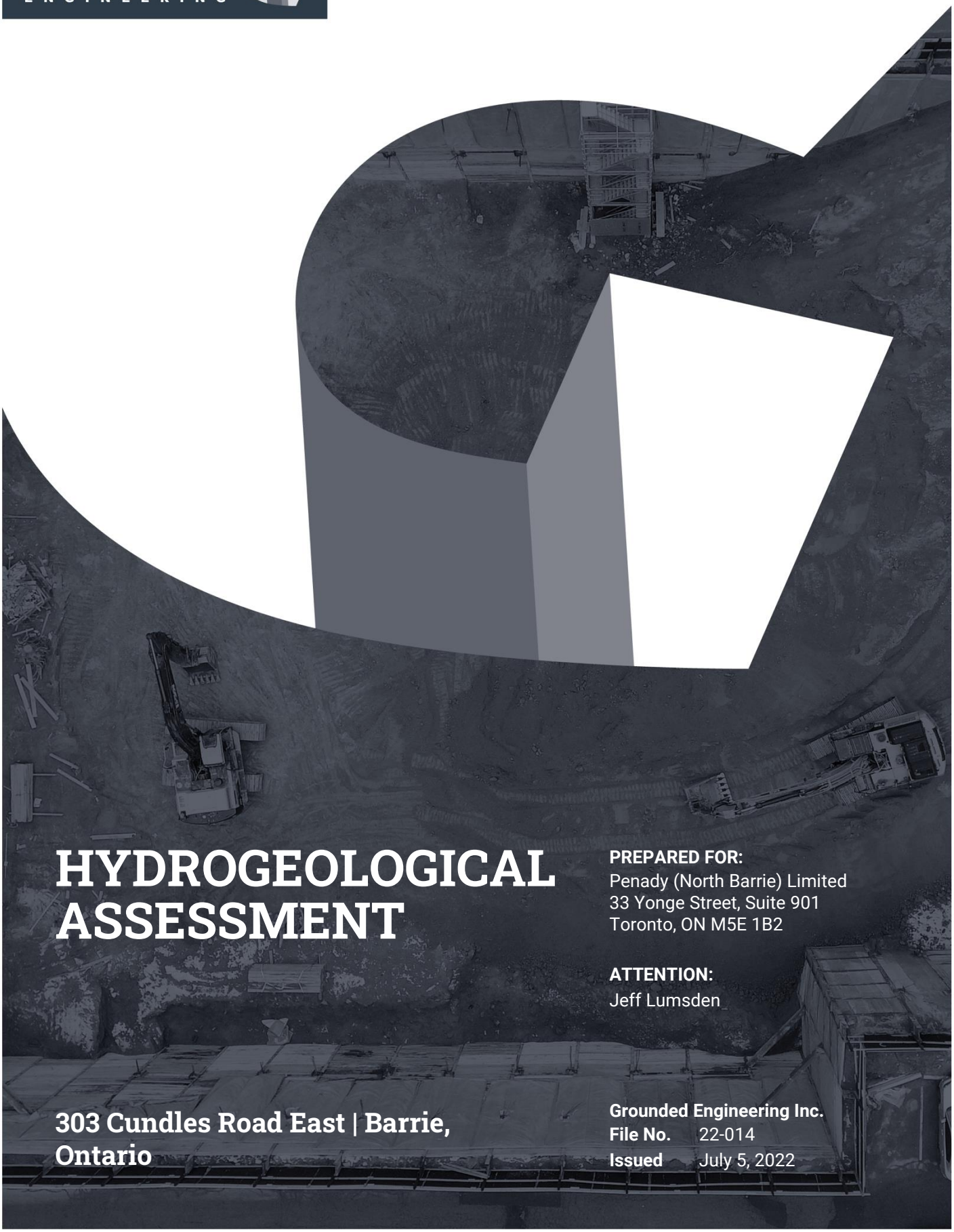

HYDROGEOLOGICAL ASSESSMENT

PREPARED FOR:
Penady (North Barrie) Limited
33 Yonge Street, Suite 901
Toronto, ON M5E 1B2

ATTENTION:
Jeff Lumsden

303 Cundles Road East | Barrie, Ontario

Grounded Engineering Inc.
File No. 22-014
Issued July 5, 2022

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1 Introduction

1.1 Background

Penady (North Barrie) Limited retained Grounded Engineering Inc., to complete a Hydrogeological Assessment for the property located at the municipal address of 303 Cundles Road East, Barrie, Ontario (the Property). The site location is presented in Figure 1.

Based on the Site Plan dated January 19, 2022 prepared by SRN Architects, it is understood that the Property will be developed with three (3) residential structures (Buildings B1, B2, and B3) ranging from 7 to 12 storeys. Buildings B1 and B2 have a common underground parking level with at a lowest (P1) level set at 3.6 m below Level 1, located at ground surface. Building B3 has two underground parking levels, with the lowest (P2) level set at 6.4 m below Level 1, located at ground surface. The hydrogeological assessment has been prepared for the Zoning by-law Amendment application per the requirement of the City of Barrie. The Site Plan is provided in Appendix A.

The hydrogeological assessment was undertaken to evaluate hydrogeological conditions at the Property for the existing and proposed development and to develop a plan to manage risk of potential impacts associated with activities related to the proposed land use.

1.2 Scope of Work

A summary of the scope of work is provided below:

- Background Information Review: Review of available background geologic and hydrogeological information for the Property and surrounding areas. This included a review of the Ministry of the Environment, Conservation and Parks (MECP) well records, watershed information by the Nottawasaga Valley Conservation Authority (NVCA)
- Private Well Survey: A well survey was conducted for properties within 500 m of the Property.
- Groundwater Level Monitoring: Groundwater level monitoring was conducted in order to assess the groundwater flow conditions.
- Hydraulic Conductivity Test: In-situ hydraulic conductivity test(s) were conducted in select monitoring wells to assess hydraulic conductivity of the strata. The soils were assessed in order to determine potential dewatering requirements.
- Water Balance: A water balance and assessment of infiltration rates for existing (pre-development) and post development conditions was completed to determine the feasibility of the proposed development.

2 Site Information

2.1 Site Location and Description

The Property is irregular in shape, with a total area of approximately 1.9 ha. The Property is currently an undeveloped plot of land, with soil and vegetation cover. It is understood that the Property will be developed with three (3) residential structures (Buildings B1, B2, and B3) ranging from 7 to 12 storeys. Buildings B1 and B2 have a common underground parking level with at a lowest (P1) level set at 3.6 m below Level 1, located at ground surface. Building B3 has two underground parking levels, with the lowest (P2) level set at 6.4 m below Level 1, located at ground surface. The general site features are presented in Figure 2.

Building Name	Level 1 Elev. (m)	Lowest Floor Level	Lowest FFE (m)
B1 and B2	256.5	P1	252.9
B3	256.5	P2	250.1

The Property is not currently serviced, but the immediate neighboring areas are serviced with municipal piped water and sewage services. The neighbouring properties are a mixture of commercial and residential use properties.

The Property information is provided below:

Municipal Address	303 Cundles Road East, Barrie, Ontario
Area	1.93 ha
Legal Description	**PIN 58830-0110 (LT):** PT LT 21 CON 3 VESPRA BEING PTS 17, 18, 33 & 34 51R35759, SUBJECT TO EASEMENT OVER PTS 33 & 34 51R35759 AS IN RO1200479, SUBJECT TO EASEMENT OVER PT 3 51R38283 AS IN SC1028774; SUBJECT TO AN EASEMENT AS IN SC1271000; SUBJECT TO AN EASEMENT IN GROSS AS IN SC1272960; CITY OF BARRIE PIN **PIN 58830-0113 (LT)**: PT LT 21 CON 3 VESPRA, PTS 2, 3 & 4 PL 51R35759, EXCEPT PARTS 1,2,3,4 PLAN 51R40672; SUBJECT TO AN EASEMENT AS IN SC1271000; SUBJECT TO AN EASEMENT IN GROSS AS IN SC1272960; SUBJECT TO AN EASEMENT IN GROSS OVER PART 2 PLAN 51R38283 AS IN SC1028774; CITY OF BARRIE
UTM Coordinates	UTM Zone 17, 605028 E, 4918657 N
Current Land Use	The property is zoned General Commercial C4 (SP-520 & SP530)
Property Owner Information	Penady (North Barrie) Limited
Person who has engaged the Qualified Person to conduct the assessment	Jeff Lumsden, PenEquity Realty Corporation

2.2 Topography & Drainage

The Ministry of Natural Resources and Forestry (MNRF) and Ministry of Energy, Northern Development and Mines (MENDM) database were searched to obtain topographic and geological maps of Ontario for review. The maps are provided in Appendix B and the information obtained are summarized below:

Records	Information
Topographic Maps	Ground surface at the site ranges between Elev. 254 masl and 260 masl, sloping northeast, towards Little Lake.
Hydrology	The nearest waterbody is an unnamed creek located approximately 335 m north of the Property and which feeds into the wetlands and connect to Little Lake. Locally, surface water and groundwater are expected to flow east/northeast towards Little Lake locally and south towards Lake Simcoe regionally.
Run Off	Storm water at the Property is currently expected to infiltrate throughout the site and drain towards the standing pool in the middle of the site and catch basins along the roadways bordering the site to the north and east.

2.3 Regional Physiography

From a regional perspective the Property is situated within the physiographic feature known as the Till Plains (Drumlinized).

The South Georgian Bay-Lake Simcoe Source Protection Committee summarizes the regional hydrology of the Nottawasaga Valley Watershed in the 2015 Approved Assessment Report: Nottawasaga Velley Source Protection Area. The Nottawasaga Valley Watershed is located within four (4) regional-scale physiographic regions as defined by Chapman and Putnam (1984). These regions include the Horseshoe Moraines, Peterborough Drumlin Field, Simcoe Lowlands and the Simcoe Uplands (Chapman and Putnam, 1984).

The Property is located within Nottawasaga Valley Source Protection Area. and more specifically within the Willow Creek Subwatershed which covers an area of approximately 339 m^2. The subwatershed is approximately 45 km long. Willow Creek generally drains towards the southwest, to Little Lake, located approximately 925 m northeast of the Property. The Willow Creek subwatershed is divided into two landform types: the Simcoe Uplands, which covers approximately two-thirds of the area and the Simcoe Lowlands covering the rest. Both were formed during the late stages of continental glaciation and the postglacial lacustrine activities of Lake Algonquin.

The following is a brief description of the physiographic regions found within the Willow Creek subwatershed.

<u>Simcoe Uplands</u>

The Simcoe Uplands comprise of a series of broad, rolling drumlinized till plains that are separated by numerous steep-walled, flat-floored valleys. The uplands occupy a total surface area of 1 035 km2 and are located south of the community of Barrie, north of Alliston and in the northern portions of Oro-Medonte and Springwater Townships. The Uplands are commonly encircled by numerous shorelines and other morphological features associated with glacial Lake Algonquin and its successors. The Oro Moraine is located within the Simcoe uplands physiographic regime extending from Midhurst to Bass Lake.

Simcoe Lowlands

The Simcoe Lowlands physiographic region ranges in elevation from 265 meters above sea level (masl) near Orangeville to 176 masl at Wasaga Beach (AquaResources and Golder Associates, 2009). Morphologically, this region is characterized by flat, lowlying plains composed of silts, clays and fine to medium-grained sands deposited within glacial Lake Algonquin (about 12,500 years ago). The Georgian Bay fringe occupies the areas of Nottawasaga, Wasaga Beach and the Townships of Tiny and Tay. It is characterized by sand dunes and boulder beaches cut into till headlands in Wasaga Beach (AquaResources and Golder Associates, 2009).

The Property is located within the till plains of the Simcoe Uplands landform of Willow Creek. The source protection area and watershed are presented in Appendix C.

2.4 Regional Geology and Soils

Based on the published information, the regional geology is described as below.

Records	Information
Geological Maps	Overburden: The overburden soils are classified as 5b Till composed of stone-poor sandy silt to silty sand-textured till on Paleozoic terrain. Bedrock: The bedrock in the area is composed of limestone, dolostone, shale, arkose and sandstone. It is classified as Shadow Lake Formation bedrock. Depth to Bedrock: Bedrock elevation is estimated to be approximately 121 masl, approximately 144 mbgs.

It should be noted that the subsurface soil and rock conditions described above represent generalized conditions only and should not be considered site specific. Maps from the Ontario Geological Survey are presented in Appendix E.

2.5 Regional Hydrogeology

A 2009 interim report from AquaResources and Golder Associates has concluded that the Nottawasaga Valley watershed can be lumped into four regional principal aquifer units.

Aquifer A1

The A1 aquifer is typically found at an elevation of 250 masl; however, it has been mapped as low as 220 masl in lowland areas, and as high as 350 masl in some regions. This aquifer exists mainly as an unconfined surficial aquifer; however; it can be locally confined. It is composed of coarse-grained glacial and interglacial sediments. A1 has a unit thickness ranging from 10-50 m. Overall this aquifer is a recharge unit.

Aquifer A2

The A2 aquifer is typically found at elevations between 180- 250 masl; however, it has been mapped as low as 150 masl in some lowland areas. This aquifer can be absent or very thin in valleys, or very thick in upland areas. In Wasaga beach, Stayner and Angus the aquifer is unconfined. In the Thorton area this aquifer has been combined with the A1 aquifer and is locally known as the Thorton aquifer. This aquifer is typically used for private well water supply.

Aquifer A3

The A3 aquifer is typically found at elevations between 130-210 mASL. It is composed of medium to coarse-grained sediments, with some gravel and silt layers. This unit is generally 35 m thick; however, north of the Oro moraine this unit is found up to 70 m thick. This aquifer supplies water to Alliston, Angus, Barrie, Colgan, Horseshoe Valley, Midhurst, Orillia, Stroud, Tottenham and Wasaga Beach.

Aquifer A4

The A4 aquifer is typically found at elevations below 150 masl. In the Barrie area this aquifer is characterized by deep tunnel channel sediments. It is composed of medium sized coarse-grained sand and gravel. When defined as a regional unit in the Alliston-Tottenham area the aquifer is thinner and composed of a finer grained sand or silty sand mix.

The regional groundwater flow for the shallow and deep aquifers generally follows the topography and surface drainage. Groundwater drainage in Simcoe County is generally towards the Nottawasaga River and its tributaries, or towards the Georgian Bay.

Based on the elevation and location of the Property, and its proximity to Little Lake, it is anticipated that all four aquifers are present underneath the Property. The lowest finished floor level of the proposed development is at 250.1 masl which is within the A1 Aquifer and possibly the A2 Aquifer.

2.6 Regional Climate

The following general climate data for the Property was obtained from Willow Creek Subwatershed Plan, dated December 2001 (Section 3.1.2.2).

Mean annual precipitation (mm/yr.)	926 mm
Mean annual evapotranspiration	576 mm
Mean annual water surplus	350 mm

The precipitation and evapotranspiration data are based on data provided in the Willow Creek Subwatershed Plan. As the property is covered by soft scape (dirt and vegetation), the mean annual water surplus will be the difference between precipitation and evapotranspiration. It is noted that the above are average values, which are representative in a regional context. There will be seasonal and annual variations in these values. However, the average values will govern long-term groundwater recharge and discharge rates. Therefore, average values are appropriate for assessment of hydrogeologic conditions at the site.

2.7 Groundwater Resources

Private well records from the MECP well record database was reviewed for wells located within 500 m radius of the Property. A total of forty-four (44) well records were retrieved from the well record database. The MECP well record is presented in Appendix D. A summary of data obtained is presented in the following table.

Total Number of Wells	**44**
Wells completed in Overburden	30 (68%)
Bedrock	0 (0%)
Unknown	14 (32%)
Depth Ranges	
50 ft. or less	12 (28%)
51 ft. to 100 ft.	1 (2%)
101 to 200 ft.	5 (11%)
Unknown	26 (59%)
Water Use	
Monitoring/Test Holes	21 (48%)
Water Supply (domestic/public/livestock)	7 (16%)

Unknown/Not Used	16 (36%)

The above summary indicates that most local wells registered in the area obtain their water supply from the A1-A3 overburden aquifers based on their depths. The wells are generally used as domestic water supply or for groundwater monitoring. Well records indicate most of the wells were 50 ft deep or less. No municipal wells were located within the Study Area, but it is noted that the closest municipal wells, are installed within the upper part of Aquifer 3 (Well 16, located 1.3 km north) and within the centre of the combined A3/A4 Aquifer (Wells 9 and 13, located 2.14 km southeast).

2.8 Private Well Survey

A house to house water well survey within 500 m of the Property was completed on April 12, 2022 to characterize the groundwater condition. Based on the private well survey, it was concluded that no sites within a 500 m radius of the Property was on private well water. The results of this inspection are as follows:

- Fire hydrants were observed along the streets in the Study Area.
- Resident buildings within residential subdivisions were using municipally supplied water as evidenced by water curb stops in lawns and driveways.
- No domestic water wells were observed at the Property or within the Study Area.
- Fire hydrants were observed along the street at all locations where the seven (7) domestic wells were identified in the MECP well records.

The Property is located in a developed area of Barrie, Ontario, and all properties are municipally serviced. A private well survey letter was distributed to residents within the 500 m Study Area during the inspection and is included in Appendix N. No responses were received.

2.9 Subsurface Investigation

A subsurface investigation was conducted by Grounded Engineering at the Property between February 24 and March 10, 2022. The field investigation is as below. Borehole logs are presented in Appendix F. The locations of the boreholes are shown on Figure 2A and Figure 2B. A cross sections is shown in Figure 4.

Boreholes	BH1 to BH12
Monitoring Wells	BH1, BH2, BH4, BH6, BH8, BH10, BH11, BH12
Well Depth (mbgs)	9.1 – 15.2

The stratigraphy beneath the investigated areas of the Property generally consists of the following:

Geological Units	Description
Topsoil	All boreholes (except Borehole 7 and Borehole 11) encountered topsoil at ground surface, ranging in thickness between 100 and 150 mm.
Earth Fill	Underlying the surficial materials (where observed), the boreholes observed a layer of earth fill that extends to depths of 0.8 to 4.6 metres below grade (Elev. 257.4 to 250.2 metres). The earth fill varies in composition but generally consists of silty sand to clayey silt. It contains gravel, rootlets, wood fragments, asphalt, and brick fragments. The earth fill varies in colour from brown, to brown with orange, to dark brown and black. It is moist to wet. Due to inconsistent placement and the inherent heterogeneity of earth fill materials, the relative density of the earth fill varies but is on average compact.
Upper Glacial Till	Underlying the fill materials, all the boreholes encountered an undisturbed native glacial till deposit. The till matrix varies widely and consists of both cohesionless sandy silt to silty sands, which are also clayey, as well as cohesive clayey silts that are also sandy. These soils are grouped together for engineering purposes as the “upper till unit”. This unit was encountered at 0.8 to 4.6 metres below grade (Elev. 257.4 to 250.2 m) and extends down to depths of 3.0 to 9.1 m below grade (Elev. 253.9 to 245.4 m). The upper till is generally brown with orange or orangey brown, to grey, and moist. There are occasional wet sandy seams within the till.
Sands and Silts	Underlying the upper till unit, all boreholes encountered undisturbed deposits of cohesionless sands and silts (sand, to silty sand, and sandy silt). These soils are grouped together as the “sands and silts” unit. This unit was encountered at 2.3 to 9.1 metres below grade (Elev. 254.5 to 245.4 m) and extends down to depths greater than 9.4 to 15.8 m below grade (Elev. 240.1 to 247.4 m) where the base of the unit was encountered. In Borehole 4, the clays and silts unit is interbedded within the sands and silts between Elev. 245.1 m and Elev. 242.2 m. This indicates that the sands and silts unit may also extend below the base of the lower clays and silts. Boreholes 4, 5, 6, 7, 8, 9, and 10 were terminated in this unit. The sands and silts unit is generally grey, and wet. It contains trace rock fragments and inferred cobbles.
Clays and Silts	Underlying the sands and silts unit, Boreholes 1, 2, 3, 4, 11, and 12 encountered a native deposit of cohesive clays and silts (clay and silt to silt and clay). These soils are grouped together as the “clays and silts” unit. This unit contains trace sand and light grey silt partings. This unit was encountered at 9.1 to 13.7 metres below grade (Elev. 247.4 to 242.3 m). Boreholes 1 to 3, 11, and 12 were terminated at target investigation depth in this unit.
Bedrock	Bedrock was not encountered up to the maximum depth of the investigation.

2.10 Groundwater Level Monitoring

A total of eight (8) monitoring wells were installed at the Property. Groundwater level measurements were taken on April 12, May 6 and June 14, 2022 as part of the hydrogeological assessment. Groundwater monitoring events will continue monthly until March 2023, to complete a year of groundwater monitoring events.

Observations pertaining to the depth of the water level and caving were made in the open boreholes immediately after completion of drilling and are reported on the borehole logs. The

measured water level along with other boreholes detailed are presented in Appendix F. Groundwater levels are summarized in the following table:

Well ID	Ground Elevation (masl)	Well Screen Elevation (masl)	Water Level (mbgs/masl)		
			Apr 12, 2022	May 6, 2022	June 14, 2022
1	256.0	245.3 - 242.3	4.0 / 252.0	4.0 / 252	4.0 /252
2	254.5	245.3 - 242.3	3.8 / 250.7	3.7 / 250.8	3.8 / 250.7
4	255.9	242.2 - 240.6	0.9 / 255.0	0.9 / 255.0	1.0 /254.9
6	255.6	248.0 - 244.9	1.0 / 254.6	0.8 / 254.8	1.0 / 254.6
8	258.2	250.5 - 247.5	2.5 / 255.7	2.5 / 255.7	2.6 / 255.6
10	256.2	248.6 - 245.6	1.3 / 254.9	1.3 / 254.9	1.4 / 254.8
11	258.5	244.8 - 243.3	2.3 / 256.2	2.2 / 256.3	2.4 / 256.1
12	256.8	250.7 - 247.7	1.9 / 254.9	1.7 / 255.1	1.8 / 255

mbgs: meter below ground surface
masl: meter above sea level
- : monitoring wells not observed/accessed

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.

The design groundwater table for engineering purposes is at Elev. 256.3± m in the south portion of the site (for footprint of buildings B1 and B2), and Elev. 255.0± m in the north portion of the site (for building B3). The sands and silts unit has high permeability and will yield free-flowing water when penetrated. There is also infiltrated stormwater perched in the earth fill.

Groundwater levels may be influenced by climatic variations, seasonal fluctuations and presence of underground services and structures.

2.11 Groundwater Quality

Groundwater samples were obtained from one (1) monitoring well on-site and submitted for laboratory analysis on March 16, 2022. The monitoring well was completed in the Sands and Silts. The sample was analyzed with respect to the Barrie Sanitary Sewer and Barrie Storm Sewer Criteria. The results of the groundwater testing are presented in Appendix H and summarized below.

Barrie Sewer By-Law (2012-172)	Exceedance
Limits for Sanitary Sewer Discharge	No exceedances of the Sanitary Sewer Criteria were noted
Limits for Storm Sewer Discharge	• Total Suspended Solids (Limit 15 mg/L, Result 15.8 mg/L) • Biochemical Oxygen Demand (Limit 15 mg/L, Result 43.2 mg/L)

Additional treatment will be required before the water can be discharged to the Storm Sewer to avoid impacts to the City's sewage works caused by groundwater quality. Additional treatment will not be required before the water can be discharged to the Sanitary and Combined Sewer. Additional permissions may be required from the City of Barrie to discharge to the Sanitary and Combined Sewers.

2.12 Hydraulic Conductivity

2.12.1 In Situ Permeability Test (Single Well Response Test)

In situ single well response tests (SWRT) were conducted on five (5) monitoring wells between March 12 and April 28, 2022, to assess the hydraulic conductivity of the underlying soil. The monitoring wells were installed in the Sands and Silts layer and the underlying Clays and Silts layer. The tests were conducted by drawing down the water levels (rising head test).

Data from the SWRT were analyzed using the Bower and Rice method. The table below summarized the results of the hydraulic conductivity testing. The analysis graphs of the tests are presented in Appendix I.

Monitoring Well	Hydraulic Conductivity (m/s)	Well Screen Strata
BH1	7.3×10^{-8}	Clays and Silts
BH4	1.0×10^{-6}	Sands and silts
BH6	2.3×10^{-6}	Sands and silts
BH10	1.2×10^{-5}	Sands and silts
BH12	2.0×10^{-6}	Sands and silts

Based on the SWRT analysis, the hydraulic conductivity of the underlying soil is 7.3×10^{-8} m/s for the clays and silts and ranges between 1.0×10^{-6} to 1.2×10^{-5} m/s.

2.12.2 Grain Size Analysis

Grain size analyses were conducted on representative soil samples through sieve and hydrometer analysis. The analysis is summarized below and presented in Appendix G.

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. The result of the analysis is also presented in Appendix G.

Borehole No. Sample No.	Sampling depth (mbgs)	Percentage				Hydraulic Conductivity* (m/s)	Description (MIT System)
		Gravel	Sand	Silt	Clay		
BH1 SS10	10.9	0	10	55	35	1.1×10^{-9}	Clayey silt, some sand, trace gravel
BH2 SS6	4.9	11	33	34	23	7.9×10^{-9}	Sand and Silt, clayey, some gravel
BH2 SS11	12.5	0	1	39	60	7.5×10^{-11}	Clay and Silt, trace sand
BH4 SS5	3.4	8	49	28	15	9.5×10^{-8}	Silty Sand, some clay, trace gravel
BH5 SS4	2.6	6	53	24	16	9.2×10^{-8}	Silty Sand, trace clay, trace gravel
BH6 SS9	9.4	0	88	9	3	2.9×10^{-5}	Sand, trace silt, trace gravel, trace clay
BH9 SS6	4.9	1	74	19	6	2.0×10^{-6}	Sand, some Silt, trace clay, trace gravel
BH11 SS7	6.3	9	54	30	7	5.6×10^{-7}	Silty Sand, trace gravel, trace clay
BH11 SS13	15.5	0	1	43	56	1×10^{-10}	Clay and Silt, trace sand
BH12 SS10	11	0	1	57	42	5.5×10^{-10}	Silt and Clay, trace sand

Hydraulic Conductivity based on a geometric mean of the applicable analytical methods using the HydrogeoSieve tool

Based on the in-situ testing and grain size analysis, the underlying soils at the Property are of moderate permeability within the limits of the excavation and low permeability soils more than 10 m below the deepest excavation (Elev. 240 ±m).

Building Name	Base of Excavation (masl)	Soils encountered
B1 and B2	252.4	Fill, Upper Tills, Sands and Silts
B3	249.6	Fill, Upper Tills

2.13 Infiltration Testing

On April 12, 2022, a representative of Grounded attempted four (4) in-situ infiltration tests in two (2) locations, using a Guelph Permeameter. While conducting the infiltration tests, it was found that soils at the Property as shallow as 0.3 mbgs were saturated/partially saturated. The infiltration tests were carried out in accordance with the methodology recommended by the Toronto Region Conservation Authority (TRCA). The soils at test location GP1 were completely saturated and could not be used to determine the infiltration rates of the underlying soils. The locations of the infiltration tests are presented on Figures 2A & 2B.

The results of the infiltration tests are provided in Appendix H and are summarized below:

Test Location	Ground Surface Elev. (masl)	Approx. Test Depth (mbgs)	Approx. Test Elev. (masl)	Soil Description	Test Type	Field Saturated Hydraulic Conductivity (m/s)	Infiltration Rate (mm/hr)	Factored Infiltration Rate* (mm/hr)
GP1	256.6	0.3	256.3	Sand, some gravel, some silt, trace clay	Guelph Permeameter	-	-	-
					T-Time	-	32	4
GP2	255.4	0.3	255.1	Silty sand, some clay, come gravel	Guelph Permeameter	1.9×10^{-6}	55	6
					T-Time	-	30	4

*A Factor of Safety of 8.5 has been applied to the measured rates, as determined by TRCA guidelines.

A high groundwater table was observed during the Guelph Permeameter Testing conducted on the Development Limit. The soils were saturated below grade during the time of testing and on other inspections in dry-weather conditions. The testing in this area was therefore unsuccessful and an infiltration rate for the Earth Fill could not be determined. Furthermore, the infiltration rate of the underlying Upper Tills also could not be tested due to these saturated conditions. If an LID measure is proposed on the proposed development, the grade may have to be raised to accommodate.

2.14 Surface Water Features

A site inspection was conducted to assess the presence of surface water features on/or bounding the Property. The inspection includes the following:

- Inspection of surface and groundwater interactions and associated features
- Inspection of areas of actual and potential groundwater discharge
- Inspection of swales and drainage courses
- Evidence of phreatophytic vegetation, which may indicate seasonally high groundwater levels and/or groundwater discharge and seepage

The site inspection was conducted on November 19, 2021. The site is undeveloped and is largely soil covered with light vegetation noted across the site. A pool of standing water was noted along the eastern boundary at the center of the site; numerous visits conducted at the site and a review of aerial photographs indicate that standing water is consistently present for a portion of the year. The pool is not natural and is present as a result of previous grading activities on the Property.

2.15 Review of Current Regulatory Requirements

Current regulatory requirements associated with water supply and hydrogeology in connection with the proposed development was reviewed. This includes the review of the Nottawasaga Valley Source Protection Plan and the Willow Creek Subwatershed Plan. Relevant information is provided below and presented in Appendix J.

2.15.1 Nottawasaga Valley Conservation Authority (NVCA)

The Property is located within the NVCA but is not regulated by the NVCA and does not fall within a Wellhead Protection Area, Intake Protection Zone or Highly Vulnerable Aquifer. The Property is considered to be within a Significant Groundwater Recharge Area (Wellhead Protection Area-Q), where dewatering activities may present a threat to the drinking water quantity. There are two types of WHPA-Q according to the Approved Source Protection Plan: CTC Source Protection Region, dated July 2015:

- WHPA-Q1 where water taking activities which do not return water to the source are considered a threat, and
- WHPA-Q2, where water taking activities may reduce recharge.

The Property is within both WHPA-Q1 and WHPA-Q2 according to the MECP Source Protection Information Atlas, but activities at the property are low stress to the aquifer, as such no additional measures are required. The source protection area and watershed are presented in Appendix C.

2.15.2 Other Regulatory Authorities

The Property is not located within the Niagara Escarpment Plan Area, Oak Ridges Moraine Plan Area, the Greenbelt Protection Act Area, and Natural Heritage Area.

3 Discussion and Analysis

3.1 Proposed Development Plan

It is understood that the Property will be developed with three (3) residential structures (Buildings B1, B2, and B3) ranging from 7 to 12 storeys. Buildings B1 and B2 have a common underground parking level with at a lowest (P1) level set at 3.6 m below Level 1, located at ground surface. Building B3 has two underground parking levels, with the lowest (P2) level set at 6.4 m below Level 1, located at ground surface. The proposed development plan is presented in Appendix A.

Building Name	Level 1 Elev. (m)	Lowest Floor Level	Lowest FFE	
			Depth (m)	Elev. (m)
B1 and B2	256.5	P1	3.6	252.9
B3	256.5	P2	6.4	250.1

The following summarizes the proposed land coverage areas for the development:

Land Coverage Type	Areas
Building Envelope	0.65 ha
Hard Surface Paving	0.73 ha
Landscape areas for evapotranspiration	0.25 ha
Landscape areas for infiltration and evapotranspiration	0.30 ha
Total Area	**1.93 ha**

3.2 Summary of Hydrogeologic Conditions

Based on the review of the available site information, the hydrogeologic conditions of the Property is summarized as follows:

- The site is characterized by surficial deposits of fill material which consisted of silty sand to clayey silt and then native material comprising of upper glacial tills followed by sands and silts and then by clays and silts. These deposits are of moderate to low permeability,

with the exception of the sands and silts which are of moderate permeability. Overall, the soils provide for low recharge capability.

- Groundwater was observed within about 0.9-4.0 m depth within all monitoring wells. Seasonal fluctuations of groundwater are expected at the site. Additional groundwater monitoring at the Site will be required to determine seasonal groundwater conditions and confirm groundwater flow direction.
- The design groundwater table for engineering purposes is at Elev. 256.3± m in the south portion of the site (for footprint of buildings B1 and B2), and Elev. 255.0± m in the north portion of the site (for building B3).
- Based on the low to moderate permeability of the soils at the surface of the Property, groundwater transmission is expected to be moderate. No area of groundwater discharge such as seepages and springs were noted at the Property during the site inspection. The Site is in a fully developed area within the City of Barrie.
- The Property lies within a Significant Groundwater Recharge Area (QHPA-Q1/Q2) per the NVCA.
- MECP well records for wells completed in the vicinity of the Property show that the primary aquifer used for potable water is within the sands and silts (A1 Aquifer). 41% of wells were installed within 60 mbgs (up to 200 ft.), with 5% of well installation details being unknown. Bedrock was not encountered in any of the wells, to a maximum depth of 87 m (285 ft.) below grade.
- Municipal wells are screened within the A3 Aquifer, A3/A4 combined Aquifer and the A4 Aquifer, which are below the limits of this investigation.

The above hydrogeologic features and functions were considered in assessing the potential impact of the proposed development. This information was used to provide mitigating measures to ensure that hydrogeologic function is not adversely affected during the proposed development.

3.3 Water Balance Analysis

A water balance model was prepared for the Property to assess the distribution of rainfall run-off and infiltration for existing (pre- and post-development) conditions (Appendix K). The model is based on Willow Creek Subwatershed Weather Data presented in Section 2.6. The Willow Creek Subwatershed Plan (2001) was used to evaluate the relative balance between rainfall, evaporation, and evapotranspiration in the shallow soil zones. The water balance for pre-and post-development conditions is summarized below:

Pre-Development Water Balance

	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Proposed Development	19,236	17,813	11,080	3,366	3,366

The post-development water balance accounts for hard surfaced areas created by buildings and pavements and uses the proposed land use statistic information provided by SRN Architects.

Post-Development Water Balance

	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Roof	6,476	5,997	-	-	5,997
Hard Surface Paving	7,278	6,740	-	-	6,740
Landscaped Areas	5,481	5,076	3,157	521	959
Proposed Development Total	19,236	17,813	3,157	521	13,396

The volume of surface water run-off available from residential roof tops was calculated to be 5,997 m^3, as noted in the above table. This volume of water will be available as a resource, to maintain groundwater recharge and function. The volume of roof run-off available is compared to the difference in infiltration volume between pre-development and post-development, as noted below:

Potential Post-Development Infiltration Deficit (m^3)	Volume of Roof Run-off Available (m^3)
2,846	5,997

The water balance calculation indicated there is a decrease in infiltration post-development at the Property. Approximately 53% of post development roof run-off (2,846 m^3) can be used to offset the infiltration deficit. Storm water management and mitigation measures can be used to capture this roof run-off to mitigate the reduced infiltration rates at the Property.

3.4 Groundwater Control Requirements

The proposed shoring at the site will consist of interlocking caisson walls, shoring designs have not yet been completed for this project. For design purposes, the stabilized groundwater table is at Elev. 256.3± m in the south portion of the Property (Buildings B1 & B2) and Elev. 255.0± m in the north portion of the Property (Building B3). The lowest Finished Floor Elevation for Building B1 & B2 is at the P1 Level at Elev. 252.9± m and the lowest FFE for Building B3 is at the P2 Level at Elev. 250.1± m. For dewatering targets in the sands and silts (Buildings B1 & B2), caisson toes were assumed to be 2 m below the dewatering target for both spread footing and raft foundation design options. For dewatering targets in the Upper Till (Building B3), caisson toes were assumed to be 1.5 m below the dewatering target for both the spread footing and raft foundation options. Therefore,

- Bulk excavation will extend down to the elevation of the prevailing groundwater table;
- Foundation excavations will extend down below the prevailing groundwater table in Buildings B1 & B2 and Building B3;
- Foundation excavations will penetrate the upper glacial till, which will yield moderate amounts of free-flowing water in the excavation; and
- Foundation excavation will penetrate the Sands and Silts in the Buildings B1 & B2 excavation, which will yield free flowing groundwater.

