Hullmark Sun Life (376 Dufferin) LP
474 Wellington Street West
Toronto, ON M5V 1E3

File No. 21-199
July 15, 2022

Attention: Charles Arbez

RE: HYDROGEOLOGICAL REVIEW REPORT
340-376R Dufferin Street & 2 Melbourne Avenue, Toronto, Ontario

Grounded Engineering Inc. ("Grounded") is pleased to provide you with this Hydrogeological Review for the site known as 340-376R Dufferin Street & 2 Melbourne Avenue, 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.

Arman Gelimforoush, MASc, EIT
Project Manager

Jason Crowder, Ph.D., P.Eng.
Principal

TORONTO

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	340-376R Dufferin Street & 2 Melbourne Avenue, Toronto, Ontario	Title, i (Exec Sum), 1 (Sec 1)	
Postal Code	M3H 4G5, M6K 3G1 and M6K 1Z8	Title	
Property Owner (on request for comments memo)	Hullmark Sunlife (376 Dufferin) LP	Title, i (Exec Sum), 1 (Sec 1)	
Proposed description of the project (if applicable) (point towers, number of podiums)	Two Towers (North Tower: 25 stories, South Tower: 21 stories) and two buildings (South Midrise: 11 stories and Building B: 6 Stories) resting on 2 levels of underground parking	i (Exec Sum), 1 (Sec 1)	
Land Use (ex. commercial, residential, mixed, institutional, industrial)	Current: Commercial Proposed: Mixed use Commercial/Residential	i (Exec Sum), 1 (Sec 1)	
Number of below grade levels for the proposed structure	Two (2) levels	i (Exec Sum), 1 (Sec 1)	
HYDROLOGICAL REVIEW INFORMATION			
Date Hydrological Review was prepared:	2022-07-15	Title	
Who Performed the Hydrological Review (Consulting Firm)	Grounded Engineering Inc.	Title, i (Exec Sum), 2 (Sec 1)	
Name of Author of Hydrological Review	Jason Crowder, Ph.D., P.Eng.	2 (Sec 1), 13 (Sec 14)	

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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**	**Caisson Wall Shoring:** Groundwater Seepage = 25,000 L/day Design Rainfall = 160,000 L/day Total = 185,000 L/day What safety factor was used? 2.0	Ii/iii (Exec Sum), 10 (Sec 10)	

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**	**Caisson Wall Shoring:** Groundwater Seepage = 12,500 L/day Design Rainfall = 160,000 L/day Total = 172,500 L/day	Appendix F	
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	**Caisson Wall Shoring**: Groundwater Seepage = 90,000 L/day Design Rainfall = 9,000 L/day Total = 99,000 L/day **Caisson Shoring with Waterproofed Foundation Walls:** Groundwater Seepage = 40,000 L/day Design Rainfall = 9,000 L/day Total = 49,000 L/day **Waterproofed Foundations:** Groundwater Seepage = 0 L/day Design Rainfall = 0 L/day Total = 0 L/day What safety factor was used? 2.0	ii (Exec Sum), 10 (Sec 10)	
List the nearest surface water (river, creek, lake)	The nearest waterbody is Lake Ontario, located approximately 1000 m south of the Property.	3 (Sec 3)	
Lowest basement elevation	82.6 masl – base of excavation 84.73 masl – finished floor elevation	i (Exec Sum), Appendix F	
Foundation elevation	82.6 masl – underside of raft foundation	i (Exec Sum)	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Ground elevation	93.4 masl	Appendix F	
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	4-5 (Sec 4 and 5), Figures 2 & 3	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
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.	✓ Yes	4-5 (Sec 4 and 5)	
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 (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 (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)	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
The pump test been carried out for at least 24 hours if possible. If not, has a slug test been conducted?	A pump test was not conducted. Slug tests were conducted.	6 (Sec 6.2)	
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 was 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)**

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of 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	7-8 (Sec 7), Appendix E	
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.**	Sanitary Combined Sewer: • No exceedances were observed in the sample	7-8 (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 28 mg/L; Limit 15 mg/L; RDL 3 mg/L) • Total Manganese (Result 0.457 mg/L; Limit 0.05 mg/L; RDL 0.0005 mg/L)	7-8 (Sec 7)	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
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	
List any of the sample parameters that exceed the Bylaw limits with the reporting detection limit (RDL) included.	Sanitary Combined Sewer: • No exceedances were observed in the sample Storm Sewer: • Total Suspended Solids (Result 28 mg/L; Limit 15 mg/L; RDL 3 mg/L) • Total Manganese (Result 0.457 mg/L; Limit 0.05 mg/L; RDL 0.0005 mg/L)	7-8 (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)**

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Does the report recommend a back-up system or relief safety valve(s)?	✓ Yes	9 (Sec 9)	
Does the associated Geotechnical report recommend a back-up system or relief safety valve(s)?	✓ Yes	14 (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	12-13 (Sec 11)	N/A
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:**	12-14 (Sec 11-12)	N/A

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

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HYDROLOGICAL REVIEW SUMMARY

Appendix A:

SANITARY/COMBINED **Sample Location: BH117**

Inorganics		Sample Result (mg/L)	Sample Result with upper RDL included (mg/L)	
Parameter	mg/L			ug/L
BOD	300	<3	<3 (3)	300,000
Fluoride	10	<0.1	<0.1 (0.1)	10,000
TKN	100	0.540	0.540 (0.5)	100,000
pH	6.0 - 11.5	7.45	7.45 (0.1)	6.0 - 11.5
Phenolics 4AAP	1	<0.001	<0.001 (0.001)	1,000
TSS	350	28	28 (3)	350,000
Total Cyanide	2	<0.002	<0.002 (0.002)	2,000
Metals				
Chromium Hexavalent	2	<0.0005	<0.0005 (0.0005)	2,000
Mercury	0.01	<0.000005	<0.000005 (0.000005)	10
Total Aluminum	50	0.778	0.778 (0.01)	50,000
Total Antimony	5	0.00013	0.00013 (0.0001)	5,000
Total Arsenic	1	0.00063	0.00063 (0.0001)	1,000
Total Cadmium	0.7	0.000038	0.000038 (0.00001)	700
Total Chromium	4	0.00209	0.00209 (0.00008)	4,000
Total Cobalt	5	0.00196	0.00196 (0.0001)	5,000
Total Copper	2	0.0026	0.0026 (0.001)	2,000
Total Lead	1	0.00114	0.00114 (0.0001)	1,000
Total Manganese	5	0.457	0.457 (0.0005)	5,000
Total Molybdenum	5	0.000708	0.000708 (0.00005)	5,000
Total Nickel	2	0.00383	0.00383 (0.0005)	2,000
Total Phosphorus	10	0.0156	0.0156 (0.003)	10,000
Total Selenium	1	0.00494	0.00494 (0.00005)	1,000
Total Silver	5	<0.00005	<0.00005 (0.00005)	5,000
Total Tin	5	0.00017	0.00017 (0.0001)	5,000
Total Titanium	5	0.0404	0.0404 (0.0003)	5,000
Total Zinc	2	0.0095	0.0095 (0.003)	2,000
Petroleum Hydrocarbons				
Animal/Vegetable Oil & Grease	150	<5	<5 (5)	150,000
Mineral/Synthetic Oil & Grease	15	<2.5	<2.5 (2.5)	15,000

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Volatile Organics		Sample Result (mg/L)	Sample Result with upper RDL included (mg/L)	
Parameter	mg/L			ug/L
Benzene	0.01	<0.5	<0.5 (0.5)	10
Chloroform	0.04	<1	<1 (1)	40
1,2-Dichlorobenzene	0.05	<0.5	<0.5 (0.5)	50
1,4-Dichlorobenzene	0.08	<0.5	<0.5 (0.5)	80
Cis-1,2-Dichloroethylene	4	<0.5	<0.5 (0.5)	4,000
Trans-1,3-Dichloropropylene	0.14	<0.5	<0.5 (0.5)	140
Ethyl Benzene	0.16	<0.5	<0.5 (0.5)	160
Methylene Chloride	2	<2	<2 (0.0005)	2,000
1,1,2,2-Tetrachloroethane	1.4	<0.5	<0.5 (0.5)	1,400
Tetrachloroethylene	1	<0.5	<0.5 (0.5)	1,000
Toluene	0.016	<0.5	<0.5 (0.5)	16
Trichloroethylene	0.4	<0.5	<0.5 (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	<1 (1)	80
Bis (2-ethylhexyl) Phthalate	0.012	<2	<2 (2)	12
3,3'-Dichlorobenzidine	0.002	<0.4	<0.4 (0.4)	2
Pentachlorophenol	0.005	<0.5	<0.5 (0.5)	5
Total PAHs	0.005	<1.7	<1.7 (1.7)	5
Misc **Parameters**				
Nonylphenols	0.02	<1	<1 (1)	20
Nonylphenol Ethoxylates	0.2	<2	<2 (2)	200

Sample Collected: November 1, 2021

Temperature: 9.2° C

HYDROLOGICAL REVIEW SUMMARY

STORM **Sample Location: BH117**

Inorganics		Sample Result (mg/L)	Sample Result with upper RDL included (mg/L)	
Parameter	mg/L			ug/L
pH	6.0 - 9.5	7.45	7.45 (0.1)	
BOD	15	<3	<3 (3)	15,000
Phenolics 4AAP	0.008	<0.001	<0.001 (0.001)	8
TSS	15	28	28 (3)	15,000
Total Cyanide	0.02	<0.002	<0.002 (0.002)	20
Metals				
Total Arsenic	0.02	0.00063	0.00063 (0.0001)	20
Total Cadmium	0.008	0.000038	0.000038 (0.00001)	8
Total Chromium	0.08	0.00209	0.00209 (0.00008)	80
Chromium Hexavalent	0.04	<0.0005	<0.0005 (0.0005)	40
Total Copper	0.04	0.0026	0.0026 (0.001)	40
Total Lead	0.12	0.00114	0.00114 (0.0001)	120
Total Manganese	0.05	0.457	0.457 (0.0005)	50
Total Mercury	0.0004	<0.000005	<0.000005 (0.000005)	0.4
Total Nickel	0.08	0.00383	0.00383 (0.0005)	80
Total Phosphorus	0.4	0.0156	0.0156 (0.003)	400
Total Selenium	0.02	0.00494	0.00494 (0.00005)	20
Total Silver	0.12	<0.00005	<0.00005 (0.00005)	120
Total Zinc	0.04	0.0095	0.0095 (0.003)	40
Microbiology				
E.coli	200	0		200,000
Volatile Organics				
Parameter	mg/L			ug/L
Benzene	0.002	<0.5	<0.5 (0.5)	2
Chloroform	0.002	<1	<1 (1)	2
1,2-Dichlorobenzene	0.0056	<0.5	<0.5 (0.5)	6
1,4-Dichlorobenzene	0.0068	<0.5	<0.5 (0.5)	7
Cis-1,2-Dichloroethylene	0.0056	<0.5	<0.5 (0.5)	6
Trans-1,3-Dichloropropylene	0.0056	<0.5	<0.5 (0.5)	6
Ethyl Benzene	0.002	<0.5	<0.5 (0.5)	2
Methylene Chloride	0.0052	<2	<2 (0.0005)	5
1,1,2,2-Tetrachloroethane	0.017	<0.5	<0.5 (0.5)	17
Tetrachloroethylene	0.0044	<0.5	<0.5 (0.5)	4
Toluene	0.002	<0.5	<0.5 (0.5)	2
Trichloroethylene	0.0076	<0.5	<0.5 (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	<1 (1)	5
Bis (2-ethylhexyl) Phthalate	0.0088	<2	<2 (2)	8.8
3,3'-Dichlorobenzidine	0.0008	<0.4	<0.4 (0.4)	0.8
Pentachlorophenol	0.002	<0.5	<0.5 (0.5)	2
Total PAHs	0.002	<1.7	<1.7 (1.7)	2
PCBs	0.0004	<0.04	<0.04 (0.04)	0.4
Misc Parameters				
Nonylphenols	0.001	<1	<1 (1)	1
Nonylphenol Ethoxylates	0.01	<2	<2 (2)	10

Sample Collected: November 1, 2021

Temperature: 9.2° C

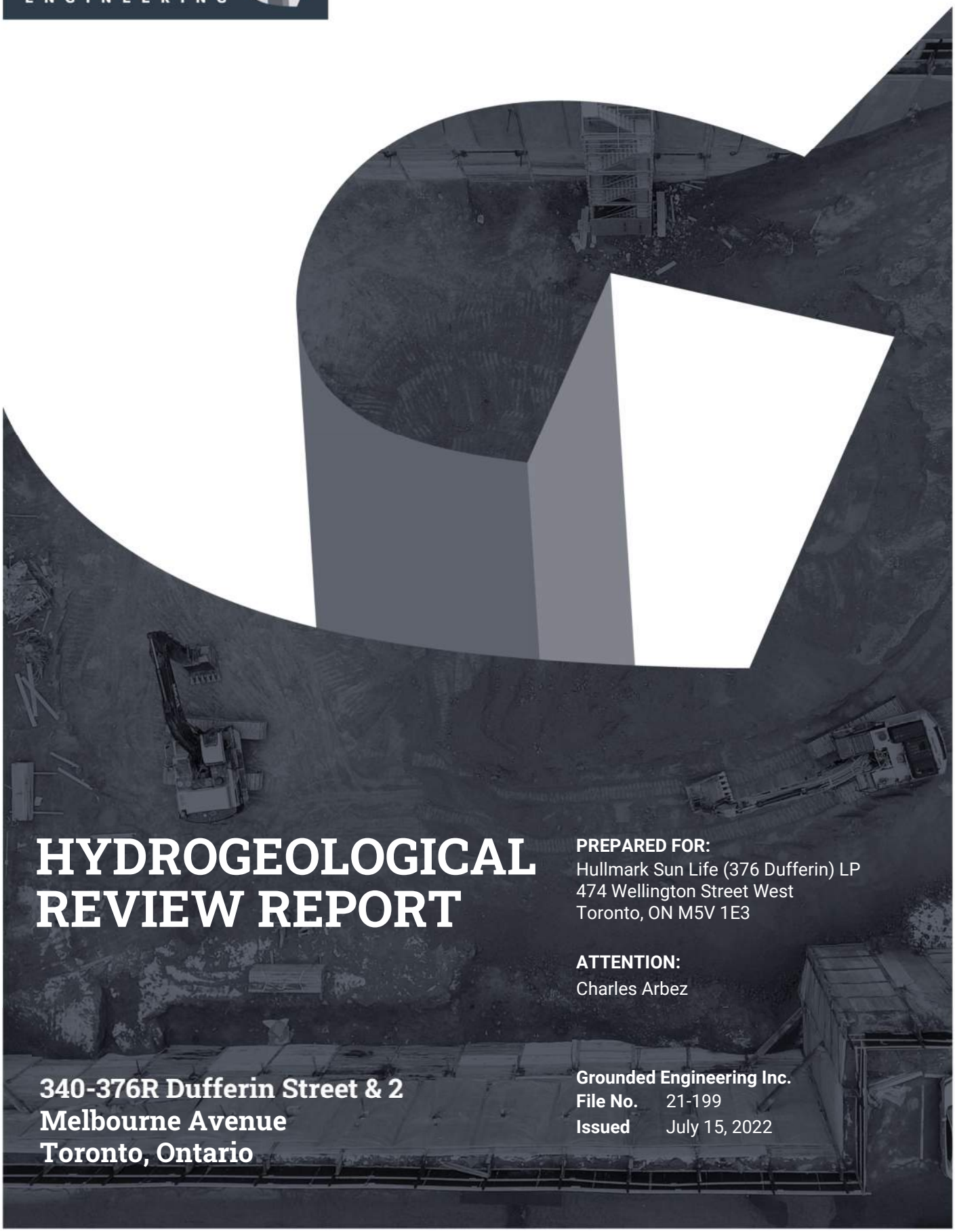
Consulting Firm that prepared Hydrological Report: _____

Qualified Professional who completed the report summary: _____

Print Name

Qualified Professional who completed the report summary: _____

Signature Date & Stamp



HYDROGEOLOGICAL REVIEW REPORT

PREPARED FOR:
Hullmark Sun Life (376 Dufferin) LP
474 Wellington Street West
Toronto, ON M5V 1E3

ATTENTION:
Charles Arbez

340-376R Dufferin Street & 2 Melbourne Avenue Toronto, Ontario

Grounded Engineering Inc.
File No. 21-199
Issued July 15, 2022

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

Executive Summary

Grounded Engineering Inc. (Grounded) was retained by Hullmark Sun Life (376 Dufferin) LP to conduct a Hydrogeological Review for the proposed redevelopment of 340-376R Dufferin Street & 2 Melbourne Avenue 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)	
340 Dufferin Street & 2 Melbourne Avenue	1 to 2	0 to 1*	Unknown	90.4	Unknown
360-376R Dufferin Street	1 to 2	0 to 1*		90.7	

*Buildings have partial basement

Proposed Development

Development Phase		Above Grade Levels	Below Grade Levels			
			Level #	Lowest Finished Floor		Approximate Base of Footings (masl)
				Depth (m)	Elevation (masl)	
340-376R Dufferin Street & 2 Melbourne Avenue	North Tower	25	2	7.8*	84.73	82.60**
	South Tower	21				
	Building A	11				
	Building B	6				

*Depth calculated from Level 1 proposed grade
**Underside of raft foundation

Site Conditions

Site Stratigraphy

Stratum/Formation	Aquifer or Aquitard	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Earth Fill	Aquifer	0.0 – 3.1	93.4 – 90.3	$1.0 \times 10^{-6***}$
Sand	Aquifer	3.1 – 9.2	90.3 – 84.2	$4.8 \times 10^{-6*}$
Silt Till	Aquifer	9.2 - 13.1	84.2 - 80.2	$1.0 \times 10^{-6***}$
Weathered Bedrock	N/A	13.1 – 14.6	80.2 – 78.8	$1.0 \times 10^{-6***}$
Sound Bedrock	N/A	14.6 and below	78.8 and below	$6.8 \times 10^{-7*}$

*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)**
BH101	5.1	88.1
BH102	Dry	Dry
BH103-S	2.8	87.6
BH103-D	2.5	87.9
BH104	5.2	88.1
BH105	6.0	87.3
BH106	4.5	88.7
BH107	2.2	88.5
BH108	3.5	87.9
BH110	3.5	87.9
BH111	5.5	87.9
BH117	5.0	88.3
EXP-BH1	5.5	88.0
EXP-BH3	5.2	88.1
EXP-BH5	4.6	88.6
EXP-BH6	Dry	Dry
EXP-TH101	5.1	88.4
EXP-TH102	4.8	88.7

Groundwater Quality				
Sample ID	**Sample Date**	**Sample Expiry Date**	**City of Toronto Storm Sewer Limits**	**City of Toronto Sanitary and Combined Sewer Limits**
SEW-UF-BH117	2021-11-01	2022-08-01	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)**
72,960	42,880	12,000	12,000,000	9,700	9,700,000

Scenario	**Short Term (Construction) Groundwater Quantity – Safety Factor of 2 Used**					
	Groundwater Seepage		**Design Rainfall Event (25mm)**		**Total Daily Water Takings**	
	L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
Caisson Wall Shoring	25,000	17.4	160,000	111.1	185,000	128.5

Scenario	Long Term (Post-Construction) Groundwater Quantity – Safety Factor of 2 Used					
	Groundwater Seepage		Infiltration Design Rainfall Event (25mm)		Total Daily Water Takings	
	L/day	L/min	L/day	L/min	L/day	L/min
Caisson Wall Shoring	90,000	62.5	9,000	6.3	99,000	68.8
Caisson Wall Shoring with Waterproofed Foundation Walls	40,000	27.8	9,000	6.3	49,000	34.0
Fully Waterproofed	0	0.0	0	0.0	0	0.0

Scenario	Zone of Influence (m)	Settlement (mm)
Caisson Wall Shoring	0	0
Caisson Wall Shoring with Waterproofed Walls	0	0
Fully Waterproofed	0	0

Regulatory Requirements	Scenario		
	Caisson Wall Shoring	**Caisson Wall Shoring with Waterproofed Foundation Walls**	**Fully Waterproofed**
Environmental Activity and Sector Registry (EASR) Posting	Required	NA*	NA*
Short Term Permit to Take Water (PTTW)	Not Required	NA*	NA*
Long Term Permit to Take Water (PTTW)	Required	Not Required	Not Required
Short Term Discharge Agreement City of Toronto	Required	NA*	NA*
Long Term Discharge Agreement City of Toronto	Required	Not Required	Not Required

*Not applicable. Regulatory requirement applies to short term conditions only, whereas proposed scenario applies to long term conditions.

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FIGURES

APPENDICES

1 Introduction

Hullmark Sun Life (376 Dufferin) LP has retained Grounded Engineering Inc. ("Grounded") to provide hydrogeological engineering design advice for their proposed development at 340-376R Dufferin Street & 2 Melbourne Avenue, in Toronto, Ontario.

Property Information	
Location of Property	340-376R Dufferin Street & 2 Melbourne Avenue, Toronto, Ontario M3H 4G5, M6K 3G1 and M6K 1Z8
Ownership of Property	Hullmark Developments
Property Dimensions (m)	128 x 59
Property Area (m^2)	7,445

Existing Development	
Number of Building Structures	Four (4) 1 to 2 storey buildings surrounding a common courtyard
Number of Above Grade Levels	1 to 2
Number of Underground Levels	0 to 1*
Sub-Grade Depth of Development (m)	Unknown
Sub-Grade Area (m^2)	Unknown
Land Use Classification	Commercial

*340 and 360 Dufferin St have partial basements

Proposed Development	
Number of Building Structures	Two (2) towers: North Tower and South Tower, two (2) buildings: Building A, Building B
Number of Above Grade Levels	North Tower: 25 stories, South Tower: 21 stories, South Midrise: 11 stories, Building B: 6 stories Existing heritage building at 350 Dufferin Street will remain.
Number of Underground Levels	Two (2) common underground parking levels
Sub-Grade Depth of Development (m)	7.8
Sub-Grade Area (m^2)	6,430

Land Use Classification	Mixed use Commercial/Residential

Qualified Person and Hydrogeological Review Information	
Qualified Person	Jason Crowder, Ph.D., P.Eng.
Consulting Firm	Grounded Engineering Inc.
Date of Hydrogeological Review	July 15, 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 11 boreholes to a maximum depth of 15.8 m instrumented with monitoring wells by Grounded, one of which is instrumented with a set of nested monitoring wells 103-S and 103-D in October 2021 ▪ Advancement of 6 boreholes to a maximum depth of 14.5 m by EXP, 4 of which were instrumented with monitoring wells in January/February 2016 ▪ Advancement of 4 test holes to a maximum depth of 7 m by EXP, 2 of which were instrumented with monitoring wells in July 2016 ▪ Advancement of 2 test holes to a maximum depth of 2.7 m by EXP, in December 2014 ▪ Completion of slug tests in all available monitoring wells ▪ Bi-weekly groundwater elevation monitoring for a period of 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 93 - 94 masl.
Local Physiographic Features	Bevelled Till Plains
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

General Hydrogeological Characterization	
	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 Lake Ontario Waterfront. Watershed. Locally, groundwater is anticipated to flow south towards Lake Ontario.
Surface Drainage	Surface water is expected to flow towards municipal catch basins located adjacent to the site, via Dufferin Street to the East and Melbourne Avenue to the south.

2 Study Area Map

A map has been enclosed which shows the following information:

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

3 Geology and Physical Hydrogeology

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

Site Stratigraphy

Stratum/Formation	Aquifer or Aquitard	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Earth Fill	Aquifer	0.0 – 3.1	93.4 – 90.3	$1.0 \times 10^{-6***}$
Sand	Aquifer	3.1 – 13.1	90.3 – 80.2	$1.5 \times 10^{-5*}$
Silt Till	Aquifer	9.2 - 13.1	84.2 - 80.2	$1.0 \times 10^{-6***}$

*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)

Bedrock			
Weathered Bedrock	13.1 – 14.6	80.2 – 78.8	$1.0 \times 10^{-6***}$
Sound Bedrock	14.6 and below	78.8 and below	$6.8 \times 10^{-7*}$

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

Surface Water		
Surface Water Body	**Distance from site (m)**	**Hydraulically Connected to Property (yes/no)**
Lake Ontario	1,000	No

4 Monitoring Well Information

Consultant	Well ID	Well Diameter (mm)	Ground Surface (masl)	Top of Screen (masl)	Bottom of Screen (masl)	Screened Geological Unit
Grounded	BH101	38	93.2*	89.6	86.5	Sand
	BH102	50	93.1*	91.9	90.3	Fill
	BH103-S	38	90.4*	88.9	85.9	Sand
	BH103-D	38	90.4*	85.5	82.5	Sand/Silt Till
	BH104	50	93.3	81.1	78.1	Silt Till/Shale
	BH105	50	93.3	80.5	77.5	Silt Till/Shale
	BH106	38	93.3*	85.7	82.7	Sand/Silt Till
	BH107	38	90.7*	89.2	86.1	Sand
	BH108	38	91.4*	88.9	85.9	Sand
	BH110	38	91.4*	88.9	85.9	Sand
	BH111	50	93.4	80.7	77.7	Silt Till/Shale
	BH117	50	93.3	88.8	85.7	Sand
EXP	EXP-BH1	-**	93.5	88.9	85.9	Sand
	EXP-BH3	-**	93.3	88.7	85.7	Sand
	EXP-BH5	-**	93.2	89.0	86.2	Sand
	EXP-BH6	-**	91.3	89.8	88.3	Sand
	EXP-TH101	-**	93.5	90.1	87.1	Sand

Consultant	Well ID	Well Diameter (mm)	Ground Surface (masl)	Top of Screen (masl)	Bottom of Screen (masl)	Screened Geological Unit
	EXP-TH102	-**	93.5	90.1	87.1	Sand

*Interior wells, advanced from top of basement slab
**Unknown
Note: EXP Wells EXP-BH1, EXP BH3, EXP-TH101, and EXP-TH102 were not located. Well construction details taken from previous consultant's reports and logs.

5 Groundwater Elevations

Well ID	Groundwater Elevation (masl)														
	Feb 08/16	Feb 10/16	July 05/16	July 06/16	Oct 26/21	Oct 27/21	Oct 28/21	Oct 29/21	Nov 4/21	Nov 12/21	Nov 16/21	Nov 26/21	Dec 10/21	Dec 23/21	Jan 07/22
BH101	-	-	-	-	-	88.1	-	-	-	88.1	-	88.1	88.1	88.1	88.1
BH102	-	-	-	-	-	DRY	-	-	-	DRY	-	DRY	DRY	DRY	DRY
BH103-S	-	-	-	-	87.5	-	-	-	87.6	87.6	87.6	87.6	87.5	87.6	87.6
BH103-D	-	-	-	-	87.6	-	-	-	87.6	87.9	87.6	87.6	87.5	87.6	87.6
BH104	-	-	-	-	-	-	-	87.8	88.0	88.0	88.1	88.1	88.1	88.1	88.1
BH105	-	-	-	-	87.1	-	87.1	-	86.1	86.6	86.9	87.0	87.3	87.3	87.2
BH106	-	-	-	-	-	-	88.7	-	-	88.7	-	88.7	88.7	88.7	88.7
BH107	-	-	-	-	88.5	-	-	-	88.5	88.5	88.4	88.5	88.5	88.5	88.5
BH108	-	-	-	-	87.9	-	-	-	87.8	87.7	87.8	87.8	87.8	87.8	87.8
BH110	-	-	-	-	87.9	-	-	-	87.9	87.8	87.8	87.8	87.8	87.8	87.8
BH111	-	-	-	-	87.9	-	87.7	-	87.8	87.8	87.8	87.8	87.8	87.8	87.8
BH117	-	-	-	-	-	-	-	88.1	88.1	88.0	88.3	88.0	88.0	88.1	88.0
EXP-BH1*	88.0	87.9	-	-	-	-	-	-	-	-	-	-	-	-	-
EXP-BH3*	88.1	88.1	-	-	-	-	-	-	-	-	-	-	-	-	-
EXP-BH5	88.2	88.2	-	-	88.4	-	-	-	88.4	-	88.6	-	-	88.4	
EXP-BH6	-	DRY	-	-	DRY	-	-	-	-	DRY	DRY	DRY	-	DRY	
EXP-TH101*	-	-	88.4	88.4	-	-	-	-	-	-	-	-	-	-	-
EXP-TH102*	-	-	88.7	88.7	-	-	-	-	-	-	-	-	-	-	-

*EXP Wells EXP-BH1, EXP BH3, EXP-TH101, and EXP-TH102 were not located. Water levels shown in table for these wells were collected as part of previous consultant's investigation.

