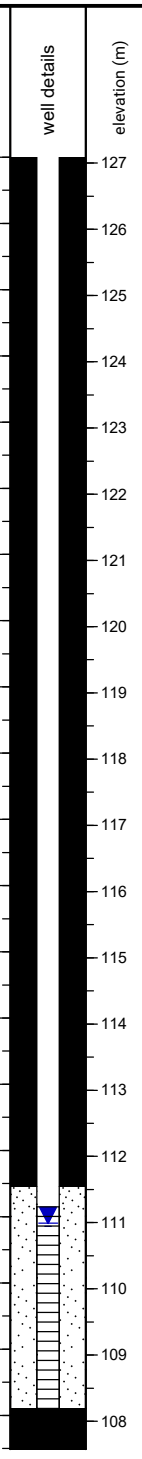
drill method : CME 75

elev depth (m)	description	graphic log	number	type	SPT N-value
127.1	**GROUND SURFACE**				
	100mm **ASPHALT**		1	SS	41
	100mm **AGGREGATE**				
	FILL, silty sand, some clay, trace gravel, trace organics, dense, brown, moist		2	SS	10
	...at 0.8 m, loose, dark brown		3	SS	5
124.8 / 2.3	**GRAVELLY SAND**, some silt, trace clay, compact to dense, brown, moist		4	SS	23
			5	SS	33
122.5 / 4.6	**CLAYEY SILT**, sandy, trace gravel, very stiff, brown to grey, moist (GLACIAL TILL)		6	SS	25
	...at 6.1 m, some sand, grey		7	SS	25
	...at 7.6 m, trace sand, hard		8	SS	47
			9	SS	92 / 275mm
116.4 / 10.7	**SANDY SILT**, some clay, trace gravel, dense, grey, moist (GLACIAL TILL)		10	SS	49
			11	SS	45
			12	SS	32
111.9 / 15.2	**SILT AND CLAY**, trace sand, hard, grey, moist		13	SS	48
			14	SS	51
	...at 18.3 m, wet, very stiff		15	SS	21
			16	SS	22
107.6 / 19.5	**END OF BOREHOLE**				

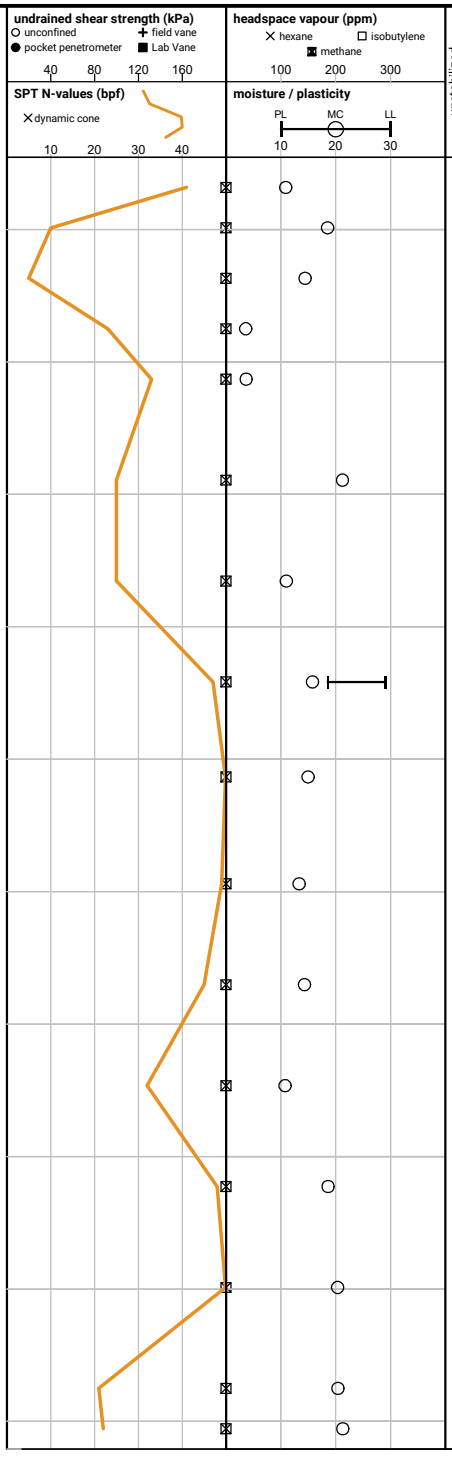
hollow stem augers OD=215 mm

mud rotary small OD=100 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: BTEX, PAHs, PHCs

SS2: EC/SAR, H-Ms, Metals, ORPs, pH — 1 65 24 10

SS3: VOCs

SS4: PAHs

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

SS7: BTEX, PHCs — 0 1 71 28

SS8: VOCs

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)
Feb 18, 2022	16.1	111.0

file: 21-195 gint.gpj

Tech : FR/AJ | **PM** : KM/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Jan 28, 2022
Position : E: 634439, N: 4841786 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 3

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : CME 75

elev depth (m)	description	graphic log	number	type	SPT N-value
127.7	**GROUND SURFACE**				
	125mm **ASPHALT**		1	SS	42
	100mm **AGGREGATE**				
	FILL, silty sand, some clay, trace gravel, dense, brown, moist		2	SS	7
	...at 0.8 m, trace cinders, loose		3	SS	9
124.7			4	SS	5
3.0	**GRAVELLY SAND**, some silt, trace clay, compact, brown, moist		5	SS	24
			6	SS	24
121.6					
6.1	**SANDY SILT**, some clay, trace gravel, compact, grey, moist (GLACIAL TILL)		7	SS	16
	...at 7.6 m, very dense		8	SS	74
			9	SS	50 / 150mm
			10	SS	84 / 275mm
			11	SS	50
	...at 13.7 m, dense		12	SS	47
112.5					
15.2	**SILT AND CLAY**, trace sand, hard, grey, moist		13	SS	42
			14	SS	54
			15	SS	50
108.8					
18.9	**END OF BOREHOLE**				

hollow stem augers OD=215 mm

mud rotary small OD=100 mm

depth scale (m): 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

well details

elevation (m): 127 126 125 124 123 122 121 120 119 118 117 116 115 114 113 112 111 110 109

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: BTEX, PAHs, PHCs

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

SS3: VOCs

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

SS7: BTEX, PAHs, PHCs

SS8: VOCs

6 32 52 10

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)
Feb 23, 2022	16.5	111.2

file: 21-195 gint.gpj

Tech : FR/AJ | **PM** : KM/SP | **Rev** : MD

BOREHOLE LOG 4

Date Started : Jan 31, 2022
Position : E: 634462, N: 4841784 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

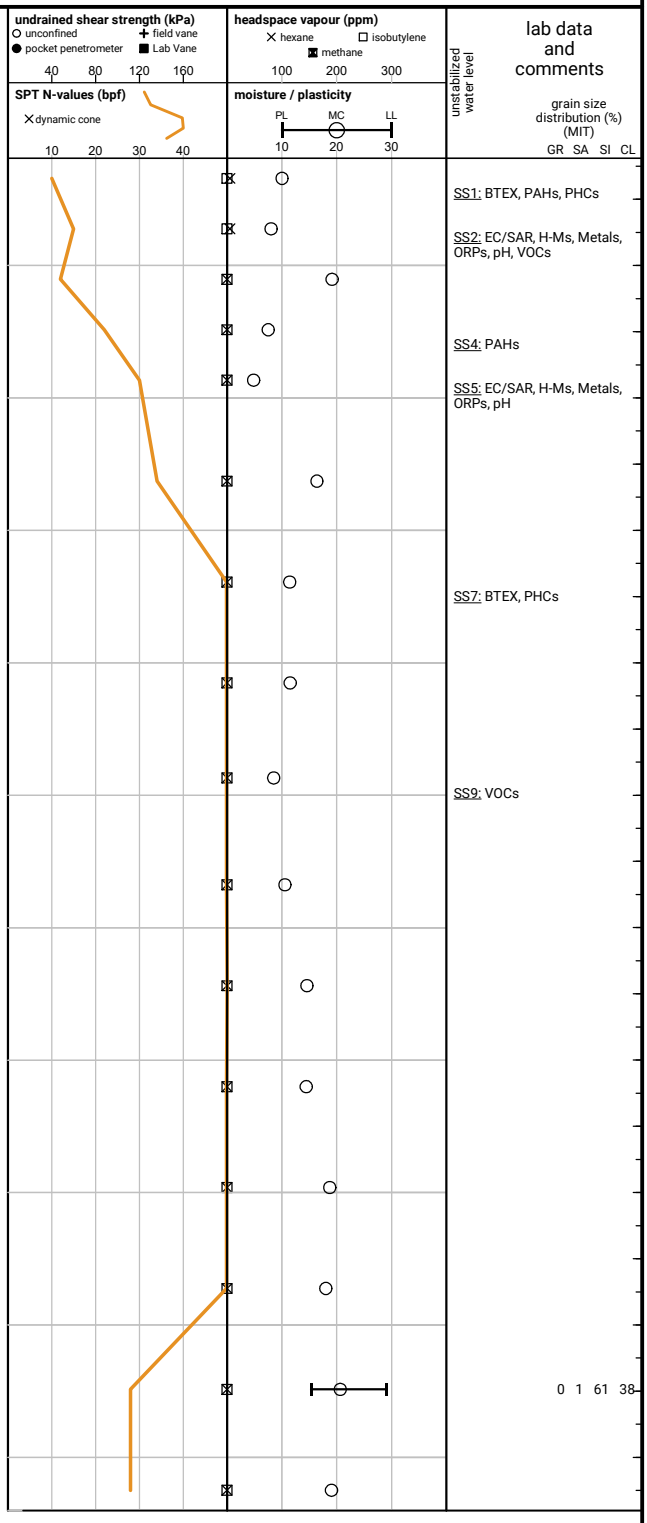
drill method : CME 75

elev depth (m)	description	number	type	SPT N-value
127.6	**GROUND SURFACE**			
	100mm **TOPSOIL**	1	SS	10
	FILL, silty sand, some clay, trace gravel, trace organics, compact, brown, moist	2	SS	15
		3	SS	12
125.3	hollow stem augers OD=215 mm			
2.3	**GRAVELLY SAND**, some silt, trace clay, compact, brown, moist	4	SS	22
		5	SS	30
	...at 4.6 m, dense, wet	6	SS	34
121.5				
6.1	**SANDY SILT**, trace clay, trace gravel, very dense, grey, moist (GLACIAL TILL)	7	SS	53
		8	SS	75
		9	SS	97 / 275mm
		10	SS	81
		11	SS	50
113.9	mud rotary small OD=100 mm			
13.7	**SILT AND CLAY**, trace sand, hard, grey, moist	12	SS	68
		13	SS	54
		14	SS	51
	...at 18.3 m, very stiff, wet	15	SS	28
107.2		16	SS	28
20.4				

END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.

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



unstabilized water level

lab data and comments

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

SS1: BTEX, PAHs, PHCs
SS2: EC/SAR, H-Ms, Metals, ORPs, pH, VOCs
SS4: PAHs
SS5: EC/SAR, H-Ms, Metals, ORPs, pH
SS7: BTEX, PHCs
SS9: VOCs
0 1 61 38

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Feb 23, 2022	14.8	112.8

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : KB

BOREHOLE LOG 5

Date Started : Feb 8, 2022
Position : E: 634451, N: 4841759 (UTM 17T)
Elev. Datum : Geodetic

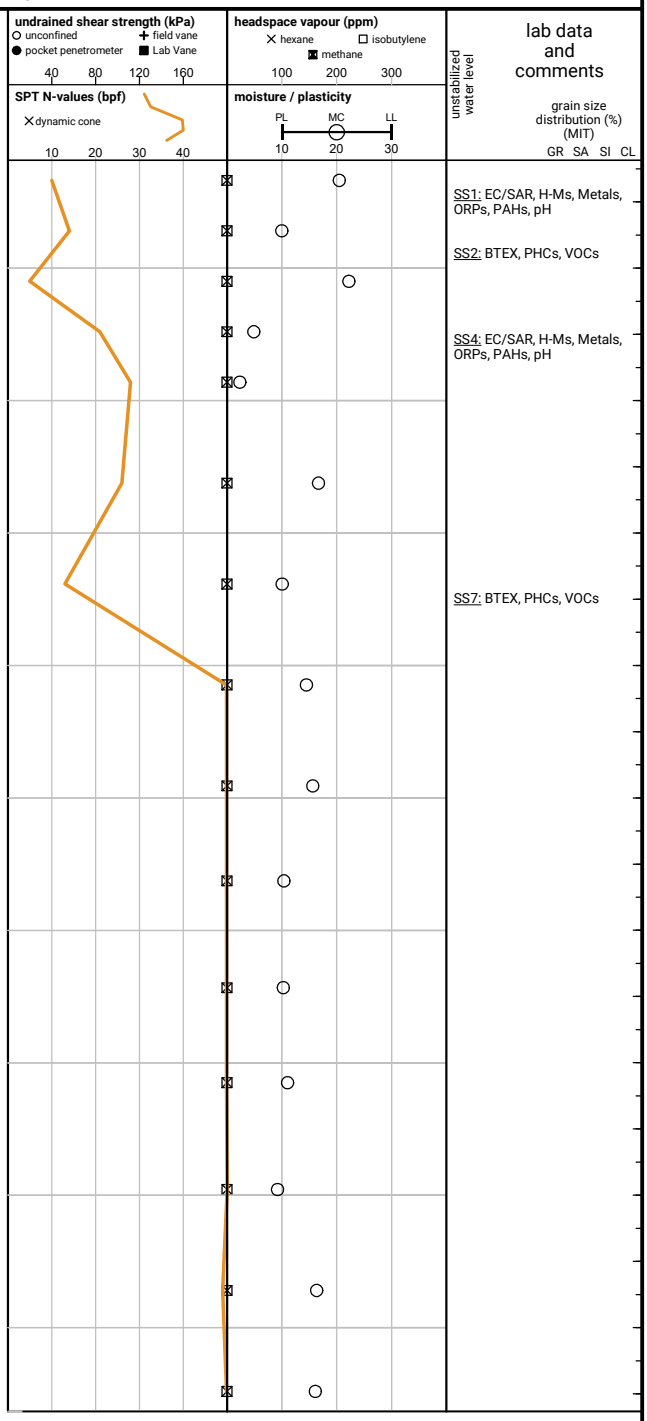
File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : CME 55

elev depth (m)	description	number	type	SPT N-value
127.6	**GROUND SURFACE**			
	150mm **TOPSOIL**	1	SS	10
	FILL, silty sand, some clay, trace gravel, trace organics, loose to compact, dark brown, moist	2	SS	14
		3	SS	5
125.3 / 2.3	**GRAVELLY SAND**, some silt, trace clay, compact, brown, moist	4	SS	21
		5	SS	28
	...at 4.6 m, some clay, wet	6	SS	26
121.5 / 6.1	**CLAYEY SILT**, some sand, trace gravel, stiff, grey, moist (GLACIAL TILL)	7	SS	13
	...at 7.6 m, silt partings, hard	8	SS	73
		9	SS	97
		10	SS	93 / 275mm
		11	SS	77
	...at 13.7 m, sandy	12	SS	94 / 275mm
112.4 / 15.2	**SANDY SILT**, some clay, trace gravel, very dense, grey, moist (GLACIAL TILL)	13	SS	50
110.8 / 16.8	**SILT AND CLAY**, trace sand, hard, grey, moist	14	SS	49
		15	SS	53
108.7 / 18.9	**END OF BOREHOLE**			

hollow stem augers OD=215 mm

mud rotary small OD=100 mm



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

SS2: BTEX, PHCs, VOCs

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

SS7: BTEX, PHCs, VOCs

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)
Feb 23, 2022	10.6	117.0

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : MD

BOREHOLE LOG 6

Date Started : Feb 7, 2022
Position : E: 634387, N: 4841750 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
125.2	**GROUND SURFACE**				
	100mm **ASPHALT**		1	SS	41
124.4	100mm **AGGREGATE**				
0.8	**FILL**, silty sand, some clay, trace gravel, trace organics, dense, brown, moist		2	SS	31
	GRAVELLY SAND, some silt, trace clay, dense, brown, moist		3	SS	21
	...at 2.3 m, compact		4	SS	22
	...at 3.0 m, wet		5	SS	12
120.6					
4.6	**CLAYEY SILT**, trace sand, trace gravel, with silt partings, stiff to very stiff, grey, moist (GLACIAL TILL)		6	SS	13
			7	SS	24
117.6					
7.6	**SANDY SILT**, trace clay, trace gravel, very dense, grey, moist (GLACIAL TILL)		8	SS	56
	...at 9.1 m, dense		9	SS	41
			10	SS	43
			11	SS	55
111.5					
13.7	**SILT AND CLAY**, trace sand, hard to very stiff, grey, moist		12	SS	45
	...at 15.2 m, trace sand		13	SS	26
			14	SS	21
	...at 18.3 m, wet		15	SS	20
			16	SS	21
104.8					
20.4	**END OF BOREHOLE**				

hollow stem augers OD=215 mm

mud rotary small OD=100 mm

depth scale (m) 0–20

well details

elevation (m) 125–105

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

SS2: BTEX, PHCs, VOCs

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

SS6: BTEX, PHCs

SS7: VOCs

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)
Feb 18, 2022	17.5	107.7

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : KB

GROUNDED ENGINEERING

Date Started : Feb 1, 2022
Position : E: 634411, N: 4841744 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 7

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : CME 55

hollow stem augers OD=215 mm

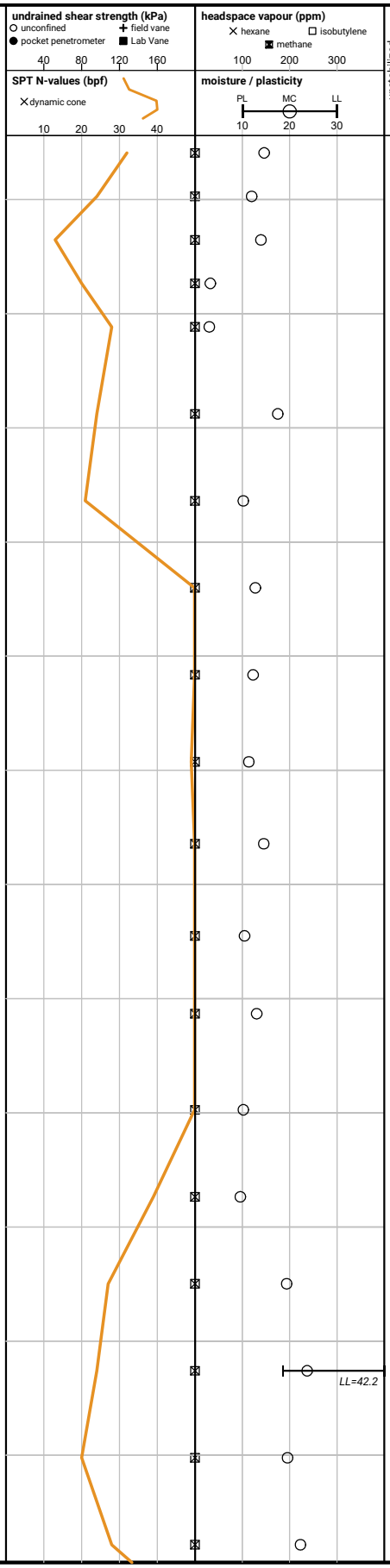
mud rotary small OD=100 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
127.1	**GROUND SURFACE**				
	100mm **ASPHALT**		1	SS	32
	100mm **AGGREGATE**				
	FILL, silty sand, trace clay, trace gravel, trace organics, trace cinders, dense to compact, dark brown with orange, moist		2	SS	24
124.8			3	SS	13
2.3	**GRAVELLY SAND**, some silt, trace clay, compact, brown, moist		4	SS	20
			5	SS	28
	...at 4.6 m, wet		6	SS	24
121.0					
6.1	**SANDY SILT**, trace clay, trace gravel, compact, grey, moist (GLACIAL TILL)		7	SS	21
	...at 7.6 m, trace clay, very dense to dense		8	SS	56
			9	SS	56
			10	SS	49
			11	SS	98 / 275mm
	...at 13.7 m, silt partings		12	SS	51
			13	SS	50 / 140mm
			14	SS	53
			15	SS	39
107.3					
19.8	**SILTY CLAY**, trace sand, very stiff, grey, wet		16	SS	27
			17	SS	24
			18	SS	20
	...at 24.4 m, wet		19	SS	28

depth scale (m): 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

well details

elevation (m): 127 126 125 124 123 122 121 120 119 118 117 116 115 114 113 112 111 110 109 108 107 106 105 104 103



unstabilized water level

lab data and comments

grain size distribution (%) (MIT)

GR SA SI CL

SS1: BTEX, PAHs, PHCs

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

2 59 32 7

SS3: VOCs

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

SS6: BTEX, PHCs, VOCs

SS8: VOCs

0 6 33 61

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : KB

(continued next page)

GROUNDED ENGINEERING

Date Started : Feb 1, 2022
Position : E: 634411, N: 4841744 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 7

