Geotechnical Investigation Report Update

Proposed Residential and Commercial Development, Main Street / Fockler Lane / Hwy 48, Whitchurch-Stouffville, Ontario

City Park Homes (Stouffville) Inc.

25 June 2026

→ **The Power of Commitment**

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1. Introduction

GHD Limited (GHD) has prepared this updated geotechnical investigation report in support of a proposed residential and commercial development located at 5262, 5270, 5286, and 5318 Main Street and 12371 Highway 48 in Whitchurch-Stouffville, Ontario (collectively referred to as "the Site"). This report updates and builds upon previous geotechnical investigations completed by GHD in 2016[1] and 2019[2] for the Site. Geographically, the Site is located on Parts 2, 3, 4, and 5 of Lot 1, Concession 8. The Site encompasses an area of approximately 7.14 hectares ("ha") (~17.64 acres). The location of the Site is provided on the **Site Location Plan, Figure 1**.

Since completion of the previous assessments, the development concept for the Site has been revised. Based on an updated concept plan, dated November 12, 2025, the proposed development consists of two- and three-storey townhomes, a commercial development area, a stormwater management block, and associated road infrastructure. The development will be municipally serviced for water and sanitary sewer. The development would replace existing residential buildings that front onto Main Street and a commercial structure on Fockler Lane. The remainder of the lands are undeveloped with a tributary of Little Rouge River flowing through the Site. The updated concept plan is illustrated on **Figure 2**.

GHD was retained to update the geotechnical investigation report by applying the previously obtained subsurface soil and groundwater information to the current concept plan.

This report presents the results of the updated geotechnical investigation and provides revised interpretations of groundwater conditions and considerations for the proposed development. The findings and conclusions presented herein reflect both the previous investigation results and the current investigation.

1.1 Limitations

This addendum has been prepared by GHD for City Park Homes (Stouffville) Inc. and may only be used and relied on by City Park Homes (Stouffville) Inc. for the purpose agreed between GHD and City Park Homes (Stouffville) Inc. as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than City Park Homes (Stouffville) Inc. arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD and described throughout this report. GHD disclaims liability arising from any of the assumptions being incorrect.

[1] Geotechnical Investigation Report, Proposed Residential and Commercial Development, Parts 2, 3, 4 and 5, Lot 1, Concession 8, Whitchurch-Stouffville, Ontario. Report prepared for 2440332 Ontario Inc. Reference G030337E1, dated July 15, 2016.
[2] Updated Geotechnical Investigation Report. Residential Development – 5262 – 5318 Main Street, Parts 2, 3, 4 and 5, Lot 1, Concession 8, Whitchurch-Stouffville, Ontario. Report prepared for 2440332 Ontario Inc. Dated June 26, 2019.

2. GHD's Scope of Work

GHD's scope of work involved the following tasks:

– Pre-planning activities:
  - Review of the 2016 and 2019 Geotechnical Investigation Reports.
  - Preparation of a Site-specific Job Safety and Environmental Analysis (JSEA).
  - Completion of underground utility locate clearances (completed by Client).
– Field Activities:
  - Advancement of six (6) test pits identified as TP1-26 to TP6-26 shown on **Figure 2** across the Site. The test pits were advanced to depths ranging between approximately 3.1 meters below ground surface (mbgs) to 4.3 mbgs.
  - Collected water level measurements from the existing monitoring wells.
– Completion of geotechnical laboratory testing on selected soil samples.
– Preparation of this updated geotechnical investigation report (factual data, analysis and recommendations).

3. Methodology

3.1 Review of Previous Geotechnical Reports

The geotechnical investigation reports from 2016 and 2019 were reviewed to support the placement of the additional test pits and to understand the existing subsurface soil and groundwater conditions at the Site. Advancement of the additional test pits were requested to confirm the presence of topsoil in the area of deposited fill material. The findings and conclusions presented herein reflect both the previous investigations and the current investigation.

3.2 Health and Safety

Upon project initiation, a Site-specific Job Safety and Environmental Analysis (JSEA) was prepared for implementation during the field investigation program. The JSEA presents the visually observed Site conditions to identify potential physical hazards to field personnel. Required personal protective equipment was also listed in the JSEA. It is mandatory for all GHD personnel involved in the field program, to read the JSEA and have a copy of the JSEA available at the Site during the investigative work. Health and Safety requirements in the JSEA were implemented during the field investigation program.

3.3 Utility Clearance

Prior to initiating the subsurface investigation activities, applicable utility companies (gas, hydro, network cables, water, wastewater, etc.) were contacted by the Client, to demarcate the location of their respective underground utilities to ensure that service lines would not be damaged during the investigative works.

3.4 Test Pit Advancement

The scope of work consisted of advancing six (6) test pits to depths ranging from 3.1 to 4.3 mbgs on May 14, 2026, by an excavation contractor retained directly by the Client. The locations are shown on **Figure 2**. The test pit records are presented in **Appendix A.** Groundwater observations were made within the test pits as the excavations were advanced.

UTM coordinates for each test pit location were estimated using Google Earth[3]. The following table presents a summary of investigated depths and UTM coordinates for the test hole locations:

Table 1 Summary of Test Pits

Tet Pit ID	Location – UTM Coordinates System*		Test Pit Termination Depth (mbgs)
	Northing	Easting	
TP1-26	4869742	638095	3.5
TP2-26	4869631	638090	3.4
TP3-26	4869547	638096	3.2
TP4-26	4869461	638061	4.3
TP5-26	4869644	638024	3.1
TP26-6	4869605	638026	3.4
* Coordinates estimated			

3.5 Physical Laboratory Testing

Geotechnical laboratory testing was completed in accordance with the latest editions of the ASTM standards and consisted of moisture content tests on recovered soil samples as well as grain size distribution analysis (sieve and hydrometer testing) on two (2) select soil samples and Atterberg limits testing on one (1) of these samples.

The results of the moisture content and gran size distribution analysis are recorded at their corresponding depths on the individual test put records provided in **Appendix A**. The associated laboratory test results are provided in **Appendix B**. The soil testing program and soil classification conformed to the latest edition of the following standards:

ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass Scope

ASTM D6913 Standard Test Method for Particle Size Distribution (Gradation) of Soils using Sieve Analysis

MTO LS-702 Standard Test Method for Particle Size Analysis of Soils (Hydrometer Analysis)

ASTM D2487 Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils

ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System-USCS)

4. Site Location and Project Description

The Site is located within the Town of Whitchurch-Stouffville at the municipal address of 5262 – 5318 Main Street. The Site fronts onto Highway 48, Fockler Lane and Main Street and was previously used for residential and commercial purposes. The Site is generally undeveloped and consists of grassed / treed lands. Several small structures exist at the Site and consist of a one-storey storage building with fenced parking area near Fockler Lane; three (3) residential dwellings along Main Street with two (2) detached garages; and two (2) residential dwellings along Highway 48 with one (1) detached garage. The tributary of Little Rouge River flows from north to south through the Site. Larger trees and vegetation line the creek. A seasonal drainage swale was observed on the western edge of the vacant field area.

[3] Google Earth, Obtained on June 1, 2026.

It is understood that the proposed development consists of two- and three-storey townhomes, a commercial development area, a stormwater management block, and associated road infrastructure. The development will be municipally serviced for water and sanitary sewer.

4.1 Regional Geology

The Site is located on the border of the physiographic regions known as the Oak Ridges Moraine and the South Slope[4]. The South Slope, which is located between the Oak Ridges Moraine and Lake Ontario, contains a variety of different soils. This area of the South Slope contains clayey tills with moderate slopes of limited relief. Bedrock consists of predominantly black and grey shales. The Oak Ridges Moraine, just north of the Site, is generally hilly with a knob and-basin relief typical of an end moraine. Overburden consists of a calcareous sandy till, with some gravel deposits.

Geological Survey information indicates that the surficial geology for the area is glaciolacustrine derived silty to clayey till and quaternary geology for the area is Halton Till, predominately silt to silty clay matrix (high in matrix carbonate content and clast poor). Bedrock in the area is expected to be comprised of limestone.

4.2 Subsurface Conditions

The following subsections present the subsurface soil and groundwater conditions as encountered during the 2016 and 2019 borehole investigation and the current test pit investigation. The detailed subsurface conditions in the test holes are presented on the previous borehole records in **Appendix C** and test pit records provided in **Appendix A**. The results of in-situ field tests (i.e., SPT "N" values), as presented on the borehole records and summarized in this report, are uncorrected.

The stratigraphic boundaries shown on the borehole records are inferred from non-continuous sampling, observations of drilling process and the results of the SPTs. These boundaries, therefore, represent transitions between soil types rather than exact planes of geological change. Furthermore, subsurface conditions will vary between and beyond the test hole locations.

In summary, the surface conditions encountered at the test hole locations generally consist of surficial topsoil over non-cohesive fill material extending to depths of approximately 1.8 to 3.5 mbgs. A layer of buried topsoil was also encountered beneath the fill material in several borehole locations. The fill and organic layers were underlain by sandy silt to sandy silty clay till, which extended to the termination depths of the test holes.

Detailed descriptions of subsurface conditions are provided in the following sections of this report. The subsurface conditions are described in accordance with the Unified Soil Classification System and the Canadian Foundation Engineering Manual, (CFEM 2023).

4.2.1 Previous Boreholes

The subsurface stratigraphy was investigated between December 2 to 4, 2014 by drilling fourteen (14) boreholes using Strong Soil Search. The boreholes were drilled to depths extending to approximately 3.5 to 15.7 mbgs.

Further investigation was completed between April 22 to 24, 2019 by drilling an additional five (5) boreholes. Drilling activities were completed by Landshark Drilling using a track mounted drill rig. Boreholes were advanced to depths ranging from approximately 6.7 m to 15.8 m. These boreholes targeted potential building areas. Borehole BH-18 was located within the proposed stormwater management block. The locations of the historical boreholes are illustrated on the **Test Hole Plan, Figure 2**. Details of the subsurface conditions encountered are presented on the borehole records in **Appendix C**.

A layer of surficial topsoil was encountered in boreholes BH-01 to BH-12 and MW-15 to MW-18. A buried topsoil layer was also encountered immediately below the fill layer in boreholes BH-01 to BH-04, BH-06 to BH-08, BH-11, BH-12

[4] Chapman and Putnam, 1984. The Physiography of Southern Ontario, 3rd Edition. Ministry of Natural Resources.

and MW-18. Surficial topsoil layers ranged in thickness from 25 to 600 mm and the buried topsoil ranged in thickness from 100 to 600 mm. The topsoil was observed to be in a damp, loose state with a silty, highly organic content. As such, it is expected to be devoid of any structural engineering properties.

A layer of fill was observed at the surface in boreholes BH-13, BH-14 and MW-19 and immediately beneath the topsoil layer in the remaining boreholes with the exception of borehole BH-09, where fill was not observed. The fill generally consisted of sand / silty sand with varying amounts of gravel and silt, was light brown to grey in colour, and was found to extend to depths ranging between 1.8 and 3.5 mbgs. Samples of the fill material were visually described to be in a generally moist to wet condition. Typically, the fill was wet at the interface of fill and underlying till layer. SPT N values obtained from within the fill material ranged from 0 to 53 blows / 300 mm, with several spoons encountering refusal on boulders, indicating a very loose to very dense state of compactness.

The till layer was encountered in all of the boreholes. The till was first encountered at depths ranging from 0.6 to 3.8 mbgs and extended to the full depth of the investigation. The till generally appeared light brown to grey in colour and typically consisted of silty sand or sandy silt with varying amounts of clay and gravel and contained occasional cobbles and boulders. Samples of the till material were visually described to be in a moist to wet condition. Based upon observations of seepage and groundwater within the till, there are inferred to be sand and silt seams / layers within the till layer. SPT N values obtained from within the till material ranged from 5 to 92 blows / 300 mm, with several spoons encountering refusal, indicating a loose to very dense state of compactness.

Representative samples of the soils encountered were submitted to the soils laboratory for analyses and characterization. Grain size distribution tests were conducted on the following samples.

Table 2 Grain Size Distribution Summary – Boreholes

Borehole / Sample ID	Depth (m)	Grain Size Distribution			Observed Soil Unit
		%Gravel	%Sand	%Fines	
BH-02 / SS5	3.1 – 3.5	20	42	38	Gravelly Silty Sand Till
BH-06 / SS5	3.1 – 3.5	8	33	59	Clayey Sand Stil Till
BH-06 / SS8	7.6 – 8.1	0	6	94	Silt layer (within the till)
BH-07 / SS1	0 – 0.6	8	47	45	Silty Sand Fill
BH-10 / SS13	15.2 – 15.7	2	39	59	Sandy Silt Till
BH-11 / SS3	1.5 – 2.0	4	43	53	Sandy Silt Fill
BH-13 / SS10	12.2 – 12.7	9	41	50	Silty Sand Till
MW-16 / SS3	2.3 – 2.9	8	31	61	Clayey Sandy Silt Till
MW-16 / SS6	4.6 – 5.2	13	23	64	Clayey Sandy Silt Till
MW-16 / SS8	7.6 – 8.2	4	27	69	Sandy Silt Till
MW-16 / SS12	13.7 – 14.3	7	17	76	Silt layer (within the till)
MW-18 / SS5	3.1 – 3.7	6	29	65	Clayey Sandy Silt Till

Notes: %Fines indicates silt and clay sized particles.

4.2.2 Test Pits

Test pits were advanced to supplement the boreholes and assess shallow subsurface conditions, including the presence of groundwater seepage. The investigation was also completed to confirm conditions observed during previous drilling and to verify the presence of buried topsoil beneath the fill material. A total of six (6) test pits were excavated on May 14, 2026, in the locations shown on **Figure 2**.

The soils encountered during the test pit program were consistent with the soil conditions previously encountered, as documented in Section 4.2.1. The investigation encountered a surficial topsoil layer ranging from approximately 200 to 280 mm in thickness, underlain by fill materials generally consisting of sandy silt / silty sand / silty clay (reworked native) with varying amounts of gravel and clay, and was visually described as moist.

Buried organic (topsoil) layers were encountered within the fill in test pits TP1-26, TP2-26, TP3-26 and TP5-26. These layers ranged in thickness from approximately 150 to 460 mm and were typically observed at depths between approximately 1.8 m and 2.3 m below ground surface. In isolated locations, construction debris including brick fragments, concrete debris, and a tarp were also observed within the fill (e.g., TP3-26 and TP6-26).