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.

Spread footing and raft foundation design options have been considered for each of the excavations. Furthermore, two spread footing designs were considered for the Buildings B1 & B2 excavation. Grounded has prepared a geotechnical engineering report for this site (File No. 22-014) which details the various foundation options considered.

The finite element model (FEM) modelling method was used to conduct numerical analysis for groundwater seepage and to determine the short-term (construction) and long-term dewatering requirements.

The FEM results is summarized below and presented in Appendix L.

Short Term (Construction) Groundwater Quantity – Safety Factor of 2.5 Used						
Building B1 & B2						
Foundation Design	**Groundwater Seepage**		**Design Rainfall Event (30 mm)**		**Total Daily Water Takings**	
	L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
Spread Footings at 251.9 masl	685,000	476	343,000	238.2	1,028,000	713.9
Spread Footings at 250 masl	855,000	593.8	343,000	238.2	1,198,000	831.9
Raft Foundation	690,000	479.2	343,000	238.2	1,033,000	717.4

Short Term (Construction) Groundwater Quantity – Safety Factor of 2.5 Used						
Building B3						
Foundation Design	**Groundwater Seepage**		**Design Rainfall Event (30 mm)**		**Total Daily Water Takings**	
	L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
Spread Footings	65,000	45.1	114,000	79.2	179,000	124.3
Raft Foundation	70,000	48.6	114,000	79.2	184,000	127.8

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 (101 mm) is approximately 1,132,000 L in B1 and B2 and 382,000 L in B3.

The groundwater control system is required to be designed by a dewatering contractor. The groundwater must be dewatered prior to excavation to maintain a stable working base in the excavation.

Mitigation measures based on dewatering and infiltration requirements as per the MECP are discussed in Section 3.6.

Long term (permanent) dewatering will not be allowed by the City of Barrie, as a result all building structures must be waterproofed in the long term.

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

3.5 Assessment of Potential Impact

3.5.1 Zone of Influence (ZOI)

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

The ZOI was calculated using the Sichardt equation below.

Equation:

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

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

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

Zone of Influence (ZOI)		
	Short Term (Construction)	**Long Term (Permanent)**
Maximum Zone of Influence (m)	38	0

3.5.2 Land Stability

The impacts to land stability on adjacent structures due to the proposed short-term dewatering at the site expected to be a maximum of 5 mm.

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

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

3.5.3 City's Sewage Works

The quantity or quality of the groundwater discharged may affect the operation of the City's sewage works. 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 2.11. 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.

3.5.4 Natural Environment

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

3.5.5 Local Drinking Water Wells

The site is located within the municipal boundaries of the City of Barrie. The site and surrounding area are provided with municipal piped water and sewer supply. The Property is located within a Significant Groundwater Recharge Area (WHPAQ1/Q2) but he lowest excavation for the proposed development is within the A1 Aquifer, as such dewatering activities are not a concern and as they will not extend to the municipal drinking water aquifers (Aquifers A3 and A4).

3.5.6 Contamination Source

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

3.6 Mitigation Measures to Maintain Hydrogeologic Functions

3.6.1 Maintenance of Groundwater Recharge

The existing groundwater recharge rates at the Property are approximately 175 mm/a. This recharge occurs in a broad diffuse manner over the entire site. Mitigation measures are available to maintain recharge rates. There are no wetlands in the immediate vicinity of the Property. A

tributary that feeds into Osprey Ridge West is located 250 m northeast of the Property. There will be no direct surface runoff from the Property to the water body.

Appropriate low-impact development (LID) techniques which can be applied include maintenance of overall groundwater recharge across the site area. In order to maintain groundwater recharge for the Property, LID methods can be implemented. There is a surplus of water available following development to maintain groundwater recharge and function. Based on the property conditions, the following typical LID measures may be suitable for the proposed development:

- Collection of clean run-offs from the building rooftops and redirection to grass areas and overland flow.
- Provision of an extra thickness of topsoil at the Property (approximately 0.3 m) on open areas to promote water storage in surficial soil and infiltration.
- Provision of landscaped areas at the Property, including areas above the parking structure, to increase post development evapotranspiration.

3.6.2 Maintenance of Groundwater Transmission Pathways

As previously indicated, the soils present on the Property are of low to moderate permeabilities, with the exception of the Sands and Silts layer which is of moderate permeability. The sands and silts may act as groundwater flow or transmission zones on the Property, but groundwater recharge through the sands and silts is limited as they underly the Earth Fill and Upper Tills which have low permeabilities. As such, the overall continuity of the groundwater flow at the Property should be maintained, where practical. Generally, the groundwater transmission pathways may be maintained through the following means:

- Bedding materials beneath underground services may serve as a subdrain to collect and convey groundwater. To prevent drainage of groundwater along bedding materials, clay trench plugs should be provided at all manhole locations in order to cut off the granular bedding.
- The excavation of any underground services or utilities across permeable layers may interrupt the groundwater flow. It is recommended that trench backfilling be carried out with materials that are similar to the materials that have been excavated.

Groundwater flow may occur into the open shallow excavations if more permeable deposits (such as sand or gravel) are encountered; as such, based on the results of the subsurface investigation, active groundwater control (such as from wells or well points) is required during construction. In addition to this, it is recommended that any excavations should be staged or constructed in such a manner to avoid the collection of overland drainage.

4 Conclusions and Recommendations

- The site is characterized by surficial deposits of fill material which consisted of silty sand to clayey silt and then native material comprising of upper glacial tills followed by sands and silts and then by clays and silts. These deposits are of moderate to low permeability, with the exception of the sands and silts which are of moderate permeability. Overall, the soils provide for low recharge capability.
- Groundwater was observed within about 0.9-4.0 m depth within all monitoring wells. Seasonal fluctuations of groundwater are expected at the site. Additional groundwater monitoring at the Site will be required to determine seasonal groundwater conditions and confirm groundwater flow direction.
- The design groundwater table for engineering purposes is at Elev. 256.3± m in the south portion of the site (for footprint of buildings B1 and B2), and Elev. 255.0± m in the north portion of the site (for building B3).
- Based on the low to moderate permeability of the soils at the surface of the Property, groundwater transmission is expected to be moderate. No area of groundwater discharge such as seepages and springs were noted at the Property during the site inspection.
- The Property lies within a Significant Groundwater Recharge Area (QHPA-Q1/Q2) according to the Nottawasaga Valley Conservation Area.
- MECP well records for wells completed in the vicinity of the Property show that the primary aquifer used for potable water is within the sands and silts (A1 Aquifer). 41% of wells were installed within 60 mbgs (up to 200 ft.), with 5% of well installation details being unknown. Bedrock was not encountered in any of the wells, to a maximum depth of 87 m (285 ft.) below grade.
- Municipal wells are screened within the A3 Aquifer, A3/A4 combined Aquifer and the A4 Aquifer, which are below the limits of this investigation.
- There will be a post development infiltration deficit of 2,407 m^3. Clean water captured from roofs can be used to mitigate the infiltration deficit.
- A permit to take water for short term construction will be required.
- A permit to take water for long term dewatering is not required for any of the proposed buildings as discharge to the City's sewers will not be permitted.
- Given the high water table and the overall moderate to low permeability of the soils, engineered infiltration methods are not recommended. Passive LIDs may be considered as part of site design.
- It is recommended that construction is phased appropriately to minimize daily groundwater takings from the Property.

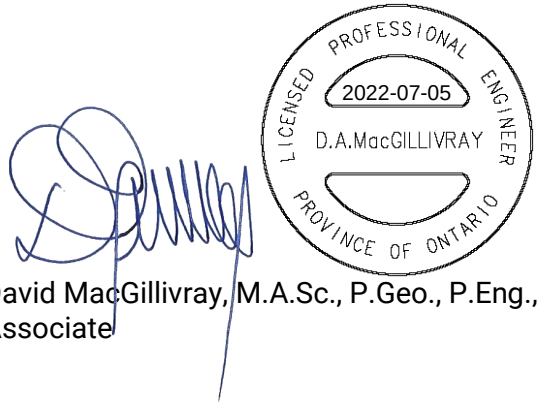
4.1 Signatures

The Hydrogeological Assessment was conducted by Mariam Al Gailani, EIT under the supervision of David MacGillivray, M.A.Sc., P.Geo., P.Eng., $QP_{RA\text{-}ESA}$.

We trust that this report meets your requirements at present.

For and on behalf of our team,

GROUNDED ENGINEERING



Mariam Al Gailani, EIT
Geotechnical and Environmental Engineering

David MacGillivray, M.A.Sc., P.Geo., P.Eng., $QP_{RA\text{-}ESA}$
Associate

5 References

1. Armstrong, D.K. and Dodge, J.E.P. *Paleozoic Geology Map of Southern Ontario*. Ontario Geological Survey, Miscellaneous Release--Data 219.
2. Chapman, L.J. and Putnam, D.F. *The Physiography of Southern Ontario*. Ontario Geological Survey. Miscellaneous Release—Data 228. 2007.
3. Grounded Engineering Inc. *Geotechnical Engineering Report, 303 Cundles Road East, Barrie, Ontario*. File No. 22-014. May 26, 2022.
4. Mak Surveying Ltd. *Site survey*. 2016..
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6. Ministry of Environment Conservation and Parks. *Map – Permits to take water*: https://www.ontario.ca/page/map-permits-take-water. Accessed: June 14, 2022.
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11. South Georgian Bay Lake Simcoe Source Protection Region. *Approved South Georgian Bay Lake Simcoe Source Protection Plan*. January 26, 2015, amended June 16, 2021.
12. South Georgian Bay-Lake Simcoe Source Protection Committee. *Approved Assessment Report: Nottawasaga Valley Source Protection Area*. January 19, 2015.
13. SRN Architects Inc. *Residential Rental / Condo, Cundles Road East, Barrie, ON*"; Project S20035. January 19, 2022.

6 Limitations and Restrictions

The assessment should not be considered a comprehensive investigation that eliminates all risks of encountering environmental problems. The information presented in this report is based on information collected during the completion of the Hydrogeological Assessment by Grounded Engineering Inc. It was based on the conditions on the Hydrogeological Assessment at the time of the site inspection supplemented by a review of historical information to assess the environmental conditions regarding the Property.

There is no warranty expressed or implied by this report regarding the hydrogeologic conditions of the Property. Professional judgement was exercised in gathering and analysing information collected by our staff, as well as that submitted by others. The conclusions presented are the product of professional care and competence and cannot be construed as an absolute guarantee.

If new information regarding the hydrogeological condition of the Property is identified during future work, or outstanding responses from regulatory agencies indicate outstanding issues on file with respect to the Property, Grounded Engineering Inc. should be notified so that we may re-evaluate the findings of this assessment and provide amendments.

6.1 Report Use

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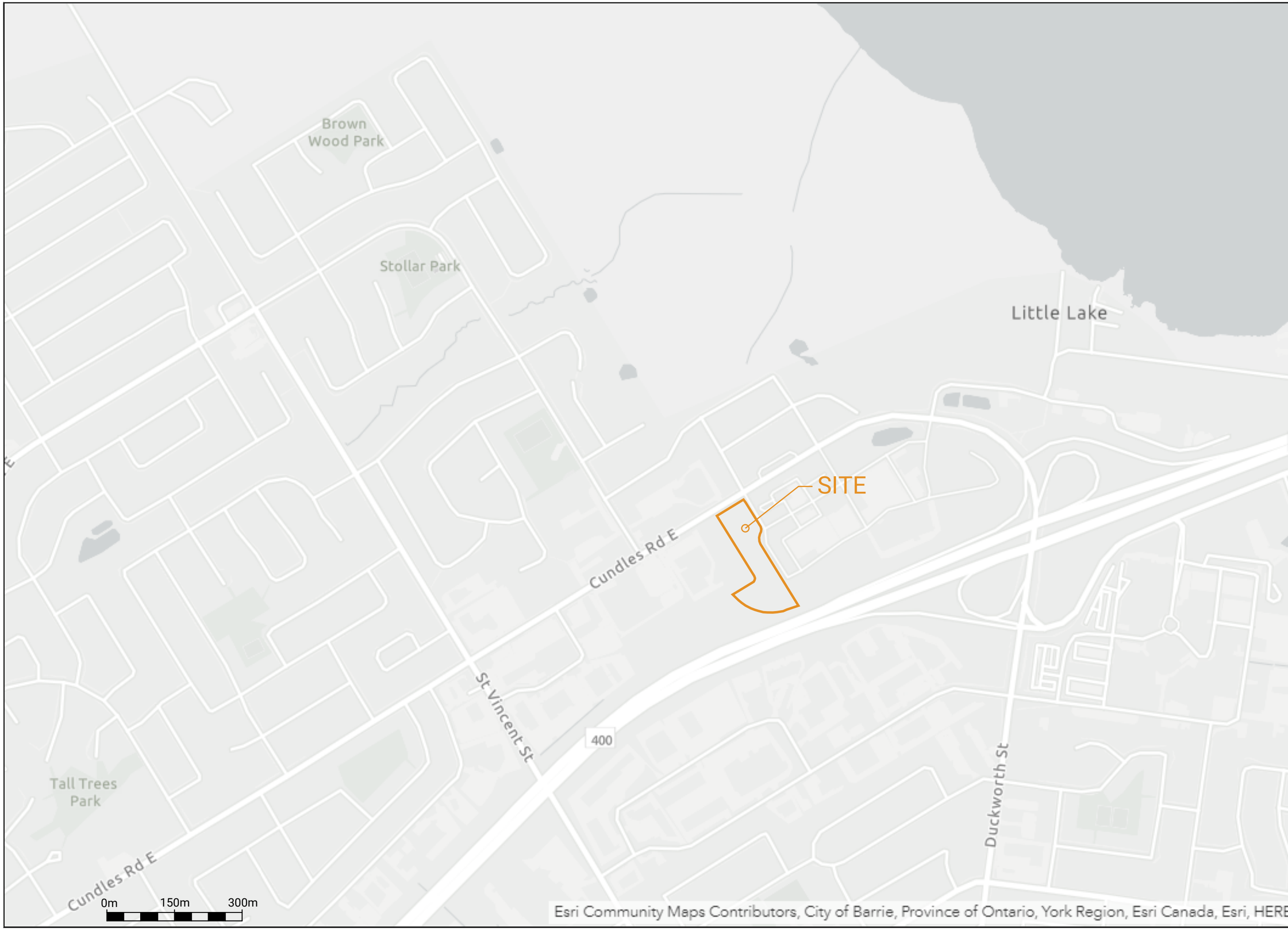
FIGURES



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LEGEND

APPROXIMATE PROPERTY BOUNDARY

Note

Reference

ArcGIS Map 2022

Project

**303 CUNDLES RD E
BARRIE ONTARIO**

Figure Title

SITE LOCATION PLAN

North

TRUE
PROJECT

Date

JUNE 2022

Scale

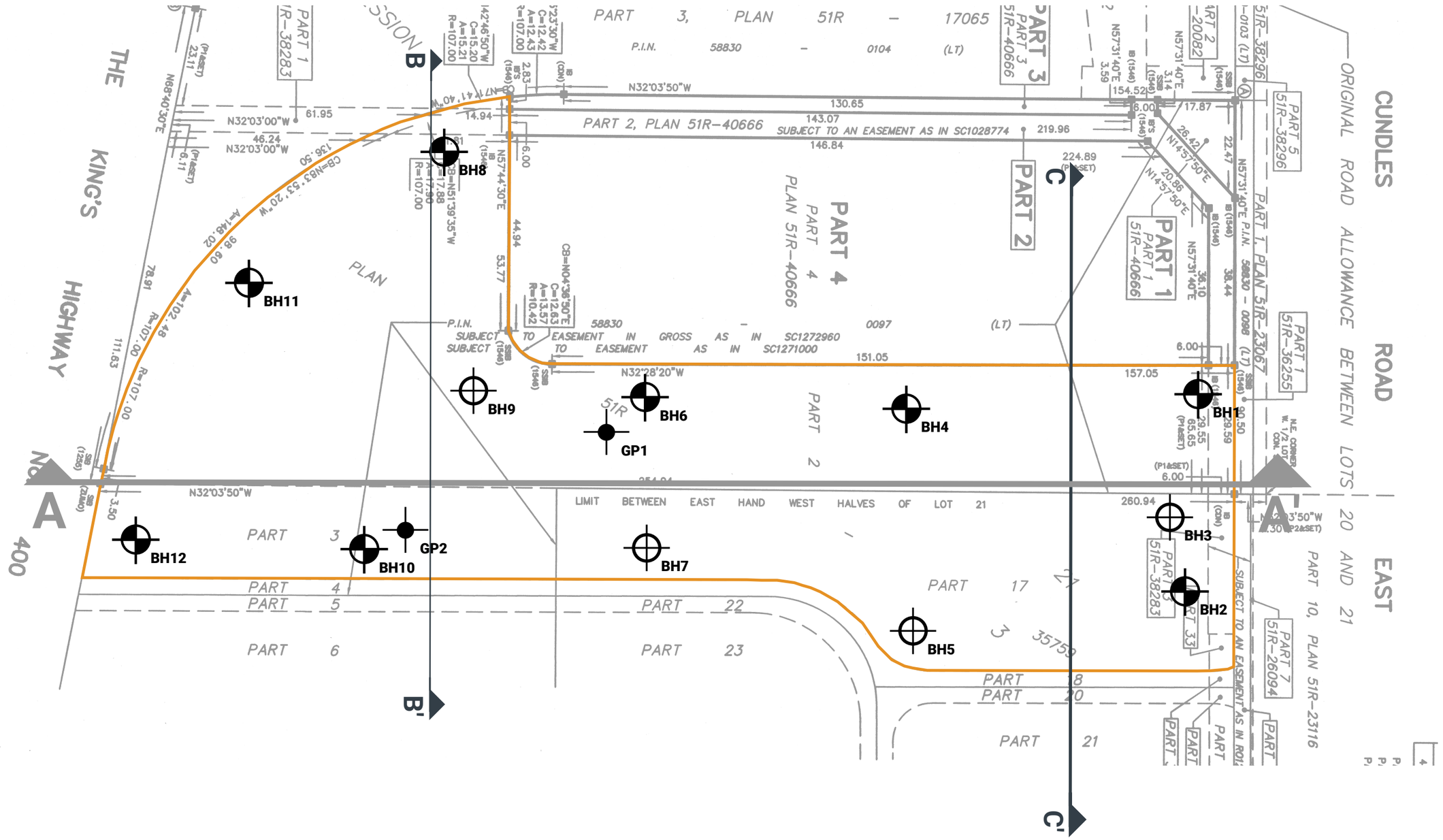
AS INDICATED

Job No

22-014

Figure No

FIGURE 1



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LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- MONITORING WELL/BOREHOLE BY GROUNDED
- GUELPH PERMEAMETER TEST BY GROUNDED
- FINITE ELEMENT SECTION LINE
- CROSS SECTION LINE

Note

Reference

Title: Plan of Survey Lot 21, Concession 3, Geographic Township of Vespra, City of Barrie, County of Simcoe
Prepared By: Rudy Mak Surveying Ltd.
Date: October 1, 2016

Project

303 CUNDLES RD E BARRIE ONTARIO

Figure Title

SITE LOCATION PLAN - EXISTING CONDITON

North

Date

JUNE 2022

Scale

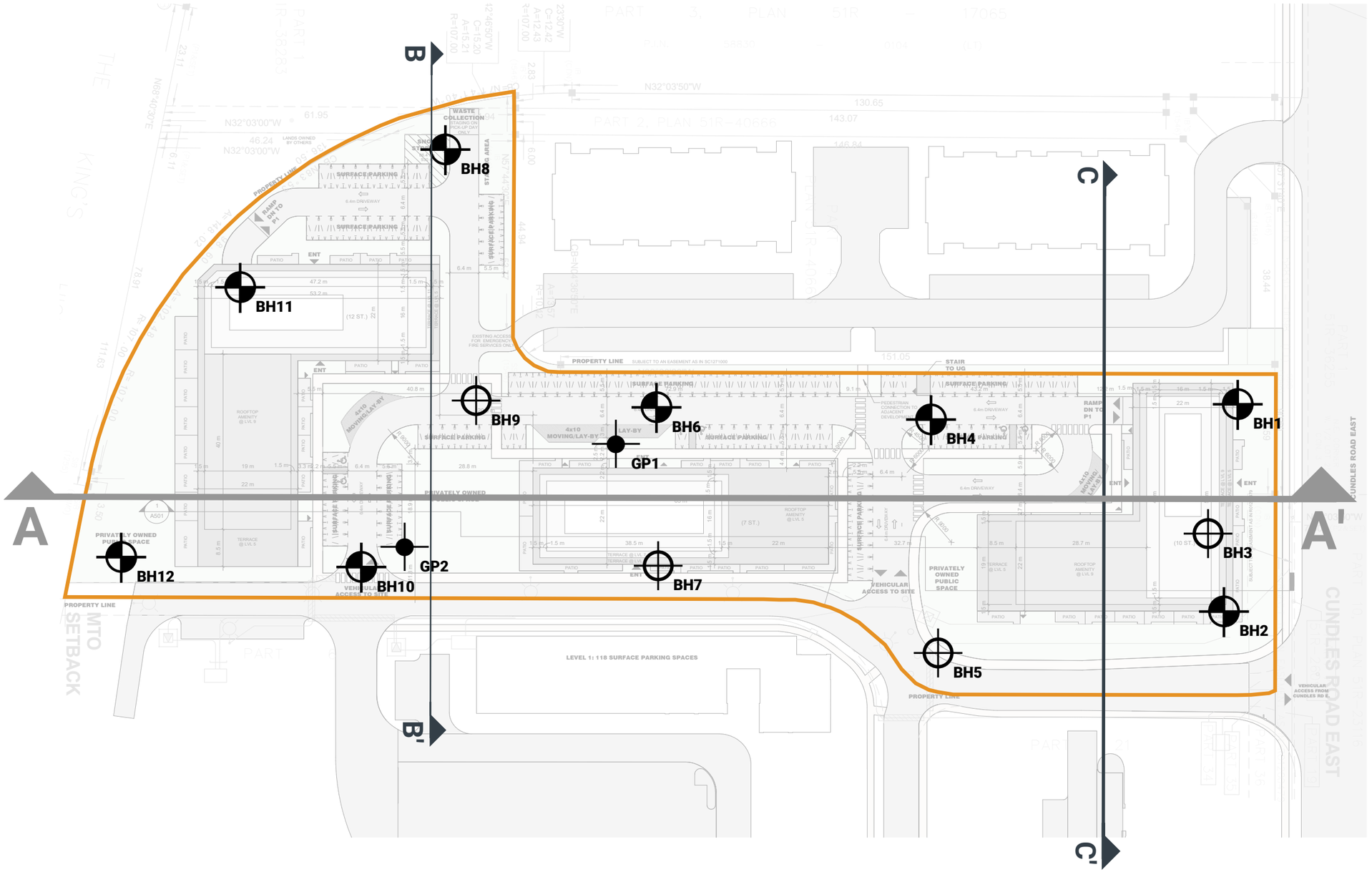
AS INDICATED

Job No

22-014

Figure No

FIGURE 2A



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LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- MONITORING WELL/BOREHOLE BY GROUNDED
- GUELPH PERMEAMETER TEST BY GROUNDED
- FINITE ELEMENT SECTION LINE
- CROSS SECTION LINE

Note

Reference

Project: S20035
Drawing No. A110
Drawing Title: Site Plan
By: SRA Architects.
Date: January 19, 2022.

Project

303 CUNDLES RD E BARRIE ONTARIO

Figure Title

SITE LOCATION PLAN - PROPOSED CONDITON

North

PROJECT TRUE

Date

JUNE 2022

Scale

AS INDICATED

Job No

22-014

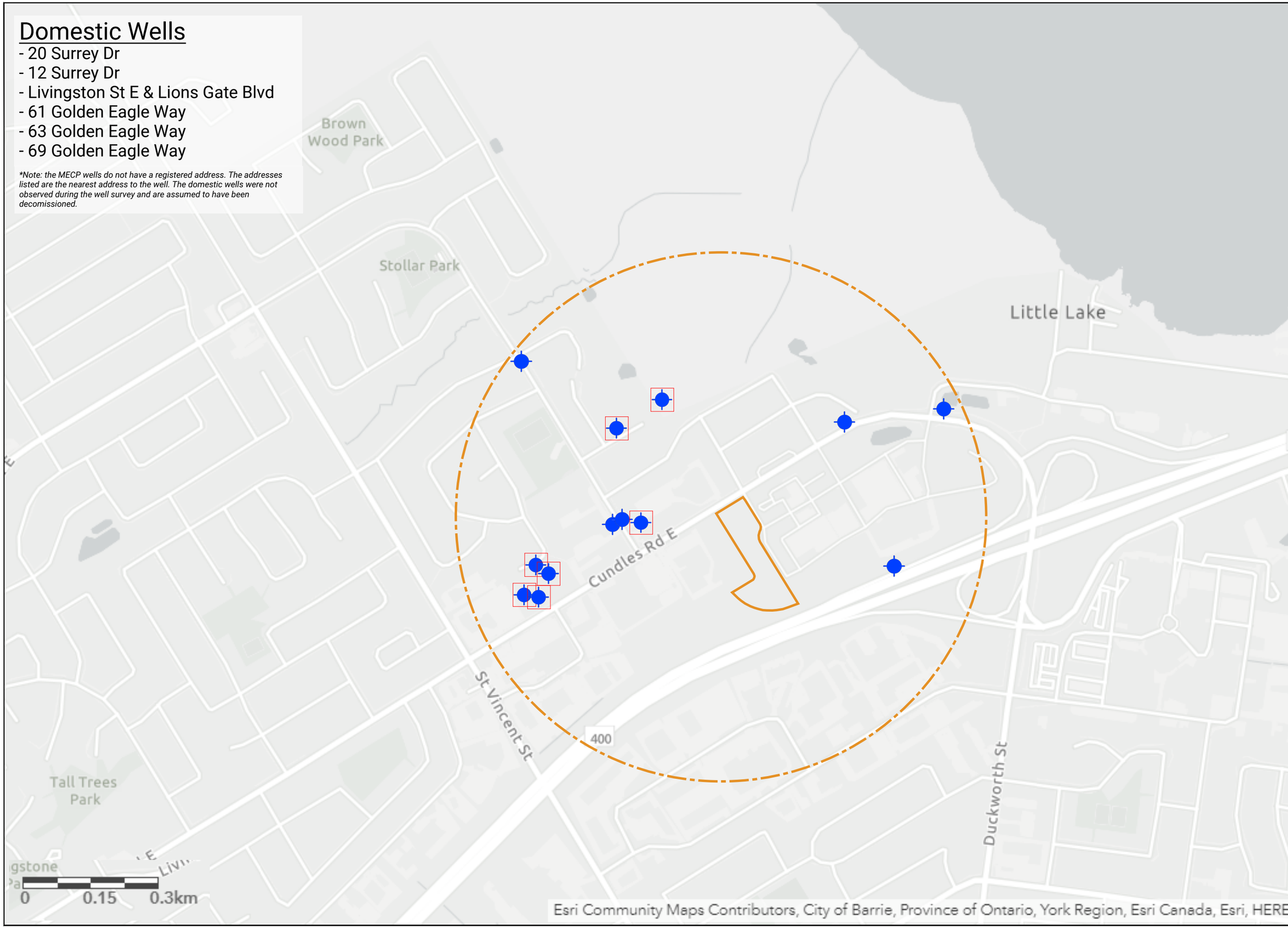
Figure No

FIGURE 2B

Domestic Wells

- 20 Surrey Dr
- 12 Surrey Dr
- Livingston St E & Lions Gate Blvd
- 61 Golden Eagle Way
- 63 Golden Eagle Way
- 69 Golden Eagle Way

**Note: the MECP wells do not have a registered address. The addresses listed are the nearest address to the well. The domestic wells were not observed during the well survey and are assumed to have been decomissioned.*



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LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- STUDY AREA (500 m RADIUS)
- MECP WELL
- DOMESTIC WELLS - ASSUMED TO BE DECOMISSIONED

Note

Reference

ArcGIS Map 2022

Project

303 CUNDLES RD E BARRIE ONTARIO

Figure Title

MECP WELL LOCATIONS

North

TRUE PROJECT

Date

JUNE 2022

Scale

AS INDICATED

Job No

22-014

Figure No

FIGURE 3

SOUTH

Buildings B1 and B2

Building B3

NORTH

Elevation (m)

260 258 256 254 252 250 248 246 244 242 240 238

BH 12 BH 11 BH 10 BH 8 BH 9 BH 7 BH 6 BH 5 BH 4 BH 3 BH 2 BH 1

Groundwater Table: Sloping from
Elev. 256.3± m in the south to
Elev. 255.0± m in the north

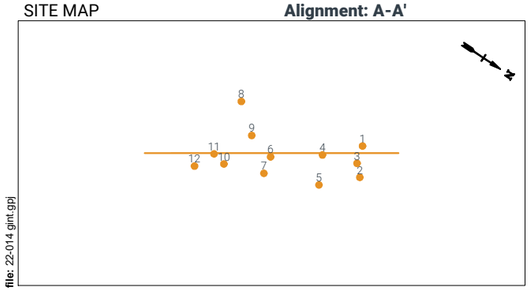
Ground FFE: Elev. 256.5± m

P1 FFE: Elev. 252.9± m

P2 FFE: Elev. 250.1± m

SITE MAP

Alignment: A-A'



file: 22-014 gint.gpj

Boreholes Equally Spaced

BOREHOLE STRATIGRAPHY LEGEND

- Topsoil
- Fill
- Sandy Silt Till (clayey)
- Silt and Clay
- Clayey Silt Till
- Silty Sand
- Sandy Silt Till
- Sandy Silt
- Clay and Silt
- Silty Sand Till
- Sand

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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

**303 CUNDLES RD E
BARRIE, ON**

Figure Title

SUBSURFACE PROFILE

A-A'

Date

JUNE 2022

Scale

AS INDICATED

Job No

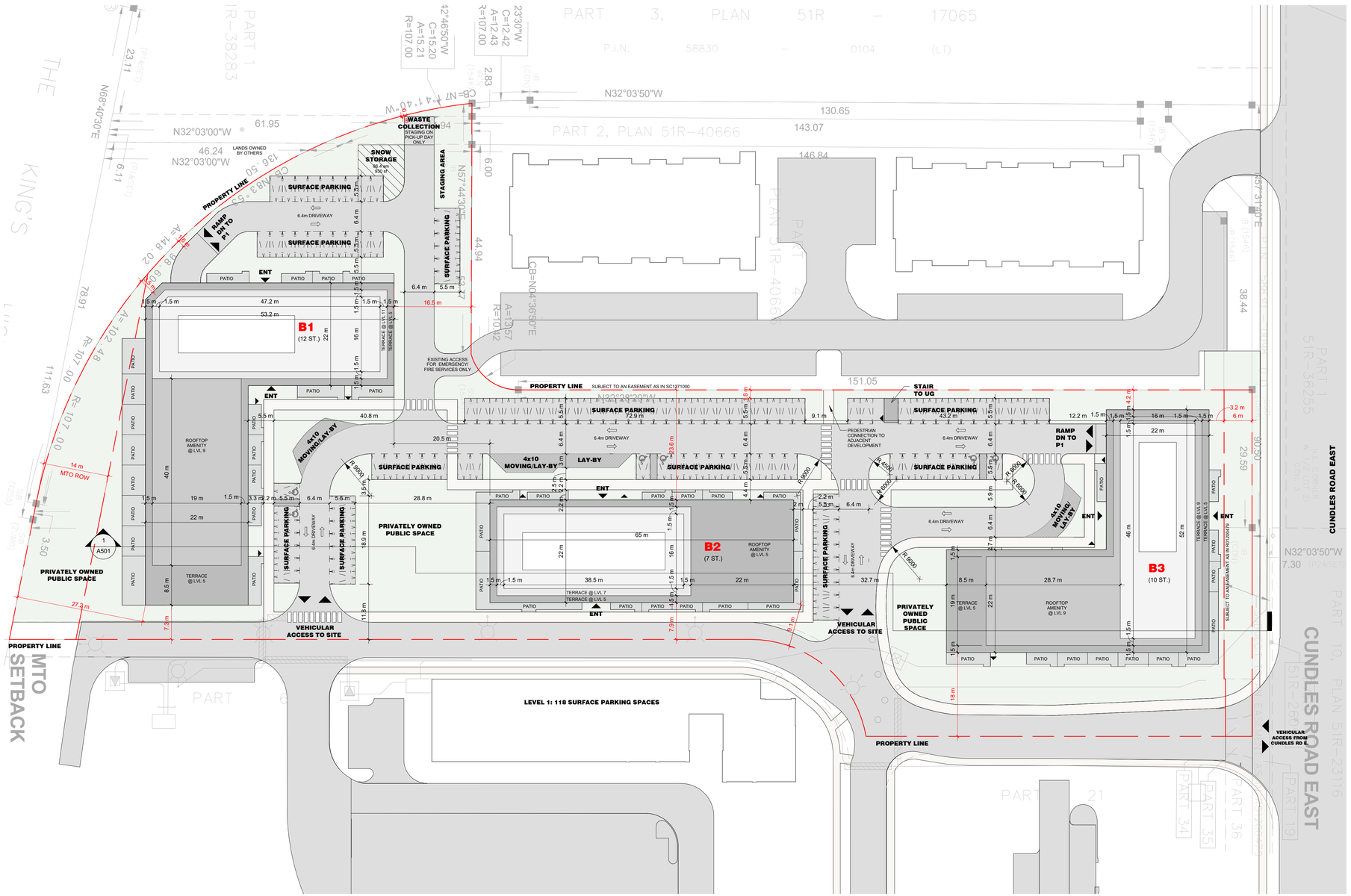
22-014

Figure No

FIGURE 4

APPENDIX A

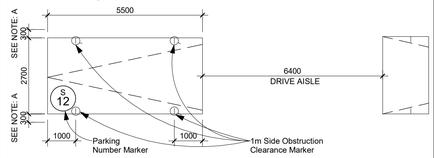
IN-PROGRESS
FEB.10TH - 2022



OVERALL SITE PLAN — 1 / A110
Scale: 1 : 450

TYPICAL PARKING SPACE:

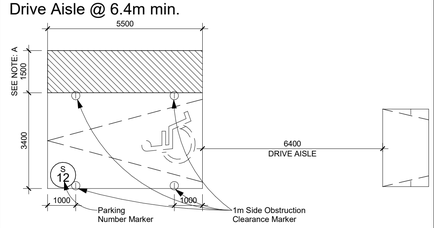
Drive Aisle @ 6.4m min.



NOTE: A- PROVIDE AN ADDITIONAL 300mm FOR PARKING SPACE WIDTH WHEN OBSTRUCTIONS OCCUR BETWEEN THE FRONT AND REAR 1000mm

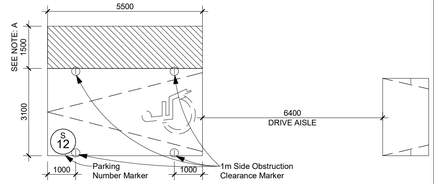
BARRIER-FREE PARKING SPACE TYPE A:

Drive Aisle @ 6.4m min.