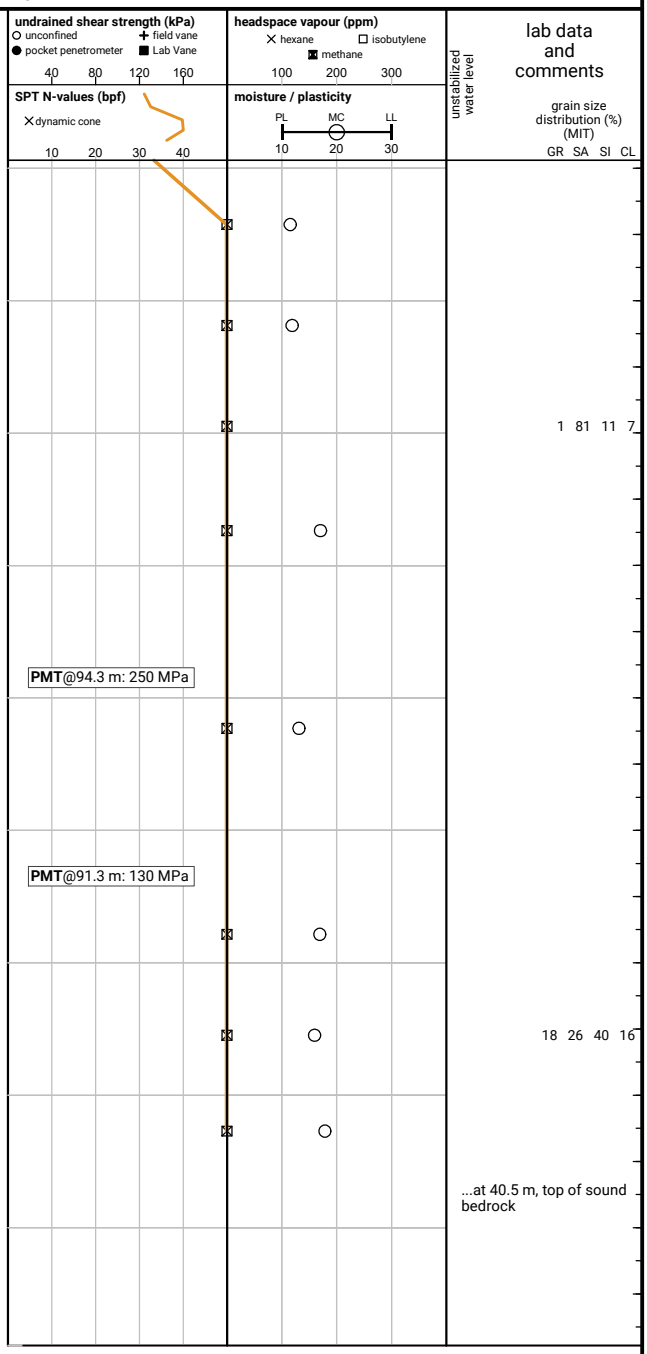
File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : CME 55

elev / depth (m)	description	graphic log	number	type	SPT N-value
	(continued)				
101.2	**SILTY CLAY**, trace sand, very stiff, grey, wet *(continued)*				
25.9	**SAND**, some silt, trace clay, trace gravel, very dense, grey, wet		20	SS	50 / 125mm
			21	SS	50 / 125mm
			22	SS	50 / 125mm
			23	SS	50 / 75mm
			1	PMT	
93.6					
33.5	**SAND AND GRAVEL**, some silt, trace clay, very dense, grey, wet		24	SS	50 / 100mm
92.0					
35.1	**SANDY SILT**, some gravel, some clay, very dense, grey, moist (GLACIAL TILL)		2	PMT	
			25	SS	50 / 75mm
	...at 38.1 m, trace shale fragments		26	SS	50 / 75mm
87.5					
39.6	**INFERRED BEDROCK**, shale and limestone fragments		27	SS	50 / 75mm
87.4			1	RUN	
39.7	**GEORGIAN BAY FORMATION** (See rock core log for details)		2	RUN	
			3	RUN	
84.2					
42.9	**END OF BOREHOLE**				

mud rotary small OD=100 mm

Rock coring (HQ) OD=96 mm



GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Feb 18, 2022	31.6	95.5
Feb 24, 2022	30.3	96.8

Borehole was filled with drill water upon completion of drilling.

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

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : KB

GROUNDED ENGINEERING

Date Started : Feb 1, 2022
Position : E: 634411, N: 4841744 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 7

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

Rock coring started at 39.7m below grade

87.4

GEORGIAN BAY FORMATION
Shale, grey, thinly bedded, weak; joints are horizontal, gapped, clean, planar;

interbedded with **limestone**, light grey, very thinly bedded, medium strong

Overall shale: 91%, limestone: 9%
... at 40.5 m (Elev. 86.7 m), transition to sound rock

Run 1 : 0% limestone
100% shale

Run 2 : 13% limestone
87% shale

Run 3 : 5% limestone
95% shale

END OF COREHOLE

Run	elev depth (m)	recovery
R1	39.7 – 39.9	TCR = **159**% SCR = **99**% RQD = **79**%
R2	39.9 – 85.7	TCR = **100**% SCR = **100**% RQD = **62**%
R3	41.4 – 84.2	TCR = **100**% SCR = **100**% RQD = **89**%

42.9m

depth (m)	elevation (m)
40	87
41	86
42	85

shale weathering zones: Z1, Z2, Z3, Z4

UCS (MPa) 5 25 50 100 250
estimated strength: R1, R2, R3, R4, R5, R6

natural fracture frequency: **WZ**, 3, 5, 2, 1, 2, 0, 2, 2, 0, 2

laboratory testing

notes and comments

39.6 / 87.5 - 40.7 / 86.4m: clay coated joint

40.4 / 86.7 - 40.4 / 86.7m: clay coated joint

41.7 / 85.4m: JT SV IR T CN

41.8 / 85.3 - 41.8 / 85.3m: fractured zone

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : KB

GROUNDED ENGINEERING

Date Started : Feb 7, 2022
Position : E: 634407, N: 4841779 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 8

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : *Truck-mounted rig*

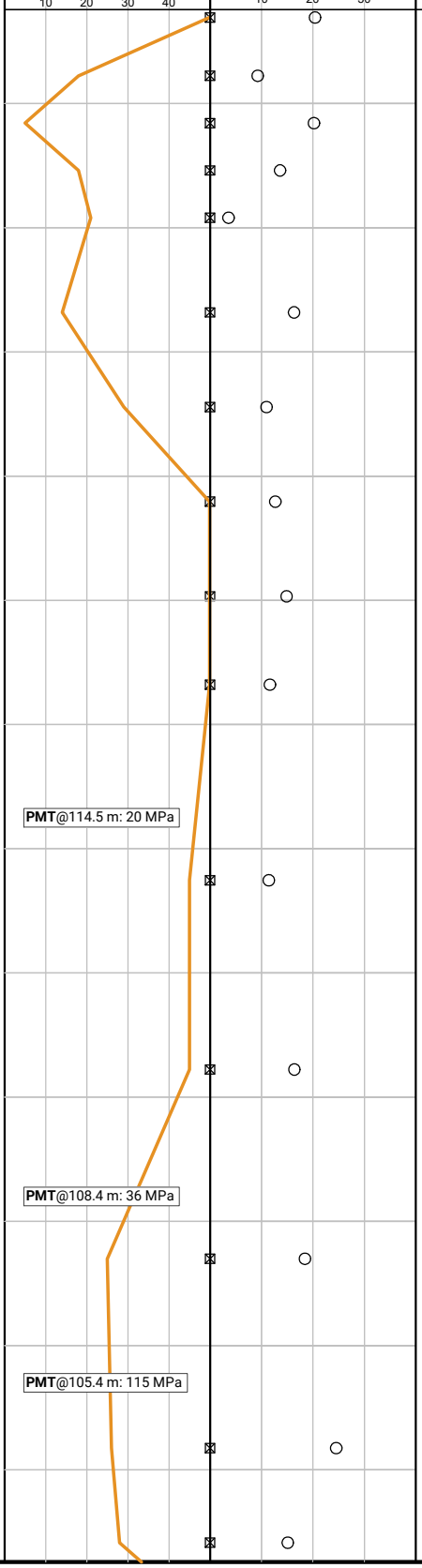
elev depth (m)	description	graphic log	number	type	SPT N-value
127.5	**GROUND SURFACE**				
	50mm **ASPHALT**		1	SS	50 / 100mm
	50mm **AGGREGATE**				
	FILL, silty sand, some clay, trace gravel, trace asphalt, very dense, dark brown, wet		2	SS	18
	...at 0.8 m, compact, moist		3	SS	5
	...at 1.5 m, loose				
125.2 / 2.3	**GRAVELLY SAND**, some silt, trace clay, compact, brown, moist		4	SS	18
			5	SS	21
	...at 4.6 m, wet		6	SS	14
	...at 6.1 m, silty sand, some gravel, grey		7	SS	29
119.9 / 7.6	**SANDY SILT**, trace clay, trace gravel, very dense to dense, grey, moist (GLACIAL TILL)		8	SS	63
			9	SS	61
	...at 10.7 m, sand seam		10	SS	89 / 250mm
			1	PMT	
			11	SS	45
			2	PMT	
	...at 16.8 m, some clay		12	SS	45
			3	PMT	
107.7 / 19.8	**SILT AND CLAY**, trace sand, very stiff, grey, moist		13	SS	25
			4	PMT	
	...at 22.9 m, wet		14	SS	26
	...at 24.4 m, sandy		15	SS	28

hollow stem augers OD=215 mm

mud rotary small OD=100 mm

depth scale (m) 0–24 | well details | elevation (m) 127–103

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

SS1: PAHs
SS2: EC/SAR, H-Ms, Metals, ORPs, pH
SS3: BTEX, PHCs, VOCs
SS4: PAHs
SS5: EC/SAR, H-Ms, Metals, ORPs, pH
SS7: BTEX, PHCs
SS8: VOCs

file: 21-195 gint.gpj

Tech : OM | **PM** : KM/SP | **Rev** : MD

(continued next page)

GROUNDED ENGINEERING

Date Started : Feb 7, 2022
Position : E: 634407, N: 4841779 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 8

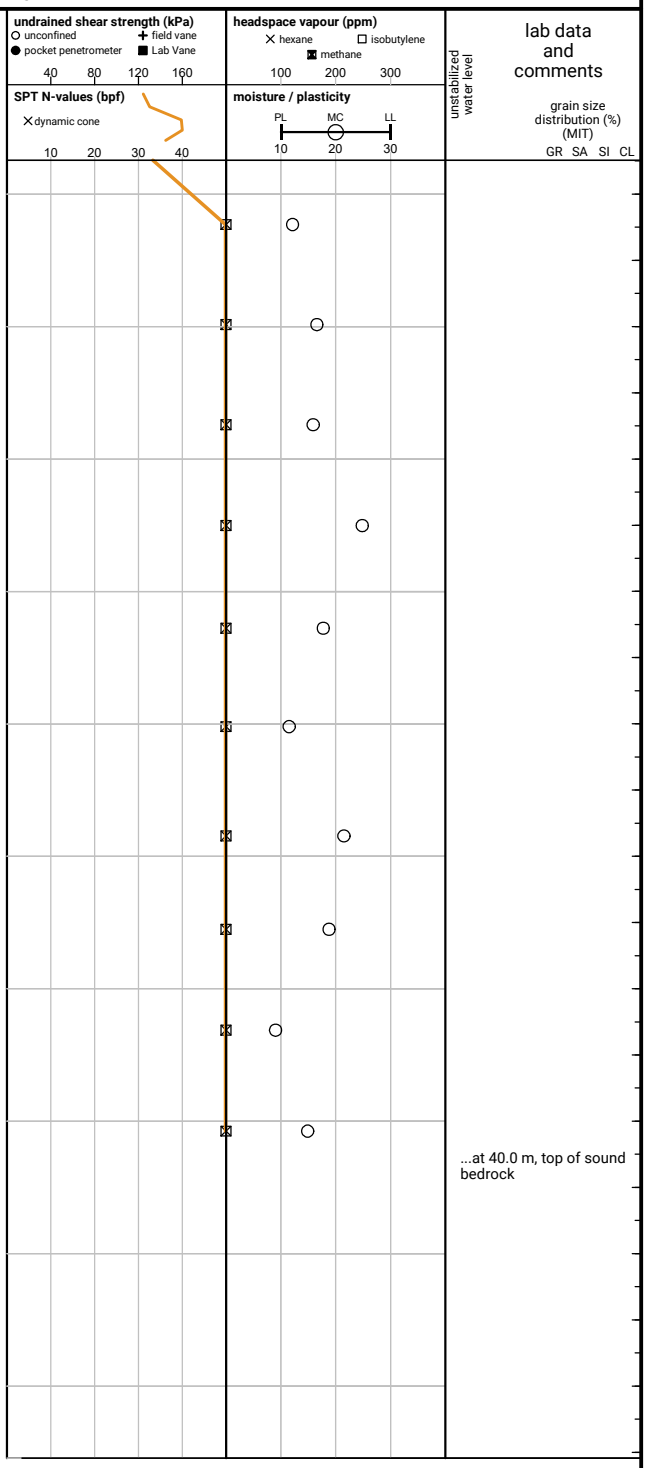
File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : *Truck-mounted rig*

elev / depth (m)	description	graphic log	number	type	SPT N-value
	(continued)				
101.6	**SILT AND CLAY**, trace sand, very stiff, grey, moist *(continued)*				
25.9	**SAND**, some silt, trace clay, trace gravel, very dense, grey, wet		16	SS	50 / 125mm
			17	SS	50 / 100mm
			18	SS	50 / 75mm
			19	SS	50 / 75mm
			20	SS	50 / 125mm
	...at 33.5 m, some gravel		21	SS	50 / 50mm
92.4					
35.1	**SANDY SILT**, some gravel, some clay, very dense, grey, wet (GLACIAL TILL)		22	SS	50 / 150mm
			23	SS	50 / 75mm
	...at 38.1 m, weathered shale fragments		24	SS	50 / 75mm
87.9					
39.6	**INFERRED BEDROCK**		25	SS	50 / 75mm
87.8			1	RUN	
39.7	**GEORGIAN BAY FORMATION** (See rock core log for details)		2	RUN	
			3	RUN	
			4	RUN	
82.9					
44.6	**END OF BOREHOLE**				

mud rotary small OD=100 mm

Rock coring (HQ) OD=96 mm



GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Feb 18, 2022	30.7	96.8
Feb 23, 2022	31.0	96.5

Borehole was filled with drill water upon completion of drilling.

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

file: 21-195 gint.gpj

Tech : OM | **PM** : KM/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Feb 7, 2022
Position : E: 634407, N: 4841779 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 8

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

depth (m)	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 39.7m below grade	**87.8**								
40	**GEORGIAN BAY FORMATION** **Shale**, grey, thinly bedded, weak; joints are horizontal, gapped, clean, planar;	39.7 R1	TCR = **0%** SCR = **0%** RQD = **0%**				**N/A**		R1 not recovered	
		40.0					**2**			
	interbedded with **limestone**, light grey, very thinly bedded, medium strong						**2**			
	Overall shale: 86%, limestone: 14% **... at 40.0 m (Elev. 87.5 m), transition to sound rock**			87			**1**			87
41		R2	TCR = **97%** SCR = **87%** RQD = **70%**				**1**		**40.9 / 86.6m:** clay coated joint	
		86.0					**2**			
		41.5		86			**1**			86
	Run 2 : 17% limestone 83% shale						**0**			
42		R3	TCR = **89%** SCR = **87%** RQD = **73%**				**1**			
	Run 3 : 15% limestone 85% shale			85			**0**	**El. 85.0m**: UCS = 10.6 MPa		85
		84.6					**0**			
43		42.9					**2**			
				84			**0**			84
		R4	TCR = **99%** SCR = **61%** RQD = **37%**				**1**		**43.9 / 83.6m:** FC SV	
44							**2**			
	Run 4 : 13% limestone 87% shale						**1**		**44.5 / 83.0m:** FC SV	
		82.9		83						83
		44.6m								
	END OF COREHOLE									

file: 21-195 gint.gpj

Tech : OM | **PM** : KM/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Feb 11, 2022
Position : E: 634451, N: 4841812 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 9

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
127.4	**GROUND SURFACE**				
	100mm **ASPHALT**		1	SS	18
	80mm **AGGREGATE**		2	SS	11
	FILL, silty sand, some clay, trace gravel, trace organics, trace brick fragments, compact, dark brown, moist		3	SS	6
125.1	...at 1.5 m, loose				
2.3	**GRAVELLY SAND**, some silt, trace clay, compact, brown, moist		4	SS	29
			5	SS	23
122.8					
4.6	**SANDY SILT**, some clay, trace gravel, compact, grey, moist (GLACIAL TILL)		6	SS	27
	...at 6.1 m, dense		7	SS	44
	...at 7.6 m, trace clay, very dense to dense		8	SS	92 / 225mm
			9	SS	93 / 250mm
			10	SS	55
			11	SS	80
			12	SS	71
			13	SS	45
	...at 16.8 m, some clay		14	SS	37
109.1					
18.3	**SILT AND CLAY**, trace sand, very stiff, grey, wet		15	SS	30
			16	SS	21
			1	PMT	
			17	SS	26
	...at 24.4 m, some sand		18	SS	20

hollow stem augers OD=215 mm

mud rotary small OD=100 mm

depth scale (m) 0–24

well details

elevation (m) 127–103

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

PMT@105.3 m: 76 MPa

unstabilized water level

lab data and comments

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

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

SS2: BTEX, PHCs, VOCs

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

SS6: BTEX, PHCs

SS7: VOCs

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : MD

(continued next page)

BOREHOLE LOG 9

Date Started : Feb 11, 2022
Position : E: 634451, N: 4841812 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : CME 55

mud rotary small OD=100 mm

Rock coring (HQ) OD=96 mm

elev depth (m)	description (continued)	graphic log	number	type	SPT N-value
101.5	**SILT AND CLAY**, trace sand, very stiff, grey, wet *(continued)*				
25.9	**SAND**, some silt, trace clay, trace gravel, very dense, grey, moist		19	SS	57
			2	PMT	
			20	SS	74
96.9					
30.5	**SILTY SAND**, trace clay, trace gravel, very dense, grey, moist		21	SS	64
	...at 32.0 m, some gravel		22	SS	50 / 50mm
			23	SS	50 / 25mm
	...at 35.1 m, gravel seam		24	SS	50 / 0mm
90.8					
36.6	**SANDY SILT**, some gravel, some clay, very dense, grey, moist (GLACIAL TILL)		25	SS	50 / 125mm
	...at 38.1 m, silt partings		26	SS	98 / 275mm
			27	SS	98 / 275mm
86.1					
41.3	...at 41.1 m, weathered shale and limestone fragments, wet		28	SS	50 / 0mm
			1	RUN	
	GEORGIAN BAY FORMATION (See rock core log for details)		2	RUN	
			3	RUN	
			4	RUN	
81.3					
46.1	**END OF BOREHOLE**				

depth scale (m): 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46

well details

elevation (m): 102 101 100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82

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

...at 41.6 m, top of sound 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)
Feb 18, 2022	30.3	97.1
Feb 24, 2022	30.4	97.0

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Feb 11, 2022
Position : E: 634451, N: 4841812 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 9

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

Rock coring started at 41.3m below grade

GEORGIAN BAY FORMATION
Shale, grey, thinly bedded, weak; joints are horizontal, gapped, clean, planar;

interbedded with **limestone**, light grey, very thinly bedded, medium strong

Overall shale: 93%, limestone: 7%
... at 41.6 m (Elev. 85.8 m), transition to sound rock

Run 1 : 0% limestone, 100% shale

Run 2 : 8% limestone, 92% shale

Run 3 : 8% limestone, 92% shale

Run 4 : 4% limestone, 96% shale

Run	elev / depth (m)	recovery
	86.1	
R1	41.3 / 41.6	TCR = **44%**, SCR = **0%**, RQD = **0%**
R2	41.6 / 84.3	TCR = **100%**, SCR = **78%**, RQD = **62%**
R3	43.1 / 82.8	TCR = **100%**, SCR = **100%**, RQD = **95%**
R4	44.6 / 81.3	TCR = **100%**, SCR = **100%**, RQD = **75%**
	46.1m	

END OF COREHOLE

natural fracture frequency	laboratory testing	notes and comments
RZ		**41.3 / 86.0 - 41.6 / 85.8m:** Run 1: clayey silt with shale fragments, grey, moist
2		
4		
3		
3		
1		
2		
1		
2	**El. 83.5m**: UCS = 9.8 MPa	
1		
2		
3		
0		
4		
2		
1		

shale weathering zones: Z1, Z2, Z3, Z4
UCS (MPa): 5, 25, 50, 100, 250
estimated strength: R1, R2, R3, R4, R5, R6

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Jan 21, 2022
Position : E: 634386, N: 4841735 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 10

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : *Manual methods*

elev / depth (m)	description	graphic log	number	type	SPT N-value
125.7	**GROUND SURFACE**				
	75mm **TOPSOIL**				
	FILL, silty sand, some clay, trace gravel, trace organics, brown, moist		1	GS	
			2	GS	
124.7 / 1.0					

hand augers

depth scale (m): 0.0, 0.5

well details

elevation (m): 125.5, 125.0

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

GS1: BTEX, EC/SAR, H-Ms, Metals, ORPs, PCBs, pH, PHCs

GS2: PCBs

END OF BOREHOLE

Dry and open upon completion of drilling.