The fill materials were underlain by native sandy silty clay till with trace gravel, visually described as moist to wet. Groundwater seepage was observed in all test pits, occurring at depths ranging from approximately 1.2 m to 3.1 mbgs. More localized shallow seepage, on the order of approximately 0.9 m to 1.2 mbgs, was encountered in the western portion of the Site near the originally proposed TP5-26 location. These conditions resulted in saturated and unstable excavation conditions, and the test pit was subsequently relocated to allow completion of the investigation.

A summary of the grain size analyses (hydrometers) conducted on two (2) representative samples from the test pits is presented in the following table:

Table 3 Grain Size Distribution Summary – Test Pits

Test Pit / Sample ID	Depth (m)	Grain Size Distribution				Observed Soil Unit
		%Gravel	%Sand	%Silt	%Clay*	
TP1-26 / GS2	3.0 – 3.2	8	25	46	21	Sandy Silty Clay
TP4-26 / GS1	0.6 – 0.8	4	50	36	10	Silty Sand
* Clay-sized indicates soil particles <2 µm						

Additionally, Atterberg limits testing was completed on sample GS2 from TP1-26 which yielded a Liquid Limit of 20%, a Plastic Limit of 14%, and a Plasticity Index of 6, with a natural water content of 14.6%.

4.2.3 Groundwater Data

Groundwater information and data is also available in the Hydrogeological Update report prepared by GHD.

4.2.3.1 Groundwater Levels

During the original drilling in 2014, five (5) of the open boreholes encountered groundwater seepage at depths ranging from about 0.6 m to 9.1 m. This seepage was generally observed to be the result of a perched zone at the fill and till interface or within the shallow till with deeper seepage noted at BH-07 (4.6 m) and BH-12 (9.1 m). The remaining nine (9) boreholes stayed dry throughout the drilling operations.

During the 2019 drilling program, groundwater seepage was encountered in each of the five (5) boreholes at or near the fill and till interface, with additional seepage observed at greater depths. The deeper groundwater seepage was observed at monitoring well MW-15 at 7.6 m; at MW-16 at 7.6 m and 12.5 m; at MW-17 at 9.1 m; at MW-18 at 3.4 m; and at MW-19 at 6.1 m. The groundwater seepage at MW-17 was recorded to be more intense than at the other locations.

During the 2026 test pit program, groundwater seepage was encountered at each test pit location between 1.2 to 3.1 m.

Monitoring wells were installed at ten (10) borehole locations in order to facilitate monitoring of groundwater levels. The monitoring wells were constructed with the screens positioned to intersect water where seepage generally occurred. The monitoring well details are provided on the borehole records and consisted of 1.5 m long screens with the sand pack extended above the screens. The well annulus of each monitoring well was sealed with hole plug to the

surface to prevent the downward migration of surface water. Monitoring well, borehole and test pit information is summarized in **Table 4** and on the individual borehole records.

Table 4 Summary of Test Hole Information

Location	Depth of Borehole (m)	Pipe Stick Up (m)	Effective Well Screen Interval (m)	Water Seepage Depth (mbgs)
BH-01	4.3	0.89	2.3 – 4.3	~ 2.0, 2.3 and 2.7
BH-02	4.3	0.86	2.0 – 3.8	~2.3 and 2.7
BH-07	6.6	1.12	2.4 – 6.1	~ 2.3 and 4.6
BH-09	3.5	1.08	1.2 – 3.1	~ 0.6, 2.3 and 3.2
BH-12	9.6	0.86	2.4 – 4.6	~ 1.75, 3.1 and 9.1
MW-15	9.8	0.78	4.6 – 8.7	~2.3 and 7.6
MW-16	15.8	0.79	7.6 – 15.2	~ 1.8. 7.6 and 12.5
MW-17	15.8	0.91	7.6 – 15.2	~ 2.3 and 9.1
MW-18	6.7	1.00	3.0 – 6.7	~ 2.3 and 3.4
MW-19	9.8	1.07	5.5 – 9.1	~ 1.2, 3.0 and 6.1
TP1-26	3.5	-	-	~3.1
TP2-26	3.4	-	-	~3.1
TP3-26	3.2	-	-	~3.1
TP4-26	4.3	-	-	~2.3
TP5-26	3.1	-	-	~1.8
TP6-26	3.4	-	-	~1.2

Notes: m = metres; mbgs = metres below ground surface
Effective well screen includes 10-slot screen and sand pack.
Water seepage depth is the estimated depth(s) where water or wet soils were encountered during the drilling activities.

Groundwater levels have been measured periodically at the Site between December 9, 2014, and May 21, 2026. Monitoring wells MW-15 through MW-19 were installed between April 22 and April 24, 2019; therefore, groundwater level data for these wells are not available prior to this period. MW-19 was inaccessible during the May 21, 2026, monitoring event, and a water level measurement was not obtained for this well on that date. A summary of representative groundwater level measurements from March 20, 2019, to May 21, 2026, is provided in **Table 5**. Groundwater level data collected prior to 2019 are presented in previous versions of the hydrogeological assessment reports.

Table 5 Groundwater Levels and Elevations

Location	Ground Elevation (m)*	Water Levels									
		March 20, 2019		April 24, 2019		June 12, 2019		Sept 19, 2019		May 21, 2026	
		WL (mbgs)	Elev (m)	WL (mbgs)	Elev (m)	WL (mbgs)	Elev (m)	WL (mbgs)	Elev (m)	WL (mbgs)	Elev (m)
BH-01	256.5	1.75	254.8	--	--	1.13	255.4	1.85	254.7	1.45	255.1
BH-02	257.3	1.82	255.5	--	--	1.33	256.0	2.18	255.1	1.50	255.8
BH-07	257.2	2.31	254.9	--	--	1.67	255.5	2.72	254.5	1.98	255.2
BH-09	255.5	0.43	255.1	--	--	0.28	255.2	2.60	252.9	0.81	254.7

Location	Ground Elevation (m)*	Water Levels									
		March 20, 2019		April 24, 2019		June 12, 2019		Sept 19, 2019		May 21, 2026	
		WL (mbgs)	Elev (m)	WL (mbgs)	Elev (m)	WL (mbgs)	Elev (m)	WL (mbgs)	Elev (m)	WL (mbgs)	Elev (m)
BH-12	258.1	1.93	256.2	--	--	0.64	257.5	2.60	255.5	1.32	256.8
MW-15	259.7	--	--	1.52	258.2	1.29	258.4	--	--	1.84	257.9
MW-16	259.1	--	--	0.45	258.7	0.80	258.3	1.27	257.8	0.81	258.3
MW-17	257.9	--	--	1.75	256.2	0.51	257.4	1.05	256.9	0.75	257.2
MW-18	257.3	--	--	1.39	255.9	1.57	255.7	2.69	254.6	1.99	255.3
MW-19	256.6	--	--	2.66	253.9	0.62	256.0	--	--	--	--

Notes:

mbgs = metres below ground surface; WL denotes “water level”; Elev means “groundwater elevation”; ‘--‘ = water level not obtained

*Elevations interpolated from contours on previous concept plan. The elevations provided are for the purposes of evaluating groundwater elevation and flow direction and should not be relied upon as a legal survey or topographic elevation survey.

It should be noted that shallow groundwater levels are transient and tend to fluctuate seasonally and during periods of precipitation. Continuous monitoring of water levels is currently being conducted using data loggers at monitoring wells on site. The data from these loggers will be provided in an addendum at a later date.

5. Discussion and Recommendations

Supporting data upon which our conclusions and recommendations are based have been presented in the foregoing sections of this report. The following conclusions and recommendations are governed by the physical properties of the subsurface materials that were encountered at the Site and assume that they are representative of the overall Site conditions. It should be noted that these conclusions and recommendations are intended for use by the designers only. Contractors bidding on or undertaking any work at the Site should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of this factual data as it affects their proposed construction techniques, equipment capabilities, costs, sequencing, and the like. Comments, techniques, or recommendations pertaining to construction should not be construed as instructions to the contractor.

The test holes generally encountered a surficial layer of topsoil into a layer of fill material, underlain by till. The till was generally loose to very dense and consisted of sandy silt / silty sand / clayey silt/ sandy silty clay with varying amounts of clay, gravel and cobbles. Occasionally there were layers of native sand or sandy silt below the fill material. Buried topsoil was also encountered. Bedrock was not encountered during the subsurface investigation. Groundwater seepage was observed in all of the test holes during drilling and excavation operations at depths ranging from approximately 1.6 to 7.6 mbgs. The boreholes yielded potentiometric water levels ranging from 0.5 to 2.7 m below grade at the various water level measurement events.

Details regarding our conclusions and recommendations are outlined in the following sections.

5.1 Site Preparation, Excavation and Backfill

It is recommended that any and all topsoil, fill, vegetation, disturbed earth, organic and organic-bearing material be stripped and removed from the proposed SWP, building footprint areas, and proposed pavement areas prior to commencing earthwork construction. The subexcavated foundation, floor slab, SWM pond, and pavement subgrade surfaces must be proof rolled and/or approved by a member of GHD prior to placement of fill or foundations.

The Occupational Health and Safety Act (OHSA) regulations require that if workers must enter an excavation deeper than 1.2 m, the excavation must be suitably sloped and / or braced in accordance with the OHSA requirements. OHSA specifies maximum slope of the excavations for four (4) broad soil types as summarized in the following table:

Table 6 Soil Types and Maximum Slope Inclination

Soil Type	Base of Slope	Maximum Slope Inclination
1	Within 1.2 metres of bottom	1 horizontal to 1 vertical
2	Within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
3	From bottom of excavation	1 horizontal to 1 vertical
4	From bottom of excavation	3 horizontal to 1 vertical

Excavation and the support of the excavation walls should be carried out in accordance with the current OHSA requirements. For the localized excavations of soil, the fill deposits at the Site can be classified as Type 3 soils. The native soils at the Site above the groundwater table can be classified as Type 2 soils, and Type 4 soils below the groundwater table. The highest number soil type identified in an excavation must govern the excavation slopes from top to bottom of the excavation.

If the above recommended excavation side slopes cannot be maintained due to lack of space or any other reason, the excavation side slopes must be supported by an engineered shoring system. The shoring system should be designed in accordance with CFEM 2023 and the current OHSA Regulations for Construction Projects. Where vertical cuts are supported with braced sheeting, the anticipated earth pressure distribution on the trench support system can be taken as per of **Section 5.5**. The design of all members of the earth support system must include the effects of loads of construction equipment, soil stockpiles, traffic loadings, etc. and where applicable, water pressure.

Surface water should be directed away from open excavations, and spoil piles should be kept a minimum of 1.0 m away from the top of any excavation to prevent excess loading on excavation sidewalls.

It is expected that the existing fill materials as well as some of the till may be suitable for reuse as trench and/or road subgrade backfill provided they are workable and at a moisture content that will permit adequate compaction. In general, based on past experience with these types of soils and similar projects, it appears that these soils may be reused as backfill, conditional on a final review and any approval to do so being conducted and obtained during construction. Note that the moisture content of some native soils will be higher than optimal for compaction purposes and therefore would require processing (such as aeration) to lower the moisture content to appropriate levels for the minimum required compaction. Further, some native soils are naturally more susceptible and sensitive to climatic conditions including frost and rain – this should be taken into account when considering the season in which the construction earthworks will occur.

Backfill to foundation walls, both on the exterior and interior, and grade raises below the floor slab, and any other areas requiring engineered fill, should be accomplished using well-graded Granular “B” Type I material complying with OPSS 1010.

5.2 Temporary Groundwater Control

The amount of groundwater seepage into excavations will depend on the season and depth of excavation relative to the groundwater level at the time of construction. Based on the groundwater level measurements and the anticipated depth of excavations for the building foundations, groundwater seepage into open excavations is expected. It is imperative that water be pumped from the excavation in order to prevent the founding materials from softening. For construction purposes, it is recommended that the groundwater be controlled to a minimum of 1m below the base of any excavation. Temporary pumping from sump pumps should be sufficient to control groundwater seepage for excavations within the native overburden or at the fill / till interface, however, should zones producing more significant groundwater infiltration be encountered, the use of cut-off trenches, ejectors or other forms of groundwater control may be required.

Based on gradation analysis of the Site soils and hydraulic response testing conducted as part of the hydrogeological assessment report prepared by GHD for this Site, the K values of the native soils is expected to range from 10^{-3} to 10^{-6} cm/sec.

If short-term pumping of groundwater at volumes greater than 50,000 L/day is required during the construction stage, a permit must be obtained from the Environmental Activity and Sector Registry (EASR). The actual rate of groundwater taking performed during construction will be a function of the final design, time of year, and the contractor's schedule, equipment, and techniques and is expected to be encountered on a seasonal basis.

It is not the purpose of this report to assess the planned water taking related to any required dewatering work. Once the detailed design drawings have been prepared, a water taking assessment can be completed to determine the requirements of dewatering and recommendations for a permit to be obtained through the EASR process, should it be needed. At the construction stage of the development, any monitoring wells at the Site are to be decommissioned in accordance with O. Reg. 903 by a licensed and experienced contractor.

5.3 Depth of Frost Penetration

A minimum frost depth of 1.2 m below the lowest final adjacent surrounding grade should be considered, as per Ontario Provincial Standard Drawing (OPSD) 3090.101 (*Foundation, Frost Penetration Depths for Southern Ontario*).

A permanent soil cover of at least 1.2 m or an appropriate thermal synthetic insulation system is required for frost protection of foundations (foundations in heated or unheated areas). During winter construction, exposed surfaces to support foundations must be protected against freezing by means of loose straw and tarpaulins.

5.4 Seismic Site Classification

The latest Ontario Building Code (OBC) requires the assignment of a Seismic Site Class for calculations of earthquake design forces and the structural design based on a two (2) percent probability of exceedance in 50 years. According to the latest OBC (2024), the Seismic Site Class is a function of soil profile and is based on the average properties of the subsoil strata to a depth of 30 m below the ground surface. The OBC provides the following three (3) methods to obtain the average properties for the top 30 m of the subsoil strata:

– Average shear wave velocity.
– Average Standard Penetration Test (SPT) values (uncorrected for overburden).
– Average undrained shear strength.

For design purposes, based on the criteria listed in Table 4.1.8.4.A. of the OBC, the results obtained from standard penetration resistance of the underlying subsurface conditions, a Seismic Site Class 'D' can be used for the design of the proposed building renovations.

The values of seismic hazard parameters shown in **Table 7** were derived from the 2020 National Building Code of Canada Seismic Hazard Tool, sourced from the Earthquakes Canada website (**Appendix E**).

