Peto MacCallum Ltd.
CONSULTING ENGINEERS

HYDROGEOLOGICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPEMENT
521 AND 525 ESSA ROAD
BARRIE, ONTARIO

for

ENCORE DEVELOPMENT GROUP

PETO MacCALLUM LTD.
19 CHURCHILL DRIVE
BARRIE, ONTARIO
L4N 8Z5
PHONE: (705) 734-3900
FAX: (705) 734-9911
EMAIL: barrie@petomaccallum.com

Distribution:
1 cc: Encore Development Group (+email)
1 cc: Innovative Planning Solutions (+email)
1 cc: PML Barrie

PML Ref.: 18BF030
Report: 2
May 2019

Peto MacCallum Ltd.
CONSULTING ENGINEERS

May 9, 2019

PML Ref.: 18BF030
Report: 2

Mr. Bryan Toteda
Encore Development Group
110 Adesso Drive, Unit 8
Concord, Ontario
L4K 3C5

Dear Mr. Toteda

Hydrogeological Investigation
Proposed Residential Development
521 and 525 Essa Road
Barrie, Ontario

Peto MacCallum Ltd. (PML) is pleased to present the results from the hydrogeological investigation recently completed for the above noted project site. Authorization for this work was provided by Mr. B. Toteda in an email dated April 3, 2019.

Three apartment buildings (about 450 m^2 each) and twelve townhouse units (about 480 m^2 total) are proposed for the property at 521 and 525 Essa Road in Barrie. All buildings will be slab-on-grade and four storeys. A continuous parking garage is planned at the ground floor of the apartments, with three residential floors above the parking garage. Site servicing, paved parking and access are planned for the site. The current planned site configuration is shown on Drawing 2-1, appended. An existing residence currently occupies each site and both will be demolished prior to site development.

Reference is made to Report 1, dated July 12, 2018, where results of the geotechnical investigation and geotechnical engineering recommendations were provided for the site.

The purpose of this supplemental hydrogeological investigation was to provide additional information and recommendations for the site plan approval. This report characterizes the existing hydrogeological conditions including ground water levels, gradient and flow direction, provides a site-specific climate-based water balance, and in-situ permeability testing results.

The comments and recommendations provided in this report are based on the site conditions at the time of the original geotechnical field investigation and supplemental hydrogeological investigation and are applicable only to the proposed residential development as addressed in the report. Any changes in the proposed plans will require review by PML to assess the validity of this report, and may require modified recommendations, additional investigation and/or analysis.

INVESTIGATION PROCEDURES

PML attended site on April 24, 2019 and completed Test Pits 1 to 3 to a depth of 0.7 to 2.0 m below existing grade at the locations show on Drawing 2-1, attached. The test pit locations were dug to carry out in-situ Guelph Permeameter (GP) tests.

PML laid out and surveyed the test pits. Co-ordination of clearances of underground utilities was provided by PML in addition to a private utility locator. The test pits were excavated cognizant of the underground utility locates.

The test pits were excavated with a mini rubber track mounted backhoe supplied and operated by a local excavator contractor working under the full-time supervision of field staff from PML. The test pits were backfilled upon completion.

All recovered soil samples were returned to our laboratory for detailed examination to confirm field classification. Three samples of the major soil units were submitted for grain size analysis. Grain size analysis test results are presented on Figures 1 to 2, appended.

Ground water levels in the three monitoring wells that were installed during PMLs geotechnical investigation were obtained in March, April and May. A final reading is scheduled for June and will be reported separately.

SITE SETTING

The site comprises the properties at 521 and 525 Essa Road in Barrie. The site is on the west side of Essa Road and is about 0.46 Ha in size. Currently the site is occupied by two residential dwellings that are to be demolished prior to construction. The site situated in a primarily residential and commercial area. Residential dwellings are to the north and west, and an automotive garage to the south.

Physiography and Topography

The site is located within the physiographic region known as the Peterborough Drumlin Field (Chapman and Putnam, 1984). In the vicinity of the site the land is characterized as a drumlinized till plain comprising moderately stony to stony, silty sand to sand deposits of the Newmarket Till.

The Ontario Department of Agriculture Soil Report notes the near surface soils are part of the Dundonald Series, sandy loam (good drainage) with smooth gently sloping topography.

The borehole elevations indicate about 1.0 m of relief across the site. The elevations of the boreholes range from elevation 315.15 to 314.10.

Drainage and Surface Water Flow

There are no water courses on the site. Surface drainage on site is expected to follow the topography in the area and flow towards the northwest.

GEOLOGY AND SUBSURFACE CONDITIONS

Geology

Bedrock below the overburden is mapped as limestone, dolostone, shale, arkose, and sand stone of the Simcoe Group from the Middle Ordovian period of the Paleozoic era of the Phanerzoic eon. Bedrock is anticipated at depths greater than 60 m based on the Ontario Division of Mines Bedrock Topography Series for the Barrie Area Map P979.

Subsurface Conditions

Reference is made to our geotechnical report for details regarding the subsurface conditions. The scope of this hydrogeological work, focused on the near surface conditions in the test pits. The Log of Test Pit sheets are appended.

In general, test pits encountered fill and native layers of silty sand, and sand and silt till overlying clayey silt.

HYDROGEOLOGICAL CONSIDERATIONS

Aquifers and Local Ground Water Use

The water wells recorded by the Ministry of Environment, Conservation and Parks (MECP) within the 500 m study area are tabulated in Appendix A. A total of 41 Water Well Records (WWR) were identified. Twenty-four records indicated the wells were for some form of domestic water use (private, commerical and/or livestock), five were for ground water monitoring and four wells were listed as not used. Bedrock was not encountered in any of the WWRs.

The wells ranged in depth from 4.0 to 61.0 m below the ground surface with fresh water encountered typically in this range. The wells were developed in sand with variable clay, silt and gravel content, clayey silt and/or silty clay till.

Municipal water is available in the vicinity of the site. It should be noted that the site is outside of any Well Head Protection Areas (WHPAs) and/or Intake Protection Zones (IPZs).

Ground Water

The ground water level monitoring to-date in the three boreholes with wells is summarized below including the first water strike (ground water first encountered during drilling), the ground water levels measured in the boreholes upon completion of augering, and measured in the wells during four subsequent site visits.