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Jan 21, 2022
Position : E: 634370, N: 4841759 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 11

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : *Manual methods*

elev / depth (m)	description	graphic log	samples: number	samples: type	SPT N-value
126.1	**GROUND SURFACE**				
	75mm **TOPSOIL**				
	FILL, sandy silt, trace clay, trace gravel, trace organics, brown, wet		1	GS	
	...at 0.7 m, moist		2	GS	
125.1 / 1.0	**END OF BOREHOLE**				

hand augers

Dry and open upon completion of drilling.

depth scale (m): 0.0, 0.5

well details

elevation (m): 126.0, 125.5

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

GS1: BTEX, EC/SAR, H-Ms, Metals, ORPs, PCBs, pH, PHCs

GS2: PCBs

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Jan 21, 2022
Position : E: 634363, N: 4841776 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 12

File No. : 21-195 **Project** : 48 Grenoble Drive, Toronto, ON **Client** : Tenblock

drill method : *Manual methods*

elev / depth (m)	description	graphic log	samples: number	samples: type	SPT N-value
125.6	**GROUND SURFACE**				
	75mm **TOPSOIL**				
	FILL, sandy silt, trace clay, trace gravel, trace organics, brown, moist		1	GS	
			2	GS	
124.6 / 1.0	**END OF BOREHOLE**				

hand augers

depth scale (m): 0.0, 0.5

well details

elevation (m): 125.5, 125.0

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

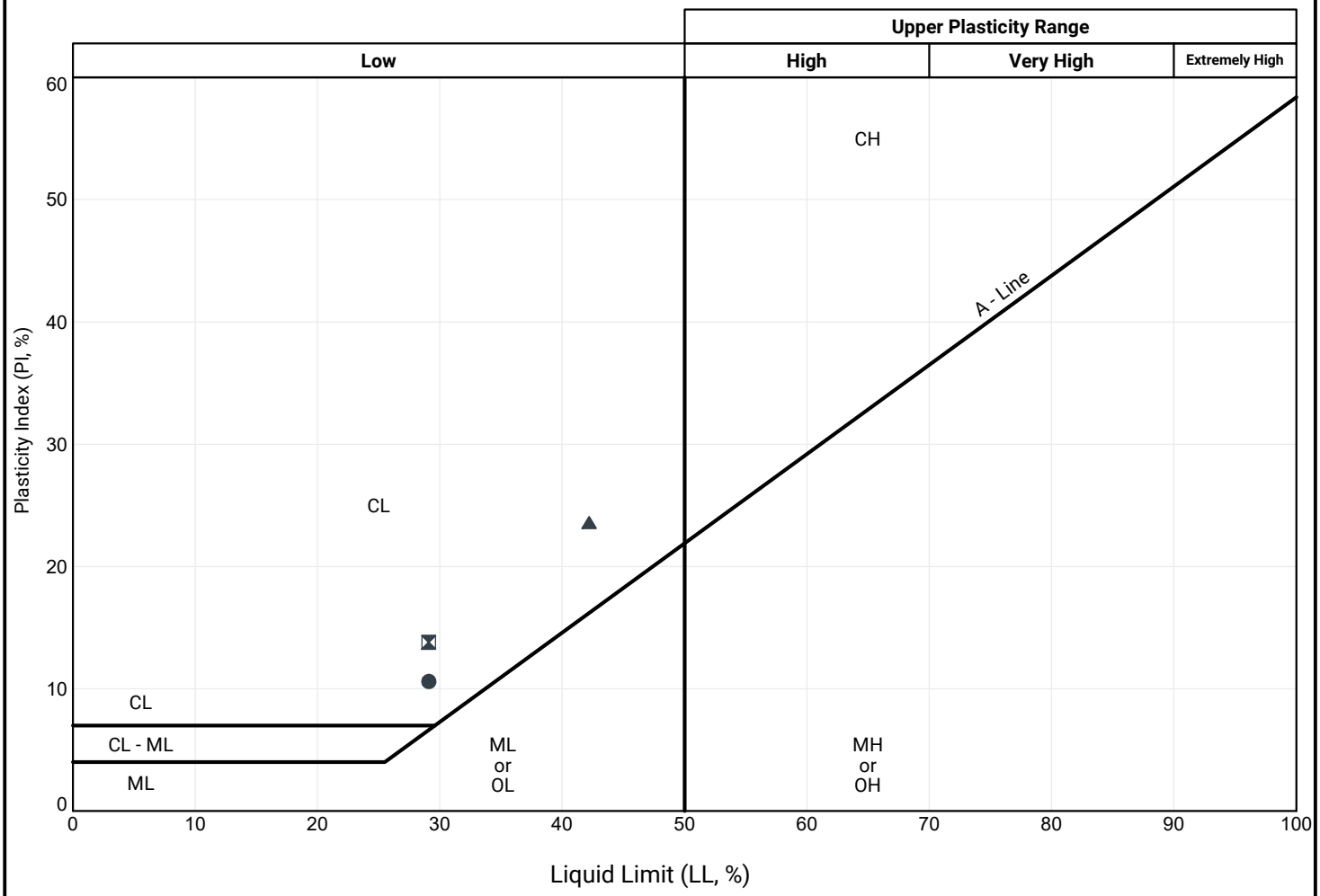
GS1: BTEX, EC/SAR, H-Ms, Metals, ORPs, PCBs, pH, PHCs

GS2: PCBs

Dry and open upon completion of drilling.

file: 21-195 gint.gpj

Tech : FR | **PM** : KM/SP | **Rev** : MD



	Borehole	Sample	Depth (m)	Elev. (m)	LL (%)	PL (%)	PI (%)
●	**2**	SS8	7.9	119.2	29	19	11
⊠	**4**	SS15	18.6	109.0	29	15	14
▲	**7**	SS17	21.6	105.5	42	19	23

GROUNDED ENGINEERING

Title: **ATTERBERG LIMITS CHART**

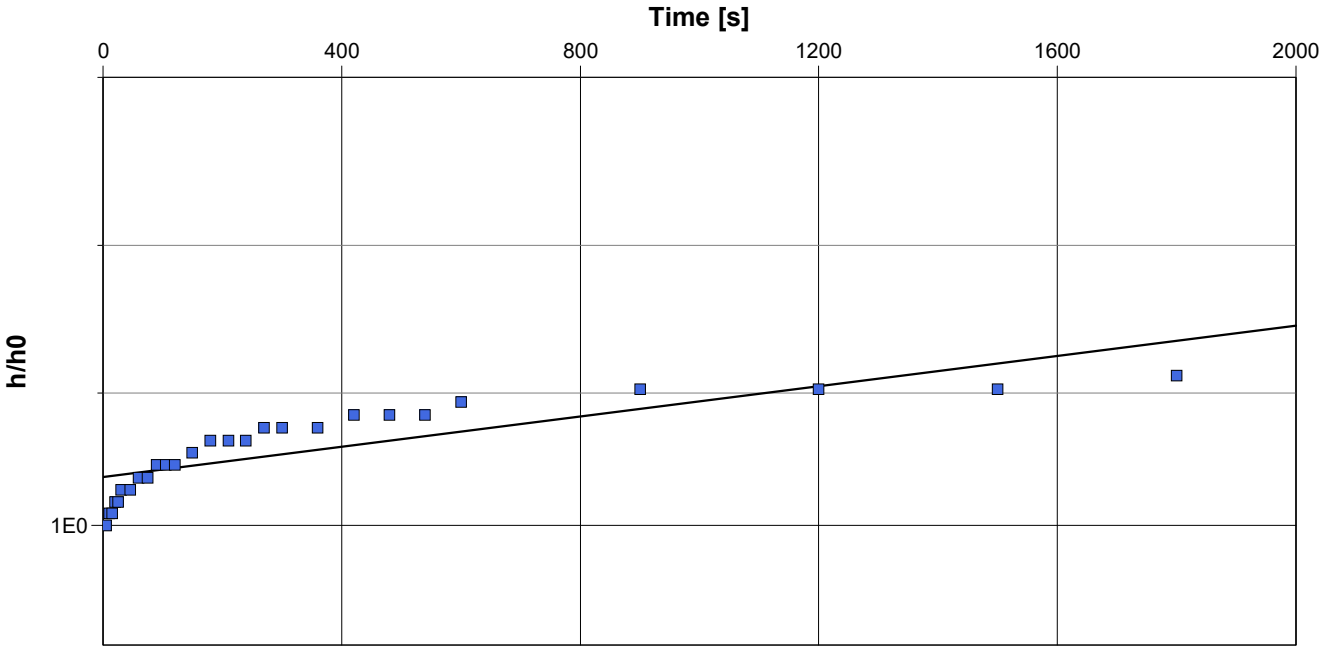
File No.: **21-195**

file: 21-195 gint.gpj

APPENDIX B

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 48 Grenoble Drive, Toronto
	Number: 21-195
	Client: Tenblock

Location: 48 Grenoble Drive, Toronto	Slug Test: MW1	Test Well: MW1
Test Conducted by: FR		Test Date: 2022-02-09
Analysis Performed by: KM/JAW	Bouwer & Rice	Analysis Date: 2022-02-25
Aquifer Thickness: 16.80 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW1	2.54×10^{-8}	

GROUNDED ENGINEERING

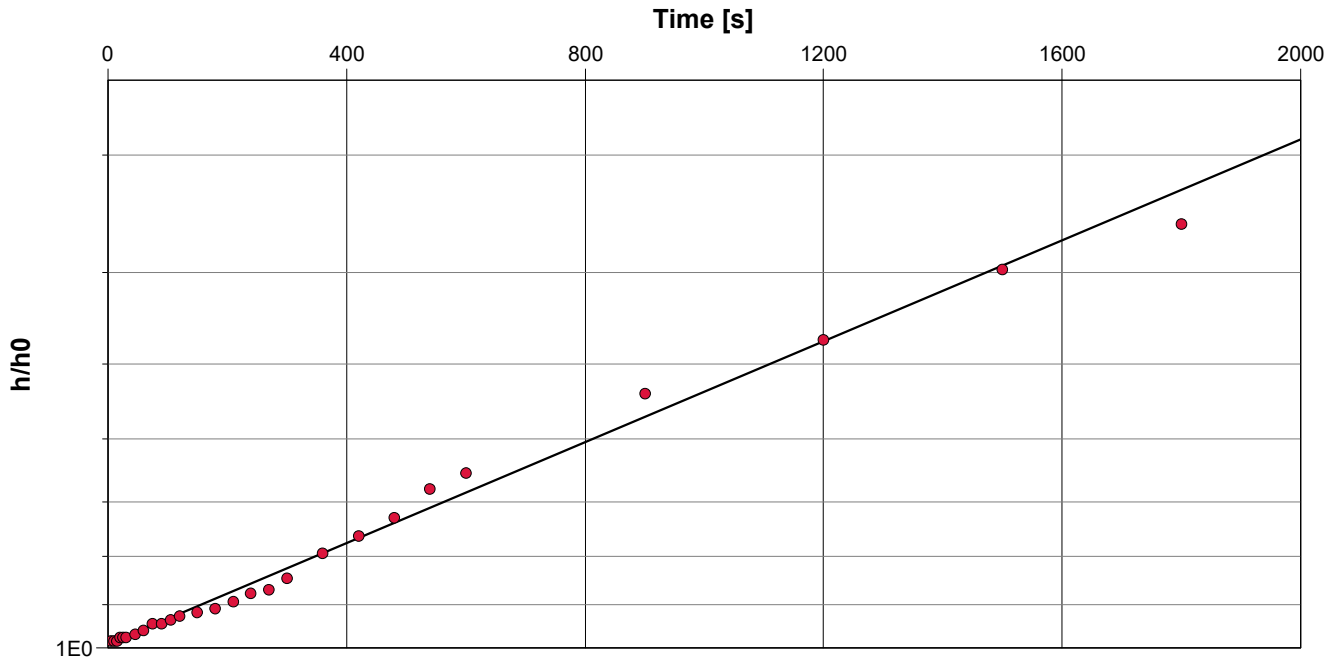
Slug Test Analysis Report

Project: 48 Grenoble Drive, Toronto

Number: 21-195

Client: Tenblock

Location: 48 Grenoble Drive, Toronto	Slug Test: MW2	Test Well: MW2
Test Conducted by: FR		Test Date: 2022-02-09
Analysis Performed by: KM/JAW	Bouwer & Rice	Analysis Date: 2022-02-25
Aquifer Thickness: 19.50 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW2	2.53×10^{-7}	

GROUNDED ENGINEERING

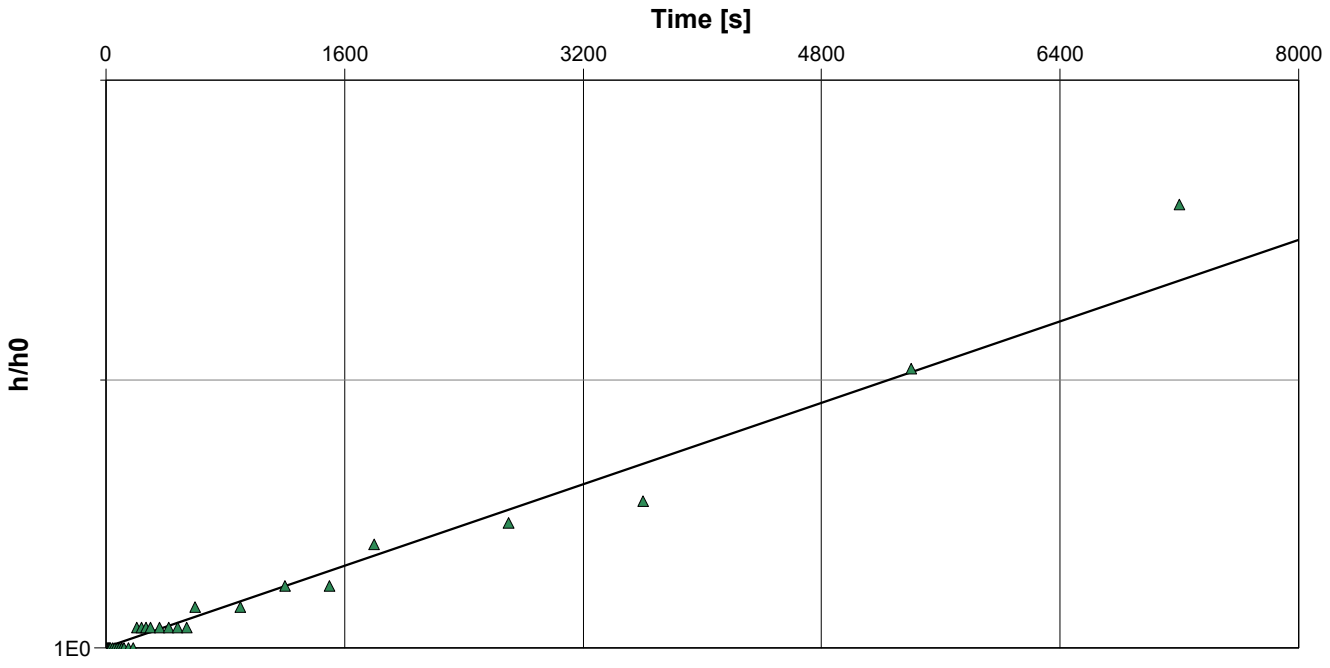
Slug Test Analysis Report

Project: 48 Grenoble Drive, Toronto

Number: 21-195

Client: Tenblock

Location: 48 Grenoble Drive, Toronto	Slug Test: MW4	Test Well: MW4
Test Conducted by: FR		Test Date: 2022-02-09
Analysis Performed by:	Bouwer & Rice	Analysis Date: 2022-02-25
Aquifer Thickness: 20.40 m		

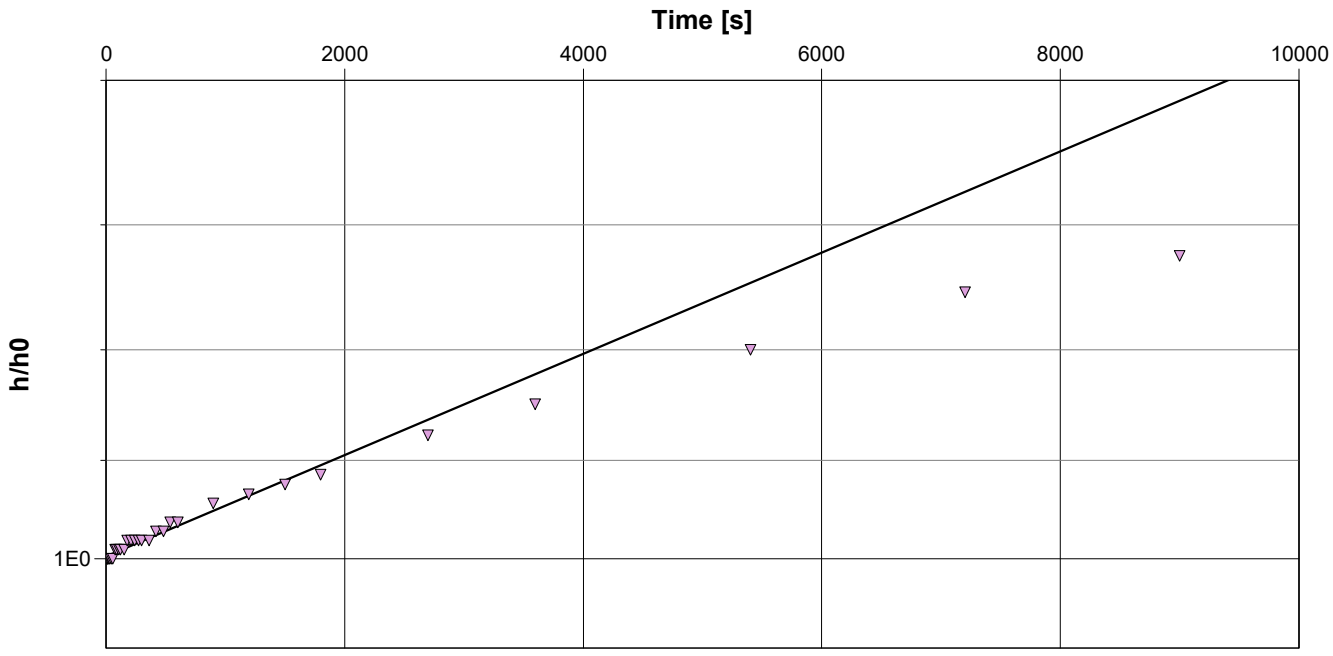


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW4	8.93×10^{-9}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 48 Grenoble Drive, Toronto
	Number: 21-195
	Client: Tenblock

Location: 48 Grenoble Drive, Toronto	Slug Test: MW5	Test Well: MW5
Test Conducted by: FR		Test Date: 2022-02-17
Analysis Performed by: KM/JAW	Bouwer & Rice	Analysis Date: 2022-02-25
Aquifer Thickness: 16.80 m		

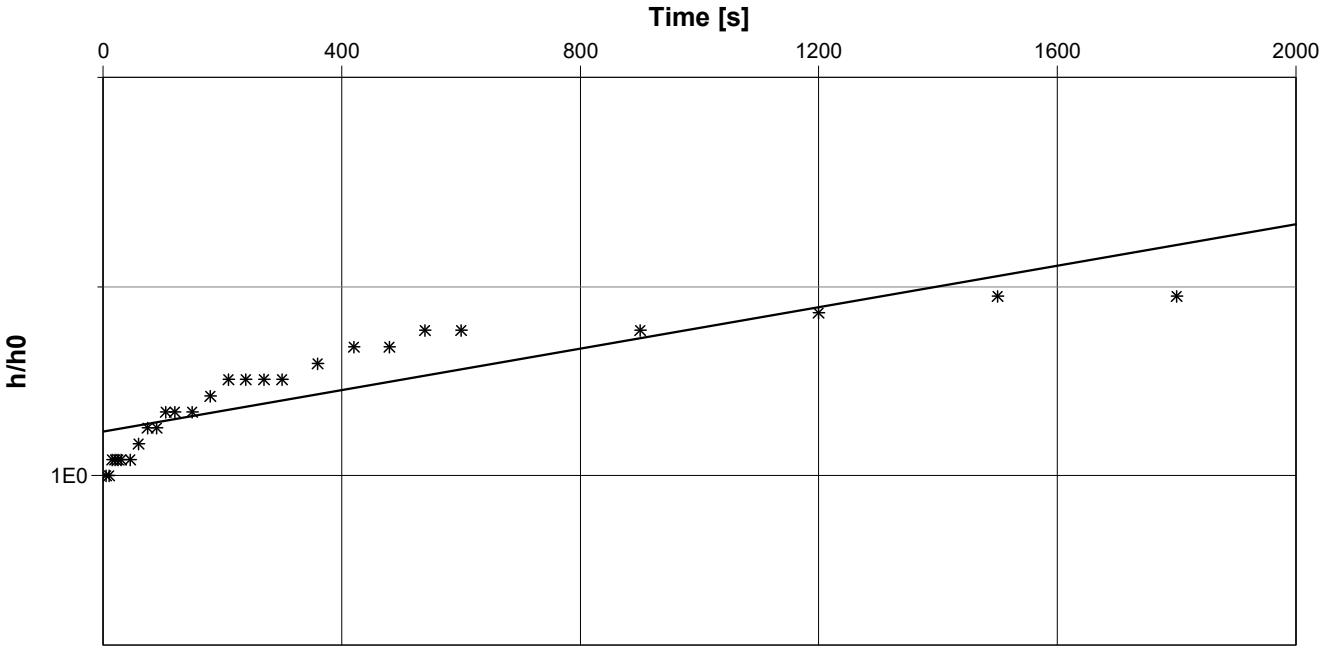


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW5	2.49×10^{-8}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 48 Grenoble Drive, Toronto
	Number: 21-195
	Client: Tenblock

Location: 48 Grenoble Drive, Toronto	Slug Test: MW6	Test Well: MW6
Test Conducted by: FR		Test Date: 2022-02-17
Analysis Performed by: KM/JAW	Bouwer & Rice	Analysis Date: 2022-02-25
Aquifer Thickness: 20.40 m		