For basement wall design purposes, the groundwater table is at Elev. 88.7± m in the sand unit. This deposit has a very high permeability and will produce free flowing water when penetrated.

There is also water within discrete fractures in the bedrock, and infiltrated storm water perched in the earth fill. 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 for new developments 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

Based on the available groundwater elevation measured for the subject site, the Peak Static GWL Observed was at Elev. 88.7 m at BH 106 from October 2021 to January 2022. The Fluctuation Allowance for October (maximum fluctuation allowance between October to January), based on the Option 1 - Table 1 approach, is 2.8 m. Therefore, the MAGWL for the site is Elev. 91.5 m.

As the proposed basement protrusion elevation extends below the observed maximum groundwater level at the Property, the elevation of the lowest structure is also below the determined 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 pump test was not completed at this site. Please note however that in situ single well response tests were completed in select monitoring wells installed on 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)
BH103-D	85.5 - 82.5	Sand	1.5×10^{-6}
BH104	81.1 - 78.1	Silt Till/Bedrock	6.9×10^{-7}
BH105	80.5 - 77.5	Silt Till/Bedrock	2.9×10^{-8}
BH106	85.7 - 82.7	Sand/Silt Till	4.8×10^{-6}
BH108	88.9 - 85.9	Sand	7.2×10^{-7}
BH110	88.9 - 85.9	Sand	1.7×10^{-6}
BH111	80.7 - 77.7	Silt Till/Bedrock	1.3×10^{-7}
BH117	88.8 - 85.7	Sand	3.9×10^{-6}

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)
BH101-SS7B	Silty Sand	Alyamani and Sen, Barr, Sauerbrei, Krumbein and Monk	9.3×10^{-6}
BH101-SS4	Sand	Alyamani and Sen, Barr, Sauerbrei, Krumbein and Monk	1.5×10^{-5}
BH103-SS5	Sand	Alyamani and Sen, Barr, Sauerbrei, Krumbein and Monk	7.1×10^{-6}
BH105-SS9	Sand and Silt Till	Alyamani and Sen, Barr, Sauerbrei, Krumbein and Monk	1.0×10^{-6}
BH106-SS8	Sand	Alyamani and Sen, Barr, Sauerbrei, Krumbein and Monk, Zunker	1.0×10^{-5}
BH107-SS5	Silty Sand	Alyamani and Sen, Barr, Sauerbrei, Krumbein and Monk	7.1×10^{-6}
BH108-SS5	Silty Sand	Alyamani and Sen, Barr, Sauerbrei, Krumbein and Monk	1.3×10^{-6}
BH110-SS6	Sand and Silt	Alyamani and Sen, Barr, Sauerbrei, Krumbein and Monk	2.5×10^{-5}

Sample ID	Soil Description	Applicable Analysis Methods	Hydraulic Conductivity (m/s)
BH111-SS9	Sand and Silt Till	Alyamani and Sen, Barr, Sauerbrei, Krumbein and Monk	2.8×10^{-7}

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}
Sands	10^{-2} to 10^{-7}
Silts	10^{-5} to 10^{-9}
Glacial Tills	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 BH117 on November 1, 2021. 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 28 mg/L)
- Manganese (Mn)- Total (Limit 0.05 mg/L, Result 0.457 mg/L)

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

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

8 Proposed Construction Method

For design purposes, the stabilized groundwater table is at about Elev. 88.7± m. The water table is present in all of the native soil units. The lowest (P2) FFE is at about Elev. 84.73± m. Therefore,

- Foundation excavations will extend below the prevailing groundwater table; and
- Foundation excavations will penetrate wet sands, which will yield free-flowing water.

The proposed shoring at the site must consist of the following:

- A continuous interlocking caisson wall with filler caissons extending into sound bedrock which will act as a cut off layer.

At the time of this report, the shoring design has yet to be finalized. A separate geotechnical engineering report has been prepared by Grounded Engineering Inc. for this site which outlines the proposed construction, shoring and foundation methodology in greater detail.

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 of the bedrock is not required. 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 the following scenarios:

- Drained foundations, consisting of perimeter drainage and a sub-slab drainage system
- Waterproofed foundation walls and a sub-slab drainage system
- Fully waterproofed foundation walls and waterproofed foundations (leak-tight)

Based on previous experience in the area, waterproofed foundation walls and sub-slab drainage system is recommended for the proposed structure.

Also, 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 6,450 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 the excavation will be exposed to the elements, and therefore 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 602,000 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)
72,960	42,880	12,000	12,000,000	9,700	9,700,000

Scenario	Short Term (Construction) Groundwater Quantity – Safety Factor of 2 Used					
	Groundwater Seepage		Design Rainfall Event (25mm)		Total Daily Water Takings	
	L/day	L/min	L/day	L/min	L/day	L/min
Caisson Wall Shoring	25,000	17.4	160,000	111.1	185,000	128.5

Scenario	Long Term (Construction) Groundwater Quantity – Safety Factor of 2 Used					
	Groundwater Seepage		Infiltration Design Rainfall Event (25mm)		Total Daily Water Takings	
	L/day	L/min	L/day	L/min	L/day	L/min
Caisson Wall Shoring	90,000	62.5	9,000	6.3	99,000	68.8
Caisson Wall Shoring with Waterproofed Foundation Walls	40,000	27.8	9,000	6.3	49,000	34.0
Fully Waterproofed	0	0.0	0	0.0	0	0.0

Regulatory Requirements	Scenario		
	Caisson Wall Shoring	Caisson Wall Shoring with Waterproofed Foundation Walls	Fully Waterproofed
Environmental Activity and Sector Registry (EASR) Posting	Required	NA*	NA*
Short Term Permit to Take Water (PTTW)	Not Required	NA*	NA*
Long Term Permit to Take Water (PTTW)	Required	Not Required	Not Required
Short Term Discharge Agreement City of Toronto	Required	NA*	NA*

Regulatory Requirements	Scenario		
	Caisson Wall Shoring	Caisson Wall Shoring with Waterproofed Foundation Walls	Fully Waterproofed
Long Term Discharge Agreement City of Toronto	Required	Not Required	Not Required

*Not applicable. Regulatory requirement applies to short term conditions only, whereas proposed scenario applies to long term conditions.

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

11 Evaluation of Impact

11.1 Zone of Influence (ZOI)

The Zone of Influence (ZOI) with respect to groundwater is 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 is 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)

An impermeable shoring wall system will be employed at the site consisting of interlocking caisson walls on all sides of the excavation cut-off into sound bedrock. As such, a zone of influence with respect to groundwater will not be generated at the site as a result of short- and long-term dewatering.

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 excavation will be supported by an impermeable, interlocking caisson wall system, fully socketed into the sound bedrock.
- A ZOI with respect to dewatering will not be generated at the site.
- As such, there will be no drawdown of the groundwater table outside of the footprint of the excavation.
- There will be no increase of effective stress within the native soils outside of the excavation footprint and therefore dewatering induced impacts such as settlement in the surrounding soils, is not anticipated.
- The calculated dewatering-induced settlements for different shoring scenarios are as follows:

Scenario	dH (m)	Increase of Effective Stress (kPa)	Maximum Additional Settlement (mm)
Caisson Wall Shoring	0	0	0
Caisson Wall Shoring and Waterproofed Walls	0	0	0
Fully Waterproofed	0	0	0

On this basis, the impact of the proposed dewatering on the existing adjacent structures is considered by Grounded to be negligible and therefore 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 and additional treatment will not be required before the water can be discharged to the Sanitary and Combined Sewer, to avoid impacts to the City's sewage works caused by groundwater quality.

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. The historic land uses are anticipated to be a source of potential contamination and are expected to provide an Area of Potential Environmental Concern for the site. As such, the pumping of groundwater at the site is anticipated to facilitate the movement of potential contaminants onto the site. Evaluation of the environmental condition of the site will be completed by Grounded under a separate cover (File No: 21-199).

12 Proposed Mitigation Measures and Monitoring Plan

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

As a result of dewatering and draining the soil, changes in groundwater level have the potential to cause settlement based on the change in the effective stresses within the ZOI.

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

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

13 Limitations

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

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

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

13.1 Report Use

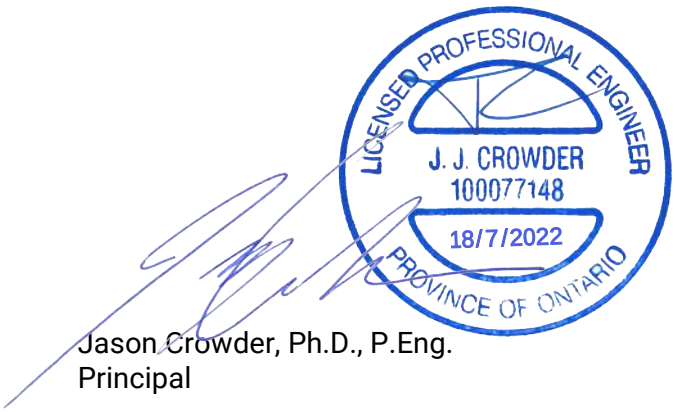
The authorized users of this report are Hullmark Sun Life (376 Dufferin) LP and their design team, for whom this report has been prepared. Grounded Engineering Inc. maintains the copyright and ownership of this document. Reproduction of this report in any format or medium requires explicit prior authorization 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,

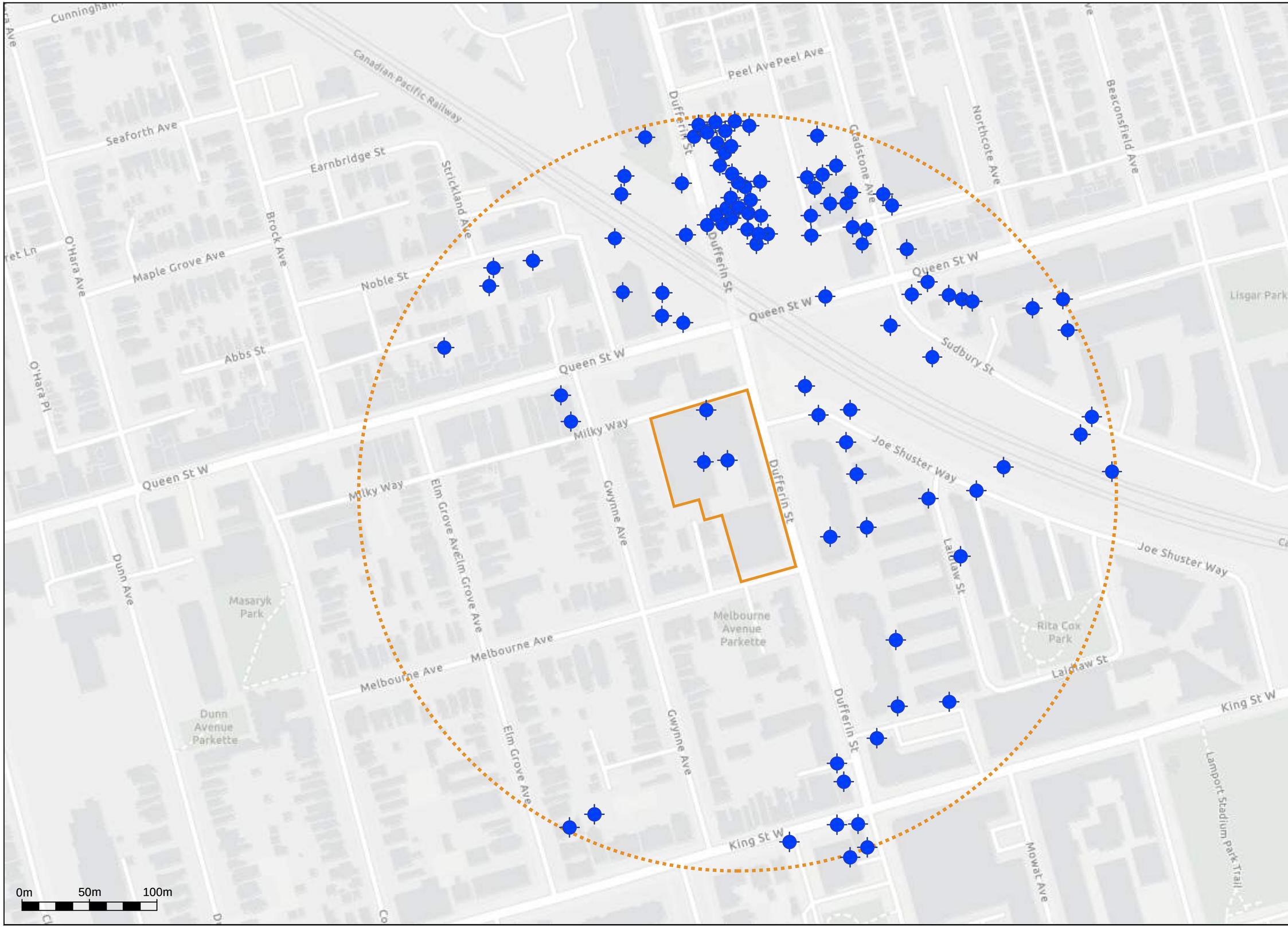
GROUNDED ENGINEERING



Arman Gelimforoush, MAS.c, EIT
Project Manager

Jason Crowder, Ph.D., P.Eng.
Principal

FIGURES



GROUNDED ENGINEERING

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

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE STUDY AREA (250 m)
- MECP MONITORING WELLS

Note

Reference

ArcGIS Online Map 2021, MECP Well Records

Project

340-376 DUFFERIN STREET, TORONTO, ONTARIO

Figure Title

SITE LOCATION PLAN

North

TRUE

PROJECT

Date

JULY, 2021

Scale

AS INDICATED

Job No

21-199

Figure No

FIGURE 1

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LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING BUILDING STRUCTURE
- COMM — COMMUNICATION
- MH — MANHOLE
- CB — CATCH BASIN
- APPROXIMATE LOCATION OF GROUNDED BOREHOLES
- APPROXIMATE LOCATION OF EXISTING MONITORING WELLS (EXP 2016)
- APPROXIMATE LOCATION OF EXISTING BOREHOLES (EXP 2016)

Note

Reference

Survey Drawing job no. 15-285.
Certificate date: April 11, 2019.
Prepared by KRCMAR Surveyors Limited.
Received on April 25, 2019.

Project

340-376 DUFFERIN STREET,
TORONTO, ONTARIO

Figure Title

BOREHOLE LOCATION PLAN - EXISTING CONDITION

North

TRUE
PROJECT

Date

JULY 2022

Scale

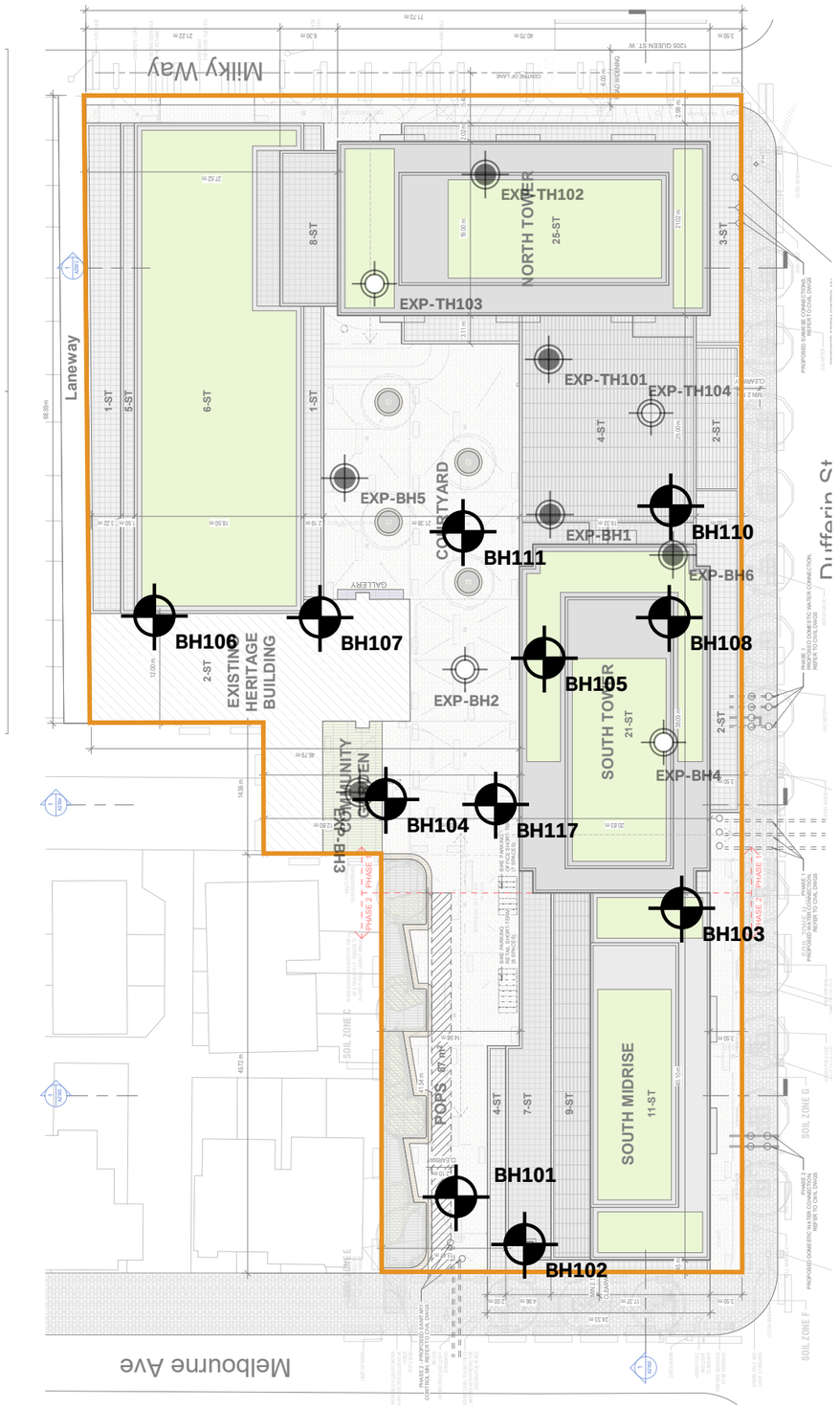
0m 10m 20m

Job No

21-199

Figure No

FIGURE 2



GROUNDED ENGINEERING
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LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- MH — MANHOLE
- CB — CATCH BASIN
- APPROXIMATE LOCATION OF GROUNDED BOREHOLES
- APPROXIMATE LOCATION OF EXISTING MONITORING WELLS (EXP 2016)
- APPROXIMATE LOCATION OF EXISTING BOREHOLES (EXP 2016)

Note

Reference

Architectural drawing set prepared by Sweeny and Co Architects, Project No. 2102, Dated July 15, 2022.

Project

340-376 DUFFERIN STREET, TORONTO, ONTARIO

Figure Title

BOREHOLE LOCATION PLAN - PROPOSED CONDITION

North

TRUE PROJECT

Date

JULY 2022

Scale

Job No

21-199

Figure No

FIGURE 3

Average Ground Elev. 93.4 m

Design Groundwater Table Elev. 88.7 m

Proposed P2 FFE Elev. 84.73 m

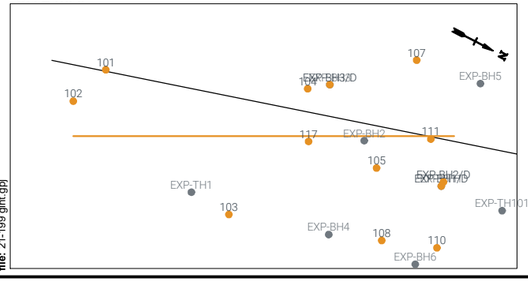
Elevation (m)

SOUTH

NORTH

Boreholes Equally Spaced

SITE MAP



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LITHOLOGY GRAPHIC LEGEND

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

GROUNDED ENGINEERING

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LEGEND

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

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

Project
340 - 376 DUFFERIN ST TORONTO

Figure Title
SUBSURFACE CROSS-SECTION

Date
JULY 2022

Scale
AS INDICATED

Job No
21-199

Figure No
FIGURE 4

APPENDIX A

BOREHOLE LOG TERMINOLOGY

GROUNDED ENGINEERING

SAMPLING/TESTING METHODS

SS: split spoon sample

AS: auger sample

GS: grab sample

FV: shear vane

DP: direct push

PMT: pressuremeter test

ST: shelby tube

CORE: soil coring

RUN: rock coring

SYMBOLS & ABBREVIATIONS

MC: moisture content

LL: liquid limit

PL: plastic limit

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.

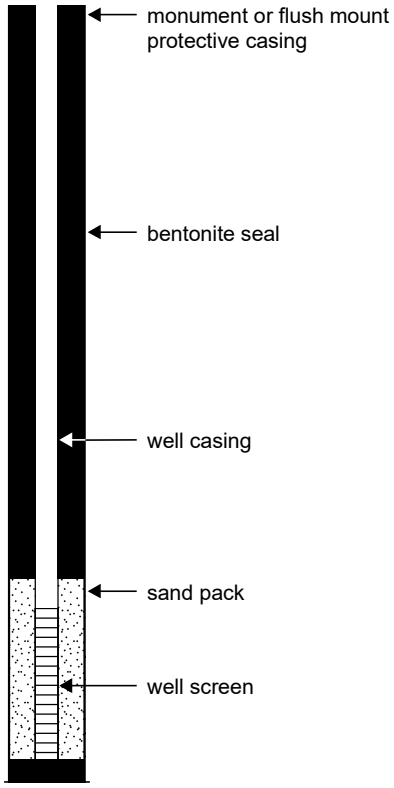
ASTM D3441 Cone Penetration Test (CPT)
Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm^2 into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

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

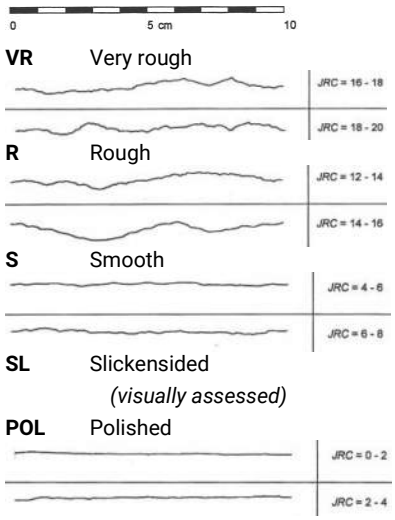
Coating

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

GROUNDED ENGINEERING

Date Started : Oct 16, 2021
Position : E: 626748, N: 4833162 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 101

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : LA rig w/ full hammer

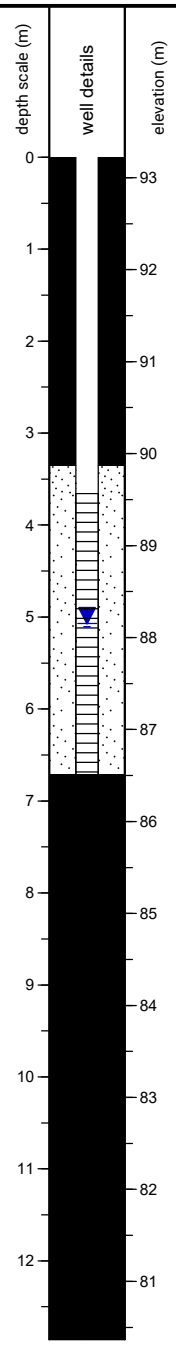
elev depth (m)	description	graphic log	number	type	SPT N-value
93.2	**TOP OF SLAB**				
	165mm **CONCRETE**		1A	SS	19
	FILL, silty sand, trace gravel, trace brick fragments, trace rock fragments, trace cinders, compact, black, moist		1B		
			2	SS	10
	...at 1.5 m, trace rootlets, brown		3	SS	18
90.9					
2.3	**SAND**, some silt, trace gravel, trace clay, very dense, brown, moist		4	SS	71
			5	SS	67
88.6					
4.6	**GRAVEL**, some sand, trace silt, trace rock fragments (inferred cobbles), loose, grey, wet		6	SS	7
87.7			7A	SS	53
5.5	**SILTY SAND**, trace gravel, trace clay, very dense, grey, moist to wet		7B		
87.1					
6.1	**SILT**, some sand, some gravel, trace to some clay, trace shale fragments, very dense, grey, wet (GLACIAL TILL)		8	SS	63
			9	SS	81
	...at 10.1 m, trace gravel, some sand/sand lenses, grey, moist		10	SS	73
			1	RUN	
			2	RUN	
80.9					
12.3	**GEORGIAN BAY FORMATION** (See rock core log for details)				
80.3					
12.9	**END OF BOREHOLE**				

hollow stem augers OD=215 mm

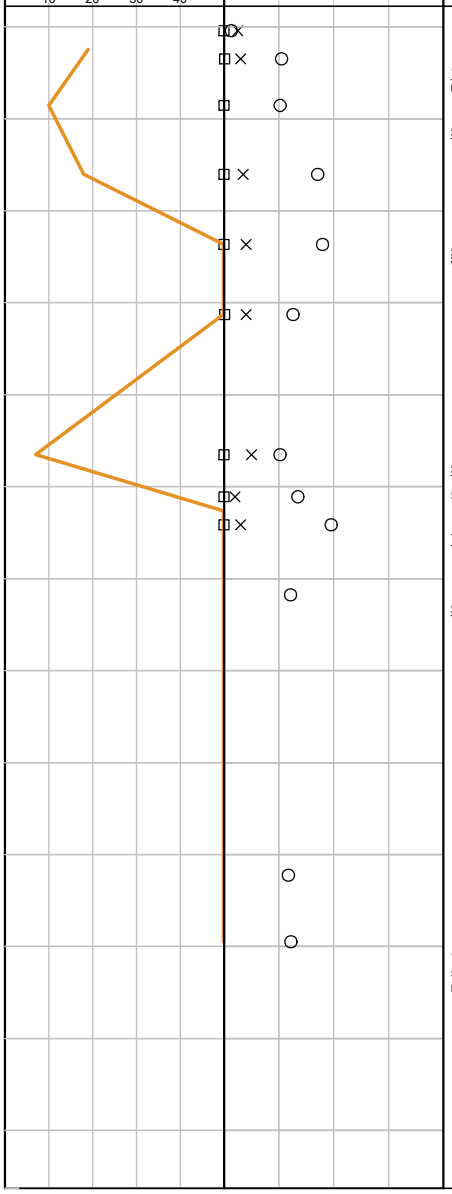
mud rotary med OD=125 mm

Rock coring (HQ) OD=96 mm

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



undrained shear strength (kPa) — unconfined, field vane, pocket penetrometer, Lab Vane; 40 80 120 160
SPT N-values (bpf) — dynamic cone; 10 20 30 40
headspace vapour (ppm) — hexane, isobutylene, methane; 100 200 300
moisture / plasticity — PL MC LL; 10 20 30



unstabilized water level

lab data and comments

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

1B: H-Ms, Metals, ORPs
0.5m: auger grinding

SS2: PAHs

1 80 17 2

SS4: BTEX, PAHs, PHCs, VOCs

SS6: PHCs
5.2m: auger grinding
1 55 41 3

7B: VOCs

SS8: BTEX, PHCs

10.2m: rock coring started split spoon extended to 10.7 m and over cored

Contained drill water upon completion of drilling. Unstabilized water level not measured. Borehole was open.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	5.1	88.1
Nov 12, 2021	5.1	88.1
Nov 26, 2021	5.1	88.1
Dec 10, 2021	5.1	88.1
Dec 23, 2021	5.1	88.1
Jan 7, 2022	5.1	88.1

file: 21-199 gint.gpj

Tech : DI | **PM** : AG/SP | **Rev** : NN

GROUNDED ENGINEERING

Date Started : Oct 16, 2021
Position : E: 626748, N: 4833162 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 101

