

June 26, 2020

SP19-462-00

Milani Group 11333 Dufferin Street Maple, ON L6A 1S5

Attention: Mr. Cam Milani

Via e-mail: <u>cam.milani@milanigroup.ca</u>

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.

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	8, 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. 2	20, 2019	October	17, 2019	Novembe	r 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
			Decembe	er 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		1.9 ~ 3.4	dry	dry	2.42	413.83	dry	-

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

Monitoring Well	ing Ground Screen Elevation Depth (mAMSL) (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 1	4, 2020	May 2	2, 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	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.

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

 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)
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.

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	-	-	-	-

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

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 Eleva	tions (mAMSL) at M	W1, 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

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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





























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.

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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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F		POSSIBLE FILL: gravelly sand,	\otimes					414	-												
Ē		trace rootlets, brown, moist	\otimes	3	SS	22			-						0						
-	2		\bigotimes						-												
-	413.2		X			50/		• •	-												wet spoon
F	2.0	cobbles, light grey, wet, very dense	6 C	4	SS	125	目	413							0						wet spoon
ŧ]					-												
-	3	no recoverv	0 C	5/	SS /	50/			-												
-	412.1). . <i>o</i> . . ()			25		W. L. 4	412.4 2019	m a											
Ē	3.4	INFERRED BEDROCK: fresh, white. DOLOSTONE						412	Ŀ												
E		,							-												
4									-												
Ē	4.1	END OF BOREHOLE:		6/	\overline{ss}	50/ 25			-							<u> </u>					
		1. Monitoring well was installed				mm															
		upon completion of drilling. 2. Auger refusal at 4.14 mbgs.																			
		3. Water encountered at 2.3 mbgs																			
		4. Groundwater level was observed																			
		5. Groundwater level was observed																			
		at 3.11 mbgs on June 19, 2019.																			
/19																					
T 8/1																					
G																					
SPCL																					
ΓdΘ																					
-00																					
9-462																					
SP1																					
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WEL																					
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CL S(
Р.																					
							GRAPH	. 3	×3.	Numbei	rs refer	~	8=3%	- · ·							

SIRATI & PARTNERS

LOG OF BOREHOLE BH/MW 3

PROJ	ECT: Proposed Residential Developme	nt						DRI	LLING D	DATA													
CLIEN	T: Milani Group		Met	hod: Hol	low St	em Au	ıger																
PROJ	ECT LOCATION: 18314 Hurontario Str	eet, (Caled	lon				Diar	meter: 20	00 mm	1			REF. NO.: SP19-462-00									
DATU	M: Geodetic							Date	e: Jun/0	3/2019	Э					E١		D.: 5					
BH LC	CATION: See Borehole/Monitoring We	ll Loc	ation	Plan																			
	SOIL PROFILE		s	SAMPL	ES			DYN RFS	AMIC CO	NE PEN		FION								DEMARKO			
				_		Ë			20 4	0. e	\gtrsim	0 1	00	PLASTI LIMIT			LIQUID LIMIT	z	ΤΨΤ	KEMARKS AND			
(m)		LoT			S F	NS NS	z	сц				20)	1	WP	CON N	N	WL	(kPa)	L UNI	GRAIN SIZE			
ELEV DEPTH	DESCRIPTION	TAP	ËR		0.3 r		ATIC	0	UNCONFI	INED	+	FIELD V & Sensit	ANE					χõ.	TURA (kn	DISTRIBUTION			
		TRA.	UMB	ΥPE	ші Ц	S CL	×	•		RIAXIAL	×	LAB V	ANE	WA	FER CC	ONTEN	T (%)	Ľ.	¥	(70)			
415.4		0 11/2	z	Ĥ	4	υõ	Ξ		20 4	0 6	0 8	0 1	00	1	0 2	20 3	30			GR SA SI C			
- 418.9	FILL: silty sand, trace cobbles.	\boxtimes						F							_								
	trace gravel, trace topsoil inclusion,	\bigotimes	1	55	4		415								0								
-	dark brown, moist	\mathbb{X}						F															
-	sand trace cobbles trace gravel	\bigotimes	_					F															
1	trace topsoil, dark brown, moist	\otimes	2	SS	8			F						0									
E I		\otimes						E															
413.9		\boxtimes					414	-															
- 1.5	GRAVELLY SAND: trace cobbles,	6. O.		~~	22			Ŀ															
	brown, very moist, dense		3	55	33	日日		Ŀ						°									
_2		, O	-			[目]																	
413.1		0.0	;					Ŀ															
- 2.3	SAND AND GRAVEL: trace	0 0		22	63	目:	413	-															
-	consist, very molet, very dense	20	4	33	03	!:目::		È.															
412 4		o O				I∷⊟:		È.															
- 41 2.0	INFERRED BEDROCK:		5 /	SS /	50/			-						0						wet spoon			
3.2					25 mm																		
	END OF BOREHOLE.				[<u></u>]																		
	1. Monitoring well was installed																						
	2. Water encountered at 3 mbgs																						
	upon completion of drilling.																						
	4. Groundwater level was observed																						
	at 3.01 mbgs on June 12, 2019.																						
	be dry on June 19, 2019.																						
	, , , , , , , , , , , , , , , , , , ,																						
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LOG OF BOREHOLE BH/MW 4