Table 7 ***Peak Ground Acceleration (PGA), Peak Ground Speed (PGV), and Design Spectral Acceleration (S) Values***

Seismic Hazard Values	10% Exceedance in 50 years (475-year return period) Site Class D	5% Exceedance in 50 years (975-year return period) Site Class D	2% Exceedance in 50 years (2,475-year return period) Site Class D
PGA (g)	0.072	0.115	0.187
PGV (m/s)	0.0664	0.109	0.189
S (0.2) (g)	0.123	0.194	0.313
S (0.5) (g)	0.118	0.183	0.295
S (1.0) (g)	0.066	0.105	0.176
S (2.0) (g)	0.0293	0.0485	0.0837
S (5.0) (g)	0.00673	0.0119	0.0221
S (10.0) (g)	0.00213	0.00377	0.00692

5.5 Lateral Earth Pressure

Structures subject to unbalanced earth pressures such as shoring systems, retaining walls, foundation walls and other similar structures must be designed to resist a pressure that can be calculated based on the following equation:

$P = K [\gamma(h-h_w) + \gamma ' h_w + q] + \gamma_w.h_w$

where:

P = the horizontal pressure at depth, h (m)

K = the earth pressure coefficient,

γ = the bulk unit weight of soil, (kN/m^3)

γ ' = the submerged unit weight of soil, (kN/m^3)

γ_w = the unit weight of water, (kN/m^3)

h_w = the depth below the groundwater level (m)

q = the surcharge loading (kPa)

Where elevated groundwater level is not anticipated to be present or a perimeter drainage system is used to eliminate hydrostatic pressures on the soil retaining structure, the above noted expression will be simplified as follows:

$P = K(\gamma h + q)$

Based on the subsurface conditions encountered at the Site, the following design parameters may be used for the design of the soil retaining structures:

Table 8 ***Soil Parameters and Earth Pressure Coefficients***

Soil	Φ	γ (kN/m^3)	K_a	K_o	K_p
Imported Granular Fill (Granular A or B Type II)	34	21	0.28	0.44	3.54
Existing Fill	28	18	0.36	0.53	2.77
Loose to Compact Native Till	30	19	0.33	0.50	3.00
Dense to Very Dense Native Till	34	20	0.28	0.44	3.54

Surcharge and hydrostatic pressures should be considered as appropriate. The above earth pressure coefficients apply to horizontal surfaces behind the walls / supports only.

It is noted that large deformation will be required prior to the full mobilization of passive earth pressure and mobilization of full active or passive resistance requires a measurable and significant wall movement or rotation. Therefore, unless the structural element can tolerate these deflections, the at-rest earth pressure should be used in design. Where movement sensitive services exist close to the shoring, the lateral pressure should also be computed using the coefficient of earth pressure at rest, K_0.

Free draining material should be placed behind the foundation wall and a minimum compaction surcharge of 12 kPa should be included in the lateral earth pressures for the structural design of the walls. Care must be taken during the compaction operation not to overstress the wall. Heavy construction equipment should be maintained at a distance of at least 1 m away from the walls while the backfill soils are being placed. Hand operated compaction equipment should be used to compact the backfill soils immediately behind the walls as per OPSS.MUNI 501 (Compacting).

The recommended value for the coefficient for sliding friction between the soil and the concrete is 0.4.

5.6 Underground Services

The soils encountered in the boreholes are suitable for the support of Site services. The bedding and sand cover materials for the pipes should be adequately compacted to provide support and protection. Provided the base area of the sewer pipes and watermains are free of all loose and deleterious materials, the pipe bedding should comply with a Class B bedding configuration as per the requirements of OPSD 802.030 (rigid pipe) and / or OPSD 802.010 (flexible pipe).

Where disturbance of the trench base has occurred, due to the presence of soft / loose soils, groundwater seepage and the like, the disturbed soils should be sub-excavated and replaced with suitably compacted granular fill. If the soil at pipe founding level is wet, clear stone may be used as bedding material but must be wrapped with a suitable filter fabric.

If fill material is found at the pipe inert level, the fill material should be visually inspected. Any wet, soft / loose, highly organic or otherwise unsuitable fills should be sub-excavated and replaced with bedding materials or clean fills compacted to minimum of 95% of its Standard Proctor Maximum Dry Density (SPMDD).

It is recommended that cover backfilling of the underground services be accomplished using Granular ‘A’, sand, or other suitable material as allowed by the OPSD standards, to a minimum of 300 mm above the pipe. Compaction of this material should attain 100% SPMDD. It is expected some of the excavated fill and native till soils may be suitable for reuse as trench backfill, conditional upon suitable moisture content (within 2% of optimum) and final review and approval by an experienced geotechnical engineer at the time of construction. Compaction of any native soil in service trenches is recommended to be a minimum of 98 % of its SPMDD. The soils observed may require processing (such as aeration) to lower their moisture content to appropriate levels prior to being considered as backfill material. It is recommended that the service bedding be inspected and approved by GHD prior to placing the bedding fill, to ensure its suitability and consistency with conditions encountered during this investigation. Bedding and backfill material and compaction should also be inspected and tested.

5.7 Foundation Design

Relevant information for final design purposes including proposed final grades, finished floor elevations, and proposed underside of foundations were not available to GHD at the time of writing this report. As such, the recommendations contained in this foundation section are considered preliminary and must be reviewed by GHD’s geotechnical engineers once such development parameters become available.

The Ontario Building Code (OBC 2024) requires buildings to be designed using Limit States Design considering Serviceability Limit States (SLS) and Ultimate Limit States (ULS).

The common practice for the SLS design of most structure and building foundations is to limit the total and differential foundation settlements to 25 mm and 19 mm, respectively. However, other serviceability criteria for the proposed

buildings may be determined by the structural engineer considering tolerable settlement that would not restrict the use or operation of the facility.

It is expected that structural loading for the proposed 2 to 3-storey residential buildings may be supported on spread and continuous strip footing placed on competent native soils. The competent native soils at the Site are expected to consist of compact to very dense till. Expected depths and elevations of at which such competent native soils were encountered at each borehole location is summarized in **Table 9:**

Table 9 Minimum Depth to Competent Native Soils

Borehole ID	Minimum Depth (meters below existing grade) to Compact Native Soils	Minimum Depth (meters below existing grade) to Dense Native Soils
BH-01	3.8	- (1)
BH-02	3.0	4.0
BH-03	2.4	4.6
BH-04	2.6	- (1)
BH-05	2.6	- (1)
BH-06	3.0	4.6
BH-07	3.5	4.6
BH-08	2.4	- (1)
BH-09	0.8	3.2
BH-10	2.6	3.2(2)
BH-11	3.2	- (1)
BH-12	2.4	3.0
BH-13	2.3	4.6
BH-14	1.8	2.5
MW-15	2.3	2.3(3)
MW-16	2.3	3.0(2)
MW-17	4.6	6.1
MW-18	4.6	4.6(4)
MW-19	1.8	4.6(4)

Notes:

(1) Soil exhibiting this state of compactness was not encountered within this borehole

(2) Compact soil observed at 4.6 meters below existing grade (below this layer of dense soil)

(3) Compact soil observed at 7.6 meters below existing grade (below this layer of dense soil)

(4) Compact soil observed at 6.1 meters below existing grade (below this layer of dense soil)

For design purposes, it is recommended that spread or strip footings constructed on the compact to very dense native soils or engineered fill be proportioned and designed using the following bearing capacities.

Table 10 Bearing Pressures for Footing Design

Parameter	Bearing Pressure				
	Undisturbed & Native Soil		Engineered Fill		
	Compact	Dense	Rock-based Fill (2)	Granular Fill (3)	Earth Borrow Fill (3)
Factored Bearing Capacity at ULS (1)	215 kPa	305 kPa	255 kPa	205 kPa	155 kPa
Bearing Capacity at SLS	120 kPa	170 kPa	150 kPa	120 kPa	90 kPa

Notes:

(1) Resistance factor ϕ=0.5 applied to the ULS bearing pressure for design purposes

(2) At least 1m of Rock-based fill. Quality of material is to be approved prior to use as engineered fill.

(3) At least 0.3m of Granular or Earth Borrow fill. Quality of material is to be approved prior to use as engineered fill.

Any engineered fill upon which foundations are placed must be a minimum thickness corresponding to the notes that accompany he above table. Rock-based fill must be completely encapsulated with suitable filter fabric to minimize any migration of fine-grained particles from surrounding soils into the voids within the rock fill.

Exterior footings placed on native soils must be provided with a minimum of 1.2 m of earth cover or equivalent insulation. During winter construction exposed surfaces to support foundations must be protected against freezing by means of loose straw and tarpaulins, heating, etc.

Under no circumstances should the foundations be placed above organic materials, loose, frozen subgrade, construction debris, or within ponded water. Prior to forming, all foundation excavations must be inspected and approved by an experienced geotechnical engineer. This will ensure that the foundation bearing material has been prepared properly at the foundation subgrade level and that the soils exposed are similar to those encountered during this investigation.

5.7.1 Engineered Fill Construction for Footings

Footings placed on engineered fill must be suitably reinforced; as a minimum, and where not already specified in the design drawings, this reinforcing should use 2 continuous runs of 15M rebar throughout the footings, and 2 runs of 15M rebar throughout near the top and bottom of the foundation walls. Following approval of the fill material to be used as backfill by a geotechnical professional, the fill is to be placed in accordance with the following recommended procedure:

1. Remove any and all existing vegetation, topsoil, fill, organics, and organic-bearing soils to the competent, undisturbed native soil from within the area of the proposed engineered fill.
2. The area of the engineered fill should extend horizontally 1 m beyond the outside edge of the building foundations and then extend downward at a 1:1 slope to the competent native soil.
3. The base of the engineered fill area must be approved by a member of GHD prior to placement of any fill, to ensure that all unsuitable materials have been removed, that the materials encountered are similar to those observed, and that the subgrade is suitable for the engineered fill.
4. Place approved engineered fill, in maximum 200 mm lifts, compacted to 100 percent of its SPMDD. Any fill material placed under wet conditions should consist of an approved, rock-based fill, with the inclusion of appropriate geotextile fabric around the rock-based fill should the rock fill contain enough voids to warrant. Rock-based fill material should be compacted by a plate tamper and visually inspected by a geotechnical engineer to confirm appropriate compaction.
5. Full time testing and inspection of the engineered fill will be required, to ensure compliance with material and compaction specifications.

The engineered fill should not be placed during winter months when freezing ambient temperatures occur persistently or intermittently.

5.8 Floor Slab Construction

The floor of the proposed buildings should be supported on engineered fill over native compact to very dense till. It is recommended that the existing unsuitable materials that may be present below the proposed floor slab for the proposed buildings be removed and that grades after sub-excavation be inspected and heavily proof rolled. Any area observed to be soft / loose should be subexcavated and replaced with engineered fill. A qualified geotechnical engineer should review the condition of the subgrade beneath the proposed slabs.

The floor slabs should be formed over a base course consisting of at least 150 mm of Granular "A" backfill as per OPSS compacted to a minimum of 100 percent of its SPMDD underneath the slab-on-grade building or 150 mm of 19 mm angular clear stone material compacted by a plate tamper as per OBC requirements. All grade increases or infilling below the granular "A" or clearstone should be constructed in accordance with the engineered fill steps provided in **Section 5.7.1** of this report.

To minimize localized cracking due to potential differential settlement and concrete shrinkage, all floor slabs should be adequately reinforced. The potential for cracking can be further reduced by using a liberal jointing pattern and structural separations at walls and columns.

Beneath basement slabs, it is recommended that under floor drains consisting of 100 mm diameter, perforated, filter-wrapped pipe at maximum 3m centres be installed below the Granular "A" or clearstone. These pipes should be led into a header placed in the middle of the drainage system. The header should consist of a 150 mm diameter, filter-wrapped, perforated pipe. The drainage system should appropriately drain into a positive sump or other permanent frost-free outlet.

5.9 Pavement Design

Based on the results of this investigation, GHD recommends the following procedures be implemented to prepare the proposed new roadways for its construction:

– Remove all topsoil, organics, organic-bearing materials and other deleterious materials from the planned pavement areas to a minimum depth to allow for the new pavement structure at which point an assessment of the exposed soils by a qualified geotechnical professional will deem whether further removal and / or placement of suitable geotextile material or other treatment is required.
– Inspect and proof roll the subgrade for the purpose of detecting possible zones of overly wet or soft subgrade. Any deleterious areas thus delineated should be replaced with approved granular material compacted to a minimum of 98 percent of its SPMDD.
– Contour the subgrade surface to prevent ponding of water during the construction and to promote rapid drainage of the sub-base and base course materials.
– To maximize drainage potential, and ensure satisfactory pavement performance, 150 mm diameter perforated pipe subdrains should be installed below any curb lines. The pipe should be encased in filter fabric and surrounded by clear stone aggregate or another suitable free-draining material. It is recommended that the subdrains outlet to the storm sewer system.
– Construct transitions between varying depths of granular base materials at a rate of 1:10 minimum.

It is expected that the proposed new roads will experience relatively low traffic volumes consisting of passenger vehicles and occasional service truck vehicles. The subgrade materials in the proposed roadway areas will consist of compacted native soils or engineered fill. The frost susceptibility of these soils is assessed as being generally moderate to severe. In this regard, the following minimum flexible pavement structures are recommended for the proposed development in accordance with Township of Whitchurch-Stouffville Desing Guidelines and Standard Drawings, dated January 2023.

Table 11 Flexible Pavement Structure for Local and Collector Roadways

Profile	Material	Minimum Thickness (mm)		In Conformance with OPSS Form
		Local Roadway	Collector Roadway	
Asphalt Surface	H.L.3	40	40	1150
Asphalt Base	H.L.8	50	100 (2 lifts)	
Granular Base	Granular “A”	150	150	1010
Granular Subbase	Granular “B” Type II	300	450	

The following steps are recommended for optimum construction of paved areas:

1. The Granular “A” and “B” courses should be compacted to a 100 percent of their respective SPMDDs.
2. All asphaltic concrete courses should be placed, spread and compacted conforming to OPSS 310 or equivalent. All asphaltic concrete should be compacted to a minimum 92.0 percent of their respective laboratory Maximum Relative Densities (MRD’s).
3. Adequate drainage should be provided to ensure satisfactory pavement performance.

It is recommended that all fill material be placed in uniform lifts not exceeding 200 mm in thickness before compaction. It is suggested that all granular material used as fill should have an in-situ moisture content within 2 percent of their optimum moisture content. All granular materials should be compacted to 100 percent SPMDD. Granular materials should consist of Granular “A” and “B” conforming to the requirements of OPSS 1010 or equivalent.

The performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved as much as practically possible. It is noted that the above recommended pavement structures are for the end use of the project. The most severe loading conditions on pavement areas and the subgrade may occur during construction. As such, during construction of the project, the recommended granular depths may not be sufficient to support loadings encountered. Consequently, special provisions such as restricted lanes, half-loads during paving, etc. may be required, especially if construction is carried out during unfavourable weather.