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

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 10.2m below grade	**83.0**								
	SILT, some sand, some gravel, trace to some clay, trace shale fragments, very dense, grey, wet (GLACIAL TILL)	10.2		83					**10.2 / 83.0 - 10.6 / 82.7m:** lost core	
11		R1	TCR = **73%** SCR = **0%** RQD = **0%**							
		81.9		82			**N/A**			82
		11.3								
12		R2	TCR = **100%** SCR = **38%** RQD = **10%**							
	GEORGIAN BAY FORMATION **Shale**, grey, thinly bedded, weak; joints are horizontal, gapped, planar;			81			**3**		**12.4 / 80.8m:** JT SV	81
							7		**12.7 / 80.5m:** JT SV	
	limestone, light grey, very thinly bedded to thinly bedded, medium strong	80.3								
	Overall shale: 84%, limestone: 16%	**12.9m**								
	END OF COREHOLE									

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

file: 21-199 gint.gpj

Tech : DI | **PM** : AG/SP | **Rev** : NN

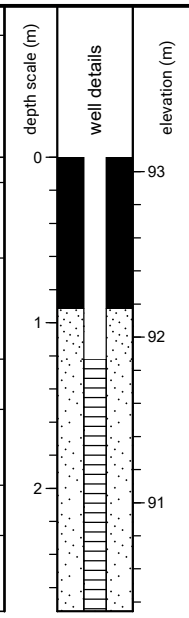
Date Started : Oct 16, 2021
Position : E: 626757, N: 4833159 (UTM 17T)
Elev. Datum : Geodetic

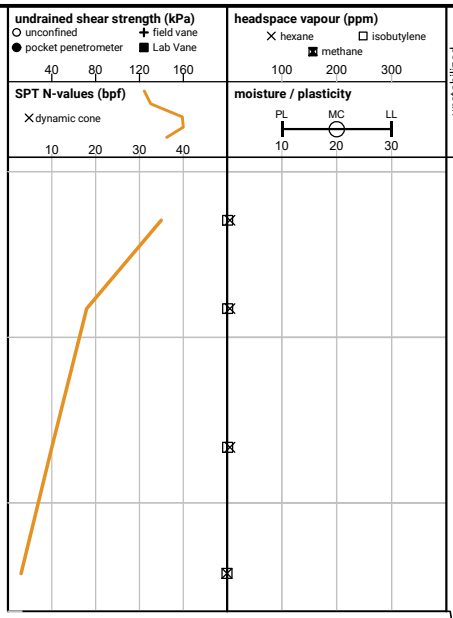
BOREHOLE LOG 102

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : *Mini Mole*

elev / depth (m)	description	graphic log	sample number	sample type	SPT N-value
93.1	**TOP OF SLAB**				
92.9	150mm **CONCRETE**				
0.2 / 92.8	150mm **AGGREGATE**				
0.3	**FILL**, sand, some silt, trace gravel, trace construction debris, trace cinders, trace rock fragments (inferred cobbles), trace brick fragments, compact to dense, brown, moist		1	SS	35
	...at 0.8 m, silt and clay packets		2	SS	18
	...at 1.5 m, trace rootlets		3	SS	10
	...at 2.3 m, very loose		4	SS	3
90.4 / 2.7	**END OF BOREHOLE**				





unstabilized water level

lab data and comments

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

SS1: BTEX, PAHs, PHCs, VOCs

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

SS3: BTEX, PHCs, VOCs

2.7m: spoon bouncing, hit refusal

SS4: BTEX, PHCs, VOCs

Dry and open upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	dry	n/a
Nov 12, 2021	dry	n/a
Nov 26, 2021	dry	n/a
Dec 10, 2021	dry	n/a
Dec 23, 2021	dry	n/a
Jan 7, 2022	dry	n/a

file: 21-199 gint.gpj

Tech : KS | **PM** : AG/SP | **Rev** : NN

Date Started : Oct 12, 2021
Position : E: 626763, N: 4833199 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 103

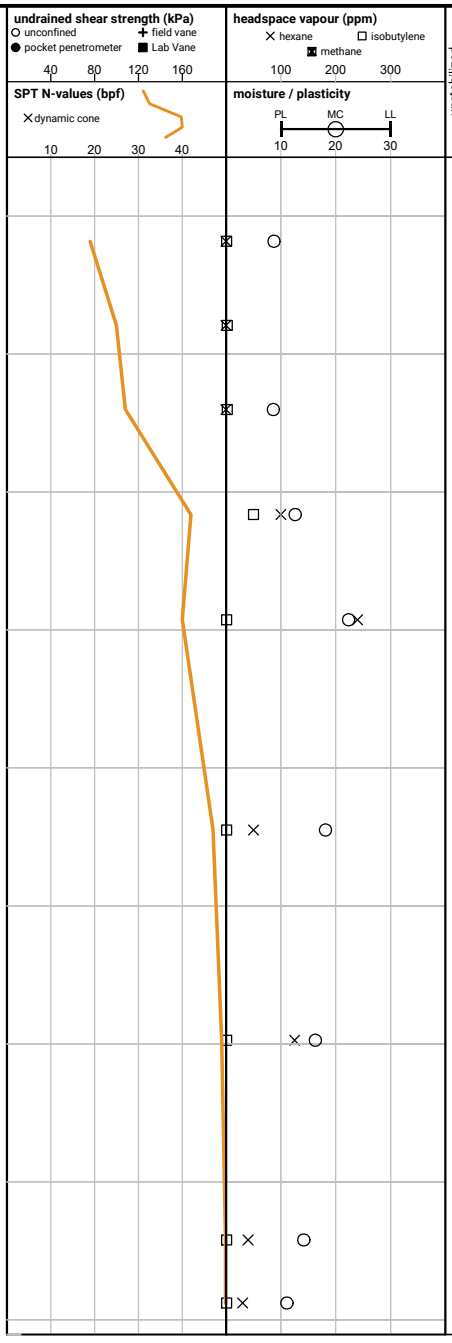
File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

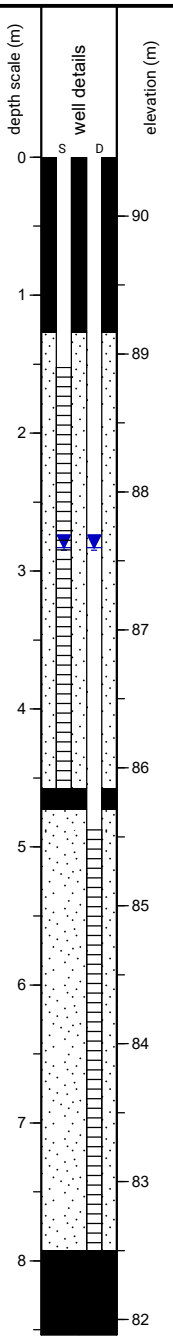
drill method : *LA rig w/ full hammer*

elev depth (m)	description	graphic log	number	type	SPT N-value
90.4	**TOP OF SLAB**				
	125mm **CONCRETE**				
90.1	175mm **AGGREGATE**				
0.3	**SAND**, some silt, compact, brown, moist		1	SS	19
			2	SS	25
			3	SS	27
	...at 2.3 m, silty sand, dense, grey		4	SS	42
	...at 3.0 m, sand and silt, trace clay, wet		5	SS	40
			6	SS	47
	...at 6.1 m, moist		7	SS	49
82.8					
7.6	**CLAYEY SILT**, some sand, trace gravel, trace shale fragments, trace rock fragments (cobbles inferred), hard, grey, moist (GLACIAL TILL)		8	SS	82
			9	SS	95
81.9					
8.5	**END OF BOREHOLE**				

hollow stem augers OD=215 mm

mud rotary med OD=125 mm





unstabilized water level

lab data and comments

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

SS2: H-Ms, Metals, ORPs, PAHs

SS3: BTEX, PAHs, PHCs, VOCs

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

0 59 38 3

SS5: BTEX, PHCs, VOCs

SS6: BTEX, PHCs, VOCs

7.0m: auger grinding **to 7.6m**

Contained drill water upon completion of drilling. Unstabilized water level not measured. Borehole was open.

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

103-S GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	2.9	87.5
Nov 4, 2021	2.8	87.6
Nov 12, 2021	2.8	87.6
Nov 16, 2021	2.8	87.6
Nov 26, 2021	2.8	87.6
Dec 10, 2021	2.9	87.5
Dec 23, 2021	2.8	87.6
Jan 7, 2022	2.8	87.6

103-D GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	2.8	87.6
Nov 4, 2021	2.8	87.6
Nov 12, 2021	2.5	87.9
Nov 16, 2021	2.8	87.6
Nov 26, 2021	2.8	87.6
Dec 10, 2021	2.9	87.5
Dec 23, 2021	2.8	87.6
Jan 7, 2022	2.8	87.6

file: 21-199 gint.gpj

Tech : DI | **PM** : AG/SP | **Rev** : NN

GROUNDED ENGINEERING

Date Started : Oct 22, 2021
Position : E: 626732, N: 4833201 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 104

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
93.3	**GROUND SURFACE**				
92.9 / 0.4	75mm **ASPHALT** 275mm **AGGREGATE**		1	SS	6
	FILL, clayey silt, some sand, trace gravel, trace cinders, trace asphalt, trace concrete, firm, brown and black, moist ...at 1.0 m, grey ...at 1.6 m, black and grey		2	SS	5
91.2 / 2.1	**SILTY SAND**, dense to very dense, brown, moist		3A	SS	5
			3B		
			4	SS	51
			5	SS	48
	...at 4.6 m, wet		6	SS	41
			7	SS	35
85.7 / 7.6	**SANDY SILT**, trace gravel, trace clay, trace rock fragments (cobbles inferred), dense to very dense, grey, wet (GLACIAL TILL)		8	SS	46
			9	SS	50 / 125mm
	...at 10.7 m, clayey silt, some sand, trace gravel, trace shale fragments		10	SS	74
			1	RUN	
80.2 / 13.1	**GEORGIAN BAY FORMATION** (See rock core log for details) ...at 13.6 m, transition to sound bedrock		2	RUN	
			3	RUN	
77.7 / 15.6	**END OF BOREHOLE**				

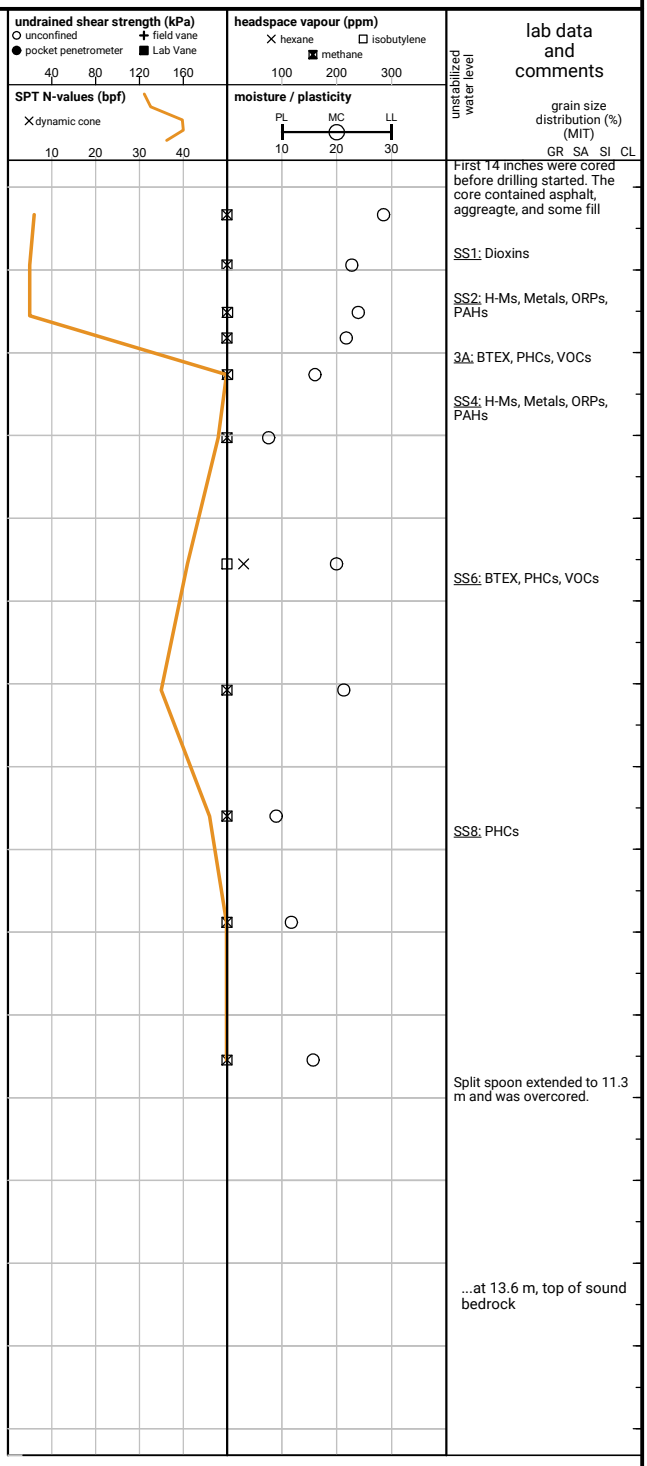
hollow stem augers (skinny) OD=110 mm

mud rotary small OD=100 mm

Rock coring (HQ) OD=96 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

First 14 inches were cored before drilling started. The core contained asphalt, aggreagte, and some fill

SS1: Dioxins

SS2: H-Ms, Metals, ORPs, PAHs

3A: BTEX, PHCs, VOCs

SS4: H-Ms, Metals, ORPs, PAHs

SS6: BTEX, PHCs, VOCs

SS8: PHCs

Split spoon extended to 11.3 m and was overcored.

...at 13.6 m, top of sound bedrock

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 29, 2021	5.5	87.8
Nov 4, 2021	5.3	88.0
Nov 12, 2021	5.3	88.0
Nov 16, 2021	5.2	88.1
Nov 26, 2021	5.2	88.1
Dec 10, 2021	5.2	88.1
Dec 23, 2021	5.2	88.1
Jan 7, 2022	5.2	88.1

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Oct 22, 2021
Position : E: 626732, N: 4833201 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 104

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

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 11.1m below grade		**82.2**								
	SANDY SILT, trace gravel, trace clay, trace rock fragments (cobbles inferred), dense to very dense, grey, wet (GLACIAL TILL)		11.1								
12		R1		TCR = **97%** SCR = **0%** RQD = **0%**	82			NA			82
			80.7		81						81
13			12.6							**13.1 / 80.3 - 13.1 / 80.2m:** SM clay	
	GEORGIAN BAY FORMATION **Shale**, grey, thinly bedded, weak; joints are horizontal, gapped, planar; **limestone**, light grey, very thinly bedded to thinly bedded, medium strong	R2		TCR = **100%** SCR = **63%** RQD = **37%**	80			7			80
	Overall shale: 60%, limestone: 40% **... at 13.6 m (Elev. 79.8 m), transition to sound rock**							3+Rz		**13.5 / 79.8 - 13.6 / 79.8m:** rubbalized zone (50 mm)	
14			79.2					3		**13.8 / 79.5 - 13.9 / 79.5m:** SM clay	
			14.1							**14.0 / 79.3 - 14.0 / 79.3m:** SM clay	
	Run 2 : 30% limestone 70% shale							4		**14.2 / 79.1 - 14.3 / 79.1m:** SM clay	
					79			3			79
15		R3		TCR = **100%** SCR = **98%** RQD = **83%**				2			
	Run 3 : 35% limestone 65% shale							4			
			77.7		78			5			78
			15.6m								

END OF COREHOLE

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Oct 18, 2021
Position : E: 626740, N: 4833222 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 105

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

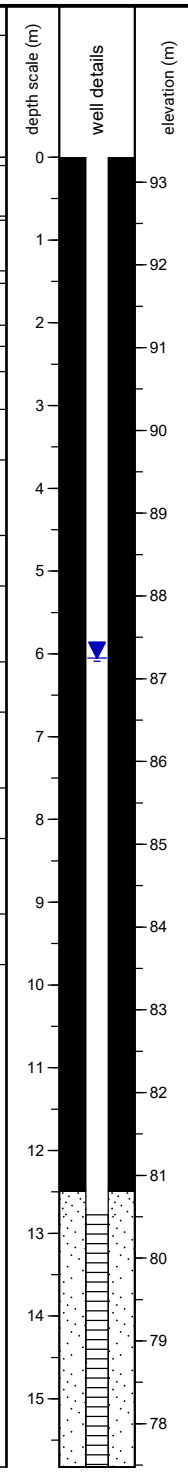
drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
93.3	**GROUND SURFACE**				
	75mm **ASPHALT**		1	SS	24
	25mm **AGGREGATE**				
	FILL, silty sand, trace gravel, trace cinders, trace brick fragments, trace rootlets,, loose to compact, black, moist		2	SS	4
91.5	...at 1.5 m, orangey brown, compact		3A	SS	17
1.8	...at 1.8 m, light brown		3B		
	SILTY SAND, with clayey sily packets, compact to dense, brown, moist		4	SS	24
	...at 3.0 m, very dense		5	SS	52
	...at 4.6 m, brown to grey (transitioning)		6	SS	45
	...at 6.1 m, wet		7	SS	39
	...at 7.6 m, grey		8	SS	36
84.2					
9.1	**SAND AND SILT**, some clay, trace gravel, very dense, grey, moist to wet (GLACIAL TILL)		9	SS	41
			1	RUN	
			2	RUN	
80.1					
13.2	**GEORGIAN BAY FORMATION** (See rock core log for details) ...at 13.6 m, transition to sound bedrock		3	RUN	
			4	RUN	
77.5					
15.8	**END OF BOREHOLE**				

hollow stem augers OD=215 mm

Rock coring (HQ) OD=96 mm

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



undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40 80 120 160
SPT N-values (bpf): dynamic cone; 10 20 30 40
headspace vapour (ppm): hexane, isobutylene, methane; 100 200 300
moisture / plasticity: PL MC LL; 10 20 30

unstabilized water level

lab data and comments

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

0.2m: SS1 was collected directly beside BH location due to suspected slab **to 0.8m**

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

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

3A: BTEX, PHCs, VOCs

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

SS6: BTEX, PHCs, VOCs

SS7: BTEX, PHCs

SS8: BTEX, VOCs

3 45 39 13

10.7m: SS10, N=80/100mm, clayey silt, trace gravel, trace sand, trace shale fragments, grey, hard, moist **to 10.8m**

10.7m: spoon bouncing, rock coring started

...at 13.6 m, top of sound bedrock

Unstabilized water level measured at 4.6 m below ground surface upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	6.3	87.0
Oct 28, 2021	6.3	87.0
Nov 4, 2021	7.2	86.1
Nov 12, 2021	6.8	86.5
Nov 16, 2021	6.5	86.8
Nov 26, 2021	6.3	87.0
Dec 10, 2021	6.0	87.3
Dec 23, 2021	6.0	87.3
Jan 7, 2022	6.1	87.2

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : NN

GROUNDED ENGINEERING

Date Started : Oct 18, 2021
Position : E: 626740, N: 4833222 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 105

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

depth (m)	stratigraphy	Run elev / depth (m)	recovery	elevation (m)	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	laboratory testing	notes and comments	elevation (m)
	Rock coring started at 10.7m below grade	**82.6**								
11	**SAND AND SILT**, some clay, trace gravel, very dense, grey, moist to wet (GLACIAL TILL)	10.7 R1	TCR = **69**% SCR = **0**% RQD = **0**%							
		11.3 R2	TCR = **62**% SCR = **0**% RQD = **0**%	82						82
12							N/A			
		80.5		81					**12.2 / 81.1 - 12.5 / 80.8m:** lost core	81
		12.8							**12.8 / 80.5 - 12.9 / 80.4m:** SM clay	
13	**GEORGIAN BAY FORMATION** **Shale**, grey, thinly bedded, weak; joints are horizontal, gapped, planar; **limestone**, light grey, very thinly bedded to thinly bedded, medium strong *Overall shale: 75%, limestone: 25%* **... at 13.6 m (Elev. 79.7 m), transition to sound rock**	R3	TCR = **100**% SCR = **72**% RQD = **55**%	80			4+Rz			80
							4		**13.5 / 79.8 - 13.6 / 79.7m:** SM clay	
							0			
14		79.0					1			
		14.3		79			3			79
							2			
15	Run 3 : 32% limestone 68% shale	R4	TCR = **100**% SCR = **100**% RQD = **90**%				1			
				78			0			78
	Run 4 : 18% limestone 82% shale	77.5					1			
		15.8m								
	END OF COREHOLE									

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : NN

BOREHOLE LOG 106

Date Started : Oct 14, 2021
Position : E: 626699, N: 4833213 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : LA rig w/ full hammer

elev depth (m)	description	graphic log	number	type	SPT N-value
93.3	**TOP OF SLAB**				
93.1 / 0.2	165mm **CONCRETE**				
93.1 / 0.2	40mm **AGGREGATE**		1	SS	7
93.1 / 0.2	40mm **ASPHALT**				
93.0 / 0.3	90mm **CONCRETE**		2	SS	8
91.8 / 1.5	**FILL**, silty sand, trace gravel, trace cinders, trace brick fragments, trace plastic fragments, loose, dark brown, moist ...at 0.9 m, trace concrete fragments		3	SS	30
	SILTY SAND, dense to very dense, brown, wet		4	SS	52
			5	SS	50
			6	SS	53
	...at 6.1 m, sandy silt, grey, wet		7	SS	45
			8	SS	52
84.2 / 9.1	**SILTY SAND**, trace gravel, trace clay, very dense, grey, wet (GLACIAL TILL)		9	SS	77
			10	SS	95 / 225mm
82.3 / 11.0	...at 10.7 m, some clay, trace shale fragments		11	SS	103 / 225mm

hollow stem augers OD=215 mm

mud rotary med OD=125 mm

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

elevation (m): 93 92 91 90 89 88 87 86 85 84 83

well details

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

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

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

moisture / plasticity: PL MC LL; 10 20 30

unstabilized water level

lab data and comments

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

SS1: PAHs

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

1.5m: auger grinding

SS3: BTEX, PHCs, VOCs

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

SS7: BTEX, PHCs, VOCs

8.5m: auger grinding

NP

9 52 34 5

9.8m: auger grinding

10.2m: auger grinding

10.7m: auger grinding, stopped at SS11 due to limited site access

END OF BOREHOLE

Contained drill water upon completion of drilling. Unstabilized water level not measured. Borehole was open.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 28, 2021	4.6	88.7
Nov 12, 2021	4.6	88.7
Nov 26, 2021	4.6	88.7
Dec 10, 2021	4.6	88.7
Dec 23, 2021	4.5	88.8
Jan 7, 2022	4.6	88.7

file: 21-199 gint.gpj

Tech : DI | **PM** : AG/SP | **Rev** : NN

Date Started : Oct 6, 2021
Position : E: 626716, N: 4833219 (UTM 17T)
Elev. Datum : Geodetic

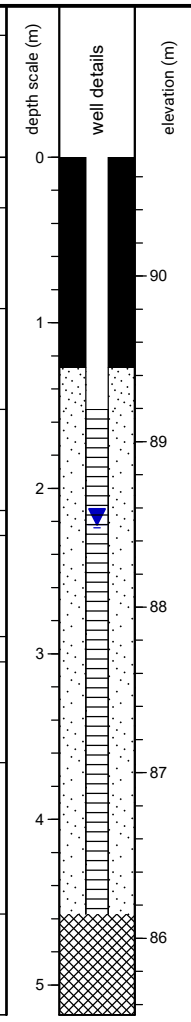
BOREHOLE LOG 107

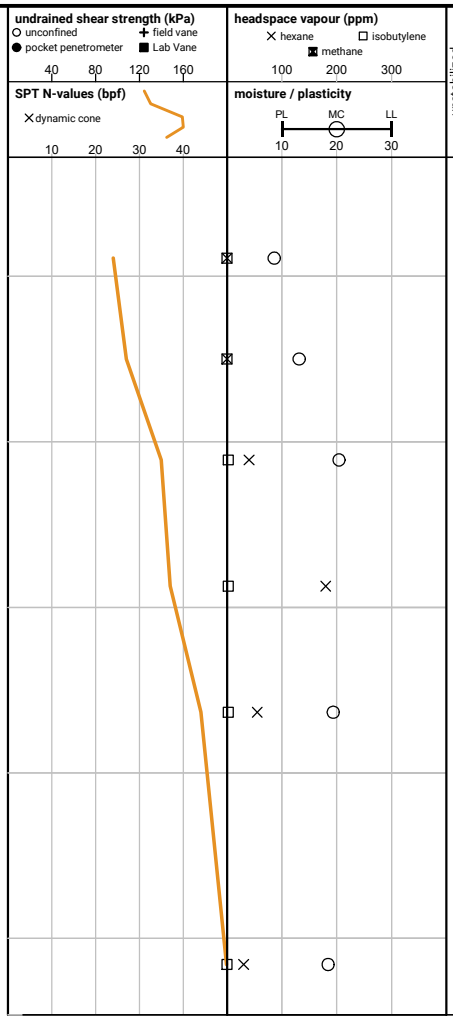
File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : *LA rig w/ full hammer*

elev depth (m)	description	graphic log	number	type	SPT N-value
90.7	**TOP OF SLAB**				
90.5	150mm **CONCRETE**				
0.2					
90.4	150mm **AGGREGATE**				
0.3	**SILTY SAND**, compact, brown, moist		1	SS	24
			2	SS	27
	...at 1.5 m, transitioning to grey, dense		3	SS	35
			4	SS	37
	...at 3.0 m, trace clay, wet		5	SS	44
			6	SS	52
85.5					
5.2	**END OF BOREHOLE**				

hollow stem augers (med)
OD=175 mm





unstabilized water level

lab data and comments

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

SS1: H-Ms, Metals, ORPs, Dioxins

SS2: PAHs

SS3: PAHs

SS4: BTEX, H-Ms, Metals, ORPs, PHCs, VOCs

0 72 26 2

SS5: BTEX, PHCs, VOCs

4.6m: hole was terminated at target depth because auger got stuck

SS6: BTEX, PHCs

Water level and cave not measured upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	2.3	88.4
Nov 4, 2021	2.2	88.5
Nov 12, 2021	2.2	88.5
Nov 16, 2021	2.3	88.4
Nov 26, 2021	2.2	88.5
Dec 10, 2021	2.2	88.5
Dec 23, 2021	2.2	88.5
Jan 7, 2022	2.2	88.5

file: 21-199 gint.gpj

Tech : OM | **PM** : AG/SP | **Rev** : NN

BOREHOLE LOG 108

Date Started : Oct 4, 2021
Position : E: 626753, N: 4833230 (UTM 17T)
Elev. Datum : Geodetic

