SIRATI & PARTNERS
Geotechnical Hydrogeological & Environmental Solutions

June 26, 2020

SP19-462-00

Milani Group
11333 Dufferin Street
Maple, ON L6A 1S5

Attention: Mr. Cam Milani

Via e-mail: cam.milani@milanigroup.ca

Subject: Long-Term Groundwater Monitoring Report – 18314 Hurontario Street, Caledon, Ontario

1.0 INTRODUCTION AND SITE VISITS

Sirati & Partners Consultants Limited (SIRATI) was authorized by Milani Group (the "Client") to undertake monthly water level monitoring at the Subject Property located at 18314 Hurontario Street, Caledon (the "Site").

The primary objective of the monthly monitoring was to characterise the seasonal groundwater level fluctuations and flow directions at the Site.

This report summarizes changes in groundwater levels at the Site over a period of twelve (12) months from June 2019 to May 2020.

The graphs presented in Section 3.0 of this report provide an overview of magnitudes and extents of rises and declines of water levels at each monitoring well.

A preliminary geotechnical investigation was completed by SIRATI at the Site. We understand that the proposed development consists of 30 residential lots, internal roads, access driveways, septic tanks, storm water management chamber, and retaining walls.

The Site is bounded by King's Highway No.10 or Hurontario Street to the northeast, residential properties to the northwest, and vacant lands to the southeast and southwest. The topography of the Site is generally sloping to the south-southeast, with elevations ranging between 415 m above mean sea level (mAMSL) and 420 mAMSL.

In a geotechnical investigation carried out by SIRATI, a total of nine (9) boreholes (BH1 through BH9) were drilled at the Site with depths ranging from 3.1 metres below the existing ground surface (mbgs) to

6.2 mbgs. Monitoring wells were installed in seven (7) boreholes (BH1 to BH5, BH7 and BH9) for long-term (stabilized) groundwater level monitoring. The approximate borehole/monitoring well locations are shown in Figure 1-1.

The soil samples retrieved from each boreholes were observed and described. The elevation at each of the borehole locations was surveyed by SIRATI personnel using differential GPS system. The elevations surveyed at the borehole locations varied from 415.4 mAMSL to 418.2 mAMSL. The observed soil features and the surveyed elevations are presented in Borehole Logs in Appendix A.

The groundwater monitoring program for groundwater levels was initiated in June 2019 and continued in the subsequent months up to May 2020. During this monitoring period, no surficial flow was observed within the Site and no surface water ponding was observed. The well condition and integrity of measurements were evaluated at each site visit.

2.0 HYDROGEOLOGICAL CHARACTERIZATION

2.1 Site Stratigraphy

The site stratigraphy reveled from the boreholes advanced at the Site generally consisted of:

- Topsoil of approximately 0.1 m to 0.5 m thick was found at all borehole locations.
- Fill materials encountered in all boreholes underneath the topsoil were observed to consist mainly of sandy silt, with silty sand, sand or gravelly sand, extending to the depth ranging from 0.8 mbgs (BH1 and BH2) to 2.3 mbgs (BH7 and BH8).
- Native soil was encountered below the fill materials and was found to consist of mainly sandy soils including sand and gravel, gravelly sand, and silty sand, extending to the bottom of borehole at BH1 or inferred bedrock at the other borehole locations.

The bedrock which was inferred to be dolostone and encountered in all the boreholes except BH1, at the depths ranging from 3.0 mbgs (BH4) to 5.3 mbgs (BH2).

2.2 Hydrogeological Cross-Sections

Based on the obtained soil information, two cross-sections presented in Figure 2-1 A-A' along N-S and Figure 2-2 B-B' along NW-SE in Appendix B were constructed to illustrate the horizontal and vertical extents of the hydrogeological units. These cross sections pass through most of the monitoring wells installed at the Site. As indicated in the cross sections, all the monitoring wells were screened in the sandy soils.

3.0 WATER LEVEL MONITORING AND SEASONAL VARIATIONS

Ground levels were measured in the on-site monitoring wells between June 2019 to May 2020, for a total of twelve (12) months. Table 3-1 below depicts all the data collected from the monitoring wells on monthly basis.

Table 3-1 Water Level Monitoring Data - June 2019 to May 2020

Monitoring Well	Ground Elevation (mAMSL)	Screen Depth (mbgs)	Depth to Ground Water (mbgs)	Ground Water Elevation (mAMSL)	Depth to Ground Water (mbgs)	Ground Water Elevation (mAMSL)	Depth to Ground Water (mbgs)	Ground Water Elevation (mAMSL)
			June 19, 2019		**July 18, 2019**		**August 19, 2019**	
MW1	417.85	2.5 ~ 5.5	4.40	413.45	4.15	413.70	4.18	413.67
MW2	418.21	2.3 ~ 5.3	4.32	413.89	4.39	413.82	4.50	413.71
MW3	415.50	2.2 ~ 3.7	3.11	412.39	Dry	Dry	Dry	Dry
MW4	415.40	1.7 ~ 3.2	Dry	Dry	Dry	Dry	Dry	Dry
MW5	416.25	1.9 ~ 3.4	Dry	Dry	Dry	Dry	Dry	Dry
MW7	415.37	2.8 ~ 4.3	2.94	412.43	3.48	411.89	3.82	411.55
MW9	415.63	2.6 ~ 5.6	3.15	412.48	3.67	411.96	3.96	411.67
			Sept. 20, 2019		**October 17, 2019**		**November 19, 2019**	
MW1	417.85	2.5 ~ 5.5	4.24	413.61	4.21	413.64	4.17	413.69
MW2	418.21	2.3 ~ 5.3	4.52	413.69	4.50	413.71	4.45	413.76
MW3	415.50	2.2 ~ 3.7	Dry	Dry	Dry	Dry	Dry	Dry
MW4	415.40	1.7 ~ 3.2	Dry	Dry	Dry	Dry	Dry	Dry
MW5	416.25	1.9 ~ 3.4	Dry	Dry	Dry	Dry	Dry	Dry
MW7	415.37	2.8 ~ 4.3	3.99	411.38	Dry	Dry	Dry	Dry
MW9	415.63	2.6 ~ 5.6	4.12	411.51	4.18	411.45	3.83	411.80
			December 16, 2019		**January 21, 2020**		**February 19, 2020**	
MW1	417.85	2.5 ~ 5.5	2.67	415.18	3.87	413.98	4.05	413.80
MW2	418.21	2.3 ~ 5.3	2.45	415.76	4.13	414.08	4.32	413.89
MW3	415.50	2.2 ~ 3.7	dry	dry	2.15	413.35	dry	-
MW4	415.40	1.7 ~ 3.2	2.77	412.63	2.39	413.01	dry	-
MW5	416.25	1.9 ~ 3.4	dry	dry	2.42	413.83	dry	-

Monitoring Well	Ground Elevation (mAMSL)	Screen Depth (mbgs)	Depth to Ground Water (mbgs)	Ground Water Elevation (mAMSL)	Depth to Ground Water (mbgs)	Ground Water Elevation (mAMSL)	Depth to Ground Water (mbgs)	Ground Water Elevation (mAMSL)
MW7	415.37	2.8 ~ 4.3	3.68	411.69	1.97	413.40	2.85	412.52
MW9	415.63	2.6 ~ 5.6	3.36	412.27	2.19	413.44	3.05	412.58
			March 24, 2020		**April 14, 2020**		**May 22, 2020**	
MW1	417.85	2.5 ~ 5.5	3.88	413.97	3.85	414.00	4.06	413.79
MW2	418.21	2.3 ~ 5.3	4.12	414.09	4.12	414.09	4.19	414.02
MW3	415.50	2.2 ~ 3.7	2.13	413.37	2.13	413.37	3.30	412.20
MW4	415.40	1.7 ~ 3.2	2.48	412.92	Dry	Dry	-	-
MW5	416.25	1.9 ~ 3.4	2.39	413.86	dry	dry	-	-
MW7	415.37	2.8 ~ 4.3	1.96	413.41	2.60	412.77	3.10	412.27
MW9	415.63	2.6 ~ 5.6	2.17	413.46	2.91	412.72	3.28	412.35

3.1 Groundwater Levels and Elevations in a year

As presented in Table 3-1, the recorded groundwater levels ranged from 1.96 mbgs measured in March 2020 at MW7 to 4.52 mbgs measured in September 2019 at MW2. The elevations ranged from 411.38 mAMSL measured in September 2019 at MW7 to 415.76 mAMSL measured in December 2019 at MW2. It should be noted that throughout one-year groundwater monitoring program, the monitoring wells including MW3, MW4, MW5 and MW7 were found to be dry at the bottom of the monitoring wells at one or more monitoring events. Three (3) monitoring wells at MW1, MW2 and MW9 were found with water all the year.