1 OF 1 ٦

SIRATI & PARTNERS

LUEN: Mari Group Method: Holds blan Augurt PADICET LOCATION 1898 Handbards Street, Caledon Datumer: 20 mm Ref. NO. : 5919462-00 DATUM Condition SAMPLES Disconstructure in the second blanch street, Caledon Disconstructure in the second blanch street, Caledon Image: Source PROFILE SAMPLES SAMPLES Image: Source PROFILE Image: Source PROFILE </th <th>Р</th> <th>ROJI</th> <th>ECT: Proposed Residential Development</th> <th>nt</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>DRI</th> <th>ILLING</th> <th>DATA</th> <th></th>	Р	ROJI	ECT: Proposed Residential Development	nt						DRI	ILLING	DATA											
PROJECT LICATION: 1931 Humanito Street, Caledon DATUM Geode HLOCATION: 50: BencheckMenning Well Learlier Part SOLL PROFILE SUL PROFILE	С	LIEN	T: Milani Group							Met	hod: H	ollow S	Stem A	uger									
DATUR Geodesic Date: JunctA0019 ENCL NO. 6 BUCATOR: See Service/Automoting Wei Looton Paris Image: Contract of the set of	Ρ	ROJI	ECT LOCATION: 18314 Hurontario Stre	eet, C	Caled	lon				Diar	meter:	200 mr	n					R	EF. NC).: S	P19-4	62-00	
BH LOCATION. See Boreholdkootkong Well coston Plan Solit PROFile So	D	ATU	M: Geodetic							Date	e: Jun/	04/201	19					E	NCL N	0.: 6			
SOUL PROFILE SAMPLES Build of the second of	В	H LC	CATION: See Borehole/Monitoring Wel	ll Loc	ation	Plan		-												-			
Image: Description Description Image: Description <thimage: description<="" th=""> <thimage: descripti<="" td=""><td></td><td></td><td>SOIL PROFILE</td><td></td><td>s</td><td>SAMPL</td><td>ES.</td><td>~</td><td></td><td>RES</td><td>IAMIC C SISTANC</td><td>E PLOT</td><td></td><td>HON .</td><td></td><td></td><td>IC NAT</td><td>URAL</td><td></td><td></td><td>5</td><td>REMA</td><td>RKS</td></thimage:></thimage:>			SOIL PROFILE		s	SAMPL	ES.	~		RES	IAMIC C SISTANC	E PLOT		HON .			IC NAT	URAL			5	REMA	RKS
Entry DESCRIPTION Image: second seco	r)	n)		5				ATEF			20	40	60 8	30 1	00	LIMIT		ITENT	LIMIT	PEN.	3) UIT V		D 917E
DECIDINATION DECIDINATION<	EL	EV	DESCRIPTION	A PLO	ъ		3 m	NOL NOL	NOL	SHE	EAR S	RENC	GTH (k	Pa)	ANE	W _P		w o	WL	E KET	RAL L (kN/m	DISTRIB	UTION
416.3	DE	PTH	DESCRIPTION	RAT/	MBE	щ	- Bo	NUO	EVAT	•	QUICK	FINED FRIAXIA	L X	& Sensit	tivity ANE	WA	TER CO	ONTEN	T (%)	9 0 0	NATU	(%))
0.0 TOPSOL: 480 mm 22 1 SS 4 0 0 0 116.8 10 10 1 SS 4 0 0 0 10.8 10 10 10 0 0 0 0 0 10.8 10 100 100 100 100 0 0 0 11.8 1.0 100 100 100 100 100 0 0 0 11.8 1.0 100 100 11 3 35 11 0 0 0 11.4 1.0 100 100 100 100 100 0 <t< td=""><td>41</td><td>6.3</td><td></td><td>STF</td><td>Ν</td><td>TYF</td><td>ŗ</td><td>GR C</td><td>ELE</td><td></td><td>20</td><td>40</td><td>60 8</td><td>30 1</td><td>00</td><td>1</td><td>0 2</td><td>20</td><td>30</td><td></td><td></td><td>GR SA</td><td>SI CI</td></t<>	41	6.3		STF	Ν	TYF	ŗ	GR C	ELE		20	40	60 8	30 1	00	1	0 2	20	30			GR SA	SI CI
11.5 1 SS 4 416 0 1 ally samt, face gravel, face lopaling logical face more than face gravel, face lopaling logical face more than a set for an more than a face gravel, face g	-	0.0	TOPSOIL: 460 mm	<u>×1/</u>						-													