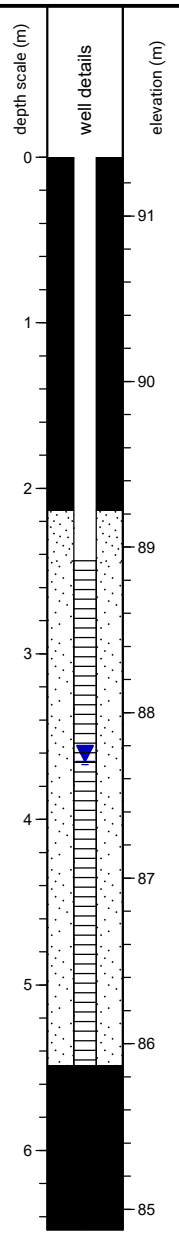
File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : *LA rig w/ full hammer*

elev depth (m)	description	graphic log	number	type	SPT N-value
91.4	**TOP OF SLAB**				
91.2	175mm **CONCRETE**				
0.2	125mm **AGGREGATE**				
91.1					
0.3	**SILTY SAND**, compact to dense, brown, moist		1	SS	12
	...at 0.9 m, dense		2	SS	34
	...at 1.5 m, grey, compact		3A	SS	19
	...at 1.8 m, brown		3B	SS	
	...at 2.3 m, transitioning to grey		4	SS	37
	...at 3.0 m, sandy silt, trace clay, wet		5	SS	35
			6	SS	40
			7	SS	80 / 225mm
84.9					
6.5					

hollow stem augers (med) OD=175 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: PAHs, PCBs

SS2: H-Ms, Metals, ORPs
1.2m: auger grinding observed

SS3A: BTEX, PHCs, VOCs

SS3B: PAHs

SS4: BTEX, H-Ms, Metals, ORPs, PHCs, VOCs

0 30 65 5

SS6: BTEX, PHCs, VOCs

END OF BOREHOLE

Water level and cave not measured upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	3.5	87.9
Nov 4, 2021	3.6	87.8
Nov 12, 2021	3.7	87.7
Nov 16, 2021	3.6	87.8
Nov 26, 2021	3.6	87.8
Dec 10, 2021	3.6	87.8
Dec 23, 2021	3.6	87.8
Jan 7, 2022	3.7	87.7

file: 21-199 gint.gpj

Tech : OM | **PM** : AG/SP | **Rev** : NN

BOREHOLE LOG 110

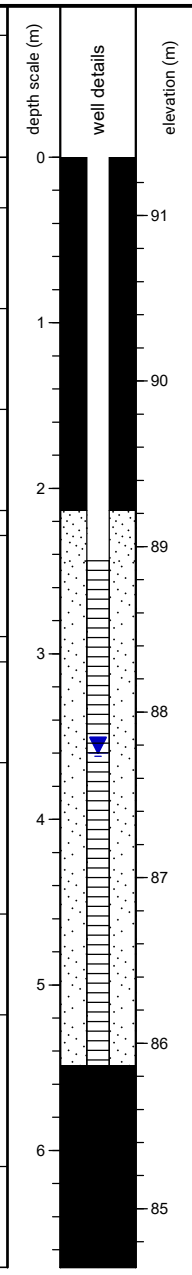
Date Started : Oct 5, 2021
Position : E: 626749, N: 4833241 (UTM 17T)
Elev. Datum : Geodetic

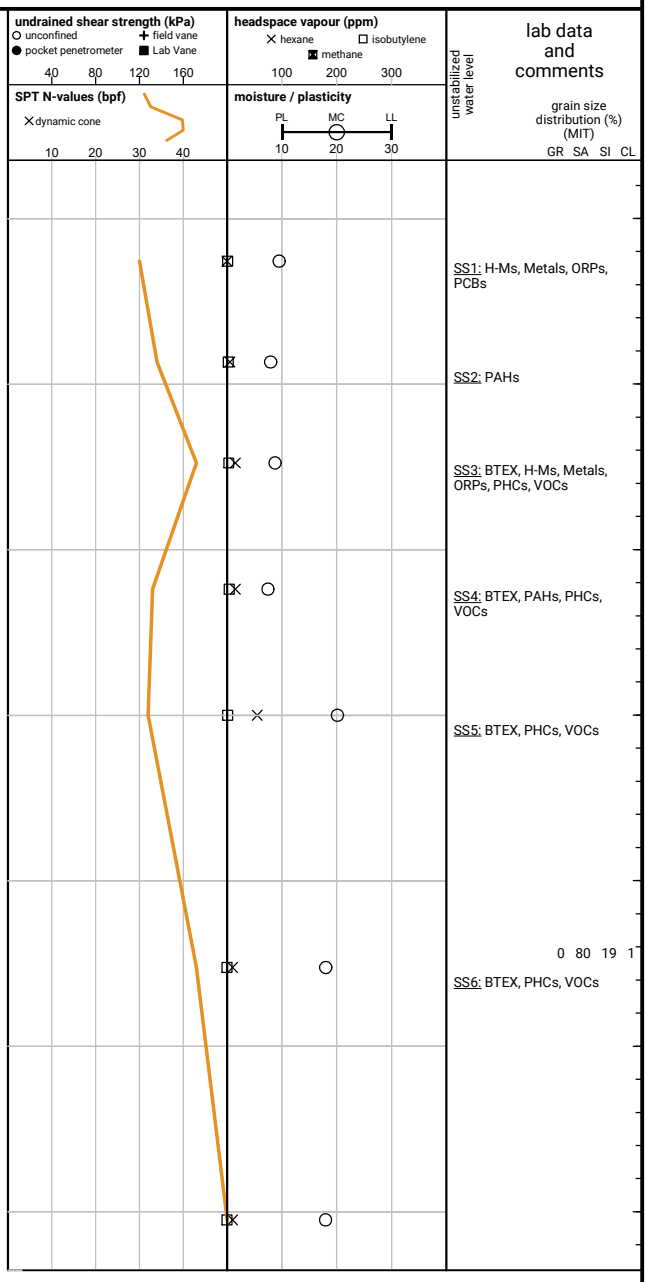
File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : *LA rig w/ full hammer*

elev / depth (m)	description	graphic log	number	type	SPT N-value
91.4	**TOP OF SLAB**				
91.2 / 0.2	150mm **CONCRETE**				
91.1 / 0.3	150mm **AGGREGATE**				
	FILL, clayey silt, some sand, trace gravel, with oxidation staining, hard, brownish grey, moist		1	SS	30
90.5 / 0.9	**SILTY SAND**, with clayey silt pockets, dense, grey, moist		2	SS	34
			3	SS	43
			4	SS	33
	...at 3.0 m, sandy silt		5	SS	32
			6	SS	43
	...at 4.6 m, sand, some silt, trace clay, wet		7	SS	50
84.7 / 6.7	**END OF BOREHOLE**				

hollow stem augers (med)
OD=175 mm





unstabilized water level

lab data and comments

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

SS1: H-Ms, Metals, ORPs, PCBs

SS2: PAHs

SS3: BTEX, H-Ms, Metals, ORPs, PHCs, VOCs

SS4: BTEX, PAHs, PHCs, VOCs

SS5: BTEX, PHCs, VOCs

0 80 19 1

SS6: BTEX, PHCs, VOCs

Water level and cave not measured upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	3.5	87.9
Nov 4, 2021	3.6	87.8
Nov 12, 2021	3.6	87.8
Nov 16, 2021	3.7	87.7
Nov 26, 2021	3.6	87.8
Dec 10, 2021	3.6	87.8
Dec 23, 2021	3.6	87.8
Jan 7, 2022	3.6	87.8

file: 21-199 gint.gpj

Tech : OM | **PM** : AG/SP | **Rev** : NN

GROUNDED ENGINEERING

Date Started : Oct 18, 2021
Position : E: 626729, N: 4833229 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 111

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
93.4	**GROUND SURFACE**				
	100mm **ASPHALT**		1	SS	99 / 200mm
	50mm **AGGREGATE**				
	FILL, sand, some cinders, some silt, trace gravel, trace brick fragments, trace wood fragments, inferred loose to compact, black, moist		2A	SS	8
			2B		
91.7			3A		
1.7	...at 0.8 m, clayey silt pockets, loose		3B	SS	16
	...at 1.2 m, sandy silt, trace clay, dark brown, compact				
	...at 1.5 m, orange and black staining		4	SS	41
	SAND AND SILT, compact, brown, moist				
	...at 2.3 m, dense to very dense, brown and grey		5	SS	55
	...at 4.6 m, silty sand		6	SS	43
	...at 6.1 m, sand and silt, trace clay, grey, very dense, wet		7	SS	49
			8	SS	52
84.3					
9.1	**SAND AND SILT**, some clay, trace gravel, very dense, grey, moist (GLACIAL TILL)		9	SS	57
	...at 10.7 m, clayey silt, trace gravel, trace sand, trace shale fragments		10	SS	90 / 150mm
			1	RUN	
			2	RUN	
80.2					
13.2	**GEORGIAN BAY FORMATION** (See rock core log for details)		3	RUN	
	...at 14.7 m, transition to sound bedrock		4	RUN	
77.7					
15.7	**END OF BOREHOLE**				

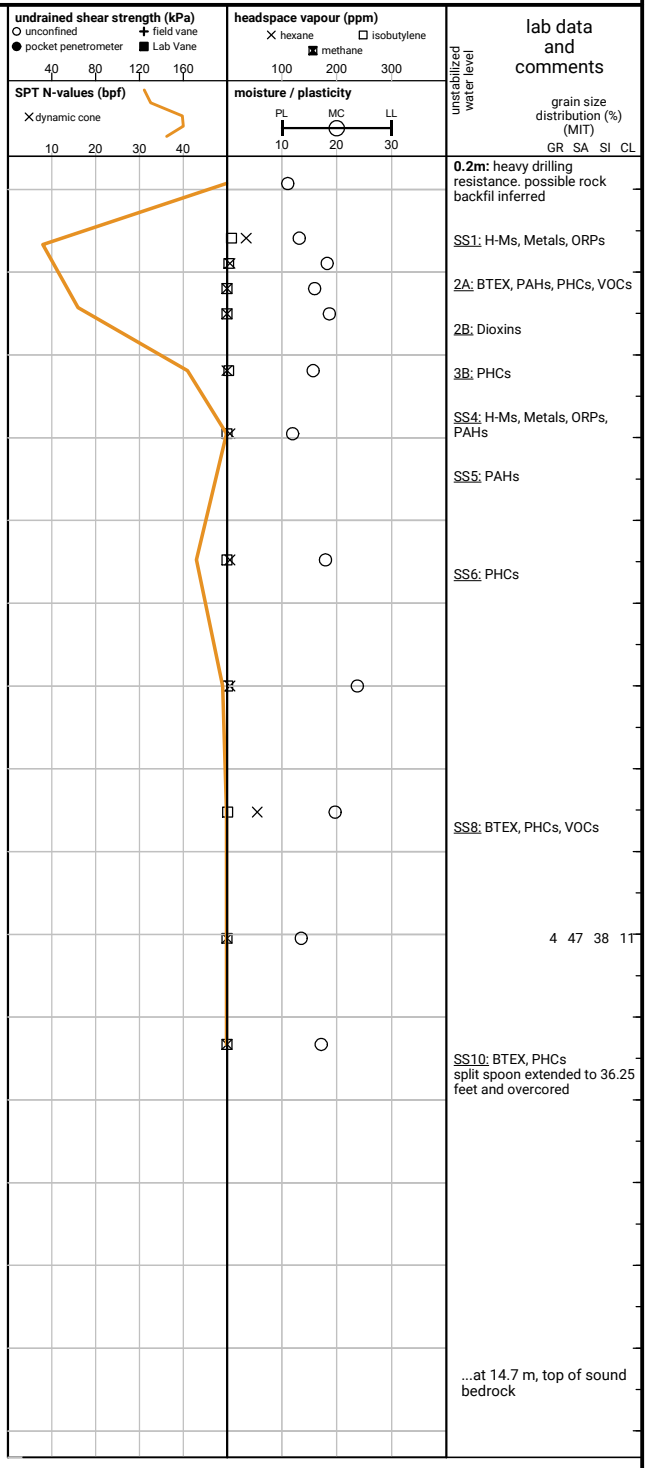
hollow stem augers (skinny) OD=110 mm

mud rotary small OD=100 mm

Rock coring (HQ) OD=96 mm

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

0.2m: heavy drilling resistance. possible rock backfil inferred

SS1: H-Ms, Metals, ORPs

2A: BTEX, PAHs, PHCs, VOCs

2B: Dioxins

3B: PHCs

SS4: H-Ms, Metals, ORPs, PAHs

SS5: PAHs

SS6: PHCs

SS8: BTEX, PHCs, VOCs

4 47 38 11

SS10: BTEX, PHCs
split spoon extended to 36.25 feet and overcored

...at 14.7 m, top of sound bedrock

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	5.5	87.9
Oct 28, 2021	5.7	87.7
Nov 4, 2021	5.6	87.8
Nov 12, 2021	5.7	87.7
Nov 16, 2021	5.6	87.8
Nov 26, 2021	5.6	87.8
Dec 10, 2021	5.6	87.8
Dec 23, 2021	5.6	87.8
Jan 7, 2022	5.6	87.8

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Oct 18, 2021
Position : E: 626729, N: 4833229 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 111

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

depth (m)	stratigraphy	Run / elev. depth (m)	recovery	elevation (m)	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	laboratory testing	notes and comments	elevation (m)
	Rock coring started at 10.8m below grade	**82.6**								
11	**SAND AND SILT**, some clay, trace gravel, very dense, grey, moist (GLACIAL TILL)	10.8 R1	TCR = **100**% SCR = **0**% RQD = **0**%							
		11.1		82					**11.1 / 82.3 - 11.2 / 82.2m:** SM clay	82
12		R2	TCR = **100**% SCR = **0**% RQD = **0**%				N/A		**11.9 / 81.5 - 12.0 / 81.4m:** SM clay	
		80.7		81						81
13		12.7								
	GEORGIAN BAY FORMATION **Shale**, grey, thinly bedded, weak; joints are horizontal, gapped, planar; **limestone**, light grey, very thinly bedded to thinly bedded, medium strong *Overall shale: 74%, limestone: 26%*	R3	TCR = **100**% SCR = **53**% RQD = **28**%	80			Wz 5 6 4		**13.6 / 79.8 - 13.6 / 79.8m:** rubbalized zone (50 mm)	80
14		79.2								
		14.2		79			3 1		**14.3 / 79.1 - 14.3 / 79.1m:** SM clay **14.5 / 78.9 - 14.6 / 78.8m:** SM clay	79
	... at 14.7 m (Elev. 78.7 m), transition to sound rock Run 3 : 30% limestone 70% shale	R4	TCR = **100**% SCR = **90**% RQD = **53**%				2 3			
15	Run 4 : 22% limestone 78% shale	77.7		78			3			78
		15.7m								
	END OF COREHOLE									

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : MD

BOREHOLE LOG 117

Date Started : Oct 25, 2021
Position : E: 626742, N: 4833207 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : CME 55

hollow stem augers OD=215 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
93.3	**GROUND SURFACE**				
	100mm **ASPHALT**				
	FILL, silty sand, trace gravel, trace clay, trace asphalt, trace brick fragments, loose to compact, black		1A	SS	16
			1B		
	...at 0.8 m, sandy silt, clayey, grey and orange		2	SS	5
			3	SS	9
91.0					
2.3	**SILTY SAND**, dense, brown, moist		4	SS	43
	...at 3.0 m, to grey		5	SS	41
			6	SS	36
	...at 6.1 m, grey, wet		7	SS	31
	...at 7.6 m, trace clay, trace gravel		8	SS	32
85.1					
8.2	**END OF BOREHOLE**				

depth scale (m) 0 1 2 3 4 5 6 7 8

well details

elevation (m) 93 92 91 90 89 88 87 86

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

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

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

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

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

1A: PAHs, Dioxins

1B: BTEX, PHCs

SS2: BTEX, H-Ms, Metals, ORPs, VOCs

SS4: H-Ms, Metals, ORPs

SS5: PAHs

SS7: BTEX, PHCs

SS8: BTEX, PHCs, VOCs

Unstabilized water level measured at 5.5 m below ground surface; open upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 29, 2021	5.3	88.0
Nov 4, 2021	5.3	88.0
Nov 12, 2021	5.3	88.0
Nov 16, 2021	5.0	88.3
Nov 26, 2021	5.3	88.0
Dec 10, 2021	5.3	88.0
Dec 23, 2021	5.2	88.1
Jan 7, 2022	5.3	88.0

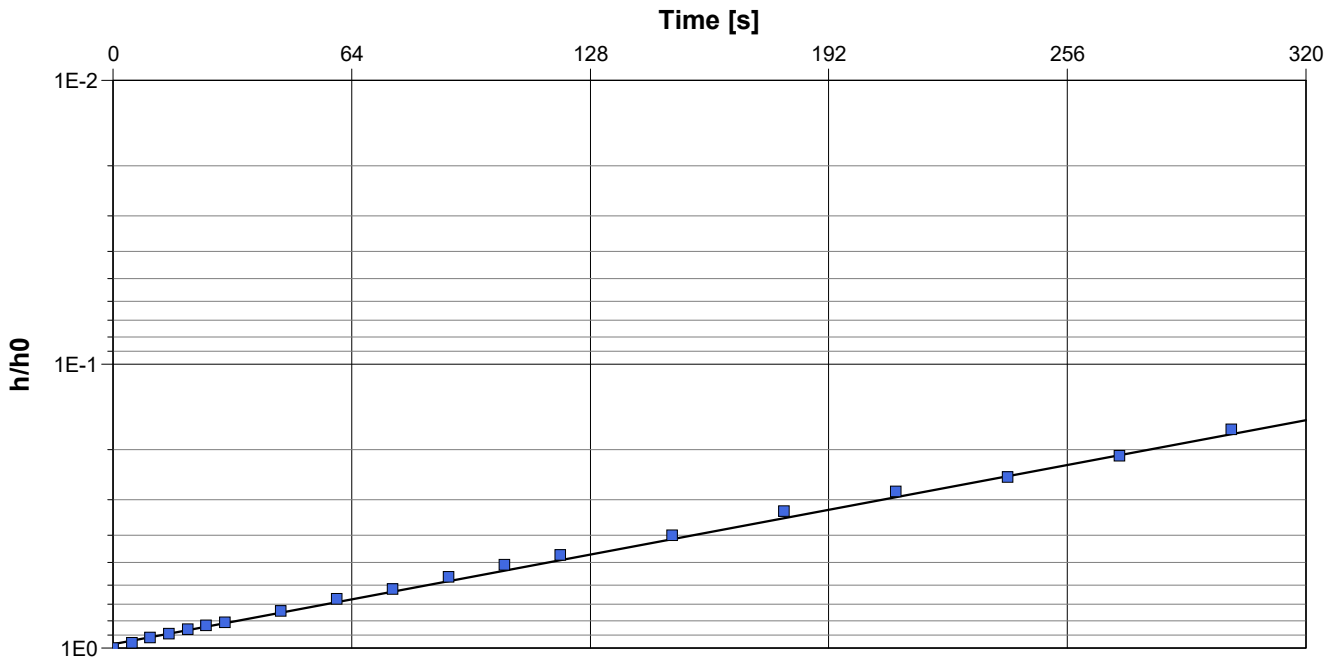
file: 21-199 gint.gpj

Tech : DI | **PM** : AG/SP | **Rev** : MD

APPENDIX B

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 340-376 Dufferin Street
	Number: 21-199
	Client: Hullmark Developments Limited

Location: Toronto, Ontario	Slug Test: BH103D-RHT	Test Well: BH103D
Test Conducted by: VT		Test Date: 2021-10-26
Analysis Performed by: AG	Bouwer & Rice	Analysis Date: 2021-11-04
Aquifer Thickness: 7.80 m		

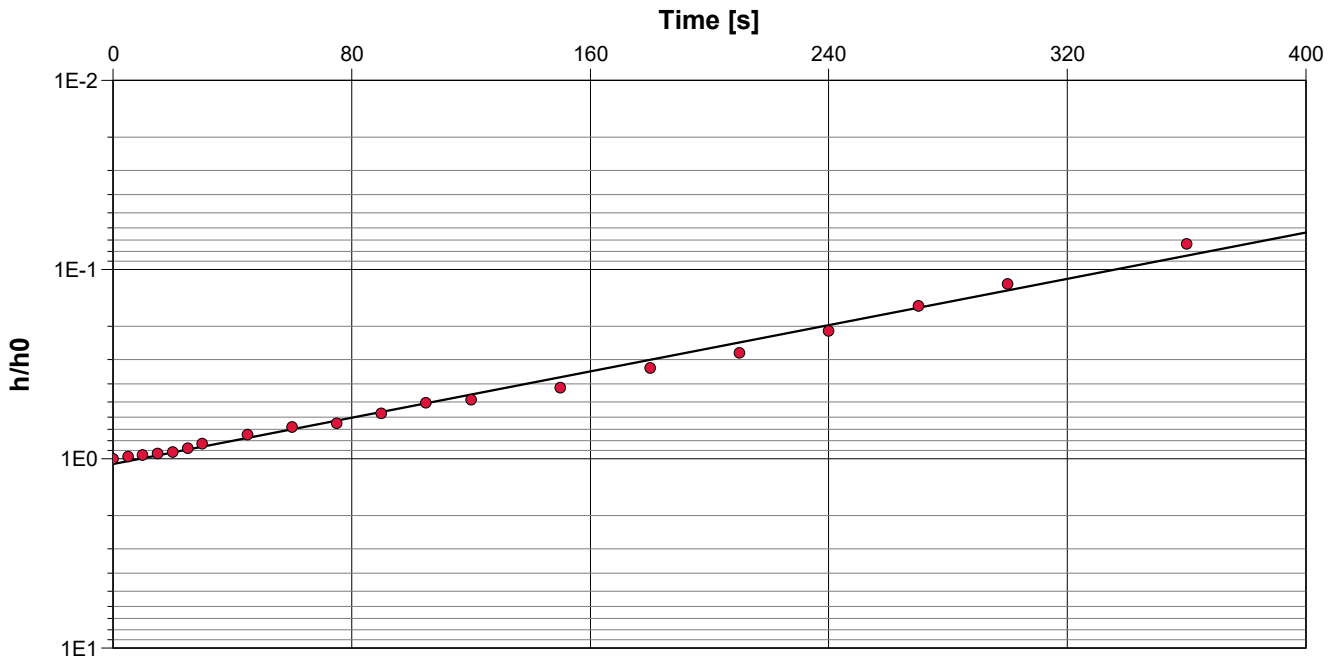


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH103D	1.46×10^{-6}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 340-376 Dufferin Street
	Number: 21-199
	Client: Hullmark Developments Limited

Location: Toronto, Ontario	Slug Test: BH110-RHT	Test Well: BH110
Test Conducted by: VT		Test Date: 2021-10-26
Analysis Performed by: AG	Bouwer & Rice	Analysis Date: 2021-11-05
Aquifer Thickness: 5.20 m		

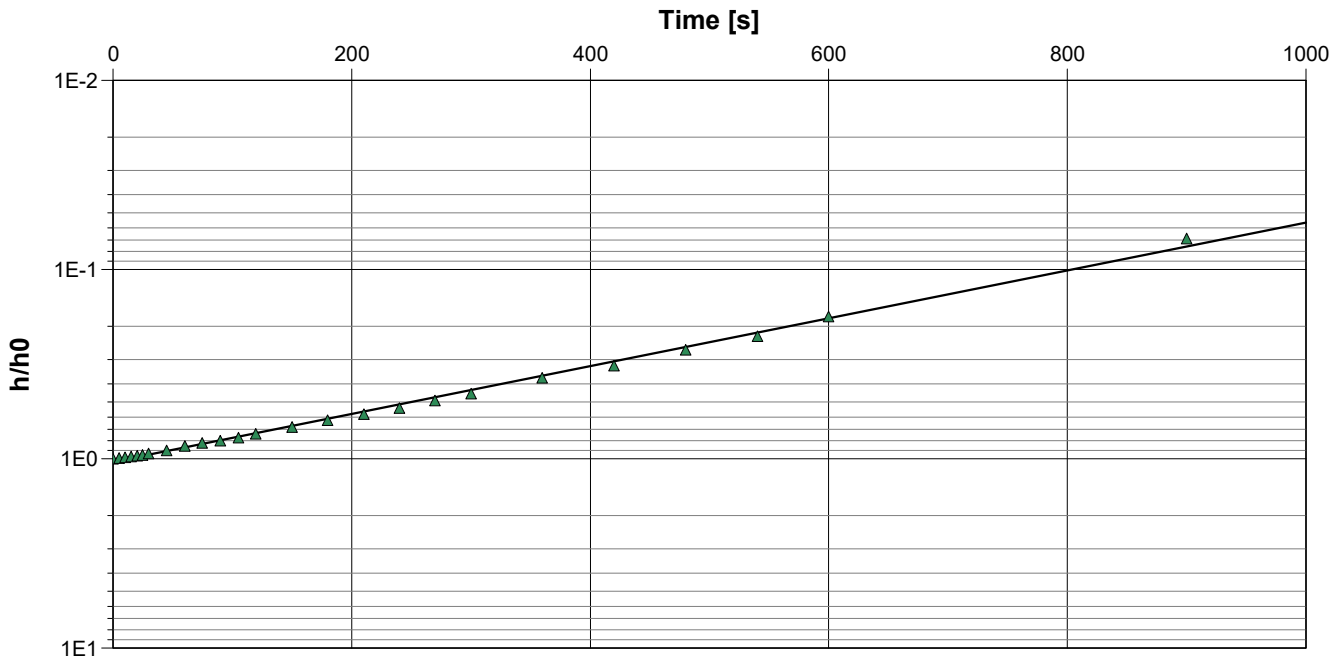


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH110	1.72×10^{-6}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 340-376 Dufferin Street
	Number: 21-199
	Client: Hullmark Developments Limited

Location: Toronto, Ontario	Slug Test: BH108-RHT	Test Well: BH108
Test Conducted by: VT		Test Date: 2021-10-26
Analysis Performed by: AG	Bouwer & Rice	Analysis Date: 2021-11-05
Aquifer Thickness: 5.30 m		

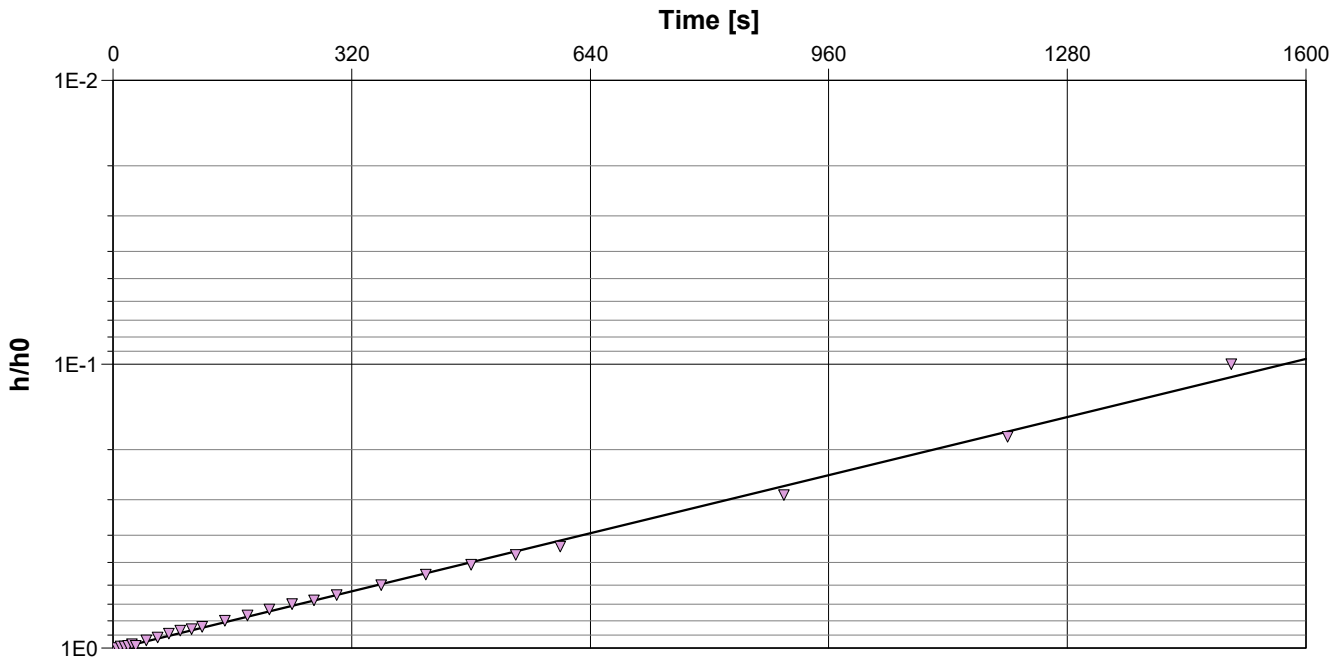


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH108	7.18×10^{-7}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 340-376 Dufferin Street
	Number: 21-199
	Client: Hullmark Developments Limited