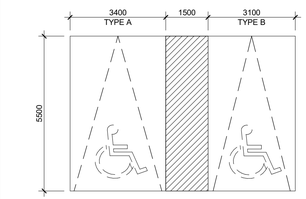
NOTE: A- PROVIDE AN ADDITIONAL 1500mm FOR PARKING SPACE WIDTH WHEN OBSTRUCTIONS OCCUR BETWEEN THE FRONT AND REAR 1000mm

BARRIER-FREE PARKING SPACE TYPE B:



NOTE: A- PROVIDE AN ADDITIONAL 1500mm FOR PARKING SPACE WIDTH WHEN OBSTRUCTIONS OCCUR BETWEEN THE FRONT AND REAR 1000mm

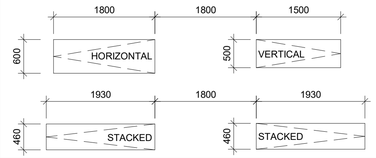
BARRIER-FREE PARKING SPACE TYPE A & B:



NOTE: WHERE THE REQUIRED 1500mm ACCESS AISLE IS PROVIDED BETWEEN TWO BARRIER-FREE PARKING SPACES, THE AISLE WIDTH CAN BE SHARED.

TYPICAL BICYCLE PARKING SPACE:

WALKWAY:	MINIMUM 1800mm
VERTICAL PARKING SPACE:	1500mm (L) x 500mm (W)
HORIZTONAL PARKING SPACE:	1800mm (L) x 600mm (W)
STACKED PARKING SPACE:	1930mm (L) x 460mm (W)



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VAUGHAN, ONTARIO. L4K 5Y2
PHONE: 905.417.5515 FAX: 905.417.5517

STAMP:

CLIENT:
PENEQUITY

PROJECT:
RESIDENTIAL RENTAL / CONDO
CUNDLES ROAD EAST
BARRIE, ON

DRAWING TITLE:
SITE PLAN

DATE:	01/19/22	SCALE:	As indicated
DRAWN BY:	Author	CHECKED BY:	Checker
PROJECT NUMBER:	S20035	DRAWING NUMBER:	A110

C:\Users\Alyssagosine\Documents\S20035PH10-Cundles Barrie-Concept-RVT 2020_alyssagNKBMH.rvt

APPENDIX B

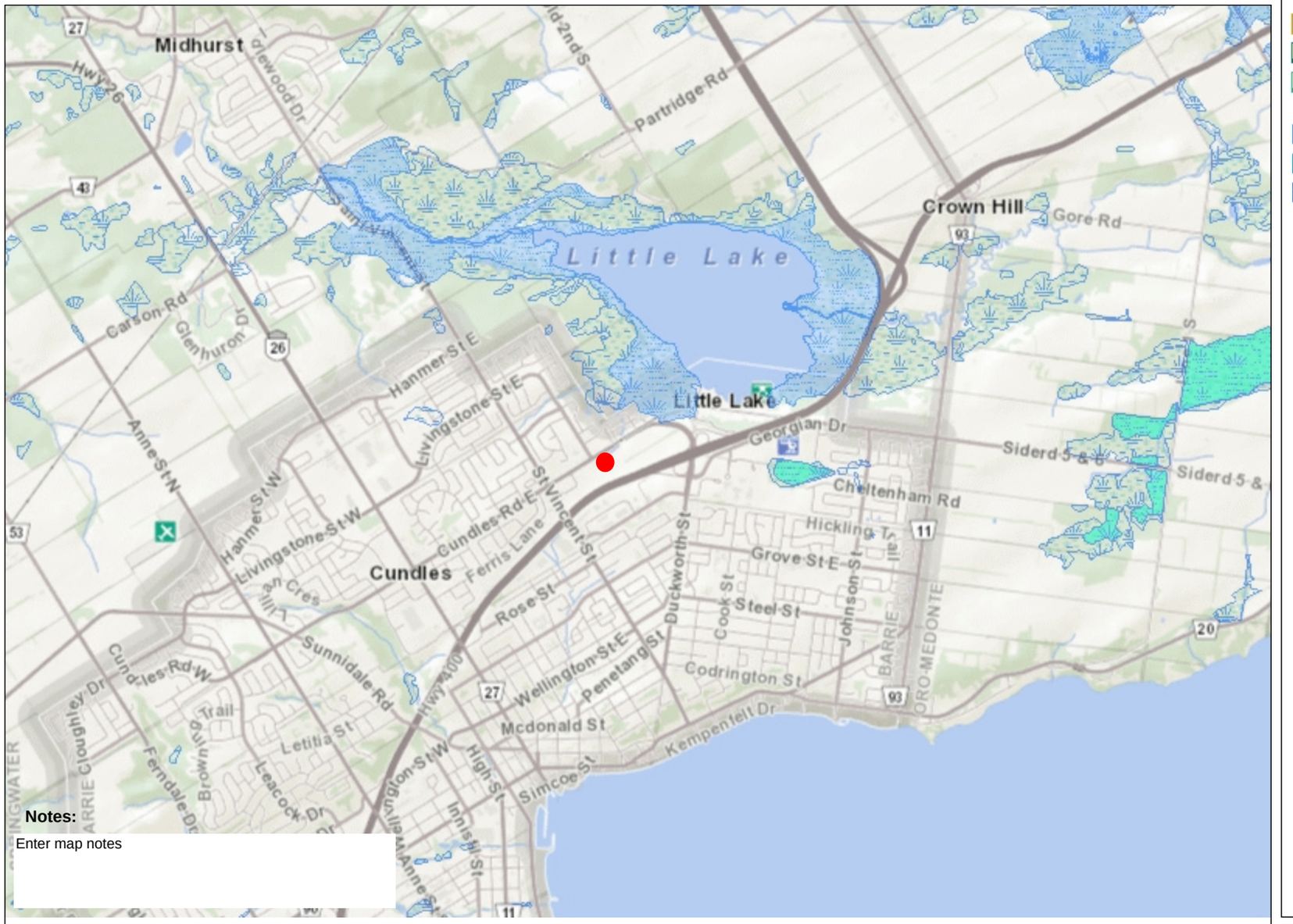
Ontario

Ministry of Natural Resources and Forestry

Make-a-Map: Natural Heritage Areas

Natural Heritage Map

Map created:6/17/2022



Legend

ANSI

- Earth Science Provincially Significant/sciences de la terre d'importance provinciale
- Earth Science Regionally Significant/sciences de la terre d'importance régionale
- Life Science Provincially Significant/sciences de la vie d'importance provinciale
- Life Science Regionally Significant/sciences de la vie d'importance régionale

Evaluated Wetland

- Provincially Significant/considérée d'importance provinciale
- Non-Provincially Significant/non considérée d'importance provinciale

Unevaluated Wetland

2.6 0 1.31 2.6 Kilometres

Absence of a feature in the map does not mean they do not exist in this area.

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

Ontario

Ministry of Natural Resources and Forestry

Make-a-Map: Natural Heritage Areas

Natural Heritage Map

Map created:6/17/2022

Notes:

Enter map notes

Legend

- Assessment Parcel
- ANSI
- Earth Science Provincially Significant/sciences de la terre d'importance provinciale
- Earth Science Regionally Significant/sciences de la terre d'importance régionale
- Life Science Provincially Significant/sciences de la vie d'importance provinciale
- Life Science Regionally Significant/sciences de la vie d'importance régionale
- Evaluated Wetland
- Provincially Significant/considérée d'importance provinciale
- Non-Provincially Significant/non considérée d'importance provinciale
- Unevaluated Wetland

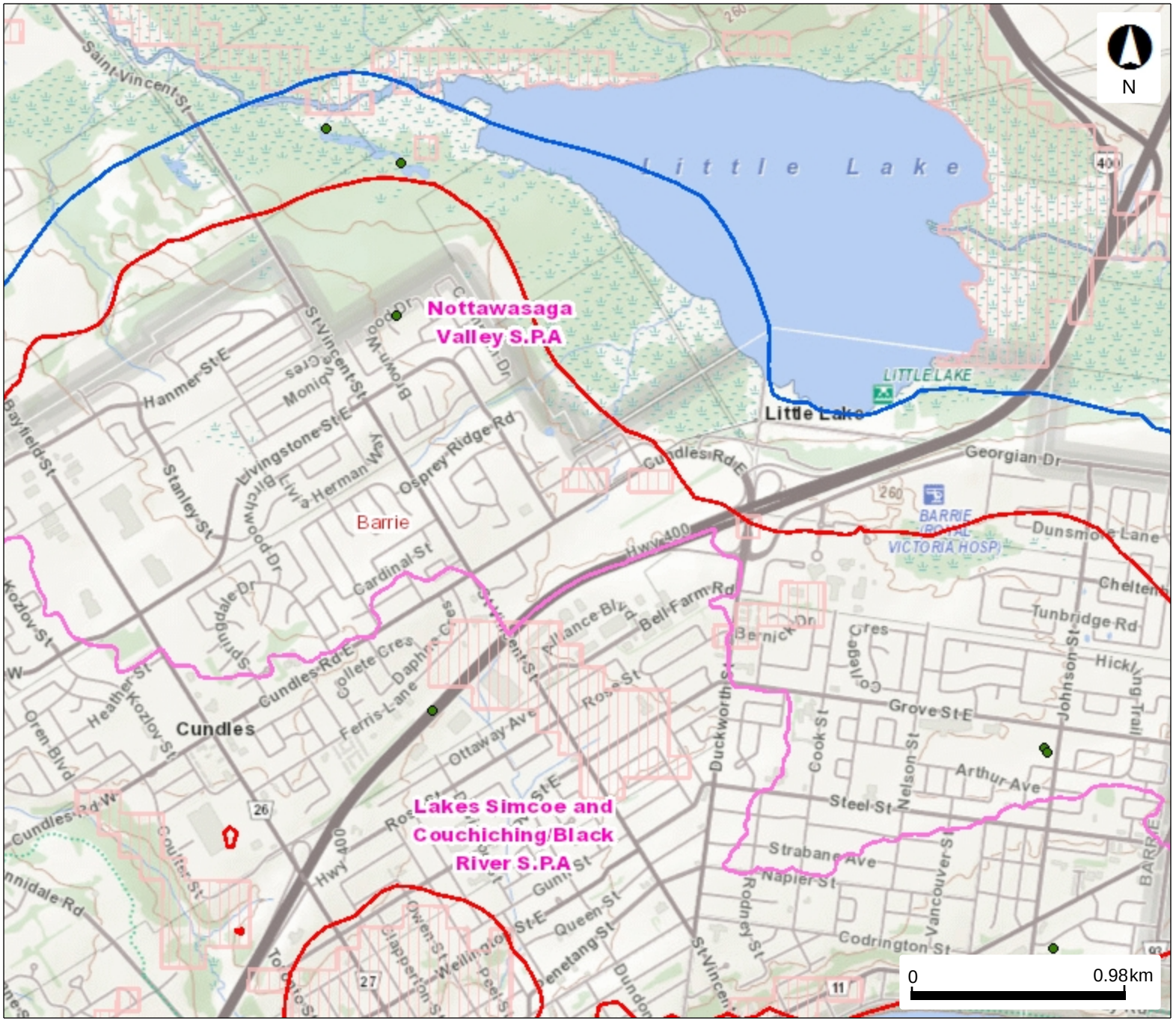
0.7 0 0.33 0.7 Kilometres

Absence of a feature in the map does not mean they do not exist in this area.

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

APPENDIX C

Water Quality and Quantity Zones



Legend

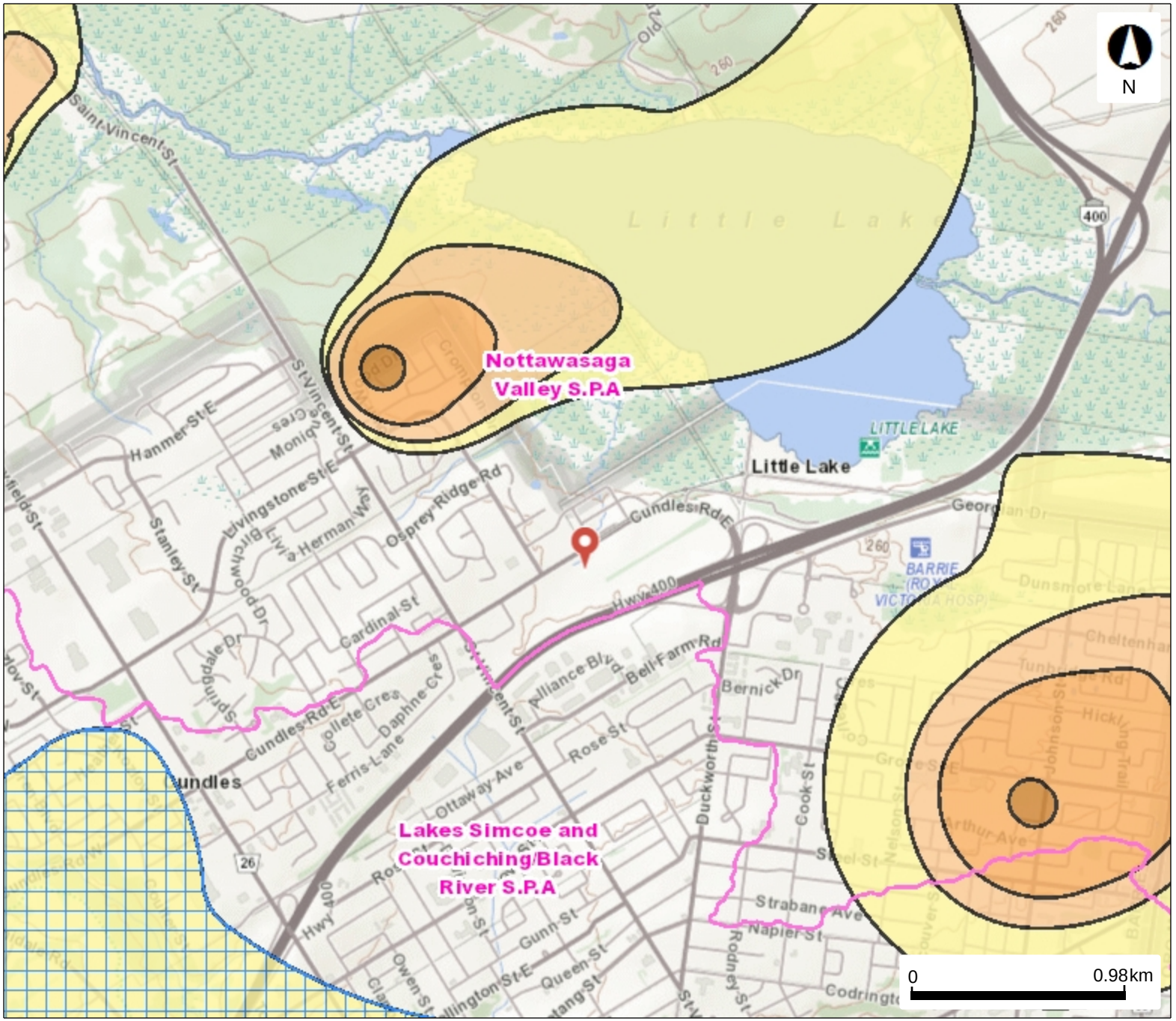
- Source Protection Areas
- Permits To Take Water: Active
- Wellhead Protection Area Q1
- Wellhead Protection Area Q2
- Highly Vulnerable Aquifers

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

Ontario

Map Created: 6/17/2022
Map Center: 44.41409 N, -79.68226 W

Wellhead Protection Areas



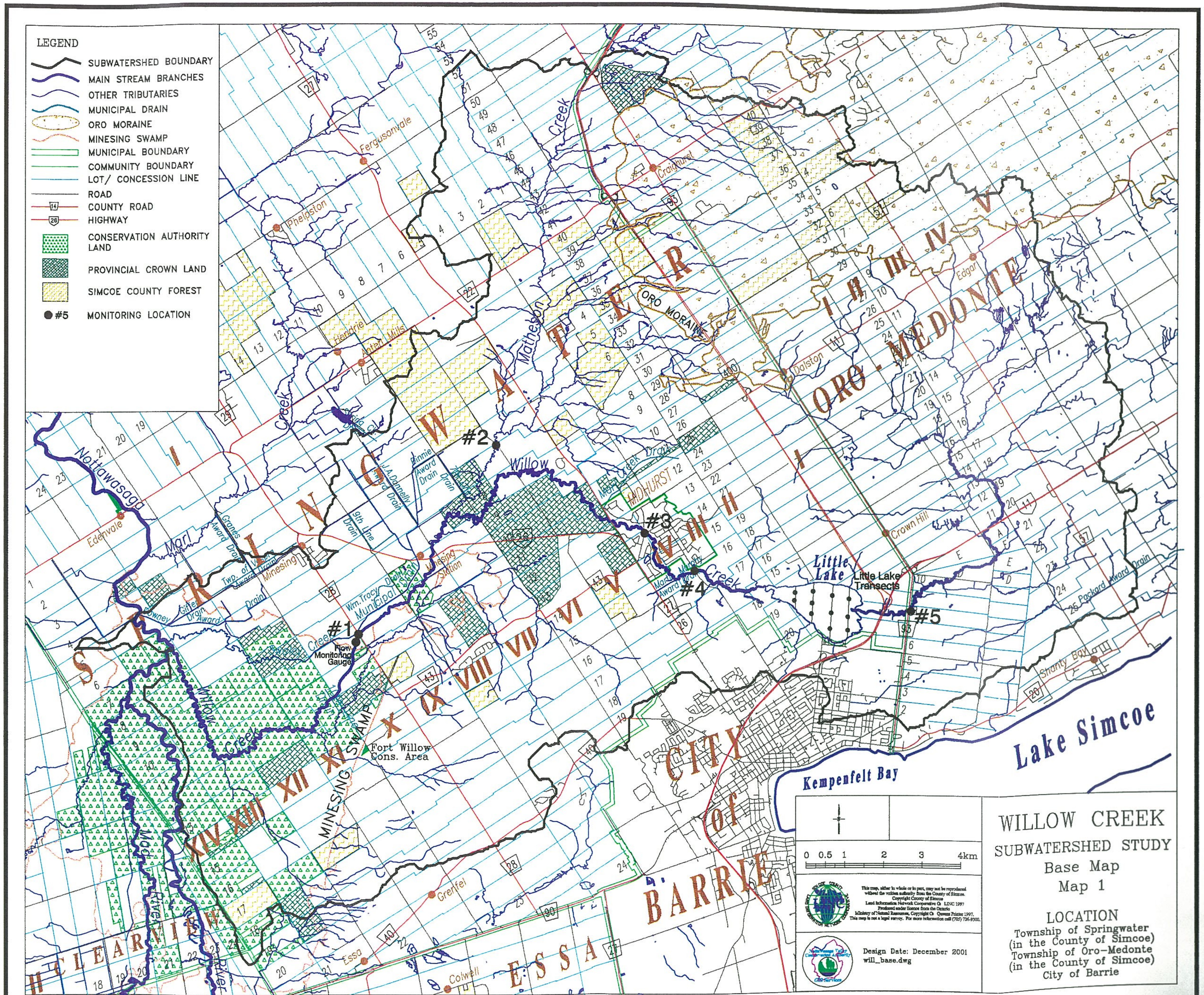
Legend

- Source Protection Areas
- Issue Contributing Areas
- WHPA Groundwater Under Direct Influence (WHPA-E)
- Wellhead Protection Area
  - A
  - B
  - C
  - C1
  - D
  - F
- Intake Protection Zone 1
- Event Based Areas
- Intake Protection Zone 2

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

Ontario

Map Created: 6/22/2022
Map Center: 44.41626 N, -79.68149 W


LEGEND
SUBWATERSHED BOUNDARY
MAIN STREAM BRANCHES
OTHER TRIBUTARIES
MUNICIPAL DRAIN
ORO MORAINE
MINESING SWAMP
MUNICIPAL BOUNDARY
COMMUNITY BOUNDARY
LOT/ CONCESSION LINE
ROAD
COUNTY ROAD
HIGHWAY
CONSERVATION AUTHORITY LAND
PROVINCIAL CROWN LAND
SIMCOE COUNTY FOREST
#5 MONITORING LOCATION
SPRINGWATER
ORO - MEDONTE
CITY of BARRIE
CLEARVIEW
ESSA
Lake Simcoe
Kempenfelt Bay
Little Lake
Little Lake Transects
Willow Creek
Matheson Creek
Nottawasaga
Mad River
MINESING SWAMP
ORO MORAINE
MIDHURST
Fort Willow Cons. Area
Flow Monitoring Gauge
#1
#2
#3
#4
#5
Edenvale
Minesing
Fergusonvale
Phelpston
Hendrie
Anten Mills
Craighurst
Dalston
Edgar
Crown Hill
Shanty Bay
Grenfel
Colwell
Essa
0 0.5 1 2 3 4km
WILLOW CREEK
SUBWATERSHED STUDY
Base Map
Map 1
LOCATION
Township of Springwater
(in the County of Simcoe)
Township of Oro-Medonte
(in the County of Simcoe)
City of Barrie
Design Date: December 2001
will_base.dwg

LEGEND

- SUBWATERSHED BOUNDARY
- MAIN STREAM BRANCHES
- OTHER TRIBUTARIES
- MUNICIPAL BOUNDARY
- COMMUNITY BOUNDARY
- CONCESSION/LOT LINE
- ROAD
- COUNTY ROAD
- HIGHWAY

- TILL MORAINES
- KAME MORAINES
- TILL PLAINS (DRUMLINIZED)
- SAND PLAINS
- CLAY PLAINS
- BEACHES AND SHORECLIFFS
- PEAT AND MUCK
- BOULDER PAVEMENT
- MUDFLOW SCARS
- DISSECTED TERRAIN

SOURCE: "THE PHYSIOGRAPHY OF SOUTHERN ONTARIO," CHAPMAN AND PUTNAM, ONTARIO RESEARCH FOUNDATION. PUBLISHED BY ONTARIO DEPT. OF MINES AND NORTHERN AFFAIRS, 1972.

Lake Simcoe

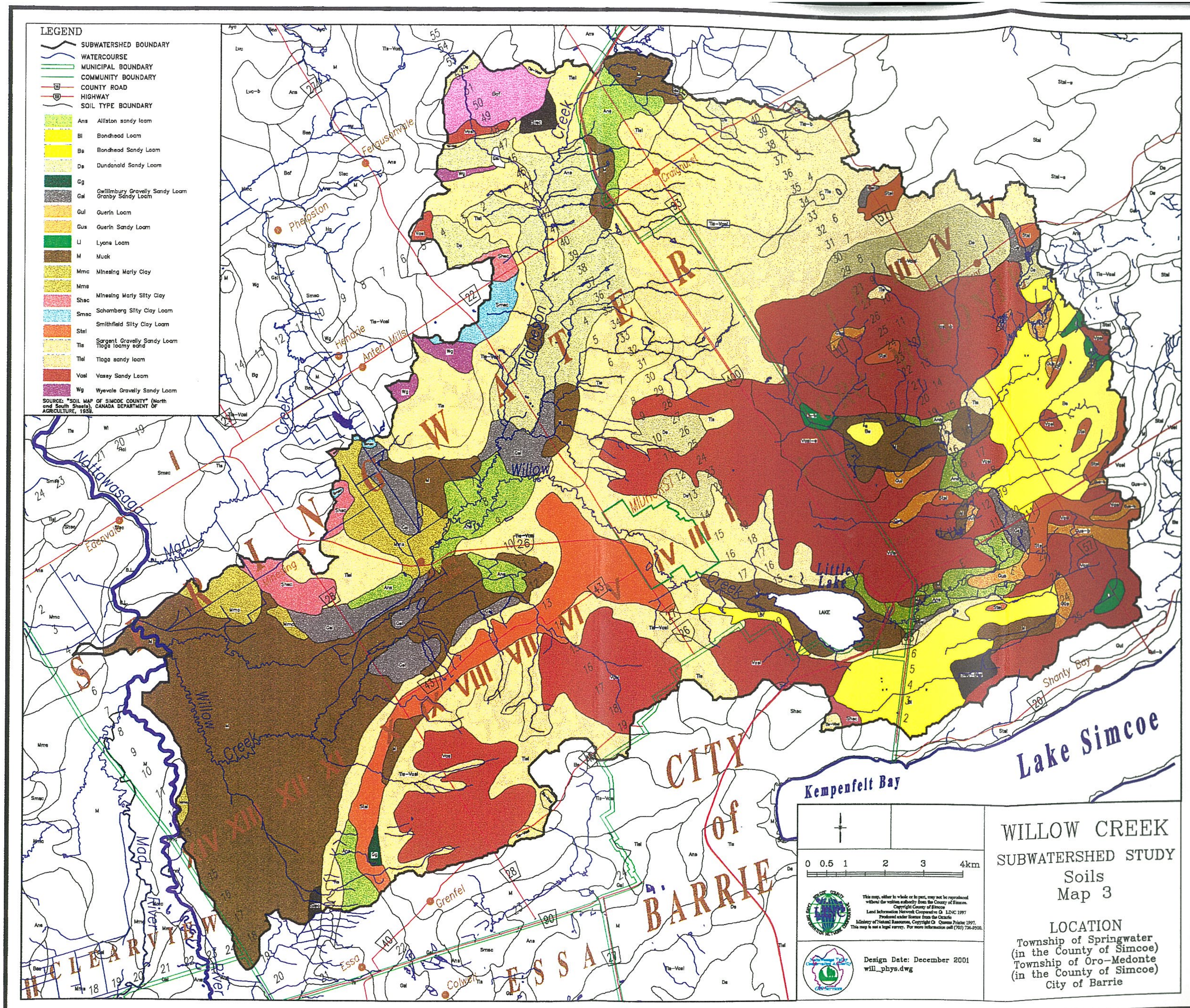
Kempenfelt Bay

0 0.5 1 2 3 4km

Design Date: December 2001
will_phys.dwg

WILLOW CREEK
SUBWATERSHED STUDY
Physiography
Map 2

LOCATION
Township of Springwater
(in the County of Simcoe)
Township of Oro-Medonte
(in the County of Simcoe)
City of Barrie



LEGEND
SUBWATERSHED BOUNDARY
WATERCOURSE
MUNICIPAL BOUNDARY
COMMUNITY BOUNDARY
COUNTY ROAD
HIGHWAY
SOIL TYPE BOUNDARY
Ans Alliston sandy loam
Bl Bondhead Loam
Bs Bondhead Sandy Loam
Ds Dundonald Sandy Loam
Gg
Gsl Gwillimbury Gravelly Sandy Loam Granby Sandy Loam
Gul Guerin Loam
Gus Guerin Sandy Loam
Ll Lyons Loam
M Muck
Mmc Minesing Marly Clay
Mms
Shsc Minesing Marly Silty Clay
Smsc Schomberg Silty Clay Loam
Smithfield Silty Clay Loam
Stsl
Tls Sargent Gravelly Sandy Loam Tioga loamy sand
Tlsl Tioga sandy loam
Vasl Vasey Sandy Loam
Wg Wyevale Gravelly Sandy Loam
SOURCE: "SOIL MAP OF SIMCOE COUNTY" (North and South Sheets), CANADA DEPARTMENT OF AGRICULTURE, 1959.
Lake Simcoe
Kempenfelt Bay
CITY of BARRIE
ESSA
Willow Creek
Little Lake
Nottawasaga
Marl
Shanty Bay
Phelpston
Craighurst
Hendrie
Anten Mills
Fergusonvale
Midhurst
Grenfel
Colwell
Edenvale
0 0.5 1 2 3 4km
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This map is not a legal survey. For more information call (705) 726-9300.
Design Date: December 2001
will_phys.dwg
WILLOW CREEK
SUBWATERSHED STUDY
Soils
Map 3
LOCATION
Township of Springwater
(in the County of Simcoe)
Township of Oro-Medonte
(in the County of Simcoe)
City of Barrie

LEGEND

- SUBWATERSHED BOUNDARY
- WATERCOURSE
- MUNICIPAL BOUNDARY
- COMMUNITY BOUNDARY
- LOT/ CONCESSION LINE
- ROAD
- COUNTY ROAD
- HIGHWAY
- CURRENT NATURAL HERITAGE SYSTEM (FROM COUNTY & MUNICIPAL OFFICIAL PLANS)
- PROPOSED ADDITIONS TO THE NATURAL HERITAGE SYSTEM
- NO DEVELOPMENT OR SITE ALTERATION AREA
- STREAM RIPARIAN NO DEVELOPMENT OR SITE ALTERATION AREAS

Fergusonvale
Pheipston
Hendrie
Arten Mills
Nottawasaga River
Edenvale
Minesing
Willow Creek
Mad River
Clearview
Greifel
Essa
Colwell
Barrie
Dalston
Edgar
Crown Hill
Little Lake
Shanty Bay
Lake Simcoe
Kempenfelt Bay

0 0.5 1 2 3 4km

Design Date: December 2001
nat_heri.dwg

WILLOW CREEK
SUBWATERSHED STUDY
Natural Heritage System
Map 4

LOCATION
Township of Springwater
(in the County of Simcoe)
Township of Oro-Medonte
(in the County of Simcoe)
City of Barrie

APPENDIX D

Water Well Records

June 16, 2022

1:30:41 PM

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
BARRIE CITY	17 604875 4918233 W	2008-08 7241	1.59			MT	0012 10	7110564 (Z81719) A	
BARRIE CITY	17 605611 4918475 W	1959-04 2801	5	UK 0082		NU		5700245 ()	LOAM 0001 CLAY MSND BLDR 0008 BRWN CLAY 0026 BLUE CLAY BLDR 0048 MSND SILT BLDR 0082 MSND SILT GRVL 0107 BLUE CLAY 0162 CLAY GRVL BLDR 0242 BLUE CLAY BLDR 0285
BARRIE CITY	17 604906 4918238 W	2007-04 7241	1.5				0012 10	7043599 (Z59477) A050283	BLCK FILL 0001 BRWN SAND SILT 0009 GREY SILT SAND 0017 GREY SILT CLAY 0022
BARRIE CITY	17 604884 4918254 W	2007-12 7241	1.5		///:	MT		7100022 (Z61712) A063275	BRWN FILL SAND LOOS 0002 BRWN SAND SILT DNSE 0010 GREY SILT SAND DNSE 0015 GREY SAND SILT WBRG 0027
BARRIE CITY	17 604908 4918223 W	2007-10 7241	1.97 1.97			MO		7100530 (M00153) A063717	BRWN FILL GRVL LOOS 0002 BRWN SAND SILT LOOS 0007 GREY SAND SILT CLAY 0025
BARRIE CITY	17 604845 4918284 W	2008-01 7241	2		///:	MO		7101535 (Z75104) A061520	BRWN FILL GRVL LOOS 0002 BRWN CLAY SILT DNSE 0012 GREY SILT FSND SOFT 0022
BARRIE CITY	17 604868 4918210 W	2008-01 7241	1.99		///:	MT		7101536 (Z75105) A061522	BRWN FILL GRVL LOOS 0002 BRWN SILT CLAY DNSE 0010 BRWN SAND SILT DNSE 0015 GREY SAND SILT 0024
BARRIE CITY	17 604854 4918217 W	2008-01 7241	2		///:	MO		7101537 (Z75106) A061521	BRWN FILL GRVL LOOS 0002 BRWN SILT CLAY DNSE 0010 BRWN SAND SILT DNSE 0016 GREY SAND SILT 0024
BARRIE CITY	17 604823 4918290 W	2008-08 7241	2.04			MT	0015 10	7110563 (Z81881) A067610	BRWN SAND GRVL SOFT 0010 BRWN SAND SILT HARD 0018 BRWN SAND SOFT 0025
BARRIE CITY	17 604875 4918233 W	2008-08 7241	2.04			MT	0020 10	7110565 (Z81880) A075529	BRWN SAND GRVL SOFT 0010 BRWN SAND SILT HARD 0022 BRWN SILT SAND HARD 0030
BARRIE CITY	17 604800 4918162 W	2008-08 7241	2.04			MO	0015 10	7110566 (Z89413) A056035	BRWN SAND GRVL LOOS 0015 GREY SILT SAND HARD 0020 BRWN SAND SILT HARD 0025
BARRIE CITY	17 604800 4918162 W	2008-08 7241	2.04			MO	0015 10	7110567 (Z89560) A067607	BRWN SAND GRVL LOOS 0020 BRWN SILT SAND HARD 0025
BARRIE CITY	17 604800 4918162 W	2008-08 7241	2.04			MO	0010 11	7110568 (Z81866) A056034	BRWN SAND GRVL LOOS 0015 GREY SILT SAND HARD 0021

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
BARRIE CITY	17 605620 4918098 W	2009-08 7075	2	FR 0015		MO		7140504 (Z76755) A086868	BRWN LOAM LOOS 0001 BRWN CLAY SOFT 0005 GREY SILT PCKD 0010 GREY SILT PCKD 0025 BRWN SAND DNSE 0030
BARRIE CITY	17 604881 4918203 W	2007-01 7241	2		///:	MT		7101538 (Z75103) A061523	BRWN FILL SAND LOOS 0002 BRWN CLAY SILT DNSE 0010 BRWN SAND SILT DNSE 0013 GREY SAND SILT 0019
BARRIE CITY 003	17 605232 4918968 W	2007-06 3413	2			MO		7045816 (Z63961) A055801	
BARRIE CITY (VESPRA)	17 604598 4918350 W	2012-08 7241	1.25			MO	0012 6	7191071 (Z156767) A137035	BRWN SAND 0012 BRWN SILT SAND 0018
BARRIE CITY (VESPRA)	17 605006 4918125 W	6946						7304581 (C39245) A218427 P	
BARRIE CITY (VESPRA)	17 604898 4918227 W	2015-08 7437						7272229 (C28359) A183943 P	
BARRIE CITY (VESPRA)	17 604893 4918223 W	2014-07 7215						7233361 (C26107) A163918 P	
BARRIE CITY (VESPRA)	17 605450 4919007 W	2014-06 3413	2			MT		7225295 (Z189740) A	
BARRIE CITY (VESPRA)	17 605355 4918644 W	2014-06 3413	2			MT		7225293 (Z189741) A	
BARRIE CITY (VESPRA)	17 604553 4918225 W	2012-08 7241	1.25			MO	0011 5	7191074 (Z156770) A137032	BRWN SAND 0012 BRWN SAND SLTY 0016
BARRIE CITY (VESPRA)	17 604593 4918305 W	2012-08 7241	1.25			MO	0011 5	7191072 (Z156766) A137033	BRWN SAND 0012 BRWN SAND SLTY 0016
BARRIE CITY (VESPRA)	17 605023 4918093 W	6946						7295972 (C39260) A218403 P	
BARRIE CITY (VESPRA) CON 03 022	17 605365 4918443 W	1957-04 1637	4	FR 0060	45/65/4/2:0	ST DO		5704614 ()	HPAN 0060 FSND 0085 MSND FSND 0090
BARRIE CITY (VESPRA) CON 04 021	17 604487 4918034 W	2020-12 7241						7379474 (Z353790) A306290 P	
BARRIE CITY (VESPRA) PR W 02 021	17 605561 4919015 W	2021-04 7360	2	UT 0020	///:	MO	0015 10	7387512 (8VW9TGON) A317633	BRWN FILL 0005 MSND 0025