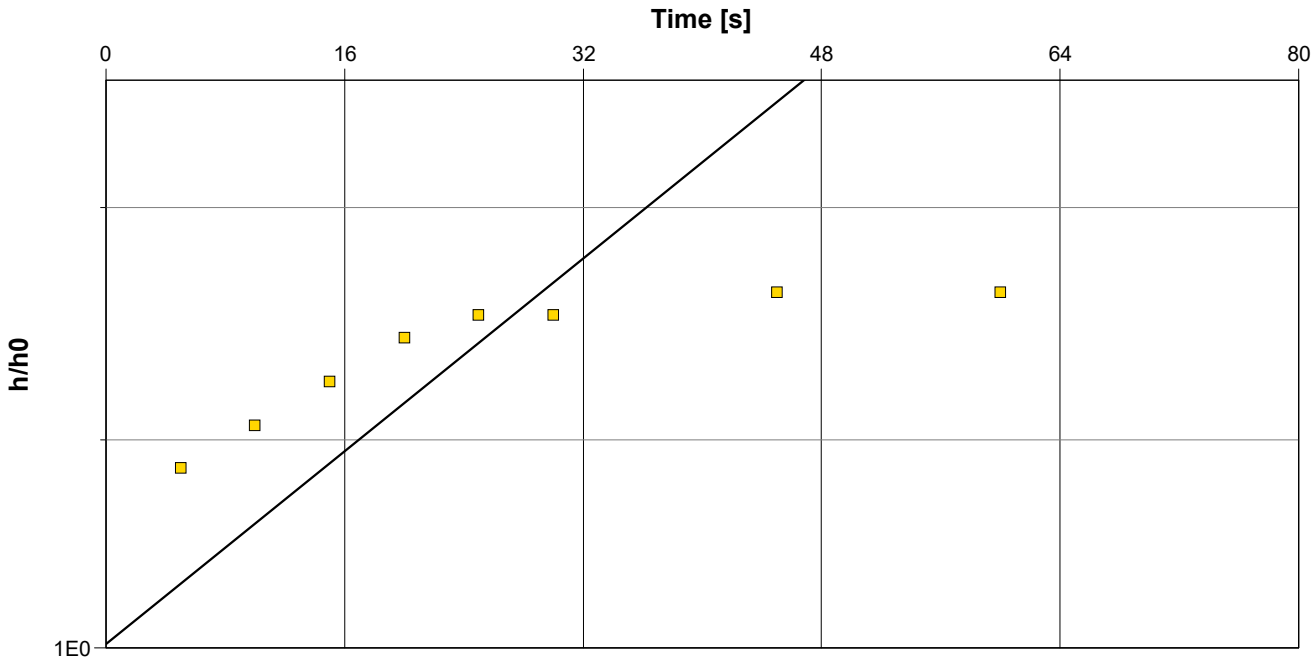


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW6	2.48×10^{-8}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 48 Grenoble Drive, Toronto
	Number: 21-195
	Client: Tenblock

Location: 48 Grenoble Drive, Toronto	Slug Test: MW7	Test Well: MW7
Test Conducted by: FR		Test Date: 2022-02-22
Analysis Performed by: KM/JAW	Bouwer & Rice	Analysis Date: 2022-02-25
Aquifer Thickness: 42.90 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW7	2.45×10^{-6}	

GROUNDED ENGINEERING

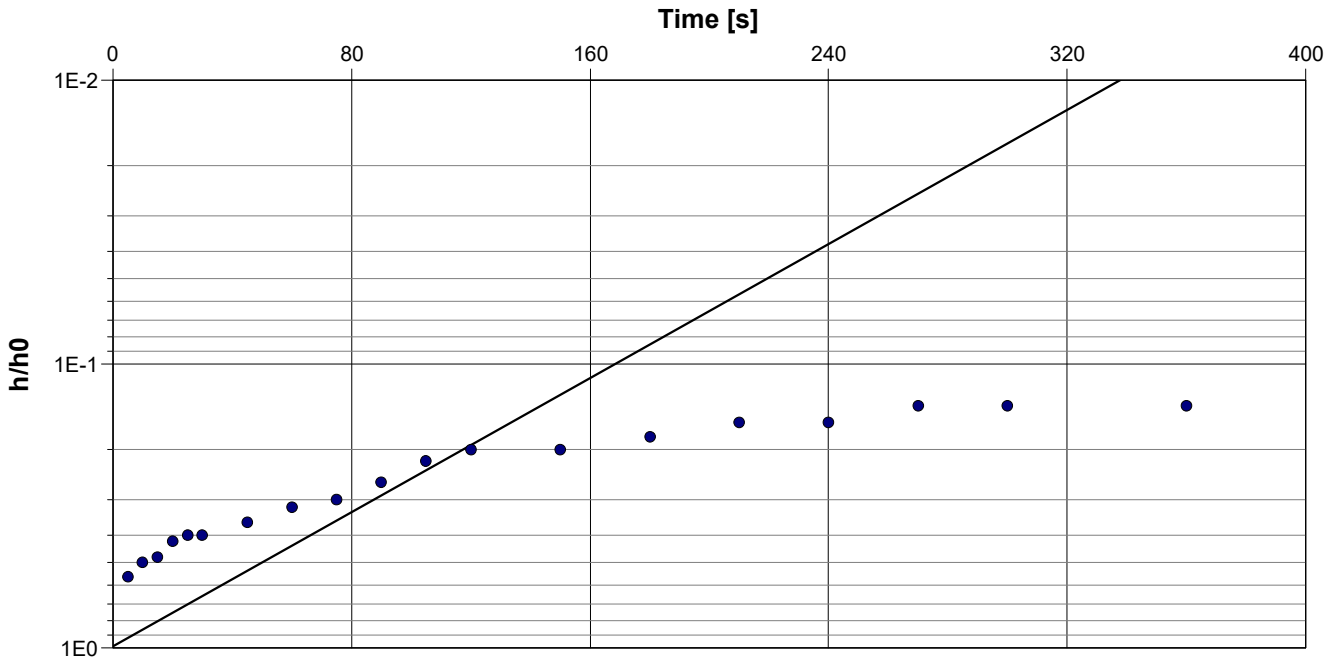
Slug Test Analysis Report

Project: 48 Grenoble Drive, Toronto

Number: 21-195

Client: Tenblock

Location: 48 Grenoble Drive, Toronto	Slug Test: MW8	Test Well: MW8
Test Conducted by: FR		Test Date: 2022-02-22
Analysis Performed by: KM/JAW	Bouwer & Rice	Analysis Date: 2022-02-25
Aquifer Thickness: 36.60 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW8	5.46×10^{-6}	

GROUNDED ENGINEERING

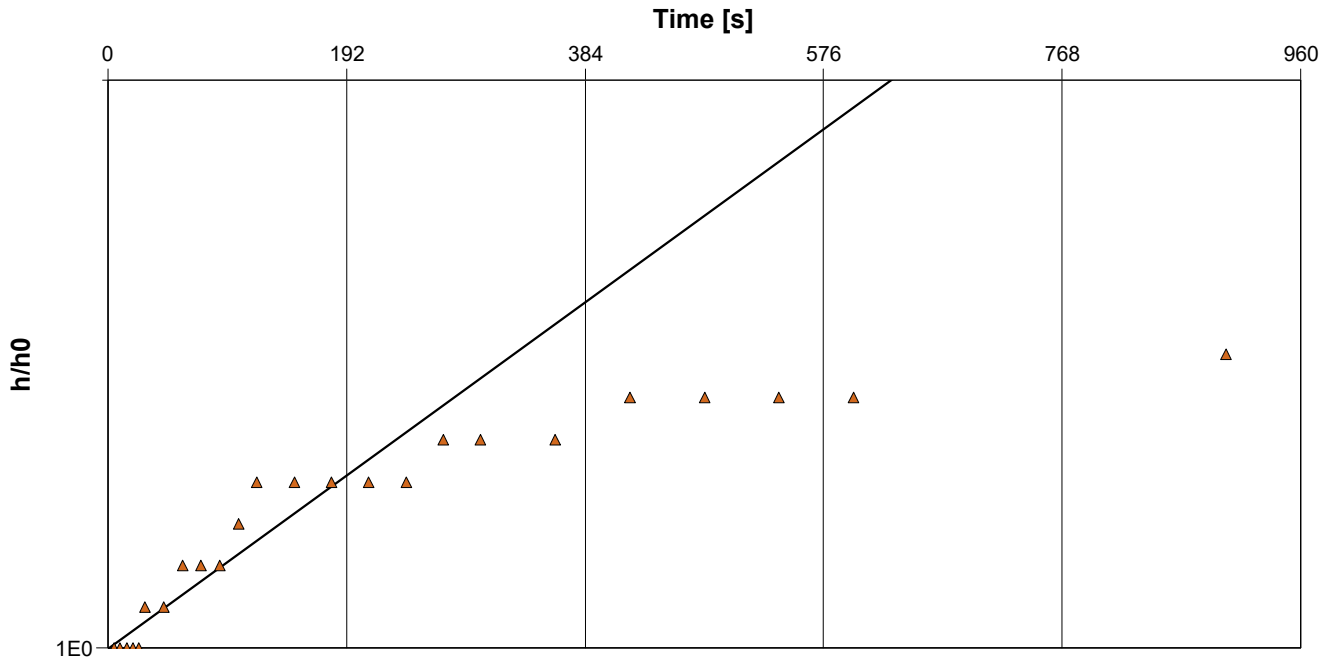
Slug Test Analysis Report

Project: 48 Grenoble Drive, Toronto

Number: 21-195

Client: Tenblock

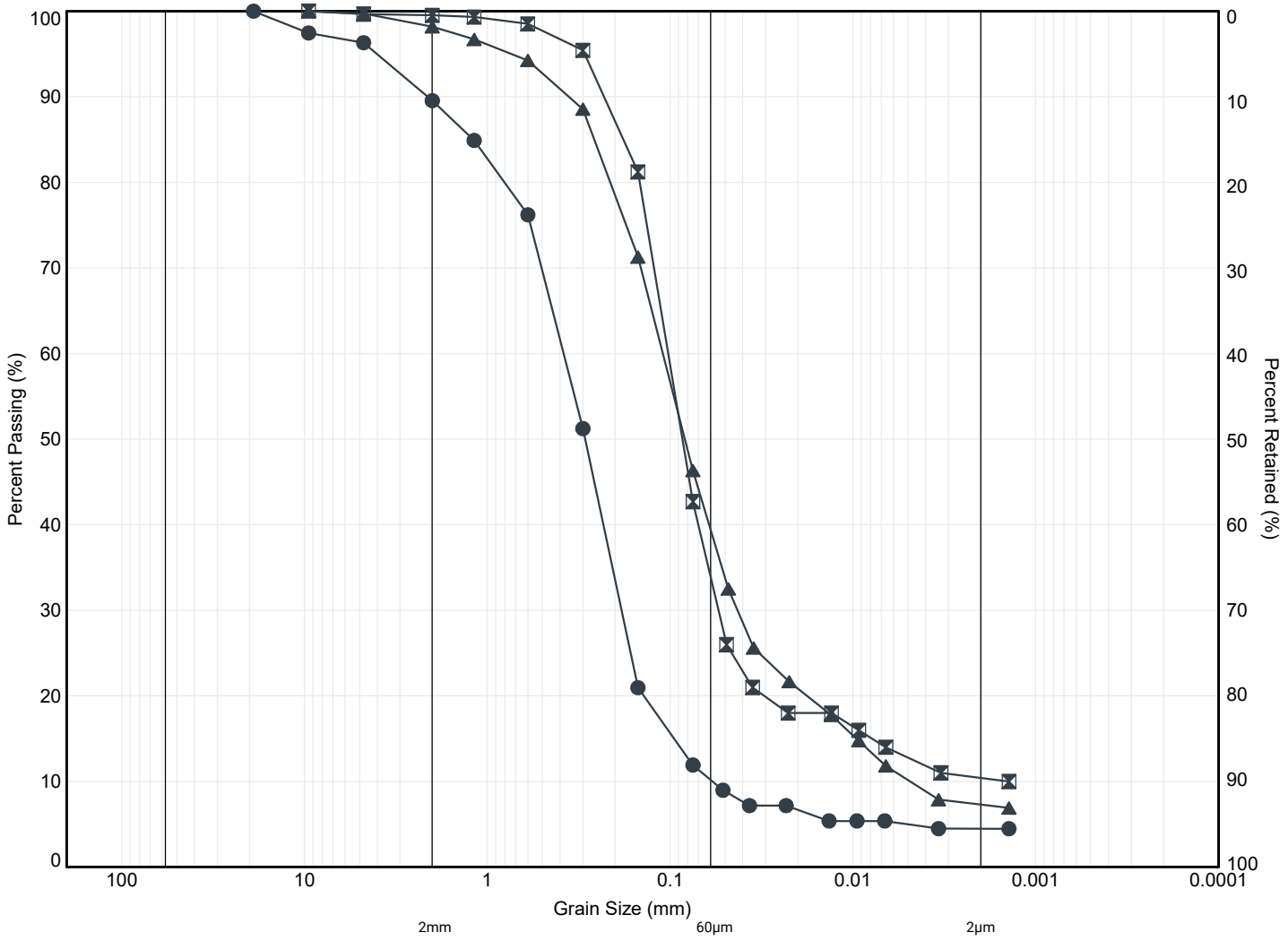
Location: 48 Grenoble Drive, Toronto	Slug Test: MW9	Test Well: MW9
Test Conducted by: FR		Test Date: 2022-02-22
Analysis Performed by: KM/JAW	Bouwer & Rice	Analysis Date: 2022-02-25
Aquifer Thickness: 46.10 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW9	6.72×10^{-8}	

APPENDIX C



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

MIT SYSTEM

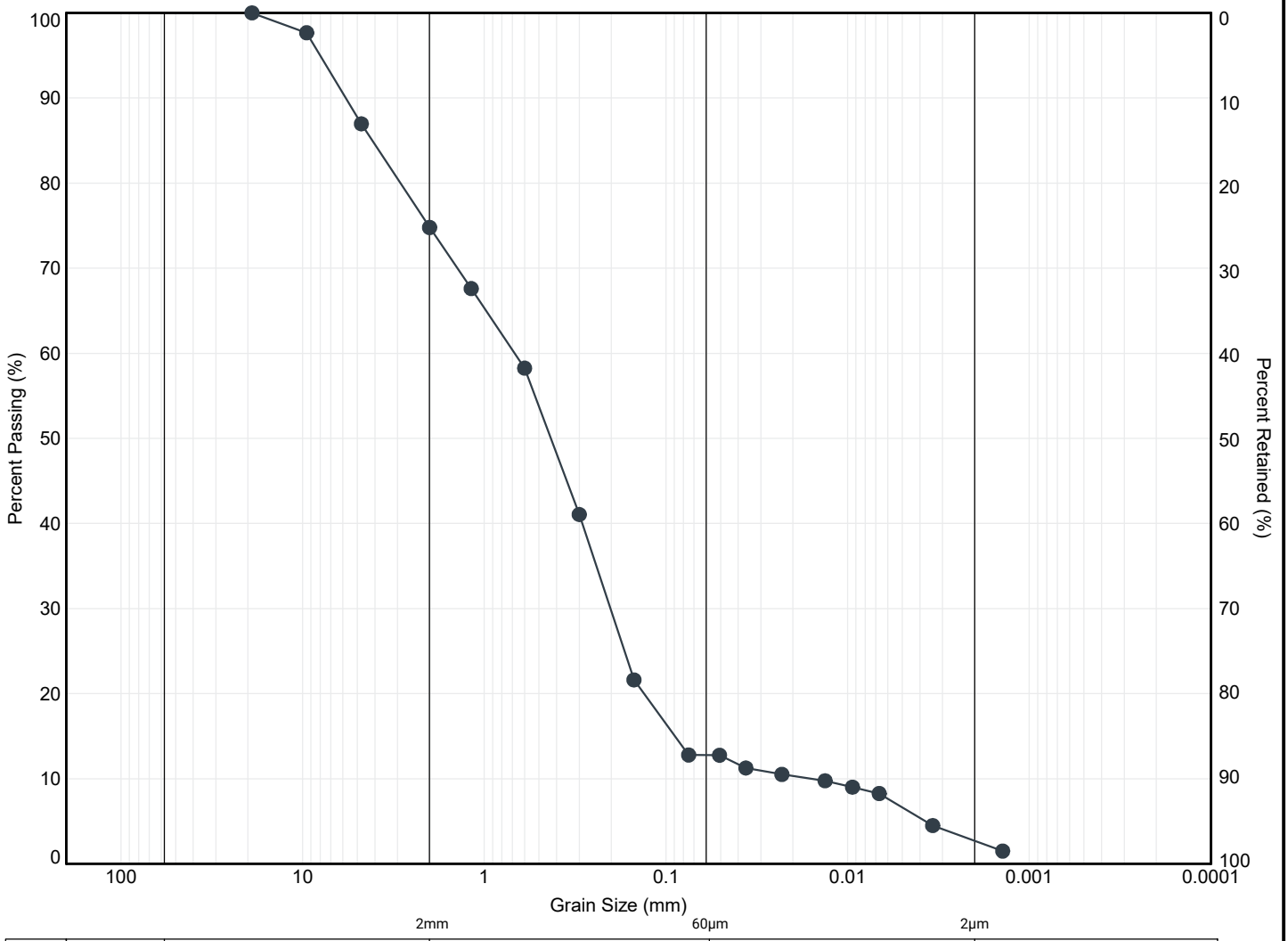
	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**1**	SS3	1.8	125.1	11	78	6	5
⊠	**2**	SS3	1.8	125.3	1	65	24	10
▲	**7**	SS3	1.8	125.3	2	59	32	7

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION**
EARTH FILL

File No.: **21-195**

file: 21-195.gint.gpj



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

MIT SYSTEM

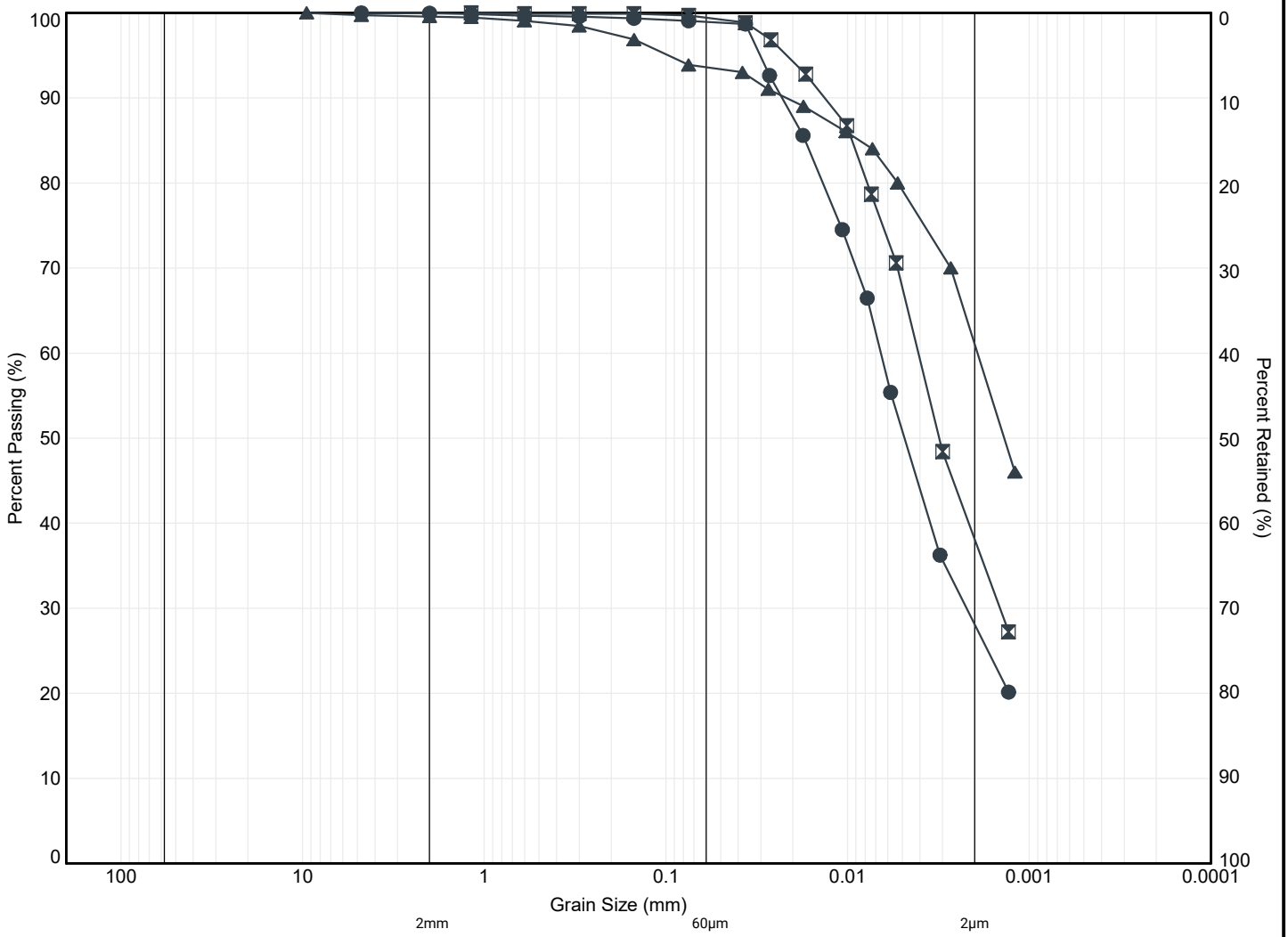
	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**1**	SS4	2.6	124.3	25	62	10	3