Location: Toronto, Ontario	Slug Test: BH104-RHT	Test Well: BH104
Test Conducted by: VT		Test Date: 2021-10-29
Analysis Performed by: AG	Bouwer & Rice	Analysis Date: 2021-11-05
Aquifer Thickness: 14.50 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH104	6.86×10^{-7}	

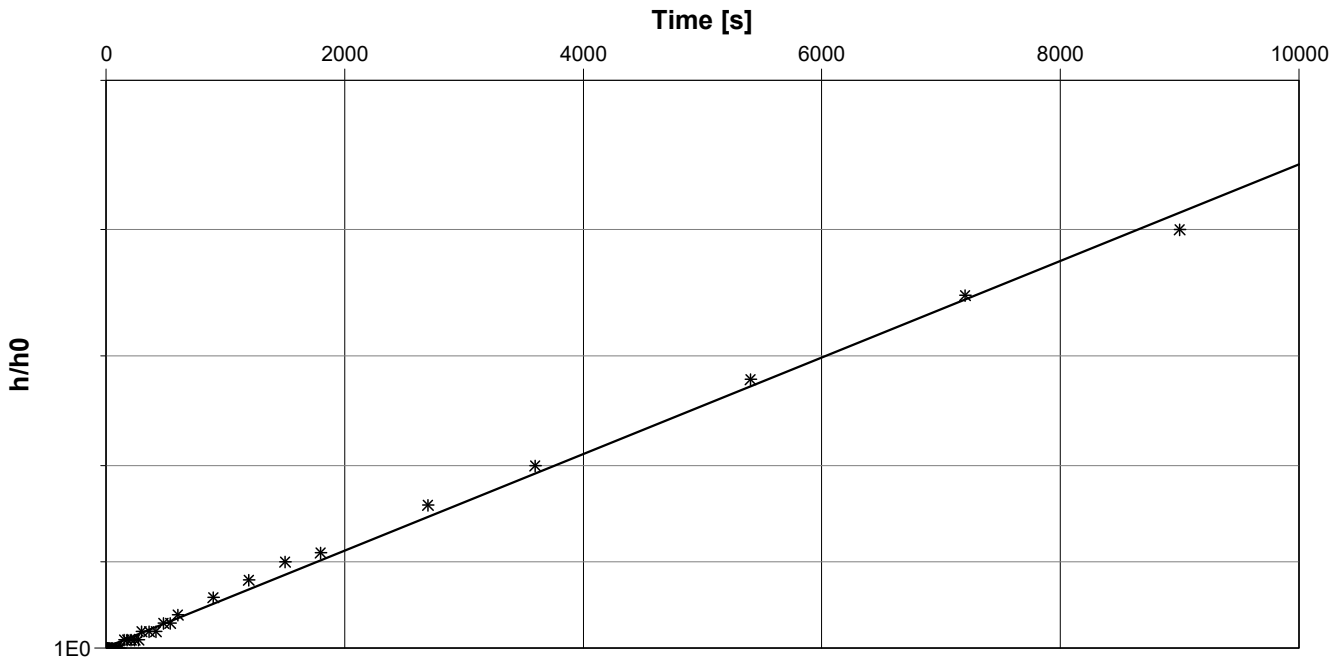
Slug Test Analysis Report

Project: 340-376 Dufferin Street

Number: 21-199

Client: Hullmark Developments Limited

Location: Toronto, Ontario	Slug Test: BH105-RHT	Test Well: BH105
Test Conducted by: DI		Test Date: 2021-10-29
Analysis Performed by: AG	Bouwer & Rice	Analysis Date: 2021-11-05
Aquifer Thickness: 15.50 m		

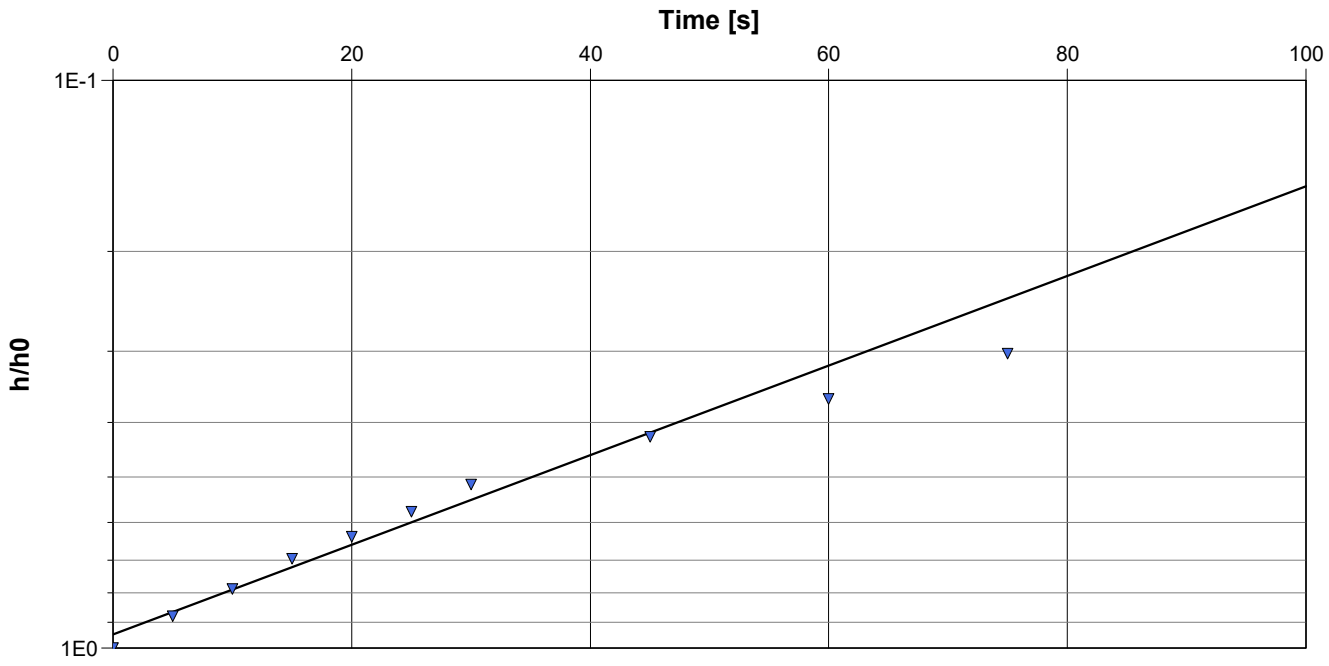


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH105	2.88×10^{-8}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 340-376 Dufferin Street
	Number: 21-199
	Client: Hullmark Developments Limited

Location: Toronto, Ontario	Slug Test: BH106(2)	Test Well: BH106(2)
Test Conducted by: DK		Test Date: 2021-12-16
Analysis Performed by:	Bouwer & Rice	Analysis Date: 2021-12-17
Aquifer Thickness: 10.60 m		

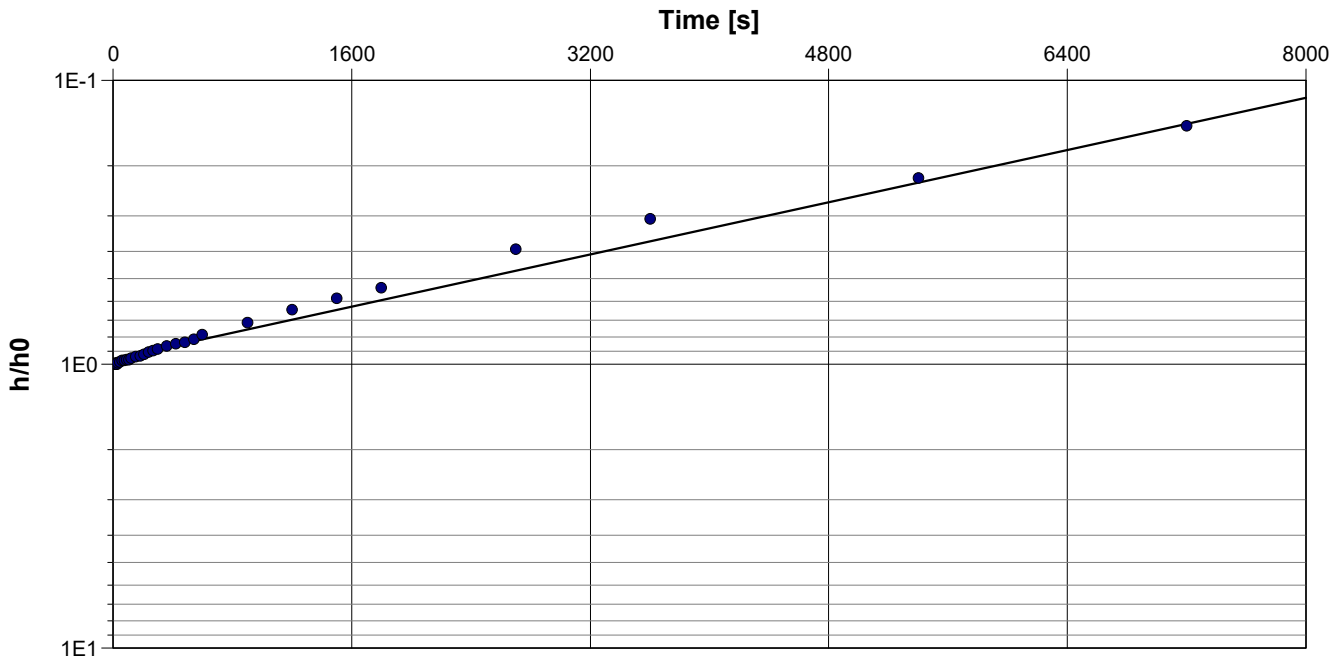


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH106(2)	4.78×10^{-6}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 340-376 Dufferin Street
	Number: 21-199
	Client: Hullmark Developments Limited

Location: Toronto, Ontario	Slug Test: BH111-RHT	Test Well: BH111
Test Conducted by: DI		Test Date: 2021-10-28
Analysis Performed by: AG	Bouwer and Rice	Analysis Date: 2021-11-05
Aquifer Thickness: 15.60 m		

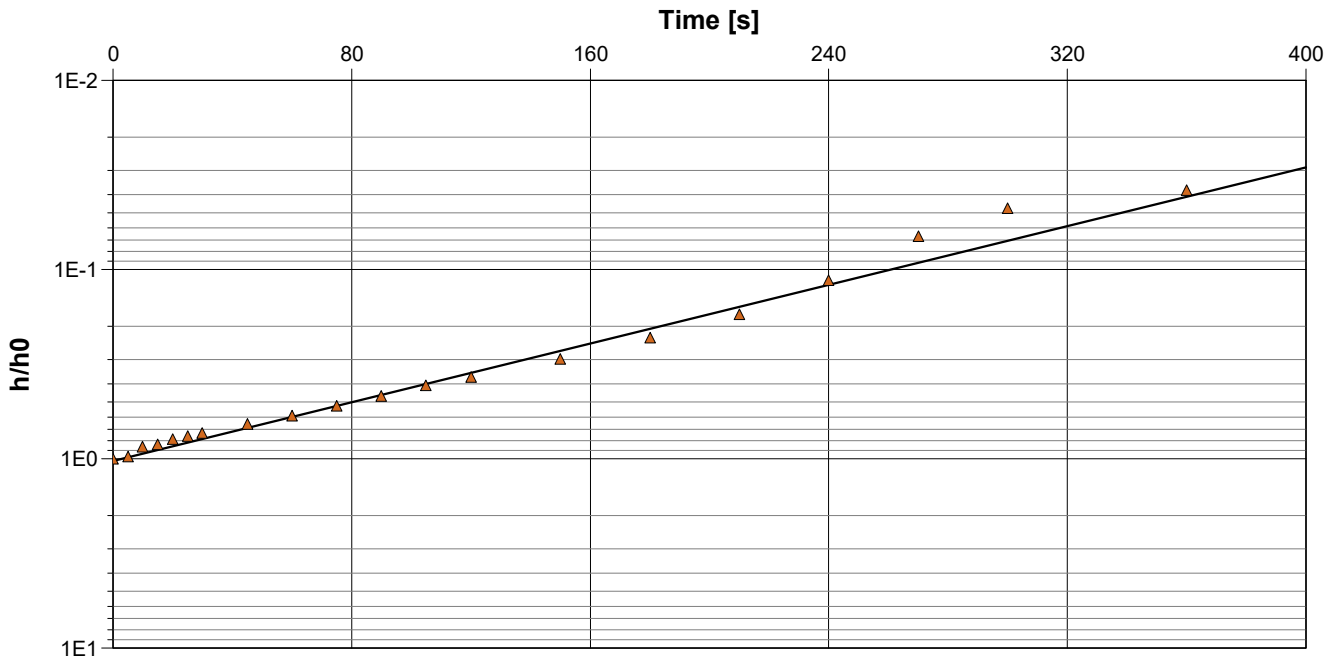


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH111	1.25×10^{-7}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 340-376 Dufferin Street
	Number: 21-199
	Client: Hullmark Developments Limited

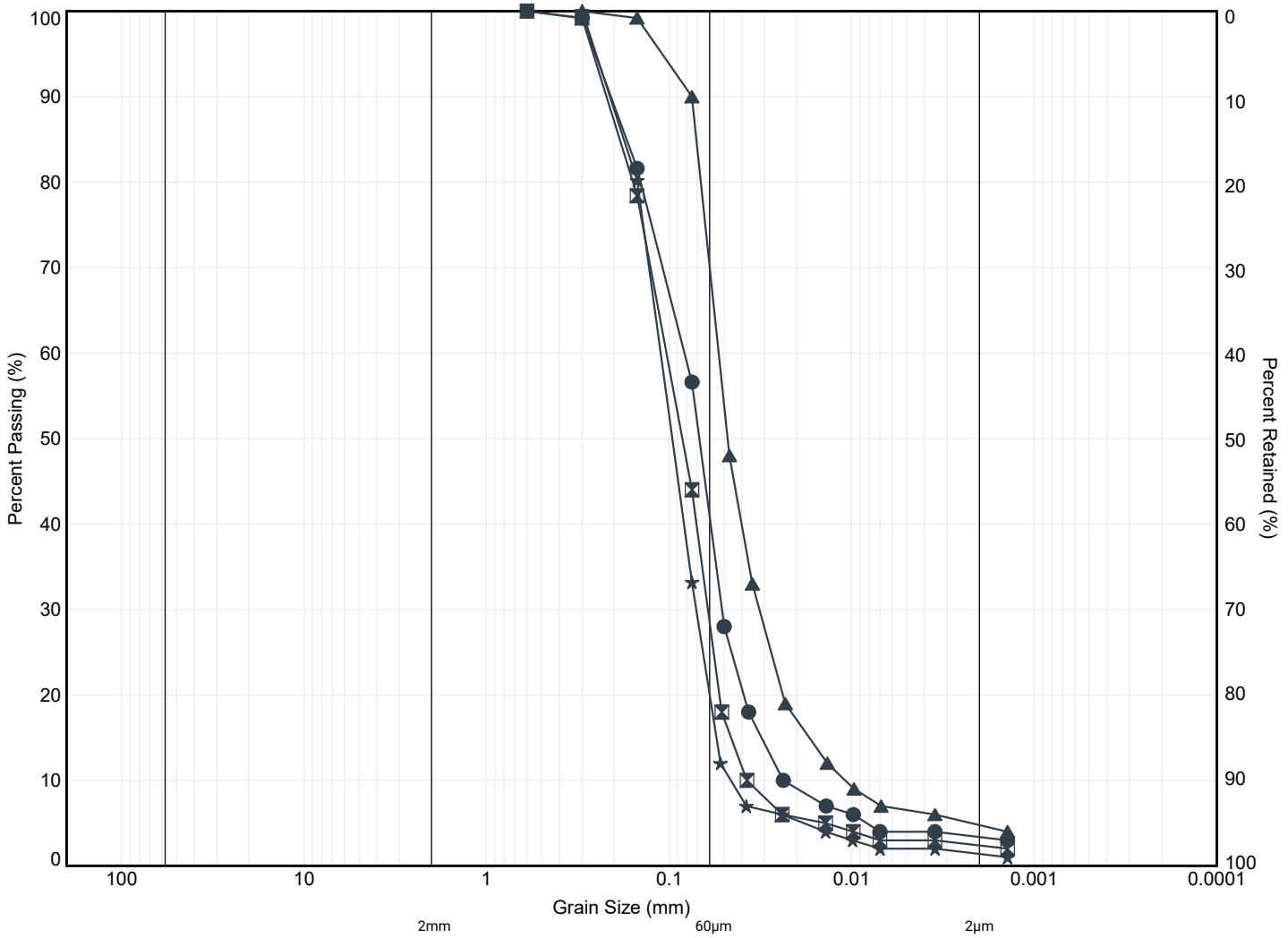
Location: Toronto, Ontario	Slug Test: BH117-RHT	Test Well: BH117
Test Conducted by: DI		Test Date: 2021-10-29
Analysis Performed by: AG	Bouwer & Rice	Analysis Date: 2021-11-05
Aquifer Thickness: 7.65 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH117	3.91×10^{-6}	

APPENDIX C



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

MIT SYSTEM

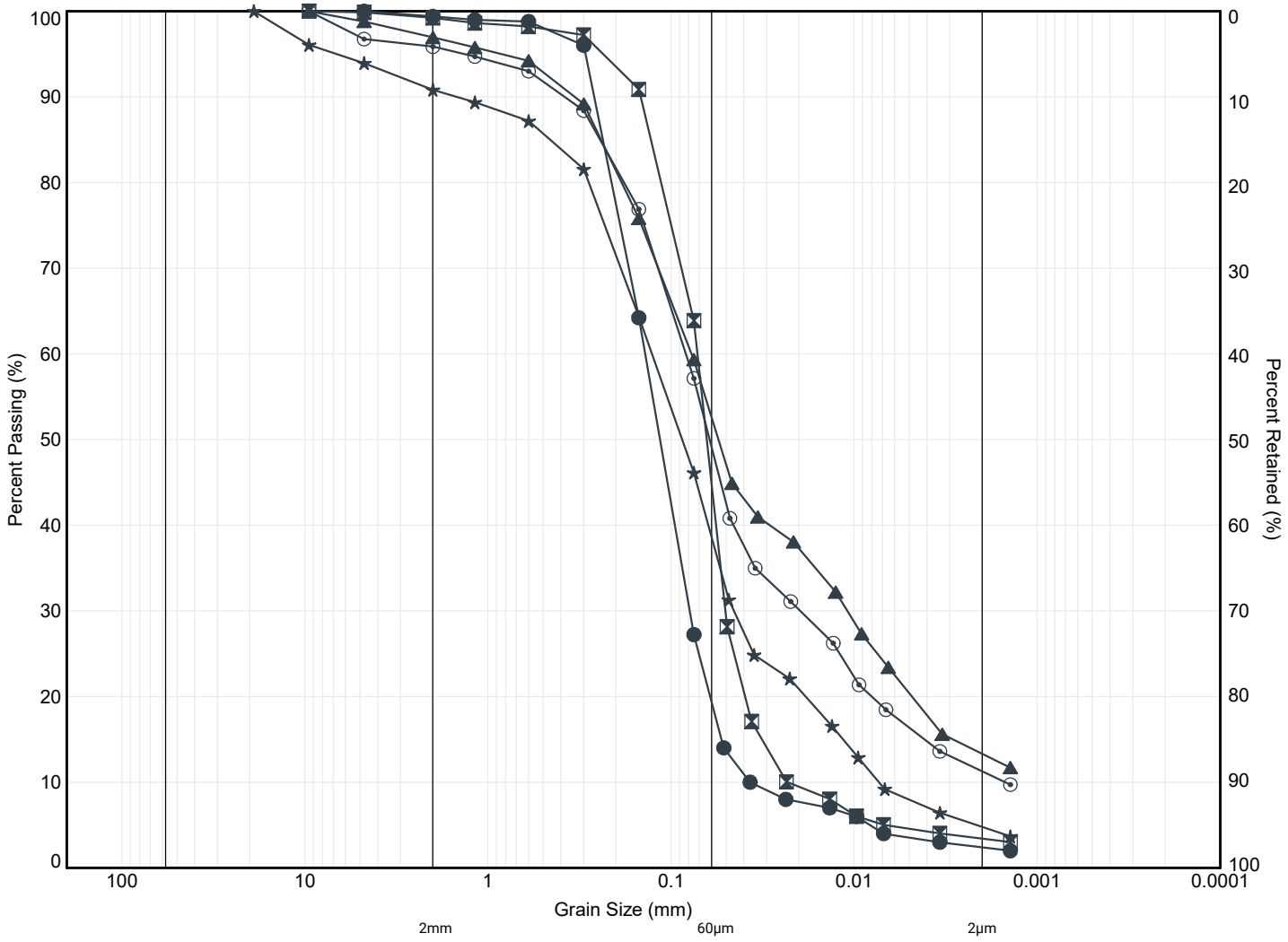
	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**103**	SS5	3.4	87.1	0	59	38	3
⊠	**107**	SS5	3.4	87.4	0	72	26	2
▲	**108**	SS5	3.4	88.0	0	30	65	5
★	**110**	SS6	4.9	86.5	0	80	19	1

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION SANDS**

File No.: **21-199**

file: 21-199.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 (%)
●	**101**	SS4	2.6	90.6	1	80	17	2
⊠	**101**	7B	5.6	87.6	1	55	41	3
▲	**105**	SS9	9.4	83.9	3	45	39	13
★	**106**	SS9	9.4	83.9	9	52	34	5
⊙	**111**	SS9	9.4	84.0	4	47	38	11

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION GLACIAL TILL**

File No.: **21-199**

file: 21-199 gint.gpj

APPENDIX D

K from Grain Size Analysis Report

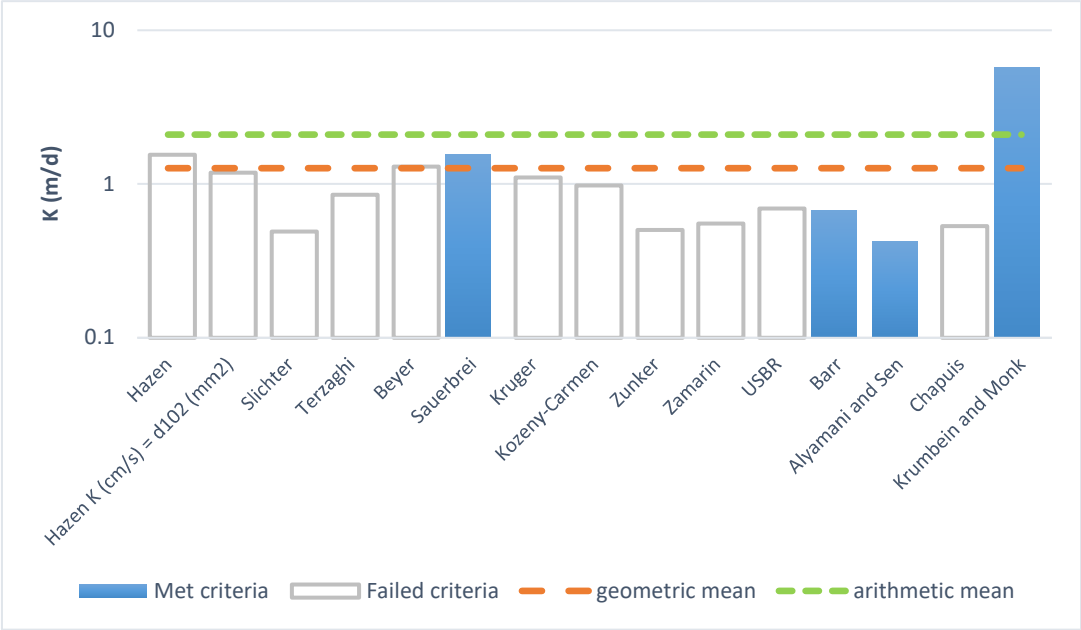
Date: 16-Nov-21

Sample Name: BH101 SS4

Mass Sample (g): 180.9

T (oC) 20

Moderately well sorted sand with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	1.8E-03	1.8E-05	1.55	
Hazen K (cm/s) = d_{10} (mm)	1.4E-03	1.4E-05	1.18	
Slichter	5.7E-04	5.7E-06	0.49	
Terzaghi	9.8E-04	9.8E-06	0.85	
Beyer	1.5E-03	1.5E-05	1.29	
Sauerbrei	1.8E-03	1.8E-05	1.56	
Kruger	1.3E-03	1.3E-05	1.10	
Kozeny-Carmen	1.1E-03	1.1E-05	0.98	
Zunker	5.8E-04	5.8E-06	0.50	
Zamarin	6.4E-04	6.4E-06	0.55	
USBR	8.0E-04	8.0E-06	0.69	
Barr	7.8E-04	7.8E-06	0.68	
Alyamani and Sen	4.9E-04	4.9E-06	0.42	
Chapuis	6.2E-04	6.2E-06	0.53	
Krumbein and Monk	6.6E-03	6.6E-05	5.73	
geometric mean	1.5E-03	1.5E-05	1.27	
arithmetic mean	2.4E-03	2.4E-05	2.10	

K from Grain Size Analysis Report

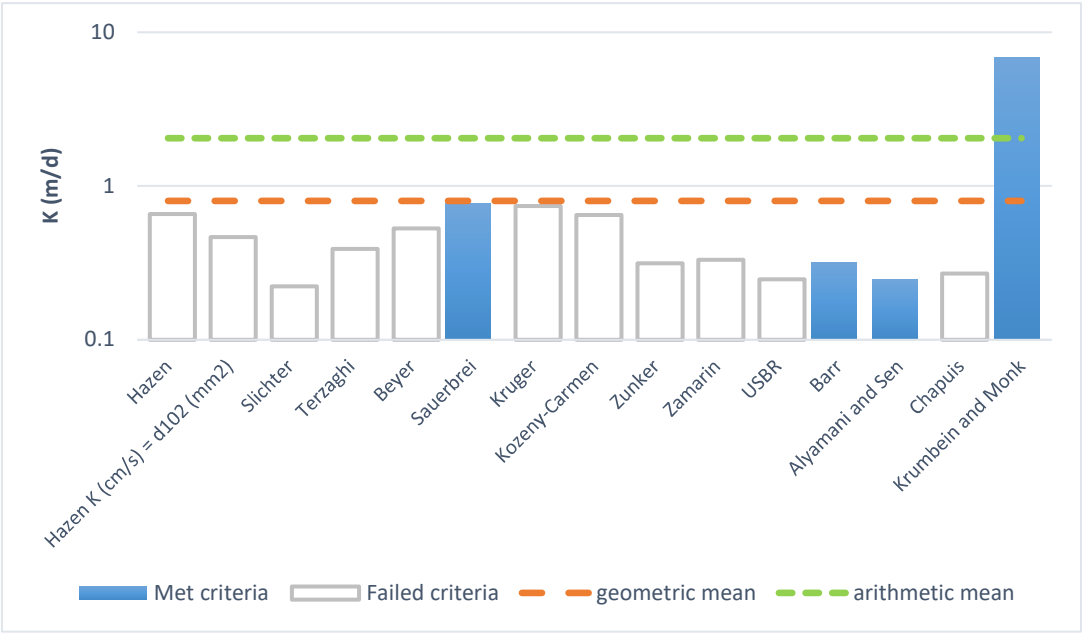
Date: 16-Nov-21

Sample Name: BH101 SS7

Mass Sample (g): 188.5

T (oC) 20

Moderately well sorted sand with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	7.6E-04	7.6E-06	0.66	
Hazen K (cm/s) = d_{10} (mm)	5.4E-04	5.4E-06	0.46	
Slichter	2.6E-04	2.6E-06	0.22	
Terzaghi	4.5E-04	4.5E-06	0.39	
Beyer	6.1E-04	6.1E-06	0.53	
Sauerbrei	8.9E-04	8.9E-06	0.77	
Kruger	8.6E-04	8.6E-06	0.74	
Kozeny-Carmen	7.5E-04	7.5E-06	0.65	
Zunker	3.6E-04	3.6E-06	0.31	
Zamarin	3.8E-04	3.8E-06	0.33	
USBR	2.9E-04	2.9E-06	0.25	
Barr	3.7E-04	3.7E-06	0.32	
Alyamani and Sen	2.8E-04	2.8E-06	0.25	
Chapuis	3.1E-04	3.1E-06	0.27	
Krumbein and Monk	7.9E-03	7.9E-05	6.86	
geometric mean	9.3E-04	9.3E-06	0.80	
arithmetic mean	2.4E-03	2.4E-05	2.05	