0.5 FLL: sandy all: trace obbles, trace grave, trace topolinics, dx toxon, most 2 SS 8 1.4 1.5 2 SS 8 1.4.6 SLTY SANC: trace gravel, toxon, most, compact 1 3 SS 11 2 SSMD MD GRAVEL trace dense, light toxon, moist, very dense 4 5 0 0 3 SITY SANC: trace gravel, toxon, most, compact 5 4 SS 53 414.0 Compact 0 0 0 0 2 SSMD MD GRAVEL trace to point complicit of drilling, light toxon, moist, very dense 5 4 SS 53 3.4 END OF BOREHOLE: 0 0 0 0 .412.0 0 0 0 0 .412.0 0 0 0 0 0 .412.0 0 0 0 0 0 0 .412.0 0 0 0 0 0 0 0 0 .412.0 0 0 0 0 0 0 0 0 0 0 <td>- 41</td> <td>5.8</td> <td></td> <td><u> </u></td> <td>1</td> <td>SS</td> <td>4</td> <td></td> <td>416</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	- 41	5.8		<u> </u>	1	SS	4		416	-								0					
address address 2 SS 0 414.8 1.5 SILTY SANC: mos gravel, toron, most, compact 3 8S 11 -2.3 SAND AND GRAVEL trace company, toron, most, compact 414 0 -2.3 SAND AND GRAVEL trace company, toron, most, very or SA 4 SS 0 -2.3 SAND AND GRAVEL trace company, toron, most, very or SA 4 5 0 -2.3 SAND AND GRAVEL trace company, toron, most, very or SA 4 5 0 -2.3 SAND AND GRAVEL trace company, toron, most, very or SA 4 5 0 -2.3 SAND AND GRAVEL trace company, toron, most, very or SA 4 5 0 -2.4 SAND GRAVEL trace company, toron, most, very or SA 4 5 0 -2.4 SAND GRAVEL trace company, toron, most, very or SA 4 5 0 -2.4 SAND GRAVEL trace company, toron, most, very or SAND GRAVEL trace company, tore	-	0.5	FILL: sandy silt, trace cobbles,	\boxtimes						-													
1 silly sand, face gravel, ace lopsoil 2 S 8 414.8 SILTY SAND: face gravel, horown, moist, moist, compact 415 0 414.9 SILTY SAND: face gravel, horown, moist, way dense 414 0 2.3 SAND AND GRAVEL, trace 0 0 2.4 SAND AND GRAVEL, trace 0 0 4.12.0 SAND AND GRAVEL, trace 0 0 4.3 SAND AND GRAVEL, trace 0 0 4.3 SAND GRAVEL, trace 0 0 4.3 SAND AND GRAVEL trace 0 0 4.3 SAND AND GRAVEL trace 0 0 4.3 SAND AND GRAVEL trace 0 0 4.412 0 0 0 0 4.413 0 0 0 0 4.414 0 0 0 0 4.415 0 0 0 0 4.10 0 0 0 0 10 10 10	-		dark brown, moist	\otimes	<u> </u>					F													
414.8 415 1.1 SILTY SAND: tace gravel, brown, molt, compact 413 2.3 SAND AND GRAVEL trace combined of the second of	1		silty sand, trace gravel, trace topsoil	\mathbb{X}	2	SS	8			-							•						
1414.0 Sano AND GRAVEL trace 0 243.3 Sano AND GRAVEL trace 0 000bes, light brown, most, very 5.0 4 012.9 Sano AND GRAVEL trace 0 0.12.9 Sano AND GRAVEL trace 0 1.12.9 Sano AND GRAVEL trace 0	_		inclusion, dan brown, moist	\otimes					415	-													
1.5 SILTY SAMD: tase gravel, brown, molet, compact 3 3 1 0 24 3.400 AND GRAVEL trace construction of the second se	- 41	4.8		\boxtimes						F													
110 110 110 110 12.3 SAND AND GRAVEL trace obbies. light brown, moist, very dense 100 100 12.3 SAND AND GRAVEL trace obbies. light brown, moist, very to draw and the second s	-	1.5	SILTY SAND: trace gravel, brown, moist_compact		3	22	11			F													