5.10 Stormwater Management Pond

It’s GHD’s understanding that one (1) SWM pond is proposed for this development and is to be located in the area of borehole MW-18. Details regarding the SWM pond including design depth and final grades, were not available at the time of writing this report. However, based on the anticipated depth of the SWM pond beneath existing grade, it is expected that the bottom of the pond will consist of clayey sandy silt till. The hydraulic conductivity of such soils is expected to be on the order of about 10^{-4} to 10^{-7} cm/sec. It is noted, however, that slight variations in the soil stratigraphy may cause variations in the permeability of the soil in both vertical and horizontal orientations. It is noted that based on the zoning map from the Town of Whitchurch-Stouffville, revised on December 2025 that the proposed SWM pond area is to be located in an area described as flood hazard.

In general, based on the information gathered during this investigation, excavation of the soils for the SWM pond is expected to be straightforward, provided that appropriate measures are taken during construction to minimize any overland or near-surficial flow of water into the area. Some groundwater and surficial water inflow into the open excavations may be expected, however this is expected to be controlled by pumping from within the excavation.

It is recommended that the SWM pond subgrade surface be proof rolled, and a representative of GHD approve the subgrade prior to construction of the berms. Construction of the berms may utilize excess till soils having a hydraulic conductivity of at least 10^{-5} cm/sec. Such operations should place the till soils in lifts no thicker than 150 mm prior to compaction and compacted to at least 95% SPMDD.

For the purpose of the proposed SWM pond, the soils observed should be stable from slip circle failure if sloped at 3 horizontal to 1 vertical (3H:1V) or flatter in the long term both above and below the water table. Between the stable

water level and the expected high-water level, it is recommended that the slopes be lessened to 5H:1V (or flatter) to guard against erosion of wavelet action. The till material will require vegetative root mass (or otherwise suitable erosion protection) to minimize erosional forces on exposed slopes.

It is recommended that a liner be used, to minimize or eliminate any interaction between stormwater and groundwater. The liner may consist of an imported clay liner. A clay liner should be a minimum of 300 mm thick (in areas located under the low-water elevation), and minimum 450 mm thick (between the low and high-water elevations). The clay liner should be placed in lifts no thicker than 150 mm prior to compaction and compacted to 100% SPMDD. It is recommended that compaction of clay material be carried out under dry weather conditions and at an in-situ moisture scarified prior to placement of a subsequent, overlying lift. Failure to achieve this will result in a poor performance and a liner with a much higher relative hydraulic conductivity. Alternatively, an approved synthetic liner (installed in accordance with manufacturer's specification) or a concrete surface may be used instead of the clay liner.

The potential for localize instabilities resulting from groundwater level gradients and differential pressures across the SWM pond liner should be allowed to in the pond's design, since resulting hydrostatic pressure may act to reduce the stability of the pond's slopes. An appropriately designed and installed liner system will achieve this.

Slopes and berms of the SWM ponds should be constructed so as to reduce or eliminate the effects of surficial erosion. Features to do so may include slope vegetation, installation of erosion or gabion mats; rip rap, and/or other acceptable stabilizing features.

Following its construction, it is recommended that a regular and ongoing maintenance program for the SWM pond be performed, including monitoring of it for any potential slope erosion, degradation, or otherwise undesirable structural conditions. Should any such conditions become evident, immediate mitigative actions must be performed.

5.11 General Recommendations

5.11.1 Wells

The wells installed as part of this investigation were recorded and reported to the MECP under well tag A253333 and are the property of the Site's Owner. Any decommissioning of monitoring wells onsite must be performed by an appropriately licensed and experienced well contractor in compliance with Ontario Regulation 903.

5.11.2 Test Pits During Tendering

It is strongly recommended that test pits be excavated at representative locations of this Site during the construction tendering phase with mandatory attendance of interested contractors. This will allow them to make their own assessments of the groundwater, soil and bedrock conditions at the Site and how these will affect their proposed construction methods, techniques and schedules.

5.11.3 Subsoil Sensitivity

The native subsoils are susceptible to strength loss or deformation if saturated or disturbed by construction traffic. Therefore, where the subgrade consists of approved soil, care must be taken to protect the exposed subgrade from excess moisture and from construction traffic.

5.11.4 Winter Construction

The subsoils encountered across the Site are frost-susceptible and freezing conditions could cause problems to the structures. As preventive measures, the following recommendations are presented:

1. During winter construction, exposed surfaces intended to support foundations must be protected against freezing by means of loose straw and tarpaulins, heating, etc.

2. Care must be exercised so that any sidewalks and / or asphalt pavements do not interfere with the opening of doors during the winter when the soils are subject to frost heave. This problem may be minimized by any one of several means, such as keeping the doors well above outside grade, installing structural slabs at the doors, and by using well-graded backfill and positive drainage, etc.
3. Because of the frost heave potential of the soils during winter, it is recommended that the trenches for exterior underground services be excavated with shallow transition slopes in order to minimize the abrupt change in density between the granular backfill, which is relatively non-frost susceptible, and the more frost-susceptible native soils.

5.12 Design Review

Due to the preliminary nature of the design details at the time of this report, it is recommended that GHD be allowed to review the building design prior to its finalization. We also strongly recommend that our firm be retained to review the foundation design and grading proposal when they are available. Once the project specifications including site layout, building locations, structural loadings, and final grading proposals are completed they should be made available to GHD, and we must be permitted the opportunity to review the recommendations contained herein, and if warranted, amend our recommendations.

Geotechnical inspection and review of foundation excavations and compaction procedures must be carried out to ensure compliance with our recommendations. Should any conditions at the Site be encountered which differ from those at the test hole locations, it is requested that GHD be notified immediately in order to permit a reassessment of our recommendations in light of the changed conditions and exact project details.

5.13 Construction Monitoring

Qualified geotechnical consulting personnel should inspect and test all stages of the construction. Specifically, they should ensure that the materials and conditions comply with this geotechnical assessment report. In addition, qualified geotechnical personnel should provide materials testing services prior to and during foundation preparation and construction. Should soil conditions be encountered that vary from those described in this report, our office should be informed immediately such that the proper measures are undertaken.

The conditions will vary across the Site depending on the final design grades and therefore, the preparation of the subbase and the compaction of all materials should be monitored at the time of construction to confirm material quality and thickness and to ensure adequate compaction.

6. Statement of Limitations

This report is intended solely for City Park Homes (Stouffville) Inc. and their designers and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevation and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of geotechnical engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or

implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

All details of design and construction are rarely known at the time of completion of a geotechnical study. The recommendations and comments made in the study report are based on our subsurface investigation and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, GHD will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design.

By issuing this report, GHD is the geotechnical engineer of record. It is recommended that GHD be retained during construction of all foundations and during earthwork operations to confirm the conditions of the subsoil are actually similar to those observed during our study. The intent of this requirement is to verify that conditions encountered during construction are consistent with the findings in the report and that inherent knowledge developed as part of our study is correctly carried forward to the construction phases.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments included in this report are based on the results obtained at the test locations only. The subsurface conditions confirmed at the test locations may vary at other locations. The subsurface conditions can also be significantly modified by the construction activities on site (e.g., excavation, dewatering and drainage, blasting, pile driving, etc.). These conditions can also be modified by exposure of soils or bedrock to humidity, dry periods or frost. Soil and groundwater conditions between and beyond the test locations may differ both horizontally and vertically from those encountered at the test locations and conditions may become apparent during construction which could not be detected or anticipated at the time of our investigation. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations. If changed conditions are identified during construction, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by GHD is completed.

All of Which is Respectfully Submitted,

GHD

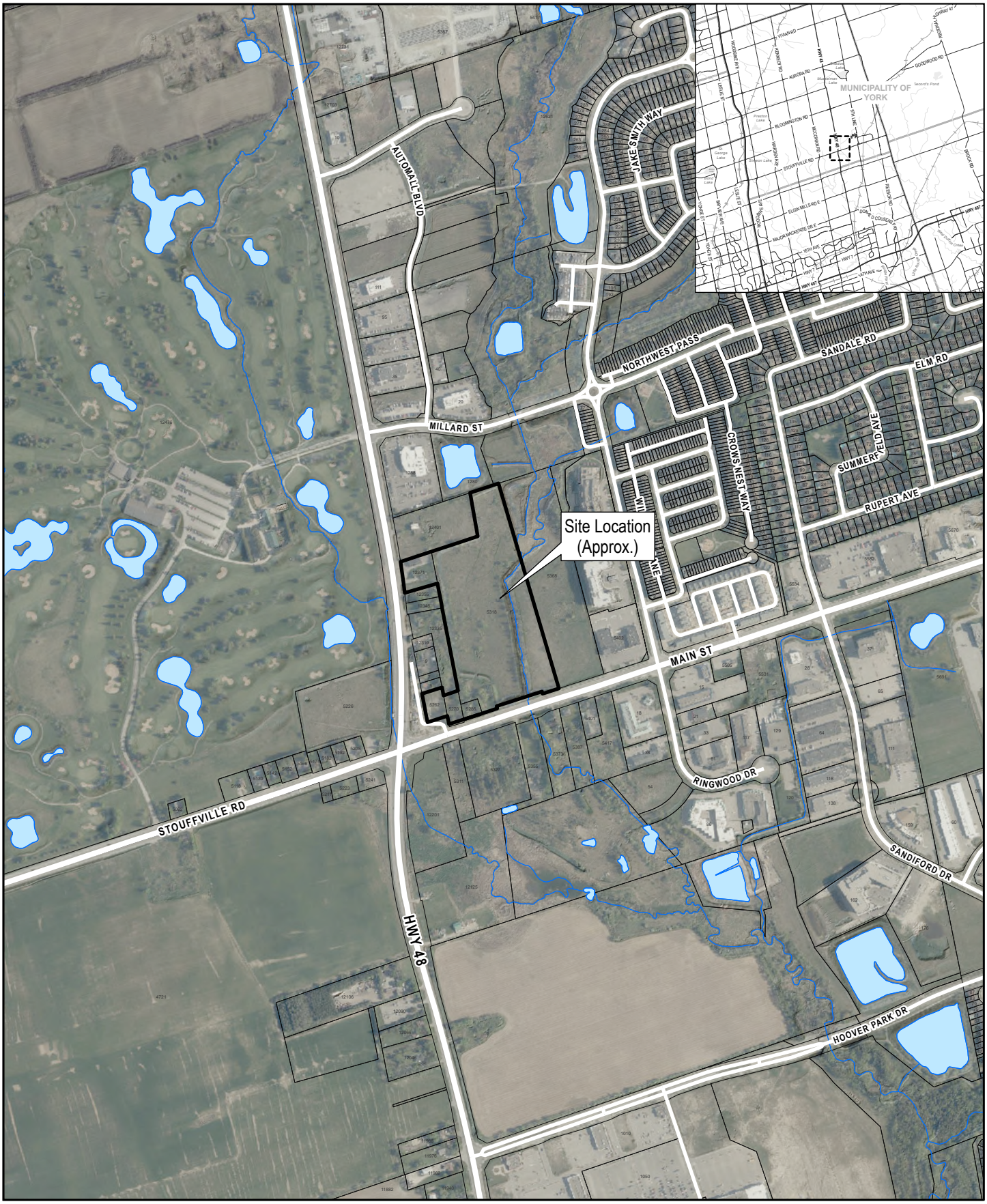
DRAFT

Michael Nieukirk, P. Eng.
Geotechnical Engineer

DRAFT

Leandro Ramos, P. Eng.
Senior Geotechnical Engineer

Figures



1:10,000

0 100 200 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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GHD

City Park Homes (Stouffville) Inc.
Main Street / Fockler Lane, Whitchurch-Stouffville, Ontario
Proposed Residential and Commercial Development

Geotechnical Investigation Report

Site Location Plan

Project No. 12687667
Revision No.
Date Jun 24, 2026

Figure 1

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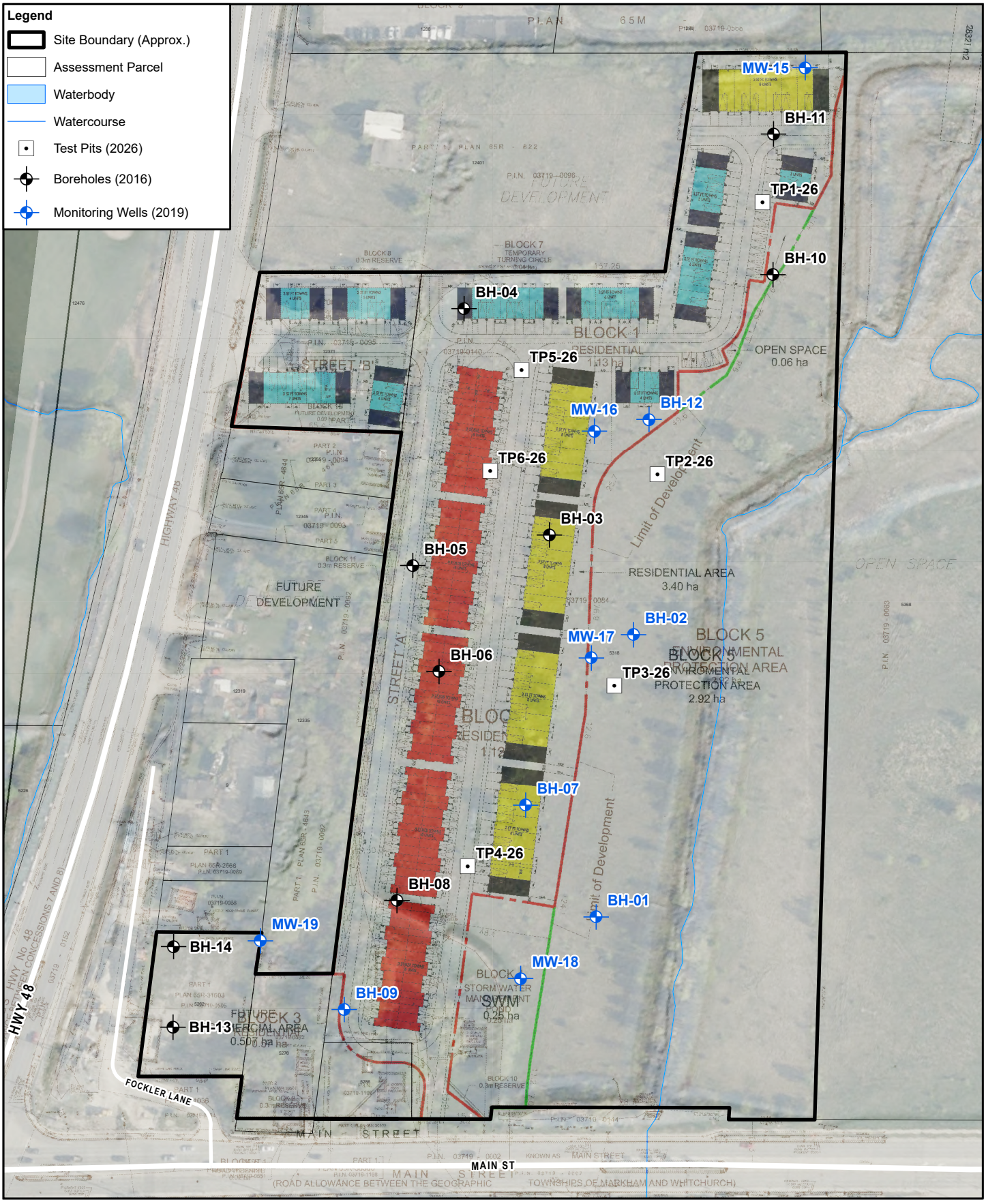