K from Grain Size Analysis Report

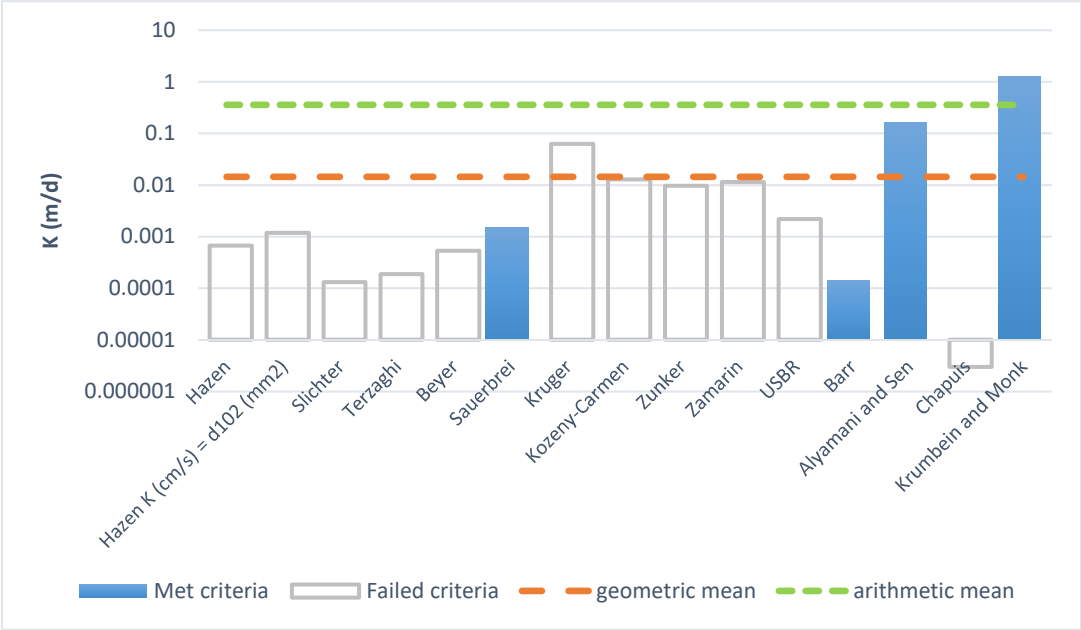
Date: 16-Nov-21

Sample Name: BH105 SS9

Mass Sample (g): 258.3

T (oC) 20

Poorly sorted silt with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	7.8E-07	7.8E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	1.4E-06	1.4E-08	0.00	
Slichter	1.5E-07	1.5E-09	0.00	
Terzaghi	2.2E-07	2.2E-09	0.00	
Beyer	6.2E-07	6.2E-09	0.00	
Sauerbrei	1.8E-06	1.8E-08	0.00	
Kruger	7.3E-05	7.3E-07	0.06	
Kozeny-Carmen	1.5E-05	1.5E-07	0.01	
Zunker	1.1E-05	1.1E-07	0.01	
Zamarin	1.3E-05	1.3E-07	0.01	
USBR	2.6E-06	2.6E-08	0.00	
Barr	1.6E-07	1.6E-09	0.00	
Alyamani and Sen	1.9E-04	1.9E-06	0.17	
Chapuis	3.5E-09	3.5E-11	0.00	
Krumbein and Monk	1.5E-03	1.5E-05	1.28	
geometric mean	1.7E-05	1.7E-07	0.01	
arithmetic mean	4.2E-04	4.2E-06	0.36	

K from Grain Size Analysis Report

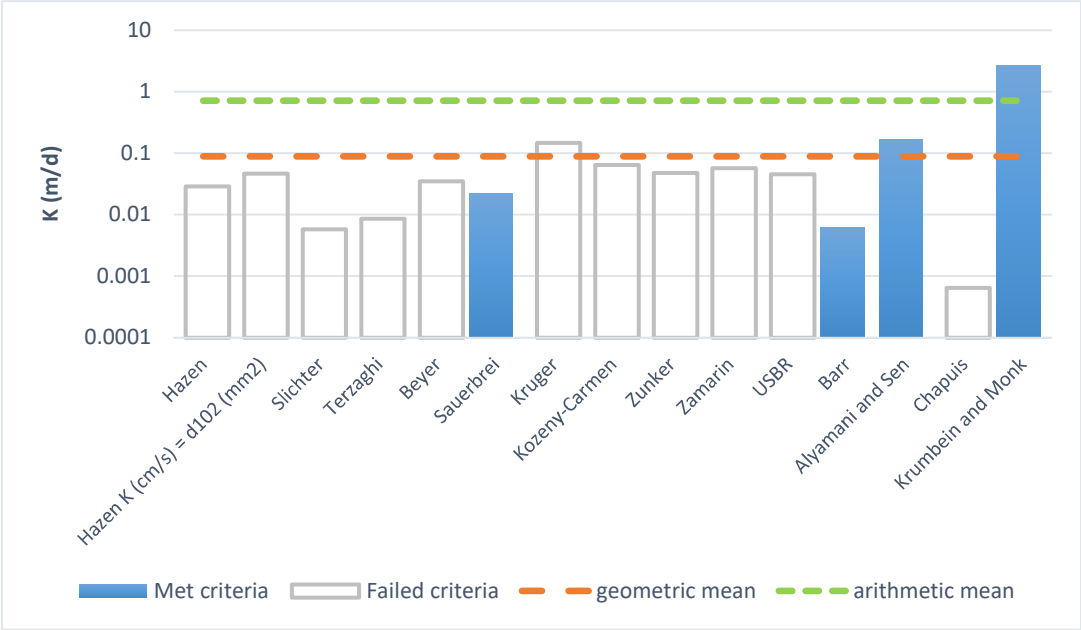
Date: 16-Nov-21

Sample Name: BH105 SS9

Mass Sample (g): 357.1

T (oC) 20

Poorly sorted sand with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	3.3E-05	3.3E-07	0.03	
Hazen K (cm/s) = d_{10} (mm)	5.4E-05	5.4E-07	0.05	
Slichter	6.7E-06	6.7E-08	0.01	
Terzaghi	9.9E-06	9.9E-08	0.01	
Beyer	4.0E-05	4.0E-07	0.03	
Sauerbrei	2.6E-05	2.6E-07	0.02	
Kruger	1.7E-04	1.7E-06	0.15	
Kozeny-Carmen	7.4E-05	7.4E-07	0.06	
Zunker	5.5E-05	5.5E-07	0.05	
Zamarin	6.6E-05	6.6E-07	0.06	
USBR	5.2E-05	5.2E-07	0.05	
Barr	7.3E-06	7.3E-08	0.01	
Alyamani and Sen	2.0E-04	2.0E-06	0.17	
Chapuis	7.5E-07	7.5E-09	0.00	
Krumbein and Monk	3.1E-03	3.1E-05	2.67	
geometric mean	1.0E-04	1.0E-06	0.09	
arithmetic mean	8.3E-04	8.3E-06	0.72	

K from Grain Size Analysis Report

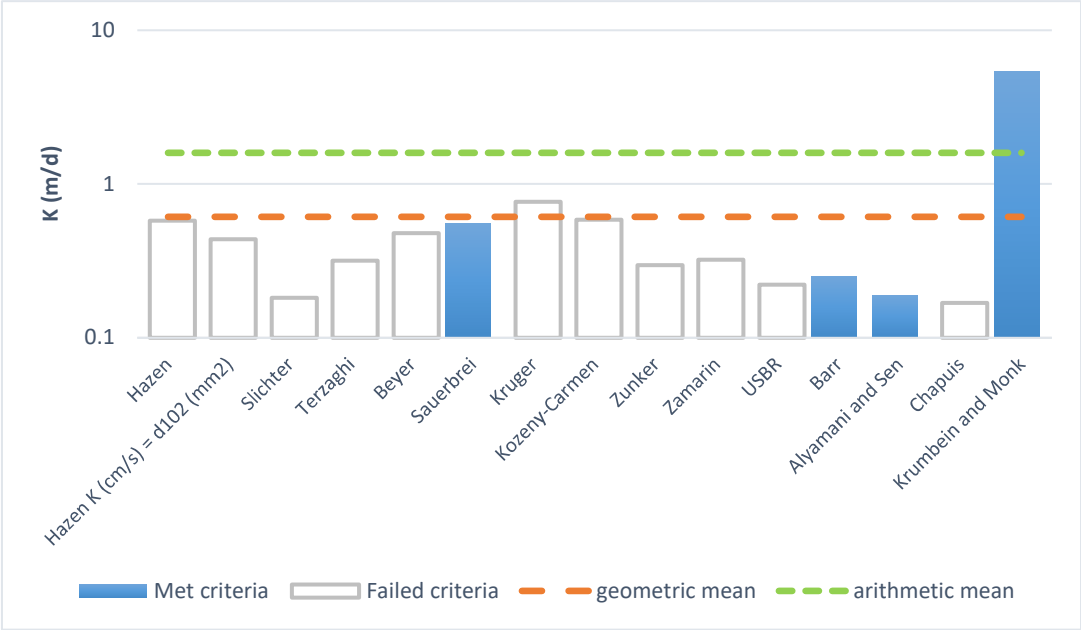
Date: 16-Nov-21

Sample Name: BH103 SS5

Mass Sample (g): 181.6

T (oC) 20

Moderately well sorted sand with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	6.7E-04	6.7E-06	0.58	
Hazen K (cm/s) = d_{10} (mm)	5.1E-04	5.1E-06	0.44	
Slichter	2.1E-04	2.1E-06	0.18	
Terzaghi	3.7E-04	3.7E-06	0.32	
Beyer	5.5E-04	5.5E-06	0.48	
Sauerbrei	6.4E-04	6.4E-06	0.55	
Kruger	8.9E-04	8.9E-06	0.77	
Kozeny-Carmen	6.8E-04	6.8E-06	0.58	
Zunker	3.4E-04	3.4E-06	0.30	
Zamarin	3.7E-04	3.7E-06	0.32	
USBR	2.6E-04	2.6E-06	0.22	
Barr	2.9E-04	2.9E-06	0.25	
Alyamani and Sen	2.2E-04	2.2E-06	0.19	
Chapuis	1.9E-04	1.9E-06	0.17	
Krumbein and Monk	6.2E-03	6.2E-05	5.38	
geometric mean	7.1E-04	7.1E-06	0.61	
arithmetic mean	1.8E-03	1.8E-05	1.59	

K from Grain Size Analysis Report

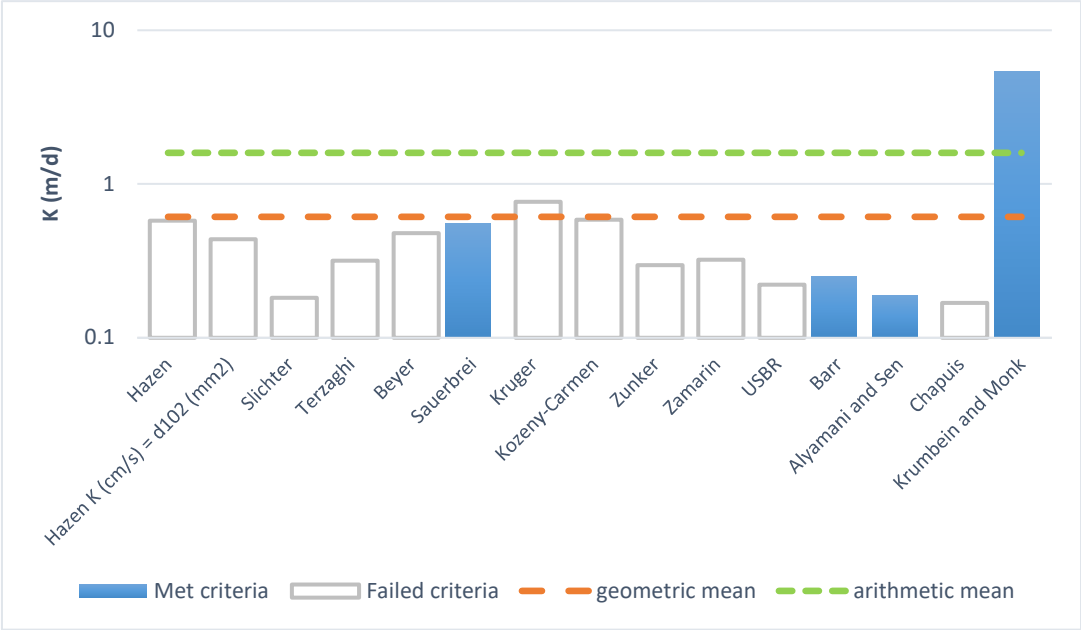
Date: 16-Nov-21

Sample Name: BH107 SS5

Mass Sample (g): 193.5

T (oC) 20

Moderately well sorted sand with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	6.7E-04	6.7E-06	0.58	
Hazen K (cm/s) = d_{10} (mm)	5.1E-04	5.1E-06	0.44	
Slichter	2.1E-04	2.1E-06	0.18	
Terzaghi	3.7E-04	3.7E-06	0.32	
Beyer	5.5E-04	5.5E-06	0.48	
Sauerbrei	6.4E-04	6.4E-06	0.55	
Kruger	8.9E-04	8.9E-06	0.77	
Kozeny-Carmen	6.8E-04	6.8E-06	0.58	
Zunker	3.4E-04	3.4E-06	0.30	
Zamarin	3.7E-04	3.7E-06	0.32	
USBR	2.6E-04	2.6E-06	0.22	
Barr	2.9E-04	2.9E-06	0.25	
Alyamani and Sen	2.2E-04	2.2E-06	0.19	
Chapuis	1.9E-04	1.9E-06	0.17	
Krumbein and Monk	6.2E-03	6.2E-05	5.38	
geometric mean	7.1E-04	7.1E-06	0.61	
arithmetic mean	1.8E-03	1.8E-05	1.59	

K from Grain Size Analysis Report

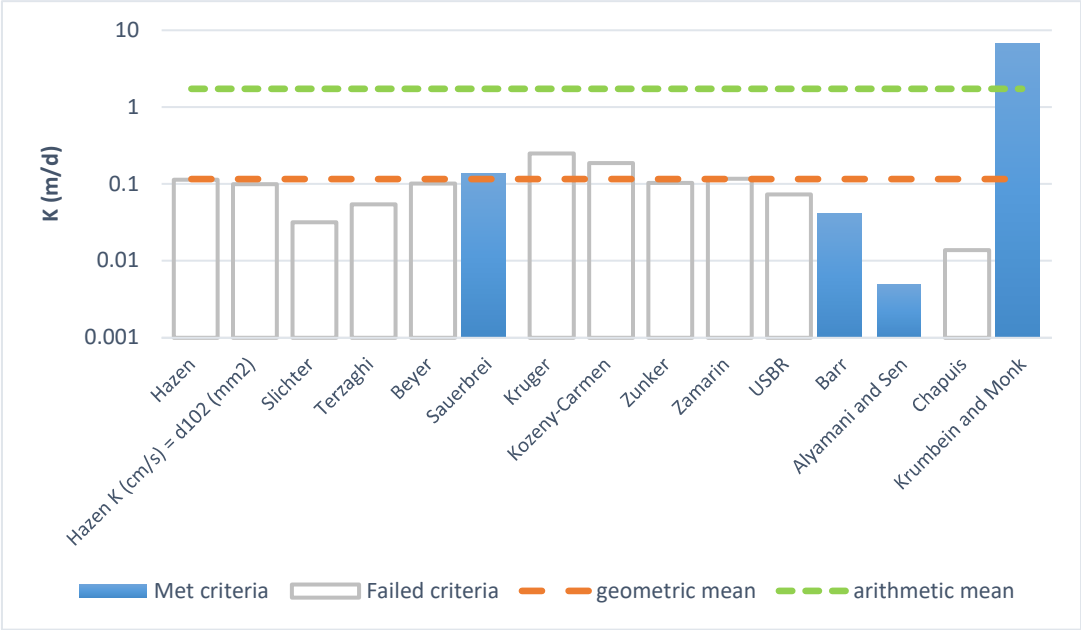
Date: 16-Nov-21

Sample Name: BH108 SS5

Mass Sample (g): 193.5

T (oC) 20

Poorly sorted silt with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	1.3E-04	1.3E-06	0.11	
Hazen K (cm/s) = d_{10} (mm)	1.1E-04	1.1E-06	0.10	
Slichter	3.7E-05	3.7E-07	0.03	
Terzaghi	6.3E-05	6.3E-07	0.05	
Beyer	1.2E-04	1.2E-06	0.10	
Sauerbrei	1.6E-04	1.6E-06	0.14	
Kruger	2.9E-04	2.9E-06	0.25	
Kozeny-Carmen	2.2E-04	2.2E-06	0.19	
Zunker	1.2E-04	1.2E-06	0.10	
Zamarin	1.4E-04	1.4E-06	0.12	
USBR	8.5E-05	8.5E-07	0.07	
Barr	4.7E-05	4.7E-07	0.04	
Alyamani and Sen	5.7E-06	5.7E-08	0.00	
Chapuis	1.6E-05	1.6E-07	0.01	
Krumbein and Monk	7.8E-03	7.8E-05	6.75	
geometric mean	1.3E-04	1.3E-06	0.12	
arithmetic mean	2.0E-03	2.0E-05	1.73	

K from Grain Size Analysis Report

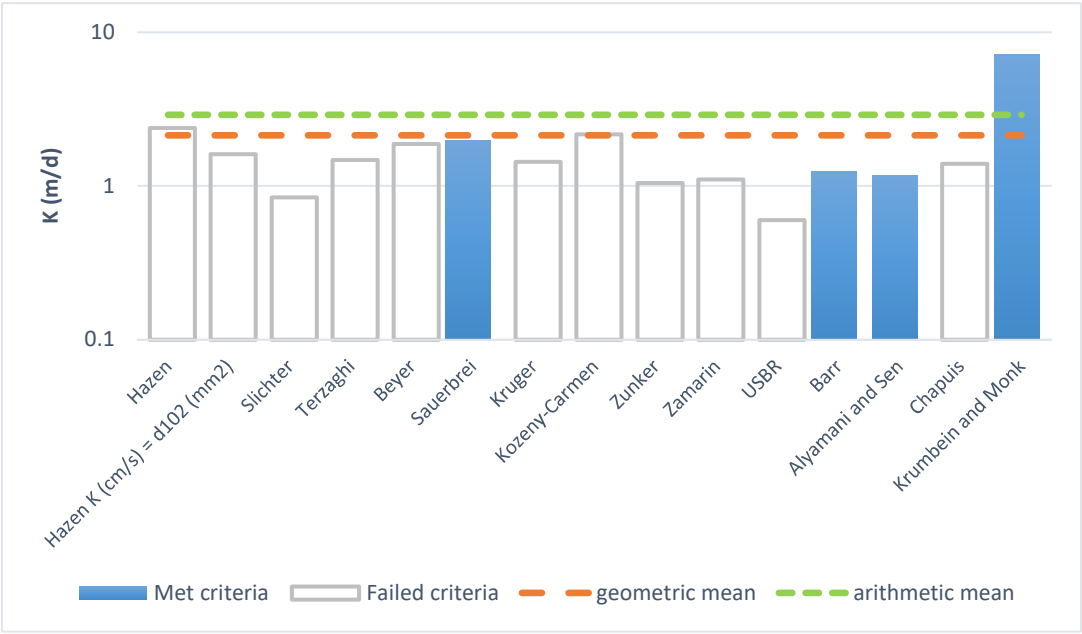
Date: 16-Nov-21

Sample Name: BH110 SS6

Mass Sample (g): 172.8

T (oC) 20

Moderately well sorted sand with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	2.8E-03	2.8E-05	2.38	
Hazen K (cm/s) = d_{10} (mm)	1.9E-03	1.9E-05	1.61	
Slichter	9.7E-04	9.7E-06	0.84	
Terzaghi	1.7E-03	1.7E-05	1.48	
Beyer	2.2E-03	2.2E-05	1.88	
Sauerbrei	2.3E-03	2.3E-05	1.97	
Kruger	1.7E-03	1.7E-05	1.43	
Kozeny-Carmen	2.5E-03	2.5E-05	2.17	
Zunker	1.2E-03	1.2E-05	1.04	
Zamarin	1.3E-03	1.3E-05	1.10	
USBR	6.9E-04	6.9E-06	0.60	
Barr	1.4E-03	1.4E-05	1.25	
Alyamani and Sen	1.3E-03	1.3E-05	1.17	
Chapuis	1.6E-03	1.6E-05	1.39	
Krumbein and Monk	8.4E-03	8.4E-05	7.23	
geometric mean	2.5E-03	2.5E-05	2.13	
arithmetic mean	3.4E-03	3.4E-05	2.90	

K from Grain Size Analysis Report

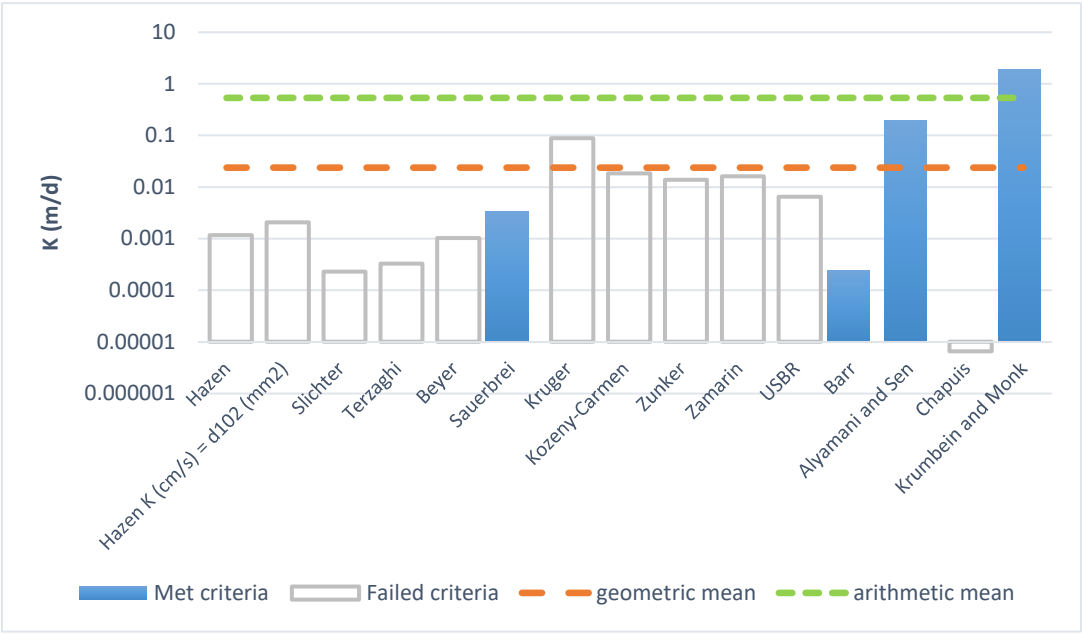
Date: 16-Nov-21

Sample Name: BH111 SS9

Mass Sample (g): 301.5

T (oC) 20

Poorly sorted sand with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	1.4E-06	1.4E-08	0.00	
Hazen K (cm/s) = d_{10} (mm)	2.4E-06	2.4E-08	0.00	
Slichter	2.7E-07	2.7E-09	0.00	
Terzaghi	3.8E-07	3.8E-09	0.00	
Beyer	1.2E-06	1.2E-08	0.00	
Sauerbrei	3.9E-06	3.9E-08	0.00	
Kruger	1.0E-04	1.0E-06	0.09	
Kozeny-Carmen	2.1E-05	2.1E-07	0.02	
Zunker	1.6E-05	1.6E-07	0.01	
Zamarin	1.9E-05	1.9E-07	0.02	
USBR	7.6E-06	7.6E-08	0.01	
Barr	2.9E-07	2.9E-09	0.00	
Alyamani and Sen	2.3E-04	2.3E-06	0.20	
Chapuis	7.6E-09	7.6E-11	0.00	
Krumbein and Monk	2.3E-03	2.3E-05	1.95	
geometric mean	2.8E-05	2.8E-07	0.02	
arithmetic mean	6.2E-04	6.2E-06	0.54	

APPENDIX E

Grounded Engineering Inc
ATTN: Shelby Plant
1 BANIGAN DRIVE
TORONTO ON M4H 1G3

Date Received: 01-NOV-21
Report Date: 09-NOV-21 14:54 (MT)
Version: FINAL

Client Phone: 647-264-7928

Certificate of Analysis

Lab Work Order #: L2657859

Project P.O. #: NOT SUBMITTED
Job Reference: 21-199
C of C Numbers:
Legal Site Desc: 390 DUFFERIN STREET

Amanda Overholster
Account Manager

ANALYTICAL REPORT

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						
L2657859-1	SW-UF-BH117	Physical Tests	Total Suspended Solids	28.0	15	mg/L
		Total Metals	Manganese (Mn)-Total	0.457	0.05	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: L2657859-1 Sample Date: 01-NOV-21 Sample ID: SW-UF-BH117
pH	pH units	6.00-11.5	6.0-9.5	7.45
Total Suspended Solids	mg/L	350	15	28.0

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.

Anions and Nutrients - WATER

			Lab ID	L2657859-1
			Sample Date	01-NOV-21
			Sample ID	SW-UF-BH117
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Fluoride (F)	mg/L	10	-	<0.10 DLDS
Total Kjeldahl Nitrogen	mg/L	100	-	0.540
Phosphorus, Total	mg/L	10	0.4	0.0156

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.

ANALYTICAL REPORT

Cyanides - WATER

			Lab ID	L2657859-1
			Sample Date	01-NOV-21
			Sample ID	SW-UF-BH117
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Cyanide, Total	mg/L	2	0.02	<0.0020

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.

ANALYTICAL REPORT

Bacteriological Tests - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2657859-1 Sample Date: 01-NOV-21 Sample ID: SW-UF-BH117
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.