41400 4140 4140 0 2.3 SAND AND CRAVEL trace obles. 0 0 412.0 0 0 0 412.0 0 0 0 412.0 0 0 0 412.0 0 0 0 3.4 END OF BOREHOLE: 0 0 2. Auger refusal at 3.35 mbg upon encounting inferred banched to be dry on June 19, 2019. 413 0 4.10 0 0 0 0 3.4 END OF BOREHOLE: 0 0 0 4.100 0 0 0 0 0 4.100 0 0 0 0 0 4.100 0 0 0 0 0 4.100 0 0 0 0 0 4.100 0 0 0 0	-		molot, compact			00	''			F						Ŭ							
2.3 SAND AND GRAVEL trace ocboles, light brown, moist, very dense 1.1 414.0 0 0 2.3 SAND AND GRAVEL trace ocboles, light brown, moist, very dense 0.4 5.5 5.3 0 0 3.4 END OF BOREHOLE: 413 0 0 0 0 3.4 END OF BOREHOLE: 1. Monitoring well was installed upon completion of drilling. 413 0 0 4.12.0 Image: Head of the state of the	-							1日		Ē													
cobles. light brown, molet, very dense 2 cobles. light brown, molet, very dense 2 cobles. light brown, molet, very dense 2 cobles. light brown, molet, very 2 cobles. ligh	41	4.0	SAND AND GRAVEL trace					[]目:	414	⊧—					+		<u> </u>	-		1			
dense 412.0 3.4 END OF BOREHOLE: 2. Auger refusal a1 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 12, 2019. 4. Monitoring well was observed to be dry on June 12, 2019. 4. Monitoring well was observed to be dry on June 12, 2019. 4. Monitoring well was observed to be dry on June 12, 2019. 4. Monitoring well was observed to be dry on June 12, 2019. 4. Monitoring well was observed to be dry on June 12, 2019. 4. Monitoring well was observed to be dry on June 12, 2019. 4. Monitoring well was observed to be dry on June 12, 2019. 4. Monitoring well was observed to be dry on June 19, 2019. 4. Monitoring well was observed to be dry on June 19, 2019. 4. Monitoring well was observed to 4. Monitoring well well well well well well well wel	-	2.0	cobbles, light brown, moist, very	00	4	SS	53			Ę						0							
412.0 0 3.4 END OF BOREHOLE: 1. Monitoring well was installed upon completion of drilling. 2. Auger refusal at 3.36 mbgs upon encountering inferred badrock. 3. Monitoring well was beserved to be dry on June 19, 2019. 4. Myon June 19, 2019.	-		dense	0	 			お目の	.	-													
412.0 20.85 20.12 413 3.4 END OF BOREHOLE: 1. Monitoring well was installed upon completion of drilling. 2. Auger refusal at 3.56 mbgs upon encountering inference before. 3. Monyon up well was installed upon completion of drilling. 2. Auger refusal at 3.56 mbgs upon encountering inference before. 3. Monyon up well was observed to be dry on June 19, 2019. 413	3			0 0			50/		·.	-						0							
3.4 END OF BOREHOLE: 0 10000 1. Monitoring well was installed upon completion of diffing, 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.	-	2.0		0	<u>\</u>	55	25	▮∶目・	1 113	-													
1. Monitoring well was installed upon completion of drilling. 2. Auger refusal at 3.5 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.	- 4	3.4	END OF BOREHOLE:				\mm		13														
			 Monitoring well was installed upon completion of drilling. Auger refusal at 3.35 mbgs upon encountering inferred bedrock. Monitoring well was observed to be dry on June 12, 2019. Monitoring well was observed to be dry on June 19, 2019. 																				