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0 20 40 60

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983 CSRS
Grid: NAD 1983 CSRS UTM Zone 17N

City Park Homes (Stouffville) Inc.
Main Street / Fockler Lane, Whitchurch-Stouffville, Ontario
Proposed Residential and Commercial Development

Geotechnical Investigation Report

Test Hole Plan

Project No. 12687667
Revision No.
Date Jun 24, 2026

Figure 2

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Appendices

Appendix A

2026 Test Pit Records

TEST PIT STRATIGRAPHIC RECORD

TP1-26

Project Number: 12687667

Client: City Park Homes (Stouffville) Inc.
Project: Geotechnical and Hydrogeological Update, City Park Homes
Location: Main Street / Fockler Lane, Stouffville
Date (dd/mm/yyyy): 14/05/2026
Excavation Company: Client Hired Subcontractor
Equipment Used: Komatsu PC138USLC
Excavation Method(s): Excavator

Northing: 4869742 m
Easting: 638095 m
Horizontal Datum: NAD83(CSRS98) / UTM zone 17N
Elevation:
Elevation Datum:

Logged By: Claire Baggesen
Approved By: Michael Nieukirk
Final Depth: 3.51 m

Coordinates and Elevation Values are Approximate

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Hand Penetrometer (kPa)	Sample Number	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Moisture Content %	Water Level(s)	Backfill Details
	0.00												
	0.20		TOPSOIL (200 mm)										
			FILL: SILTY SAND, with clay, trace gravel, light brown, moist		GS1						11		
1													
2			- buried organics (230 mm), dark brown at 2.21 m BGS										
	2.44		NATIVE: SANDY SILTY CLAY TILL, trace gravel, light brown, moist										
3			- groundwater seepage at 3.05 m BGS		GS2	8	25	46	21		15	▼	
	3.51		End of Test Pit at 3.51 m BGS										
4													
5													

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ **At Time of Excavation:**3.10 m **on** 14/05/2026
▼ **Upon Completion of Excavation:**3.10 m **on** 14/05/2026

TEST PIT STRATIGRAPHIC RECORD

TP2-26

Project Number: 12687667

Client: City Park Homes (Stouffville) Inc.
Project: Geotechnical and Hydrogeological Update, City Park Homes
Location: Main Street / Fockler Lane, Stouffville
Date (dd/mm/yyyy): 14/05/2026
Excavation Company: Client Hired Subcontractor
Equipment Used: Komatsu PC138USLC
Excavation Method(s): Excavator

Northing: 4869631 m
Easting: 638090 m
Horizontal Datum: NAD83(CSRS98) / UTM zone 17N
Elevation:
Elevation Datum:

Logged By: Claire Baggesen
Approved By: Michael Nieukirk
Final Depth: 3.35 m

Coordinates and Elevation Values are Approximate

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Hand Penetrometer (kPa)	Sample Number	Grain Size Analysis (Gravel %, Sand %, Silt %, Clay %, Fines %)	Moisture Content %	Water Level(s)	Backfill Details
	0.00								
	0.30		TOPSOIL (200 mm)						
1			FILL: SANDY SILT, trace to with clay, trace gravel, light brown, moist		GS1		16		
2			- buried organics (460 mm), dark brown from 1.83 m BGS to 2.29 m BGS		GS2		31		
	2.29		NATIVE: SANDY SILTY CLAY TILL, trace gravel, light brown, moist						
3			- groundwater seepage at 3.05 m BGS		GS3		15	▼	
	3.35		End of Test Pit at 3.35 m BGS						
4									
5									

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ **At Time of Excavation:**3.10 m **on** 14/05/2026
▼ **Upon Completion of Excavation:**3.10 m **on** 14/05/2026

TEST PIT STRATIGRAPHIC RECORD

TP3-26

Project Number: 12687667

Client: City Park Homes (Stouffville) Inc.
Project: Geotechnical and Hydrogeological Update, City Park Homes
Location: Main Street / Fockler Lane, Stouffville
Date (dd/mm/yyyy): 14/05/2026
Excavation Company: Client Hired Subcontractor
Equipment Used: Komatsu PC138USLC
Excavation Method(s): Excavator

Northing: 4869547 m
Easting: 638096 m
Horizontal Datum: NAD83(CSRS98) / UTM zone 17N
Elevation:
Elevation Datum:

Logged By: Claire Baggesen
Approved By: Michael Nieukirk
Final Depth: 3.20 m

Coordinates and Elevation Values are Approximate

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Hand Penetrometer (kPa)	Sample Number	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Moisture Content %	● SPT N-Value ▼ DCPT Value (blows 100mm) Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak □ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual ○ Moisture Content (%) PL w LL (20 40 60 80)	Water Level(s)	Backfill Details
	0.00													
	0.25		TOPSOIL (250 mm)											
			FILL: SANDY SILT, trace gravel, light brown, moist - green tarp at 0.30 m BGS		GS1						8	○		
1														1
	1.98		- layer of organics (150 mm), dark brown at 1.83 m BGS		GS2						44	○		
2			FILL (Reworked Native): SILTY CLAY with sand, trace gravel, grey, moist											2
			- concrete slab, chunks of bricks at 2.74 m BGS										▼	
3	3.05													3
	3.20		NATIVE: SANDY SILTY CLAY TILL, trace gravel, grey, moist - groundwater seepage at 3.05 m BGS		GS3						11	○	▽	
			End of Test Pit at 3.20 m BGS											
4														4
5														5

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ **At Time of Excavation:**3.10 m **on** 14/05/2026
▼ **Upon Completion of Excavation:**3.00 m **on** 14/05/2026

TEST PIT STRATIGRAPHIC RECORD

TP4-26

Project Number: 12687667

Client: City Park Homes (Stouffville) Inc.
Project: Geotechnical and Hydrogeological Update, City Park Homes
Location: Main Street / Fockler Lane, Stouffville
Date (dd/mm/yyyy): 14/05/2026
Excavation Company: Client Hired Subcontractor
Equipment Used: Komatsu PC138USLC
Excavation Method(s): Excavator

Northing: 4869461 m
Easting: 638061 m
Horizontal Datum: NAD83(CSRS98) / UTM zone 17N
Elevation:
Elevation Datum:

Logged By: Claire Baggesen
Approved By: Michael Nieukirk
Final Depth: 4.27 m

Coordinates and Elevation Values are Approximate

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Hand Penetrometer (kPa)	Sample Number	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Moisture Content %	● SPT N-Value ▼ DCPT Value (blows 100mm) Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak □ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual ○ Moisture Content (%) PL w LL (20 40 60 80)	Water Level(s)	Backfill Details
	0.00													
	0.28		TOPSOIL (280 mm)											
			FILL: SILTY SAND, trace gravel, trace clay, brown, moist		GS1	4	50	36	10		14	○		
1														
2	2.13													
			NATIVE: SANDY SILTY CLAY TILL, trace gravel, light brown, moist - groundwater seepage at 2.29 m BGS										▽	
3														
					GS2						11	○		
4	4.27												▼	
			End of Test Pit at 4.27 m BGS											
5														

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ **At Time of Excavation:** 2.30 m **on** 14/05/2026
▼ **Upon Completion of Excavation:** 4.20 m **on** 14/05/2026

TEST PIT STRATIGRAPHIC RECORD

TP5-26

Project Number: 12687667

Client: City Park Homes (Stouffville) Inc.
Project: Geotechnical and Hydrogeological Update, City Park Homes
Location: Main Street / Fockler Lane, Stouffville
Date (dd/mm/yyyy): 14/05/2026
Excavation Company: Client Hired Subcontractor
Equipment Used: Komatsu PC138USLC
Excavation Method(s): Excavator

Northing: 4869644 m
Easting: 638024 m
Horizontal Datum: NAD83(CSRS98) / UTM zone 17N
Elevation:
Elevation Datum:

Logged By: Claire Baggesen
Approved By: Michael Nieukirk
Final Depth: 3.05 m

Coordinates and Elevation Values are Approximate

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Hand Penetrometer (kPa)	Sample Number	Grain Size Analysis (Gravel %, Sand %, Silt %, Clay %, Fines %)	Moisture Content %	Water Level(s)	Backfill Details
	0.00								
	0.25		TOPSOIL (280 mm)						
			FILL: SANDY SILT, trace gravel, light brown, moist		GS1		13		
1									
2			- groundwater seepage at 1.83 m BGS					▽	
	2.44		- buried organics (150 mm), dark brown at 2.29 m BGS		GS2		32		
			SANDY SILTY CLAY TILL, trace gravel, light brown to grey, wet						
3	3.05				GS3		13	▼	
			End of Test Pit at 3.05 m BGS						
4									
5									

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ **At Time of Excavation:** 1.80 m **on** 14/05/2026
▼ **Upon Completion of Excavation:** 3.00 m **on** 14/05/2026

TEST PIT STRATIGRAPHIC RECORD

TP6-26

Project Number: 12687667

Client: City Park Homes (Stouffville) Inc.
Project: Geotechnical and Hydrogeological Update, City Park Homes
Location: Main Street / Fockler Lane, Stouffville
Date (dd/mm/yyyy): 14/05/2026
Excavation Company: Client Hired Subcontractor
Equipment Used: Komatsu PC138USLC
Excavation Method(s): Excavator

Northing: 4869605 m
Easting: 638026 m
Horizontal Datum: NAD83(CSRS98) / UTM zone 17N
Elevation:
Elevation Datum:

Logged By: Claire Baggesen
Approved By: Michael Nieukirk
Final Depth: 3.35 m

Coordinates and Elevation Values are Approximate

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Hand Penetrometer (kPa)	Sample Number	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Moisture Content %	● SPT N-Value ▼ DCPT Value (blows 100mm) Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak □ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual ○ Moisture Content (%) PL w LL (20 40 60 80)	Water Level(s)	Backfill Details
0	0.00													
	0.23		TOPSOIL (230 mm)											
			FILL: SANDY SILT, trace clay, trace gravel, light brown, moist		GS1						11	○		
1	1.10		- chunk of bricks at 1.07 m BGS										▽	
			NATIVE: SANDY SILTY CLAY TILL, trace gravel, light brown, moist - groundwater seepage at 1.22 m BGS											
2														
3					GS2						12	○	▼	
	3.35		End of Test Pit at 3.35 m BGS											
4														
5														

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ **At Time of Excavation:** 1.20 m **on** 14/05/2026
▼ **Upon Completion of Excavation:** 3.10 m **on** 14/05/2026

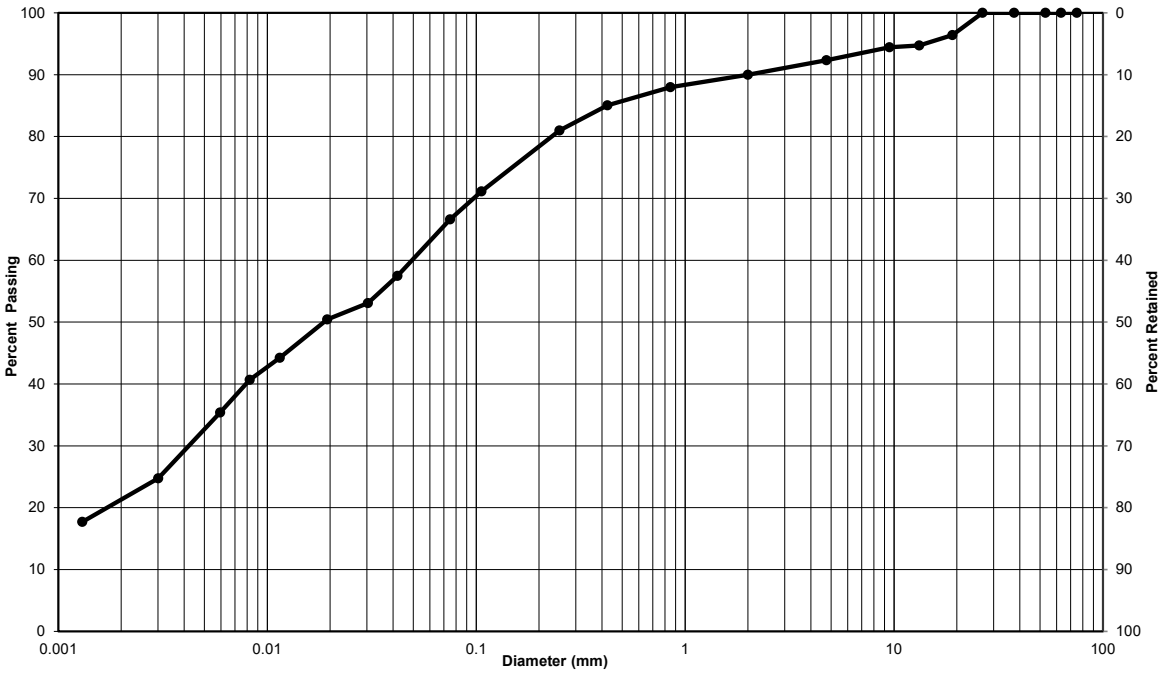
Appendix B

Test Pit Geotechnical Lab Results

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	City Park Homes (Stouffville) Inc.	**Lab No.:**	SS-26-26
Project/Site:	Main Street / Fockler Lane, Stouffville, ON	**Project No.:**	12687667
Borehole No.:	TP1-26	Sample No.:	GS2
Depth:	10-10.5'	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy silty clay (CL-ML)	8	25	67
Silt-size particles (%) :	46		
Clay-size particles (%) (<0.002 mm):	21		

Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Josh Sullivan	**Date:**	May 29, 2026
Verified by:	Joe Sullivan	**Date:**	May 29, 2026
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	City Park Homes (Stouffville) Inc.	**Lab no.:**	SS-26-26
Project/Site:	Main Street / Fockler Lane, Stouffville, ON	**Project no.:**	12687667

Borehole no.:	TP1-26	Sample no.:	GS2	Sample Depth:	10-10.5'
Soil Description:				Date sampled:	-

Apparatus:	Hand Crank	Balance no.:	Intell	Porcelain bowl no.:	1
Liquid limit device no.:	1	Oven no.:	B23-02667	Spatula no.:	1
Sieve no.:	0.425	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	27	24	17
Water Content:			
Tare no.	43	82	327
Wet soil+tare, g	32.36	33.89	33.75
Dry soil+tare, g	30.57	31.80	31.62
Mass of water, g	1.79	2.09	2.13
Tare, g	21.45	21.37	21.56
Mass of soil, g	9.12	10.43	10.06
Water content %	19.6%	20.0%	21.2%

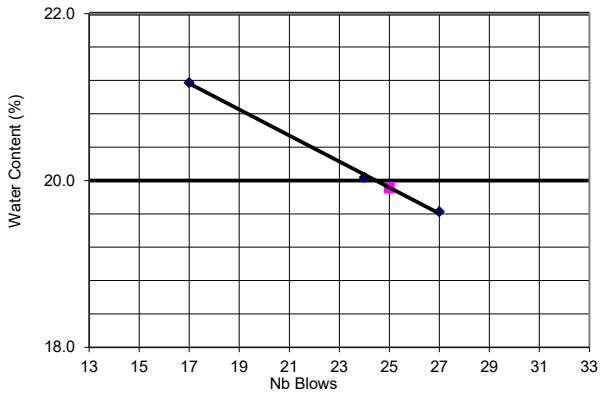
Plastic Limit (PL) - Water Content:		
Tare no.	13	16
Wet soil+tare, g	31.04	33.77
Dry soil+tare, g	29.88	32.30
Mass of water, g	1.16	1.47
Tare, g	21.68	21.96
Mass of soil, g	8.20	10.34
Water content %	14.1%	14.2%
Average water content %	14.2%	

Natural Water Content (W^n):		
Tare no.	Bowl	
Wet soil+tare, g	947.31	
Dry soil+tare, g	847.50	
Mass of water, g	99.81	
Tare, g	166.01	
Mass of soil, g	681.49	
Water content %	14.6%	

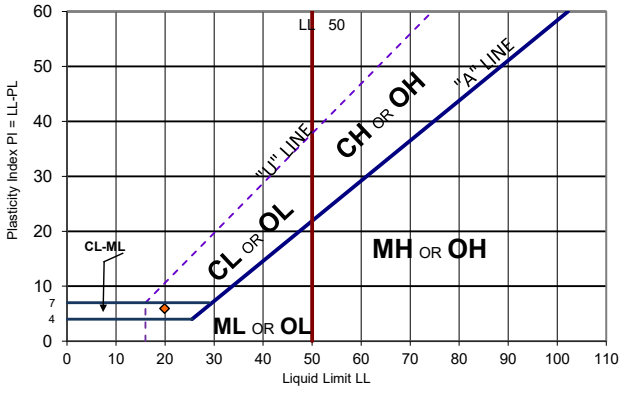
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
20	14	6	14.6

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

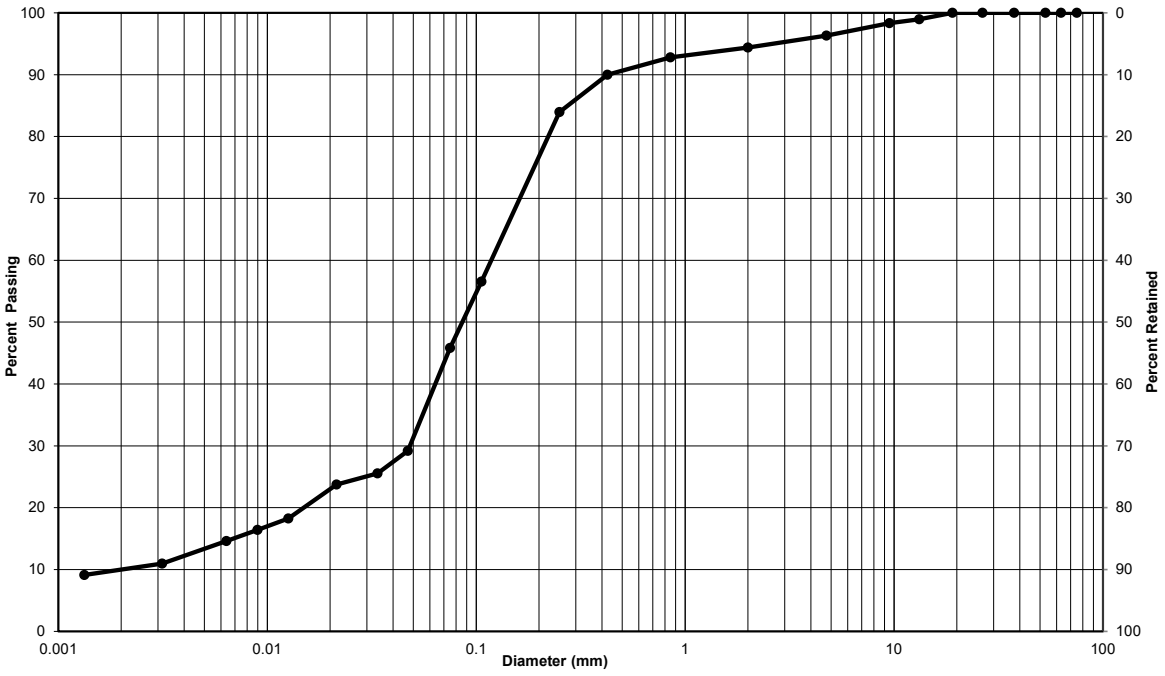
Remarks:

Performed by:	Josh Sullivan	**Date:**	May 29, 2026
Reviewed by:	Joe Sullivan	**Date:**	May 29, 2026
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Particle-Size Analysis of Soils

MTO LS-702/ASTM D422 (Geotechnical)

Client:	City Park Homes (Stouffville) Inc.	**Lab No.:**	SS-26-26
Project/Site:	Main Street / Fockler Lane, Stouffville, ON	**Project No.:**	12687667
Borehole No.:	TP4-26	Sample No.:	GS1
Depth:	2-2.5'	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty sand (SM)	4	50	46
Silt-size particles (%) :	36		
Clay-size particles (%) (<0.002 mm):	10		

Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Josh Sullivan	**Date:**	May 29, 2026
Verified by:	Joe Sullivan	**Date:**	May 29, 2026
Laboratory Location:	GHD Limited - 347 Pido Road, Unit 29, Peterborough, ON		

Appendix C

Previous Borehole Records

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-1

BOREHOLE No.: BH-01
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 2 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft / m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
	0.0		GROUND SURFACE					
	0.1		**TOPSOIL** (100 mm)					
1			**FILL** Light Brown Silty Sand Fill, moist, loose to compact	SS-1	30	13	0 2 4 6	6
2								
3	1.0			SS-2	100	10	9 6 6	12
4								
5				SS-3	50	10	4 1 3	4
6								
7	2.0		Grey Sand with Silt Fill, wet, loose					
	2.3		Saturated	SS-4a	60	20	3	
8	2.4			SS-4b	60	39	5 7	12
9	2.7		**TOPSOIL**					
10	3.0		**SAND** Brown Sand with Silt, loose, saturated				7	
11				SS-5	0		4 4	8
12								
	3.8						6	
13	4.0		**TILL** Grey Silty Sand Till with Clay, moist, compact	SS-6	50	10	9 14	23
14								
	4.3		END OF BOREHOLE					
15								
16	5.0							
17								
18								
19								
20	6.0							
21								
22								
23	7.0							
24								
25								
26	8.0							
27								
28								
29	9.0							
30								
31								
32								

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_P W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

— m
— 0.89 m

WL - 1.5 m
12/9/2014

WL = 3.35 mbeg upon borehole completion

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-2

BOREHOLE No.: BH-02
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 2 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

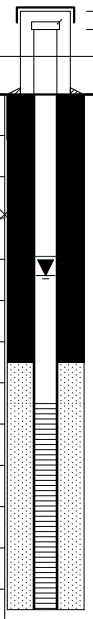
- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
	0.0			GROUND SURFACE					
		0.1		**TOPSOIL** (100 mm)					
1				**FILL** Light Brown Sand with Silt and Gravel Fill, moist, loose	SS-1	30	15	1 3 6 6	9
2									
3	1.0				SS-2	40	12	4 50=4"	100+
4		1.2		Boulders					
5		1.5		Light Brown Sand with Gravel Fill, moist to wet, very loose	SS-3	40	13	1 1 1	2
6	2.0								
7									
8		2.3		Wet, loose	SS-4a	40	15	2 3	
		2.6			SS-4b	50	21	5	8
9		2.7		**TOPSOIL**					
10	3.0			**TILL** Grey Gravelly Silty Sand Till, wet, compact				9	
11					SS-5	80	15	7 4	11
12		3.5		Grey Sandy Silt Till with Gravel and Clay, moist, stiff					
13	4.0	3.8		Light Brown to Grey	SS-6	90	10	12 20 16	36
14		4.3		END OF BOREHOLE					
15									
16	5.0								
17									
18									
19									
20	6.0								
21									
22									
23	7.0								
24									
25									
26	8.0								
27									
28									
29	9.0								
30									
31									
32									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m)
◆ RQD
◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS



— m
— 0.86 m

WL - 1.3 m
12/9/2014

WL = 2.9 mbeg upon borehole completion
SS-5:
20% Gravel
42% Sand
38% Silt and Clay

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-3

BOREHOLE No.: BH-03
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 2 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft / m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE	COMMENTS
	0.0		GROUND SURFACE							
	0.1		**TOPSOIL** (75 mm)				1			
1			**FILL** Light Brown Sand with Gravel Fill, moist, compact	SS-1	70	6	9 10 12	19		
2	0.8		Moist to wet, trace Silt, loose	SS-2	40	10	2 1 1	2		
3	1.0									
4										
5	1.5									
	1.7		Wet	SS-3a	70	13	2 3			
6	1.8		**TOPSOIL**	SS-3b	70	12	3	6		
7	2.0		**TILL** Light Brown to Grey Sandy Silt Till with Clay and Gravel, moist, loose							
8	2.4		Compact Wet 2.3 - 2.6mbeg	SS-4	100	14	4 4 11	15		
9										
10	3.0						9			
11				SS-5	60	13	12 12	24		
12										
13	4.0									
14										
15	4.6		Grey, dense				13			
16				SS-6	100	10	23 23	46		
17	5.0									
18										
19										
20	6.1		Grey Fine Silty Sand Till, moist, very dense				15			
21				SS-7	90	17	34 58	92		
22	6.6		END OF BOREHOLE							Borehole dry upon completion
23	7.0									
24										
25										
26	8.0									
27										
28										
29										
30	9.0									
31										
32										

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-4

BOREHOLE No.: BH-04
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 2 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE (△ Field, □ Lab) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE							
		0.1		**TOPSOIL** (100 mm)							
1				**FILL** Brown Sand with Gravel Fill, trace Silt, moist, loose	SS-1	80	11	2 4 5 10	9	⊗	
2		0.8		Light Brown to Grey Silty Sand with Gravel Fill, moist, compact	SS-2	70	8	5 6 4	10	⊗	
3	1.0										
4											
5		1.5		Trace Gravel, loose	SS-3	80	10	1 2 3	5	×○	
6											
7	2.0										
		2.3		**TOPSOIL**							
8		2.4		**TILL** Light Brown to Grey Sandy Silt Till, with Clay, moist, compact	SS-4	100	16	3 6 7	13	×○	
9											
10	3.0	3.0		With Gravel	SS-5	100	11	8 9 12	21	○ ×	
11		3.5		END OF BOREHOLE							Borehole dry upon completion
12											
13	4.0										
14											
15											
16											
17	5.0										
18											
19											
20	6.0										
21											
22											
23	7.0										
24											
25											
26	8.0										
27											
28											
29	9.0										
30											
31											
32											

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-5

BOREHOLE REPORT

BOREHOLE No.: BH-05
ELEVATION: Existing Grade
Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 2 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND
- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

Depth (ft / m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE — 10 20 30 40 50 60 70 80 90	COMMENTS
0.0	0.0		GROUND SURFACE							
0.2	0.2		**TOPSOIL** (150 mm)							
1	0.2		**FILL** Light Brown to Grey Silty Sand Fill with Gravel, moist, loose	SS-1	60	8	0 0 6	6		
2	0.8		Light Brown Sand with Gravel Fill, trace Cobbles, moist, compact	SS-2	60	10	4 5 7	10		
3	1.0						3			
4										
5	1.5		Wet, loose	SS-3	20	9	1 0 0	0		
6										
7	2.0									
8	2.4		**TILL** Light Brown Sandy Silt Till, with Clay and Gravel, moist, compact	SS-4	70	10	4 6 9	15		
9										
10	3.0									
11				SS-5	100	10	6 7 8	15		
12	3.5		END OF BOREHOLE							Borehole dry upon completion
13	4.0									
14										
15										
16										
17	5.0									
18										
19										
20	6.0									
21										
22										
23	7.0									
24										
25										
26	8.0									
27										
28										
29	9.0									
30										
31										
32										

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-6

BOREHOLE No.: BH-06
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 4 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	COMMENTS
		0.0		GROUND SURFACE						
		0.1		**TOPSOIL** (100 mm)						
1				**FILL** Light Brown Sand with Gravel Fill, moist, dense	SS-1	70	35	4 13 25	38	
2		0.8		Trace Silt, compact				14		
3	1.0				SS-2	80	8	18 11 7	18	
4										
5		1.5		With Silt, loose				2		
6					SS-3	10	9	2 3	5	
7	2.0									
8		2.3		Boulder 2.1 - 2.3 mbeg Saturated	SS-4a	60	13	2 2		
9		2.6 2.7		**TOPSOIL**	SS-4b	60	14	2	4	
10	3.0			**TILL** Light Brown to Grey Clayey Sandy Silt Till with Gravel, moist, compact	SS-5	100	12	5 8 14	22	SS-5: 8% Gravel 33% Sand 59% Silt and Clay 34% between 5-75 µm
11										
12										
13	4.0									
14										
15		4.6		Light Brown to Grey Silty Sand Till with Gravel, trace Clay, moist, very dense	SS-6	80	9	17 27 36	63	
16	5.0									
17										
18										
19										
20	6.0				SS-7	100	11	49 50=5"	100+	
21										
22										
23	7.0									
24										
25				- Silt seam	SS-8	90	17	19 25 33	58	SS-8: 0% Gravel 6% Sand 94% Silt and Clay
26	8.0									
27										
28										
29										
30	9.0	9.1		Occasional Cobbles	SS-9	100	12	19 23 28	51	
31		9.6		END OF BOREHOLE						Borehole dry upon completion
32										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-7