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
BARRIE CITY (VESPRA) PR W 02 021	17 605644 4919088 W	2019-07 7247						7370402 (C47141) A275252 P	
BARRIE CITY (VESPRA) PR W 02 021	17 605476 4919049 W	2021-04 7360	2	UT 0020	///:	MO	0015 10	7387511 (WHDDGQO7) A317632	BRWN FILL 0005 MSND 0025
VESPRA TOWNSHIP	17 604498 4919097 W	2020-09 7644						7372330 (Z347956) A301440 P	
VESPRA TOWNSHIP CON 03 020	17 604514 4918574 W	1974-07 1204	6	FR 0145	91/141/2/2:0	DO	0144 4	5712335 ()	BRWN CLAY 0014 BRWN SAND GRVL CLAY 0021 GREY CLAY GRVL BLDR 0090 GREY CLAY SAND 0125 GREY SILT SAND 0145 GREY SAND 0148
VESPRA TOWNSHIP CON 03 020	17 604534 4918574 W	1975-06 1204	6	FR 0145	92/130/5/1:30	DO	0146 4	5712309 ()	BRWN SAND FILL 0003 BRWN CLAY SOFT 0014 BRWN SAND GRVL 0021 GREY CLAY GRVL BLDR 0091 GREY SAND CLAY 0127 GREY SILT SAND 0145 BRWN FSND 0150
VESPRA TOWNSHIP CON 03 020	17 604714 4918954 W	1970-09 2514	6	FR 0054	26/54/1/7:0	ST DO	0054 3	5707737 ()	FILL 0002 BRWN CLAY 0018 YLLW MSND 0028 YLLW FSND SILT 0039 YLLW FSND 0057 BLUE CLAY 0110
VESPRA TOWNSHIP CON 03 020	17 604774 4918744 W	1970-09 4608	30	FR 0015 FR 0027	12/23/5/1:15	DO		5707500 ()	BRWN CLAY STNS 0017 GREY FSND 0027
VESPRA TOWNSHIP CON 03 020	17 604564 4918624 W	1975-11 2340	6	UK 0118 FR 0138	90/127/8/1:0	DO	0145 6	5712925 ()	BRWN SAND FILL LOOS 0007 BRWN SAND CLAY 0038 GREY CLAY SAND PCKD 0095 GREY CLAY GRVL PCKD 0118 BRWN MSND PCKD 0124 BRWN SAND SILT CLAY 0138 BRWN FSND PCKD 0152 GREY SILT CLAY PCKD 0152
VESPRA TOWNSHIP CON 03 020	17 604814 4919024 W	1975-05 3203	5	FR 0122	50/75/10/1:30	DO	0132 4	5713449 ()	BRWN LOAM 0001 FSND 0028 GREY CLAY SILT LYRD 0081 CLAY 0122 FSND 0136
VESPRA TOWNSHIP CON 03 021	17 604542 4918623 W	1964-12 4608	30	FR 0032	32//2/:			5704613 ()	LOAM 0002 BRWN LOAM MSND 0046
VESPRA TOWNSHIP CON 03 021	17 604711 4918744 W	1964-02 2514	6					5704612 () A	PRDG 0015 BRWN CLAY 0017 YLLW MSND 0033 BRWN CLAY MSND GRVL 0058 BLUE CLAY 0090 GREY MSND 0158
VESPRA TOWNSHIP CON 03 021	17 604726 4918749 W	1964-01 2514	6					5704611 () A	LOAM 0001 BRWN CLAY 0017 YLLW MSND 0033 BRWN CLAY MSND GRVL 0058 BLUE CLAY 0090 GREY MSND CLAY 0275 MSND 0285

Notes:
UTM: UTM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
DATE CNTR: Date Work Completedand Well Contractor Licence Number
CASING DIA: .Casing diameter in inches
WATER: Unit of Depth in Fee. See Table 4 for Meaning of Code

PUMP TEST: Static Water Level in Feet / Water Level After Pumping in Feet / Pump Test Rate in GPM / Pump Test Duration in Hour : Minutes
WELL USE: See Table 3 for Meaning of Code
SCREEN: Screen Depth and Length in feet
WELL: WEL (AUDIT #) Well Tag . A: Abandonment; P: Partial Data Entry Only
FORMATION: See Table 1 and 2 for Meaning of Code

1. Core Material and Descriptive terms

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
BLDR	BOULDERS	FCRD	FRACTURED	IRFM	IRON FORMATION	PORS	POROUS	SOFT	SOFT
BSLT	BASALT	FGRD	FINE-GRAINED	LIMY	LIMY	PRDG	PREVIOUSLY DUG	SPST	SOAPSTONE
CGRD	COARSE-GRAINED	FGVL	FINE GRAVEL	LMSN	LIMESTONE	PRDR	PREV. DRILLED	STKY	STICKY
CGVL	COARSE GRAVEL	FILL	FILL	LOAM	TOPSOIL	QRTZ	QUARTZITE	STNS	STONES
CHRT	CHERT	FLDS	FELDSPAR	LOOS	LOOSE	QSND	QUICKSAND	STNY	STONEY
CLAY	CLAY	FLNT	FLINT	LTCL	LIGHT-COLOURED	QTZ	QUARTZ	THIK	THICK
CLN	CLEAN	FOSS	FOSILIFEROUS	LYRD	LAYERED	ROCK	ROCK	THIN	THIN
CLYY	CLAYEY	FSND	FINE SAND	MARL	MARL	SAND	SAND	TILL	TILL
CMTD	CEMENTED	GNIS	GNEISS	MGRD	MEDIUM-GRAINED	SHLE	SHALE	UNKN	UNKNOWN TYPE
CONG	CONGLOMERATE	GRNT	GRANITE	MGVL	MEDIUM GRAVEL	SHLY	SHALY	VERY	VERY
CRYS	CRYSTALLINE	GRSN	GREENSTONE	MRBL	MARBLE	SHRP	SHARP	WBRG	WATER-BEARING
CSND	COARSE SAND	GRVL	GRAVEL	MSND	MEDIUM SAND	SHST	SCHIST	WDFR	WOOD FRAGMENTS
DKCL	DARK-COLOURED	GRWK	GREYWACKE	MUCK	MUCK	SILT	SILT	WTHD	WEATHERED
DLMT	DOLOMITE	GVLY	GRAVELLY	OBDN	OVERBURDEN	SLTE	SLATE		
DNSE	DENSE	GYPS	GYPSUM	PCKD	PACKED	SLTY	SILTY		
DRTY	DIRTY	HARD	HARD	PEAT	PEAT	SNDS	SANDSTONE		
DRY	DRY	HPAN	HARDPAN	PGVL	PEA GRAVEL	SNDY	SANDYOAPSTONE		

2. Core Color

Code	Description
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GREN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

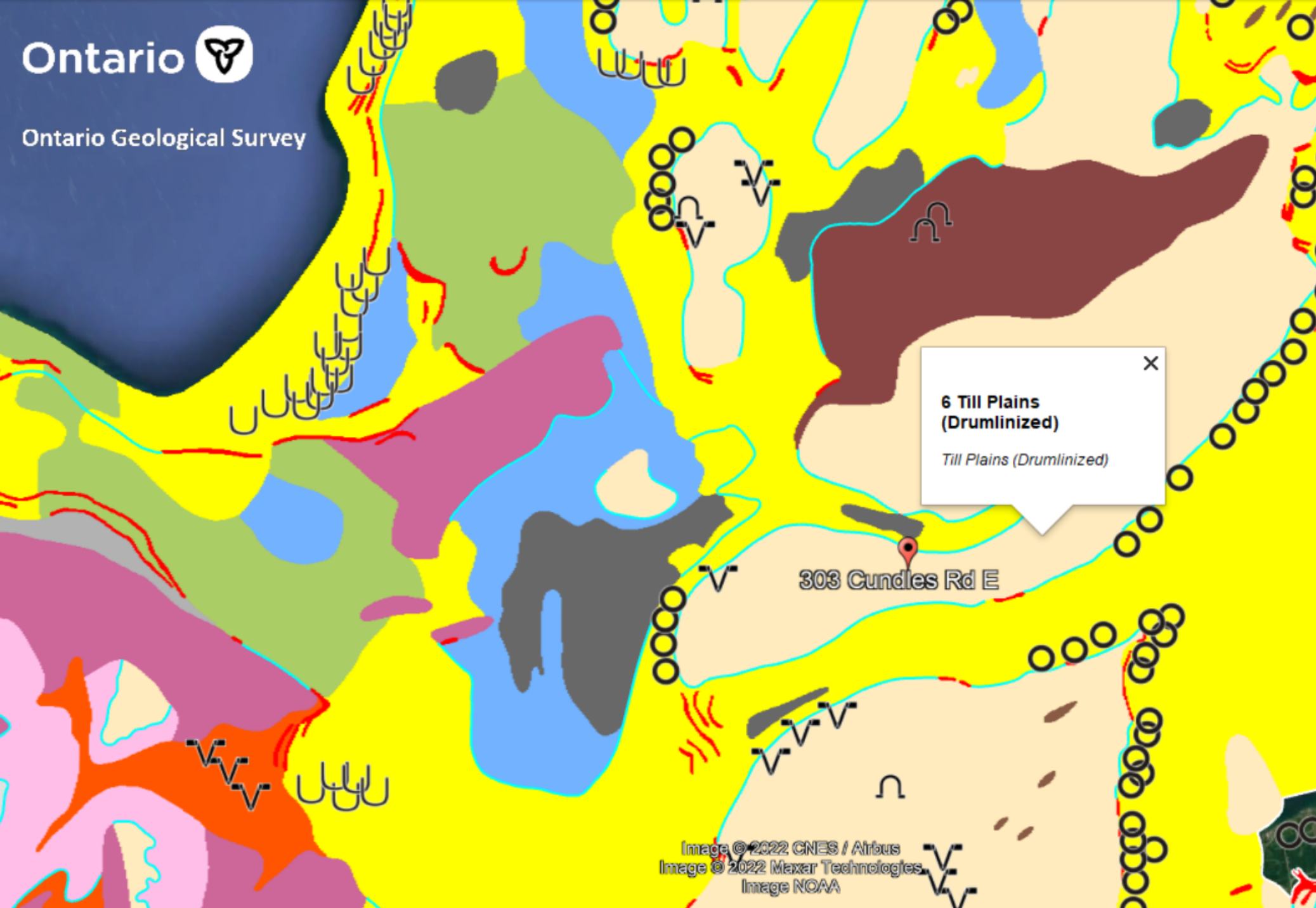
3. Well Use

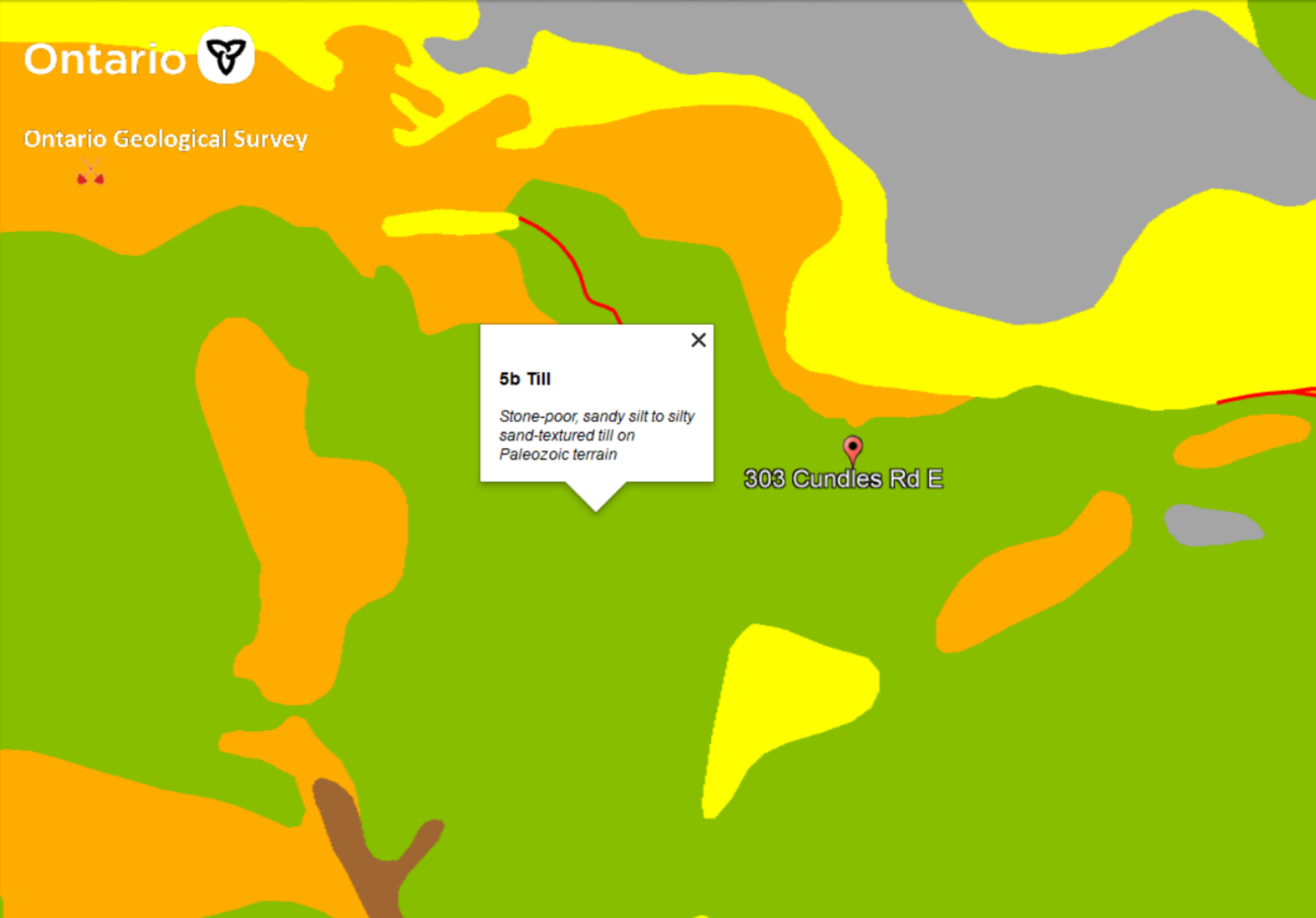
Code	Description	Code	Description
DO	Domestic	OT	Other
ST	Livestock	TH	Test Hole
IR	Irrigation	DE	Dewatering
IN	Industrial	MO	Monitoring
CO	Commercial	MT	Monitoring TestHole
MN	Municipal		
PS	Public		
AC	Cooling And A/C		
NU	Not Used		

4. Water Detail

Code	Description	Code	Description
FR	Fresh	GS	Gas
SA	Salty	IR	Iron
SU	Sulphur		
MN	Mineral		
UK	Unknown		

APPENDIX E


Ontario
Ontario Geological Survey
6 Till Plains
(Drumlinized)
Till Plains (Drumlinized)
303 Cundles Rd E
Image © 2022 CNES / Airbus
Image © 2022 Maxar Technologies
Image NOAA


Ontario
Ontario Geological Survey
5b Till
Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain
303 Cundles Rd E


Ontario
Ontario Geological Survey
54a
Limestone, dolostone, shale, arkose, sandstone
Ottawa Group; Simcoe Group; Shadow Lake Formation
303 Cundles Rd E
Image Landsat / Copernicus
Image NOAA

APPENDIX F

BOREHOLE LOG 1

Date Started : Mar 10, 2022
Position : E: 604953, N: 4918751 (UTM 17T)
Elev. Datum : Geodetic

File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
256.0	**GROUND SURFACE**				
	150mm **TOPSOIL**		1	SS	24
	FILL, clayey silt, sandy, trace gravel, trace rootlets, trace wood fragments, organic odour, very stiff to stiff, brown, moist		2	SS	14
	...at 0.8 m, trace brick fragments		3	SS	10
	...at 2.3 m, some sand, trace construction debris, grey		4	SS	11
253.0					
3.0	**SANDY SILT**, clayey, trace gravel, loose, brown, moist (GLACIAL TILL)		5	SS	9
	...at 4.6 m, dense		6	SS	30
	...at 6.1 m, grey		7	SS	33
			8	SS	36
246.9					
9.1	**SILT AND CLAY**, trace sand, hard, grey, moist		9A	SS	44
	...at 9.3 m, sand seam		9B	SS	
			10	SS	66
			11	SS	69
	...at 13.7 m, interbedded with dark grey silty clay layers		12	SS	41
241.7					
14.3	**END OF BOREHOLE**				

hollow stem augers OD=215 mm

mud rotary small OD=100 mm

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

elevation (m): 255 254 253 252 251 250 249 248 247 246 245 244 243 242

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: BTEX, H-Ms, Metals, ORPs, OCs, PHCs

SS5: BTEX, H-Ms, Metals, ORPs, PHCs

SS8: H-Ms, Metals, ORPs

SS9B: BTEX, PHCs

0 10 55 35

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Jun 14, 0222	4.1	251.9
Apr 12, 2022	4.0	252.0
May 6, 2022	4.0	252.0

file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

BOREHOLE LOG 2

Date Started : Mar 9, 2022
Position : E: 604991, N: 4918772 (UTM 17T)
Elev. Datum : Geodetic

File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

drill method	elev depth (m)	description	graphic log	number	type	SPT N-value
	254.5	**GROUND SURFACE**				
hollow stem augers OD=215 mm		150mm **TOPSOIL**		1	SS	8
		FILL, sandy silt, some clay, trace gravel, trace rootlets, trace asphalt, trace wood fragments, stiff, brown, moist		2	SS	9
		...at 1.5 m, trace brick fragments, trace construction debris, brown with orange		3	SS	12
	252.2 2.3	**CLAYEY SILT**, sandy, trace gravel, stiff, brown with grey, moist (GLACIAL TILL)		4	SS	9
		...at 3.0 m, wet		5	SS	12
		...at 4.6 m, very stiff		6	SS	18
		...at 6.1 m, stiff, grey		7	SS	12
mud rotary small OD=100 mm	246.9 7.6	**SILTY SAND**, trace clay, trace gravel, dense, grey, wet		8A	SS	40
	246.4 8.1	**SANDY SILT**, clayey, trace gravel, dense, grey, moist (GLACIAL TILL)		8B	SS	
	245.4 9.1	**SANDY SILT**, some clay, dense to very dense, grey, moist		9	SS	47
				10	SS	66
	242.3 12.2	**CLAY AND SILT**, trace sand, light grey silt partings, hard, grey, moist		11	SS	86
				12	SS	54
	238.7 15.8			13	SS	58

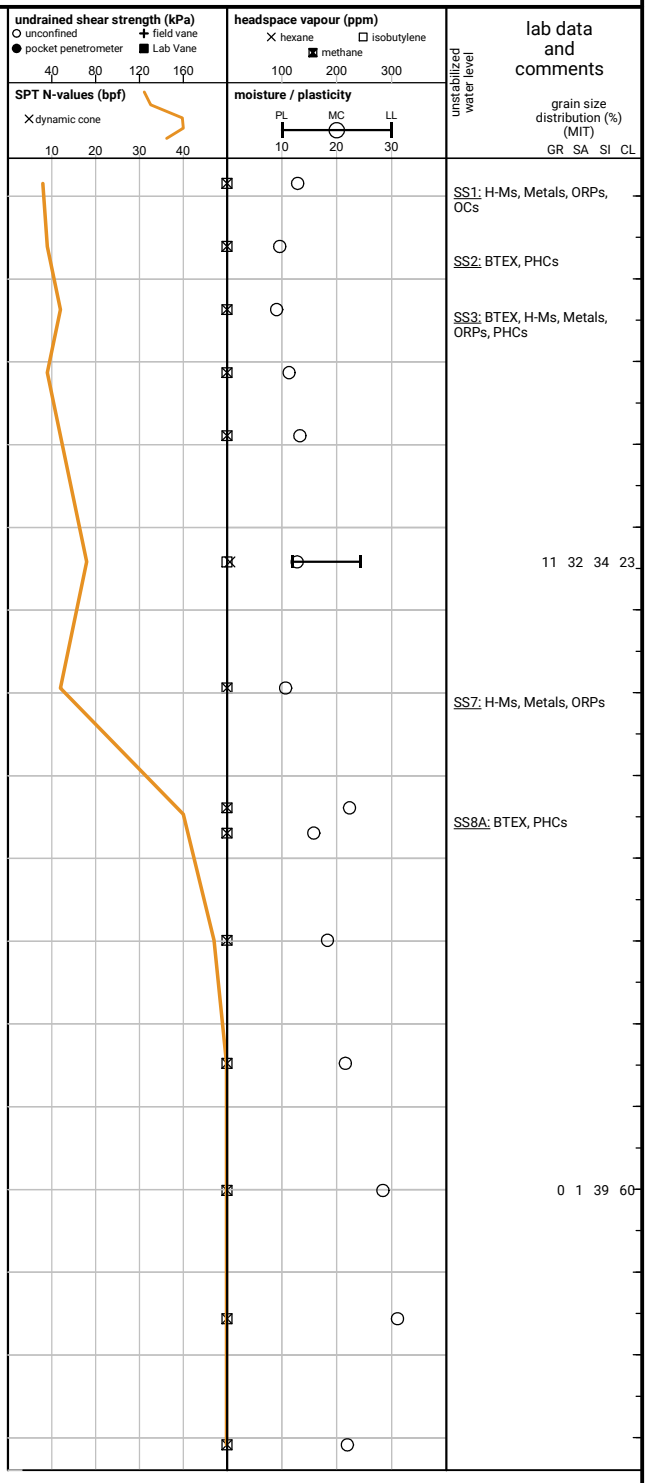
END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Apr 12, 2022	3.8	250.7
May 6, 2022	3.7	250.8
Jun 14, 2022	3.8	250.7



file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 7, 2022
Position : E: 604977, N: 4918758 (UTM 17T)
Elev. Datum : Geodetic

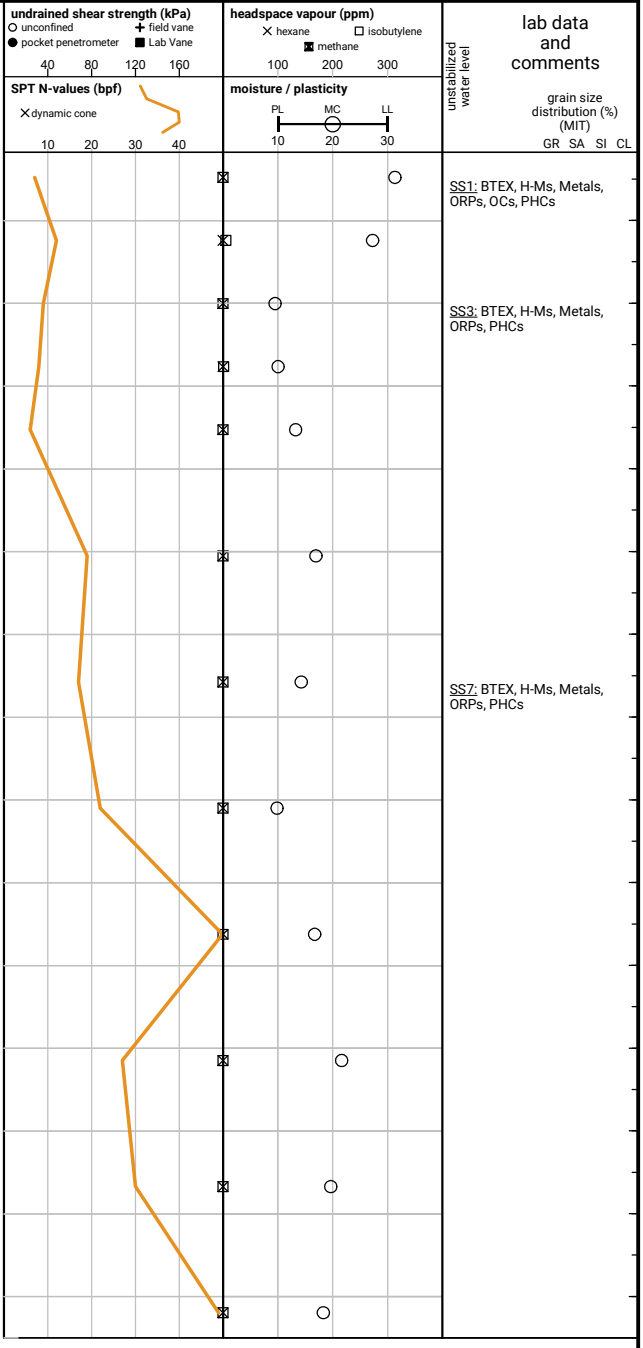
BOREHOLE LOG 3

File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

drill method	elev depth (m)	description	graphic log	number	type	SPT N-value
	254.8	**GROUND SURFACE**				
hollow stem augers OD=215 mm CME 55		100mm **TOPSOIL**		1	SS	7
	254.0 / 0.8	**FILL**, silty sand, trace clay, trace gravel, loose, brown, wet				
		FILL, clayey silt, sandy, trace gravel, trace asphalt, stiff, brown, moist		2	SS	12
		...at 1.5 m, brown to dark brown		3	SS	9
		...at 2.3 m, brown with orange		4	SS	8
		...at 3.0 m, dark grey with brown		5	SS	6
	250.2 / 4.6					
mud rotary small OD=100 mm		**CLAYEY SILT**, sandy, trace gravel, trace rock fragments, inferred cobbles, very stiff, brown, moist (GLACIAL TILL)		6	SS	19
				7	SS	17
				8	SS	22
	245.7 / 9.1					
		CLAY AND SILT, trace sand, hard, grey, moist		9	SS	56
		...at 10.7 m, very stiff		10	SS	27
		...at 12.2 m, hard		11	SS	30
				12	SS	49
	240.5 / 14.3					

END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.



unstabilized water level

lab data and comments

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

SS1: BTEX, H-Ms, Metals, ORPs, OCs, PHCs

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

SS7: BTEX, H-Ms, Metals, ORPs, PHCs

file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

BOREHOLE LOG 4

Date Started : Mar 8, 2022
Position : E: 604994, N: 4918712 (UTM 17T)
Elev. Datum : Geodetic

File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
255.9	**GROUND SURFACE**				
	100mm **TOPSOIL**		1	SS	14
255.1 / 0.8	**FILL**, silty sand, some clay, trace gravel, compact, brown, wet				
	CLAYEY SILT, sandy, trace gravel, very stiff, brown, moist (GLACIAL TILL)		2	SS	22
			3	SS	18
253.6 / 2.3	**SILTY SAND**, some clay, trace gravel, black sand pockets, compact to loose, brown, wet (GLACIAL TILL)		4	SS	16
			5	SS	9
	...at 4.6 m, clayey silt, sandy, very stiff		6	SS	20
	...at 6.1 m, sandy silt, clayey, dense, moist		7	SS	31
248.1 / 7.8	**SILTY SAND**, trace gravel, compact to dense, grey, wet		8A / 8B	SS / SS	23
	...at 9.1 m, trace rock fragments, inferred cobbles		9	SS	49
245.1 / 10.8	**CLAY AND SILT**, trace sand, light grey sand pockets, very stiff, grey, moist		10A / 10B	SS / SS	22
			11	SS	27
242.2 / 13.7	**SILTY SAND**, trace clay, dense, grey, wet		12	SS	36
			13	SS	36
240.1 / 15.8	**END OF BOREHOLE**				

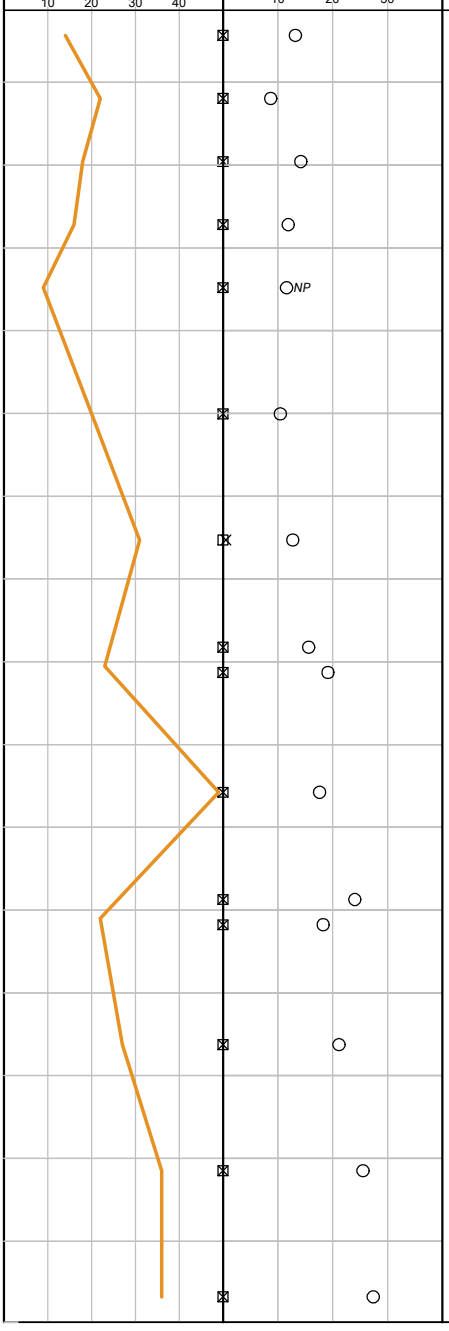
hollow stem augers OD=215 mm

mud rotary small OD=100 mm

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

elevation (m): 255 254 253 252 251 250 249 248 247 246 245 244 243 242 241

well details



unstabilized water level

lab data and comments

grain size distribution (%) (MIT)

GR SA SI CL

SS1: H-Ms, Metals, ORPs, PCBs, OCs

SS2: BTEX, PHCs

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

8 49 28 15

SS7: H-Ms, Metals, ORPs

SS8B: BTEX, PHCs

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Apr 12, 2022	0.9	255.0
May 6, 2022	0.9	255.0
Jun 14, 2022	1.0	254.9

file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 9, 2022
Position : E: 605031, N: 4918731 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 5

File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

drill method	elev depth (m)	description	graphic log	number	type	SPT N-value
	255.1	**GROUND SURFACE**				
hollow stem augers OD=215 mm		100mm **TOPSOIL**		1	SS	7
		FILL, clayey silt, sandy, trace gravel, trace asphalt, trace brick fragments, trace rock fragments,, firm, brown, moist		2	SS	13
				3	SS	12
	252.8 2.3	**SILTY SAND**, some clay, trace gravel, trace rootlets, loose, brown with orange, moist (GLACIAL TILL)		4	SS	9
		...at 3.0 m, compact		5	SS	14
mud rotary small OD=100 mm		...at 4.6 m, grey		6	SS	24
				7	SS	26
				8	SS	22
	246.0 9.1	**SANDY SILT**, some clay, dense, grey, moist		9	SS	49
		...at 10.7 m, wet		10	SS	36
		...at 12.2 m, very dense		11	SS	72
				12	SS	92 / 275mm
	241.0 14.1	**END OF BOREHOLE**				

Borehole was filled with drill water upon completion of drilling.

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

well details

elevation (m): 255 254 253 252 251 250 249 248 247 246 245 244 243 242 241

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

NP

unstabilized water level

lab data and comments

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

SS1: H-Ms, Metals, ORPs, OCs

SS2: BTEX, PHCs

6 54 24 16

SS4: H-Ms, Metals, ORPs, PHCs

SS6: BTEX, H-Ms, Metals, ORPs, PHCs

file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

Date Started : Mar 3, 2022
Position : E: 605036, N: 4918654 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 6

File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

drill method : CME 55

elev depth (m)	description	stratigraphy: graphic log	samples: number	type	SPT N-value
255.6	**GROUND SURFACE**				
	125mm **TOPSOIL**		1	SS	15
254.8 (0.8)	**FILL**, silty sand, trace clay, trace gravel, trace rootlets, organic odour, compact, brown to grey, wet		2	SS	12
	SANDY SILT, clayey, trace gravel, compact, brown with orange, moist (GLACIAL TILL)		3	SS	55
	...at 1.5 m, trace rock fragments, inferred cobbles, very dense				
	...at 2.3 m, compact		4	SS	29
	...at 3.0 m, dense		5	SS	34
251.0 (4.6)	**SAND**, trace silt, trace clay, dense to very dense, grey, wet		6	SS	31
			7	SS	57
	...at 7.6 m, silty sand		8	SS	89 / 250mm
	...at 9.1 m, sand, trace silt, trace clay		9	SS	77
244.4 (11.2)			10	SS	81

hollow stem augers OD=215 mm

mud rotary small OD=100 mm

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

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

unstabilized water level

lab data and comments

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

SS2: BTEX, H-Ms, Metals, ORPs, OCs, PHCs
SS3: H-Ms, Metals, ORPs
SS5: H-Ms, Metals, ORPs
SS6: BTEX, PHCs
SS8: BTEX, PHCs
0 88 9 3

END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Apr 12, 2022	1.0	254.6
May 6, 2022	0.8	254.8
Jun 14, 2022	1.0	254.6

file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

BOREHOLE LOG 7

Date Started : Mar 3, 2022
Position : E: 605060, N: 4918659 (UTM 17T)
Elev. Datum : Geodetic

File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

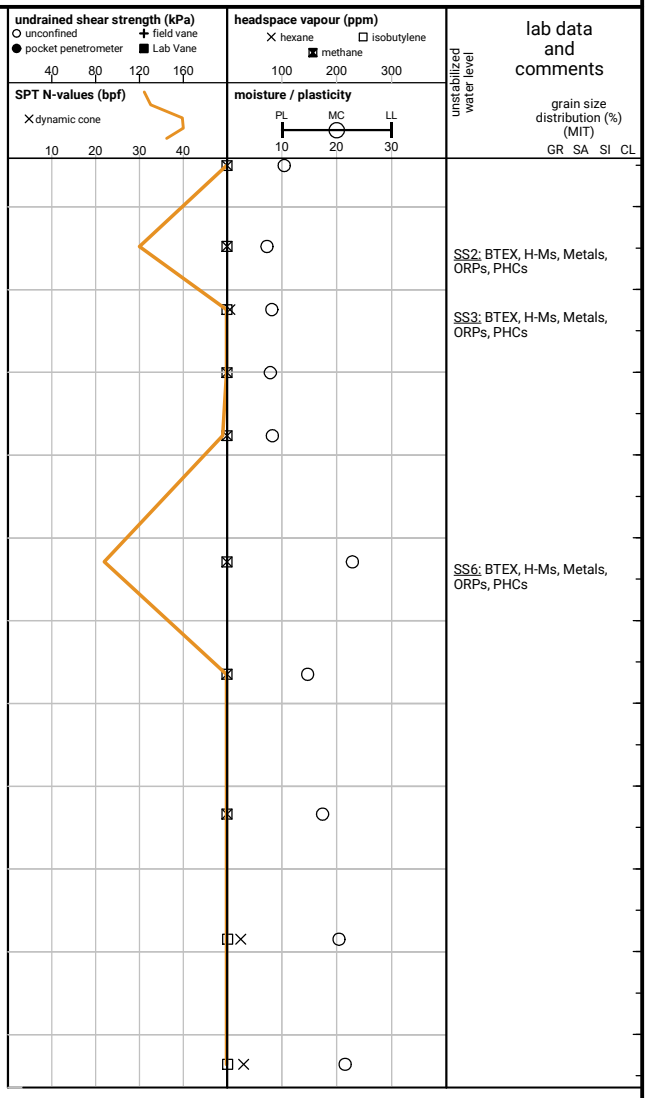
drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
255.6	**GROUND SURFACE**				
254.8 / 0.8	**FILL**, silty sand, some gravel, trace clay, trace rock fragments, inferred compact, brown, moist		1	SS	50 / 25mm
	SANDY SILT, clayey, trace gravel, black sand pockets, dense to very dense, brown with orange, moist (GLACIAL TILL)		2	SS	30
			3	SS	61
			4	SS	60
			5	SS	49
251.0 / 4.6	**SILTY SAND**, trace gravel, trace rock fragments, inferred cobbles, compact, grey, wet		6	SS	22
	...at 6.1 m, very dense		7	SS	50 / 125mm
			8	SS	76
			9	SS	87
			10	SS	90
244.4 / 11.2	**END OF BOREHOLE**				

hollow stem augers OD=215 mm

mud rotary small OD=100 mm

Borehole was filled with drill water upon completion of drilling.