ANALYTICAL REPORT

Total Metals - WATER

			Lab ID	L2657859-1
			Sample Date	01-NOV-21
			Sample ID	SW-UF-BH117
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Aluminum (Al)-Total	mg/L	50	-	0.778
Antimony (Sb)-Total	mg/L	5	-	0.00013
Arsenic (As)-Total	mg/L	1	0.02	0.00063
Cadmium (Cd)-Total	mg/L	0.7	0.008	0.000038
Chromium (Cr)-Total	mg/L	4	0.08	0.00209
Cobalt (Co)-Total	mg/L	5	-	0.00196
Copper (Cu)-Total	mg/L	2	0.04	0.0026
Lead (Pb)-Total	mg/L	1	0.12	0.00114
Manganese (Mn)-Total	mg/L	5	0.05	0.457
Mercury (Hg)-Total	mg/L	0.01	0.0004	<0.0000050
Molybdenum (Mo)-Total	mg/L	5	-	0.000708
Nickel (Ni)-Total	mg/L	2	0.08	0.00383
Selenium (Se)-Total	mg/L	1	0.02	0.00494
Silver (Ag)-Total	mg/L	5	0.12	<0.000050
Tin (Sn)-Total	mg/L	5	-	0.00017
Titanium (Ti)-Total	mg/L	5	-	0.0404
Zinc (Zn)-Total	mg/L	2	0.04	0.0095

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

			Lab ID	L2657859-1
			Sample Date	01-NOV-21
			Sample ID	SW-UF-BH117
		Guide Limits		
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	L2657859-1
			Sample Date	01-NOV-21
			Sample ID	SW-UF-BH117
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
BOD	mg/L	300	15	<3.0 BODL
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	L2657859-1
			Sample Date	01-NOV-21
			Sample ID	SW-UF-BH117
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Benzene	ug/L	10	2	<0.50
Chloroform	ug/L	40	2	<1.0
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	<0.50
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	%	-	-	90.2
Surrogate: 1,4-Difluorobenzene	%	-	-	101.4

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	L2657859-1
			Sample Date	01-NOV-21
			Sample ID	SW-UF-BH117
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Acenaphthene	ug/L	-	-	<0.010
Anthracene	ug/L	-	-	0.012
Benzo(a)anthracene	ug/L	-	-	<0.010
Benzo(a)pyrene	ug/L	-	-	<0.010
Benzo(b&j)fluoranthene	ug/L	-	-	<0.010
Benzo(e)pyrene	ug/L	-	-	<0.050
Benzo(ghi)perylene	ug/L	-	-	<0.010
Benzo(k)fluoranthene	ug/L	-	-	<0.010
Chrysene	ug/L	-	-	<0.010
Dibenz(a,h)acridine	ug/L	-	-	<0.050
Dibenz(a,j)acridine	ug/L	-	-	<0.050
Dibenz(a,h)anthracene	ug/L	-	-	<0.010
Dibenzo(a,i)pyrene	ug/L	-	-	<0.050
7H-Dibenzo(c,g)carbazole	ug/L	-	-	<0.050
1,3-Dinitropyrene	ug/L	-	-	<1.0
1,6-Dinitropyrene	ug/L	-	-	<1.0
1,8-Dinitropyrene	ug/L	-	-	<1.0
Fluoranthene	ug/L	-	-	<0.010
Fluorene	ug/L	-	-	<0.010
Indeno(1,2,3-cd)pyrene	ug/L	-	-	<0.010
Naphthalene	ug/L	-	-	<0.010
Perylene	ug/L	-	-	<0.010
Phenanthrene	ug/L	-	-	<0.010
Pyrene	ug/L	-	-	<0.010
Surrogate: 2-Fluorobiphenyl	%	-	-	76.1
Surrogate: D14-Terphenyl	%	-	-	93.9
Surrogate: d14-Terphenyl	%	-	-	103.4
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.

ANALYTICAL REPORT

Semi-Volatile Organics - WATER

			Lab ID	L2657859-1
			Sample Date	01-NOV-21
			Sample ID	SW-UF-BH117
		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	<0.50
Surrogate: 2-Fluorobiphenyl	%	-	-	80.6
Surrogate: p-Terphenyl d14	%	-	-	91.4
Surrogate: 2,4,6-Tribromophenol	%	-	-	122.2

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	L2657859-1
			Sample Date	01-NOV-21
			Sample ID	SW-UF-BH117
		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	%	-	-	105.9
Total PCBs	ug/L	1	0.4	<0.040
Surrogate: Tetrachloro-m-xylene	%	-	-	95.3

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	L2657859-1
			Sample Date	01-NOV-21
			Sample ID	SW-UF-BH117
		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

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
BODL	Limit of Reporting for BOD was increased to account for the largest volume of sample tested.

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
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)

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

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.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

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

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
		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

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 R5637613								
WG3653308-2 LCS								
Acenaphthene			82.3		%		50-130	08-NOV-21
Anthracene			89.0		%		60-130	08-NOV-21
Benzo(a)anthracene			100.8		%		60-140	08-NOV-21
Benzo(a)pyrene			79.6		%		60-130	08-NOV-21
Benzo(b&j)fluoranthene			89.7		%		60-130	08-NOV-21
Benzo(ghi)perylene			90.3		%		50-140	08-NOV-21
Benzo(k)fluoranthene			88.0		%		60-130	08-NOV-21
Chrysene			99.2		%		60-140	08-NOV-21
Dibenz(a,h)anthracene			93.6		%		60-130	08-NOV-21
Fluoranthene			93.4		%		60-130	08-NOV-21
Fluorene			88.3		%		60-130	08-NOV-21
Indeno(1,2,3-cd)pyrene			92.3		%		60-140	08-NOV-21
Naphthalene			77.3		%		50-130	08-NOV-21
Perylene			86.6		%		60-130	08-NOV-21
Phenanthrene			92.2		%		60-130	08-NOV-21
Pyrene			93.3		%		60-130	08-NOV-21
WG3653308-1 MB								
Acenaphthene			<0.010		ug/L		0.01	08-NOV-21
Anthracene			<0.010		ug/L		0.01	08-NOV-21
Benzo(a)anthracene			<0.010		ug/L		0.01	08-NOV-21
Benzo(a)pyrene			<0.010		ug/L		0.01	08-NOV-21
Benzo(b&j)fluoranthene			<0.010		ug/L		0.01	08-NOV-21
Benzo(ghi)perylene			<0.010		ug/L		0.01	08-NOV-21
Benzo(k)fluoranthene			<0.010		ug/L		0.01	08-NOV-21
Chrysene			<0.010		ug/L		0.01	08-NOV-21
Dibenz(a,h)anthracene			<0.010		ug/L		0.01	08-NOV-21
Fluoranthene			<0.010		ug/L		0.01	08-NOV-21
Fluorene			<0.010		ug/L		0.01	08-NOV-21
Indeno(1,2,3-cd)pyrene			<0.010		ug/L		0.01	08-NOV-21
Naphthalene			<0.010		ug/L		0.01	08-NOV-21
Perylene			<0.010		ug/L		0.01	08-NOV-21
Phenanthrene			<0.010		ug/L		0.01	08-NOV-21
Pyrene			<0.010		ug/L		0.01	08-NOV-21
Surrogate: 2-Fluorobiphenyl			70.8		%		40-130	08-NOV-21

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 R5637613								
WG3653308-1 MB								
Surrogate: D14-Terphenyl			90.6		%		40-130	08-NOV-21
625-SAN-WT	**Water**							
Batch R5638159								
WG3653308-2 LCS								
3,3-Dichlorobenzidine			20.7	RRQC	%		50-140	09-NOV-21
Bis(2-ethylhexyl)phthalate			126.8		%		50-140	09-NOV-21
Di-n-butylphthalate			101.6		%		50-140	09-NOV-21
Pentachlorophenol			144.0	LCS-H	%		50-140	09-NOV-21
COMMENTS: RRQC: Recovery is below ALS control limits. Reported non-detect results for associated samples have not been affected.								
WG3653308-1 MB								
3,3-Dichlorobenzidine			<0.40		ug/L		0.4	09-NOV-21
Bis(2-ethylhexyl)phthalate			<2.0		ug/L		2	09-NOV-21
Di-n-butylphthalate			<1.0		ug/L		1	09-NOV-21
Pentachlorophenol			<0.50		ug/L		0.5	09-NOV-21
Surrogate: 2-Fluorobiphenyl			74.9		%		40-130	09-NOV-21
Surrogate: 2,4,6-Tribromophenol			97.4		%		40-130	09-NOV-21
Surrogate: p-Terphenyl d14			108.1		%		40-130	09-NOV-21
BOD-WT	**Water**							
Batch R5637855								
WG3650878-10 DUP		**L2657584-7**						
BOD		<3.0	<3.0	RPD-NA	mg/L	N/A	30	02-NOV-21
WG3650878-11 LCS								
BOD			104.5		%		85-115	02-NOV-21
WG3650878-9 MB								
BOD			<2.0		mg/L		2	02-NOV-21
CN-TOT-WT	**Water**							
Batch R5635096								
WG3651039-25 DUP		**WG3651039-27**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	02-NOV-21
WG3651039-24 LCS								
Cyanide, Total			96.2		%		80-120	02-NOV-21
WG3651039-23 MB								
Cyanide, Total			<0.0020		mg/L		0.002	02-NOV-21
WG3651039-26 MS		**WG3651039-27**						
Cyanide, Total			93.1		%		70-130	02-NOV-21

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 R5634838								
WG3650763-4 DUP		**WG3650763-3**						
Chromium, Hexavalent		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	02-NOV-21
WG3650763-2 LCS								
Chromium, Hexavalent			103.8		%		80-120	02-NOV-21
WG3650763-1 MB								
Chromium, Hexavalent			<0.00050		mg/L		0.0005	02-NOV-21
WG3650763-5 MS		**WG3650763-3**						
Chromium, Hexavalent			104.7		%		70-130	02-NOV-21
EC-WW-MF-WT	**Water**							
Batch R5635086								
WG3650432-3 DUP		**L2657859-1**						
E. Coli		0	0		CFU/100mL	0.0	65	02-NOV-21
WG3650432-4 DUP		**L2657835-1**						
E. Coli		0	<10	RPD-NA	CFU/100mL	N/A	65	02-NOV-21
WG3650432-1 MB								
E. Coli			0		CFU/100mL		1	02-NOV-21
F-IC-N-WT	**Water**							
Batch R5635989								
WG3651635-14 DUP		**WG3651635-13**						
Fluoride (F)		0.065	0.065		mg/L	0.0	20	03-NOV-21
WG3651635-12 LCS								
Fluoride (F)			100.3		%		90-110	03-NOV-21
WG3651635-11 MB								
Fluoride (F)			<0.020		mg/L		0.02	03-NOV-21
WG3651635-15 MS		**WG3651635-13**						
Fluoride (F)			103.9		%		75-125	03-NOV-21
HG-T-CVAA-WT	**Water**							
Batch R5635114								
WG3650565-4 DUP		**WG3650565-3**						
Mercury (Hg)-Total		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	03-NOV-21
WG3650565-2 LCS								
Mercury (Hg)-Total			101.0		%		80-120	03-NOV-21
WG3650565-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	03-NOV-21
WG3650565-6 MS		**WG3650565-5**						
Mercury (Hg)-Total			102.0		%		70-130	03-NOV-21
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 R5634397								
WG3650202-4 DUP		**WG3650202-3**						
Aluminum (Al)-Total		0.0075	0.0089		mg/L	17	20	02-NOV-21
Antimony (Sb)-Total		0.00014	0.00014		mg/L	0.1	20	02-NOV-21
Arsenic (As)-Total		0.00013	0.00015		mg/L	16	20	02-NOV-21
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	02-NOV-21
Chromium (Cr)-Total		0.00051	<0.00050	RPD-NA	mg/L	N/A	20	02-NOV-21
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-NOV-21
Copper (Cu)-Total		0.00688	0.00706		mg/L	2.6	20	02-NOV-21
Lead (Pb)-Total		0.000680	0.000677		mg/L	0.4	20	02-NOV-21
Manganese (Mn)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	02-NOV-21
Molybdenum (Mo)-Total		0.000383	0.000362		mg/L	5.6	20	02-NOV-21
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	02-NOV-21
Selenium (Se)-Total		0.000262	0.000272		mg/L	3.9	20	02-NOV-21
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-NOV-21
Tin (Sn)-Total		0.00052	0.00033	J	mg/L	0.00019	0.0002	02-NOV-21
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	02-NOV-21
Zinc (Zn)-Total		0.0127	0.0131		mg/L	3.1	20	02-NOV-21
WG3650202-2 LCS								
Aluminum (Al)-Total			103.3		%		80-120	02-NOV-21
Antimony (Sb)-Total			101.3		%		80-120	02-NOV-21
Arsenic (As)-Total			102.6		%		80-120	02-NOV-21
Cadmium (Cd)-Total			103.7		%		80-120	02-NOV-21
Chromium (Cr)-Total			101.7		%		80-120	02-NOV-21
Cobalt (Co)-Total			101.0		%		80-120	02-NOV-21
Copper (Cu)-Total			102.0		%		80-120	02-NOV-21
Lead (Pb)-Total			100.7		%		80-120	02-NOV-21
Manganese (Mn)-Total			100.9		%		80-120	02-NOV-21
Molybdenum (Mo)-Total			101.3		%		80-120	02-NOV-21
Nickel (Ni)-Total			101.3		%		80-120	02-NOV-21
Selenium (Se)-Total			102.6		%		80-120	02-NOV-21
Silver (Ag)-Total			102.3		%		80-120	02-NOV-21
Tin (Sn)-Total			102.4		%		80-120	02-NOV-21
Titanium (Ti)-Total			99.4		%		80-120	02-NOV-21
Zinc (Zn)-Total			99.0		%		80-120	02-NOV-21

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 R5634397								
WG3650202-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	02-NOV-21
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	02-NOV-21
Arsenic (As)-Total			<0.00010		mg/L		0.0001	02-NOV-21
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	02-NOV-21
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	02-NOV-21
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	02-NOV-21
Copper (Cu)-Total			<0.00050		mg/L		0.0005	02-NOV-21
Lead (Pb)-Total			<0.000050		mg/L		0.00005	02-NOV-21
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	02-NOV-21
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	02-NOV-21
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	02-NOV-21
Selenium (Se)-Total			<0.000050		mg/L		0.00005	02-NOV-21
Silver (Ag)-Total			<0.000050		mg/L		0.00005	02-NOV-21
Tin (Sn)-Total			<0.00010		mg/L		0.0001	02-NOV-21
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	02-NOV-21
Zinc (Zn)-Total			<0.0030		mg/L		0.003	02-NOV-21
WG3650202-5 MS		**WG3650202-6**						
Aluminum (Al)-Total			N/A	MS-B	%		-	02-NOV-21
Antimony (Sb)-Total			103.2		%		70-130	02-NOV-21
Arsenic (As)-Total			104.5		%		70-130	02-NOV-21
Cadmium (Cd)-Total			103.9		%		70-130	02-NOV-21
Chromium (Cr)-Total			105.9		%		70-130	02-NOV-21
Cobalt (Co)-Total			98.6		%		70-130	02-NOV-21
Copper (Cu)-Total			94.2		%		70-130	02-NOV-21
Lead (Pb)-Total			95.0		%		70-130	02-NOV-21
Manganese (Mn)-Total			N/A	MS-B	%		-	02-NOV-21
Molybdenum (Mo)-Total			105.9		%		70-130	02-NOV-21
Nickel (Ni)-Total			95.7		%		70-130	02-NOV-21
Selenium (Se)-Total			104.5		%		70-130	02-NOV-21
Silver (Ag)-Total			98.2		%		70-130	02-NOV-21
Tin (Sn)-Total			102.4		%		70-130	02-NOV-21
Titanium (Ti)-Total			N/A	MS-B	%		-	02-NOV-21
Zinc (Zn)-Total			83.9		%		70-130	02-NOV-21
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 R5636834								
WG3652338-3 DUP		**L2657843-1**						
Nonylphenol		<1.0	<1.0	RPD-NA	ug/L	N/A	30	05-NOV-21
Nonylphenol Monoethoxylates		<2.0	<2.0	RPD-NA	ug/L	N/A	30	05-NOV-21
Nonylphenol Diethoxylates		<0.10	<0.10	RPD-NA	ug/L	N/A	30	05-NOV-21
WG3652338-2 LCS								
Nonylphenol			95.4		%		75-125	05-NOV-21
Nonylphenol Monoethoxylates			98.2		%		75-125	05-NOV-21
Nonylphenol Diethoxylates			97.1		%		75-125	05-NOV-21
WG3652338-1 MB								
Nonylphenol			<1.0		ug/L		1	05-NOV-21
Nonylphenol Monoethoxylates			<2.0		ug/L		2	05-NOV-21
Nonylphenol Diethoxylates			<0.10		ug/L		0.1	05-NOV-21
WG3652338-4 MS		**L2657843-1**						
Nonylphenol			101.3		%		60-140	05-NOV-21
Nonylphenol Monoethoxylates			132.3		%		60-140	05-NOV-21
Nonylphenol Diethoxylates			97.1		%		60-140	05-NOV-21
OGG-SPEC-WT	**Water**							
Batch R5634283								
WG3650184-2 LCS								
Oil and Grease, Total			81.3		%		70-130	02-NOV-21
Mineral Oil and Grease			77.8		%		70-130	02-NOV-21
WG3650184-1 MB								
Oil and Grease, Total			<5.0		mg/L		5	02-NOV-21
Mineral Oil and Grease			<2.5		mg/L		2.5	02-NOV-21
P-T-COL-WT	**Water**							
Batch R5635098								
WG3650630-3 DUP		**L2657585-1**						
Phosphorus, Total		2.63	2.62		mg/L	0.3	20	03-NOV-21
WG3650630-2 LCS								
Phosphorus, Total			99.8		%		80-120	03-NOV-21
WG3650630-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	03-NOV-21
WG3650630-4 MS		**L2657585-1**						
Phosphorus, Total			N/A	MS-B	%		-	03-NOV-21
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 R5637631								
WG3653308-2 LCS								
Benzo(e)pyrene			85.0		%		60-130	08-NOV-21
1,3-Dinitropyrene			134.6	LCS-H	%		60-130	08-NOV-21
1,6-Dinitropyrene			91.9		%		60-130	08-NOV-21
Dibenz(a,h)acridine			85.5		%		60-130	08-NOV-21
1,8-Dinitropyrene			103.5		%		60-130	08-NOV-21
Dibenz(a,j)acridine			91.3		%		60-130	08-NOV-21
7H-Dibenzo(c,g)carbazole			95.2		%		60-130	08-NOV-21
Dibenzo(a,i)pyrene			95.6		%		60-130	08-NOV-21
WG3653308-1 MB								
Benzo(e)pyrene			<0.050		ug/L		0.05	08-NOV-21
1,3-Dinitropyrene			<1.0		ug/L		1	08-NOV-21
1,6-Dinitropyrene			<1.0		ug/L		1	08-NOV-21
Dibenz(a,h)acridine			<0.050		ug/L		0.05	08-NOV-21
1,8-Dinitropyrene			<1.0		ug/L		1	08-NOV-21
Dibenz(a,j)acridine			<0.050		ug/L		0.05	08-NOV-21
7H-Dibenzo(c,g)carbazole			<0.050		ug/L		0.05	08-NOV-21
Dibenzo(a,i)pyrene			<0.050		ug/L		0.05	08-NOV-21
Surrogate: d14-Terphenyl			98.4		%		40-130	08-NOV-21
PCB-WT	**Water**							
Batch R5635451								
WG3650278-2 LCS								
Aroclor 1242			120.4		%		65-130	03-NOV-21
Aroclor 1248			108.8		%		65-130	03-NOV-21
Aroclor 1254			109.8		%		65-130	03-NOV-21
Aroclor 1260			116.1		%		65-130	03-NOV-21
WG3650278-1 MB								
Aroclor 1242			<0.020		ug/L		0.02	03-NOV-21
Aroclor 1248			<0.020		ug/L		0.02	03-NOV-21
Aroclor 1254			<0.020		ug/L		0.02	03-NOV-21
Aroclor 1260			<0.020		ug/L		0.02	03-NOV-21
Surrogate: Decachlorobiphenyl			125.5		%		50-150	03-NOV-21
Surrogate: Tetrachloro-m-xylene			88.5		%		50-150	03-NOV-21
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 R5635915								
WG3651418-4 DUP		**WG3651418-3**						
pH		7.45	7.49	J	pH units	0.04	0.2	03-NOV-21
WG3651418-2 LCS								
pH			7.01		pH units		6.9-7.1	03-NOV-21
PHENOLS-4AAP-WT	**Water**							
Batch R5635191								
WG3650627-3 DUP		**L2657870-1**						
Phenols (4AAP)		0.0256	0.0257		mg/L	0.5	20	02-NOV-21
WG3650627-2 LCS								
Phenols (4AAP)			100.3		%		85-115	02-NOV-21
WG3650627-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	02-NOV-21
WG3650627-4 MS		**L2657870-1**						
Phenols (4AAP)			N/A	MS-B	%		-	02-NOV-21
SOLIDS-TSS-WT	**Water**							
Batch R5637265								
WG3652280-6 DUP		**WG3652280-7**						
Total Suspended Solids		10700	10900		mg/L	1.7	20	05-NOV-21
WG3652280-5 LCS								
Total Suspended Solids			99.3		%		85-115	05-NOV-21
WG3652280-4 MB								
Total Suspended Solids			<3.0		mg/L		3	05-NOV-21
TKN-F-WT	**Water**							
Batch R5635493								
WG3651030-3 DUP		**WG3651030-5**						
Total Kjeldahl Nitrogen		0.130	0.170	J	mg/L	0.040	0.1	03-NOV-21
WG3651030-2 LCS								
Total Kjeldahl Nitrogen			120.8		%		75-125	03-NOV-21
WG3651030-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	03-NOV-21
WG3651030-4 MS		**WG3651030-5**						
Total Kjeldahl Nitrogen			110.4		%		70-130	03-NOV-21
VOC-ROU-HS-WT	**Water**							
Batch R5635590								
WG3650933-4 DUP		**WG3650933-3**						
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	03-NOV-21
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	03-NOV-21

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 R5635590								
WG3650933-4 DUP		**WG3650933-3**						
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	03-NOV-21
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	03-NOV-21
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	03-NOV-21
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	03-NOV-21
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	03-NOV-21
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	03-NOV-21
m+p-Xylenes		<0.40	<0.40	RPD-NA	ug/L	N/A	30	03-NOV-21
o-Xylene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	03-NOV-21
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	03-NOV-21
Toluene		<0.40	<0.40	RPD-NA	ug/L	N/A	30	03-NOV-21
trans-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	03-NOV-21
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	03-NOV-21
WG3650933-1 LCS								
1,1,2,2-Tetrachloroethane			86.7		%		70-130	03-NOV-21
1,2-Dichlorobenzene			107.6		%		70-130	03-NOV-21
1,4-Dichlorobenzene			116.9		%		70-130	03-NOV-21
Benzene			112.6		%		70-130	03-NOV-21
Chloroform			111.6		%		70-130	03-NOV-21
cis-1,2-Dichloroethylene			103.9		%		70-130	03-NOV-21
Dichloromethane			122.8		%		70-130	03-NOV-21
Ethylbenzene			93.2		%		70-130	03-NOV-21
m+p-Xylenes			104.5		%		70-130	03-NOV-21
o-Xylene			90.5		%		70-130	03-NOV-21
Tetrachloroethylene			103.2		%		70-130	03-NOV-21
Toluene			95.5		%		70-130	03-NOV-21
trans-1,3-Dichloropropene			72.9		%		70-130	03-NOV-21
Trichloroethylene			106.3		%		70-130	03-NOV-21
WG3650933-2 MB								
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	03-NOV-21
1,2-Dichlorobenzene			<0.50		ug/L		0.5	03-NOV-21
1,4-Dichlorobenzene			<0.50		ug/L		0.5	03-NOV-21
Benzene			<0.50		ug/L		0.5	03-NOV-21
Chloroform			<1.0		ug/L		1	03-NOV-21
cis-1,2-Dichloroethylene			<0.50				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 R5635590								
WG3650933-2 MB								
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	03-NOV-21
Dichloromethane			<2.0		ug/L		2	03-NOV-21
Ethylbenzene			<0.50		ug/L		0.5	03-NOV-21
m+p-Xylenes			<0.40		ug/L		0.4	03-NOV-21
o-Xylene			<0.30		ug/L		0.3	03-NOV-21
Tetrachloroethylene			<0.50		ug/L		0.5	03-NOV-21
Toluene			<0.40		ug/L		0.4	03-NOV-21
trans-1,3-Dichloropropene			<0.30		ug/L		0.3	03-NOV-21
Trichloroethylene			<0.50		ug/L		0.5	03-NOV-21
Surrogate: 1,4-Difluorobenzene			101.7		%		70-130	03-NOV-21
Surrogate: 4-Bromofluorobenzene			91.8		%		70-130	03-NOV-21
WG3650933-5 MS		**WG3650933-3**						
1,1,2,2-Tetrachloroethane			79.6		%		50-150	03-NOV-21
1,2-Dichlorobenzene			103.7		%		50-150	03-NOV-21
1,4-Dichlorobenzene			113.6		%		50-150	03-NOV-21
Benzene			107.3		%		50-150	03-NOV-21
Chloroform			107.2		%		50-150	03-NOV-21
cis-1,2-Dichloroethylene			97.3		%		50-150	03-NOV-21
Dichloromethane			115.7		%		50-150	03-NOV-21
Ethylbenzene			87.1		%		50-150	03-NOV-21
m+p-Xylenes			99.7		%		50-150	03-NOV-21
o-Xylene			84.7		%		50-150	03-NOV-21
Tetrachloroethylene			98.7		%		50-150	03-NOV-21
Toluene			88.7		%		50-150	03-NOV-21
trans-1,3-Dichloropropene			64.8		%		50-150	03-NOV-21
Trichloroethylene			102.9		%		50-150	03-NOV-21

Quality Control Report

Workorder: L2657859 Report Date: 09-NOV-21

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.
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
RRQC	Refer to report remarks for information regarding this QC result.