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION**
GRAVELLY SAND

File No.: **21-195**

file: 21-195.gint.gpj



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

MIT SYSTEM

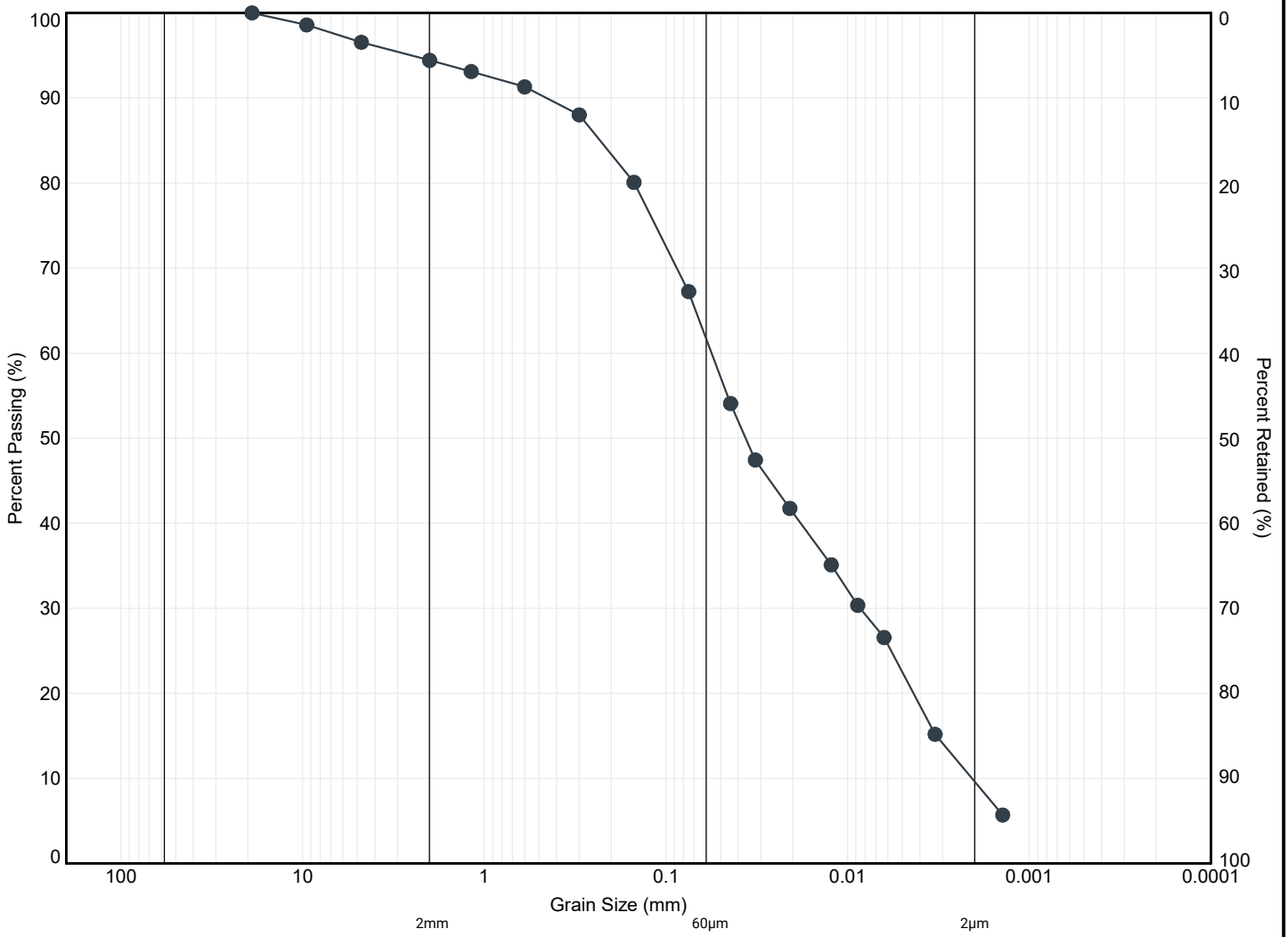
	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**2**	SS8	7.9	119.2	0	1	71	28
⊠	**4**	SS15	18.6	109.0	0	1	61	38
▲	**7**	SS17	21.6	105.5	0	6	33	61

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION**
CLAYEY SILT TO SILTY CLAY TILLS

File No.: **21-195**

file: 21-195.gint.gpj



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

MIT SYSTEM

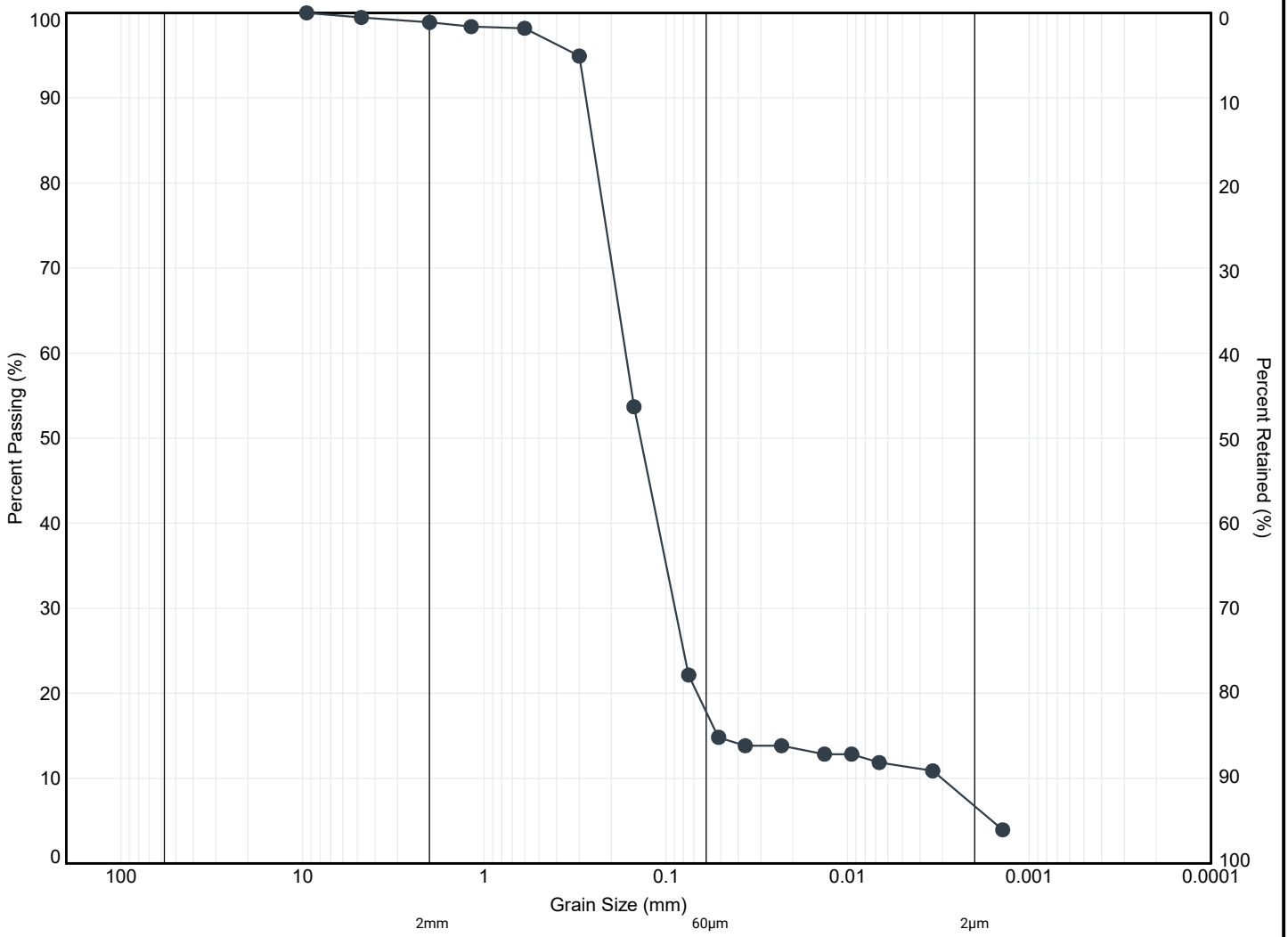
	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**3**	SS12	14.0	113.7	6	32	52	10

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION**
SANDY SILT TILL

File No.: **21-195**

file: 21-195 gint.gpj



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

MIT SYSTEM

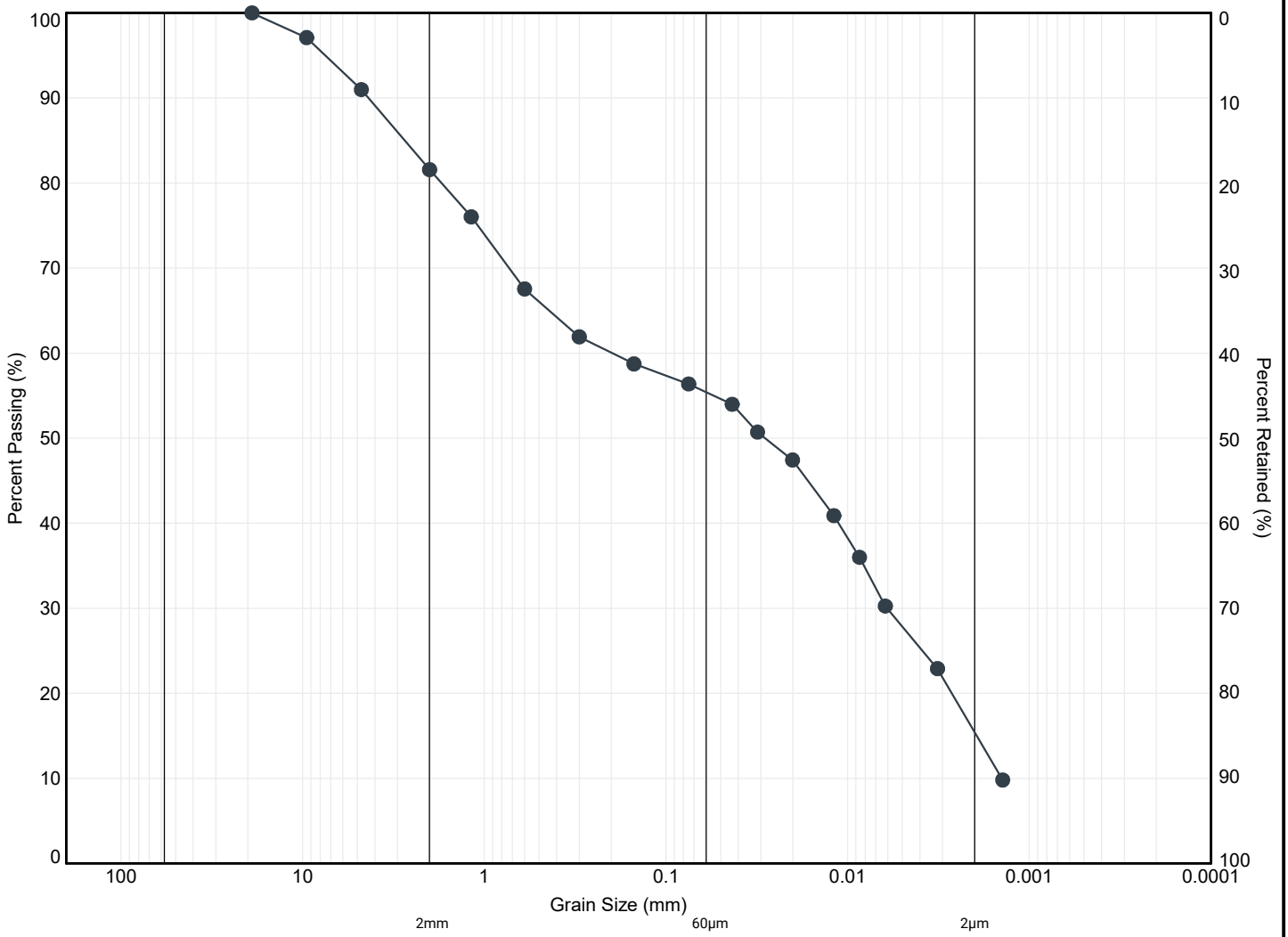
	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**7**	SS22	29.0	98.1	1	81	11	7

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION**
SAND

File No.: **21-195**

file: 21-195.gint.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 (%)
●	**7**	SS26	38.2	88.9	18	26	40	16

GROUNDED ENGINEERING

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

File No.: **21-195**

file: 21-195.gint.gpj

APPENDIX D

K from Grain Size Analysis Report

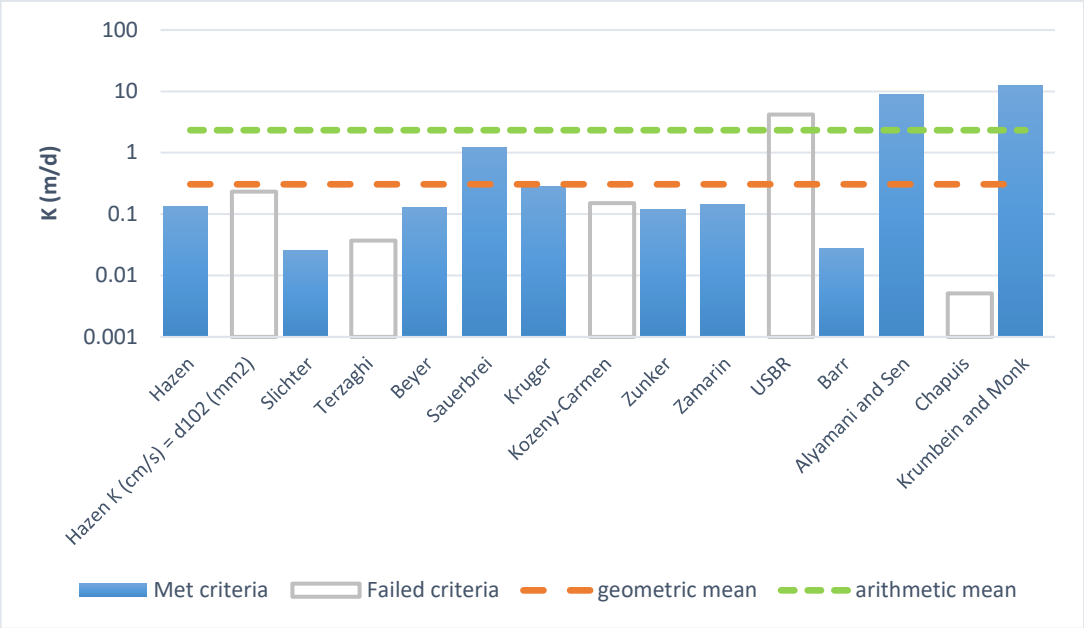
Date: 01-Mar-22

Sample Name: BH1 SS4

Mass Sample (g): 100

T (oC) 20

Poorly sorted sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	1.5E-04	1.5E-06	0.13	
Hazen K (cm/s) = d_{10} (mm)	2.7E-04	2.7E-06	0.23	
Slichter	3.0E-05	3.0E-07	0.03	
Terzaghi	4.3E-05	4.3E-07	0.04	
Beyer	1.5E-04	1.5E-06	0.13	
Sauerbrei	1.4E-03	1.4E-05	1.24	
Kruger	3.2E-04	3.2E-06	0.28	
Kozeny-Carmen	1.7E-04	1.7E-06	0.15	
Zunker	1.4E-04	1.4E-06	0.12	
Zamarin	1.7E-04	1.7E-06	0.14	
USBR	4.9E-03	4.9E-05	4.21	
Barr	3.2E-05	3.2E-07	0.03	
Alyamani and Sen	1.0E-02	1.0E-04	8.85	
Chapuis	5.9E-06	5.9E-08	0.01	
Krumbein and Monk	1.4E-02	1.4E-04	12.50	
geometric mean	3.6E-04	3.6E-06	0.31	
arithmetic mean	2.7E-03	2.7E-05	2.34	

K from Grain Size Analysis Report

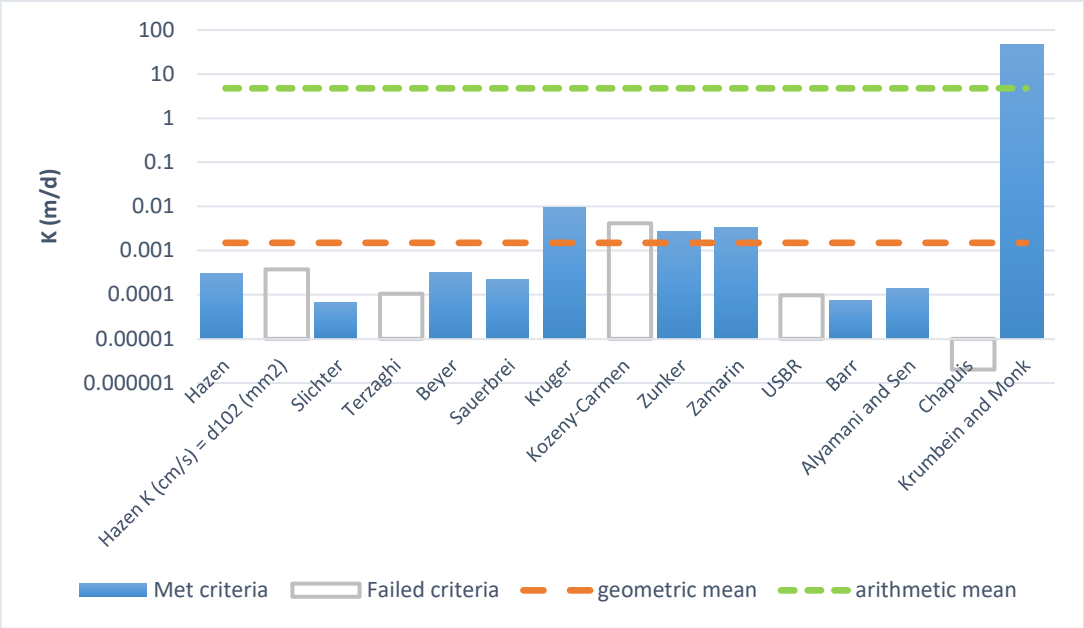
Date: 01-Mar-22

Sample Name: BH2 SS8

Mass Sample (g): 100

T (oC) 20

Poorly sorted clay low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	3.5E-07	3.5E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	4.3E-07	4.3E-09	0.00	
Slichter	7.7E-08	7.7E-10	0.00	
Terzaghi	1.2E-07	1.2E-09	0.00	
Beyer	3.8E-07	3.8E-09	0.00	
Sauerbrei	2.5E-07	2.5E-09	0.00	
Kruger	1.1E-05	1.1E-07	0.01	
Kozeny-Carmen	4.8E-06	4.8E-08	0.00	
Zunker	3.2E-06	3.2E-08	0.00	
Zamarin	3.9E-06	3.9E-08	0.00	
USBR	1.1E-07	1.1E-09	0.00	
Barr	8.8E-08	8.8E-10	0.00	
Alyamani and Sen	1.6E-07	1.6E-09	0.00	
Chapuis	2.3E-09	2.3E-11	0.00	
Krumbein and Monk	5.5E-02	5.5E-04	47.68	
geometric mean	1.7E-06	1.7E-08	0.00	
arithmetic mean	5.5E-03	5.5E-05	4.77	

K from Grain Size Analysis Report

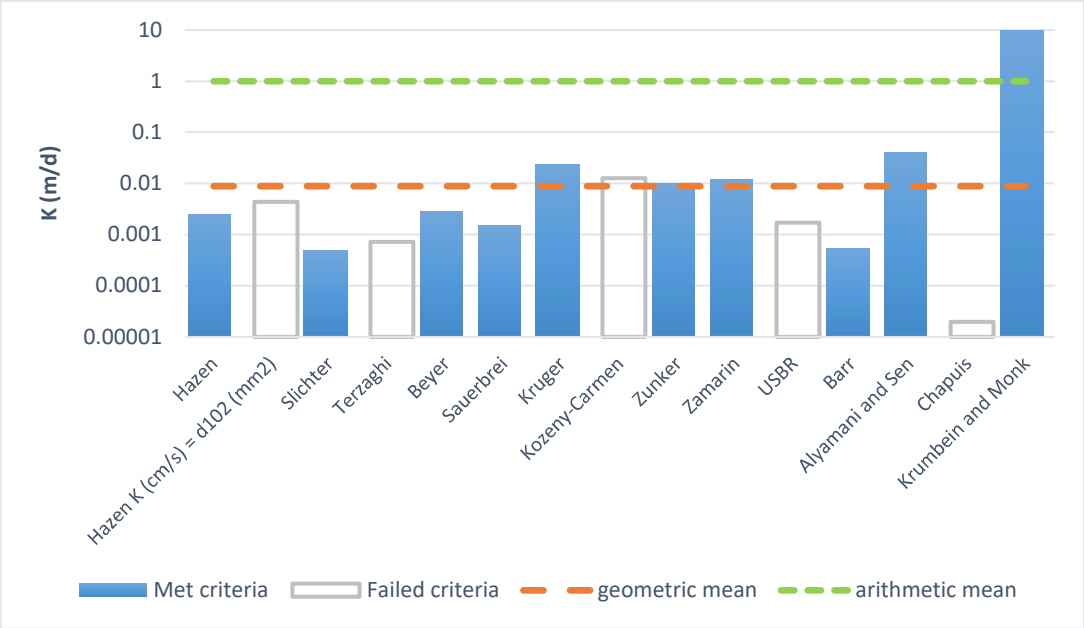
Date: 01-Mar-22

Sample Name: BH3 SS12

Mass Sample (g): 100

T (oC) 20

Poorly sorted silt low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	2.9E-06	2.9E-08	0.00	
Hazen K (cm/s) = d_{10} (mm)	5.0E-06	5.0E-08	0.00	
Slichter	5.8E-07	5.8E-09	0.00	
Terzaghi	8.3E-07	8.3E-09	0.00	
Beyer	3.3E-06	3.3E-08	0.00	
Sauerbrei	1.7E-06	1.7E-08	0.00	
Kruger	2.7E-05	2.7E-07	0.02	
Kozeny-Carmen	1.5E-05	1.5E-07	0.01	
Zunker	1.1E-05	1.1E-07	0.01	
Zamarin	1.4E-05	1.4E-07	0.01	
USBR	2.0E-06	2.0E-08	0.00	
Barr	6.2E-07	6.2E-09	0.00	
Alyamani and Sen	4.6E-05	4.6E-07	0.04	
Chapuis	2.3E-08	2.3E-10	0.00	
Krumbein and Monk	1.1E-02	1.1E-04	9.86	
geometric mean	1.0E-05	1.0E-07	0.01	
arithmetic mean	1.2E-03	1.2E-05	1.00	