file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

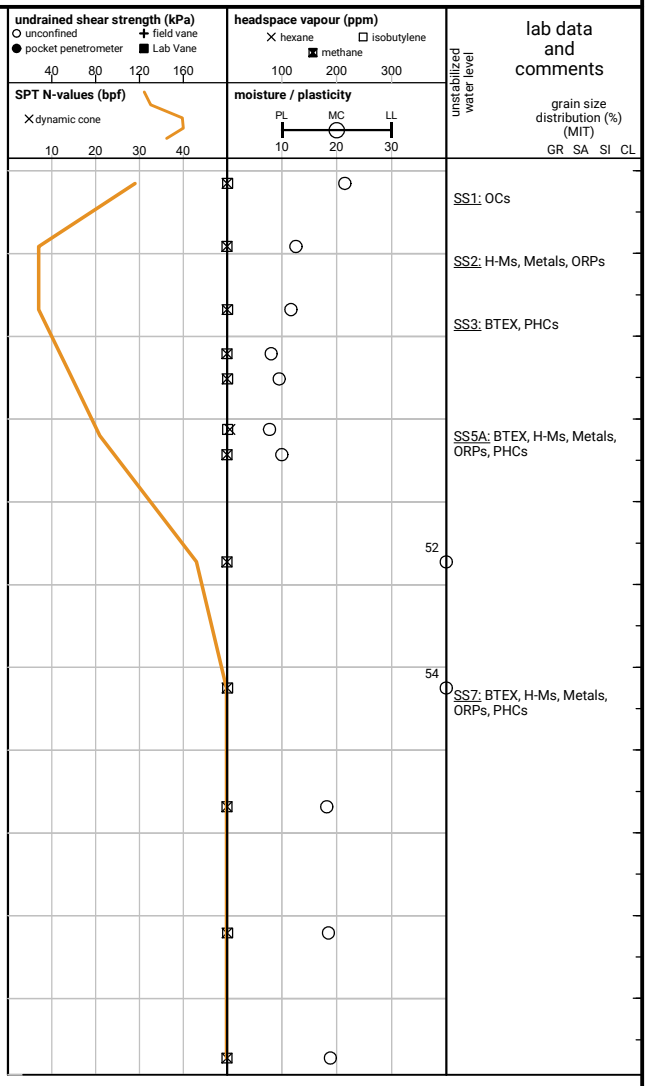
GROUNDED ENGINEERING

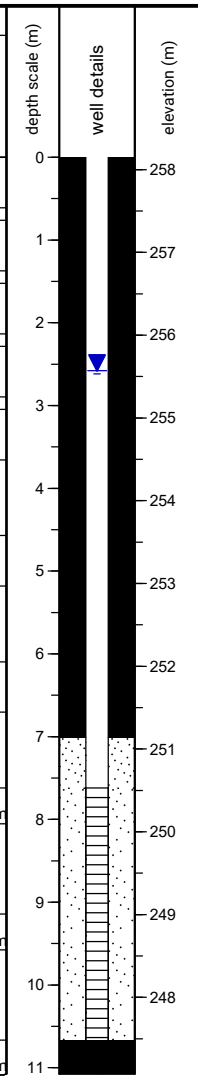
Date Started : Mar 4, 2022
Position : E: 604995, N: 4918578 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 8

File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

drill method : CME 55	elev depth (m)	description	graphic log	number	type	SPT N-value
	258.2	**GROUND SURFACE**				
hollow stem augers OD=215 mm		100mm **TOPSOIL**		1	SS	29
	257.4 / 0.8	**FILL**, sandy silt, some clay, trace gravel, trace rootlets, compact, brown, wet				
		CLAYEY SILT, sandy, trace gravel, firm to stiff, orangey brown to grey, moist (GLACIAL TILL)		2	SS	7
				3	SS	7
		...at 2.3 m, silty sand seam		4A	SS	14
				4B	SS	
		...at 3.0 m, very stiff		5A	SS	21
		...at 3.5 m, some sand, grey		5B	SS	
		...at 4.6 m, rock fragments, inferred cobbles, hard		6	SS	43
	252.1 / 6.1					
mud rotary small OD=100 mm		**SILTY SAND**, trace gravel, trace rock fragments, inferred cobbles, very dense, grey, moist		7	SS	66
		...at 7.6 m, wet		8	SS	91 / 275mm
				9	SS	93 / 275mm
	247.1 / 11.1			10	SS	100 / 250mm





END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Apr 12, 2022	2.5	255.7
May 6, 2022	2.5	255.7
Jun 14, 2022	2.6	255.6

file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

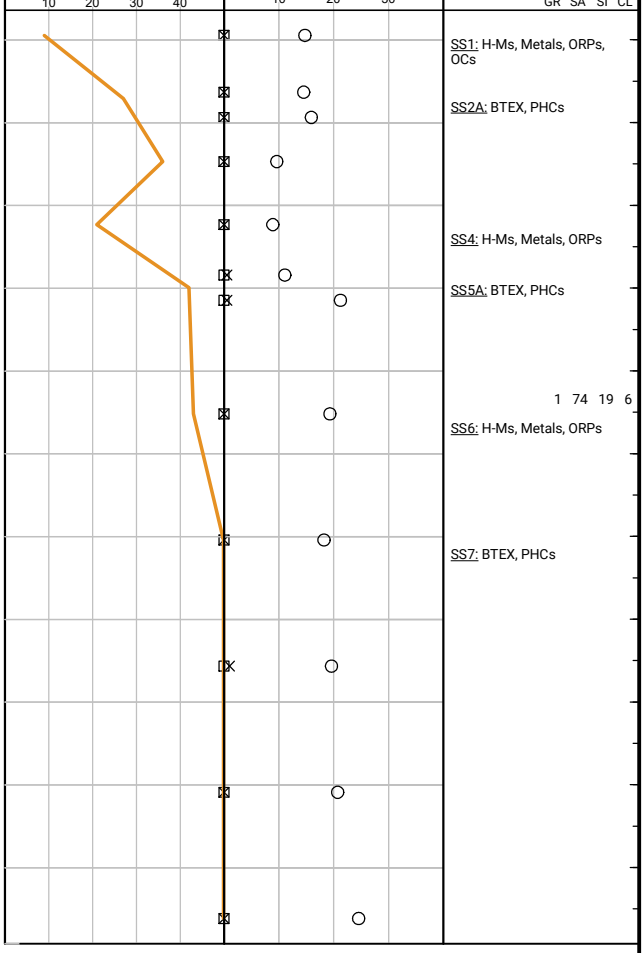
Date Started : Mar 2, 2022
Position : E: 605026, N: 4918616 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 9

File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

drill method	elev / depth (m)	description	graphic log	number	type	SPT N-value	depth scale (m)	well details	elevation (m)	lab data and comments
	256.4	**GROUND SURFACE**								
hollow stem augers OD=215 mm		150mm **TOPSOIL**		1	SS	9				
	255.6 / 0.8	**FILL**, sandy silt, trace clay, trace gravel, trace rootlets, some topsoil, organic odour, loose, brown with black, wet		2A	SS	27				
		SANDY SILT, clayey, trace gravel, compact to dense, brown to grey, moist (GLACIAL TILL)		2B	SS					
		...at 1.2 m, trace rock fragments, inferred cobbles		3	SS	36				
		...at 1.5 m, dense								
		...at 2.3 m, clayey silt, very stiff		4	SS	21				
	253.4 / 3.0	**SAND**, some silt, trace clay, trace gravel, dense, brown to grey, moist to wet		5A	SS	42				
		...at 3.4 m, wet		5B	SS					
mud rotary small OD=100 mm				6	SS	43				
		...at 6.1 m, very dense		7	SS	67				
				8	SS	79				
		...at 9.1 m, sandy silt		9	SS	79				
				10	SS	65				
	245.1 / 11.3	**END OF BOREHOLE**								

Borehole was filled with drill water upon completion of drilling.



file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

Date Started : Feb 28, 2022
Position : E: 605080, N: 4918606 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 10

File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
256.2	**GROUND SURFACE**				
	150mm **TOPSOIL**		1	SS	7
255.4	**FILL**, sandy silt, some clay, trace gravel, organic odour, loose, dark grey, wet				
0.8	**CLAYEY SILT**, some sand, trace gravel, hard, brown, moist (GLACIAL TILL)		2	SS	30
	...at 1.5 m, trace rock fragments, inferred cobbles, very stiff		3	SS	17
			4	SS	20
	...at 3.0 m, clay seams, grey, wet		5	SS	23
251.6					
4.6	**SAND**, some silt, trace gravel, very dense, grey, moist		6	SS	58
	...at 6.1 m, trace rock fragments, inferred cobbles, moist to wet		7	SS	71
	...at 7.6 m, silty sand, wet		8	SS	85
			9	SS	89
244.9			10	SS	79
11.3					

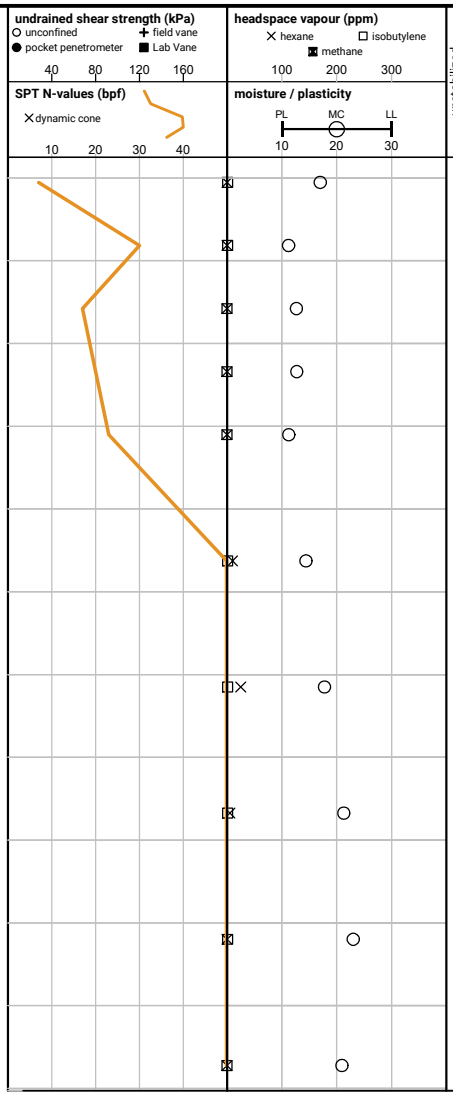
hollow stem augers OD=215 mm

mud rotary small OD=100 mm

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

well details

elevation (m): 256 255 254 253 252 251 250 249 248 247 246 245



unstabilized water level

lab data and comments

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

SS1: BTEX, H-Ms, Metals, ORPs, OCs, PHCs

SS2: H-Ms, Metals, ORPs

SS3: BTEX, PHCs

SS5: H-Ms, Metals, ORPs

SS7: BTEX, PHCs

END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Apr 12, 2022	1.3	254.9
May 6, 2022	1.3	254.9
Jun 14, 2022	1.4	254.8

file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

BOREHOLE LOG 11

Date Started : Mar 1, 2022
Position : E: 605076, N: 4918587 (UTM 17T)
Elev. Datum : Geodetic

File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
258.5	**GROUND SURFACE**				
	FILL, sandy silt, some clay, trace gravel, trace rootlets, trace asphalt, compact, brown, wet		1	SS	17
	...at 0.8 m, trace wood fragments, very loose, grey		2	SS	3
	...at 1.5 m, organic odour		3	SS	1
256.2					
2.3	**CLAYEY SILT**, sandy, trace gravel, trace rock fragments, inferred cobbles, hard, brown, moist (GLACIAL TILL)		4	SS	60 / 250mm
	...at 3.0 m, no rock fragments, brown with mottled orange to grey		5	SS	41
253.9					
4.6	**SILTY SAND**, trace clay, trace gravel, trace rock fragments, inferred cobbles, very dense, brown, wet		6	SS	65
	...at 6.1 m, grey		7	SS	73
			8	SS	74
			9	SS	50
	...at 10.7 m, sandy silt		10	SS	88 / 275mm
			11	SS	97 / 250mm
244.8					
13.7	**CLAY AND SILT**, trace sand, light grey silt partings, hard, grey, moist		12	SS	53
			13	SS	59
242.7					
15.8					

hollow stem augers OD=215 mm

mud rotary small OD=100 mm

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

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

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

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

moisture / plasticity: PL MC LL; 10 20 30

unstabilized water level

lab data and comments

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

SS1: H-Ms, Metals, ORPs, OCs

SS3: BTEX, PHCs

SS4: H-Ms, Metals, ORPs

SS6: BTEX, PHCs

9 54 30 7

SS8: BTEX, H-Ms, Metals, ORPs, PHCs

LL=45

0 1 43 56

END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Apr 12, 2022	2.3	256.2
May 6, 2022	2.2	256.3
Jun 14, 2022	2.4	256.1

file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

BOREHOLE LOG 12

Date Started : Feb 24, 2022
Position : E: 605105, N: 4918574 (UTM 17T)
Elev. Datum : Geodetic

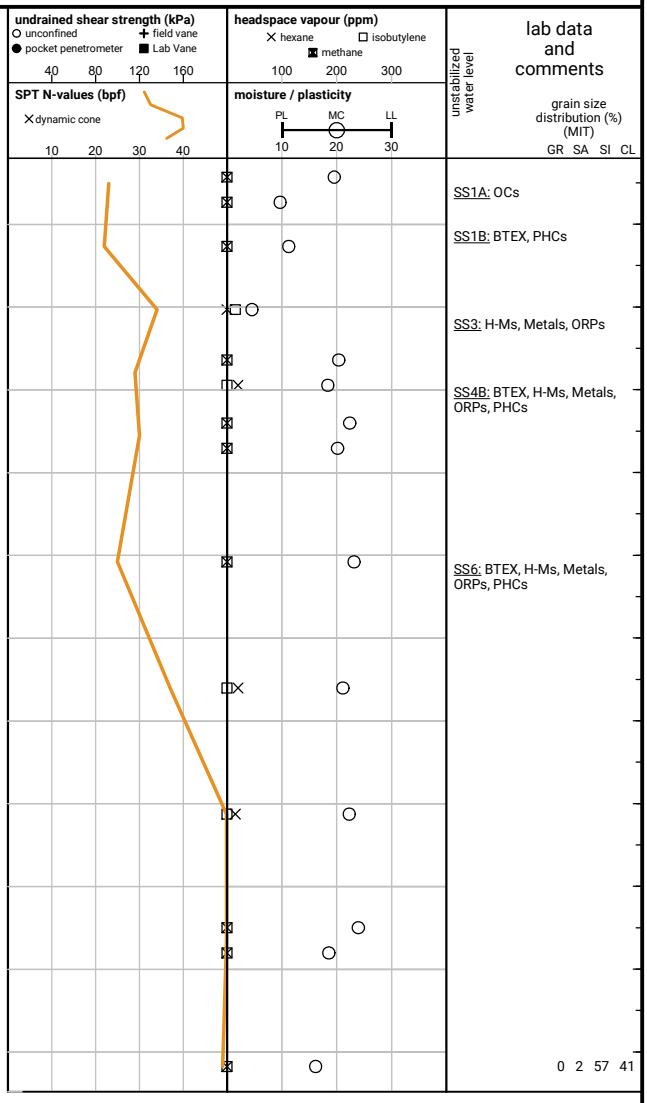
File No. : 22-014 **Project** : 303 Cundles Rd E, Barrie, ON **Client** : Penady (North Barrie) Limited c/o PenEquity Realty Corporation

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
256.8	**GROUND SURFACE**				
256.3 / 0.5	125mm **TOPSOIL**		1A	SS	23
	FILL, sandy silt, trace clay, organic odour, compact, brown with orange, wet		1B	SS	
	FILL, silty sand, trace clay, compact, brown, moist		2	SS	22
	...at 1.5 m, gravelly sand, trace rock fragments, inferred cobbles, dense		3	SS	34
254.5 / 2.3	**SILTY SAND**, compact, grey, moist		4A	SS	29
	...at 2.6 m, hard clay seams		4B	SS	
	...at 3.0 m, silty sand, grey with orange, wet		5A	SS	30
	...at 3.4 m, hard clay seams		5B	SS	
	...at 4.6 m, silty sand, grey, wet		6	SS	25
	...at 6.1 m, dense to very dense		7	SS	37
			8	SS	74
247.4 / 9.4	**SILT AND CLAY**, trace sand, very dense, grey, moist		9A	SS	63
			9B	SS	
			10	SS	49
245.5 / 11.3					

hollow stem augers OD=215 mm

mud rotary small OD=100 mm



END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.

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

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Apr 12, 2022	1.9	254.9
May 6, 2022	1.7	255.1
Jun 14, 2022	1.8	255.0

file: 22-014 gint.gpj

Tech : VT | **PM** : DK | **Rev** : MD

APPENDIX G

K from Grain Size Analysis Report

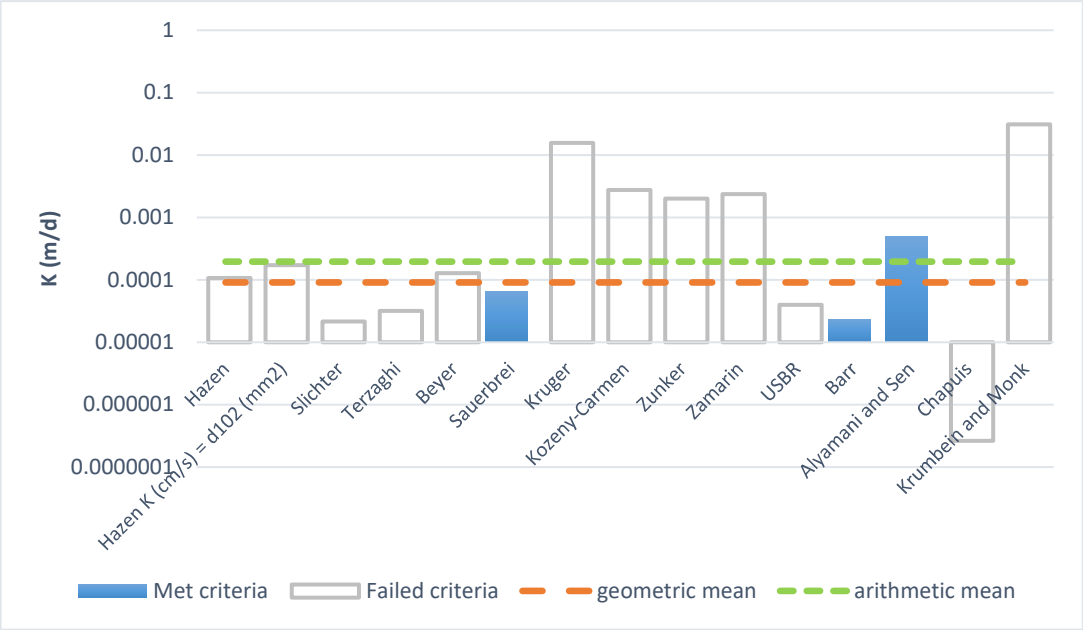
Date: 25-Apr-22

Sample Name: BH1 SS10

Mass Sample (g): 100

T (oC) 20

Poorly sorted clay with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	1.2E-07	1.2E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	2.0E-07	2.0E-09	0.00	
Slichter	2.5E-08	2.5E-10	0.00	
Terzaghi	3.6E-08	3.6E-10	0.00	
Beyer	1.5E-07	1.5E-09	0.00	
Sauerbrei	7.6E-08	7.6E-10	0.00	
Kruger	1.8E-05	1.8E-07	0.02	
Kozeny-Carmen	3.2E-06	3.2E-08	0.00	
Zunker	2.3E-06	2.3E-08	0.00	
Zamarin	2.7E-06	2.7E-08	0.00	
USBR	4.6E-08	4.6E-10	0.00	
Barr	2.7E-08	2.7E-10	0.00	
Alyamani and Sen	5.8E-07	5.8E-09	0.00	
Chapuis	3.0E-10	3.0E-12	0.00	
Krumbein and Monk	3.6E-05	3.6E-07	0.03	
geometric mean	1.1E-07	1.1E-09	0.00	
arithmetic mean	2.3E-07	2.3E-09	0.00	

K from Grain Size Analysis Report

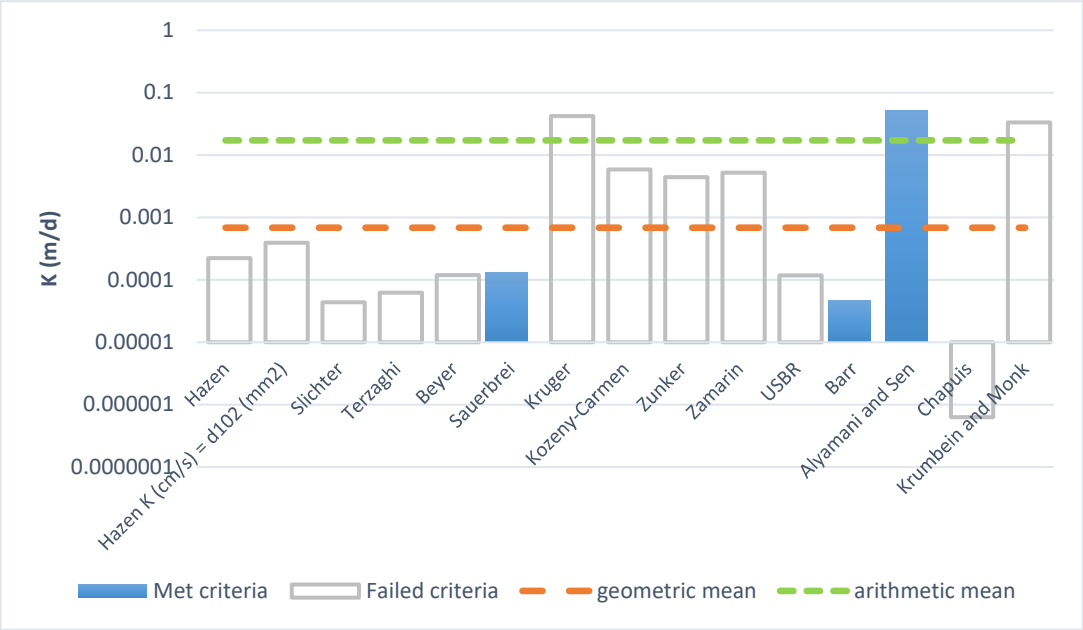
Date: 25-Apr-22

Sample Name: BH2 SS6

Mass Sample (g): 100

T (oC) 20

Poorly sorted sandy gravelly silt with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	2.6E-07	2.6E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	4.5E-07	4.5E-09	0.00	
Slichter	5.1E-08	5.1E-10	0.00	
Terzaghi	7.2E-08	7.2E-10	0.00	
Beyer	1.4E-07	1.4E-09	0.00	
Sauerbrei	1.5E-07	1.5E-09	0.00	
Kruger	4.9E-05	4.9E-07	0.04	
Kozeny-Carmen	6.8E-06	6.8E-08	0.01	
Zunker	5.1E-06	5.1E-08	0.00	
Zamarin	6.0E-06	6.0E-08	0.01	
USBR	1.4E-07	1.4E-09	0.00	
Barr	5.4E-08	5.4E-10	0.00	
Alyamani and Sen	6.0E-05	6.0E-07	0.05	
Chapuis	7.3E-10	7.3E-12	0.00	
Krumbein and Monk	3.8E-05	3.8E-07	0.03	
geometric mean	7.9E-07	7.9E-09	0.00	
arithmetic mean	2.0E-05	2.0E-07	0.02	

K from Grain Size Analysis Report

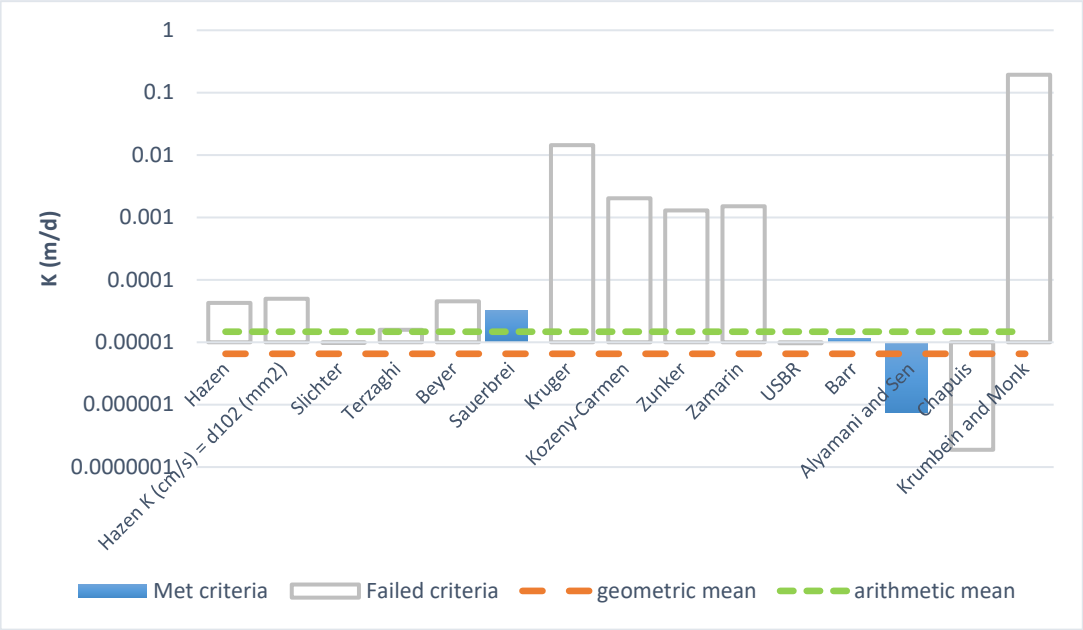
Date: 25-Apr-22

Sample Name: BH2 SS11

Mass Sample (g): 100

T (oC) 20

Poorly sorted clay with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	4.9E-08	4.9E-10	0.00	
Hazen K (cm/s) = d_{10} (mm)	5.8E-08	5.8E-10	0.00	
Slichter	1.1E-08	1.1E-10	0.00	
Terzaghi	1.8E-08	1.8E-10	0.00	
Beyer	5.2E-08	5.2E-10	0.00	
Sauerbrei	3.7E-08	3.7E-10	0.00	
Kruger	1.7E-05	1.7E-07	0.01	
Kozeny-Carmen	2.4E-06	2.4E-08	0.00	
Zunker	1.5E-06	1.5E-08	0.00	
Zamarin	1.7E-06	1.7E-08	0.00	
USBR	1.1E-08	1.1E-10	0.00	
Barr	1.3E-08	1.3E-10	0.00	
Alyamani and Sen	8.7E-10	8.7E-12	0.00	
Chapuis	2.2E-10	2.2E-12	0.00	
Krumbein and Monk	2.3E-04	2.3E-06	0.19	
geometric mean	7.5E-09	7.5E-11	0.00	
arithmetic mean	1.7E-08	1.7E-10	0.00	

K from Grain Size Analysis Report

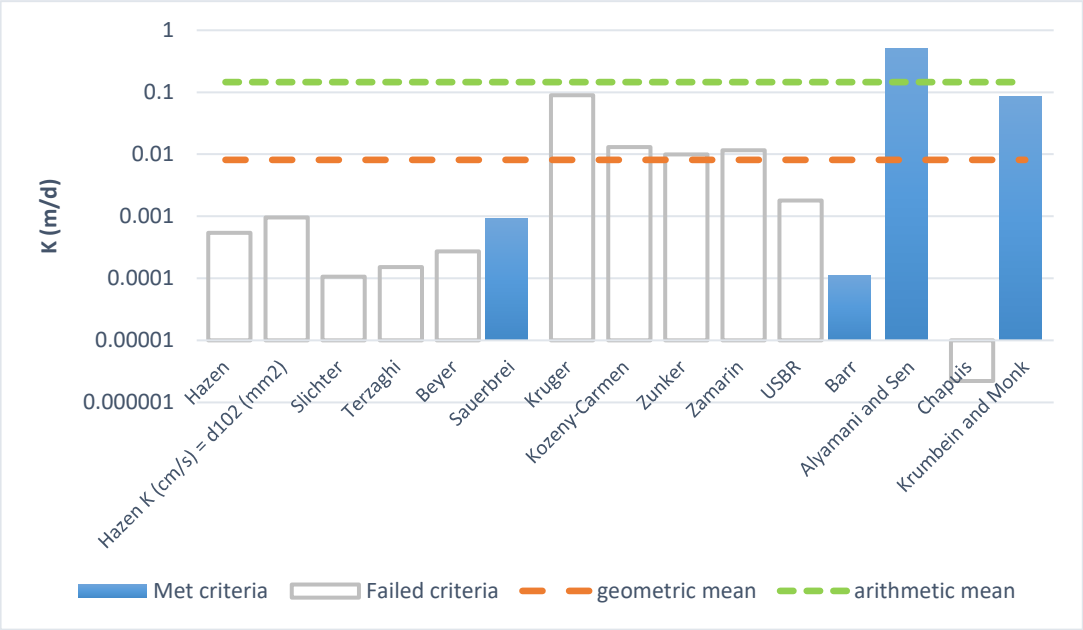
Date: 25-Apr-22

Sample Name: BH4 SS5

Mass Sample (g): 100

T (oC) 20

Poorly sorted sand with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	6.2E-07	6.2E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	1.1E-06	1.1E-08	0.00	
Slichter	1.2E-07	1.2E-09	0.00	
Terzaghi	1.7E-07	1.7E-09	0.00	
Beyer	3.1E-07	3.1E-09	0.00	
Sauerbrei	1.1E-06	1.1E-08	0.00	
Kruger	1.0E-04	1.0E-06	0.09	
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	2.1E-06	2.1E-08	0.00	
Barr	1.3E-07	1.3E-09	0.00	
Alyamani and Sen	5.8E-04	5.8E-06	0.50	
Chapuis	2.5E-09	2.5E-11	0.00	
Krumbein and Monk	9.8E-05	9.8E-07	0.08	
geometric mean	9.5E-06	9.5E-08	0.01	
arithmetic mean	1.7E-04	1.7E-06	0.15	

K from Grain Size Analysis Report

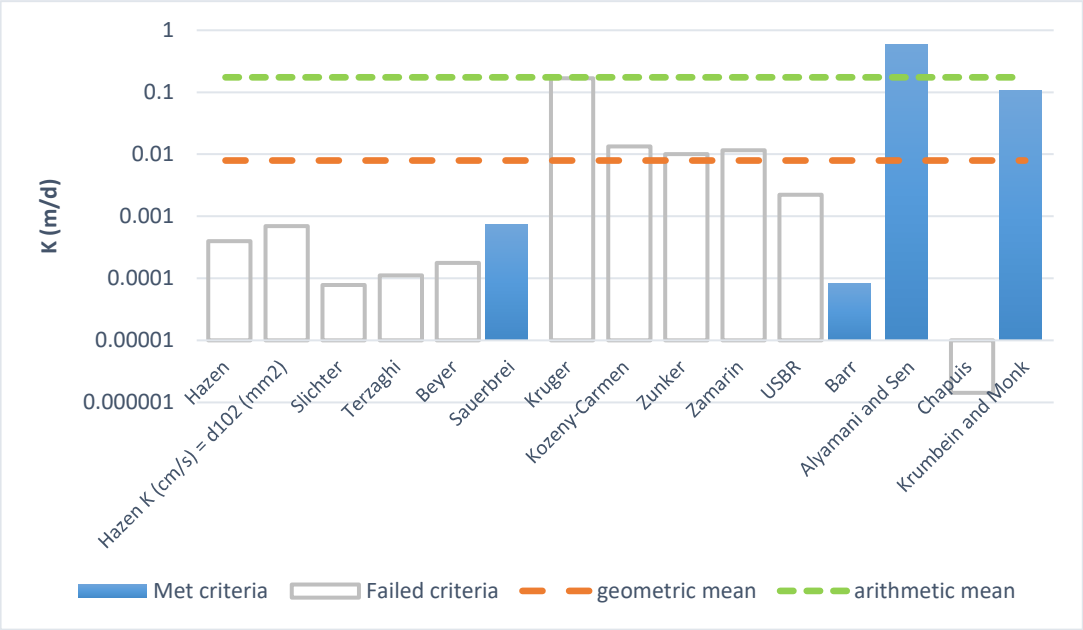
Date: 25-Apr-22

Sample Name: BH5 SS4

Mass Sample (g): 100

T (oC) 20

Poorly sorted sand with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	4.6E-07	4.6E-09	0.00	
Hazen K (cm/s) = d_{10} (mm)	8.1E-07	8.1E-09	0.00	
Slichter	9.0E-08	9.0E-10	0.00	
Terzaghi	1.3E-07	1.3E-09	0.00	
Beyer	2.0E-07	2.0E-09	0.00	
Sauerbrei	8.6E-07	8.6E-09	0.00	
Kruger	1.9E-04	1.9E-06	0.17	
Kozeny-Carmen	1.5E-05	1.5E-07	0.01	
Zunker	1.2E-05	1.2E-07	0.01	
Zamarin	1.3E-05	1.3E-07	0.01	
USBR	2.6E-06	2.6E-08	0.00	
Barr	9.6E-08	9.6E-10	0.00	
Alyamani and Sen	6.9E-04	6.9E-06	0.60	
Chapuis	1.6E-09	1.6E-11	0.00	
Krumbein and Monk	1.3E-04	1.3E-06	0.11	
geometric mean	9.2E-06	9.2E-08	0.01	
arithmetic mean	2.0E-04	2.0E-06	0.18	

K from Grain Size Analysis Report

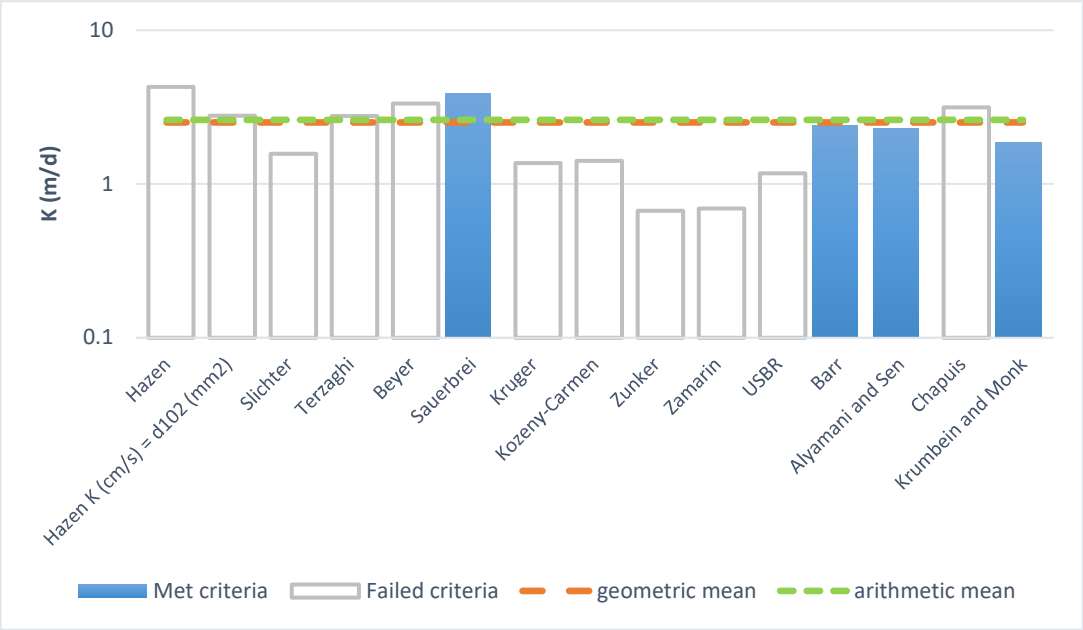
Date: 25-Apr-22

Sample Name: BH6 SS9

Mass Sample (g): 100

T (oC) 20

Moderately well sorted sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	5.0E-03	5.0E-05	4.28	
Hazen K (cm/s) = d_{10} (mm)	3.2E-03	3.2E-05	2.78	
Slichter	1.8E-03	1.8E-05	1.57	
Terzaghi	3.2E-03	3.2E-05	2.76	
Beyer	3.9E-03	3.9E-05	3.33	
Sauerbrei	4.5E-03	4.5E-05	3.90	
Kruger	1.6E-03	1.6E-05	1.36	
Kozeny-Carmen	1.6E-03	1.6E-05	1.41	
Zunker	7.7E-04	7.7E-06	0.67	
Zamarin	8.0E-04	8.0E-06	0.69	
USBR	1.4E-03	1.4E-05	1.17	
Barr	2.8E-03	2.8E-05	2.40	
Alyamani and Sen	2.7E-03	2.7E-05	2.31	
Chapuis	3.6E-03	3.6E-05	3.15	
Krumbein and Monk	2.1E-03	2.1E-05	1.86	
geometric mean	2.9E-03	2.9E-05	2.52	
arithmetic mean	3.0E-03	3.0E-05	2.62	