Borehole	First Strike Depth (m) / Elevation	Upon Completion Depth (m) / Elevation	Water Level in Wells Depth (m) / Elevation			
			20/06/2018	27/03/2019	24/04/2019	08/05/2019
1	3.4 / 310.8	3.7 / 310.5	1.1 / 313.1	0.0 / 314.2	0.0 / 314.2	0.23 / 313.9
4	4.6 / 310.2	4.1 / 310.7	2.3 / 312.5	1.9 / 312.9	1.4 / 313.4	1.6 / 313.2
7	4.0 / 311.2	4.1 / 311.1	2.3 / 312.9	2.2 / 313.0	2.1 / 313.1	2.1 / 313.1

Based on the above, the stabilized ground water table ranged from 0.0 to 2.2 m below existing grade (elevation 312.5 to 314.2).

Ground water levels are subject to seasonal fluctuations, and in response to variations in precipitation.

Hydraulic Gradient

Based on the water levels measured on April 24, 2019, the shallow ground water flow direction is to the southeast towards Essa Road. The water levels measured show a 1.1 m variation across the site with a ground water elevation of 314.2 at Borehole/Monitoring Well 1 and a ground water elevation of 313.1 at Borehole/Monitoring Well 7, resulting in a hydraulic gradient of 0.9%.

Infiltration Assessment

Three test pits were completed and two GP tests were conducted in each test pit on April 24, 2019. The first test was completed at depths of 0.3 to 1.3 m and the second test was completed at depths of 0.5 to 2.0 m. Test pit locations were selected to provide site coverage. GP test depths were selected ensuring unsaturated native soil conditions. The test locations are shown on Drawing 2-1. For each test, the water level drop in the GP chamber was visually monitored and recorded until a steady infiltration rate was reached.

From the GP testing a field saturated Hydraulic Conductivity (K_{fs}) was estimated utilizing the Zhang et al. (1998) method:

$$K_{fs} = \frac{C_1 x Q_1}{2\pi {H_1}^2 + \pi a^2 C_1 + 2\pi \left(\frac{H_1}{\alpha^*}\right)}$$

Where,

C = shape factor dependent on the soil texture-structure (Zhang et al., 1998)

Q = the steady-state rate of fall of water in reservoir (cm/s)

H = hydraulic head (cm)

α = borehole radius (cm)

An approximate relationship between K_{fs} and the infiltration rate was established in the TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guide and was utilized to determine approximate infiltration rates:

$$Infiltrate\ Rate = \sqrt[3.7363]{\frac{K_{fs}}{6\ x\ 10^{-11}}}$$

The test locations and results are summarized below:

Test Pit	Material Type	Estimated, K_{fs} (cm/sec)	Unfactored Infiltration Rate (mm/hr)
GP 1	Silty Sand	10^{-4} to 10^{-5}	60.8
GP 2	Silty Sand to Silt and Sand	10^{-4} to 10^{-5}	19.4
GP 3	Clayey Silt	10^{-5} to 10^{-6}	14

Particle Size Distribution

Three soil samples were submitted for grain size analysis and Hydraulic Conductivity (K) was estimated based on the particle size distribution. The results of the laboratory testing are included in Figures 1 and 2 and the estimate of Hydraulic Conductivity is summarized in the table below.

Test Pit	Depth (m)	Soil Type	Estimated K (cm/sec)
GP 1	2.0	Silty Sand	10^{-5} to 10^{-6}
GP 2	0.3	Silty Sand	< 10^{-6}
GP 3	1.8	Clayey Silt	< 10^{-6}

The Vukovic & Soro method was used to assess K.

The K value derived from the particle size distribution curve does not take into consideration site specific details such as compaction, soil structure, organic content and/or the degree of saturation.

PRELIMINARY WATER BALANCE

Climate

The site is located in Barrie, west of Lake Simcoe within Simcoe County. The climate of Barrie is humid-continental, characterized by changeable weather patterns. Barrie's location relative to Georgian Bay and Lake Simcoe, can result in disparities in weather over short distances. From Environment Canada data, the average annual temperature recorded at the Barrie Water Pollution Control Centre (WPCC), which is located on the central portion of the City, averages 6.9°C. With the highest monthly average temperature in July, at 20.8°C and the lowest monthly average temperature in January, at –7.7°C. The average annual precipitation recorded at the Barrie WPCC is 932.9 mm.

Water Balance: Pre-Development

To determine the amount of ground water infiltration relative to existing site conditions, a pre-development water balance was carried out to provide an estimate of the volume of infiltrating precipitation at the site. This method is based on classic storm water management principles and generally over-estimates the volume of runoff, providing a conservative assessment of infiltration volume. It is noted that the equations were developed for heavy rainfall events of short duration, where as a large volume of the precipitation occurs at a light to moderate rate over an extended period of time and would result in a much higher volume of infiltration.

For the purposes of our analysis, the following parameters were assumed:

- The amount of rainwater infiltration was based on information at the nearest Environment Canada Monitoring Station, located at the Barrie WPCC. The annual precipitation was recorded to be 932.9 mm/year, and the water surplus was computed to be 347 mm/year (computed by the Thornthwaite and Mather Method).
- The water available for infiltration was computed using the following infiltration factors:

Topography……..0.30
Soil……0.20
Cover……0.10
Total……..0.60

- By multiplying the water surplus of 347 mm/year by the infiltration factor of 0.60, the infiltration was computed to be 208.2 mm/year.

The total existing catchment area for infiltrating precipitation was computed as follows:

- Total Approximate Site Area = 4,571 m^2 (0.46 Ha)
- Total Approximate Impermeable Surface Area (two buildings and two paved driveways are known to be on the site) = 700 m^2

Total Site Area less the Impermeable Surface Area = 3,871 m^2

The total pre-development infiltration at the site (potential for ground water recharge) is calculated to be 805,942.2 L/year.

Development Impact Assessment

Water Balance: Post Development

In order to assess the effect of site development, a post-development water balance for the site was carried out using the same approach and infiltration factors noted above. It is understood that development plans include:

- Buildings 1 to 3 (urban town homes including underground parking) with a total impermeable surface of 1,791 m^2, representing 39% of the entire site;
- Building 4 (standard town homes including driveways) with an impermeable surface of 652 m^2, representing 14% of the entire site;
- Paved road way (675 m^2);
- Permeable green space including required setbacks, tree protection area, amenity area and green space (1,453 m^2).