K from Grain Size Analysis Report

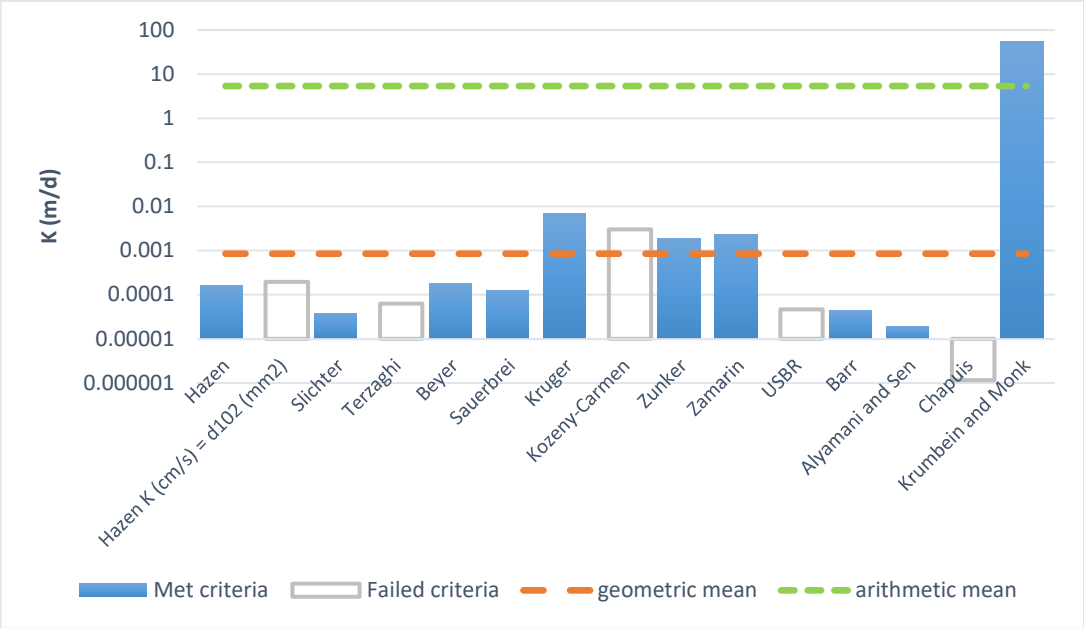
Date: 01-Mar-22

Sample Name: BH4 SS15

Mass Sample (g): 100

T (oC) 20

Poorly sorted clay low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	1.9E-07	1.9E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	2.3E-07	2.3E-09	0.00	
Slichter	4.5E-08	4.5E-10	0.00	
Terzaghi	7.2E-08	7.2E-10	0.00	
Beyer	2.0E-07	2.0E-09	0.00	
Sauerbrei	1.5E-07	1.5E-09	0.00	
Kruger	8.2E-06	8.2E-08	0.01	
Kozeny-Carmen	3.5E-06	3.5E-08	0.00	
Zunker	2.2E-06	2.2E-08	0.00	
Zamarin	2.7E-06	2.7E-08	0.00	
USBR	5.4E-08	5.4E-10	0.00	
Barr	5.2E-08	5.2E-10	0.00	
Alyamani and Sen	2.3E-08	2.3E-10	0.00	
Chapuis	1.3E-09	1.3E-11	0.00	
Krumbein and Monk	6.3E-02	6.3E-04	54.17	
geometric mean	1.0E-06	1.0E-08	0.00	
arithmetic mean	6.3E-03	6.3E-05	5.42	

K from Grain Size Analysis Report

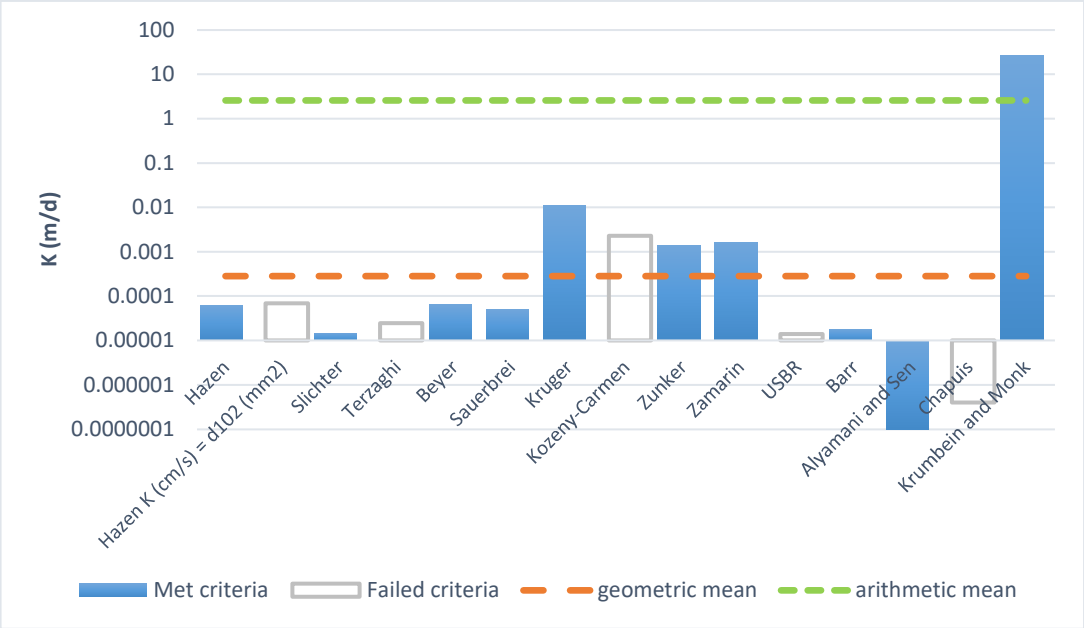
Date: 01-Mar-22

Sample Name: BH7 SS17

Mass Sample (g): 100

T (oC) 20

Poorly sorted clay low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	7.2E-08	7.2E-10	0.00	
Hazen K (cm/s) = d_{10} (mm)	7.9E-08	7.9E-10	0.00	
Slichter	1.7E-08	1.7E-10	0.00	
Terzaghi	2.8E-08	2.8E-10	0.00	
Beyer	7.4E-08	7.4E-10	0.00	
Sauerbrei	5.8E-08	5.8E-10	0.00	
Kruger	1.3E-05	1.3E-07	0.01	
Kozeny-Carmen	2.6E-06	2.6E-08	0.00	
Zunker	1.6E-06	1.6E-08	0.00	
Zamarin	1.9E-06	1.9E-08	0.00	
USBR	1.6E-08	1.6E-10	0.00	
Barr	2.0E-08	2.0E-10	0.00	
Alyamani and Sen	1.2E-10	1.2E-12	0.00	
Chapuis	4.6E-10	4.6E-12	0.00	
Krumbein and Monk	3.0E-02	3.0E-04	25.93	
geometric mean	3.3E-07	3.3E-09	0.00	
arithmetic mean	3.0E-03	3.0E-05	2.59	

K from Grain Size Analysis Report

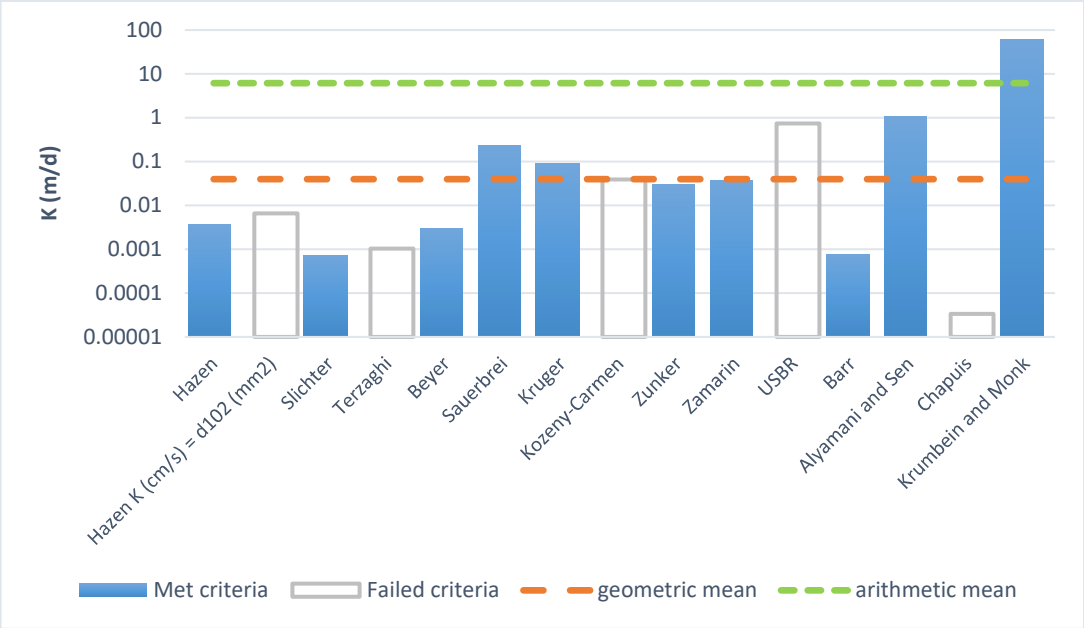
Date: 01-Mar-22

Sample Name: BH7 SS22

Mass Sample (g): 100

T (oC) 20

Poorly sorted sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	4.3E-06	4.3E-08	0.00	
Hazen K (cm/s) = d_{10} (mm)	7.6E-06	7.6E-08	0.01	
Slichter	8.4E-07	8.4E-09	0.00	
Terzaghi	1.2E-06	1.2E-08	0.00	
Beyer	3.5E-06	3.5E-08	0.00	
Sauerbrei	2.7E-04	2.7E-06	0.23	
Kruger	1.1E-04	1.1E-06	0.09	
Kozeny-Carmen	4.5E-05	4.5E-07	0.04	
Zunker	3.5E-05	3.5E-07	0.03	
Zamarin	4.3E-05	4.3E-07	0.04	
USBR	8.5E-04	8.5E-06	0.73	
Barr	9.0E-07	9.0E-09	0.00	
Alyamani and Sen	1.2E-03	1.2E-05	1.05	
Chapuis	3.8E-08	3.8E-10	0.00	
Krumbein and Monk	7.0E-02	7.0E-04	60.20	
geometric mean	4.6E-05	4.6E-07	0.04	
arithmetic mean	7.1E-03	7.1E-05	6.16	

K from Grain Size Analysis Report

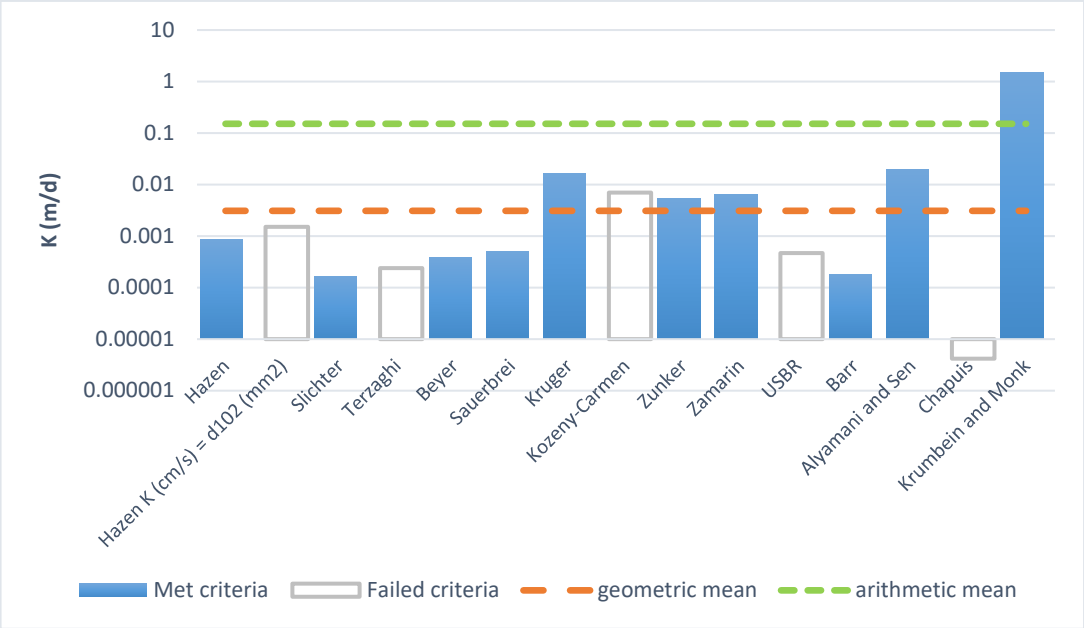
Date: 01-Mar-22

Sample Name: BH7 SS26

Mass Sample (g): 100

T (oC) 20

Poorly sorted silt low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	9.9E-07	9.9E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	1.7E-06	1.7E-08	0.00	
Slichter	1.9E-07	1.9E-09	0.00	
Terzaghi	2.8E-07	2.8E-09	0.00	
Beyer	4.5E-07	4.5E-09	0.00	
Sauerbrei	5.7E-07	5.7E-09	0.00	
Kruger	1.9E-05	1.9E-07	0.02	
Kozeny-Carmen	8.1E-06	8.1E-08	0.01	
Zunker	6.3E-06	6.3E-08	0.01	
Zamarin	7.5E-06	7.5E-08	0.01	
USBR	5.4E-07	5.4E-09	0.00	
Barr	2.1E-07	2.1E-09	0.00	
Alyamani and Sen	2.2E-05	2.2E-07	0.02	
Chapuis	4.9E-09	4.9E-11	0.00	
Krumbein and Monk	1.7E-03	1.7E-05	1.48	
geometric mean	3.6E-06	3.6E-08	0.00	
arithmetic mean	1.8E-04	1.8E-06	0.15	

Adopting the equation form presented in Vukovic and Soro (1992),

$$K = \frac{\rho g}{\mu} N \varphi(n) d_e^2$$

the following values and equations aresubstituted into the appropriate terms to evalute the models listed in the table below. The values of d_e to be entered should be in cm units. The values of K calculated have the units cm/s, except for the Alyamani and Sen model (see footnote).

Source	N	$\varphi(n)$	d_e	Applicable Conditions
Hazen simplified (Freeze and Cherry, 1979)	$10\frac{\mu}{\rho g}$	1	d_{10}	uniformly graded sand, n = 0.375 T = 10 °C
Hazen (1892)[a]	6×10^{-4}	$[1 + 10(n - 0.26)]$	d_{10}	0.01 cm < d_{10} < 0.3 cm U < 5
Slichter (1898)[a]	1×10^{-2}	$n^{3.287}$	d_{10}	0.01 cm < d_{10} < 0.5 cm
Terzaghi (1925)[a]	10.7×10^{-3} smooth grains 6.1×10^{-3} coarse grains	$\left(\frac{n - 0.13}{\sqrt[3]{1-n}}\right)^2$	d_{10}	sandy soil, coarse sand
Beyer (1964)[a]	$5.2 \times 10^{-4} \log\frac{500}{U}$	1	d_{10}	0.006 cm < d_{10} <0.06 cm $1 < U < 20$
Sauerbrei (1932)[a] (Vuković and Soro, 1992)	$(3.75 \times 10^{-5}) \times \tau$ $\tau \cong 1.093 \times 10^{-4} T^2 + 2.102 \times 10^{-2} T + 0.5889$	$\frac{n^3}{(1-n)^2}$	d_{17}	sand and sandy clay d_{17} < 0.05 cm
Krüger (1919)[a]	4.35×10^{-4}	$\frac{n}{(1-n)^2}$	$\frac{1}{\sum_{i=1}^{n} \frac{\Delta w_i}{d_i}}$	medium sand $U > 5$ T = 0 °C
Kozeny-Carmen (1953)[a]	8.3×10^{-3}	$\frac{n^3}{(1-n)^2}$	d_{10} or $\frac{1}{\frac{3}{2}\frac{\Delta w_1}{d_1} + \sum_{i=2}^{n} \Delta g_i \frac{d_i^g + d_i^d}{2 d_i^g d_i^d}}$ $d_1 = \frac{1}{\frac{1}{2}\left(\frac{1}{d_i^g} + \frac{1}{d_i^d}\right)}$	Coarse sand
Zunker (1930)[a]	0.7×10^{-3} for nonuniform, clayey, angular grains 1.2×10^{-3} for nonuniform 1.4×10^{-3} for uniform, coarse grains 2.4×10^{-3} for uniform sand, well rounded grains	$\frac{n}{(1-n)}$	$\frac{1}{\sum_{i=1}^{n} \Delta g_i \frac{d_i^g - d_i^d}{d_i^g d_i^d ln\left(\frac{d_i^g}{d_i^d}\right)}}$	no fractions finer than d = 0.0025 mm
Zamarin (1928)[a]	8.65×10^{-3}	$\frac{n^3}{(1-n)^2} C_n$ $C_n = (1.275 - 1.5n)^2$	$\frac{1}{\sum_{i=1}^{n} \Delta g_i \frac{\ln\left(\frac{d_i^g}{d_i^d}\right)}{d_i^g - d_i^d}}$	Large grained sands with no fractions having d < 0.00025 mm
USBR (United States Bureau of Reclamation) (Bialas, 1966)[a]	$(4.8 \times 10^{-4})(10^{0.3})$	1.0	$d_{20}^{1.15}$	Medium grained sands with U < 5; derived for T = 15 °C
Barr (2001)	$\frac{1}{(36)5C_s^2}$ C_s^2 = 1 for spherical grains C_s^2 = 1.35 for angular grains	$\frac{n^3}{(1-n)^2}$	d_{10}	unspecified
Alyamani and Sen (1993)	1300	1.0	$[I_o + 0.025(d_{50} - d_{10})]$	unspecified
Chapuis (2004)	$\frac{\mu}{\rho g}$	$10^{1.291\xi - 0.6435}$ $\xi = \frac{n}{1-n}$	$d_{10}^{\left(\frac{10^{(0.5304 - 0.2937\xi)}}{2}\right)}$	$0.3 < n < 0.7$ $0.10 < d_{10} < 2.0$ mm $2 < U < 12$ $d_{10}/d_5 < 1.4$
Krumbein and Monk (1942)	7.501×10^{-6}	$e^{(-1.31 \times \sigma_\phi)}$ $\sigma_\phi = \frac{\frac{d_{84\phi} - d_{16\phi}}{4}}{\frac{d_{95\phi} - d_{5\phi}}{6.6}}$	$2^{\left(\frac{d_{16\phi} + d_{50\phi} + d_{84\phi}}{3}\right)}$	natural sands with lognormal grain size distribution

* indicates formulas were taken from Vuković and Soro, (1992)
N = constant dependent on characteristics of the porous medium
$\varphi(n)$ = function of porosity
T = water temp. (°C)
g = 980 cm s^{-2}
$\rho = 3.1 \times 10^{-8} T^3 - 7.0 \times 10^{-6} T^2 + 4.19 \times 10^{-5} T + 0.99985$
$\mu = -7.0 \times 10^{-8} T^3 + 1.002 \times 10^{-5} T^2 - 5.7 \times 10^{-4} T + 0.0178$
$\tau = 1.093 \times 10^{-4} T^2 + 2.102 \times 10^{-2} T + 0.5889$
n = porosity as fraction of aquifer volume
d_i^g = the maximum grain diameter in fraction i
d_i^d = the minimum grain diameter in fraction i
d_{10} = grain size (cm) corresponding to 10% by weight passing through the sieves
d_{20} = grain size (cm) corresponding to 20% by weight passing through the sieves
d_{50} = grain size (cm) corresponding to 50% by weight passing through the sieves
d_{60} = grain size (cm) corresponding to 60% by weight passing through the sieves
$U = d_{60}/d_{10}$
Δg_i = the fraction of mass that passes between sieves i and $i+1$ where i is the smaller sieve
Δw_i = fraction of total weight of sample with fraction identifier 'i'
d_i = mean grain diameter of the fraction i
$d_{i\phi}$ = mean grain diameter of the fraction i in phi units ($\phi = \log_2 (d_e/d_o)$, d_e in mm, d_o = 1 mm)
I_o = x-intercept (grain size) of a percent grain retention curve plotted on arithmetic axes and focussing on data below 50% retained

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APPENDIX E

Grounded Engineering Inc
ATTN: Shelby Plant
1 Banigan Drive
TORONTO ON M4H 1G3

Date Received: 16-FEB-22
Report Date: 28-FEB-22 09:15 (MT)
Version: FINAL

Client Phone: 647-264-7928

Certificate of Analysis

Lab Work Order #: L2686534

Project P.O. #: NOT SUBMITTED
Job Reference: 21-195
C of C Numbers:
Legal Site Desc: 48 GRENOBLE DR.