K from Grain Size Analysis Report

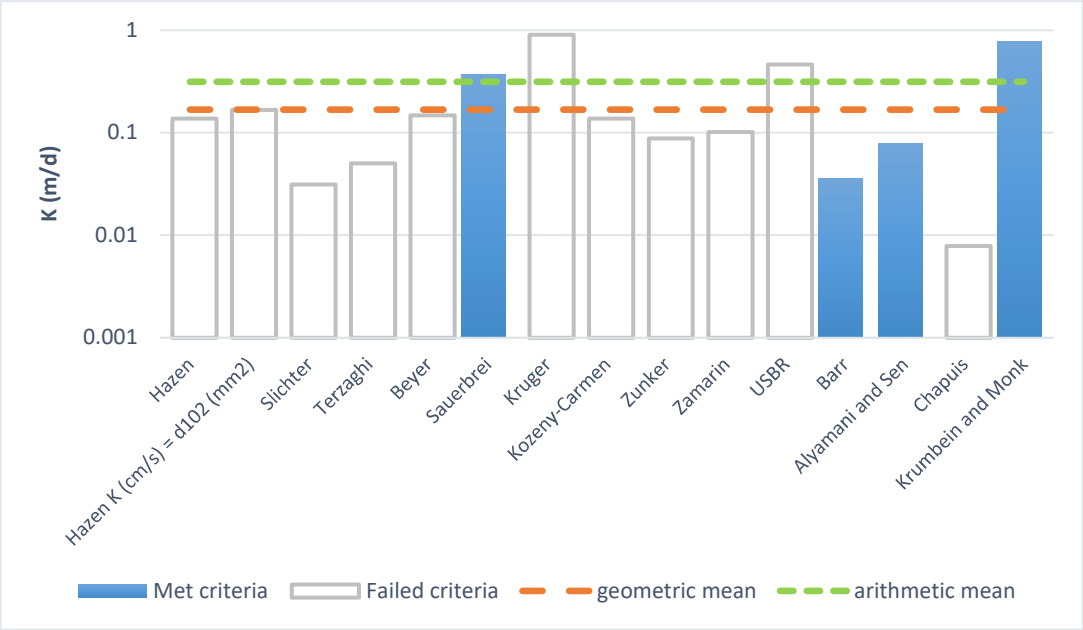
Date: 25-Apr-22

Sample Name: BH9 SS6

Mass Sample (g): 100

T (oC) 20

Poorly sorted sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	1.6E-04	1.6E-06	0.14	
Hazen K (cm/s) = d_{10} (mm)	1.9E-04	1.9E-06	0.17	
Slichter	3.6E-05	3.6E-07	0.03	
Terzaghi	5.8E-05	5.8E-07	0.05	
Beyer	1.7E-04	1.7E-06	0.15	
Sauerbrei	4.3E-04	4.3E-06	0.37	
Kruger	1.1E-03	1.1E-05	0.91	
Kozeny-Carmen	1.6E-04	1.6E-06	0.14	
Zunker	1.0E-04	1.0E-06	0.09	
Zamarin	1.2E-04	1.2E-06	0.10	
USBR	5.4E-04	5.4E-06	0.46	
Barr	4.2E-05	4.2E-07	0.04	
Alyamani and Sen	9.1E-05	9.1E-07	0.08	
Chapuis	9.1E-06	9.1E-08	0.01	
Krumbein and Monk	8.9E-04	8.9E-06	0.77	
geometric mean	2.0E-04	2.0E-06	0.17	
arithmetic mean	3.6E-04	3.6E-06	0.31	

K from Grain Size Analysis Report

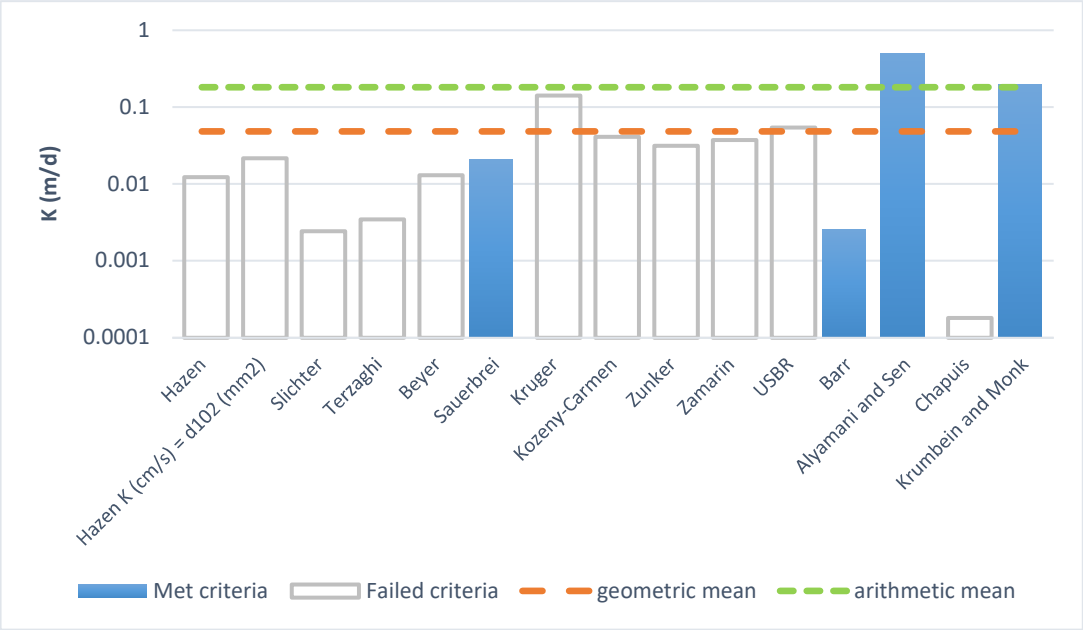
Date: 25-Apr-22

Sample Name: BH11 SS7

Mass Sample (g): 100

T (oC) 20

Poorly sorted sand with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	1.4E-05	1.4E-07	0.01	
Hazen K (cm/s) = d_{10} (mm)	2.5E-05	2.5E-07	0.02	
Slichter	2.8E-06	2.8E-08	0.00	
Terzaghi	4.0E-06	4.0E-08	0.00	
Beyer	1.5E-05	1.5E-07	0.01	
Sauerbrei	2.4E-05	2.4E-07	0.02	
Kruger	1.6E-04	1.6E-06	0.14	
Kozeny-Carmen	4.8E-05	4.8E-07	0.04	
Zunker	3.6E-05	3.6E-07	0.03	
Zamarin	4.3E-05	4.3E-07	0.04	
USBR	6.3E-05	6.3E-07	0.05	
Barr	3.0E-06	3.0E-08	0.00	
Alyamani and Sen	5.8E-04	5.8E-06	0.50	
Chapuis	2.1E-07	2.1E-09	0.00	
Krumbein and Monk	2.3E-04	2.3E-06	0.20	
geometric mean	5.6E-05	5.6E-07	0.05	
arithmetic mean	2.1E-04	2.1E-06	0.18	

K from Grain Size Analysis Report

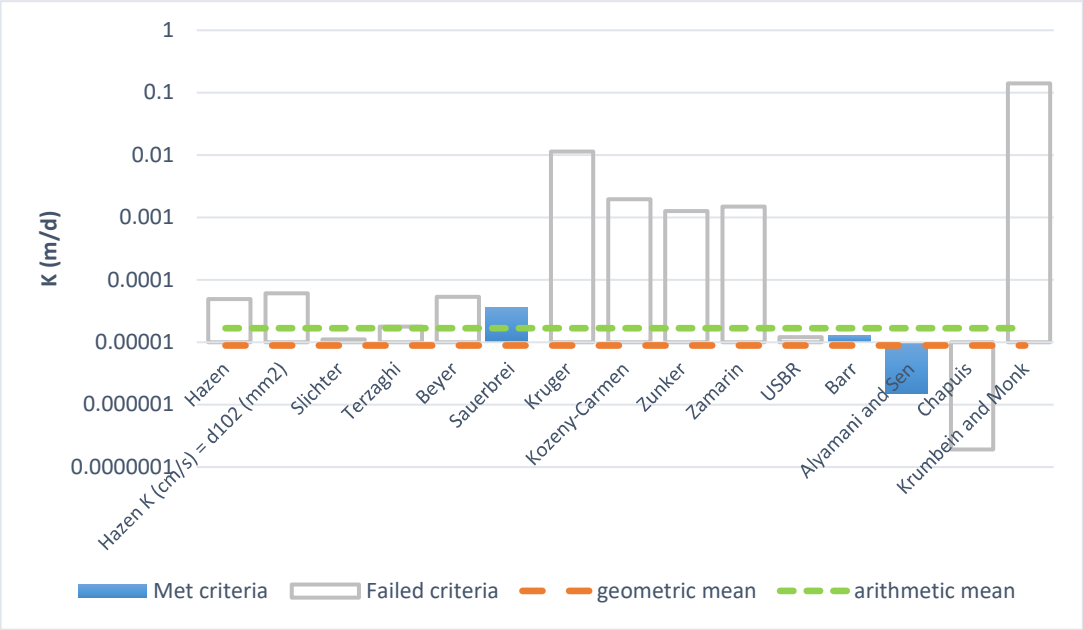
Date: 25-Apr-22

Sample Name: BH11 SS13

Mass Sample (g): 100

T (oC) 20

Poorly sorted clay with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	5.7E-08	5.7E-10	0.00	
Hazen K (cm/s) = d_{10} (mm)	7.0E-08	7.0E-10	0.00	
Slichter	1.3E-08	1.3E-10	0.00	
Terzaghi	2.0E-08	2.0E-10	0.00	
Beyer	6.2E-08	6.2E-10	0.00	
Sauerbrei	4.2E-08	4.2E-10	0.00	
Kruger	1.3E-05	1.3E-07	0.01	
Kozeny-Carmen	2.3E-06	2.3E-08	0.00	
Zunker	1.5E-06	1.5E-08	0.00	
Zamarin	1.7E-06	1.7E-08	0.00	
USBR	1.4E-08	1.4E-10	0.00	
Barr	1.5E-08	1.5E-10	0.00	
Alyamani and Sen	1.8E-09	1.8E-11	0.00	
Chapuis	2.2E-10	2.2E-12	0.00	
Krumbein and Monk	1.6E-04	1.6E-06	0.14	
geometric mean	1.0E-08	1.0E-10	0.00	
arithmetic mean	1.9E-08	1.9E-10	0.00	

K from Grain Size Analysis Report

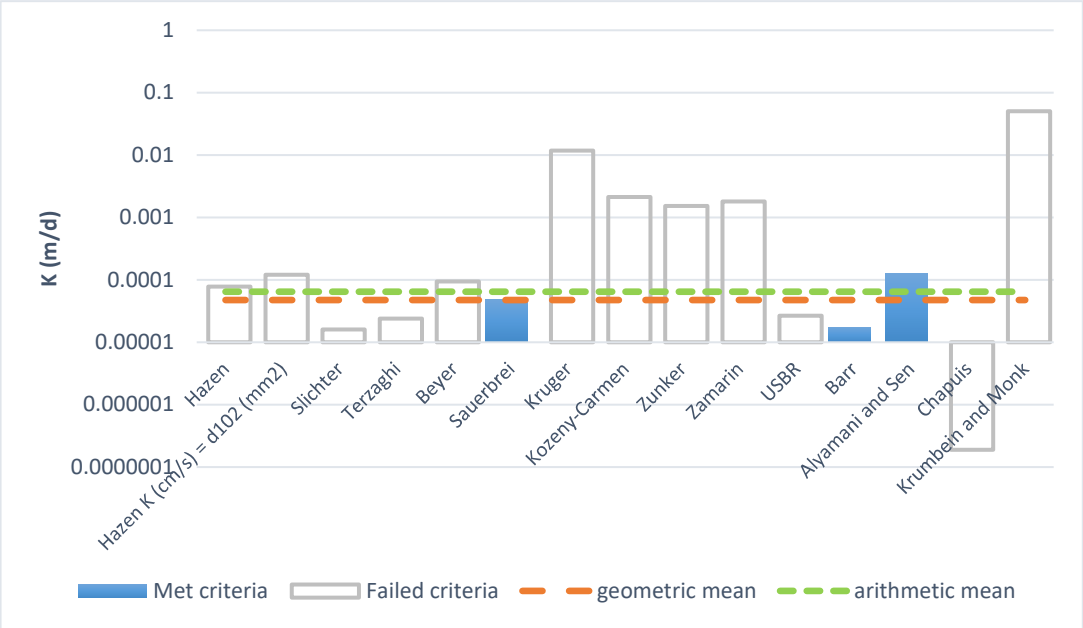
Date: 25-Apr-22

Sample Name: BH12 SS10

Mass Sample (g): 100

T (oC) 20

Poorly sorted clay with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	9.0E-08	9.0E-10	0.00	
Hazen K (cm/s) = d_{10} (mm)	1.4E-07	1.4E-09	0.00	
Slichter	1.8E-08	1.8E-10	0.00	
Terzaghi	2.8E-08	2.8E-10	0.00	
Beyer	1.1E-07	1.1E-09	0.00	
Sauerbrei	5.7E-08	5.7E-10	0.00	
Kruger	1.4E-05	1.4E-07	0.01	
Kozeny-Carmen	2.5E-06	2.5E-08	0.00	
Zunker	1.8E-06	1.8E-08	0.00	
Zamarin	2.1E-06	2.1E-08	0.00	
USBR	3.1E-08	3.1E-10	0.00	
Barr	2.0E-08	2.0E-10	0.00	
Alyamani and Sen	1.5E-07	1.5E-09	0.00	
Chapuis	2.2E-10	2.2E-12	0.00	
Krumbein and Monk	5.8E-05	5.8E-07	0.05	
geometric mean	5.5E-08	5.5E-10	0.00	
arithmetic mean	7.5E-08	7.5E-10	0.00	

APPENDIX H

Grounded Engineering Inc
ATTN: Deepak Kanraj
1 Banigan Drive
TORONTO ON M4H 1G3

Date Received: 17-MAR-22
Report Date: 28-MAR-22 15:13 (MT)
Version: FINAL

Client Phone: 647-264-7932

Certificate of Analysis

Lab Work Order #: L2692976

Project P.O. #: NOT SUBMITTED
Job Reference: 22-014
C of C Numbers:
Legal Site Desc: 299 CUNDLES RD E

Amanda Overholster
Account Manager

Summary of Guideline Exceedances

Guideline ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Ontario Sewer Use Bylaws - Barrie Sanitary Sewer (2012-172)						
(No parameter exceedances)						
Ontario Sewer Use Bylaws - Barrie Storm Sewer (2012-172)						
L2692976-1	SEW-UF-BH8	Physical Tests	Total Suspended Solids	15.8	15	mg/L
		Aggregate Organics	BOD	43.2	15	mg/L

ANALYTICAL REPORT

Physical Tests - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2692976-1 Sample Date: 16-MAR-22 Sample ID: SEW-UF-BH8
pH	pH units	6.0-9.5	6.0-9.5	7.99
Total Suspended Solids	mg/L	350	15	15.8

Guide Limit #1: Barrie Sanitary Sewer (2012-172)
Guide Limit #2: Barrie Storm Sewer (2012-172)

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

Anions and Nutrients - WATER

			Lab ID	L2692976-1
			Sample Date	16-MAR-22
			Sample ID	SEW-UF-BH8
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Chloride (Cl)	mg/L	1500	-	150
Fluoride (F)	mg/L	10	-	0.505
Total Kjeldahl Nitrogen	mg/L	100	-	0.209
Phosphorus, Total	mg/L	10	-	0.139
Sulfate (SO4)	mg/L	1500	-	35.0
Sulphide as S	mg/L	-	-	<0.018
Sulphide (as H2S)	mg/L	1	-	<0.019

Guide Limit #1: Barrie Sanitary Sewer (2012-172)
Guide Limit #2: Barrie Storm Sewer (2012-172)

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	L2692976-1
			Sample Date	16-MAR-22
			Sample ID	SEW-UF-BH8
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Cyanide, Total	mg/L	1.2	-	0.0022

Guide Limit #1: Barrie Sanitary Sewer (2012-172)
Guide Limit #2: Barrie Storm Sewer (2012-172)

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.

Total Metals - WATER

			Lab ID	L2692976-1
			Sample Date	16-MAR-22
			Sample ID	SEW-UF-BH8
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Aluminum (Al)-Total	mg/L	50	-	0.570
Antimony (Sb)-Total	mg/L	5	-	0.00021
Arsenic (As)-Total	mg/L	1	-	0.00054
Barium (Ba)-Total	mg/L	5	-	0.0884
Bismuth (Bi)-Total	mg/L	5	-	<0.000050
Cadmium (Cd)-Total	mg/L	0.7	0.001	0.000028
Chromium (Cr)-Total	mg/L	2	0.08	0.00102
Cobalt (Co)-Total	mg/L	5.0	-	0.00045
Copper (Cu)-Total	mg/L	2.0	0.01	0.0053
Gold (Au)-Total	ug/L	5000	-	<0.020
Iron (Fe)-Total	mg/L	50	-	0.592
Lead (Pb)-Total	mg/L	0.7	0.05	0.00041
Manganese (Mn)-Total	mg/L	5	-	0.0699
Mercury (Hg)-Total	mg/L	0.01	-	<0.0000050
Molybdenum (Mo)-Total	mg/L	5	-	0.00481
Nickel (Ni)-Total	mg/L	2	0.05	0.00931
Platinum (Pt)-Total	ug/L	5000	-	<0.020
Rhodium (Rh)-Total	ug/L	5000	-	<0.0050
Selenium (Se)-Total	mg/L	1.0	-	0.000444
Silver (Ag)-Total	mg/L	0.4	-	<0.000050
Tin (Sn)-Total	mg/L	5	-	0.00460
Vanadium (V)-Total	mg/L	5.0	-	0.00115
Zinc (Zn)-Total	mg/L	2.0	0.04	0.0084

Guide Limit #1: Barrie Sanitary Sewer (2012-172)
Guide Limit #2: Barrie Storm Sewer (2012-172)

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

Aggregate Organics - WATER

			Lab ID	L2692976-1
			Sample Date	16-MAR-22
			Sample ID	SEW-UF-BH8
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
BOD	mg/L	300	15	43.2
COD	mg/L	600	-	80
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	0.1	-	<0.0010

Guide Limit #1: Barrie Sanitary Sewer (2012-172)
Guide Limit #2: Barrie Storm Sewer (2012-172)

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.

Volatile Organic Compounds - WATER

				Lab ID	L2692976-1
				Sample Date	16-MAR-22
				Sample ID	SEW-UF-BH8
		Guide Limits			
Analyte	Unit	#1	#2		
Acetone	ug/L	-	-	<20	
Benzene	ug/L	10	-	<0.50	
Bromodichloromethane	ug/L	-	-	5.3	
Bromoform	ug/L	-	-	<1.0	
Bromomethane	ug/L	-	-	<0.50	
Carbon Disulfide	ug/L	-	-	<1.0	
Carbon tetrachloride	ug/L	-	-	<0.20	
Chlorobenzene	ug/L	-	-	<0.50	
Dibromochloromethane	ug/L	-	-	3.4	
Chloroethane	ug/L	-	-	<1.0	
Chloroform	ug/L	-	-	5.8	
Chloromethane	ug/L	-	-	<2.0	
1,2-Dibromoethane	ug/L	-	-	<0.20	
1,2-Dichlorobenzene	ug/L	50	-	<0.50	
1,3-Dichlorobenzene	ug/L	-	-	<0.50	
1,4-Dichlorobenzene	ug/L	80	-	<0.50	
Dichlorodifluoromethane	ug/L	-	-	<1.0	
1,1-Dichloroethane	ug/L	-	-	<0.50	
1,2-Dichloroethane	ug/L	-	-	<0.50	
1,1-Dichloroethylene	ug/L	-	-	<0.50	
cis-1,2-Dichloroethylene	ug/L	-	-	<0.50	
trans-1,2-Dichloroethylene	ug/L	-	-	<0.50	
Dichloromethane	ug/L	90	-	<2.0	
1,2-Dichloropropane	ug/L	-	-	<0.50	
cis-1,3-Dichloropropene	ug/L	-	-	<0.30	
trans-1,3-Dichloropropene	ug/L	-	-	<0.30	
Ethylbenzene	ug/L	60	-	<0.50	
n-Hexane	ug/L	-	-	<0.50	
2-Hexanone	ug/L	-	-	<20	
Methyl Ethyl Ketone	ug/L	-	-	<20	

Guide Limit #1: Barrie Sanitary Sewer (2012-172)
Guide Limit #2: Barrie Storm Sewer (2012-172)

Volatile Organic Compounds - WATER

			Lab ID	L2692976-1
			Sample Date	16-MAR-22
			Sample ID	SEW-UF-BH8
		Guide Limits		
Analyte	Unit	#1	#2	
Methyl Isobutyl Ketone	ug/L	-	-	<20
MTBE	ug/L	-	-	<0.50
Styrene	ug/L	-	-	<0.50
1,1,1,2-Tetrachloroethane	ug/L	-	-	<0.50
1,1,2,2-Tetrachloroethane	ug/L	60	-	<0.50
Tetrachloroethylene	ug/L	60	-	<0.50
Toluene	ug/L	20	-	<0.40
1,1,1-Trichloroethane	ug/L	-	-	<0.50
1,1,2-Trichloroethane	ug/L	-	-	<0.50
Trichloroethylene	ug/L	50	-	<0.50
Trichlorofluoromethane	ug/L	-	-	<1.0
Vinyl chloride	ug/L	-	-	<0.50
o-Xylene	ug/L	-	-	<0.30
m+p-Xylenes	ug/L	-	-	<0.40
Xylenes (Total)	ug/L	300	-	<0.50
Surrogate: 4-Bromofluorobenzene	%	-	-	100.0
Surrogate: 1,4-Difluorobenzene	%	-	-	99.3

Guide Limit #1: Barrie Sanitary Sewer (2012-172)
Guide Limit #2: Barrie Storm Sewer (2012-172)

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

Polycyclic Aromatic Hydrocarbons - WATER

			Lab ID	L2692976-1
			Sample Date	16-MAR-22
			Sample ID	SEW-UF-BH8
		Guide Limits		
Analyte	Unit	#1	#2	
Acenaphthene	ug/L	-	-	<0.020
Acenaphthylene	ug/L	-	-	<0.020
Anthracene	ug/L	-	-	<0.020
Benzo(a)anthracene	ug/L	-	-	<0.020
Benzo(a)pyrene	ug/L	-	-	<0.010
Benzo(b&j)fluoranthene	ug/L	-	-	<0.020
Benzo(g,h,i)perylene	ug/L	-	-	<0.020
Benzo(k)fluoranthene	ug/L	-	-	<0.020
Chrysene	ug/L	-	-	<0.020
Dibenz(a,h)anthracene	ug/L	-	-	<0.020
Fluoranthene	ug/L	-	-	<0.020
Fluorene	ug/L	-	-	<0.020
Indeno(1,2,3-cd)pyrene	ug/L	-	-	<0.020
1-Methylnaphthalene	ug/L	-	-	<0.020
2-Methylnaphthalene	ug/L	-	-	<0.020
Naphthalene	ug/L	-	-	<0.050
Phenanthrene	ug/L	-	-	<0.020
Pyrene	ug/L	-	-	<0.020
Surrogate: Chrysene d12	%	-	-	104.3
Surrogate: Naphthalene d8	%	-	-	87.5
Surrogate: Phenanthrene d10	%	-	-	101.6
Total PAHs	ug/L	5	-	<0.095

Guide Limit #1: Barrie Sanitary Sewer (2012-172)
Guide Limit #2: Barrie Storm Sewer (2012-172)

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

Organochlorine Pesticides - WATER

			Lab ID	L2692976-1
			Sample Date	16-MAR-22
			Sample ID	SEW-UF-BH8
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Hexachlorobenzene	ug/L	0.1	-	<0.0080
Surrogate: Tetrachloro-m-xylene	%	-	-	78.4

Guide Limit #1: Barrie Sanitary Sewer (2012-172)
Guide Limit #2: Barrie Storm Sewer (2012-172)

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.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
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.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

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

COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

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.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

OCP-ROUTINE-WT	Water	Pesticides, Organochlorine in Water	SW846 8270

Samples are extracted using a solvent mixture and the resulting extracts are analyzed on GC/MSD

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.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
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-511-WT	Water	PAH-O. Reg 153/04 (July 2011)	SW846 3510/8270

Aqueous samples, fortified with surrogates, are extracted using liquid/liquid extraction technique. The sample extracts are concentrated and then analyzed using GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.

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 and as of November 30, 2020), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

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.

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.

PM-T-TQMS-VA	Water	Total Precious Metals in Water by ICPMS	EPA 200.2/6020B (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by Triple Quadrupole ICPMS.

S2-T-COL-VA	Water	Total Sulphide by Colorimetric	APHA 4500 -S E-Auto-Colorimetry

Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. Results expressed "as H2S", if reported, represent the maximum possible H2S concentration based on the total sulfide concentration in the sample.

S2-T>H2S-CALC-VA	Water	Total Sulphide Calculated as H2S	APHA 4500-S2 SULPHIDE

This calculation converts Total Sulphide as (S2-) and reports it as Total Sulphide as (H2S). Total Sulphide as (S2-) is determined using procedures adapted from APHA 4500-S2 "Sulphide".

S2-T>H2S-CALC-WT	Water	Total Sulphide Calculated as H2S	Calculation

This calculation converts Total Sulphide as (S2-) and reports it as Total Sulphide as (H2S). Total Sulphide as (S2-) is determined using procedures adapted from APHA 4500-S2 "Sulphide".

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.

TKN-F-WT	Water	TKN in Water by Fluorescence	J. ENVIRON. MONIT., 2005,7,37-42,RSC

Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection

VOC-ROU-HS-WT	Water	Volatile Organic Compounds	SW846 8260

Aqueous samples are analyzed by headspace-GC/MS.

XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION

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

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

Chain of Custody Numbers:

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

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

GLOSSARY OF REPORT TERMS

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

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

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

Quality Control Report

Workorder: L2692976 Report Date: 28-MAR-22

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-WT	**Water**							
Batch R5749956								
WG3707682-2 DUP		**L2693037-1**						
BOD		22.3	24.7		mg/L	10	30	18-MAR-22
WG3707682-3 LCS								
BOD			92.3		%		85-115	18-MAR-22
WG3707682-1 MB								
BOD			<2.0		mg/L		2	18-MAR-22
CL-IC-N-WT	**Water**							
Batch R5748529								
WG3707611-9 DUP		**WG3707611-10**						
Chloride (Cl)		57.2	57.3		mg/L	0.2	20	18-MAR-22
WG3707611-7 LCS								
Chloride (Cl)			103.6		%		90-110	18-MAR-22
WG3707611-6 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-MAR-22
WG3707611-8 MS		**WG3707611-10**						
Chloride (Cl)			99.2		%		75-125	18-MAR-22
CN-TOT-WT	**Water**							
Batch R5748558								
WG3707529-3 DUP		**WG3707529-5**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	18-MAR-22
WG3707529-2 LCS								
Cyanide, Total			97.9		%		80-120	18-MAR-22
WG3707529-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	18-MAR-22
WG3707529-4 MS		**WG3707529-5**						
Cyanide, Total			92.8		%		70-130	18-MAR-22
COD-T-WT	**Water**							
Batch R5748237								
WG3707777-3 DUP		**L2692215-4**						
COD		25	26		mg/L	4.4	20	18-MAR-22
WG3707777-2 LCS								
COD			104.9		%		85-115	18-MAR-22
WG3707777-1 MB								
COD			<10		mg/L		10	18-MAR-22
WG3707777-4 MS		**L2692215-4**						
COD			106.0		%		75-125	18-MAR-22
F-IC-N-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT	**Water**							
Batch R5748529								
WG3707611-9 DUP		**WG3707611-10**						
Fluoride (F)		0.062	0.062		mg/L	0.4	20	18-MAR-22
WG3707611-7 LCS								
Fluoride (F)			103.6		%		90-110	18-MAR-22
WG3707611-6 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-MAR-22
WG3707611-8 MS		**WG3707611-10**						
Fluoride (F)			99.6		%		75-125	18-MAR-22
HG-T-CVAA-WT	**Water**							
Batch R5747743								
WG3707259-3 DUP		**L2692851-1**						
Mercury (Hg)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	18-MAR-22
WG3707259-2 LCS								
Mercury (Hg)-Total			96.6		%		80-120	18-MAR-22
WG3707259-1 MB								
Mercury (Hg)-Total			<0.000005(		mg/L		0.000005	18-MAR-22
WG3707259-4 MS		**L2692851-2**						
Mercury (Hg)-Total			84.8		%		70-130	18-MAR-22
MET-T-CCMS-WT	**Water**							
Batch R5747482								
WG3707346-4 DUP		**WG3707346-3**						
Aluminum (Al)-Total		0.0569	0.0661		mg/L	15	20	18-MAR-22
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-MAR-22
Arsenic (As)-Total		0.00023	0.00024		mg/L	5.1	20	18-MAR-22
Barium (Ba)-Total		0.0374	0.0371		mg/L	0.9	20	18-MAR-22
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-MAR-22
Cadmium (Cd)-Total		0.0000060	0.0000056		mg/L	6.9	20	18-MAR-22
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-MAR-22
Cobalt (Co)-Total		0.00016	0.00015		mg/L	1.4	20	18-MAR-22
Copper (Cu)-Total		0.00545	0.00540		mg/L	1.1	20	18-MAR-22
Iron (Fe)-Total		0.141	0.157		mg/L	11	20	18-MAR-22
Lead (Pb)-Total		0.000284	0.000286		mg/L	0.9	20	18-MAR-22
Manganese (Mn)-Total		0.0128	0.0130		mg/L	1.5	20	18-MAR-22
Molybdenum (Mo)-Total		0.00301	0.00294		mg/L	2.5	20	18-MAR-22
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-MAR-22
Selenium (Se)-Total		0.000075	0.000083		mg/L	11	20	18-MAR-22

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5747482								
WG3707346-4 DUP		**WG3707346-3**						
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-MAR-22
Tin (Sn)-Total		0.00011	<0.00010	RPD-NA	mg/L	N/A	20	18-MAR-22
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-MAR-22
Zinc (Zn)-Total		0.0055	0.0054		mg/L	1.5	20	18-MAR-22
WG3707346-2 LCS								
Aluminum (Al)-Total			103.0		%		80-120	18-MAR-22
Antimony (Sb)-Total			101.1		%		80-120	18-MAR-22
Arsenic (As)-Total			103.2		%		80-120	18-MAR-22
Barium (Ba)-Total			102.3		%		80-120	18-MAR-22
Bismuth (Bi)-Total			98.4		%		80-120	18-MAR-22
Cadmium (Cd)-Total			103.8		%		80-120	18-MAR-22
Chromium (Cr)-Total			102.0		%		80-120	18-MAR-22
Cobalt (Co)-Total			99.5		%		80-120	18-MAR-22
Copper (Cu)-Total			100.2		%		80-120	18-MAR-22
Iron (Fe)-Total			102.8		%		80-120	18-MAR-22
Lead (Pb)-Total			101.6		%		80-120	18-MAR-22
Manganese (Mn)-Total			100.2		%		80-120	18-MAR-22
Molybdenum (Mo)-Total			101.3		%		80-120	18-MAR-22
Nickel (Ni)-Total			100.0		%		80-120	18-MAR-22
Selenium (Se)-Total			101.6		%		80-120	18-MAR-22
Silver (Ag)-Total			96.6		%		80-120	18-MAR-22
Tin (Sn)-Total			102.5		%		80-120	18-MAR-22
Vanadium (V)-Total			102.2		%		80-120	18-MAR-22
Zinc (Zn)-Total			111.7		%		80-120	18-MAR-22
WG3707346-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	18-MAR-22
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	18-MAR-22
Arsenic (As)-Total			<0.00010		mg/L		0.0001	18-MAR-22
Barium (Ba)-Total			<0.00010		mg/L		0.0001	18-MAR-22
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	18-MAR-22
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	18-MAR-22
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	18-MAR-22
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	18-MAR-22
Copper (Cu)-Total			<0.00050		mg/L		0.0005	18-MAR-22

Quality Control Report

Client: Grounded Engineering Inc
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Contact: Deepak Kanraj

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5747482								
WG3707346-1 MB								
Iron (Fe)-Total			<0.010		mg/L		0.01	18-MAR-22
Lead (Pb)-Total			<0.000050		mg/L		0.00005	18-MAR-22
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	18-MAR-22
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	18-MAR-22
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	18-MAR-22
Selenium (Se)-Total			<0.000050		mg/L		0.00005	18-MAR-22
Silver (Ag)-Total			<0.000050		mg/L		0.00005	18-MAR-22
Tin (Sn)-Total			<0.00010		mg/L		0.0001	18-MAR-22
Vanadium (V)-Total			<0.00050		mg/L		0.0005	18-MAR-22
Zinc (Zn)-Total			<0.0030		mg/L		0.003	18-MAR-22
WG3707346-5 MS		**WG3707346-6**						
Aluminum (Al)-Total			N/A	MS-B	%		-	18-MAR-22
Antimony (Sb)-Total			102.4		%		70-130	18-MAR-22
Arsenic (As)-Total			106.5		%		70-130	18-MAR-22
Barium (Ba)-Total			N/A	MS-B	%		-	18-MAR-22
Bismuth (Bi)-Total			93.3		%		70-130	18-MAR-22
Cadmium (Cd)-Total			102.4		%		70-130	18-MAR-22
Chromium (Cr)-Total			104.8		%		70-130	18-MAR-22
Cobalt (Co)-Total			101.0		%		70-130	18-MAR-22
Copper (Cu)-Total			94.4		%		70-130	18-MAR-22
Iron (Fe)-Total			N/A	MS-B	%		-	18-MAR-22
Lead (Pb)-Total			97.8		%		70-130	18-MAR-22
Manganese (Mn)-Total			N/A	MS-B	%		-	18-MAR-22
Molybdenum (Mo)-Total			102.1		%		70-130	18-MAR-22
Nickel (Ni)-Total			98.1		%		70-130	18-MAR-22
Selenium (Se)-Total			102.8		%		70-130	18-MAR-22
Silver (Ag)-Total			90.9		%		70-130	18-MAR-22
Tin (Sn)-Total			101.1		%		70-130	18-MAR-22
Vanadium (V)-Total			107.4		%		70-130	18-MAR-22
Zinc (Zn)-Total			94.0		%		70-130	18-MAR-22
OCP-ROUTINE-WT	**Water**							

Quality Control Report

Client: Grounded Engineering Inc
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Contact: Deepak Kanraj