The total post-development area for infiltrating precipitation was computed as follows:

- Total Site Area = 4,571 m^2 (0.46 ha)
- Total Impermeable Surface Area (buildings and paved roads) = 3,118 m^2
- Total Site Area less the Impermeable Surface Area = 1,453 m^2

Based on the current site conditions and proposed site development plan, the total post development infiltration at the site (potential for ground water recharge) is calculated to be 302,514.6 L/year, having a reduction of site infiltration of approximately 62%.

Development Considerations

Ground Water Recharge Management

The Low Impact Development (LID) guidelines call for the pre and post-development ground water infiltration volumes to be maintained as much as practically possible. The assessment provided above indicates a significant reduction in the volume of surface water infiltration following redevelopment of the site; hence, implementation of measures to reduce the infiltration deficit should be considered.

Mitigation Measures, Opportunities and Constraints

The following measures should be considered to reduce the post-development infiltration:

- Reduce the area of the impermeable surfaces.
- Create swales/depressed areas that will retard the rate of storm water runoff and promote infiltration.
- Promote surface water flow from impermeable surfaces into the infiltration facilities, as opposed to directing surface water to catchbasins connected to the municipal storm sewers.
- Ensure that roof drains are not connected to the municipal storm water control system.
- Reduce the slope of the ground surface to promote increased infiltration.

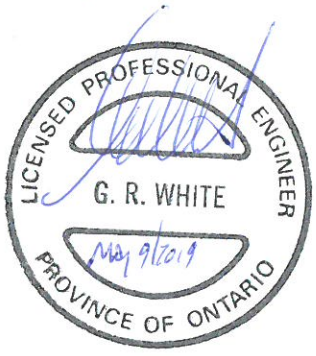
CLOSURE

We trust this report is complete within our terms of reference, and the information provided is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to call our office.

Sincerely

Peto MacCallum Ltd.

Alicia Kimberley, MSc., P.Geo.
Manager, Hydrogeological Services

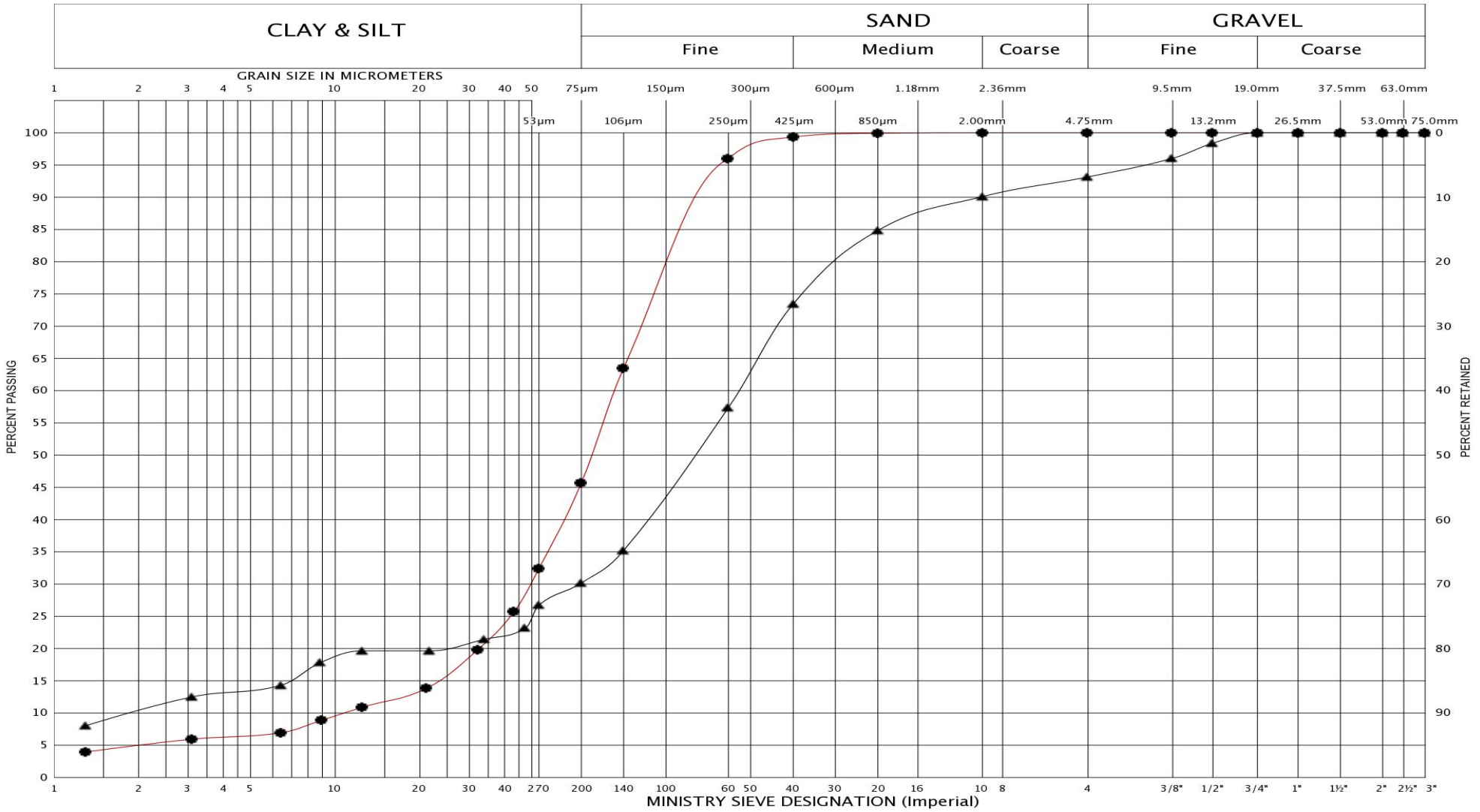


Geoffrey R. White, P.Eng.
Associate
Manager, Geotechnical and Geoenvironmental Services

AK/GRW:jlb

Enclosure(s):
Figures 1 to 2 – Grain Size Distribution Charts
List of Abbreviations
Log of Test Pits GP1 to GP3
Drawing No. 2-1 - Site Plan
Drawing 2-2 – Hydrogeological Section A-A'
Appendix A – MECP WWRs
Appendix B – Statement of Limitations