3.2 Groundwater Fluctuations in a year

Based on the data obtained, the groundwater fluctuations were assessed. The calculated maximum and minimum water levels are presented in Table 3-2 below.

Table 3-2 Maximum/Minimum Water Levels and Fluctuations

Monitoring Well	Maximum Depth to Groundwater (mbgs)	Date	Minimum Depth to Groundwater (mbgs)	Date	Minimum and Maximum Difference (m)
MW1	4.40	June 19, 2019	2.67	Dec. 16, 2019	1.73
MW2	4.52	Sept. 20, 2019	2.45	Dec. 16, 2019	2.07
MW3*	3.30	May 22, 2020	2.15	Jan. 21, 2020	1.15

Monitoring Well	Maximum Depth to Groundwater (mbgs)	Date	Minimum Depth to Groundwater (mbgs)	Date	Minimum and Maximum Difference (m)
MW4*	2.85	Feb. 19, 2020	1.96	March 24, 2020	0.89
MW5*	2.42	Jan. 21,2020	2.13	April 14, 2020	0.29
MW7*	3.99	Sept. 20, 2019	1.97	Jan. 21,2020	2.02
MW9	4.18	Oct.17, 2019	2.19	Jan. 21,2020	1.99

* The monitoring well was found to be dry at least once during the monitoring program.

Figure 3-1 graphically presents the groundwater levels observed in the monitoring wells in the period of the groundwater monitoring.

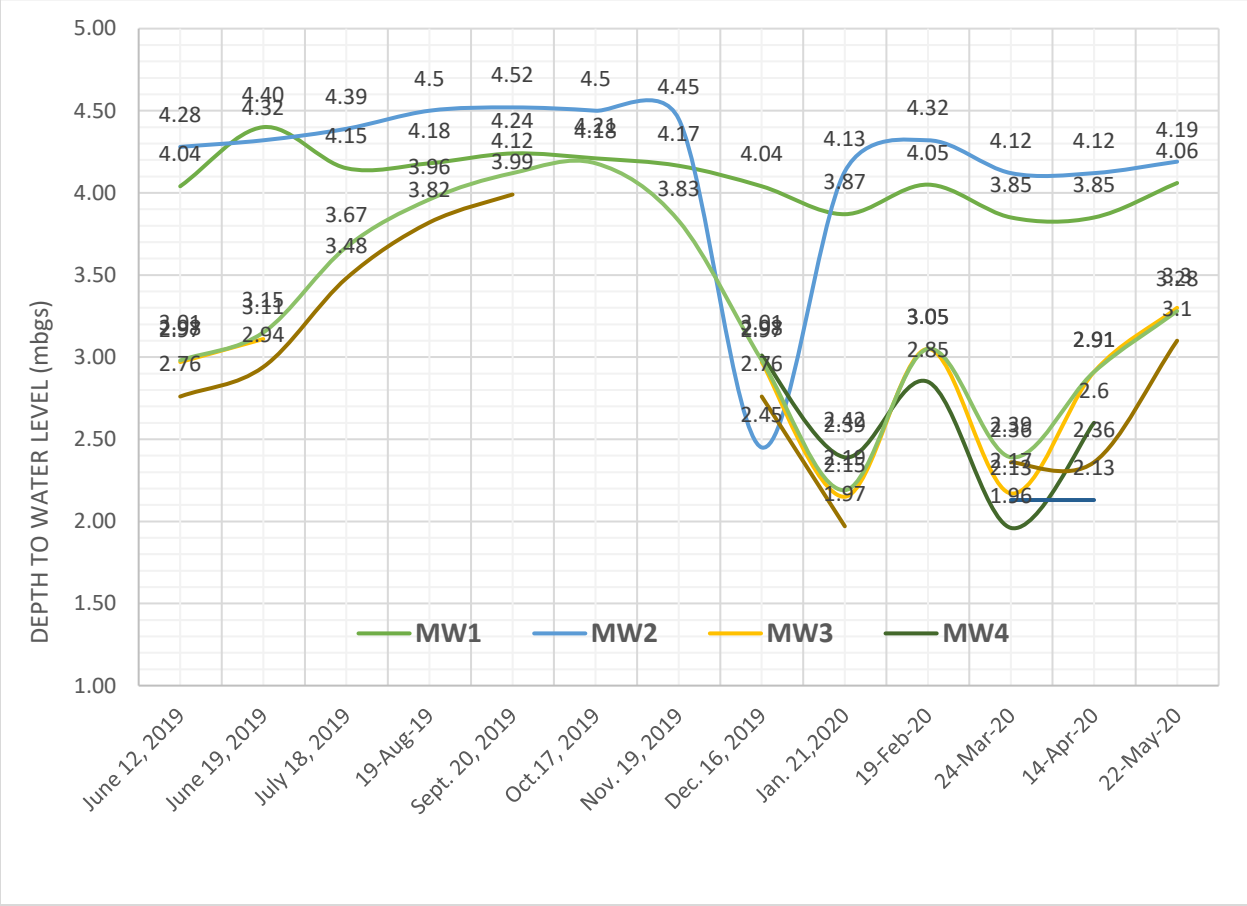

Figure 3-1 Groundwater Levels Observed in Entire Site Area

As indicated, Monitoring Wells MW1, MW2 and MW9 were found with water all the year round. The groundwater elevations observed in these monitoring wells are presented in Figure 3-2.