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
OCP-ROUTINE-WT	**Water**							
Batch R5746677								
WG3706941-2 LCS								
Hexachlorobenzene			93.0		%		50-150	18-MAR-22
WG3706941-1 MB								
Hexachlorobenzene			<0.0080		ug/L		0.008	18-MAR-22
Surrogate: Tetrachloro-m-xylene			81.2		%		40-130	18-MAR-22
OGG-SPEC-WT	**Water**							
Batch R5747539								
WG3707148-2 LCS								
Oil and Grease, Total			91.1		%		70-130	17-MAR-22
Mineral Oil and Grease			83.4		%		70-130	17-MAR-22
WG3707148-1 MB								
Oil and Grease, Total			<5.0		mg/L		5	17-MAR-22
Mineral Oil and Grease			<2.5		mg/L		2.5	17-MAR-22
P-T-COL-WT	**Water**							
Batch R5748947								
WG3708220-3 DUP		**L2693037-1**						
Phosphorus, Total		0.157	0.165		mg/L	4.9	20	22-MAR-22
WG3708220-2 LCS								
Phosphorus, Total			100.6		%		80-120	22-MAR-22
WG3708220-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	22-MAR-22
WG3708220-4 MS		**L2693037-1**						
Phosphorus, Total			N/A	MS-B	%		-	22-MAR-22
PAH-511-WT	**Water**							
Batch R5747629								
WG3707228-2 LCS								
1-Methylnaphthalene			90.8		%		50-140	18-MAR-22
2-Methylnaphthalene			82.9		%		50-140	18-MAR-22
Acenaphthene			84.9		%		60-130	18-MAR-22
Acenaphthylene			83.7		%		60-130	18-MAR-22
Anthracene			92.4		%		50-140	18-MAR-22
Benzo(a)anthracene			97.8		%		60-140	18-MAR-22
Benzo(a)pyrene			76.2		%		50-140	18-MAR-22
Benzo(b&j)fluoranthene			83.8		%		60-130	18-MAR-22
Benzo(g,h,i)perylene			100.7		%		50-140	18-MAR-22
Benzo(k)fluoranthene			78.2		%		50-140	18-MAR-22

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Water**							
Batch R5747629								
WG3707228-2 LCS								
Chrysene			93.1		%		60-140	18-MAR-22
Dibenz(a,h)anthracene			97.1		%		50-140	18-MAR-22
Fluoranthene			92.3		%		60-140	18-MAR-22
Fluorene			93.2		%		60-130	18-MAR-22
Indeno(1,2,3-cd)pyrene			114.9		%		50-140	18-MAR-22
Naphthalene			85.0		%		50-130	18-MAR-22
Phenanthrene			103.6		%		60-140	18-MAR-22
Pyrene			92.9		%		60-140	18-MAR-22
WG3707228-1 MB								
1-Methylnaphthalene			<0.020		ug/L		0.02	18-MAR-22
2-Methylnaphthalene			<0.020		ug/L		0.02	18-MAR-22
Acenaphthene			<0.020		ug/L		0.02	18-MAR-22
Acenaphthylene			<0.020		ug/L		0.02	18-MAR-22
Anthracene			<0.020		ug/L		0.02	18-MAR-22
Benzo(a)anthracene			<0.020		ug/L		0.02	18-MAR-22
Benzo(a)pyrene			<0.010		ug/L		0.01	18-MAR-22
Benzo(b&j)fluoranthene			<0.020		ug/L		0.02	18-MAR-22
Benzo(g,h,i)perylene			<0.020		ug/L		0.02	18-MAR-22
Benzo(k)fluoranthene			<0.020		ug/L		0.02	18-MAR-22
Chrysene			<0.020		ug/L		0.02	18-MAR-22
Dibenz(a,h)anthracene			<0.020		ug/L		0.02	18-MAR-22
Fluoranthene			<0.020		ug/L		0.02	18-MAR-22
Fluorene			<0.020		ug/L		0.02	18-MAR-22
Indeno(1,2,3-cd)pyrene			<0.020		ug/L		0.02	18-MAR-22
Naphthalene			<0.050		ug/L		0.05	18-MAR-22
Phenanthrene			<0.020		ug/L		0.02	18-MAR-22
Pyrene			<0.020		ug/L		0.02	18-MAR-22
Surrogate: Naphthalene d8			83.6		%		60-140	18-MAR-22
Surrogate: Phenanthrene d10			109.4		%		60-140	18-MAR-22
Surrogate: Chrysene d12			97.0		%		50-150	18-MAR-22
PH-WT	**Water**							

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Contact: Deepak Kanraj

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	**Water**							
Batch R5748318								
WG3707600-4 DUP		**WG3707600-3**						
pH		7.61	7.65	J	pH units	0.04	0.2	18-MAR-22
WG3707600-2 LCS								
pH			7.04		pH units		6.9-7.1	18-MAR-22
PHENOLS-4AAP-WT	**Water**							
Batch R5748599								
WG3707238-3 DUP		**WG3707238-5**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-MAR-22
WG3707238-2 LCS								
Phenols (4AAP)			101.9		%		85-115	18-MAR-22
WG3707238-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-MAR-22
WG3707238-4 MS		**WG3707238-5**						
Phenols (4AAP)			109.8		%		75-125	18-MAR-22
PM-T-TQMS-VA	**Water**							
Batch R5750987								
WG3709426-3 DUP		**L2692976-1**						
Gold (Au)-Total		<0.020	<0.020	RPD-NA	ug/L	N/A	20	28-MAR-22
Platinum (Pt)-Total		<0.020	<0.020	RPD-NA	ug/L	N/A	20	28-MAR-22
Rhodium (Rh)-Total		<0.0050	<0.0050	RPD-NA	ug/L	N/A	20	28-MAR-22
WG3709426-2 LCS								
Gold (Au)-Total			95.0		%		80-120	28-MAR-22
Platinum (Pt)-Total			96.5		%		80-120	28-MAR-22
Rhodium (Rh)-Total			102.7		%		80-120	28-MAR-22
WG3709426-1 MB								
Gold (Au)-Total			<0.020		ug/L		0.02	28-MAR-22
Platinum (Pt)-Total			<0.020		ug/L		0.02	28-MAR-22
Rhodium (Rh)-Total			<0.0050		ug/L		0.005	28-MAR-22
WG3709426-4 MS		**L2692976-1**						
Gold (Au)-Total			72.3		%		70-130	28-MAR-22
Platinum (Pt)-Total			87.6		%		70-130	28-MAR-22
Rhodium (Rh)-Total			93.6		%		70-130	28-MAR-22
S2-T-COL-VA	**Water**							

Quality Control Report

Client: Grounded Engineering Inc
1 Banigan Drive
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Contact: Deepak Kanraj

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S2-T-COL-VA	**Water**							
Batch R5748339								
WG3707791-3 DUP		**L2692412-1**						
Sulphide as S		<0.018	<0.018	RPD-NA	mg/L	N/A	20	19-MAR-22
WG3707791-2 LCS								
Sulphide as S			102.6		%		75-125	19-MAR-22
WG3707791-1 MB								
Sulphide as S			<0.018		mg/L		0.018	19-MAR-22
SO4-IC-N-WT	**Water**							
Batch R5748529								
WG3707611-9 DUP		**WG3707611-10**						
Sulfate (SO4)		6.75	6.76		mg/L	0.0	20	18-MAR-22
WG3707611-7 LCS								
Sulfate (SO4)			104.6		%		90-110	18-MAR-22
WG3707611-6 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-MAR-22
WG3707611-8 MS		**WG3707611-10**						
Sulfate (SO4)			102.2		%		75-125	18-MAR-22
SOLIDS-TSS-WT	**Water**							
Batch R5748469								
WG3707905-3 DUP		**L2692914-1**						
Total Suspended Solids		700	680		mg/L	2.9	20	21-MAR-22
WG3707905-2 LCS								
Total Suspended Solids			96.7		%		85-115	21-MAR-22
WG3707905-1 MB								
Total Suspended Solids			<3.0		mg/L		3	21-MAR-22
TKN-F-WT	**Water**							
Batch R5749404								
WG3708214-3 DUP		**L2693026-1**						
Total Kjeldahl Nitrogen		0.632	0.623		mg/L	1.5	20	22-MAR-22
WG3708214-2 LCS								
Total Kjeldahl Nitrogen			109.4		%		75-125	22-MAR-22
WG3708214-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-MAR-22
WG3708214-4 MS		**L2693026-1**						
Total Kjeldahl Nitrogen			100.5		%		70-130	22-MAR-22
VOC-ROU-HS-WT	**Water**							

Quality Control Report

Client: Grounded Engineering Inc
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5748894								
WG3708337-4 DUP		**WG3708337-3**						
1,1,1,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
1,1,1-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
1,1,2-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
1,2-Dibromoethane		<0.20	<0.20	RPD-NA	ug/L	N/A	30	22-MAR-22
1,1-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
1,1-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
1,2-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
1,2-Dichloropropane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
1,3-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
2-Hexanone		<20	<20	RPD-NA	ug/L	N/A	30	22-MAR-22
Acetone		<20	<20	RPD-NA	ug/L	N/A	30	22-MAR-22
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
Bromodichloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-MAR-22
Bromoform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-MAR-22
Bromomethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
Carbon Disulfide		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-MAR-22
Carbon tetrachloride		<0.20	<0.20	RPD-NA	ug/L	N/A	30	22-MAR-22
Chlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
Chloroethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-MAR-22
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-MAR-22
Chloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	22-MAR-22
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
cis-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	22-MAR-22
Dibromochloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-MAR-22
Dichlorodifluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-MAR-22
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	22-MAR-22
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
m+p-Xylenes		<0.40	<0.40	RPD-NA	ug/L	N/A	30	22-MAR-22
Methyl Ethyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	22-MAR-22
Methyl Isobutyl Ketone		<20	<20		ug/L			22-MAR-22

Quality Control Report

Client: Grounded Engineering Inc
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Contact: Deepak Kanraj

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5748894								
WG3708337-4 DUP		**WG3708337-3**						
Methyl Isobutyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	22-MAR-22
n-Hexane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
MTBE		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
o-Xylene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	22-MAR-22
Styrene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
Toluene		<0.40	<0.40	RPD-NA	ug/L	N/A	30	22-MAR-22
trans-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
trans-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	22-MAR-22
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
Trichlorofluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-MAR-22
Vinyl chloride		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-MAR-22
WG3708337-1 LCS								
1,1,1,2-Tetrachloroethane			98.0		%		70-130	22-MAR-22
1,1,2,2-Tetrachloroethane			86.8		%		70-130	22-MAR-22
1,1,1-Trichloroethane			95.7		%		70-130	22-MAR-22
1,1,2-Trichloroethane			105.6		%		70-130	22-MAR-22
1,2-Dibromoethane			107.4		%		70-130	22-MAR-22
1,1-Dichloroethane			95.5		%		70-130	22-MAR-22
1,1-Dichloroethylene			96.2		%		70-130	22-MAR-22
1,2-Dichlorobenzene			101.5		%		70-130	22-MAR-22
1,2-Dichloroethane			106.3		%		70-130	22-MAR-22
1,2-Dichloropropane			100.7		%		70-130	22-MAR-22
1,3-Dichlorobenzene			108.5		%		70-130	22-MAR-22
1,4-Dichlorobenzene			106.5		%		70-130	22-MAR-22
2-Hexanone			83.4		%		60-140	22-MAR-22
Acetone			117.4		%		60-140	22-MAR-22
Benzene			95.4		%		70-130	22-MAR-22
Bromodichloromethane			105.5		%		70-130	22-MAR-22
Bromoform			103.9		%		70-130	22-MAR-22
Bromomethane			101.2		%		60-140	22-MAR-22
Carbon Disulfide			88.4		%		70-130	22-MAR-22
Carbon tetrachloride			97.0		%		70-130	22-MAR-22

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5748894								
WG3708337-1 LCS								
Chlorobenzene			96.0		%		70-130	22-MAR-22
Chloroethane			107.8		%		70-130	22-MAR-22
Chloroform			98.5		%		70-130	22-MAR-22
Chloromethane			109.1		%		60-140	22-MAR-22
cis-1,2-Dichloroethylene			98.7		%		70-130	22-MAR-22
cis-1,3-Dichloropropene			90.8		%		70-130	22-MAR-22
Dibromochloromethane			99.7		%		70-130	22-MAR-22
Dichlorodifluoromethane			129.2		%		50-140	22-MAR-22
Dichloromethane			101.5		%		70-130	22-MAR-22
Ethylbenzene			93.4		%		70-130	22-MAR-22
m+p-Xylenes			95.0		%		70-130	22-MAR-22
Methyl Ethyl Ketone			108.1		%		60-140	22-MAR-22
Methyl Isobutyl Ketone			96.1		%		50-150	22-MAR-22
n-Hexane			92.7		%		70-130	22-MAR-22
MTBE			94.0		%		70-130	22-MAR-22
o-Xylene			95.1		%		70-130	22-MAR-22
Styrene			90.9		%		70-130	22-MAR-22
Tetrachloroethylene			90.8		%		70-130	22-MAR-22
Toluene			97.8		%		70-130	22-MAR-22
trans-1,2-Dichloroethylene			97.3		%		70-130	22-MAR-22
trans-1,3-Dichloropropene			99.6		%		70-130	22-MAR-22
Trichloroethylene			95.7		%		70-130	22-MAR-22
Trichlorofluoromethane			97.4		%		60-140	22-MAR-22
Vinyl chloride			100.1		%		60-140	22-MAR-22
WG3708337-2 MB								
1,1,1,2-Tetrachloroethane			<0.50		ug/L		0.5	22-MAR-22
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	22-MAR-22
1,1,1-Trichloroethane			<0.50		ug/L		0.5	22-MAR-22
1,1,2-Trichloroethane			<0.50		ug/L		0.5	22-MAR-22
1,2-Dibromoethane			<0.20		ug/L		0.2	22-MAR-22
1,1-Dichloroethane			<0.50		ug/L		0.5	22-MAR-22
1,1-Dichloroethylene			<0.50		ug/L		0.5	22-MAR-22
1,2-Dichlorobenzene			<0.50		ug/L		0.5	22-MAR-22
1,2-Dichloroethane			<0.50		ug/L		0.5	22-MAR-22

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5748894								
WG3708337-2 MB								
1,2-Dichloropropane			<0.50		ug/L		0.5	22-MAR-22
1,3-Dichlorobenzene			<0.50		ug/L		0.5	22-MAR-22
1,4-Dichlorobenzene			<0.50		ug/L		0.5	22-MAR-22
2-Hexanone			<20		ug/L		20	22-MAR-22
Acetone			<20		ug/L		20	22-MAR-22
Benzene			<0.50		ug/L		0.5	22-MAR-22
Bromodichloromethane			<1.0		ug/L		1	22-MAR-22
Bromoform			<1.0		ug/L		1	22-MAR-22
Bromomethane			<0.50		ug/L		0.5	22-MAR-22
Carbon Disulfide			<1.0		ug/L		1	22-MAR-22
Carbon tetrachloride			<0.20		ug/L		0.2	22-MAR-22
Chlorobenzene			<0.50		ug/L		0.5	22-MAR-22
Chloroethane			<1.0		ug/L		1	22-MAR-22
Chloroform			<1.0		ug/L		1	22-MAR-22
Chloromethane			<2.0		ug/L		2	22-MAR-22
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	22-MAR-22
cis-1,3-Dichloropropene			<0.30		ug/L		0.3	22-MAR-22
Dibromochloromethane			<1.0		ug/L		1	22-MAR-22
Dichlorodifluoromethane			<1.0		ug/L		1	22-MAR-22
Dichloromethane			<2.0		ug/L		2	22-MAR-22
Ethylbenzene			<0.50		ug/L		0.5	22-MAR-22
m+p-Xylenes			<0.40		ug/L		0.4	22-MAR-22
Methyl Ethyl Ketone			<20		ug/L		20	22-MAR-22
Methyl Isobutyl Ketone			<20		ug/L		20	22-MAR-22
n-Hexane			<0.50		ug/L		0.5	22-MAR-22
MTBE			<0.50		ug/L		0.5	22-MAR-22
o-Xylene			<0.30		ug/L		0.3	22-MAR-22
Styrene			<0.50		ug/L		0.5	22-MAR-22
Tetrachloroethylene			<0.50		ug/L		0.5	22-MAR-22
Toluene			<0.40		ug/L		0.4	22-MAR-22
trans-1,2-Dichloroethylene			<0.50		ug/L		0.5	22-MAR-22
trans-1,3-Dichloropropene			<0.30		ug/L		0.3	22-MAR-22
Trichloroethylene			<0.50		ug/L		0.5	22-MAR-22

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5748894								
WG3708337-2 MB								
Trichlorofluoromethane			<1.0		ug/L		1	22-MAR-22
Vinyl chloride			<0.50		ug/L		0.5	22-MAR-22
Surrogate: 1,4-Difluorobenzene			100.2		%		70-130	22-MAR-22
Surrogate: 4-Bromofluorobenzene			101.6		%		70-130	22-MAR-22
WG3708337-5 MS		**WG3708337-3**						
1,1,1,2-Tetrachloroethane			98.1		%		50-150	22-MAR-22
1,1,2,2-Tetrachloroethane			105.0		%		50-150	22-MAR-22
1,1,1-Trichloroethane			95.6		%		50-150	22-MAR-22
1,1,2-Trichloroethane			106.9		%		50-150	22-MAR-22
1,2-Dibromoethane			108.3		%		50-150	22-MAR-22
1,1-Dichloroethane			96.2		%		50-150	22-MAR-22
1,1-Dichloroethylene			95.8		%		50-150	22-MAR-22
1,2-Dichlorobenzene			102.8		%		50-150	22-MAR-22
1,2-Dichloroethane			108.9		%		50-150	22-MAR-22
1,2-Dichloropropane			102.7		%		50-150	22-MAR-22
1,3-Dichlorobenzene			102.1		%		50-150	22-MAR-22
1,4-Dichlorobenzene			103.2		%		50-150	22-MAR-22
2-Hexanone			89.9		%		50-150	22-MAR-22
Acetone			117.0		%		50-150	22-MAR-22
Benzene			97.3		%		50-150	22-MAR-22
Bromodichloromethane			108.6		%		50-150	22-MAR-22
Bromoform			111.6		%		50-150	22-MAR-22
Bromomethane			100.2		%		50-150	22-MAR-22
Carbon Disulfide			88.4		%		50-150	22-MAR-22
Carbon tetrachloride			97.4		%		50-150	22-MAR-22
Chlorobenzene			97.6		%		50-150	22-MAR-22
Chloroethane			104.8		%		50-150	22-MAR-22
Chloroform			100.5		%		50-150	22-MAR-22
Chloromethane			98.9		%		50-150	22-MAR-22
cis-1,2-Dichloroethylene			100.2		%		50-150	22-MAR-22
cis-1,3-Dichloropropene			97.7		%		50-150	22-MAR-22
Dibromochloromethane			101.0		%		50-150	22-MAR-22
Dichlorodifluoromethane			100.9		%		50-150	22-MAR-22
Dichloromethane			103.4		%		50-150	22-MAR-22

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5748894								
WG3708337-5 MS		**WG3708337-3**						
Ethylbenzene			92.0		%		50-150	22-MAR-22
m+p-Xylenes			94.9		%		50-150	22-MAR-22
Methyl Ethyl Ketone			110.0		%		50-150	22-MAR-22
Methyl Isobutyl Ketone			101.7		%		50-150	22-MAR-22
n-Hexane			91.4		%		50-150	22-MAR-22
MTBE			96.0		%		50-150	22-MAR-22
o-Xylene			94.2		%		50-150	22-MAR-22
Styrene			91.9		%		50-150	22-MAR-22
Tetrachloroethylene			89.9		%		50-150	22-MAR-22
Toluene			96.3		%		50-150	22-MAR-22
trans-1,2-Dichloroethylene			99.9		%		50-150	22-MAR-22
trans-1,3-Dichloropropene			104.1		%		50-150	22-MAR-22
Trichloroethylene			98.5		%		50-150	22-MAR-22
Trichlorofluoromethane			94.5		%		50-150	22-MAR-22
Vinyl chloride			93.1		%		50-150	22-MAR-22

Quality Control Report

Workorder: L2692976 Report Date: 28-MAR-22

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

Legend:

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

Sample Parameter Qualifier Definitions:

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

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.

Chair

L2692976-COFC

COC Number: 20 - 954863

Page 1 of 1

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Grounded Engineering
Contact:	Deepak Kanraj
Phone:	
	Company address below will appear on the final report
Street:	1 Bangian Dr
City/Province:	Toronto, ON
Postal Code:	M2H 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: dkanraj@groundedeng.ca

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax:

Email 2:

Turnaround Time (TAT) Requested

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

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

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

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

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

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

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs:

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

Project Information	
ALS Account # / Quote #:	
Job #:	22 - 014
PO / AFE:	
LSD:	299 Cundles Rd E
ALS Lab Work Order # (ALS use only):	L2692976 AP

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler: VT

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	Source Set	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	SCW-UF-BH8	16-MAR-22	9:30	GW	19	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)

Barrie municipality

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			
				2.2			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Vivi Tran	2022/03/16	7PM					31-Mar-22	1030

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

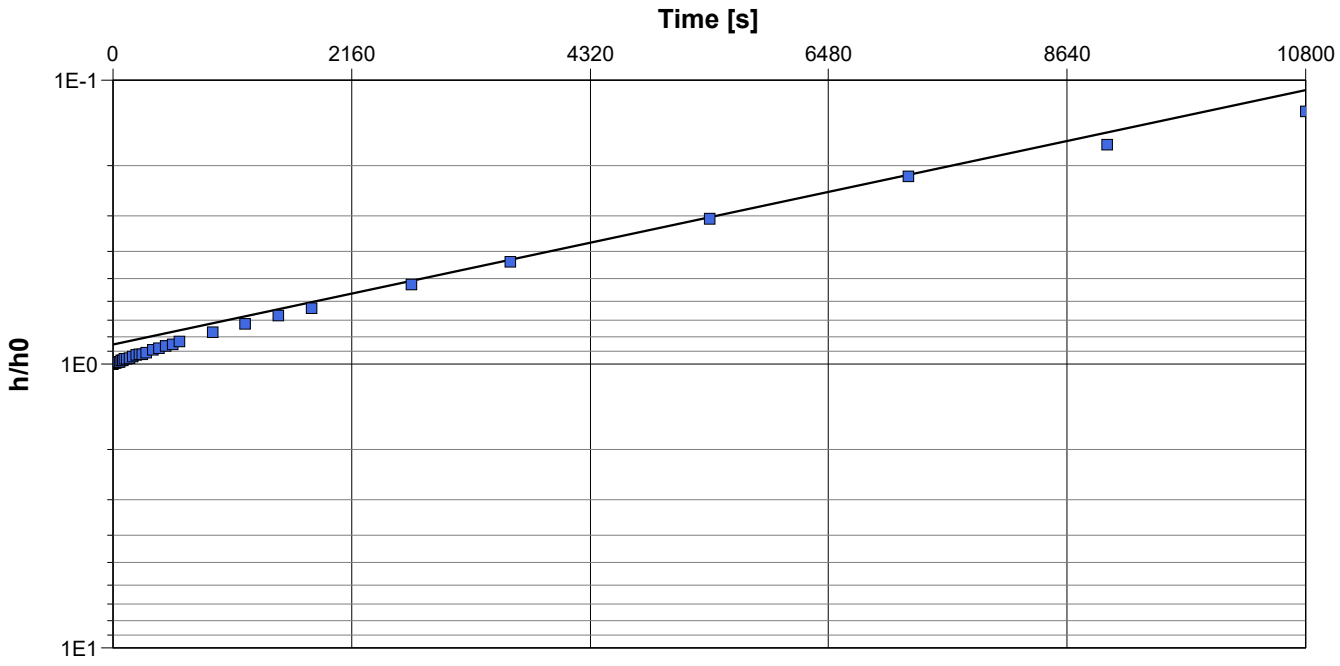
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

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

APPENDIX I

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 299 Cundles Road East
	Number: 22-014
	Client: Penady (North Barrie) Limited

Location: Barrie, Ontario	Slug Test: BH1	Test Well: BH1
Test Conducted by: VT		Test Date: 2022-04-12
Analysis Performed by: MA	BH1 RHT	Analysis Date: 2022-05-17
Aquifer Thickness: 15.85 m		

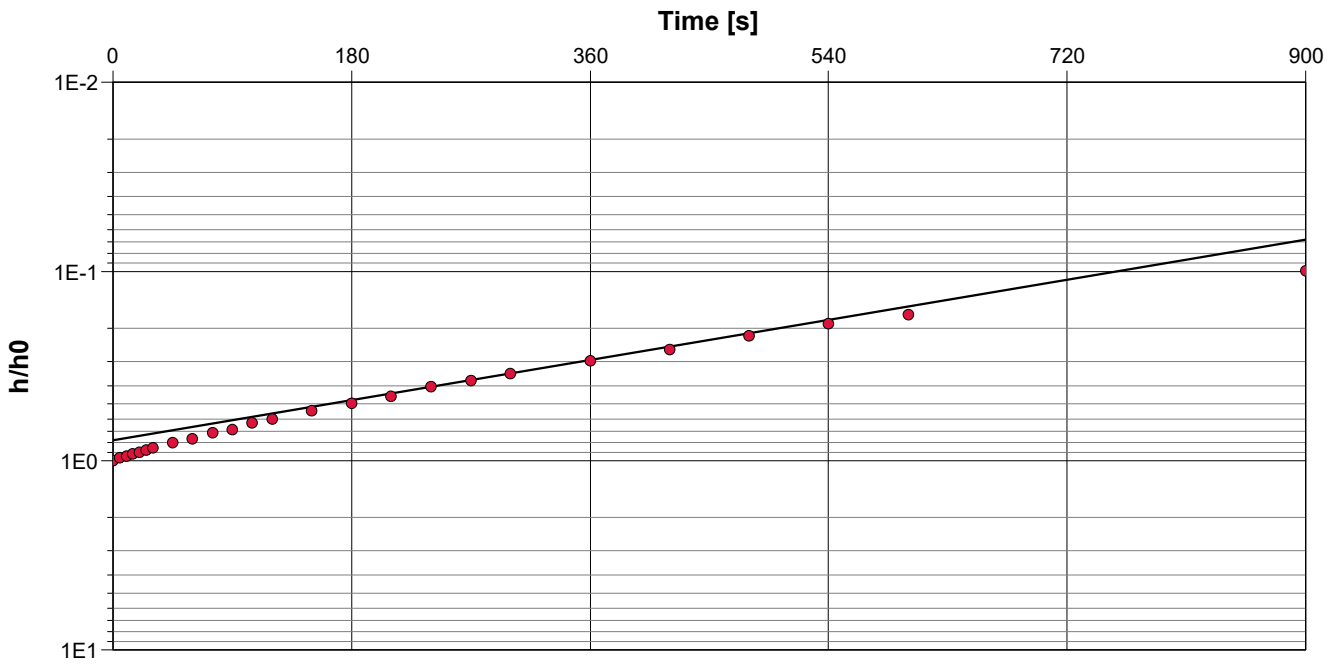


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH1	7.32×10^{-8}	

GROUNDED ENGINEERING	**Slug Test Analysis Report**
	Project: 299 Cundles Road East
	Number: 22-014
	Client: Penady (North Barrie) Limited

Location: Barrie, Ontario	Slug Test: BH4	Test Well: BH4
Test Conducted by: VT		Test Date: 2022-04-28
Analysis Performed by: MA	BH4 RHT	Analysis Date: 2022-05-17
Aquifer Thickness: 15.85 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH4	1.04×10^{-6}	

GROUNDED ENGINEERING

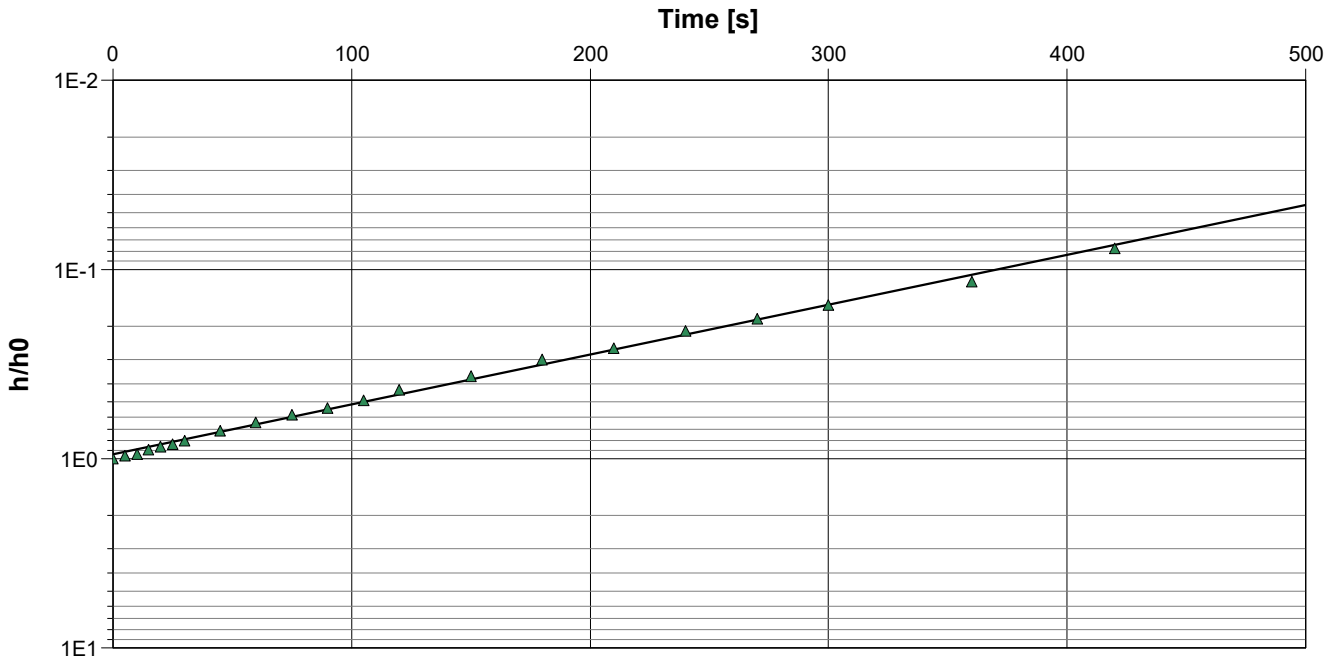
Slug Test Analysis Report

Project: 299 Cundles Road East

Number: 22-014

Client: Penady (North Barrie) Limited

Location: Barrie, Ontario	Slug Test: BH6	Test Well: BH6
Test Conducted by: VT		Test Date: 2022-03-12
Analysis Performed by: MA	BH6 RHT	Analysis Date: 2022-05-17
Aquifer Thickness: 15.85 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH6	2.32×10^{-6}	

GROUNDED ENGINEERING

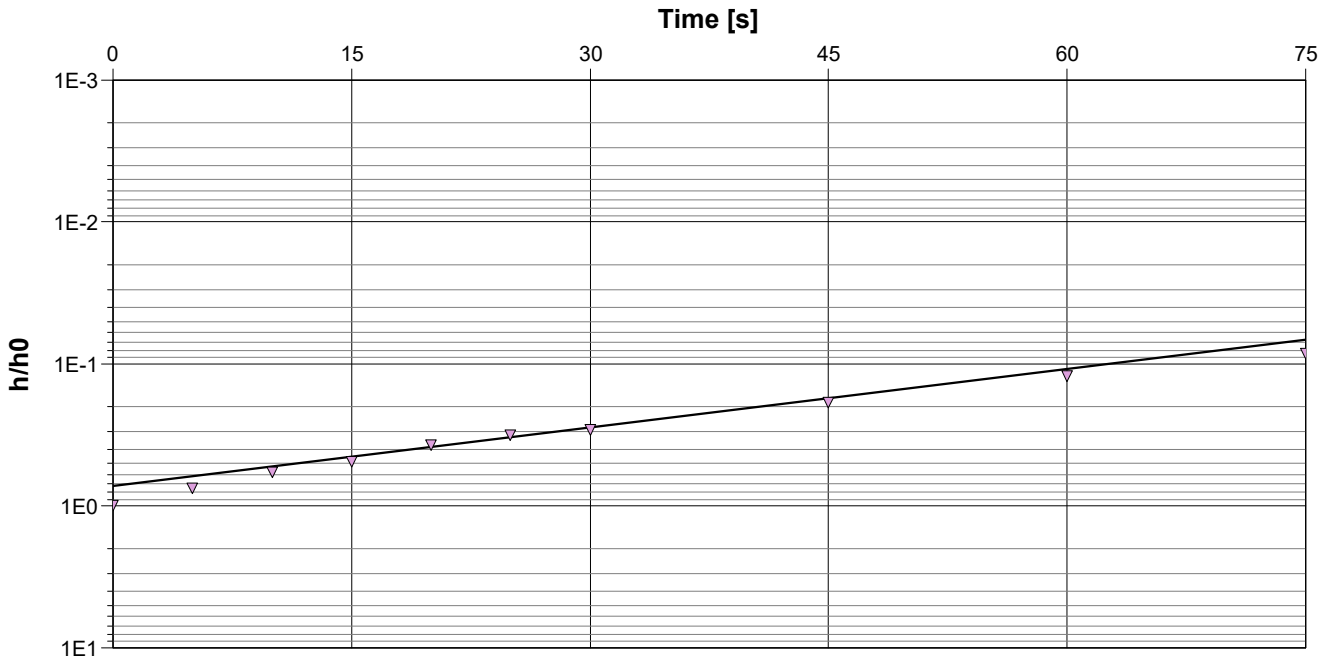
Slug Test Analysis Report

Project: 299 Cundles Road East

Number: 22-014

Client: Penady (North Barrie) Limited

Location: Barrie, Ontario	Slug Test: BH10	Test Well: BH10
Test Conducted by: VT		Test Date: 2022-03-15
Analysis Performed by: MA	BH10 RHT	Analysis Date: 2022-05-17
Aquifer Thickness: 15.85 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH10	1.22×10^{-5}	

GROUNDED ENGINEERING

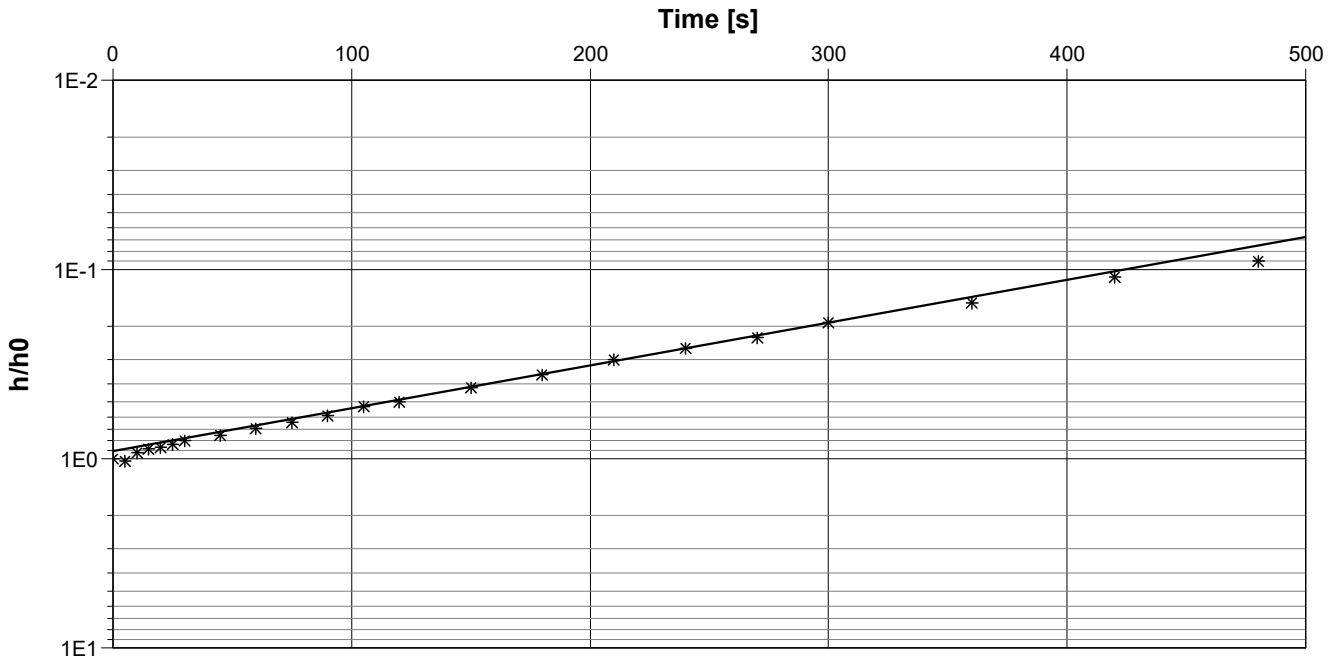
Slug Test Analysis Report

Project: 299 Cundles Road East

Number: 22-014

Client: Penady (North Barrie) Limited

Location: Barrie, Ontario	Slug Test: BH12	Test Well: BH12
Test Conducted by: VT		Test Date: 2022-03-15
Analysis Performed by: MA	BH12 RHT	Analysis Date: 2022-05-17
Aquifer Thickness: 15.85 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH12	1.99×10^{-6}	

APPENDIX J

Nottawasaga Valley Conservation Authority

Property Screening Report

17-Jun-2022

Information Resources for Regulated Properties

Do I need a permit?