UNIFIED SOIL CLASSIFICATION SYSTEM



LEGEND	BH	GP 2	GP 1
	SAMPLE	3	4
	SYMBOL	●	▲

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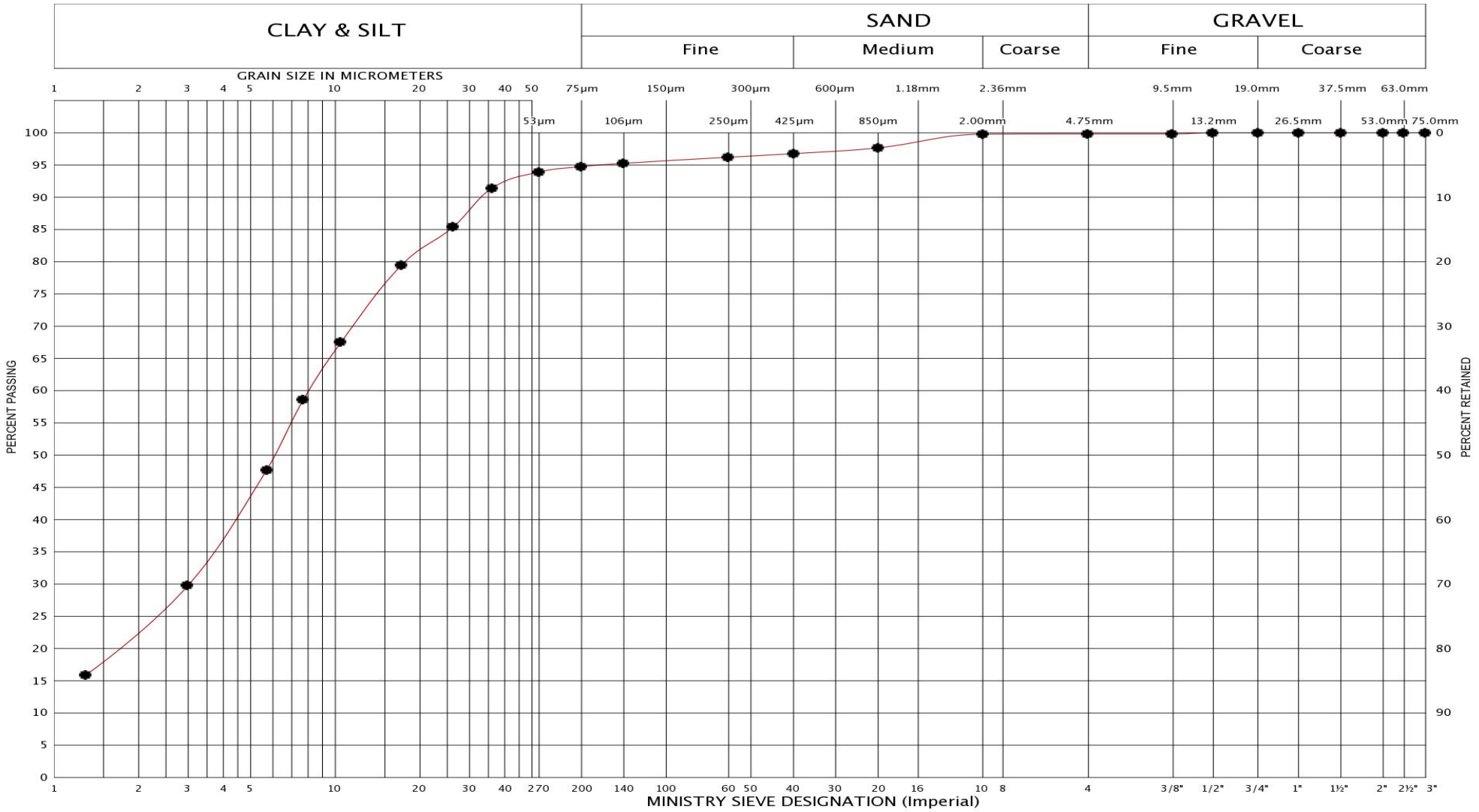
GRAIN SIZE DISTRIBUTION SILTY

SAND TILL, Trace Clay, Trace Gravel

FIG No.: 1

Project No.: 18BF030

UNIFIED SOIL CLASSIFICATION SYSTEM



LEGEND	BH	GP 3
	SAMPLE	4
	SYMBOL	●

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GRAIN SIZE DISTRIBUTION

CLAYEY SILT, Trace Sand

FIG No.: 2

Project No.: 18BF030

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

Standard Penetration Resistance N: - The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: - The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3 m into the subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described in the following terms:

CONSISTENCY	N (blows/0.3 m)	c (kPa)	DENSENESS	N (blows/0.3 m)
Very Soft	0 - 2	0 - 12	Very Loose	0 - 4
Soft	2 - 4	12 - 25	Loose	4 - 10
Firm	4 - 8	25 - 50	Compact	10 - 30
Stiff	8 - 15	50 - 100	Dense	30 - 50
Very Stiff	15 - 30	100 - 200	Very Dense	> 50
Hard	> 30	> 200		

WTLL	Wetter Than Liquid Limit
WTPL	Wetter Than Plastic Limit
APL	About Plastic Limit
DTPL	Drier Than Plastic Limit

TYPE OF SAMPLE

SS	Split Spoon	ST	Slotted Tube Sample
WS	Washed Sample	TW	Thinwall Open
SB	Scraper Bucket Sample	TP	Thinwall Piston
AS	Auger Sample	OS	Oesterberg Sample
CS	Chunk Sample	FS	Foil Sample
GS	Grab Sample	RC	Rock Core

PH	Sample Advanced Hydraulically
PM	Sample Advanced Manually

SOIL TESTS

Qu	Unconfined Compression	LV	Laboratory Vane
Q	Undrained Triaxial	FV	Field Vane
Qcu	Consolidated Undrained Triaxial	C	Consolidation
Qd	Drained Triaxial		

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LOG OF BOREHOLE NO. GP1

17T

PROJECT Proposed Residential Development - 521 and 525 Essa Road
PML REF. 18BF030
LOCATION Barrie, Ontario
BORING DATE April 24, 2019
ENGINEER GW
BORING METHOD Excavator
TECHNICIAN JR