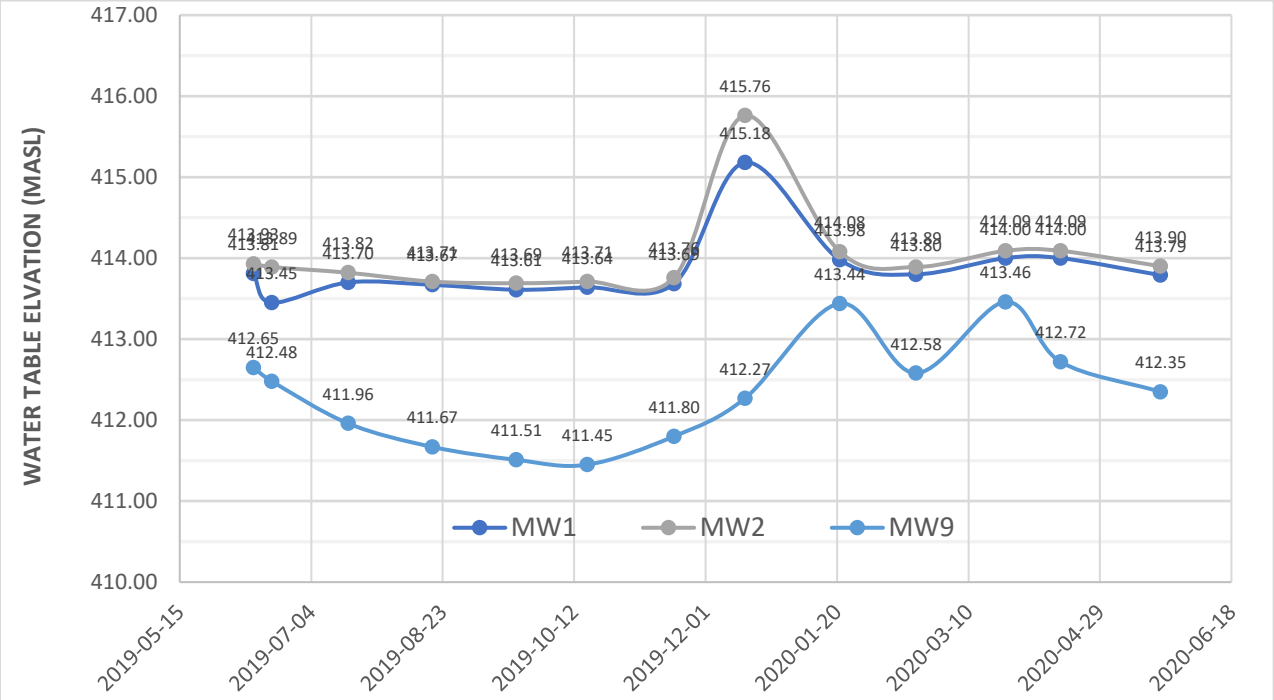

Figure 3-2 Groundwater Elevations Observed in MW1, MW2 and MW9

Based on the data obtained, the maximum water level difference was observed and calculated to be 2.07 m at MW2 and the minimum was 1.73 m at MW1. Therefore, the maximum water level fluctuation at the Site may reach up to 2.1 m.

3.3 Groundwater Depths and Elevations in Seasons

Based on the monthly measured water levels, seasonal water levels were calculated by averaging the water levels measured in each season. Table 3-3 depicts the seasonal average depth to water level, in which the empty cells indicate that the respective monitoring wells were either dry or had intermittent water levels.

Table 3-3 Seasonal Average Depth (m) to Groundwater at On-Site Monitoring Wells

Monitoring Well	Summer	Fall	Winter	Spring
MW1	4.24	4.21	3.53	3.92
MW2	4.40	4.49	3.63	4.14
MW3	-	-	2.60	2.79
MW4	-	-	2.67	-
MW5	-	-	-	-

Monitoring Well	Summer	Fall	Winter	Spring
MW7	3.41	-	-	2.61
MW9	3.59	4.04	2.87	2.86

As per the data above, the shallowest seasonal average water level was observed at 2.60 mbgs at MW3 in the Winter, while the deepest seasonal average water level was observed at 4.49 mbgs at MW2 in the Fall.

It was mentioned that three (3) monitoring wells at MW1, MW2 and MW9 were found with water all the year round. The average seasonal water level elevations in these monitoring wells are tabulated in Table 3-4 and graphically presented in Figure 3-3.

Table 3-4 Seasonal Average Water Level Elevations (mAMSL) at MW1, MW2 and MW9

Monitoring Well	Summer	Fall	Winter	Spring
MW1	413.61	413.65	414.32	413.93
MW2	413.81	413.72	414.58	414.03
MW9	412.04	411.59	412.76	412.84

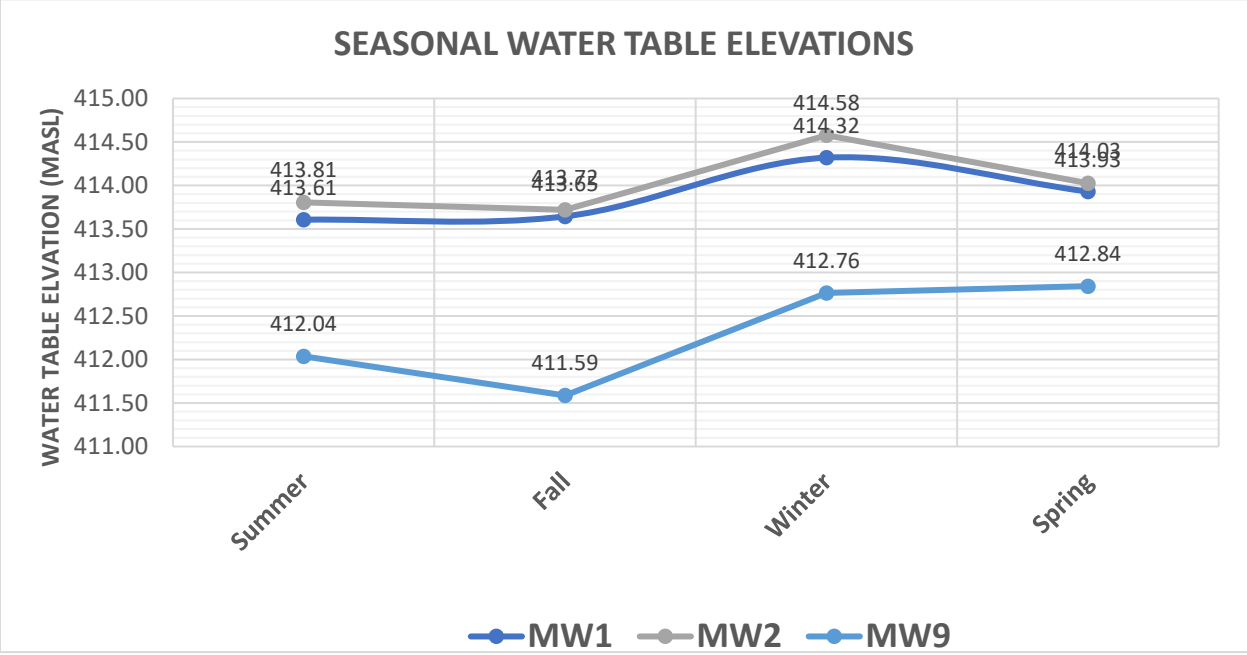

Figure 3-3 Seasonal Average Groundwater Elevations Observed in MW1, MW2 and MW9

3.4 Inferred Groundwater Flow Direction

Based on the seasonal average water level data, groundwater elevation contours were constructed, and groundwater flow directions were inferred, which are shown in Figures 3-4 to 3-7. As a result, the groundwater at the Site appeared to flow to the south to southeast.

4.0 CONCLUSIONS

Based on groundwater monitoring completed between June 2019 and May 2020 at the Site, the following findings could be concluded.

- The measured groundwater levels ranged from 1.96 mbgs measured in March 2020 at MW7 to 4.52 mbgs measured in September 2019 at MW2. The elevations ranged from 411.38 mAMSL measured in September 2019 at MW7 to 415.76 mAMSL measured in December 2019 at MW2.
- The maximum water level fluctuation observed in the monitoring wells with water all the year round was 2.07 m at MW2, and the minimum was 1.73 m at MW1. Therefore, the maximum water level fluctuation at the Site may reach up to 2.1 m.
- Groundwater flow direction at the Site was inferred to be to the south to southeast, with minor seasonal change.

5.0 LIMITATIONS

This report was produced for the sole use of the Client for the Site and may not be relied upon by any other person or entity without the written authorization of SIRATI.

Professional judgement was exercised in gathering and analyzing data and formulation of recommendations using current industry guidelines and standards. Similar to all professional persons rendering advice, SIRATI cannot act as absolute insurer of the conclusion we have reached. No additional warranty or representation, expressed or implied, is included or intended in this report other than stated herein the report.

The scope of services performed in the execution of this study may not be appropriate to satisfy third parties. SIRATI accepts no responsibility for damages if any, suffered by any third party as a result of decisions made or action taken based on this report. Any use, copying or distribution of the report in whole or in part is not permitted without the express written permission of SIRATI and use of findings, conclusions and recommendations represented in this report, is at the sole risk of third parties.