Submit a Property Inquiry

Google Driving Directions

Info Regarding Covid-19

Email the Regulations Department
permits@nvca.on.ca

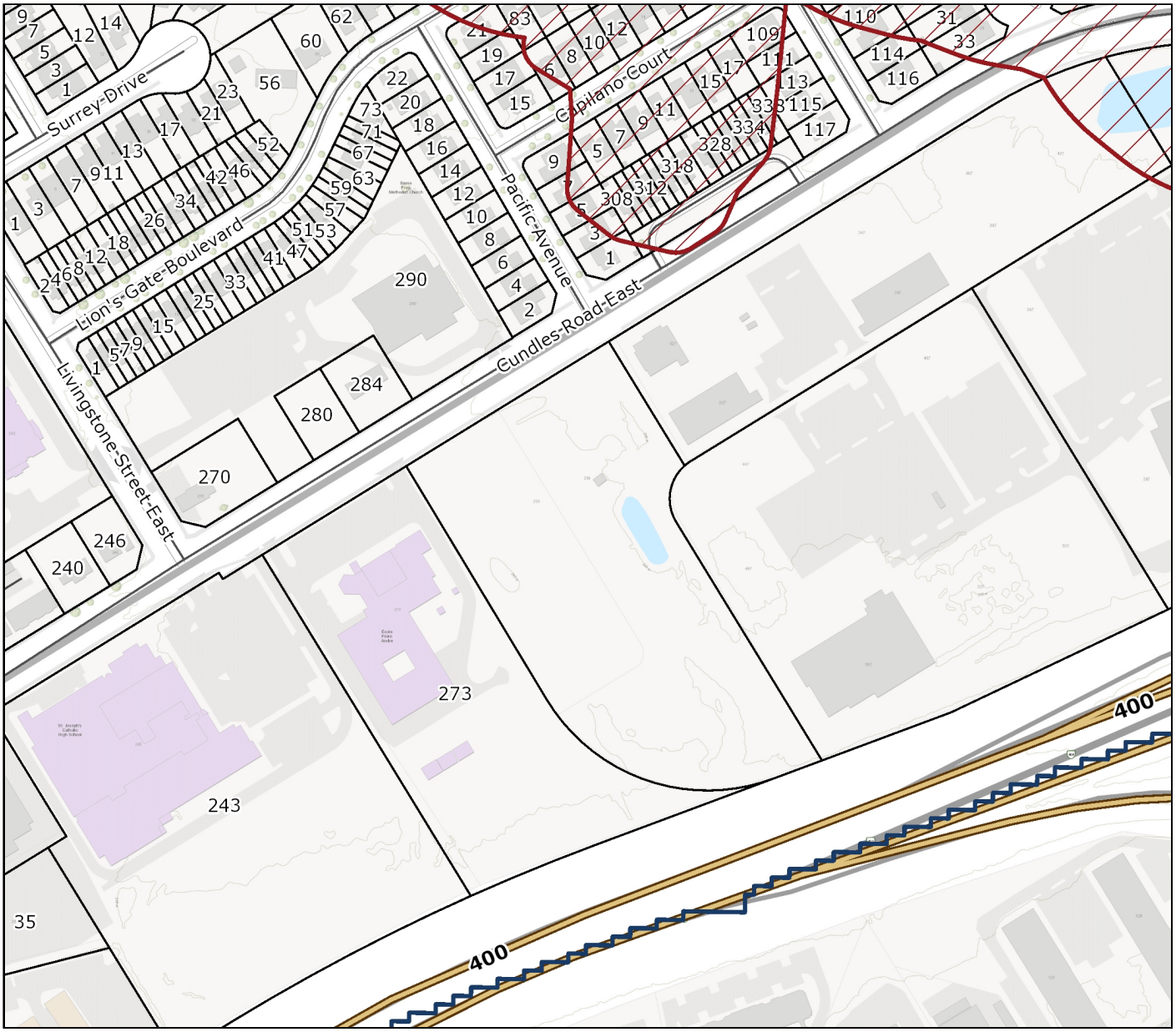
NVCA Contact Information

(705) 424-1479

8195 8th Line,
Utopia, ON L0M 1T0

www.nvca.on.ca

Monday to Friday
8:30 a.m. to 4:30 p.m.
except between 12:00 p.m. - 1:00 p.m.



APPENDIX K

Water Balance - 303 Cundles Road East

1. Climate Information

Precipitation	926	mm/a	0.93 m/a *
Evapotranspiration	576	mm/a	0.58 m/a *
Water Surplus	350	mm/a	0.35 m/a

2. Infiltration Rates

Selected Approach **Table 2**

Table 2 Approach - Infiltration Factors

Topography - rolling land	0.2	*
Soil - Sand with some clay	0.2	*
Cover - Cultivated lands	0.1	*
TOTAL:	0.5	

Infiltration	175	mm/a	0.175 m/a
Run-off	175	mm/a	0.175 m/a

Table 3 Approach - Typical Recharge Rates

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

3. Property Statistics - Pre-development

Area Covered by Existing Building	0	m^2	0.00 ha
Area Covered by Existing Hard Surface Paving	0	m^2	0.00 ha
Area Covered by Existing Landscaped area	19,236	m^2	1.92 ha
TOTAL	19,236	m^2	1.92 ha

4. Property Statistics - Post-development

Area Covered by Building with Additions	6,476	m^2	0.65 ha
Area Covered by Hard Surface Paving	7,278	m^2	0.73 ha
Area Covered by Landscaped Area - Outside Building Footprint	2,975	m^2	0.30 ha
Area Covered by Landscaped Area - Within Building Footprint	2,507	m^2	0.25 ha
TOTAL:	19,236	m^2	1.92 ha

*Based on published information

Water Balance - 303 Cundles Road East

5. Annual Water Balance Before Building Additions

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building (entire site)	0	0	-	-	-	0
Hard Surface Paving	0	0	-	-	-	0
Landscape Area (entire site)	19,236	17,813	11,080	-	3,366	3,366
TOTAL	**19,236**	**17,813**	**11,080**	**0**	**3,366**	**3,366**

6. Annual Water Balance After Building Additions

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building (entire site)	6,476	5,997	-	-	-	5,997
Hard Surface Paving	7,278	6,740	-	-	-	6,740
Landscape Area (entire site)	5,481	5,076	3,157	-	521	959
TOTAL	**19,236**	**17,813**	**3,157**	**0**	**521**	**13,696**

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

	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	17,813	11,080	-	3,366	3,366
Post-Development	17,813	3,157	-	521	13,696

8. Requirement for Infiltration of Roof Runoff

Volume of roof (building additions) run-off captured (90%)	5,397 m^3
Volume of post-development infiltration without roof run-off	521 m^3
Volume of roof run-off required to match pre-development infiltration rates	2,846 m^3
Percentage of roof run-off (building additions roof) required to match pre-development infiltration	53%

APPENDIX L

Material Name	Color	KS (m/s)
Earth Fill		1e-06
Upper Tills		1e-07
Sands and Silts		5e-06
Clays and Silts		1e-07
ST Caissons		1e-09

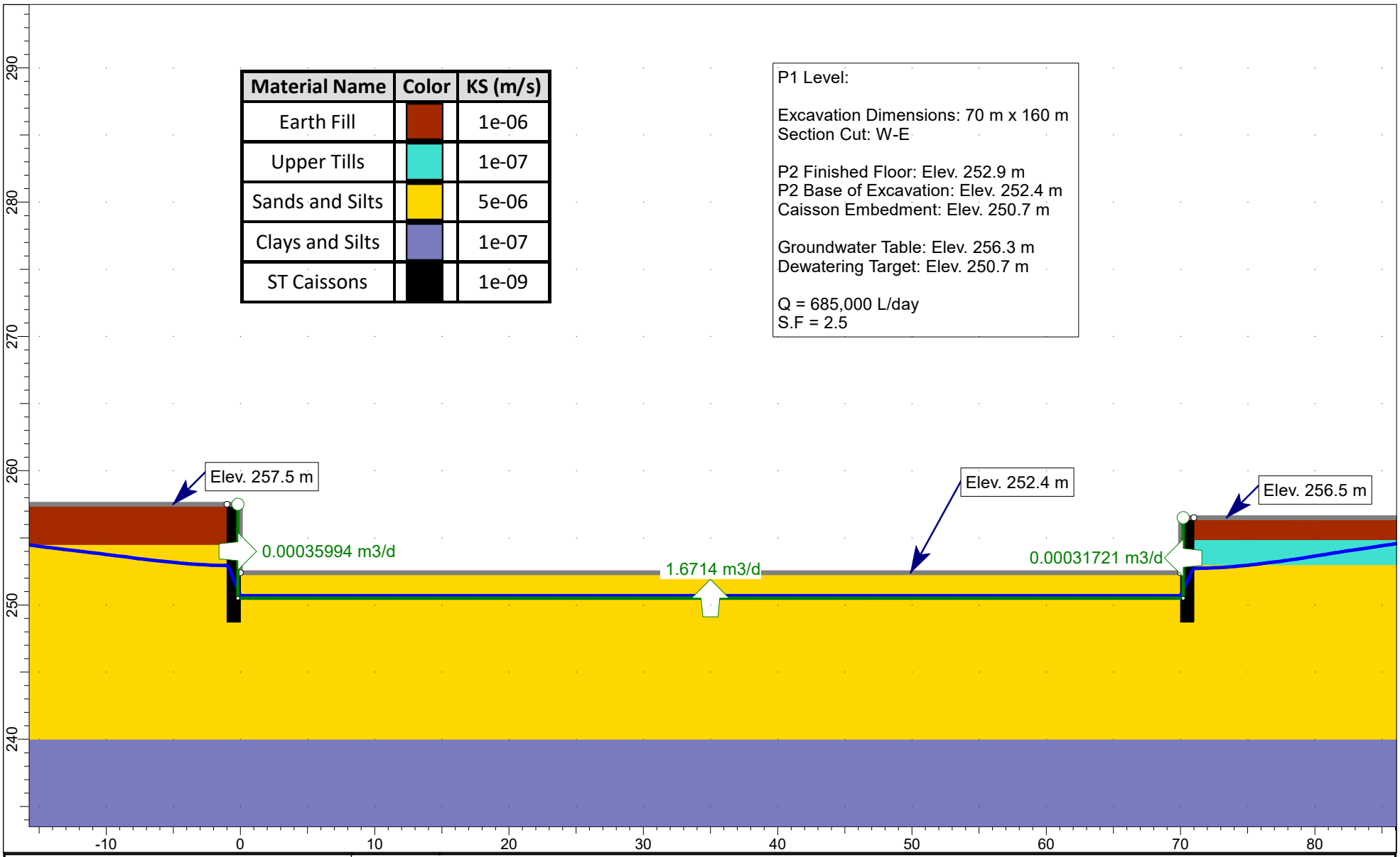
P1 Level:

Excavation Dimensions: 70 m x 160 m
Section Cut: W-E

P2 Finished Floor: Elev. 252.9 m
P2 Base of Excavation: Elev. 252.4 m
Caisson Embedment: Elev. 250.7 m

Groundwater Table: Elev. 256.3 m
Dewatering Target: Elev. 250.7 m

Q = 685,000 L/day
S.F = 2.5



GROUNDED ENGINEERING

SLIDEINTERPRET 9.022

File: **22-014 | 299 Cundles Road East**

Analysis: Dewatering | Buildings B1 & B2 | P1 Level: Impermeable Shoring - 251.9 masl footings

Ref.

RS2 File: B1-B2.slmd

Scale: 1:400

Eng: MA

Material Name	Color	KS (m/s)
Earth Fill		1e-06
Upper Tills		1e-07
Sands and Silts		5e-06
Clays and Silts		1e-07
ST Caissons		1e-09

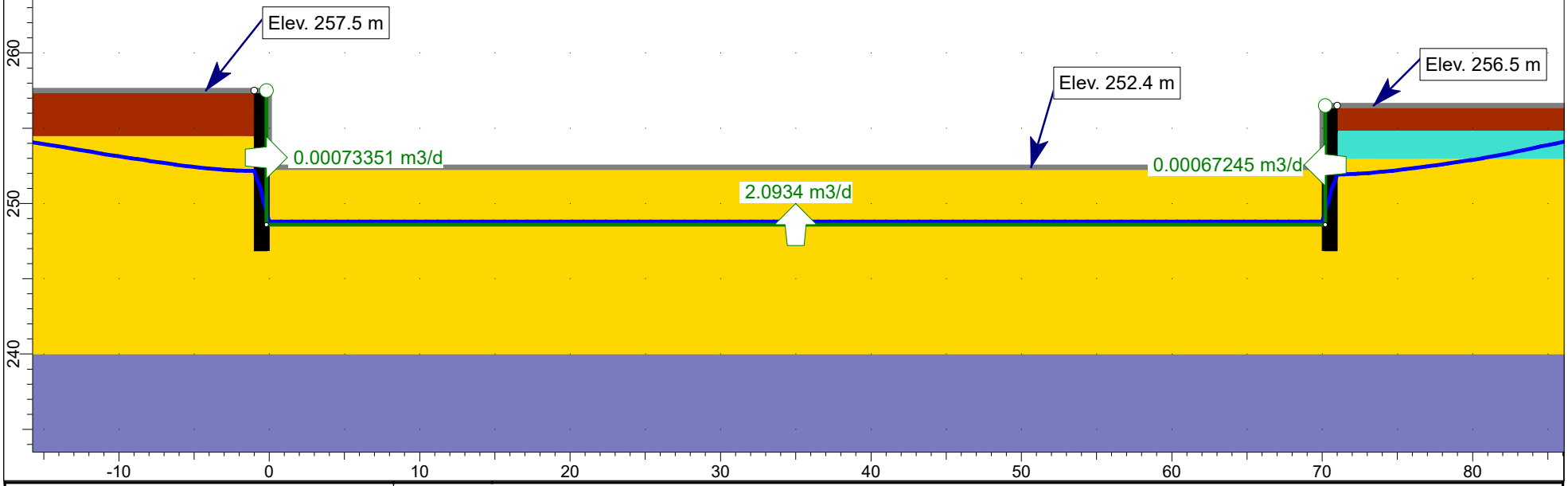
P1 Level:

Excavation Dimensions: 70 m x 160 m
Section Cut: W-E

P2 Finished Floor: Elev. 252.9 m
P2 Base of Excavation: Elev. 252.4 m
Caisson Embedment: Elev. 246.8 m

Groundwater Table: Elev. 256.3 m
Dewatering Target: Elev. 248.8 m

Q = 855,000 L/day
S.F = 2.5



GROUNDED ENGINEERING

File	22-014 | 299 Cundles Road East
Analysis	Dewatering | Buildings B1 & B2 | P1 Level: Impermeable Shoring - 250 m Footings
Ref.	
RS2 File	B1-B2.slmd
Scale	1:400
Eng	MA

SLIDEINTERPRET 9.022

Material Name	Color	KS (m/s)
Earth Fill		1e-06
Upper Tills		1e-07
Sands and Silts		5e-06
Clays and Silts		1e-07
ST Caissons		1e-09

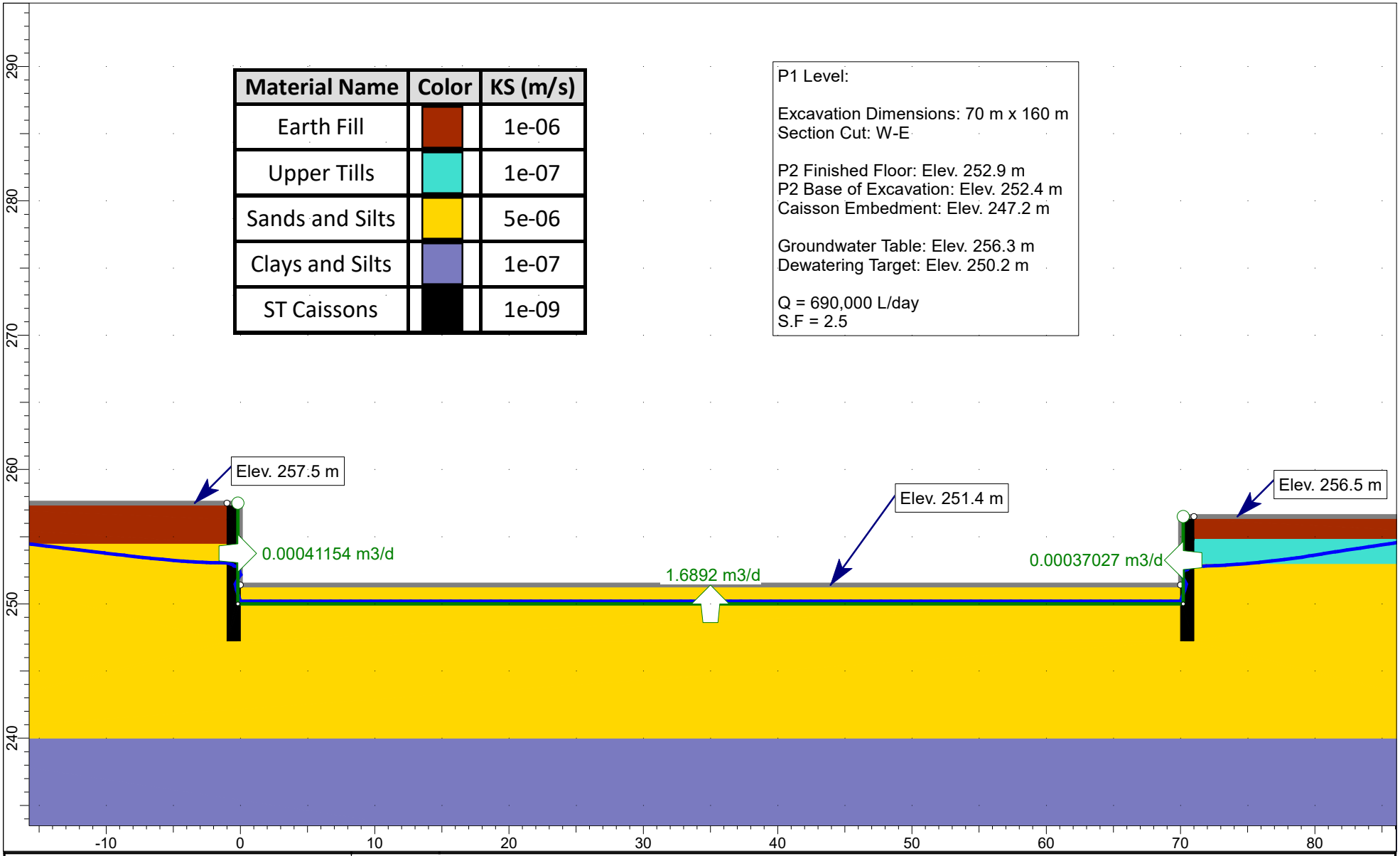
P1 Level:

Excavation Dimensions: 70 m x 160 m
Section Cut: W-E

P2 Finished Floor: Elev. 252.9 m
P2 Base of Excavation: Elev. 252.4 m
Caisson Embedment: Elev. 247.2 m

Groundwater Table: Elev. 256.3 m
Dewatering Target: Elev. 250.2 m

Q = 690,000 L/day
S.F = 2.5



GROUNDED ENGINEERING

SLIDEINTERPRET 9.022

File: **22-014 | 299 Cundles Road East**

Analysis: Dewatering | Buildings B1 & B2 | P1 Level: Impermeable Shoring - Raft Foundations

Ref.

RS2 File: B1-B2.slmd

Scale: 1:400

Eng: MA

Material Name	Color	KS (m/s)
Earth Fill		1e-06
Upper Tills		1e-07
Sands and Silts		5e-06
Clays and Silts		1e-07
ST Caissons		1e-09

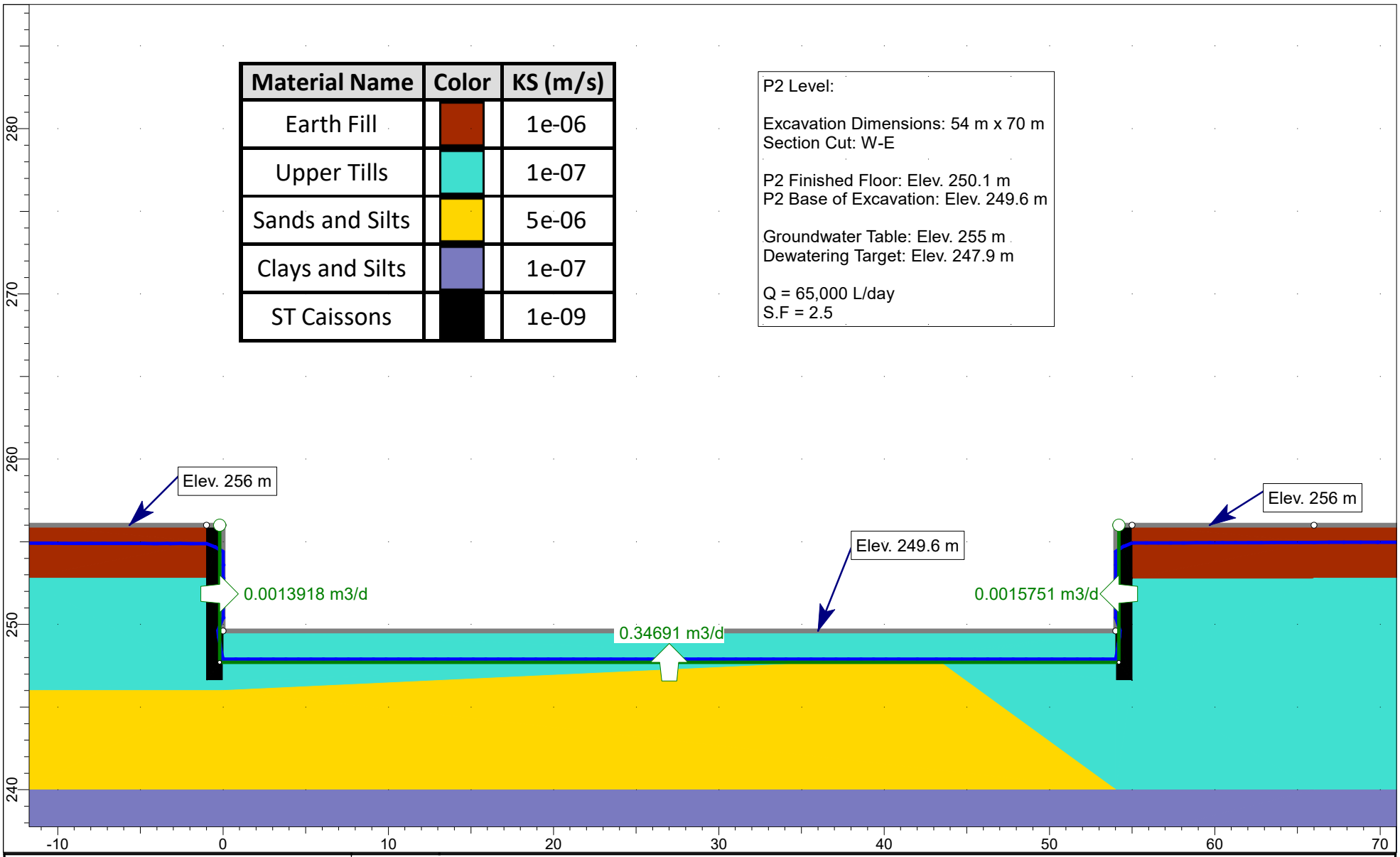
P2 Level:

Excavation Dimensions: 54 m x 70 m
Section Cut: W-E

P2 Finished Floor: Elev. 250.1 m
P2 Base of Excavation: Elev. 249.6 m

Groundwater Table: Elev. 255 m
Dewatering Target: Elev. 247.9 m

Q = 65,000 L/day
S.F = 2.5



GROUNDED ENGINEERING

File	22-014 | 299 Cundles Road East
Analysis	Dewatering | Buildings B3 | P2 Level: Impermeable Shoring - Spread Footings
Ref.	
RS2 File	B3.slmd
Scale	1:325
Eng	MA

SLIDEINTERPRET 9.022

Material Name	Color	KS (m/s)
Earth Fill		1e-06
Upper Tills		1e-07
Sands and Silts		5e-06
Clays and Silts		1e-07
ST Caissons		1e-09

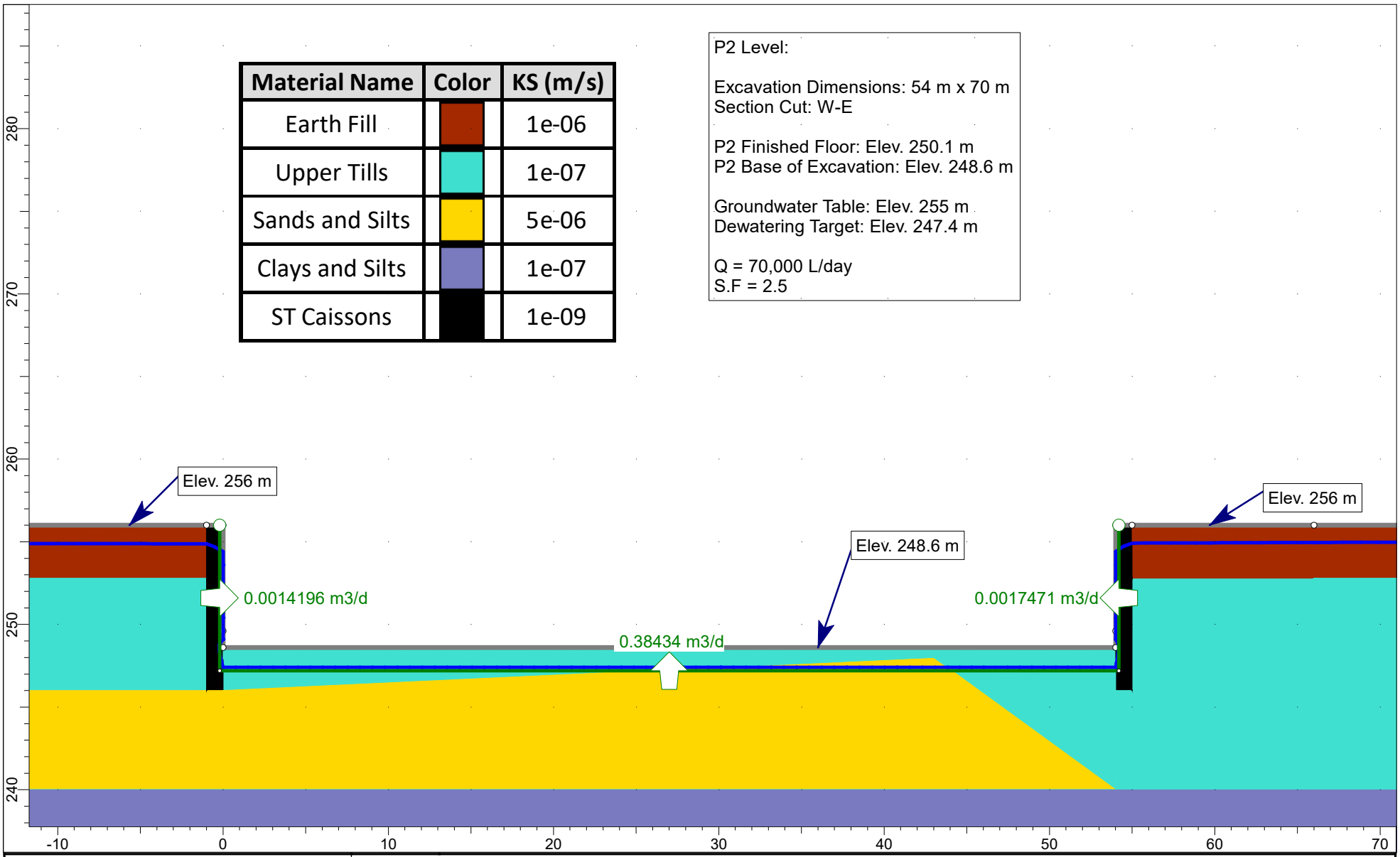
P2 Level:

Excavation Dimensions: 54 m x 70 m
Section Cut: W-E

P2 Finished Floor: Elev. 250.1 m
P2 Base of Excavation: Elev. 248.6 m

Groundwater Table: Elev. 255 m
Dewatering Target: Elev. 247.4 m

Q = 70,000 L/day
S.F = 2.5



GROUNDED ENGINEERING

File	22-014 | 299 Cundles Road East
Analysis	Dewatering | Buildings B3 | P2 Level: Raft Foundations, Impermeable Shoring
Ref.	
RS2 File	B3.slmd
Scale	1:325
Eng	MA

SLIDEINTERPRET 9.022

APPENDIX M

B1 & B2 SHORT TERM - SPREAD FOOTINGS AT 251.9 M

Excavation Dimensions [m]	
N-S	163
E-W	70
Area (m2)	11410
Perimeter (m)	466

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	30	101
Depth (m)	0.03	0.101

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		1.6714	163	272,438
Sides		0.00035994	116	42
(extra row if sides are different)		0.00031721	350	111
Total				272,591
Factor of Safety	2.5			681,477

Storm Events	
2 Year [L/day]	100 Year [L/day]
342,300	1,153,000

Summary	L/day	L/min
Groundwater	685,000	475.7
Rainfall	343,000	238.2
Total	1,028,000	713.9

B1 & B2 LONG TERM - SPREAD FOOTINGS AT 251.9 M

Excavation Dimensions [m]	
N-S	163
E-W	70
Area (m2)	11410
Perimeter (m)	466

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	30	101
Depth (m)	0.03	0.101

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		0	163	-
Sides		0	116	-
(extra row if sides are different)		0	350	-
Total		0		-
Factor of Safety	2.5			-

Infiltration [L/day]
0

Summary	L/day	L/min
Groundwater	-	-
Infiltration	-	-
Total	-	-

B1 & B2 SHORT TERM - SPREAD FOOTINGS AT 250M

Excavation Dimensions [m]	
N-S	163
E-W	70
Area (m2)	11410
Perimeter (m)	466

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	30	101
Depth (m)	0.03	0.101

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		2.0934	163	341,224
Sides		0.00073351	116	85
(extra row if sides are different)		0.00067245	350	235
Total				341,545
Factor of Safety	2.5			853,862

Storm Events	
2 Year [L/day]	100 Year [L/day]
342,300	1,153,000

Summary	L/day	L/min
Groundwater	855,000	593.8
Rainfall	343,000	238.2
Total	1,198,000	831.9

B1 & B2 SHORT TERM - SPREAD FOOTINGS AT 250M

Excavation Dimensions [m]	
N-S	163
E-W	70
Area (m2)	11410
Perimeter (m)	466

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	30	101
Depth (m)	0.03	0.101

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		0	163	-
Sides		0	116	-
(extra row if sides are different)		0	350	-
Total		0		-
Factor of Safety	2.0			-

Infiltration [L/day]
0

Summary	L/day	L/min
Groundwater	-	-
Infiltration	-	-
Total	-	-

B1 & B2 SHORT TERM - RAFT FOUNDATION

Excavation Dimensions [m]	
N-S	163
E-W	70
Area (m2)	11410
Perimeter (m)	466

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	30	101
Depth (m)	0.03	0.101

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		1.6892	163	275,340
Sides		0.00041154	116	48
(extra row if sides are different)		0.00037027	350	130
Total				275,517
Factor of Safety	2.5			688,792

Storm Events	
2 Year [L/day]	100 Year [L/day]
342,300	1,153,000

Summary	L/day	L/min
Groundwater	690,000	479.2
Rainfall	343,000	238.2
Total	1,033,000	717.4

B1 & B2 LONG TERM - RAFT FOUNDATION

Excavation Dimensions [m]	
N-S	163
E-W	70
Area (m2)	11410
Perimeter (m)	466

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	30	101
Depth (m)	0.03	0.101

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		0	163	-
Sides		0	116	-
(extra row if sides are different)		0	350	-
Total		0		-
Factor of Safety	2.5			-

Infiltration [L/day]
0

Summary	L/day	L/min
Groundwater	-	-
Infiltration	-	-
Total	-	-

B3 SHORT TERM - SPREAD FOOTINGS

Excavation Dimensions [m]	
N-S	70
E-W	54
Area (m2)	3780
Perimeter (m)	248

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	30	101
Depth (m)	0.03	0.101

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		0.34691	70	24,284
Sides		0.0013918	220	306
(extra row if sides are different)		0.0015751	28	44
Total				24,634
Factor of Safety	2.5			61,585

Storm Events	
2 Year [L/day]	100 Year [L/day]
113,400	382,000

Summary	L/day	L/min
Groundwater	65,000	45.1
Rainfall	114,000	79.2
Total	179,000	124.3

B3 LONG TERM - SPREAD FOOTINGS

Excavation Dimensions [m]	
N-S	70
E-W	54
Area (m2)	3780
Perimeter (m)	248

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	30	101
Depth (m)	0.03	0.101

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		0	70	-
Sides		0	220	-
(extra row if sides are different)		0	28	-
Total		0		-
Factor of Safety	2.5			-

Infiltration [L/day]
0

Summary	L/day	L/min
Groundwater	-	-
Infiltration	-	-
Total	-	-

B3 SHORT TERM - RAFT FOUNDATION

Excavation Dimensions [m]	
N-S	70
E-W	54
Area (m2)	3780
Perimeter (m)	248

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	30	101
Depth (m)	0.03	0.101

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		0.38434	70	26,904
Sides		0.0014196	220	312
(extra row if sides are different)		0.0017471	28	49
Total				27,265
Factor of Safety	2.5			68,163

Storm Events	
2 Year [L/day]	100 Year [L/day]
113,400	382,000

Summary	L/day	L/min
Groundwater	70,000	48.6
Rainfall	114,000	79.2
Total	184,000	127.8

B3 LONG TERM - RAFT FOUNDATION

Excavation Dimensions [m]	
N-S	70
E-W	54
Area (m2)	3780
Perimeter (m)	248

Rainfall Data		
Year	2	100
Hour	3	12
Depth (mm)	30	101
Depth (m)	0.03	0.101

Section		Flow [m3/day]	Length [m]	Volume [L/day]
Base		0	70	-
Sides		0	220	-
(extra row if sides are different)		0	28	-
Total		0		-
Factor of Safety	2.5			-

Infiltration [L/day]
0

Summary	L/day	L/min
Groundwater	-	-
Infiltration	-	-
Total	-	-

Appendix N

File No. 22-014
April 11, 2022

Attention: Residents

Subject: Private Well Survey

Grounded Engineering Inc. (“Grounded”) is retained on behalf of Penady (North Barrie) Limited to conducted a Private Well Survey within the 500 m of the proposed development located at 299 Cundles Road East, Barrie.

A Private Well Survey of the neighboring properties is required as part of the development application and is completely voluntary for the residents. If you wish to participate in the survey please contact [PM] at Grounded Engineering Inc. within 30 days of receiving this letter. The contact information is as below:

- Phone number: 647-265-0912
- Email: dkanraj@groundedeng.ca

If we can be of further assistance, please do not hesitate to contact us.

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