BOREHOLE No.: BH-07
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 2 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

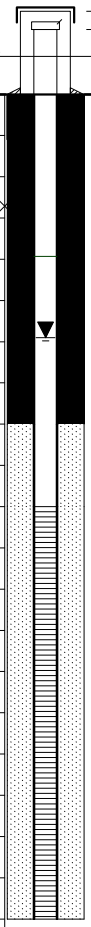
LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
		0.1		**TOPSOIL** (100 mm)					
1				**FILL** Light Brown Silty Sand with Gravel Fill, moist, loose	SS-1	60	6	0 0 5	5
2								21	
3	1.0			Boulder from 0.76 to 1.22 mbeg	SS-2	10	6	50=5"	100+
4									
5		1.5		Grading to Grey, compact	SS-3	80	7	9 12 4	16
6	2.0								
7									
8		2.3		Loose, Wet	SS-4a	70	11	0 3	
9		2.6			SS-4b	70	40	3	6
		2.7		**TOPSOIL**					
10	3.0			**SANDY SILT** Dark Brown Sandy Silt with organics, moist, loose	SS-5	30	36	3 3 3	6
11		3.5		**TILL** Grey Sandy Silt Till with Clay, moist, compact					
12									
13	4.0								
14									
15		4.6		Wet, dense	SS-6	60	11	7 15 18	33
16	5.0								
17									
18									
19									
20	6.0	6.1		Grey Silty Sand Till, trace Gravel, moist, very dense	SS-7	70	13	22 33 50	83
21		6.6		END OF BOREHOLE					
22									
23	7.0								
24									
25									
26	8.0								
27									
28									
29									
30	9.0								
31									
32									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90



COMMENTS

— m
— 1.12 m

SS-1:
8% Gravel
47% Sand
45% Silt and Clay

WL - 1.8 m
12/9/2014

WL = 4.9 mbeg upon borehole completion

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-8

BOREHOLE No.: BH-08
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 2 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft / m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
0.0	0.0		GROUND SURFACE					
1	0.1		**TOPSOIL** (125 mm)					
			FILL Light brown Gravelly Sand Fill, moist, compact	SS-1	70	11	0 1 13	14
2							20	
3				SS-2	80	7	15 8 6	14
1.0								
4								
5	1.5		Moist to wet, trace Silt	SS-3	40	9	4 2 10	12
6								
2.0								
7	2.3							
8	2.4		**TOPSOIL**	SS-4	100	24	6 8 11	19
			TILL Light Brown Sandy Silt Till with Clay and Gravel, moist, very stiff					
9								
10	3.0		Moist to wet				8	
3.0				SS-5	100	10	13 13	26
11	3.5		END OF BOREHOLE					
12								
13								
4.0								
14								
15								
16								
5.0								
17								
18								
19								
6.0								
20								
21								
22								
23								
7.0								
24								
25								
26								
8.0								
27								
28								
29								
9.0								
30								
31								
32								

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_P W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

Borehole dry upon completion

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-9

BOREHOLE No.: BH-09
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 2 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
				TOPSOIL (600 mm)	SS-1	80	29	1 2 3	5
		0.6		**TILL** Light Brown Silty Sand Till, with Gravel, trace Clay, moist, dense	SS-2	80	23	5 8 19	32
		1.5		Compact	SS-3	40	10	13 8 8 9	17
		2.4		Wet 2.3 - 2.4 mbeg Light Brown Sandy Silt Till with clay and Gravel, moist, compact	SS-4	90	8	8 12 13	25
		3.0							
		3.2		Wet 3.0 - 3.2 mbeg Dense	SS-5	100	7	17 20 24	44
		3.5		END OF BOREHOLE					

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

— m
— 1.08 m

WL - 0.8 m 12/9/2014

WL = 3.2 mbeg upon borehole completion

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-10

BOREHOLE No.: BH-10
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 2

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 3 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (W_P, W_l) / "N" Value (blows / 0.3 m) / RQD / CONE — Field △ Lab □	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
		0.1		**TOPSOIL** (100 mm)							
1				**FILL** Light Brown Sand with Gravel Fill, moist, dense	SS-1	100	15	0 5 34 50=4"	39	○ ×	Borehole caving suggests presence of groundwater at 7.8 mbeg
2		0.8		Brown Silty Sand Fill, trace Gravel, moist, compact	SS-2	40	31	6 7 3	10	× ○	
3	1.0										
4											
5					SS-3	40	16	3 6 7	13	×○	
6				Grading to Grey							
7	2.0	2.1		**TILL** Light Brown Clayey Silt Till with Sand and Gravel, moist, very stiff	SS-4	40	17	3 4 14	18	⊗	
8											
9											
10	3.0	3.0		Light Brown Silty Sand with Gravel Till, trace Clay, moist, very dense	SS-5	50	12	18 30 22	52	○ ×	
11											
12											
13	4.0										
14											
15		4.6		Compact	SS-6	100	15	24 12 16	28	○ ×	
16	5.0										
17											
18				Wet 5.5 - 6.2 mbeg							
19											
20	6.0				SS-7	100	18	8 9 12	21	○×	
21											
22											
23	7.0										
24											
25		7.6		Grey Sandy Silt Till, trace Gravel, moist, dense	SS-8	90	14	11 13 17	30	○ ×	Borehole caved to 7.8 mbeg upon completion
26	8.0										
27											
28											
29											
30	9.0	9.1		Trace Clay	SS-9	90	20	9 14 15	29	○ ×	
31											
32											

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-10

BOREHOLE No.: BH-10
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 2 of 2

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 3 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / Field / Lab / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
35	10.7			With Gravel, compact	SS-10	80	16	10 11 13	24	○ ×	
40	12.2			Dense	SS-11	0		10 18 22	40	×	
45	13.7			Occasional Cobbles, very dense	SS-12	60	8	28 29 29	58	○ ×	
50	15.7			END OF BOREHOLE	SS-13	75	15	18 23 24	47	○ ×	SS-13: 2% Gravel 39% Sand 59% Silt and Clay

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-11

BOREHOLE No.: BH-11
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 3 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE (△ Field, □ Lab)	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
		0.1		**TOPSOIL** (100 mm)							
1				**FILL** Light brown Sandy Silt Fill, trace Gravel, moist, very loose	SS-1	30	35	1 1 4 6	5		
2											
3	1.0				SS-2	50	10	3 2 2	4		
4											
5					SS-3	60	19	2 0 1	1		SS-3: 4% Gravel 43% Sand 53% Silt and Clay
6	2.0										
7											
8		2.4									
9		2.5		**TOPSOIL**	SS-4	90	18	5 4 5	9		
10	3.0	3.0		**TILL** Light Brown to Grey Clayey Silt Till with Sand, trace Gravel, moist, compact	SS-5	100	15	4 8 11	19		
11				Wet							
12											
13	4.0										
14											
15		4.6		Light Brown to Grey Silty Sand Till with Gravel, trace Clay, moist, compact	SS-6	80	21	9 12 14	26		
16											
17	5.0										
18											
19											
20	6.0	6.1		Grey							
21					SS-7	90	16	8 12 11	23		
22											
23	7.0										
24											
25											
26	8.0										
27											
28											
29											
30	9.0										
31					SS-8	80	12	9 12 13	25		
32		9.6		END OF BOREHOLE							Borehole dry upon completion

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-12

BOREHOLE No.: BH-12

ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc

PROJECT: 5262-5318 Main Street, Stouffville, Ontario

LOGGED BY: K. Plumpton DATE: 3 December 2014

DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons

NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
		0.1		**TOPSOIL** (125 mm)					
1				**FILL** Light Brown Sand with Gravel Fill, trace Silt, moise, very loose	SS-1	50	8	4 9 7	16
2				With Silt					
3	1.0				SS-2	20	17	2 1 1	2
4									
5		1.7			SS-3a	100	6	3	
6		1.8		**TOPSOIL**	SS-3b	100	22	4 3	7
7	2.0			**TILL** Light Brown Sandy Silt Till with Clay and Gravel, moist, compact					
8					SS-4	100	11	3 6 8	14
9									
10	3.0	3.0		Increased Gravel, wet, dense	SS-5	100	14	7 13 19	32
11									
12									
13	4.0			Boulder 3.8 - 4.0 mbeg					
14									
15		4.6		Grey, very dense					
16					SS-6	90	9	31 39 30	69
17	5.0								
18									
19									
20	6.0	6.1		Grey Silty Fine Sand Till, trace Gravel, moist, very dense	SS-7	100	13	24 29 27	56
21									
22									
23	7.0								
24									
25									
26	8.0								
27									
28									
29									
30	9.0	9.1		Wet	SS-8	90	19	22 24 28	52
31		9.6		END OF BOREHOLE					
32									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

WL - 1.4 m 12/9/2014

WL = 3.2 mbeg upon borehole completion

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-13

BOREHOLE No.: BH-13
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 2

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 4 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (W_p, W_l) / "N" Value (blows / 0.3 m) / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE							
				FILL Grey Gravel Fill							
		0.6		Light Brown to Grey Silty Sand Fill with Gravel, moist, loose	SS-1	60	21	4 2 3	5		
					SS-2a	80	16	8 4			
		1.8		**TILL** Light Brown Sandy Silt Till with Clay and Gravel, moist, compact	SS-2b	80	12	4	8		
					SS-3	100	11	7 10 14	24		
		3.0		Light brown to grey	SS-4	100	9	10 13 16	29		
		4.6		Trace Clay, occasional Cobbles, very dense	SS-5	100	9	50 50=4"	100+		
					SS-6	80	7	22 35 27	62		
		7.6		Grey Silty Sand Till with Gravel, trace Silt, moist, very dense	SS-7	80	12	26 28 25	53		
		9.1		Grey Silty Clay Till with Gravel, moist, dense	SS-8	80	14	14 15 22	37		

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-13

BOREHOLE No.: BH-13

ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 2 of 2

CLIENT: 2440332 Ontario Inc

PROJECT: 5262-5318 Main Street, Stouffville, Ontario

LOGGED BY: K. Plumpton DATE: 4 December 2014

DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons

NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE (△ Field, □ Lab) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE							
35		10.7		Trace Gravel	SS-9	90	9	12 20 25	45		
36	11.0										
40	12.0	12.2		Grey Silty Sand Till with Gravel and Cobbles, trace Clay, moist, very dense	SS-10	60	8	50=5"	100+		SS-10: 9% Gravel 41% Sand 50% Silt and Clay
45	13.0				SS-11	70	13	57 50=4"	100+		
46	14.0										
49	15.0										
50		15.2 15.3		Light Brown END OF BOREHOLE	SS-12	100	16	50=4"	100+		Borehole dry upon completion
51											
52	16.0										
56	17.0										
59	18.0										
62	19.0										
65	20.0										

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-14

BOREHOLE No.: BH-14
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: K. Plumpton DATE: 4 December 2014
DRILLING COMPANY: Strong Soil Search METHOD: Track-mounted Rig with Split Spoons
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE							
				FILL Brown Sand and Gravel Fill							
		0.6		Light Brown Sand and Gravel Fill, moist, compact	SS-1	90	23	3 4 9	13		
		1.5		Wet	SS-2	90	10	6 7 10	17		
		1.8		**TILL** Light Brown Silty Sand Till with Gravel, trace Clay, moist, compact							
		2.3		Very dense	SS-3	100	11	15 34 35	69		
		3.0		Dense	SS-4	100	11	23 19 17	36		
		4.6		Very Dense	SS-5	90	6	22 28 27	55		
		6.1		Occasional Cobbles, dense	SS-6	100	8	14 23 25	48		
				- Boulder at 7.6 mbeg							
					SS-7	90	13	20 26 29	55		
		9.6		END OF BOREHOLE							Borehole dry upon completion

BOREHOLE LOG GEOTECH G030337E1, 15-01-23.GEOTECH BOREHOLE LOGS.GPJ GEOLOGIC.GDT 17/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-15

BOREHOLE No.: MW-15
ELEVATION: Existing Grade

BOREHOLE REPORT

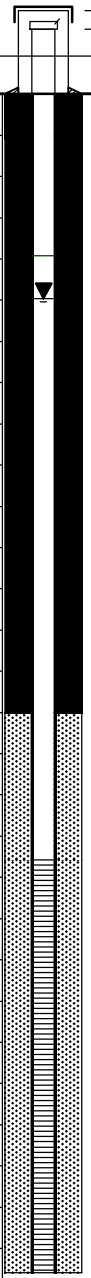
Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: J.Cummings DATE: 22 April 2019
DRILLING COMPANY: Landshark Drilling Ltd. METHOD: Hollow Stem Auger and SPT
NOTES:

LEGEND
SS - SPLIT SPOON
AS - AUGER SAMPLE
ST - SHELBY TUBE
CS - CORE SAMPLE
- WATER LEVEL

UTM: (±3m) 17T 638088E 4869802N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / Field / Lab / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
		0.0		**TOPSOIL** (25mm)							
1				**FILL** - Brown Sandy Silt, Trace Gravel, Wet, Very Loose	SS-1	50	9	1 1 2 2	3		
2											
3	1.0				SS-2	50	14	0 0 1 3	1		
4											
5		1.5		Loose	SS-3	75	16	1 2 5 5	7		WL - 1.5 m 4/24/2019
6	2.0										
7											
8		2.3		**TILL** - Grey Clayey Sandy Silt, Trace Gravel, Moist, Dense	SS-4	100	11	9 15 15 18	30		
9											
10	3.0				SS-5	100	7	12 22 15 11	37		
11											
12											
13	4.0										
14											
15					SS-6	100	15	14 14 19 19	33		WL - 4.7 m (open borehole, immediately after drilling)
16	5.0										
17											
18											
19											
20	6.0				SS-7	100	17	10 13 19 17	32		
21											
22											
23	7.0										
24											
25		7.6		Grey Sandy Silt, Trace Clay and Gravel, Wet, Compact	SS-8	50	16	4 10 11 11	21		First encounter of groundwater seepage at 7.6 m Borehole caving at 7.9 m
26	8.0										
27											
28											
29	9.0										51 mm I.D. Monitoring Well installed to 8.7 m
30		9.1		Dense	SS-9	100	17	10 18 24 30	42		
31											
32		9.8		END OF BOREHOLE							