LOG OF BOREHOLE BH/MW 5

PROJECT: Proposed Residential Development

& PARTNERS



PROJ	ECT: Proposed Residential Developme	ent						DRI	LING	DATA										
CLIEN	IT: Milani Group	Meth	nod: Ho	llow S	tem Aı	lger														
PROJ	ECT LOCATION: 18314 Hurontario Str	eet, (Caled	lon				Diar	neter: 2	00 mn	n					R	EF. NC).: S	P19-4	462-00
DATU	M: Geodetic							Date	: Jun/C	4/201	9					E١	NCL N	0.: 7		
BHLC	OCATION: See Borehole/Monitoring We	II Loc	ation	Plan		-		DYN				TION						<u> </u>	-	
	SOIL PROFILE		S	SAMPL	.ES	к		RES	STANCE	PLOT	\geq			PLASTI			LIQUID		WT	REMARKS
(m)		Б			(M)	/ATE IS	_		20 4	0 6	60 E	80 1	00		CON	TENT	LIMIT W.	F PEN	UNIT.)	AND GRAIN SIZE
ELEV	DESCRIPTION	APL	щ		.3 m	ND N TION	TION	SHE			STH (ki	Pa) FIELD V	ANE	-		o		CU) (K	URAL (kN/n	DISTRIBUTION
DEPTH		RAT	IMBE	Ц		NDN	EVA	•		RIAXIAI	_ ×	& Sensit	ivity ANE	WA	TER CO	ONTEN	T (%)	d C	NATI	(%)
415.2		ST	ž	È	Ž	ВS	EL		20 4	0 6	50 E	80 1	00	1	0 2	20 3	30			GR SA SI CI
- 0.0 - 414.9	TOPSOIL: 300 mm	<u> </u>					415	-										-		
- 0.3	FILL: sandy silt, trace gravel, trace	1XX	1	SS	4			F								0				
Ē	brown, moist	\otimes						Ē												
	silty sand, trace gravel, dark brown.	\mathbb{X}						Ŀ												
-	moist	\otimes	2	SS	9			È.						0						
		\otimes	<u> </u>				414	-												
413.7		<u>k</u>				-		F												
- 1.5	cobbles, light brown, moist to wet,	0	3	SS	23			Ē						0						
2	compact to dense	0	 					E												
		0. () 0. ()					413	-	_									1		
	becoming wet	0					110	È.												wet spoon
-		0	4	SS	33			F						0						
-		e [)						Ē												
3	wet							E												
		6 ()	5	SS	35		412	-							0					
).				-		È.												
		6. () 6. ()						-												
4		20						-												
		. O					111	-												
410.9	END OF BOREHOLE:	<u>.</u>	0	\ 33 /	50/		411	-												
	1 Auger refued at 4.2 mbgs upon				25 mm															
	encountering inferred bedrock.																			
	2. Water encountered at 2.3 mbgs																			
	apon completion of animig.																			
5																				
, i																				
F																				
101-1																				
3																				
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j			L																	
						GRAPH	, 3	×3.	Number	s refer	~	8=3%								