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) / DYNAMIC CONE PENETRATION / STANDARD PENETRATION TEST	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SURFACE ELEVATION 314.90						+ FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q (50 100 150 200) DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ● (20 40 60 80)	(10 20 30 40)		
0.0	TOPSOIL: Brown, sand, trace gravel, trace silt, moist		1	GS						
0.20										
314.70	FILL: Brown, silty sand, moist		2	GS		314				
1.0										
1.1										
313.8	SAND AND SILT: Brown, sand and silt, moist		3	GS						GP Test 1
			4	GS		313				GP Test 2
2.0										
312.9	TEST PIT TERMINATED AT 2.0 m									Upon completion of augering No water Sloughing at 1.6 m
3.0										
4.0										
5.0										

NOTES

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LOG OF BOREHOLE NO. GP2

17T

PROJECT Proposed Residential Development - 521 and 525 Essa Road
PML REF. 18BF030
LOCATION Barrie, Ontario
BORING DATE April 24, 2019
ENGINEER GW
BORING METHOD Excavator
TECHNICIAN JR

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) / DYNAMIC CONE PENETRATION / STANDARD PENETRATION TEST	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SURFACE ELEVATION 314.70									
0.0	TOPSOIL: Brown, sand, trace gravel, trace silt, moist		1	GS						
0.20										
314.50	SILTY SAND: Brown, silty sand, moist to wet		2	GS						GP Test 1
										GP Test 2
			3	GS						Upon completion of augering Water at 0.6 m No sloughing
0.70										
314.00	TEST PIT TERMINATED AT 0.7 m					314				
1.0										
2.0										
3.0										
4.0										
5.0										

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ● Q; 50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80
PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%): 10 20 30 40

NOTES

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LOG OF BOREHOLE NO. GP3

17T

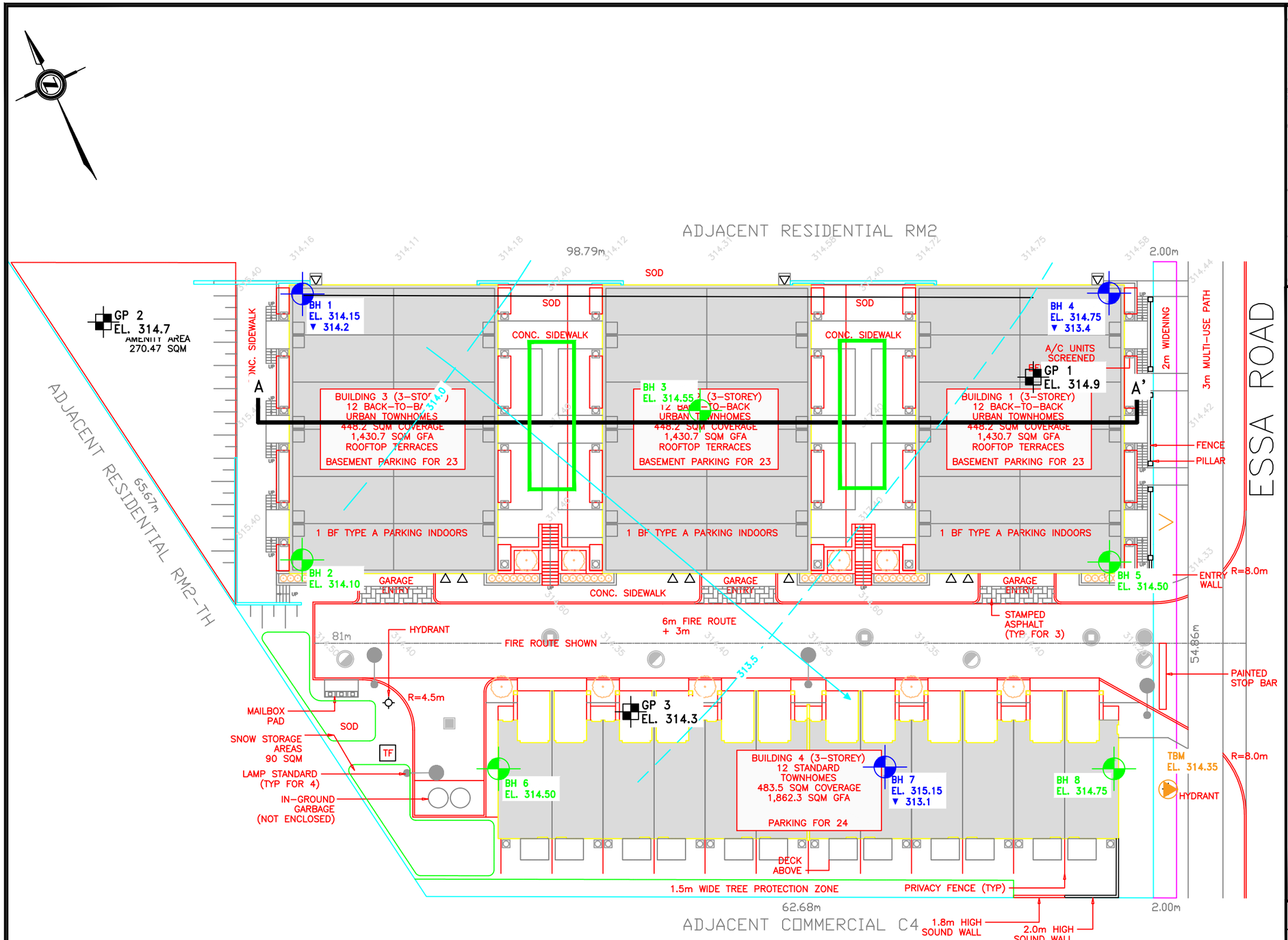
PROJECT Proposed Residential Development - 521 and 525 Essa Road — **PML REF.** 18BF030