6.0 SIGNATURES

Should you have any questions regarding the information presented or limitation set in this report, please do not hesitate to contact our office.

Yours truly,

Sirati and Partners Consultants Limited

Sudhakar Kurli, P. Geo
Hydrogeologist/Project Manager

Bujing Guan, M. A. Sc., P. Geo.
Senior Hydrogeologist /Environmental Specialist

Enclosures

Figure 1-1 Borehole/Monitoring Well Locations Plan
Figure 2-1 Soil Profile Cross-section A-A'
Figure 2-2 Soil Profile Cross-section B-B'
Figure 3-1 Groundwater Levels Observed in Entire Site Area
Figure 3-2 Groundwater Elevations Observed in MW1, MW2 and MW9
Figure 3-3 Seasonal Average Groundwater Elevations Observed in MW1, MW2 and MW9
Figure 3-4 Inferred Shallow Groundwater Flow Direction Map (Summer)
Figure 3-5 Inferred Shallow Groundwater Flow Direction Map (Fall)
Figure 3-6 Inferred Shallow Groundwater Flow Direction Map (Winter)
Figure 3-7 Inferred Shallow Groundwater Flow Direction Map (Spring)

Appendix A Borehole Logs

FIGURES

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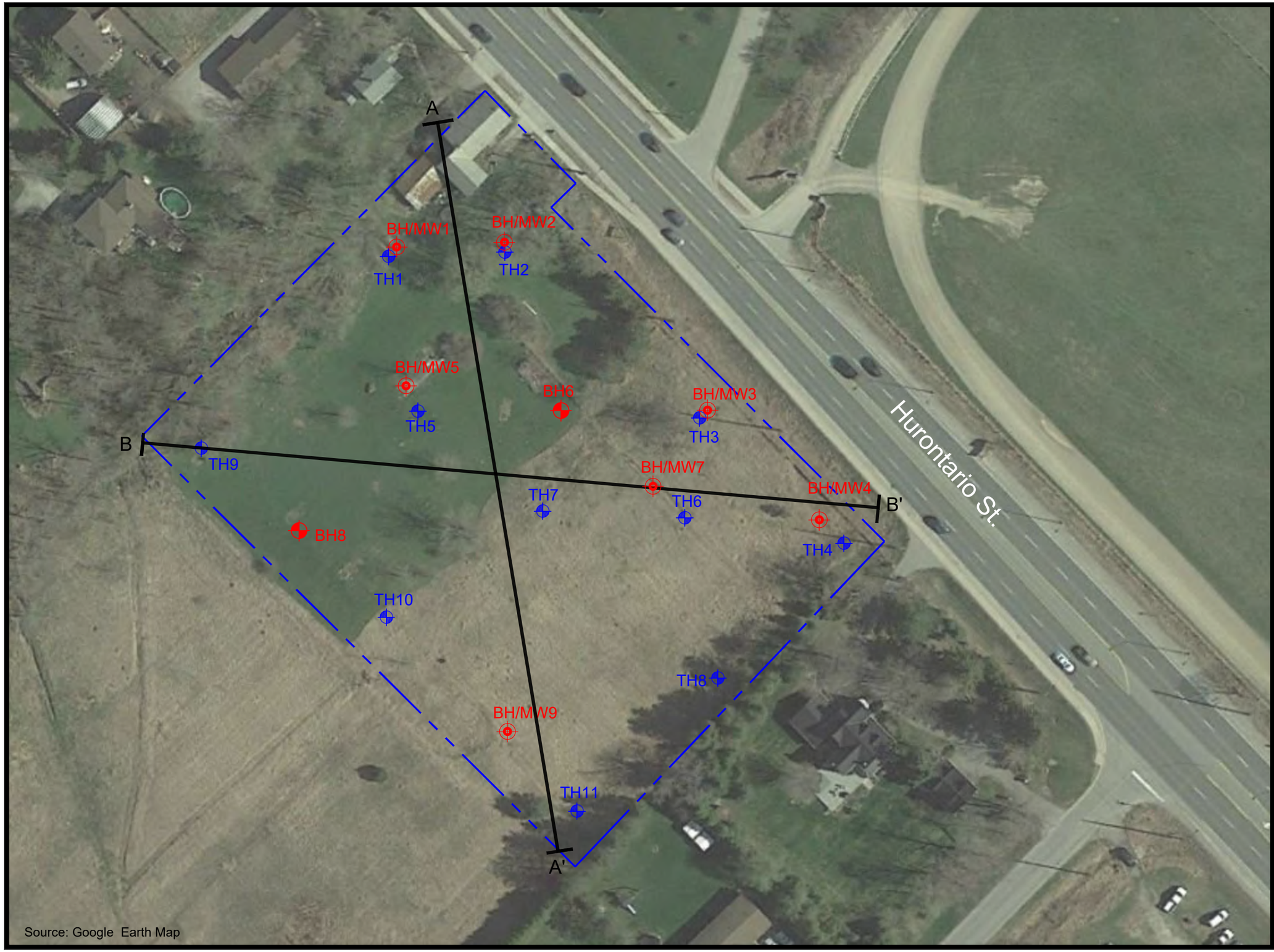

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King City, ON. L7B 1H5
Phone# 905 833 1582, Fax# 905 833 5360

North:

Legend:

- Property Boundary
- Borehole Location
- Monitoring Well Location
- Test Hole Location

Project Title:

Long Term Groundwater Monitoring

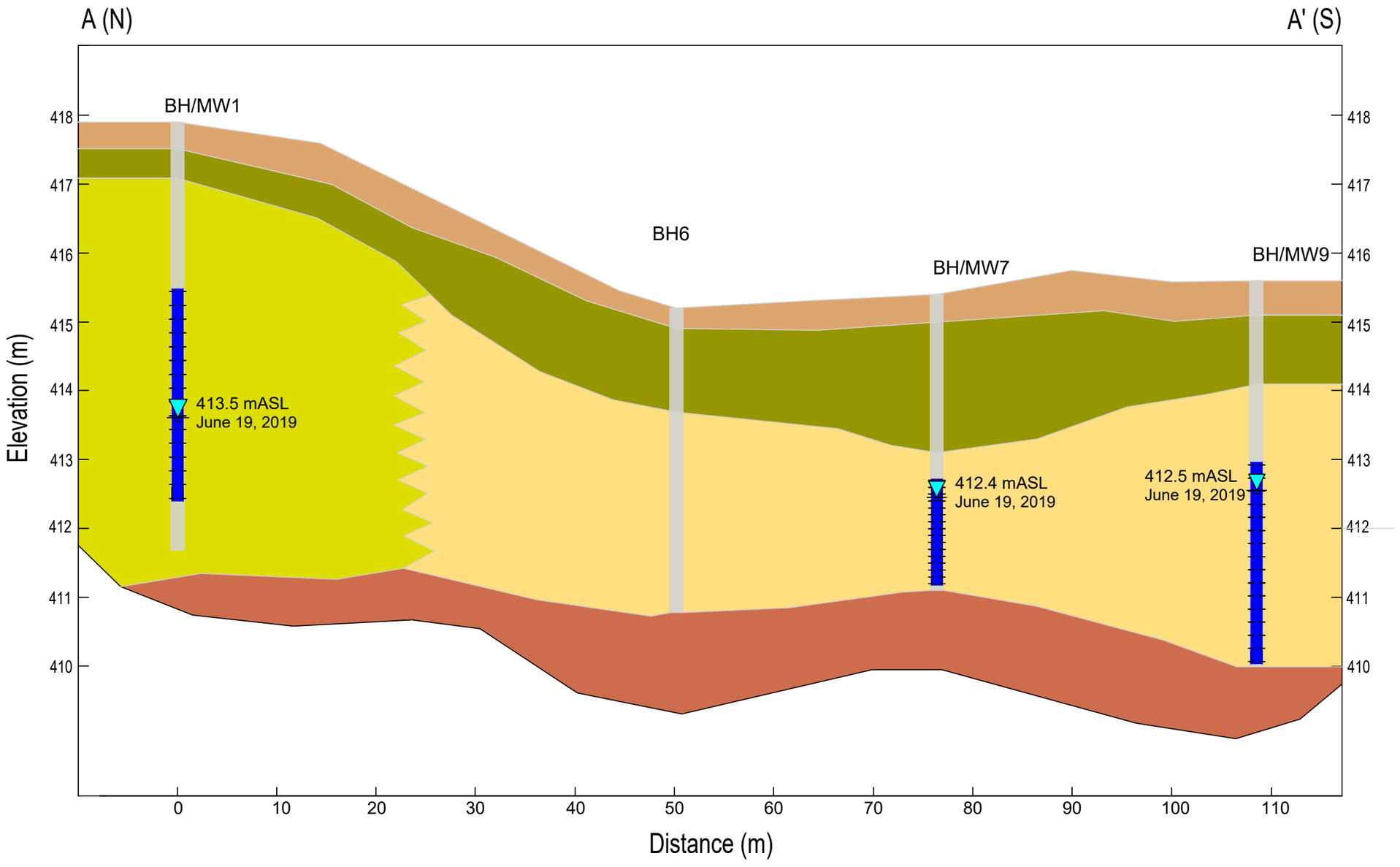
Site Location:

18314 Hurontario Street
Caledon, Ontario

Figure Title:

Borehole/Monitoring Well Location Plan

Scale:	Project Number:
0m 20m	SP19-462-30
Date:	**Figure Number:**
June 2020	1-1



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Phone# 905 833 1582, Fax# 905 833 5360

North:

Legend:

- Topsoil
- Fill
- Silty Sand
- Sand and gravel
- Dolostone Inferred Bedrock

MW1 — Borehole / Well ID

Water Level

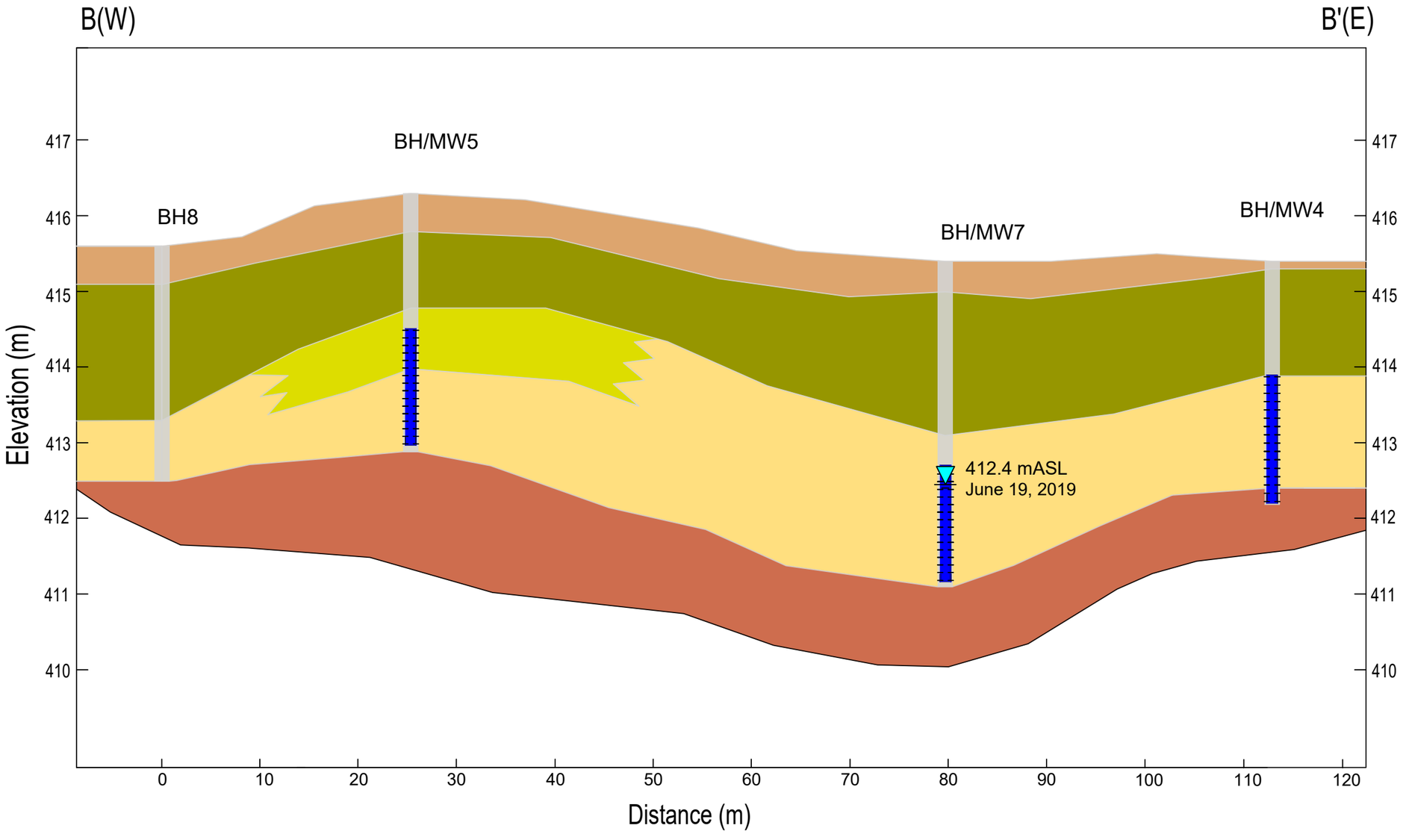
Well Screen

Project Title:
Long Term Groundwater Monitoring

Site Location:
18314 Hurontario Street
Caledon, ON

Figure Title:
Soil Profile Cross-section A-A'

Scale:	Project Number:
As Shown	SP19-462-30
Date: June 2020	**Figure Number:** 2-1



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Phone# 905 833 1582, Fax# 905 833 5360

North:

Legend:

- Topsoil
- Fill
- Silty Sand
- Sand and gravel
- Dolostone Inferred Bedrock

MW1 — Borehole / Well ID

Water Level

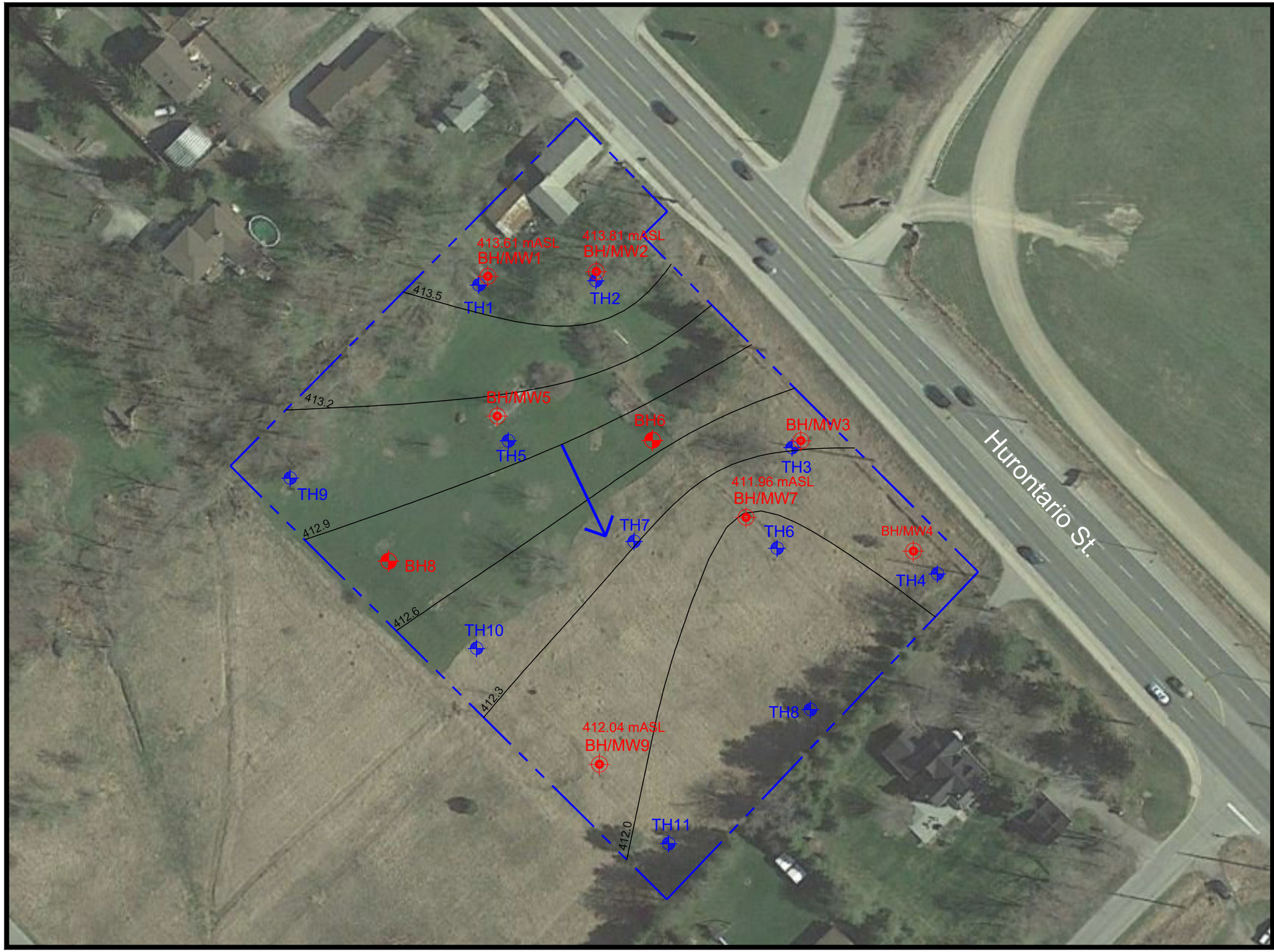
Well Screen

Project Title:
Long Term Groundwater Monitoring

Site Location:
18314 Hurontario Street
Caledon, ON

Figure Title:
Soil Profile Cross-section B-B'

Scale:	Project Number:
As Shown	SP19-462-30
Date:	**Figure Number:**
June 2020	2-2



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Phone# 905 833 1582, Fax# 905 833 5360

North:

Legend:

- Property Boundary
- Contour Line
- Inferred Shallow Groundwater Flow Direction
- Borehole Location
- Monitoring Well Location
- Test Hole Location

Project Title:

Long Term Groundwater Monitoring

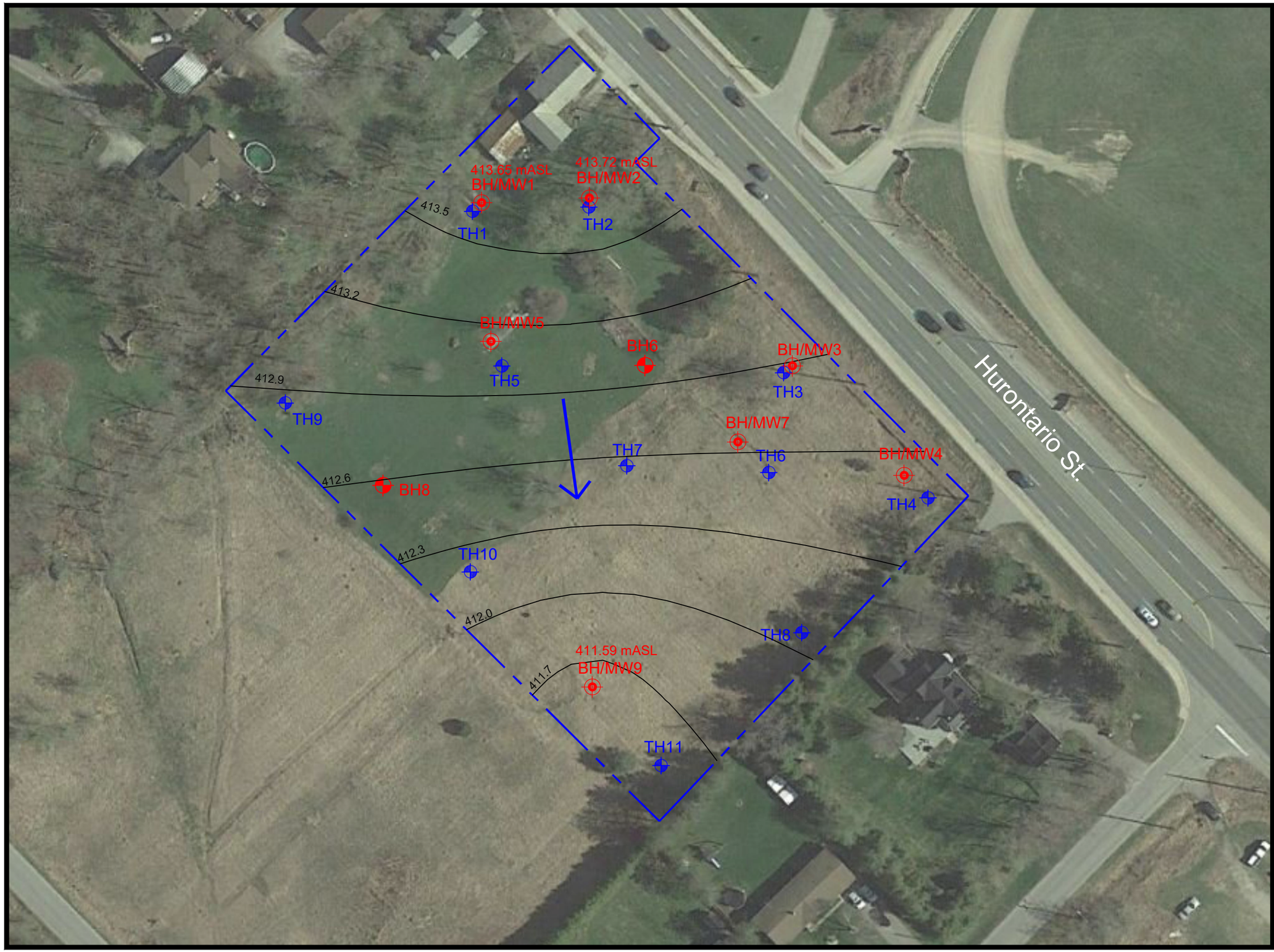
Site Location:

18314 Hurontario Street
Caledon, ON

Figure Title:

Inferred Shallow Groundwater Flow Direction Map (Summer)

Scale:	Project Number:
0m 20m	SP19-462-30
Date:	**Figure Number:**
June 2020	3-4



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North:

Legend:

- Property Boundary
- Contour Line
- Inferred Shallow Groundwater Flow Direction
- Borehole Location
- Monitoring Well Location
- Test Hole Location

Project Title:

Long Term Groundwater Monitoring

Site Location:

18314 Hurontario Street
Caledon, ON

Figure Title:

Inferred Shallow Groundwater Flow Direction Map (Fall)

Scale: 0m – 20m

Project Number: SP19-462-00

Date: June 2020

Figure Number: 3-4

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North:

Legend:

- Property Boundary
- Contour Line
- Inferred Shallow Groundwater Flow Direction
- Borehole Location
- Monitoring Well Location
- Test Hole Location