Amanda Overholster
Account Manager

Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Guideline						
Ontario Toronto Sanitary Discharge Sewer By-Law 100-2016 (FEB 4,2016) - Ontario Toronto Sanitary Discharge Sewer By-Law						
(No parameter exceedances)						
Ontario Toronto Sanitary Discharge Sewer By-Law 100-2016 (FEB 4,2016) - Ontario Toronto Storm Sewer By-Law						
L2686534-1	SW-UF-BH2	Physical Tests	Total Suspended Solids	246	15	mg/L
		Cyanides	Cyanide, Total	0.0711	0.02	mg/L
		Total Metals	Copper (Cu)-Total	<0.050	0.04	mg/L
			Manganese (Mn)-Total	0.384	0.05	mg/L
			Zinc (Zn)-Total	<0.30	0.04	mg/L
		Aggregate Organics	BOD	40.5	15	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: L2686534-1 Sample Date: 16-FEB-22 Sample ID: SW-UF-BH2
pH	pH units	6.00-11.5	6.0-9.5	7.48
Total Suspended Solids	mg/L	350	15	246

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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	L2686534-1
			Sample Date	16-FEB-22
			Sample ID	SW-UF-BH2
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Fluoride (F)	mg/L	10	-	<1.0 DLDS
Total Kjeldahl Nitrogen	mg/L	100	-	3.55
Phosphorus, Total	mg/L	10	0.4	<0.30 DLM

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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	L2686534-1
			Sample Date	16-FEB-22
			Sample ID	SW-UF-BH2
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Cyanide, Total	mg/L	2	0.02	0.0711

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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	L2686534-1
			Sample Date	16-FEB-22
			Sample ID	SW-UF-BH2
		Guide Limits		
Analyte	Unit	#1	#2	
E. Coli	CFU/100mL	-	200	0

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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: L2686534-1 Sample Date: 16-FEB-22 Sample ID: SW-UF-BH2
Aluminum (Al)-Total	mg/L	50	-	1.82 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	4	0.08	<0.050 DLHC
Cobalt (Co)-Total	mg/L	5	-	<0.010 DLHC
Copper (Cu)-Total	mg/L	2	0.04	<0.050 DLHC
Lead (Pb)-Total	mg/L	1	0.12	<0.0050 DLHC
Manganese (Mn)-Total	mg/L	5	0.05	0.384 DLHC
Mercury (Hg)-Total	mg/L	0.01	0.0004	<0.0000050
Molybdenum (Mo)-Total	mg/L	5	-	0.0257 DLHC
Nickel (Ni)-Total	mg/L	2	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	-	0.050 DLHC
Zinc (Zn)-Total	mg/L	2	0.04	<0.30 DLHC

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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

Speciated Metals - WATER

		Guide Limits		
			Lab ID	L2686534-1
			Sample Date	16-FEB-22
			Sample ID	SW-UF-BH2
Analyte	**Unit**	**#1**	**#2**	
Chromium, Hexavalent	mg/L	2	0.04	<0.00050

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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	L2686534-1
			Sample Date	16-FEB-22
			Sample ID	SW-UF-BH2
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
BOD	mg/L	300	15	40.5
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	0.008	<0.0010

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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

Volatile Organic Compounds - WATER

			Lab ID	L2686534-1
			Sample Date	16-FEB-22
			Sample ID	SW-UF-BH2
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Benzene	ug/L	10	2	<0.50
Chloroform	ug/L	40	2	1.1
1,2-Dichlorobenzene	ug/L	50	5.6	<0.50
1,4-Dichlorobenzene	ug/L	80	6.8	<0.50
cis-1,2-Dichloroethylene	ug/L	4000	5.6	<0.50
Dichloromethane	ug/L	2000	5.2	<2.0
trans-1,3-Dichloropropene	ug/L	140	-	<0.50
Ethylbenzene	ug/L	160	2	<0.50
1,1,2,2-Tetrachloroethane	ug/L	1400	17	<0.50
Tetrachloroethylene	ug/L	1000	4.4	<0.50
Toluene	ug/L	16	2	0.56
Trichloroethylene	ug/L	400	7.6	<0.50
o-Xylene	ug/L	-	-	<0.50
m+p-Xylenes	ug/L	-	-	<1.0
Xylenes (Total)	ug/L	1400	4.4	<1.1
Surrogate: 4-Bromofluorobenzene	%	-	-	97.0
Surrogate: 1,4-Difluorobenzene	%	-	-	100.0

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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.

Polycyclic Aromatic Hydrocarbons - WATER

			Lab ID	L2686534-1
			Sample Date	16-FEB-22
			Sample ID	SW-UF-BH2
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Acenaphthene	ug/L	-	-	<0.025 DLM
Anthracene	ug/L	-	-	<0.025 DLM
Benzo(a)anthracene	ug/L	-	-	<0.030 RRR
Benzo(a)pyrene	ug/L	-	-	<0.025 DLM
Benzo(b&j)fluoranthene	ug/L	-	-	0.025 DLM
Benzo(e)pyrene	ug/L	-	-	<0.050
Benzo(ghi)perylene	ug/L	-	-	0.028 DLM
Benzo(k)fluoranthene	ug/L	-	-	<0.025 DLM
Chrysene	ug/L	-	-	0.039 DLM
Dibenz(a,h)acridine	ug/L	-	-	<0.050
Dibenz(a,j)acridine	ug/L	-	-	<0.050
Dibenz(a,h)anthracene	ug/L	-	-	<0.025 DLM
Dibenzo(a,i)pyrene	ug/L	-	-	<0.050
7H-Dibenzo(c,g)carbazole	ug/L	-	-	<0.070 DLQ
1,3-Dinitropyrene	ug/L	-	-	<1.0
1,6-Dinitropyrene	ug/L	-	-	<1.0
1,8-Dinitropyrene	ug/L	-	-	<1.0
Fluoranthene	ug/L	-	-	0.079 R
Fluorene	ug/L	-	-	<0.025 DLM
Indeno(1,2,3-cd)pyrene	ug/L	-	-	<0.025 DLM
Naphthalene	ug/L	-	-	<0.040 DLB
Perylene	ug/L	-	-	<0.025 DLM
Phenanthrene	ug/L	-	-	0.058 R
Pyrene	ug/L	-	-	0.109 DLM
Surrogate: 2-Fluorobiphenyl	%	-	-	66.1
Surrogate: D14-Terphenyl	%	-	-	68.0
Surrogate: d14-Terphenyl	%	-	-	79.7
Total PAHs	ug/L	5	2	<1.7

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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.

Semi-Volatile Organics - WATER

			Lab ID	L2686534-1
			Sample Date	16-FEB-22
			Sample ID	SW-UF-BH2
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
3,3-Dichlorobenzidine	ug/L	2	0.8	<0.40
Di-n-butylphthalate	ug/L	80	15	<1.0
Bis(2-ethylhexyl)phthalate	ug/L	12	8.8	<2.0
Pentachlorophenol	ug/L	5	2	<2.0 RRR
Surrogate: 2-Fluorobiphenyl	%	-	-	54.9
Surrogate: p-Terphenyl d14	%	-	-	60.0
Surrogate: 2,4,6-Tribromophenol	%	-	-	105.8

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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	L2686534-1
			Sample Date	16-FEB-22
			Sample ID	SW-UF-BH2
		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	%	-	-	50.5
Total PCBs	ug/L	1	0.4	<0.040
Surrogate: Tetrachloro-m-xylene	%	-	-	82.1

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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	L2686534-1
			Sample Date	16-FEB-22
			Sample ID	SW-UF-BH2
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Nonylphenol	ug/L	20	1	<1.0
Nonylphenol Diethoxylates	ug/L	-	-	<0.10
Total Nonylphenol Ethoxylates	ug/L	200	10	<2.0
Nonylphenol Monoethoxylates	ug/L	-	-	<2.0

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law
Guide Limit #2: Ontario Toronto Storm Sewer By-Law

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

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments
L2686534-1	Water	Note: RRR; The Reporting Limit has been raised due to possible instrument background interference.	
L2686534-1	Water	Note: RRR: Detection limit raised due to bias low analyte response in continuing calibration standard.	

Qualifiers for Individual Parameters Listed:

Qualifier	Description
R	The ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLQ	Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
RRR	Refer to Report Remarks for issues regarding this analysis

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
625-PAH-LOW-WT	Water	EPA 8270 PAH (Low Level)	SW846 8270

Aqueous samples are extracted and extracts are analyzed on GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

625-SAN-WT	Water	Ontario Sanitary Sewer SVOC Target List	SW-846 8270

Samples are extracted with solvent and then analyzed by GC/MS.

BOD-WT	Water	BOD	APHA 5210 B

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

CR-CR6-IC-WT	Water	Chromium +6	EPA 7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Chromium (III) is calculated as the difference between the total chromium and the chromium (VI) results.

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).

EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
		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.	
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.	
		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.	
PAH-EXTRA-WT	Water	Sanitary Sewer Use By-Law Additional PAH	SW 846 8270
PAH-SUM-CALC-WT	Water	TOTAL PAH's	CALCULATION
		Total PAH represents the sum of all PAH analytes reported for a given sample. Note that regulatory agencies and criteria differ in their definitions of Total PAH in terms of the individual PAH analytes to be included.	
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.	

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
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-ED	Water	Phenols (4AAP)	EPA 9066 AUTO-DISTILL-COLORIMETRIC

This automated method is based on the distillation of phenol and subsequent reaction of the distillate with an oxidizing agent (alkaline potassium ferricyanide), and 4-aminoantipyrine to form a red complex which is measured at 505 nm. The method will include ortho and meta-substituted phenols, and is collectively named 4AAP phenols.

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.

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:

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
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA

Reference Information

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

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
625-PAH-LOW-WT	**Water**							
Batch R5728371								
WG3697929-2 LCS								
Acenaphthene			85.3		%		50-130	23-FEB-22
Anthracene			91.5		%		60-130	23-FEB-22
Benzo(a)anthracene			99.3		%		60-140	23-FEB-22
Benzo(a)pyrene			87.2		%		60-130	23-FEB-22
Benzo(b&j)fluoranthene			93.5		%		60-130	23-FEB-22
Benzo(ghi)perylene			86.0		%		50-140	23-FEB-22
Benzo(k)fluoranthene			81.4		%		60-130	23-FEB-22
Chrysene			88.9		%		60-140	23-FEB-22
Dibenz(a,h)anthracene			89.0		%		60-130	23-FEB-22
Fluoranthene			93.8		%		60-130	23-FEB-22
Fluorene			89.9		%		60-130	23-FEB-22
Indeno(1,2,3-cd)pyrene			97.2		%		60-140	23-FEB-22
Naphthalene			89.4		%		50-130	23-FEB-22
Perylene			84.0		%		60-130	23-FEB-22
Phenanthrene			86.1		%		60-130	23-FEB-22
Pyrene			94.5		%		60-130	23-FEB-22
WG3697929-1 MB								
Acenaphthene			<0.010		ug/L		0.01	23-FEB-22
Anthracene			<0.010		ug/L		0.01	23-FEB-22
Benzo(a)anthracene			<0.010		ug/L		0.01	23-FEB-22
Benzo(a)pyrene			<0.010		ug/L		0.01	23-FEB-22
Benzo(b&j)fluoranthene			<0.010		ug/L		0.01	23-FEB-22
Benzo(ghi)perylene			<0.010		ug/L		0.01	23-FEB-22
Benzo(k)fluoranthene			<0.010		ug/L		0.01	23-FEB-22
Chrysene			<0.010		ug/L		0.01	23-FEB-22
Dibenz(a,h)anthracene			0.013	MB-LOR	ug/L		0.01	23-FEB-22
Fluoranthene			<0.010		ug/L		0.01	23-FEB-22
Fluorene			<0.010		ug/L		0.01	23-FEB-22
Indeno(1,2,3-cd)pyrene			<0.010		ug/L		0.01	23-FEB-22
Naphthalene			0.020	MB-LOR	ug/L		0.01	23-FEB-22
Perylene			<0.010		ug/L		0.01	23-FEB-22
Phenanthrene			<0.010		ug/L		0.01	23-FEB-22
Pyrene			<0.010		ug/L		0.01	23-FEB-22
Surrogate: 2-Fluorobiphenyl			86.6		%		40-130	23-FEB-22

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
625-PAH-LOW-WT	**Water**							
Batch R5728371								
WG3697929-1 MB								
Surrogate: D14-Terphenyl			88.3		%		40-130	23-FEB-22
625-SAN-WT	**Water**							
Batch R5728527								
WG3697929-2 LCS								
3,3-Dichlorobenzidine			64.6		%		50-140	23-FEB-22
Bis(2-ethylhexyl)phthalate			99.1		%		50-140	23-FEB-22
Di-n-butylphthalate			86.1		%		50-140	23-FEB-22
Pentachlorophenol			58.2		%		50-140	23-FEB-22
WG3697929-1 MB								
3,3-Dichlorobenzidine			<1.0	RRQC	ug/L		0.4	23-FEB-22
Bis(2-ethylhexyl)phthalate			<2.0		ug/L		2	23-FEB-22
Di-n-butylphthalate			<1.0		ug/L		1	23-FEB-22
Pentachlorophenol			<1.0	RRQC	ug/L		0.5	23-FEB-22
Surrogate: 2-Fluorobiphenyl			89.3		%		40-130	23-FEB-22
Surrogate: 2,4,6-Tribromophenol			107.4		%		40-130	23-FEB-22
Surrogate: p-Terphenyl d14			113.7		%		40-130	23-FEB-22
COMMENTS: RRQC: Detection limit raised due to bias low analyte response in continuing calibration standard.								
BOD-WT	**Water**							
Batch R5728545								
WG3697448-2 DUP		**L2686580-1**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	30	17-FEB-22
WG3697448-3 LCS								
BOD			99.0		%		85-115	17-FEB-22
WG3697448-1 MB								
BOD			<2.0		mg/L		2	17-FEB-22
CN-TOT-WT	**Water**							
Batch R5727301								
WG3697252-9 DUP		**WG3697252-8**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	17-FEB-22
WG3697252-7 LCS								
Cyanide, Total			94.6		%		80-120	17-FEB-22
WG3697252-6 MB								
Cyanide, Total			<0.0020		mg/L		0.002	17-FEB-22
WG3697252-10 MS		**WG3697252-8**						
Cyanide, Total			91.3		%		70-130	17-FEB-22

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CR-CR6-IC-WT	**Water**							
Batch R5727402								
WG3697380-4 DUP		**WG3697380-3**						
Chromium, Hexavalent		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-FEB-22
WG3697380-2 LCS								
Chromium, Hexavalent			93.2		%		80-120	17-FEB-22
WG3697380-1 MB								
Chromium, Hexavalent			<0.00050		mg/L		0.0005	17-FEB-22
WG3697380-5 MS		**WG3697380-3**						
Chromium, Hexavalent			91.3		%		70-130	17-FEB-22
EC-WW-MF-WT	**Water**							
Batch R5727463								
WG3697222-3 DUP		**L2686514-1**						
E. Coli		0	<10	RPD-NA	CFU/100mL	N/A	65	17-FEB-22
WG3697222-1 MB								
E. Coli			0		CFU/100mL		1	17-FEB-22
F-IC-N-WT	**Water**							
Batch R5728065								
WG3697926-4 DUP		**WG3697926-3**						
Fluoride (F)		0.028	0.028		mg/L	0.6	20	18-FEB-22
WG3697926-2 LCS								
Fluoride (F)			101.2		%		90-110	18-FEB-22
WG3697926-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-FEB-22
WG3697926-5 MS		**WG3697926-3**						
Fluoride (F)			100.0		%		75-125	18-FEB-22
HG-T-CVAA-WT	**Water**							
Batch R5727576								
WG3697726-3 DUP		**L2686576-1**						
Mercury (Hg)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	18-FEB-22
WG3697726-2 LCS								
Mercury (Hg)-Total			99.8		%		80-120	18-FEB-22
WG3697726-1 MB								
Mercury (Hg)-Total			<0.000005(		mg/L		0.000005	18-FEB-22
WG3697726-4 MS		**L2686577-1**						
Mercury (Hg)-Total			100.0		%		70-130	18-FEB-22
MET-T-CCMS-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5727599								
WG3697677-4 DUP		**WG3697677-3**						
Aluminum (Al)-Total		0.0158	0.0152		mg/L	4.0	20	18-FEB-22
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-FEB-22
Arsenic (As)-Total		0.00019	0.00021		mg/L	11	20	18-FEB-22
Cadmium (Cd)-Total		0.0000240	0.0000227		mg/L	5.6	20	18-FEB-22
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-FEB-22
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-FEB-22
Copper (Cu)-Total		0.00087	0.00087		mg/L	0.0	20	18-FEB-22
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-FEB-22
Manganese (Mn)-Total		0.00384	0.00382		mg/L	0.3	20	18-FEB-22
Molybdenum (Mo)-Total		0.000574	0.000556		mg/L	3.3	20	18-FEB-22
Nickel (Ni)-Total		0.00106	0.00100		mg/L	5.6	20	18-FEB-22
Selenium (Se)-Total		0.000131	0.000146		mg/L	11	20	18-FEB-22
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-FEB-22
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-FEB-22
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	18-FEB-22
Zinc (Zn)-Total		0.0187	0.0185		mg/L	1.1	20	18-FEB-22
WG3697677-2 LCS								
Aluminum (Al)-Total			103.2		%		80-120	18-FEB-22
Antimony (Sb)-Total			100.0		%		80-120	18-FEB-22
Arsenic (As)-Total			98.4		%		80-120	18-FEB-22
Cadmium (Cd)-Total			97.0		%		80-120	18-FEB-22
Chromium (Cr)-Total			95.8		%		80-120	18-FEB-22
Cobalt (Co)-Total			93.2		%		80-120	18-FEB-22
Copper (Cu)-Total			94.6		%		80-120	18-FEB-22
Lead (Pb)-Total			100.7		%		80-120	18-FEB-22
Manganese (Mn)-Total			97.1		%		80-120	18-FEB-22
Molybdenum (Mo)-Total			94.8		%		80-120	18-FEB-22
Nickel (Ni)-Total			95.8		%		80-120	18-FEB-22
Selenium (Se)-Total			95.5		%		80-120	18-FEB-22
Silver (Ag)-Total			90.4		%		80-120	18-FEB-22
Tin (Sn)-Total			97.2		%		80-120	18-FEB-22
Titanium (Ti)-Total			96.0		%		80-120	18-FEB-22
Zinc (Zn)-Total			96.0		%		80-120	18-FEB-22