LOG OF BOREHOLE BH 6

SIRATI & PARTNERS

	PROJI CLIEN PROJI DATU	ECT: Proposed Residential Developmen T: Milani Group ECT LOCATION: 18314 Hurontario Stra M: Geodetic CATION: See Borehole/Monitoring Wel	DRILLING DATA Method: Hollow Stem Auger Diameter: 200 mm REF. NO.: SP19-462- Date: Jun/03/2019 ENCL NO.: 8								462-00									
ľ	SOIL PROFILE SAMPLES															URAL			F	REMARKS
ī	(m) <u>ELEV</u> DEPTH 415.4	DESCRIPTION	STRATA PLOT	NUMBER	түре	"N" <u>BLOWS</u> 0.3 m	GROUND WATER CONDITIONS	ELEVATION	2 SHE/ 0 UI • Q 2	AR ST NCONF UICK TI	RENGT INED RIAXIAL	80 H (kPa) + ^{FIEL} × LAE 80	D VANE Insitivity VANE 100		TER CC	STURE ITENT w o DNTEN 20 3	LIQUID LIMIT WL (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT W (kN/m³)	AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
-	0.0 415.0 0.4	TOPSOIL: 380 mm FILL: sandy silt, trace topsoil		1	SS	3		415	-						с	þ		-		
	1	inclusion, trace gravel, trace rootets, dark brown, moist sandy silt, some gravel, trace gravel, trace rootlets, dark brown,	\bigotimes	2	SS	9			-						φ					
-		moist	\bigotimes					414	-											
-	2		\bigotimes	3	SS	3			-						Φ					
-	<u>413.1</u> 2.3	SAND AND GRAVEL: trace		1	55	56		413	-						0					
-	3	dense		-					- - - 112 4 1	m										
-				5	SS	45		Jun 19	, 2019) 					0					wet spoon
-	4								- - - -											
	41 4.3 4.3	NFERRED BEDROCK: DOLOSTONE fragments, white END OF BOREHOLE: 1. Monitoring well was installed upon completion of drilling.		6	<u> ss</u>	50/ 25 mm														
		 Water encountered at 3 mbgs upon completion of drilling. Auger refusal at 3.66 mbgs. Groundwater level was observed at 2.76 mbgs on June 12, 2019. Groundwater level was observed at 2.94 mbgs on June 19, 2019. 																		
3PJ SPCL.GDT 8/1/19																				
JRAFT SP19-462-00.(
SPCL SOIL LOG-1WELL-E																				

LOG OF BOREHOLE BH/MW 7

CLIEN	IT: Milani Group			Metho	od: Hol	low St	em Au	ıger													
PROJ	ECT LOCATION: 18314 Hurontario Sti			Diam	eter: 2	00 mm	ı					RE	EF. NC).: SI	P19-4	462-00					
DATU	M: Geodetic			-				Date:	Jun/0	3/201	9					EN	ICL N	O.: 9			
BH LC	SOIL PROFILE	ell Loc	ation	Plan	ES			DYNA	MIC CO	NE PEI	VETRAT	FION									
	SOIL PROFILE		3		.=.5	Ë		RESIS	TANCE	PLOT	\geq		00	PLAST	C NAT	URAL		z	T WT	REMAP AND	RKS
(m)		LOT			Sε	WAT	z	SHEA			0 8 H (kF	0 1 2a)	1	W _P	CON	TENT N	WL	(KPa)	VL UNI'	GRAIN	SIZE
DEPTH	DESCRIPTION	ATA F	BER		0.3 I	UND	ATIC		NCONF	INED	+	FIELD V & Sensit	ANE ivity					POCK CUJ	ATURA (kh	DISTRIBU	JTION
415.6		STR/	NUM	TYPE	"z	GRO CON	ELEV	• QI 2	JICK TF 0 4	RIAXIAL 0 6	. × 0 8	LAB V/ 0 1	ANE 00	1	0 2	0 3	30		Ż	GR SA	SI CL
- 0.0	TOPSOIL: 460 mm	<u>x1 /y</u>						_												-	
415.2		<u>// _\</u>	1	SS	5			-							o						
0.5	FILL: silty sand, trace topsoil						415														
	trace gravel, brown							-													
-			2	SS	16			Ē						0							
								-													
-	POSSIBLE FILL: gravelly sand,						111	-													
-	trace silt, light brown, moist	\otimes	3	SS	16		414	-						c	·						
2								-													
413.3								-													
- 2.3	SAND: some gravel, some slit, brown, wet, very dense		4	SS	90/ 250											Þ				11 69 1	15 5
					mm		413	-													
- 3 412 5					50/																
3.1	END OF BOREHOLE:		5	SS	125										0						
	1. Water was encountered at 2.1				mm																
	mbgs upon completion of drilling. 2. Auger refusal at 3.8 mbgs upon																				
	encountering inferred bedrock.																				
		-	-	I	I		l	I	I	I	I	I	L	I	I	I	L				