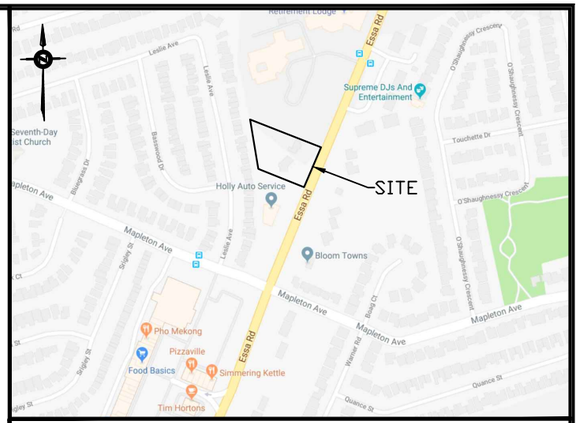
LOCATION Barrie, Ontario — **BORING DATE** April 24, 2019 — **ENGINEER** GW

BORING METHOD Excavator — **TECHNICIAN** JR

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q / DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SURFACE ELEVATION 314.25						50 100 150 200 / 20 40 60 80	10 20 30 40		
0.0	TOPSOIL: Brown, sand, trace gravel, trace silt, moist		1	GS						
0.25						314				
314.00	FILL: Brown, silty sand, moist		2	GS						
1.0						313				
1.4										
312.8	SILTY SAND: Brown, silty sand, moist to wet		3	GS						GP Test 1
1.6										
312.6	CLAYEY SILT: Grey, clayey silt, wet		4	GS						GP Test 2
1.8										
312.4	TEST PIT TERMINATED AT 1.8 m									Upon completion of augering No water Sloughing at 1.3 m
2.0										
3.0										
4.0										
5.0										

NOTES





KEY PLAN
BARRIE, ONTARIO

LEGEND:

- BH 1 / EL. 314.15 / ▼ 313.1 — BOREHOLE 1 (WITH MONITORING WELL) SURFACE ELEVATION GROUND WATER ELEVATION (APRIL 24, 2019)
- BH 2 / EL. 314.10 — BOREHOLE 2 SURFACE ELEVATION
- GP 1 / EL. 314.7 — GUELPH PERMEAMETER SURFACE ELEVATION
- TBM / EL. 314.35 — TEMPORARY BENCH MARK TOP OF FLANGE OF FIRE HYDRANT #3986 ELEVATON 314.35 (METRIC, GEODETIC)
- PROPOSED STORM WATER MANAGEMENT TANK
- A — A' — HYDROGEOLOGICAL SECTION
- 314.0 — APPROXIMATE GROUND WATER CONTOUR SHALLOW AQUIFER
- INFERRED GROUND WATER FLOW DIRECTION

REFERENCE:

BASE PLAN PROVIDED BY CLIENT.

0m 5 10 15 20 25

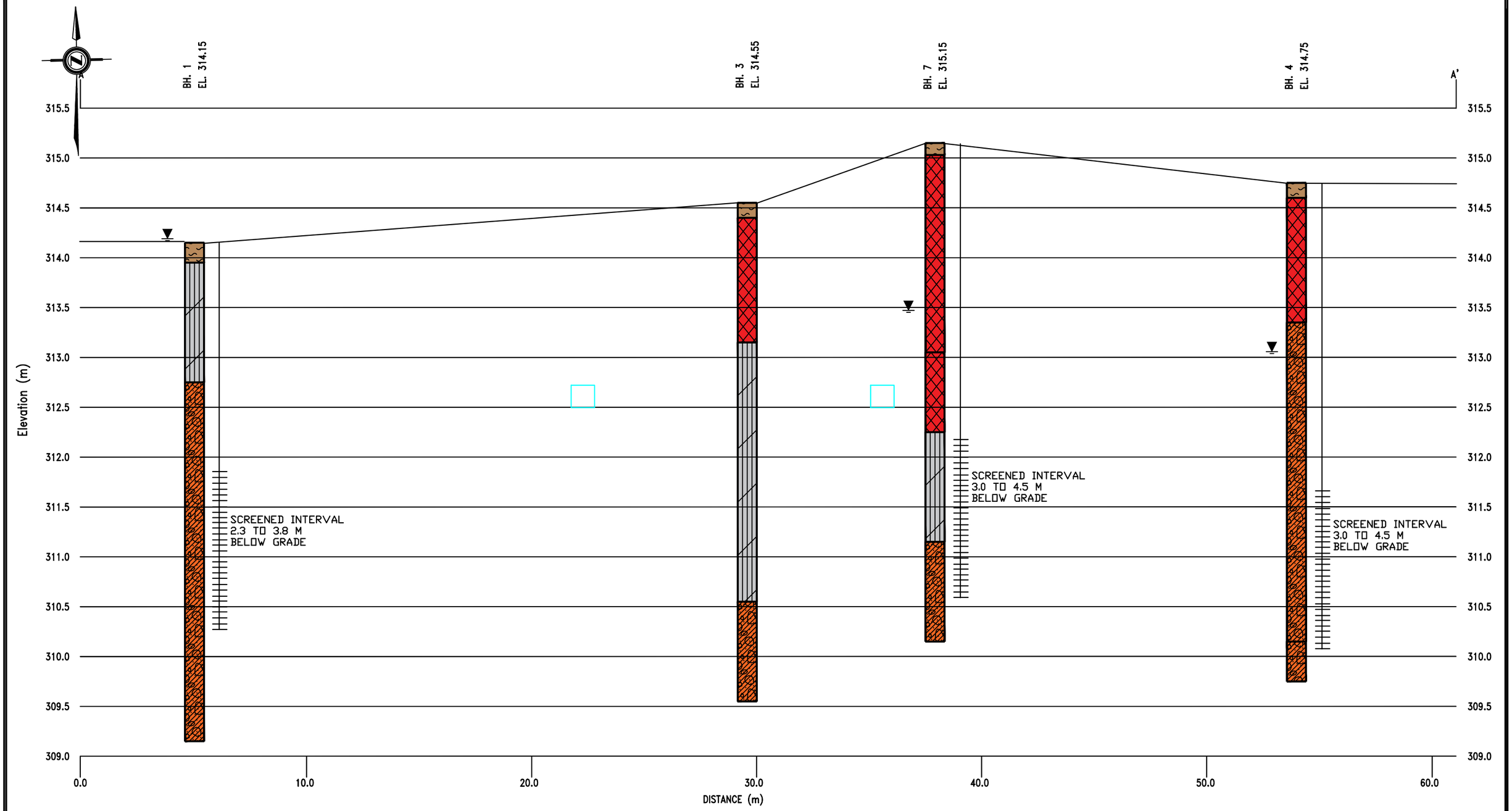
SCALE

SITE PLAN

PROPOSED RESIDENTIAL DEVELOPMENT
521 AND 525 ESSA ROAD
BARRIE, ONTARIO

Peto MacCallum Ltd.
CONSULTING ENGINEERS

		DATE	SCALE	PML REF.	DRAWING NO.
DRAWN	AK	MAY 2019	AS SHOWN	18BF030	2-1
CHECKED	GW				
APPROVED	GW				



LEGEND:

- TOPSOIL
- CLAYEY SILT
- SILTY SAND TILL
- FILL
- GROUND WATER LEVEL (APRIL 24, 2019) * HIGHEST WATER LEVELS OBSERVED
- STORM WATER MANAGEMENT TANK (INV. 312.15)

HYDROGEOLOGICAL SECTION A–A'

PROPOSED RESIDENTIAL DEVELOPMENT
521 AND 525 ESSA ROAD
BARRIE, ONTARIO

Peto MacCallum Ltd.
CONSULTING ENGINEERS

		DATE	SCALE	PML REF.	DRAWING NO.
DRAWN	AK	MAY, 2019	AS SHOWN	18BF030	2–2
CHECKED	GW				
APPROVED	GW				

APPENDIX A

MECP WWRs

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
INNISFIL TOWNSHIP CON 12 005	17 603005 4910442 W	2016/04 7499	36			NU		7275569 (Z204286) A	
INNISFIL TOWNSHIP	17 602934 4910422 W	2016/04 7499						7275568 (Z204285) A	
INNISFIL TOWNSHIP	17 603110 4910769 W	2015/12 7215						7260073 (C31909) A197191 P	
INNISFIL TOWNSHIP CON 12 004	17 602943 4910479 W	2015/06 7391	2	8			0004 10	7244307 (Z117445) A098202	BRWN GRVL SAND STNS 0002 BRWN CLAY SAND 0005 GREY CLAY SAND SLTY 0010 GREY CLAY SAND SLTY 0015
INNISFIL TOWNSHIP	17 603224 4910848 W	2011/11 7241	1.5			MT	0010 10	7174638 (Z143414) A126471	BRWN FILL 0010 GREY SILT CLAY TILL 0020
INNISFIL TOWNSHIP	17 603231 4910867 W	2011/11 7241	1.5			MT	0010 10	7174637 (Z143415) A126470	BRWN FILL 0010 GREY SILT CLAY TILL 0020
INNISFIL TOWNSHIP CON 12 004	17 602891 4910127 W	2010/12 7314						7157916 (M05775) A093144 A	
INNISFIL TOWNSHIP CON 12 004	17 602912 4910111 W	2010/01 7238	0.79	UT 0030		MO	0021 16	7147833 (Z114066) A091560	BRWN SAND GRVL 0038
BARRIE CITY	17 602997 4910411 W	2009/11 2514	36			NU		7139176 (Z91918) A080954 A	15
BARRIE CITY	17 602912 4910103 W	2009/11 7215				TH	0005 10	7136882 (Z107512) A093130	BRWN FILL 0002 BRWN SAND SILT 0012 GREY CLAY SAND 0015
BARRIE CITY	17 602904 4910113 W	2009/11 7215				TH	0005 10	7136881 (Z107515) A093144	BRWN FILL 0002 BRWN SILT SAND 0015
INNISFIL TOWNSHIP CON 12 005	17 603491 4910612 W	2005/07 3108						5740508 (Z30593) A	PRDG 0031
INNISFIL TOWNSHIP	17 603500 4910622 W	2005/07 3108				NU		5740507 (Z30595) A	PRDG 0025
INNISFIL TOWNSHIP CON 12 004	17 602926 4910401 W	2004/05 7230	1.97	FR 0005		NU	0005 12	5739117 (Z15071) A011694	BRWN FILL GRVL SILT 0003 BRWN SAND SILT CLAY 0005 GREY SAND SILT LOOS 0008 GREY CLAY SILT DNSE 0017
INNISFIL TOWNSHIP CON 12 005	17 603290 4910199 L	1987/07 4919	30 30	UK 0040	40/56//:1	DO		5722349 (05049)	BRWN LOAM HARD 0001 BRWN SAND PCKD 0062