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5727599								
WG3697677-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	18-FEB-22
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	18-FEB-22
Arsenic (As)-Total			<0.00010		mg/L		0.0001	18-FEB-22
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	18-FEB-22
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	18-FEB-22
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	18-FEB-22
Copper (Cu)-Total			<0.00050		mg/L		0.0005	18-FEB-22
Lead (Pb)-Total			<0.000050		mg/L		0.00005	18-FEB-22
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	18-FEB-22
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	18-FEB-22
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	18-FEB-22
Selenium (Se)-Total			<0.000050		mg/L		0.00005	18-FEB-22
Silver (Ag)-Total			<0.000050		mg/L		0.00005	18-FEB-22
Tin (Sn)-Total			<0.00010		mg/L		0.0001	18-FEB-22
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	18-FEB-22
Zinc (Zn)-Total			<0.0030		mg/L		0.003	18-FEB-22
WG3697677-5 MS		**WG3697677-3**						
Aluminum (Al)-Total			104.1		%		70-130	18-FEB-22
Antimony (Sb)-Total			102.5		%		70-130	18-FEB-22
Arsenic (As)-Total			101.5		%		70-130	18-FEB-22
Cadmium (Cd)-Total			98.9		%		70-130	18-FEB-22
Chromium (Cr)-Total			98.2		%		70-130	18-FEB-22
Cobalt (Co)-Total			92.3		%		70-130	18-FEB-22
Copper (Cu)-Total			91.6		%		70-130	18-FEB-22
Lead (Pb)-Total			98.0		%		70-130	18-FEB-22
Manganese (Mn)-Total			96.4		%		70-130	18-FEB-22
Molybdenum (Mo)-Total			99.8		%		70-130	18-FEB-22
Nickel (Ni)-Total			93.2		%		70-130	18-FEB-22
Selenium (Se)-Total			100.8		%		70-130	18-FEB-22
Silver (Ag)-Total			88.8		%		70-130	18-FEB-22
Tin (Sn)-Total			98.3		%		70-130	18-FEB-22
Titanium (Ti)-Total			100.4		%		70-130	18-FEB-22
Zinc (Zn)-Total			91.2		%		70-130	18-FEB-22
NP,NPE-LCMS-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NP,NPE-LCMS-WT	**Water**							
Batch R5727595								
WG3697354-3 DUP		**L2686073-1**						
Nonylphenol		<1.0	<1.0	RPD-NA	ug/L	N/A	30	17-FEB-22
Nonylphenol Monoethoxylates		<2.0	<2.0	RPD-NA	ug/L	N/A	30	17-FEB-22
Nonylphenol Diethoxylates		<0.10	<0.10	RPD-NA	ug/L	N/A	30	17-FEB-22
WG3697354-2 LCS								
Nonylphenol			98.0		%		75-125	17-FEB-22
Nonylphenol Monoethoxylates			92.5		%		75-125	17-FEB-22
Nonylphenol Diethoxylates			80.2		%		75-125	17-FEB-22
WG3697354-1 MB								
Nonylphenol			<1.0		ug/L		1	17-FEB-22
Nonylphenol Monoethoxylates			<2.0		ug/L		2	17-FEB-22
Nonylphenol Diethoxylates			<0.10		ug/L		0.1	17-FEB-22
WG3697354-4 MS		**L2686073-1**						
Nonylphenol			120.0		%		60-140	17-FEB-22
Nonylphenol Monoethoxylates			175.3	K	%		60-140	17-FEB-22
Nonylphenol Diethoxylates			89.5		%		60-140	17-FEB-22
OGG-SPEC-WT	**Water**							
Batch R5727597								
WG3697643-2 LCS								
Oil and Grease, Total			88.8		%		70-130	18-FEB-22
Mineral Oil and Grease			83.4		%		70-130	18-FEB-22
WG3697643-1 MB								
Oil and Grease, Total			<5.0		mg/L		5	18-FEB-22
Mineral Oil and Grease			<2.5		mg/L		2.5	18-FEB-22
P-T-COL-WT	**Water**							
Batch R5728093								
WG3697657-3 DUP		**L2686850-1**						
Phosphorus, Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	22-FEB-22
WG3697657-2 LCS								
Phosphorus, Total			101.7		%		80-120	22-FEB-22
WG3697657-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	22-FEB-22
WG3697657-4 MS		**L2686850-1**						
Phosphorus, Total			82.9		%		70-130	22-FEB-22
PAH-EXTRA-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-EXTRA-WT	**Water**							
Batch R5728372								
WG3697929-2 LCS								
Benzo(e)pyrene			89.9		%		60-130	23-FEB-22
1,3-Dinitropyrene			92.4		%		60-130	23-FEB-22
1,6-Dinitropyrene			94.7		%		60-130	23-FEB-22
Dibenz(a,h)acridine			96.6		%		60-130	23-FEB-22
1,8-Dinitropyrene			110.7		%		60-130	23-FEB-22
Dibenz(a,j)acridine			101.3		%		60-130	23-FEB-22
7H-Dibenzo(c,g)carbazole			105.1		%		60-130	23-FEB-22
Dibenzo(a,i)pyrene			90.2		%		60-130	23-FEB-22
WG3697929-1 MB								
Benzo(e)pyrene			<0.050		ug/L		0.05	23-FEB-22
1,3-Dinitropyrene			<1.0		ug/L		1	23-FEB-22
1,6-Dinitropyrene			<1.0		ug/L		1	23-FEB-22
Dibenz(a,h)acridine			<0.050		ug/L		0.05	23-FEB-22
1,8-Dinitropyrene			<1.0		ug/L		1	23-FEB-22
Dibenz(a,j)acridine			<0.050		ug/L		0.05	23-FEB-22
7H-Dibenzo(c,g)carbazole			<0.050		ug/L		0.05	23-FEB-22
Dibenzo(a,i)pyrene			<0.050		ug/L		0.05	23-FEB-22
Surrogate: d14-Terphenyl			96.6		%		40-130	23-FEB-22
PCB-WT	**Water**							
Batch R5727428								
WG3697555-2 LCS								
Aroclor 1242			104.2		%		65-130	18-FEB-22
Aroclor 1248			98.2		%		65-130	18-FEB-22
Aroclor 1254			95.4		%		65-130	18-FEB-22
Aroclor 1260			94.2		%		65-130	18-FEB-22
WG3697555-1 MB								
Aroclor 1242			<0.020		ug/L		0.02	18-FEB-22
Aroclor 1248			<0.020		ug/L		0.02	18-FEB-22
Aroclor 1254			<0.020		ug/L		0.02	18-FEB-22
Aroclor 1260			<0.020		ug/L		0.02	18-FEB-22
Surrogate: Decachlorobiphenyl			93.3		%		50-150	18-FEB-22
Surrogate: Tetrachloro-m-xylene			68.3		%		50-150	18-FEB-22
PH-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	**Water**							
Batch R5727769								
WG3697878-4 DUP		**WG3697878-3**						
pH		6.79	6.84	J	pH units	0.05	0.2	18-FEB-22
WG3697878-2 LCS								
pH			6.93		pH units		6.9-7.1	18-FEB-22
PHENOLS-4AAP-ED	**Water**							
Batch R5729634								
WG3700152-3 DUP		**L2686854-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	25-FEB-22
WG3700152-2 LCS								
Phenols (4AAP)			90.0		%		85-115	25-FEB-22
WG3700152-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	25-FEB-22
WG3700152-4 MS		**L2686977-1**						
Phenols (4AAP)			98.1		%		75-125	25-FEB-22
SOLIDS-TSS-WT	**Water**							
Batch R5727924								
WG3698179-3 DUP		**L2687125-1**						
Total Suspended Solids		88.6	87.6		mg/L	1.1	20	21-FEB-22
WG3698179-2 LCS								
Total Suspended Solids			95.3		%		85-115	21-FEB-22
WG3698179-1 MB								
Total Suspended Solids			<3.0		mg/L		3	21-FEB-22
TKN-F-WT	**Water**							
Batch R5728298								
WG3697655-3 DUP		**L2686904-1**						
Total Kjeldahl Nitrogen		0.071	0.089	J	mg/L	0.019	0.1	23-FEB-22
WG3697655-2 LCS								
Total Kjeldahl Nitrogen			105.2		%		75-125	23-FEB-22
WG3697655-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	23-FEB-22
WG3697655-4 MS		**L2686904-1**						
Total Kjeldahl Nitrogen			125.3		%		70-130	23-FEB-22
VOC-ROU-HS-WT	**Water**							
Batch R5726998								
WG3697184-4 DUP		**WG3697184-3**						
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	18-FEB-22
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	18-FEB-22

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5726998								
WG3697184-4 DUP		**WG3697184-3**						
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	18-FEB-22
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	18-FEB-22
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	18-FEB-22
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	18-FEB-22
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	18-FEB-22
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	18-FEB-22
m+p-Xylenes		<0.40	<0.40	RPD-NA	ug/L	N/A	30	18-FEB-22
o-Xylene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	18-FEB-22
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	18-FEB-22
trans-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	18-FEB-22
Trichloroethylene		7.86	8.72		ug/L	10	30	18-FEB-22
WG3697184-1 LCS								
1,1,2,2-Tetrachloroethane			113.1		%		70-130	17-FEB-22
1,2-Dichlorobenzene			102.0		%		70-130	17-FEB-22
1,4-Dichlorobenzene			99.8		%		70-130	17-FEB-22
Benzene			96.9		%		70-130	17-FEB-22
Chloroform			99.1		%		70-130	17-FEB-22
cis-1,2-Dichloroethylene			98.1		%		70-130	17-FEB-22
Dichloromethane			104.1		%		70-130	17-FEB-22
Ethylbenzene			95.4		%		70-130	17-FEB-22
m+p-Xylenes			96.5		%		70-130	17-FEB-22
o-Xylene			95.3		%		70-130	17-FEB-22
Tetrachloroethylene			98.4		%		70-130	17-FEB-22
trans-1,3-Dichloropropene			106.6		%		70-130	17-FEB-22
Trichloroethylene			98.3		%		70-130	17-FEB-22
WG3697184-2 MB								
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	17-FEB-22
1,2-Dichlorobenzene			<0.50		ug/L		0.5	17-FEB-22
1,4-Dichlorobenzene			<0.50		ug/L		0.5	17-FEB-22
Benzene			<0.50		ug/L		0.5	17-FEB-22
Chloroform			<1.0		ug/L		1	17-FEB-22
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	17-FEB-22
Dichloromethane			<2.0		ug/L		2	17-FEB-22
Ethylbenzene			<0.50		ug/L		0.5	

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5726998								
WG3697184-2 MB								
Ethylbenzene			<0.50		ug/L		0.5	17-FEB-22
m+p-Xylenes			<0.40		ug/L		0.4	17-FEB-22
o-Xylene			<0.30		ug/L		0.3	17-FEB-22
Tetrachloroethylene			<0.50		ug/L		0.5	17-FEB-22
trans-1,3-Dichloropropene			<0.30		ug/L		0.3	17-FEB-22
Trichloroethylene			<0.50		ug/L		0.5	17-FEB-22
Surrogate: 1,4-Difluorobenzene			100.1		%		70-130	17-FEB-22
Surrogate: 4-Bromofluorobenzene			99.0		%		70-130	17-FEB-22
WG3697184-5 MS		**WG3697184-3**						
1,1,2,2-Tetrachloroethane			87.3		%		50-150	18-FEB-22
1,2-Dichlorobenzene			101.1		%		50-150	18-FEB-22
1,4-Dichlorobenzene			101.4		%		50-150	18-FEB-22
Benzene			95.0		%		50-150	18-FEB-22
Chloroform			97.1		%		50-150	18-FEB-22
cis-1,2-Dichloroethylene			95.4		%		50-150	18-FEB-22
Dichloromethane			97.5		%		50-150	18-FEB-22
Ethylbenzene			96.5		%		50-150	18-FEB-22
m+p-Xylenes			96.6		%		50-150	18-FEB-22
o-Xylene			95.3		%		50-150	18-FEB-22
Tetrachloroethylene			97.4		%		50-150	18-FEB-22
trans-1,3-Dichloropropene			97.6		%		50-150	18-FEB-22
Trichloroethylene			97.7		%		50-150	18-FEB-22
Batch R5728209								
WG3698280-4 DUP		**WG3698280-3**						
Toluene		<0.40	<0.40	RPD-NA	ug/L	N/A	30	23-FEB-22
WG3698280-1 LCS								
Toluene			99.5		%		70-130	22-FEB-22
WG3698280-2 MB								
Toluene			<0.40		ug/L		0.4	22-FEB-22
WG3698280-5 MS		**WG3698280-3**						
Toluene			95.2		%		50-150	23-FEB-22

Quality Control Report

Workorder: L2686534 Report Date: 28-FEB-22

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

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.
K	Matrix Spike recovery outside ALS DQO due to sample matrix effects.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
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

L2686534-COFC

Form

COC Number: 20 - 954787

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution
Company:	Grounded Engineering	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)
Contact:	Shelby Plant	Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
Phone:		☑ Compare Results to Criteria on Report - provide details below if box checked
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Street:	1 Bunigan Dr.	Email 1 or Fax: Splant@groundedeng.ca
City/Province:	Toronto, ON	Email 2
Postal Code:	M4H 1E9	Email 3
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Recipients
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Company:		Email 1 or Fax
Contact:		Email 2

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#:
Job #:	21-195	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:	48 Grenoble Cr.	Location:	
ALS Lab Work Order # (ALS use only):	L2686534	ALS Contact:	Sampler: KS

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: dd-mmm-yy hh:mm

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

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	Storm + Sanitary combined	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	SW-4F-BH2	16-Feb-22	13:00	GW	20	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	City of Toronto Storm and Sanitary 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			
8.9				1.9			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Kishani Sundaralingam	Date: Feb 16/22	Time: 13:00	Received by: HK	Date: 02/16/2022	Time: 15:50	Received by: HDJ	Date: 16-02-22	Time: 17

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2019 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

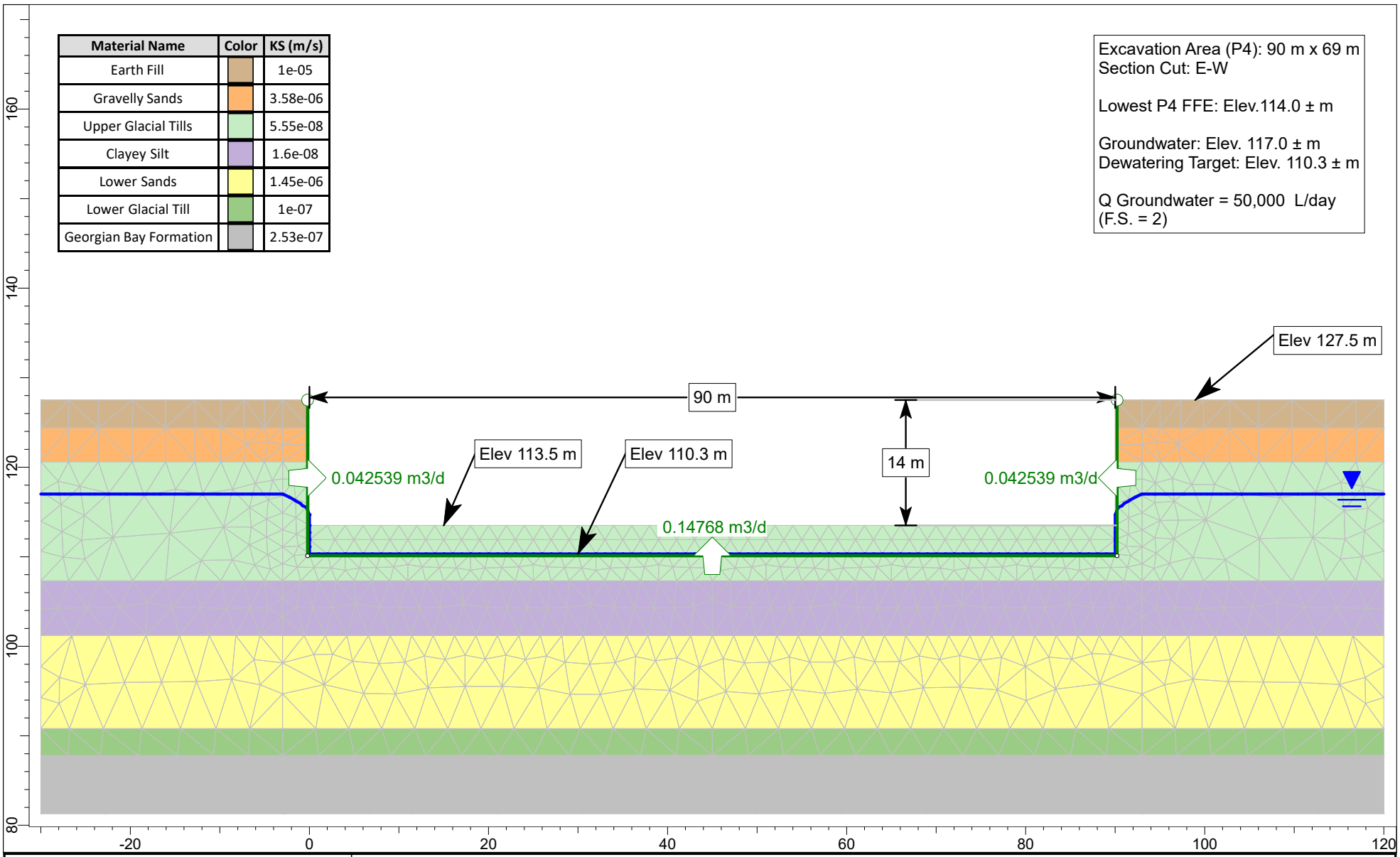
Material Name	Color	KS (m/s)
Earth Fill		1e-05
Gravelly Sands		3.58e-06
Upper Glacial Tills		5.55e-08
Clayey Silt		1.6e-08
Lower Sands		1.45e-06
Lower Glacial Till		1e-07
Georgian Bay Formation		2.53e-07

Excavation Area (P4): 90 m x 69 m
Section Cut: E-W

Lowest P4 FFE: Elev.114.0 ± m

Groundwater: Elev. 117.0 ± m
Dewatering Target: Elev. 110.3 ± m

Q Groundwater = 50,000 L/day
(F.S. = 2)



GROUNDED ENGINEERING

Project	21-195 | 48 Grenoble Dr, Toronto		
Analysis Description	Dewatering | Steady State Analysis	Model	ST: Soilder Pile and Lagging | Master Scenario
Drawn By	KM	Scale 1:600	Date 2022-03-04
Source	Hydrogeological Report		File Name 21-195_Slide1.slmd

SLIDEINTERPRET 9.019

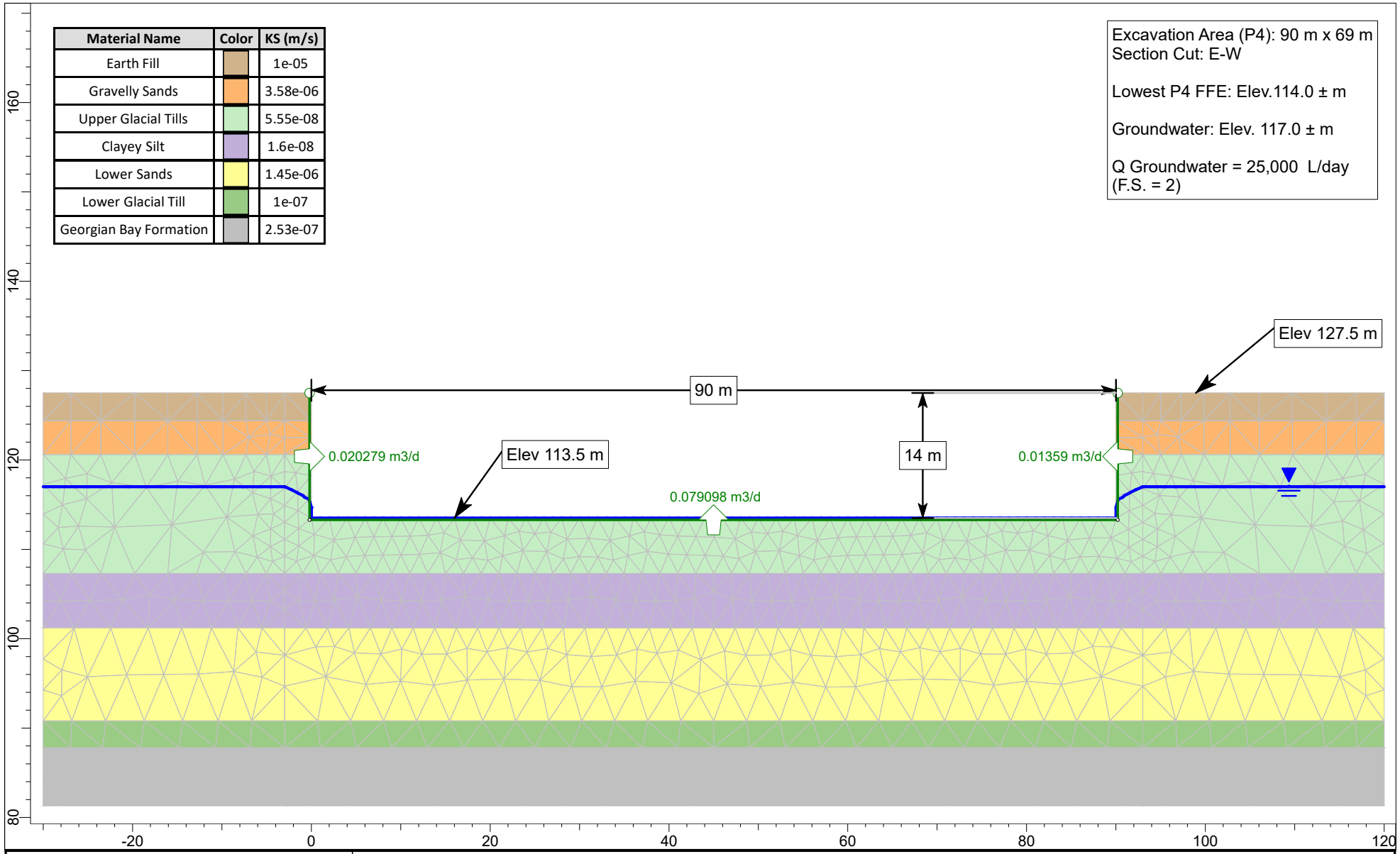
Material Name	Color	KS (m/s)
Earth Fill		1e-05
Gravelly Sands		3.58e-06
Upper Glacial Tills		5.55e-08
Clayey Silt		1.6e-08
Lower Sands		1.45e-06
Lower Glacial Till		1e-07
Georgian Bay Formation		2.53e-07

Excavation Area (P4): 90 m x 69 m
Section Cut: E-W

Lowest P4 FFE: Elev.114.0 ± m

Groundwater: Elev. 117.0 ± m

Q Groundwater = 25,000 L/day
(F.S. = 2)



GROUNDED ENGINEERING

Project	21-195 | 48 Grenoble Dr, Toronto		
Analysis Description	Dewatering | Steady State Analysis	Model	LT: Drained Structure | Master Scenario
Drawn By	KM	Scale 1:600	Date 2022-03-04
Source	Hydrogeological Report		File Name 21-195_Slide1.slmd

SLIDEINTERPRET 9.019

APPENDIX G

SHORT TERM - Soilder Pile and Lagging

Excavation Dimensions [m]	
N-S	69
E-W	90
Area (m2)	6210
Perimeter (m)	318

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		0.14768	69	10,190
Sides		0.042539	318	13,527
Total				23,717
Factor of Safety	2.0			47,435

Storm Events	
2 Year [L/day]	100 Year [L/day]
155,250	584,000

Summary	L/day	L/min
Groundwater	50,000	34.7
Rainfall	156,000	108.3
Total	206,000	143.1

LONG TERM - Drained Structure (Worst Case)

Excavation Dimensions [m]	
N-S	69
E-W	90
Area (m2)	6210
Perimeter (m)	318

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		0.079098	69	5,458
Sides		0.020279	318	6,449
Total				11,906
Factor of Safety	2.0			23,813

Infiltration [L/day]
22657.5

Summary	L/day	L/min
Groundwater	25,000	17.4
Infiltration	23,000	16.0
Total	48,000	33.3