Hold Time Exceedances:

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

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

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

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

www.alsglobal.com

L2657859-COFC

orm

COC Number: 20 - 893253

Page 1 of 1

WL

Report To	Contact and company name below will appear on the final report
Company:	Grounded Engineering
Contact:	Shelby Plant
Phone:	
	Company address below will appear on the final report
Street:	1 Barrigan Drive
City/Province:	Toronto/ON
Postal Code:	M4H 1G3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax splant@groundedeng.ca

Email 2 agelimforo@groundedeng.ca

Email 3

Invoice Recipients

Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax

Email 2

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs:

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

Project Information

ALS Account # / Quote #:	
Job #:	21-197
PO / AFE:	
LSD:	340 Dufferin Street

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): L2657859

ALS Contact: Sampler: DI

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	Toronto Sanitary/Storm	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	SW-UF-BH117	01-NOV-21	13:00	GW	20	X			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Toronto Sanitary/Storm Sewer set

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

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

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C			
1.8	9.2					

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Dave Issner	November 1, 2021	15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
Kuram	11/1/2021	15:34

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

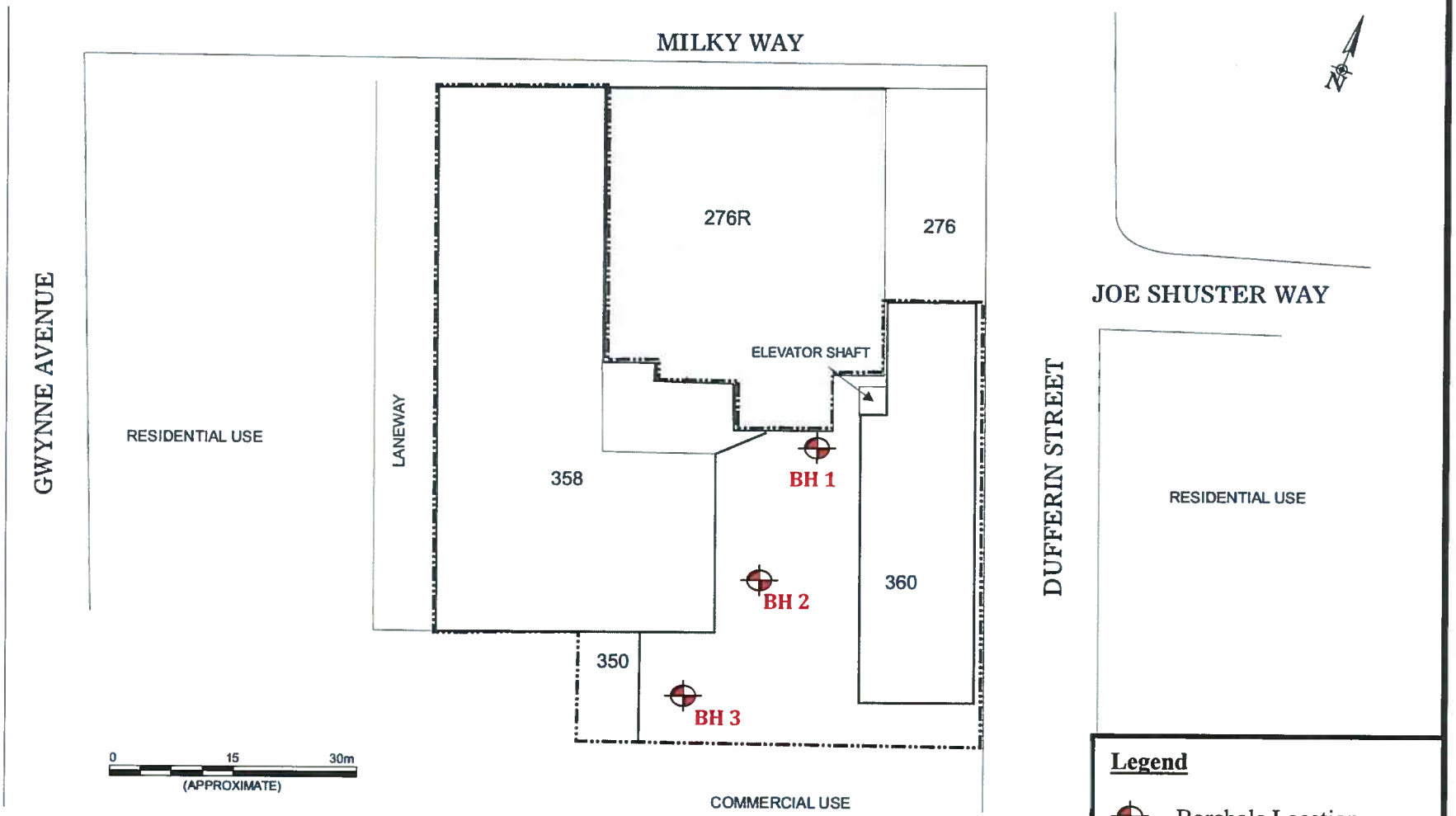
AUG 2020 FRONT

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

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

White Paper Co

APPENDIX F



Legend

Borehole Location (Approximate)

exp Services Inc.
1595 Clark Boulevard
Brampton, Ontario
L6T 4V1
Telephone: (905) 793-9800
Fax: (905) 793-0641

SCALE: As shown		**BOREHOLE LOCATION PLAN** **Preliminary Geotechnical Investigation** 350-360 Dufferin Street Toronto, Ontario	
DATE: February 2016			
DWN.: AA	**CHKD.:KL**	**PROJECT NO.:** MRK-00230785-A0-003	**DRAWING NO.:** 1

Log of Borehole 1

Project No. MRK-00230785-A0 | Drawing No. 2

Project: Preliminary Geotechnical Investigation | Sheet No. 1 of 1

Location: 350 - 360 Dufferin Street, Toronto, Ontario

Date Drilled: February 1, 2016

Drill Type: Hollow Stem Auger

Datum: Geodetic

Auger Sample ☒ | Combustible Vapour Reading □

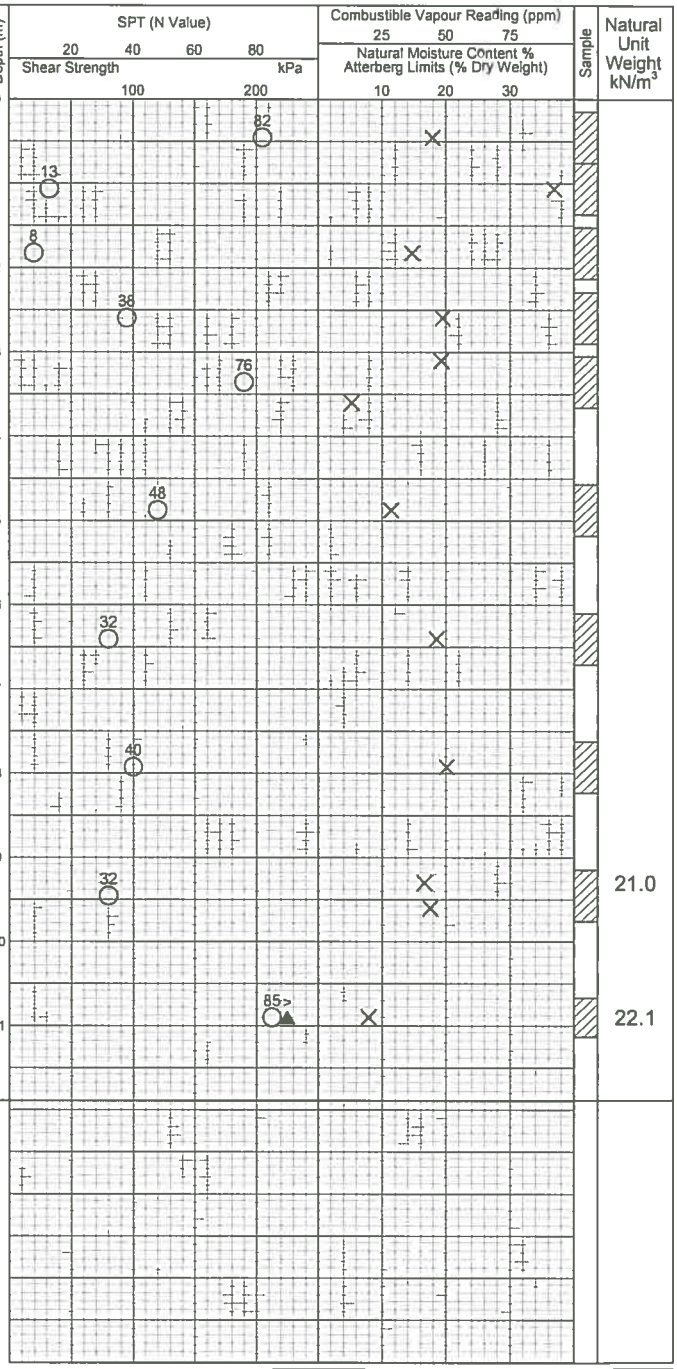
SPT (N) Value ○ ▨ | Natural Moisture ×

Dynamic Cone Test — | Plastic and Liquid Limit ⊢—○

Shelby Tube ■ | Undrained Triaxial at % Strain at Failure ⊕

Field Vane Test S | Penetrometer ▲

Groundwater	Soil/Rock Symbol	Soil Description	ELEV. m
		~50 mm **ASPHALT** over	93.48
		FILL - sand and gravel, trace cinders, occasional brick fragments, black, moist	92.9
		FILL - clayey silt, some sand, trace gravel, occasional wood fibre, black, moist **- slight hydrocarbon odour**	92.1
		FILL - silty sand, grey, moist **- hydrocarbon odour**	
		- hydrocarbon odour	90.3
		SAND - fine grained, trace silt seams and pockets, brown to grey, moist, dense to very dense	
		- becoming wet below ~5.5 m depth	
			85.0
		SILT TILL - some clay, trace gravel, trace sand pockets and silt seams, grey, moist, dense to very dense	
		Borehole Terminated on Auger Refusal End of Borehole	81.6



Notes:
1. Borehole advanced to completion at ~11.9 m depth by conventional soil sampling methods using a specialist drilling subcontractor. For borehole definitions, see notes prior to logs.
2. This drawing forms part of and must be read in conjunction with the subject report (Ref. No.: MRK-00230785-A0); borehole data requires interpretation assistance by exp professional staff before use by others.

exp. Brampton

Elapsed Time	Water Level (m)	Hole Open to (m)
On Completion	No Free Water	6.1
February 8, 2016	5.5	Well
February 10, 2016	5.5	Well

LAGWGL02EXP 230785A_BH_LOGS.GPJ NEW.GDT 2/18/16

Log of Borehole 2

Project No. MRK-00230785-A0

Drawing No. 3

Project: Preliminary Geotechnical Investigation

Sheet No. 1 of 1

Location: 350 - 360 Dufferin Street, Toronto, Ontario

Date Drilled: January 29, 2016

Drill Type: Hollow Stem Auger

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test ——
Shelby Tube ■
Field Vane Test S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit |—○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Groundwater	Soil/Rock Symbol	Soil Description	ELEV. m	Depth (m)
		~40 mm **ASPHALT** over ~210 mm **CONCRETE** over	93.21	0
		FILL - silty sand, some gravel, trace clay, black, moist	92.5	
		FILL - clayey silt, some sand, trace gravel, brown, moist	91.4	1
		SAND - fine grained, trace silt seams and pockets, oxidized zones, brown to grey, moist, compact to dense		2
				3
				4
				5
		- becoming wet below ~5.5 m depth		6
				7
			84.7	8
		SILT TILL - some clay, trace gravel, trace sand pockets and silt seams, grey, moist, dense to very dense		9
				10
				11
		- shale fragments at spoon tip		12
			80.0	13
		SHALE BEDROCK - interbedded with shaley limestone and limestone layers, highly weathered, grey	79.3	
		End of Borehole		

SPT (N Value): 20 40 60 80
Shear Strength kPa: 100 200
Combustible Vapour Reading (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SPT values: 7, 14, 25, 32, 32, 36, 46, 44, 50/150 mm, 92, 54/150 mm, 60/50 mm, 60/50 mm

Sample

Natural Unit Weight kN/m³: 22.9, 23.5

LAGWGL02EXP 230785A_BH_LOGS.GPJ NEW.GDT 2/18/16

Notes:
1. Borehole advanced to completion at ~13.9 m depth by conventional soil sampling methods using a specialist drilling subcontractor. For borehole definitions, see notes prior to logs.
2. This drawing forms part of and must be read in conjunction with the subject report (Ref. No.: MRK-00230785-A0); borehole data requires interpretation assistance by exp professional staff before use by others.

exp.
Brampton

Elapsed Time	Water Level (m)	Hole Open to (m)
On Completion	No Free Water	5.8

Log of Borehole 3

Project No. MRK-00230785-A0

Drawing No. 4

Project: Preliminary Geotechnical Investigation

Sheet No. 1 of 1

Location: 350 - 360 Dufferin Street, Toronto, Ontario

Date Drilled: January 29, 2016

Drill Type: Hollow Stem Auger

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test ——
Shelby Tube ■
Field Vane Test S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit |—○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Soil Description	ELEV. m	Natural Unit Weight kN/m³
~60 mm **ASPHALT** over ~250 mm **CONCRETE** over **FILL** - clayey silt, some sand, trace gravel, trace organics, brown to black, moist	93.28	
	91.5	19.6
SAND - fine grained, occasional silt seams, oxidized zones, brown to grey, moist, compact to dense		19.7
- becoming fine to medium grained and wet below ~5.5 m depth		
	84.8	
SILT TILL - some clay, trace gravel, trace sand pockets and silt seams, grey, moist, very dense		23.5
- shale fragments at spoon tip		
	79.9	
SHALE BEDROCK - interbedded with shaley limestone and limestone layers, highly weathered, grey		
	78.8	
End of Borehole		

Depth (m): 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

SPT (N Value): 20 40 60 80
Shear Strength kPa: 100 200
Combustible Vapour Reading (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SPT values: 9, 8, 14, 40, 36, 39, 27, 13, 88, 60/150 mm, 50/100 mm, 60/50 mm, 60/50 mm

Notes:
1. Borehole advanced to completion at ~14.5 m depth by conventional soil sampling methods using a specialist drilling subcontractor. For borehole definitions, see notes prior to logs.
2. This drawing forms part of and must be read in conjunction with the subject report (Ref. No.: MRK-00230785-A0); borehole data requires interpretation assistance by exp professional staff before use by others.

exp. Brampton

Elapsed Time	Water Level (m)	Hole Open to (m)
On Completion	No Free Water	6.6
February 8, 2016	5.2	Well
February 10, 2016	5.2	Well

LAGWGL02EXP 230785A_BH_LOGS.GPJ NEW.GDT 2/18/16

APPENDIX G

Excavation: 128 x 50 m

Section: N-S

P2 FFE: 84.6 m

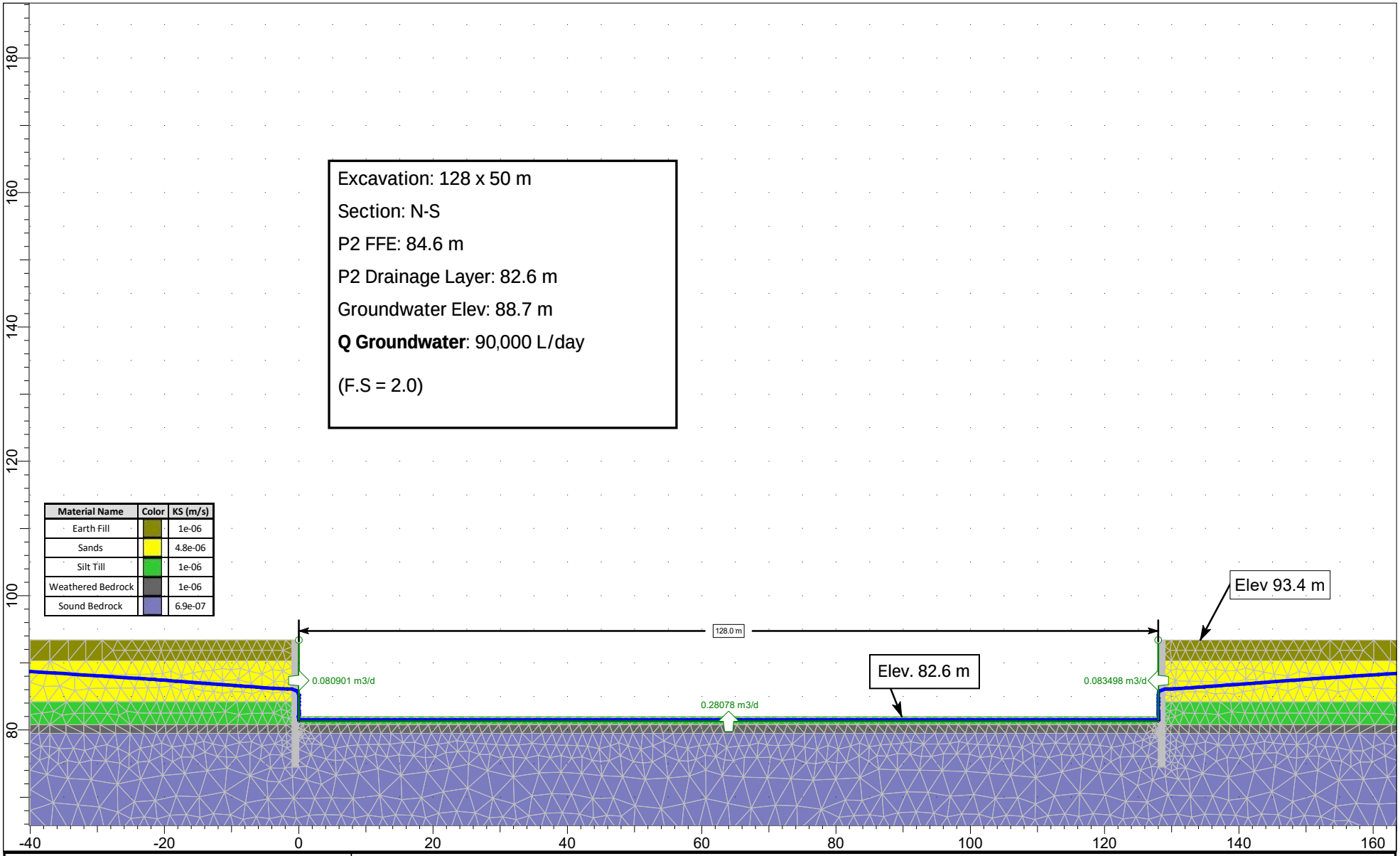
P2 Drainage Layer: 82.6 m

Groundwater Elev: 88.7 m

Q Groundwater: 90,000 L/day

(F.S = 2.0)

Material Name	Color	KS (m/s)
Earth Fill		1e-06
Sands		4.8e-06
Silt Till		1e-06
Weathered Bedrock		1e-06
Sound Bedrock		6.9e-07



GROUNDED ENGINEERING

SLIDEINTERPRET 9.019

Project	340 - 376 Dufferin Street, Toronto, Ontario		
Analysis Description	P2 Dewatering	*Model*	P2 Dewatering - Short Term | P2 Dewatering - Long Term with Caisson
Drawn By	AG	*Scale* 1:800	*Date* 2022-06-02
Source		*File Name*	21-199 FEM.slmd

Excavation: 128 x 50 m

Section: N-S

P2 FFE: 84.0 m

Base of Excavation: 82.6 m

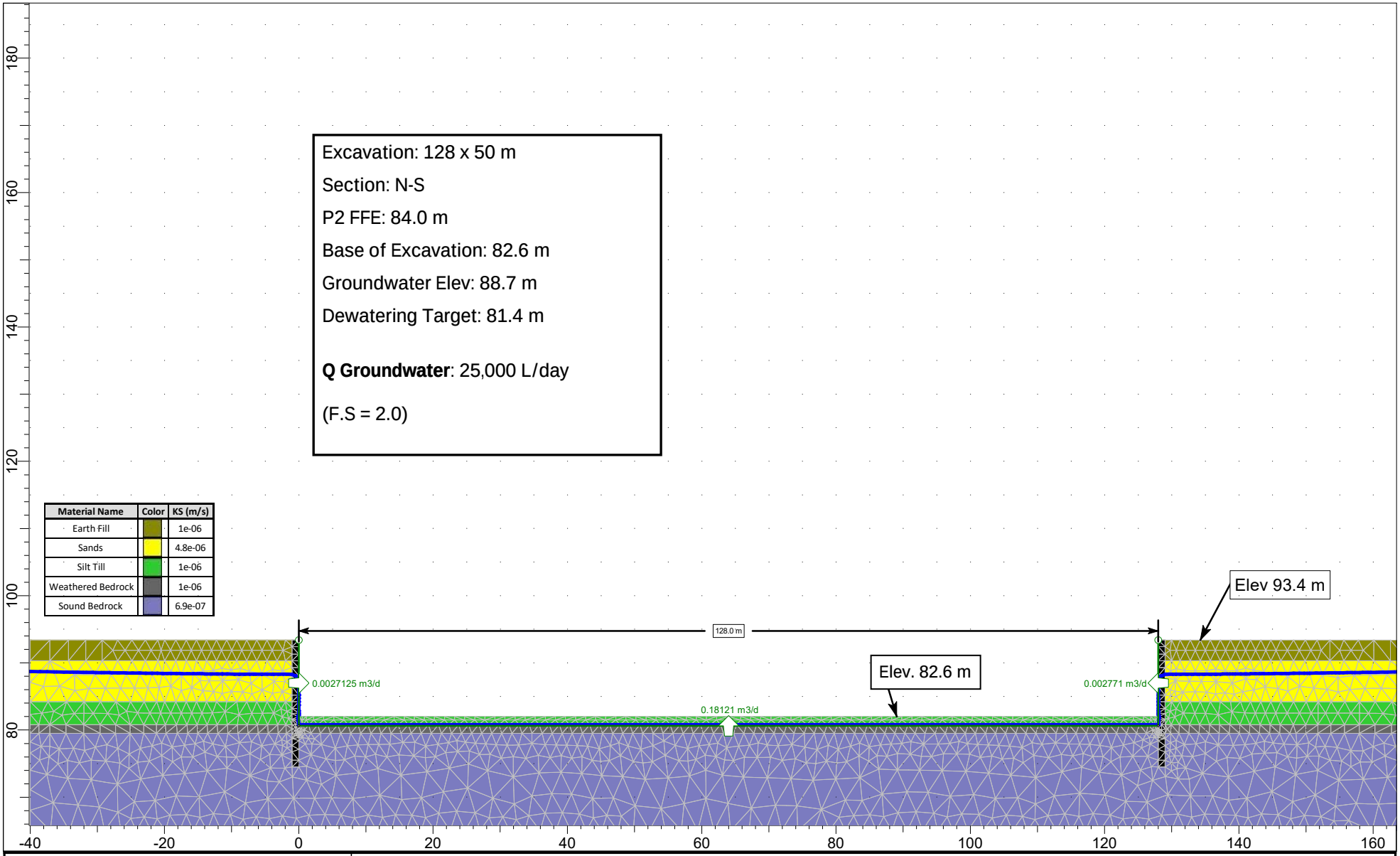
Groundwater Elev: 88.7 m

Dewatering Target: 81.4 m

Q Groundwater: 25,000 L/day

(F.S = 2.0)

Material Name	Color	KS (m/s)
Earth Fill		1e-06
Sands		4.8e-06
Silt Till		1e-06
Weathered Bedrock		1e-06
Sound Bedrock		6.9e-07



GROUNDED ENGINEERING

SLIDEINTERPRET 9.019

Project	340 - 376 Dufferin Street, Toronto, Ontario		
Analysis Description	P2 Dewatering	*Model*	P2 Dewatering - Short Term | P2 Dewatering - Short Term with Caisson
Drawn By	AG	*Scale* 1:800	*Date* 2022-06-02
Source		*File Name*	21-199 FEM.slmd

Excavation: 128 x 50 m

Section: N-S

P2 FFE: 84.6 m

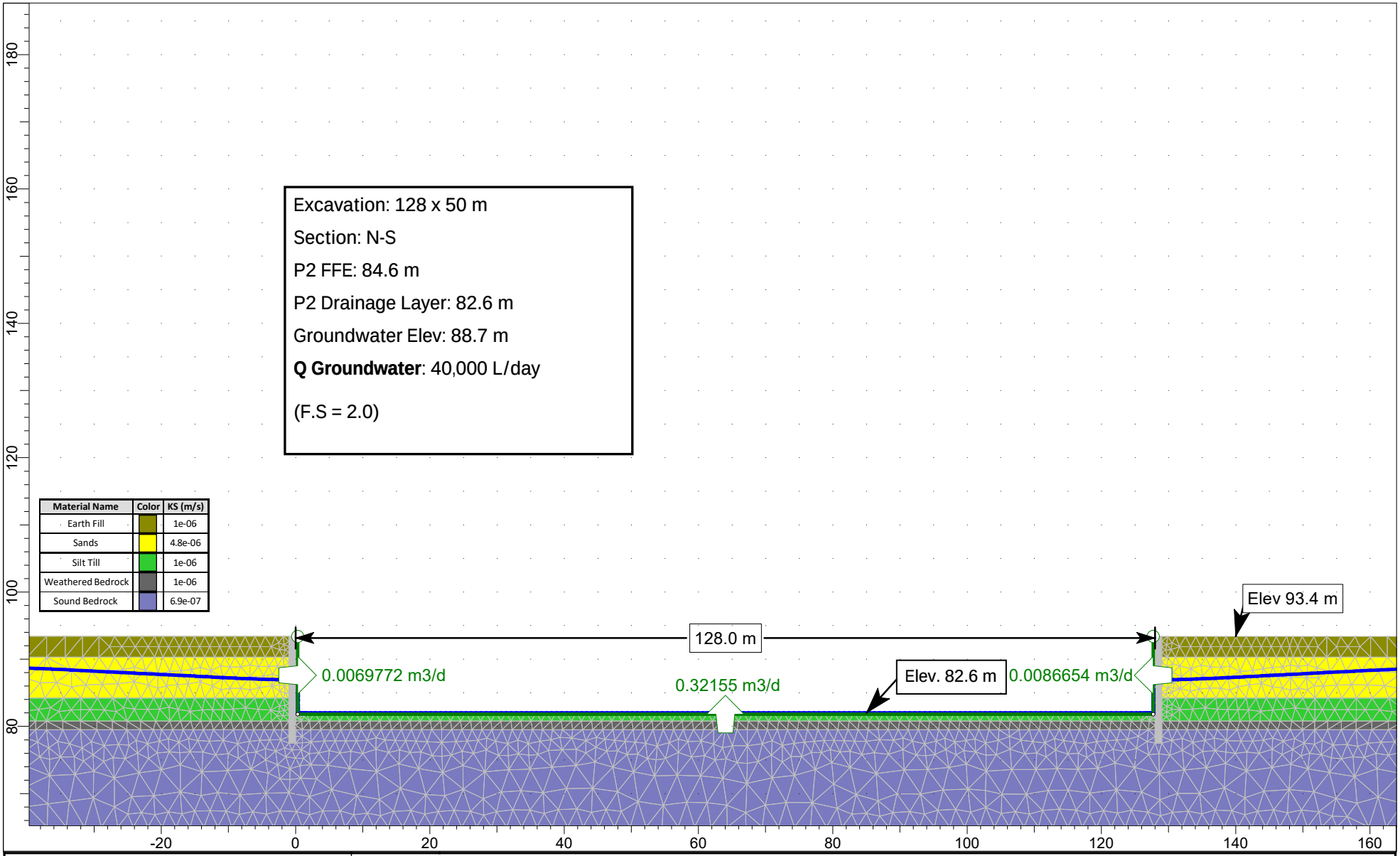
P2 Drainage Layer: 82.6 m

Groundwater Elev: 88.7 m

Q Groundwater: 40,000 L/day

(F.S = 2.0)

Material Name	Color	KS (m/s)
Earth Fill		1e-06
Sands		4.8e-06
Silt Till		1e-06
Weathered Bedrock		1e-06
Sound Bedrock		6.9e-07



GROUNDED ENGINEERING

File	**340 - 376 Dufferin Street, Toronto, Ontario**
Analysis	P2 Dewatering: Group 3, P2 Dewatering - Long Term with Caisson and Waterproofed Foundation Wall
Ref.	
RS2 File	21-199 FEM.slmd
Scale	1:800
Eng	AG

SLIDEINTERPRET 9.022

APPENDIX H

SHORT TERM - CAISSON SHORING

Excavation Dimensions [m]	
N-S	128
E-W	50
Area (m2)	6400
Perimeter (m)	356

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		0.18121	50	9,061
Sides		0.00277	356	986
(extra row if sides are different)			0	-
Total				10,047
Factor of Safety	2.0			20,093

Storm Events	
2 Year [L/day]	100 Year [L/day]
160,000	602,000

Summary	L/day	L/min
Groundwater	25,000	17.4
Rainfall	160,000	111.1
Total	185,000	128.5

LONG TERM - CAISSON SHORING

Excavation Dimensions [m]	
N-S	128
E-W	50
Area (m2)	6400
Perimeter (m)	356

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		0.28078	50	14,039
Sides		0.0835	356	29,726
(extra row if sides are different)			0	-
Total				43,765
Factor of Safety	2.0			87,530

Infiltration [L/day]
8085

Summary	L/day	L/min
Groundwater	90,000	62.5
Infiltration	9,000	6.3
Total	99,000	68.8

LONG TERM - CAISSON SHORING WITH WATERPROOFED FOUNDATION WALLS

Excavation Dimensions [m]	
N-S	128
E-W	50
Area (m2)	6400
Perimeter (m)	356

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	0.32155	50	16,078
Sides	8.67E-03	356	3,085
(extra row if sides are different)		0	-
Total			19,162
Factor of Safety 2.0			38,324

Infiltration [L/day]
8085

Summary	L/day	L/min
Groundwater	40,000	27.8
Infiltration	9,000	6.3
Total	49,000	34.0