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
INNISFIL TOWNSHIP CON 12 005	17 602964 4910823 W	1984/01 2514	6	FR 0055	44/56/10 /1:0	DO	0060 3	5719022 ()	BRWN CLAY SILT SAND 0042 GREN MSND 0063
INNISFIL TOWNSHIP CON 12 005	17 603064 4910773 W	1980/07 3660	5	FR 0170	147/175/ 5/2:0	DO	0186 4	5716815 ()	BRWN SAND GRVL 0030 GREY CLAY 0058 GREY SAND CLAY 0080 GREY CLAY 0105 BRWN SAND DRY 0170 BRWN SAND WBRG 0190
INNISFIL TOWNSHIP CON 12 005	17 603014 4910623 W	1979/11 3203	5	FR 0019	44/62/6/ 1:0	DO	0073 3	5716539 ()	PRDG 0049 GREY SAND 0076 GREY CLAY 0076
INNISFIL TOWNSHIP CON 12 005	17 603311 4910873 W	1978/12 3135	5	UK 0155	155/165/ 10/2:0	CO DO	0181 4	5715885 ()	BRWN LOAM 0001 BRWN SAND CLAY 0032 GREY CLAY 0040 BRWN SAND DRY 0155 BRWN SAND 0185
INNISFIL TOWNSHIP CON 12 004	17 602964 4910323 W	1977/02 3742	30	FR 0010	6/30/4/4: 0	DO		5715044 ()	LOAM 0001 BRWN CLAY LTCL 0005 GRVL 0010 BLUE CLAY LTCL 0036
INNISFIL TOWNSHIP CON 12 004	17 602914 4910173 W	1977/02 3413	30	FR 0044	15/35/3/:	DO		5715042 ()	LOAM 0001 BRWN CLAY LTCL 0010 BLUE CLAY LTCL 0044
INNISFIL TOWNSHIP CON 12 004	17 602914 4910273 W	1977/02 3413	30	FR 0043	10/35//:	DO		5715041 ()	LOAM 0001 BRWN CLAY LTCL 0010 BLUE CLAY LTCL 0043
INNISFIL TOWNSHIP CON 12 005	17 602914 4910773 W	1977/05 4608	30	FR 0015	10///:	DO		5714922 ()	CLAY STNS 0015 GREY CLAY 0025
INNISFIL TOWNSHIP CON 12 005	17 603414 4910793 W	1977/03 3660	5	FR 0153	140/145/ 6/1:0	DO	0161 3	5714107 ()	RED SAND 0015 GREY CLAY GRVL 0040 BRWN FSND CLAY 0050 BLUE CLAY 0092 BRWN SAND CLAY 0153 GREY MSND 0158 BRWN MSND 0164
INNISFIL TOWNSHIP CON 12 005	17 603114 4910823 W	1975/01 2804	30	FR 0023		DO		5712158 ()	BLCK LOAM 0001 BRWN CLAY STNS 0030 GREY CSND DRY 0035
INNISFIL TOWNSHIP CON 12 004	17 603002 4910372 W	1974/06 4608		FR 0008	8///:	DO		5711269 ()	BRWN GRVL 0002 BRWN CLAY 0012 BRWN GRVL 0015
INNISFIL TOWNSHIP CON 12 004	17 602982 4910306 W	1974/06 4608	30	FR 0010	10///:	DO		5711113 ()	BRWN SAND 0004 BRWN CLAY 0007 BRWN CLAY 0025
INNISFIL TOWNSHIP CON 12 004	17 602984 4910330 W	1974/06 4608	30	FR 0008	8///:	DO		5711112 ()	BRWN SAND 0002 BRWN CLAY 0012 BRWN CLAY 0018
INNISFIL TOWNSHIP CON 13 005	17 603214 4910983 W	1969/08 4608	30	FR 0042 FR 0052	42/48//1: 0	DO		5706557 ()	BRWN CLAY STNS 0015 GREY CLAY 0035 GREY MSND 0052
INNISFIL TOWNSHIP CON 12 005	17 603204 4910894 W	1964/10 2514	6	FR 0077	48/70/10 /2:0	ST DO	0077 3	5701445 ()	LOAM 0001 FILL 0005 BRWN CLAY BLDR 0015 BLUE CLAY BLDR 0040 MSND 0080
INNISFIL TOWNSHIP CON 12 005	17 603121 4910825 W	1962/09 3715	30	FR 0025	15/20/2/ 24:0	CO		5701444 ()	LOAM 0002 BRWN CLAY 0025
INNISFIL TOWNSHIP CON 12 005	17 602981 4910747 W	1962/05 3715	30	FR 0015	15//3/24: 0	DO		5701443 ()	CLAY 0023 GRVL 0030

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
INNISFIL TOWNSHIP CON 12 005	17 603460 4910703 W	1960/11 3512	5					5701442 () A	FSND 0100 BLUE CLAY 0150 FSND 0250 BLUE CLAY 0350 FSND 0430 BLUE CLAY 0450 FSND 0477
INNISFIL TOWNSHIP CON 12 005	17 603455 4910715 W	1960/10 3512	4					5701441 () A	FSND 0100 BLUE CLAY 0120
INNISFIL TOWNSHIP CON 12 004	17 602851 4910772 W	1966/10 4608	30	FR 0012	12//2/:	DO		5701439 ()	BRWN CLAY STNS 0030
INNISFIL TOWNSHIP CON 12 004	17 602931 4910808 W	1966/09 4608	30	FR 0012	12//2/:	DO		5701438 ()	BRWN CLAY STNS 0028
INNISFIL TOWNSHIP CON 12 004	17 602881 4910435 W	1965/03 2514	6	FR 0155	155/165/ 8/2:0	CO	0188 3	5701436 ()	LOAM 0001 YLLW CLAY 0015 BLUE CLAY 0021 SILT 0024 GREY CLAY 0048 SILT CLAY 0066 FSND 0072 SILT CLAY 0092 MSND GRVL 0155 MSND 0191
INNISFIL TOWNSHIP CON 12 005	17 603017 4910745 W	1965/02 2514	6 5	FR 0059	47/55/4/ 2:0	DO	0053 3	5701435 ()	PRDG 0049 MSND 0059 BLUE CLAY MSND 0065 BLUE CLAY 0066
INNISFIL TOWNSHIP CON 12 004	17 602744 4910388 W	1961/03 1308	30	FR 0045	45//13/8: 0	DO		5701434 ()	BRWN CLAY MSND 0005 GRVL 0011 CLAY MSND 0030 BRWN MSND 0065
INNISFIL TOWNSHIP CON 12 004	17 602643 4910372 W	1951/10 5510	4	FR 0052	42/43/4/ 1:0	ST DO	0052 10	5701433 ()	LOAM MSND 0002 CLAY STNS 0022 MSND 0062

APPENDIX B

Statement of Limitations

STATEMENT OF LIMITATIONS

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The report is based solely on the scope of services which are specifically referred to in this report. No physical or intrusive testing has been performed, except as specifically referenced in this report. This report is not a certification of compliance with past or present regulations, codes, guidelines and policies.

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STATEMENT OF LIMITATIONS

The findings and comments made by PML in this report are based on the conditions observed at the time of PML's site reconnaissance. No assurances can be made and no assurances are given with respect to any potential changes in site conditions following the time of completion of PML's field work. Furthermore, regulations, codes and guidelines may change at any time subsequent to the date of this report and these changes may affect the validity of the findings and recommendations given in this report.

The results and conclusions with respect to site conditions are therefore in no way intended to be taken as a guarantee or representation, expressed or implied, that the Site is free from any contaminants from past or current land use activities or that the conditions in all areas of the Site and beneath or within structures are the same as those areas specifically sampled.

Any investigation, examination, measurements or sampling explorations at a particular location may not be representative of conditions between sampled locations. Soil, ground water, surface water, or building material conditions between and beyond the sampled locations may differ from those encountered at the sampling locations and conditions may become apparent during construction which could not be detected or anticipated at the time of the intrusive sampling investigation.

Budget estimates contained in this report are to be viewed as an engineering estimate of probable costs and provided solely for the purposes of assisting the client in its budgeting process. It is understood and agreed that PML will not in any way be held liable as a result of any budget figures provided by it.

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