Project Title:
Long Term Groundwater Monitoring

Site Location:
18314 Hurontario Street
Caledon, ON

Figure Title:
Inferred Shallow Groundwater Flow Direction Map (Winter)

Scale: 0m 20m

Project Number: SP19-462-00

Date: June 2020

Figure Number: 3-5

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North:

Legend:

- Property Boundary
- Contour Line
- Inferred Shallow Groundwater Flow Direction
- Borehole Location
- Monitoring Well Location
- Test Hole Location

Project Title:
Long Term Groundwater Monitoring

Site Location:
18314 Hurontario Street
Caledon, ON

Figure Title:
Inferred Shallow Groundwater Flow Direction Map (Spring)

Scale: 0m 20m

Project Number: SP19-462-00

Date: June 2020

Figure Number: 3-7

APPENDIX A

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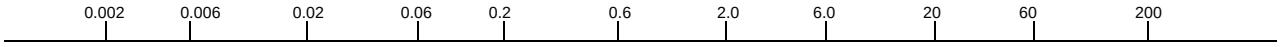
Enclosure No. 1: Notes On Sample Descriptions

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by Sirati & Partners Consultants Limited also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

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LOG OF BOREHOLE BH/MW 1

PROJECT: Proposed Residential Development
CLIENT: Milani Group
PROJECT LOCATION: 18314 Hurontario Street, Caledon
DATUM: Geodetic
BH LOCATION: See Borehole/Monitoring Well Location Plan

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Jun/04/2019

REF. NO.: SP19-462-00
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS / 0.3 m "N"	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
417.9						
0.0 / 417.4	**TOPSOIL:** 460 mm	1	SS	4		
0.5 / 417.1	**FILL:** sandy silt, trace cobbles, trace gravel, trace topsoil inclusion, dark brown, moist					
0.8	**SILTY SAND:** trace cobbles, some gravel, white to light brown, moist, compact	2	SS	16	417	
	trace clay, becoming dense	3	SS	38	416	
	moist to very moist, compact	4	SS	20		
	wet, very dense	5	SS	105/ 230 mm	415	10 59 25 6
					414	wet spoon
	becoming wet, dense seam of clay	6	SS	30	413	
411.7	becoming very dense	7	SS	50/ 75 mm	412	
6.2	**END OF BOREHOLE:**					

1. Monitoring well was installed upon completion of drilling.
2. Groundwater level was observed at 4.04 mbgs on June 12, 2019.
3. Groundwater level was observed at 4.4 mbgs on June 19, 2019.

W. L. 413.5 m
Jun 19, 2019

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
$+^3$, $\times^3$: Numbers refer to Sensitivity
○ $^{\varepsilon_f}$=3% Strain at Failure

SPCL SOIL LOG-1WELL-DRAFT SP19-462-00.GPJ SPCL.GDT 8/1/19

LOG OF BOREHOLE BH/MW 2

PROJECT: Proposed Residential Development

CLIENT: Milani Group

PROJECT LOCATION: 18314 Hurontario Street, Caledon

DATUM: Geodetic

BH LOCATION: See Borehole/Monitoring Well Location Plan

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 200 mm

Date: Jun/04/2019

REF. NO.: SP19-462-00

ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
418.2							
0.0 / 417.8	**TOPSOIL:** 460 mm		1	SS	5		418
0.5 / 417.4	**FILL:** sandy silt, trace cobbles, trace gravel, trace topsoil inclusion, dark brown, moist						
0.8	**GRAVELLY SAND:** some silt, trace cobbles, trace clay, white to light brown, moist, compact		2	SS	29		417
			3	SS	28		
	no recovery becoming very dense		4	SS	50/ 50 mm		416
415.2							
3.0	**SILTY SAND:** some gravel, trace cobbles, light brown, wet, compact		5	SS	18		415
						W. L. 413.9 m Jun 19, 2019	414
	very dense		6	SS	50/ 125 mm		
412.9							413
5.3	**END OF BOREHOLE:**						

1. Monitoring well was installed upon completion of drilling.
2. Auger refusal at 5.3 mbgs upon encountering inferred bedrock.
3. Groundwater level was observed at 4.28 mbgs on June 12, 2019.
4. Groundwater level was observed at 4.32 mbgs on June 19, 2019.

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 20 40 60 80 100

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
	36	43	18	3
wet spoon				
grinding noise				

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPCL SOIL LOG-1WELL-DRAFT SP19-462-00.GPJ SPCL.GDT 8/1/19

LOG OF BOREHOLE BH/MW 3

PROJECT: Proposed Residential Development

CLIENT: Milani Group

PROJECT LOCATION: 18314 Hurontario Street, Caledon

DATUM: Geodetic

BH LOCATION: See Borehole/Monitoring Well Location Plan

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 200 mm

Date: Jun/04/2019

REF. NO.: SP19-462-00

ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
415.5								
0.0 / 415.0	**TOPSOIL:** 460 mm		1	SS	3		415	
0.5	**FILL:** sandy silt, trace cobbles, trace gravel, trace topsoil inclusion, dark brown, moist							
1	sand mixed with topsoil, trace gravel, dark brown, moist		2	SS	6			
	POSSIBLE FILL: gravelly sand, trace rootlets, brown, moist		3	SS	22		414	
2 / 413.2								
2.3	**SAND AND GRAVEL:** trace cobbles, light grey, wet, very dense		4	SS	50/ 125 mm		413	wet spoon
3	no recovery		5	SS	50/ 25 mm	W. L. 412.4 m Jun 19, 2019		
412.1								
3.4	**INFERRED BEDROCK:** fresh, white, DOLOSTONE						412	
4 / 411.4								
4.1	**END OF BOREHOLE:**		6	SS	50/ 25 mm			

1. Monitoring well was installed upon completion of drilling.
2. Auger refusal at 4.14 mbgs.
3. Water encountered at 2.3 mbgs upon completion of drilling.
4. Groundwater level was observed at 2.97 mbgs on June 12, 2019.
5. Groundwater level was observed at 3.11 mbgs on June 19, 2019.

DYNAMIC CONE PENETRATION RESISTANCE PLOT — 20 40 60 80 100

SHEAR STRENGTH (kPa) — ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE — 20 40 60 80 100

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L

WATER CONTENT (%) — 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; $\circ^{\varepsilon=3\%}$ Strain at Failure

SPCL SOIL LOG-1WELL-DRAFT SP19-462-00.GPJ SPCL.GDT 8/1/19

LOG OF BOREHOLE BH/MW 4

PROJECT: Proposed Residential Development
CLIENT: Milani Group
PROJECT LOCATION: 18314 Hurontario Street, Caledon
DATUM: Geodetic
BH LOCATION: See Borehole/Monitoring Well Location Plan

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Jun/03/2019

REF. NO.: SP19-462-00
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
415.4												
415.3 / 0.1	**TOPSOIL:** 76 mm											
	FILL: silty sand, trace cobbles, trace gravel, trace topsoil inclusion, dark brown, moist		1	SS	4		415					
1	sand, trace cobbles, trace gravel, trace topsoil, dark brown, moist		2	SS	8							
413.9							414					
1.5	**GRAVELLY SAND:** trace cobbles, brown, very moist, dense		3	SS	33							
2 / 413.1												
2.3	**SAND AND GRAVEL:** trace cobbles, very moist, very dense		4	SS	63		413					
3 / 412.4												
412.2	**INFERRED BEDROCK:**		5	SS	50/ 25 mm							wet spoon
3.2	DOLOSTONE											
	END OF BOREHOLE:											

1. Monitoring well was installed upon completion of drilling.
2. Water encountered at 3 mbgs upon completion of drilling.
3. Auger refusal at 3.15 mbgs.
4. Groundwater level was observed at 3.01 mbgs on June 12, 2019.
5. Monitoring well was observed to be dry on June 19, 2019.