SIRATI



LOG OF BOREHOLE BH 8

PROJECT: Proposed Residential Development

DRILLING DATA

& PARTNERS

SIKAT	& PARTNERS				LC)G O	F BO	REH	IOLE	BH/	MW	9								1 OF 1
PROJ	ECT: Proposed Residential Developme	nt						DRIL	LING	DATA										
CLIEN	IT: Milani Group							Meth	od: Ho	llow St	em Au	ıger								
PROJ	ECT LOCATION: 18314 Hurontario Str	eet, 0	Caleo	lon				Diam	eter: 2	00 mm	ı					RI	EF. NC).: SI	P19-	462-00
DATU	M: Geodetic							Date:	Jun/()3/2019	9					E		O.: 1(C	
BH LC	CATION: See Borehole/Monitoring We	ll Loc	ation	Plan																
	SOIL PROFILE		5	SAMPL	.ES			DYNA RESIS	MIC CC	NE PEN PLOT		TION			ΝΔΤ	ΠRΔI		_	REMARKS	
(L				TER			20 4	40 6	0 8	0 1	00	PLASTI LIMIT	C MOIS	STURE	LIQUID LIMIT	, U	IT WI	AND
(m) ELEV		PLO'			SS∣ε	NNS NO	Z	SHE	AR ST	RENG	L TH (kF	Pa)	I	W _P		w	WL	KET P) (kPa	AL UN N/m ³)	GRAIN SIZE
DEPTH	DESCRIPTION	ATA	BER		<u>BLO</u> 0.3		ATIC	ου	NCONF	INED	÷	FIÉLD V. & Sensiti	ANE			T (%)	ATUR (K	(%)		
115.6		STR/	NUM	ТҮРЕ	z	GRO CON	ELEV		UICK II 20 4	RIAXIAL 10 6	. × 08	LAB VA 10 10	ANE 00	1	0 2	20 ;	30		z	GR SA SI CL
- 0.0	TOPSOIL: 460 mm	<u>x1 1/</u>	-				_	-												
415.2		1/ 2	1	SS	4			-							0					
0.5	FILL: sandy silt, trace cobbles,	X						F												
[trace gravel, trace topsoil inclusion,						415	-												
1	sandy silt mixed with cobbles, some	\otimes	2	22	13			E							0					
-	gravel, brown, moist	\otimes	-	00	15			-							Ŭ					
414.1		\otimes						-												
_ 1.5	GRAVELLY SAND: trace cobbles,	0.0			40		414													
	dense		3	SS	42			-						0						
-		0.0						E												
-		00						È.												
F	very dense	0	4	SS	52			-						c						26 51 18 5
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3		20				日日		-												
	becoming wet	0. () 	- -		20	. 🗶														wet spoon
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-410.0		[. <i>o</i>				¦∶⊟:		-												
5.6	END OF BOREHOLE:																			
	1. Monitoring well was installed																			
	2. Water encountered at 3 mbgs																			
	upon completion of drilling.																			
	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.																			
							1										1			
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						GRAPH	13	VJ.	INUMBE	sieter	0	. ∞ =3%	0	at Eailun						

SIRATI & PARTNERS