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPCL SOIL LOG-1WELL-DRAFT SP19-462-00.GPJ SPCL.GDT 8/1/19

LOG OF BOREHOLE BH/MW 5

PROJECT: Proposed Residential Development

CLIENT: Milani Group

PROJECT LOCATION: 18314 Hurontario Street, Caledon

DATUM: Geodetic

BH LOCATION: See Borehole/Monitoring Well Location Plan

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 200 mm

Date: Jun/04/2019

REF. NO.: SP19-462-00

ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
416.3							
0.0 / 415.8	**TOPSOIL:** 460 mm		1	SS	4		416
0.5 / 414.8	**FILL:** sandy silt, trace cobbles, trace gravel, trace topsoil inclusion, dark brown, moist silty sand, trace gravel, trace topsoil inclusion, dark brown, moist		2	SS	8		415
1.5 / 414.0	**SILTY SAND:** trace gravel, brown, moist, compact		3	SS	11		414
2.3 / 412.9	**SAND AND GRAVEL** trace cobbles, light brown, moist, very dense		4	SS	53		413
			5	SS	50/25 mm		
3.4	**END OF BOREHOLE:** 1. Monitoring well was installed upon completion of drilling. 2. Auger refusal at 3.35 mbgs upon encountering inferred bedrock. 3. Monitoring well was observed to be dry on June 12, 2019. 4. Monitoring well was observed to be dry on June 19, 2019.						

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
- ○ UNCONFINED
- ● QUICK TRIAXIAL
- + FIELD VANE & Sensitivity
- × LAB VANE

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L

WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

SPCL SOIL LOG-1WELL-DRAFT SP19-462-00.GPJ SPCL.GDT 8/1/19

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ ε=3% Strain at Failure

LOG OF BOREHOLE BH 6

PROJECT: Proposed Residential Development

CLIENT: Milani Group

PROJECT LOCATION: 18314 Hurontario Street, Caledon

DATUM: Geodetic

BH LOCATION: See Borehole/Monitoring Well Location Plan

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 200 mm

Date: Jun/04/2019

REF. NO.: SP19-462-00

ENCL NO.: 7

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
415.2								
0.0 / 414.9	**TOPSOIL:** 300 mm		1	SS	4		415	
0.3	**FILL:** sandy silt, trace gravel, trace rootlets, trace topsoil inclusion, dark brown, moist							
1	silty sand, trace gravel, dark brown, moist		2	SS	9		414	
413.7								
1.5	**SAND AND GRAVEL:** trace cobbles, light brown, moist to wet, compact to dense		3	SS	23		413	
2	becoming wet		4	SS	33			wet spoon
3	wet		5	SS	35		412	
4								
410.9							411	
4.3	**END OF BOREHOLE:**		6	SS	50/ 25 mm			

1. Auger refusal at 4.3 mbgs upon encountering inferred bedrock.
2. Water encountered at 2.3 mbgs upon completion of drilling.

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 20 40 60 80 100

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; $\circ^{\varepsilon=3\%}$ Strain at Failure

SPCL SOIL LOG-1WELL-DRAFT SP19-462-00.GPJ SPCL.GDT 8/1/19

LOG OF BOREHOLE BH/MW 7

PROJECT: Proposed Residential Development
CLIENT: Milani Group
PROJECT LOCATION: 18314 Hurontario Street, Caledon
DATUM: Geodetic
BH LOCATION: See Borehole/Monitoring Well Location Plan

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Jun/03/2019

REF. NO.: SP19-462-00
ENCL NO.: 8

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
415.4												
0.0 / 415.0	**TOPSOIL:** 380 mm		1	SS	3		415					
0.4	**FILL:** sandy silt, trace topsoil inclusion, trace gravel, trace rootets, dark brown, moist											
1	sandy silt, some gravel, trace gravel, trace rootlets, dark brown, moist		2	SS	9							
							414					
			3	SS	3							
2 / 413.1												
2.3	**SAND AND GRAVEL:** trace cobbles, light brown, wet, very dense		4	SS	56		413					
						▽						
3			5	SS	45		W. L. 412.4 m Jun 19, 2019					wet spoon
							412					
4 / 411.1												
414.3 / 4.3	**INFERRED BEDROCK:** DOLOSTONE fragments, white		6	SS	50/ 25 mm							
	END OF BOREHOLE:											

1. Monitoring well was installed upon completion of drilling.
2. Water encountered at 3 mbgs upon completion of drilling.
3. Auger refusal at 3.66 mbgs.
4. Groundwater level was observed at 2.76 mbgs on June 12, 2019.
5. Groundwater level was observed at 2.94 mbgs on June 19, 2019.

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε_f=3% Strain at Failure

SPCL SOIL LOG-1WELL-DRAFT SP19-462-00.GPJ SPCL.GDT 8/1/19

LOG OF BOREHOLE BH 8

PROJECT: Proposed Residential Development
CLIENT: Milani Group
PROJECT LOCATION: 18314 Hurontario Street, Caledon
DATUM: Geodetic
BH LOCATION: See Borehole/Monitoring Well Location Plan

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Jun/03/2019

REF. NO.: SP19-462-00
ENCL NO.: 9

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
415.6												
0.0 / 415.2	**TOPSOIL:** 460 mm		1	SS	5							
0.5	**FILL:** silty sand, trace topsoil inclusion, dark brown, moist						415					
1	trace gravel, brown		2	SS	16							
	POSSIBLE FILL: gravelly sand, trace silt, light brown, moist		3	SS	16		414					
2 / 413.3												
2.3	**SAND:** some gravel, some silt, brown, wet, very dense		4	SS	90/ 250 mm		413					11 69 15 5
3 / 412.5												
3.1	**END OF BOREHOLE:**		5	SS	50/ 125 mm							

1. Water was encountered at 2.1 mbgs upon completion of drilling.
2. Auger refusal at 3.8 mbgs upon encountering inferred bedrock.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

SPCL SOIL LOG-1WELL-DRAFT SP19-462-00.GPJ SPCL.GDT 8/1/19

SIRATI & PARTNERS

LOG OF BOREHOLE BH/MW 9

PROJECT: Proposed Residential Development
CLIENT: Milani Group
PROJECT LOCATION: 18314 Hurontario Street, Caledon
DATUM: Geodetic
BH LOCATION: See Borehole/Monitoring Well Location Plan

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Jun/03/2019

REF. NO.: SP19-462-00
ENCL NO.: 10

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
415.6								
0.0 415.2	**TOPSOIL:** 460 mm		1	SS	4		415	
0.5 414.1	**FILL:** sandy silt, trace cobbles, trace gravel, trace topsoil inclusion, dark brown, moist sandy silt mixed with cobbles, some gravel, brown, moist		2	SS	13			
1.5	**GRAVELLY SAND:** trace cobbles, trace silt, trace clay, brown, moist, dense		3	SS	42		414	
	very dense		4	SS	52		413	26 51 18 5
	becoming wet		5	SS	22	W. L. 412.5 m Jun 19, 2019	412	wet spoon
	becoming light brown		6	SS	40		411	
410.0								
5.6	**END OF BOREHOLE:** 1. Monitoring well was installed upon completion of drilling. 2. Water encountered at 3 mbgs upon completion of drilling. 3. Auger refusal at 5.6 mbgs. 4. Groundwater level was observed at 2.98 mbgs on June 12, 2019. 5. Groundwater level was observed at 3.15 mbgs on June 19, 2019.							

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
$+^3$, $\times^3$: Numbers refer to Sensitivity
○ $^{\varepsilon}$=3% Strain at Failure

SPCL SOIL LOG-1WELL-DRAFT SP19-462-00.GPJ SPCL.GDT 8/1/19