BOREHOLE LOG GEOTECH 11192167-02, 19-04-24, BH LOGS TM,SS,LR.GPJ GEOLOGIC.GDT 26/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-16

BOREHOLE No.: MW-16
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 2

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: J.Cummings DATE: 22 April 2019
DRILLING COMPANY: Landshark Drilling Ltd. METHOD: Hollow Stem Auger and SPT
NOTES:

LEGEND
- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

UTM: (±3m) 17T 638061E 4869641N

Depth (ft / m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
	0.0		GROUND SURFACE					
	0.0		**TOPSOIL** (25mm)					
1			**FILL** - Rusty Brown Sandy Silt, Trace Gravel, Wet, Very Loose	SS-1	100	12	1 3 1 1	4
3 – 1.0								
5				SS-2	100	12	2 3 5 7	8
6	1.8		**TILL** - Brown Clayey Sandy Silt, Trace Gravel, Wet, Loose					
7 – 2.0	2.3		Moist, Compact	SS-3	75	11	3 7 8 11	15
10 – 3.0	3.0		Dense	SS-4	50	13	9 14 19 21	33
13 – 4.0				SS-5	75	10	12 18 20 22	38
15	4.6		Grey, Compact	SS-6	100	11	12 12 11 11	23
17 – 5.0								
20 – 6.0				SS-7	75	16	6 10 15 17	25
23 – 7.0								
25	7.6		Sandy Silt, Trace Clay and Gravel, Wet, Compact	SS-8	75	17	4 5 9 11	14
27 – 8.0								
29 – 9.0								
30	9.1		Dense	SSS-9	75	16	7 16 24 32	40
32								

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
Atterberg limits (%) W_p W_l
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE
10 20 30 40 50 60 70 80 90

COMMENTS

— 0.87 m
— 0.79 m

WL - 0.5 m
4/24/2019

Borehole open on completion of drilling

SS-3:
8% Gravel
31% Sand
61% Silt and Clay
37% between 5-75 µm

WL - 4.6 m
(open borehole, immediately after drilling)
SS-6:
13% Gravel
23% Sand
64% Silt and Clay
41% between 5-75 µm

SS-8:
4% Gravel
27% Sand
69% Silt and Clay
61% between 5-75 µm

BOREHOLE LOG GEOTECH 11192167-02, 19-04-24, BH LOGS TM,SS,LR.GPJ GEOLOGIC.GDT 26/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-16

BOREHOLE No.: MW-16
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 2 of 2

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: J.Cummings DATE: 22 April 2019
DRILLING COMPANY: Landshark Drilling Ltd. METHOD: Hollow Stem Auger and SPT
NOTES:

LEGEND
- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: (±3m) 17T 638061E 4869641N

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) / "N" Value (blows / 0.3 m) / Field / Lab / RQD / CONE	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
35		10.7		Compact	SS-10	100	15	7 11 13 15	24		
36	11.0										
40	12.0				SS-11	100	19	6 11 16 20	27		
43	13.0										
45		13.7		Silt, Some Clay, Some Sand, Trace Gravel, Dense	SS-12	100	14	6 17 24 26	41		**SS-12:** 7% Gravel 17% Sand 76% Silt and Clay 62% between 5-75 µm
46	14.0										
49	15.0										
50		15.2		Very Dense	SS-13	100	12	36 50/5"	100+		51 mm I.D. Monitoring Well installed to 15.2 m
52	16.0	15.8		END OF BOREHOLE							
56	17.0										
59	18.0										
62	19.0										
65	20.0										

BOREHOLE LOG GEOTECH 11192167-02, 19-04-24, BH LOGS TM,SS,LR.GPJ GEOLOGIC.GDT 26/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-17

BOREHOLE No.: MW-17
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 2

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: J.Cummings DATE: 22 April 2019
DRILLING COMPANY: Landshark Drilling Ltd. METHOD: Hollow Stem Auger and SPT
NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: (±3m) 17T 638092E 4869557N

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
		0.0		**TOPSOIL** (25mm)					
1				**FILL** - Brown Silty Sand, Some Gravel, Wet, Compact	SS-1	50	9	1 2 17 48	19
2									
3	1.0				SS-2	50	8	10 8 8 21	16
4									
5		1.5		Trace Clay, Very Loose	SS-3	25	11	7 1 1 1	2
6	2.0								
7									
8					SS-4	75	13	4 2 14 9	16
9		2.6		**TILL** - Grey Clayey Sandy Silt, Trace Gravel, Wet, Loose					
10	3.0				SS-5	75	26	1 2 3 4	5
11									
12									
13	4.0								
14									
15		4.6		Moist, Compact	SS-6	50	8	8 14 13 13	27
16	5.0								
17									
18									
19									
20	6.0	6.1		Very Dense	SS-7	50	14	13 32 50	82
21									
22									
23	7.0								
24									
25									
26	8.0								
27									
28									
29									
30	9.0	9.1		Grey Sandy Silt, Occasional Cobbles and/or Boulders, Compact, Wet	SS-8	75	7	6 10 14 14	24
31									
32									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
Atterberg limits (%) W_p W_l
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

— 0.99 m
— 0.91 m

Borehole open on completion of drilling

WL - 1.7 m 4/24/2019

First encounter of groundwater seepage at 2.3 m

WL - 3.1 m (open borehole, immediately after drilling)

More intense groundwater seepage observed at approximately 9.1 m

BOREHOLE LOG GEOTECH 11192167-02, 19-04-24, BH LOGS TM,SS,LR.GPJ GEOLOGIC.GDT 26/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-17

BOREHOLE No.: MW-17
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 2 of 2

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: J.Cummings DATE: 22 April 2019
DRILLING COMPANY: Landshark Drilling Ltd. METHOD: Hollow Stem Auger and SPT
NOTES:

LEGEND
- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: (±3m) 17T 638092E 4869557N

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (W_P, W_l) / "N" Value (blows / 0.3 m) / RQD / CONE — Field △ Lab □	COMMENTS
		0.0		GROUND SURFACE						10 20 30 40 50 60 70 80 90	
34											
35											
36	11.0										
37											
38											
39	12.0										
40											
41					SS-9	75	12	3 10 12 14	22		
42											
43	13.0										
44											
45											
46	14.0										
47											
48											
49	15.0										
50		15.2		Very Dense	SS-10	100	11	15 50	100+		51 mm I.D. Monitoring Well installed to 15.2 m
51											
52		15.8		END OF BOREHOLE							
53	16.0										
54											
55											
56	17.0										
57											
58											
59	18.0										
60											
61											
62	19.0										
63											
64											
65											
	20.0										

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-18

BOREHOLE No.: MW-18
ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc
PROJECT: 5262-5318 Main Street, Stouffville, Ontario
LOGGED BY: J.Cummings DATE: 22 April 2019
DRILLING COMPANY: Landshark Drilling Ltd. METHOD: Hollow Stem Auger and SPT
NOTES:

LEGEND
- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

UTM: (±3m) 17T 638096E 4869429N

Depth (ft / m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
	0.0		GROUND SURFACE					
	0.2		**TOPSOIL** (150mm)				0	
1	0.5		**FILL** - Brown Sandy Silt, Some Gravel and Organics, Moist, Very Loose	SS-1	75	20	0 3 4	3
2	0.8		Grey, Clayey				4	
3 – 1.0			Medium Brown Sandy Silt, Some Gravel, Moist, Compact	SS-2	75	9	4 8 8	16
4	1.5		Medium Brown Silty Sand, Some Gravel, Occasional Cobbles and/or Boulders, Moist, Very Dense	SS-3	75	10	9 18 35 15	53
5 – 2.0	2.3		**ORGANIC SILT** - Black Organic Silt with Rootlets, Moist, Loose	SS-4	75	23	1 1 3 4	4
6	2.7		**TILL** - Mottled Grey with Brown Clayey Sandy Silt, Trace Gravel, Wet, Loose	SS-5	75	18	1 3 3 8	6
7 – 3.0								
8	4.6		Grey, Moist, Dense	SS-6	75	11	11 17 22 27	39
9 – 4.0								
10	6.1		Compact	SS-7	100	10	5 10 15 15	25
11 – 5.0	6.7		END OF BOREHOLE					
12								
13 – 6.0								
14								
15 – 7.0								
16								
17 – 8.0								
18								
19 – 9.0								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE
10 20 30 40 50 60 70 80 90

COMMENTS

— 1.07 m
— 1.00 m

Borehole open on completion of drilling

WL - 1.4 m
4/24/2019

SS-5:
6% Gravel
29% Sand
65% Silt and Clay
46% between 5-75 µm
First encounter of groundwater seepage at 3.4 m

WL - 4.8 m
(open borehole, immediately after drilling)

51 mm I.D. Monitoring Well installed to 6.7 m

BOREHOLE LOG GEOTECH 11192167-02, 19-04-24, BH LOGS TM,SS,LR.GPJ GEOLOGIC.GDT 26/6/19

REFERENCE No.: 11192167-02 ENCLOSURE No.: A-19

BOREHOLE No.: MW-19

ELEVATION: Existing Grade

BOREHOLE REPORT

Page: 1 of 1

CLIENT: 2440332 Ontario Inc

PROJECT: 5262-5318 Main Street, Stouffville, Ontario

LOGGED BY: J.Cummings DATE: 22 April 2019

DRILLING COMPANY: Landshark Drilling Ltd. METHOD: Hollow Stem Auger and SPT

NOTES:

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

UTM: (±3m) 17T 637996E 4869414N

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N
		0.0		GROUND SURFACE					
1–3	1.0			**FILL** - Dark Grey to Dark Brown Sandy Silt, Some Gravel, Trace Clay, Wet, Very Loose	SS-1	75	14	0 1 3 5	4
4–6	2.0	1.8		**TILL** - Mottled Light Brown with Grey Clayey Sandy Silt, Some Gravel, Moist, Compact	SS-2	100	12	5 7 7 6	14
7–9					SS-3	100	10	7 11 13 16	24
10	3.0	3.0		Wet	SS-4	25	12	4 12 13 17	25
11–14	4.0								
15		4.6		Grey, Moist, Dense	SS-5	100	9	14 18 15 13	33
16–19	5.0								
20	6.0	6.1		Wet, Compact	SS-6	25	13	6 8 9 12	17
21–24	7.0								
25–26					SS-7	50	13	9 6 13 11	19
27–30	8.0								
31	9.0				SS-8	100	15	4 7 17 28	24
32		9.8		END OF BOREHOLE					

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
Atterberg limits (%) W_p W_l
× "N" Value (blows / 0.3 m) ◆ RQD ◎ CONE

10 20 30 40 50 60 70 80 90

COMMENTS

— 1.14 m
— 1.07 m

Borehole open on completion of drilling

First encounter of groundwater seepage at 1.2 m

WL - 2.7 m 4/24/2019

51 mm I.D. Monitoring Well installed to 9.1 m

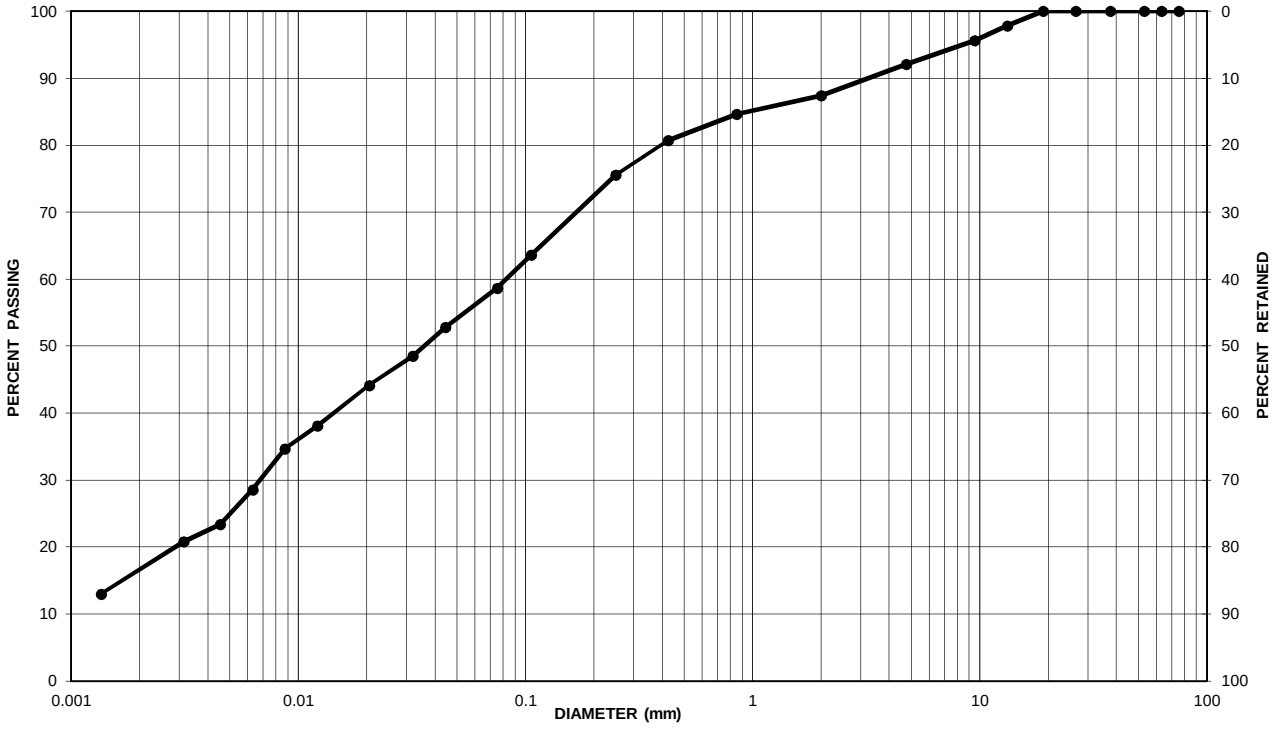
BOREHOLE LOG GEOTECH 11192167-02, 19-04-24, BH LOGS TM,SS,LR.GPJ GEOLOGIC.GDT 26/6/19

Appendix D

Previous Borehole Geotechnical Lab Results

PARTICLE-SIZE ANALYSIS OF SOILS (GEOTECHNICAL) (USCS) (LS 702)

CLIENT:	2440332 Ontario Inc.	**LAB No.:**	SS-14-113
PROJECT/ SITE:	5262-5318 Main St, Whitchurch-Stouffville, ON	**PROJECT No.:**	11192167-02
Borehole No.:	BH6	Sample No.:	SS5
Depth:	3.1 - 3.5 m	Enclosure:	B-1



CLAY & SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE
UNIFIED SOIL CLASSIFICATION SYSTEM					

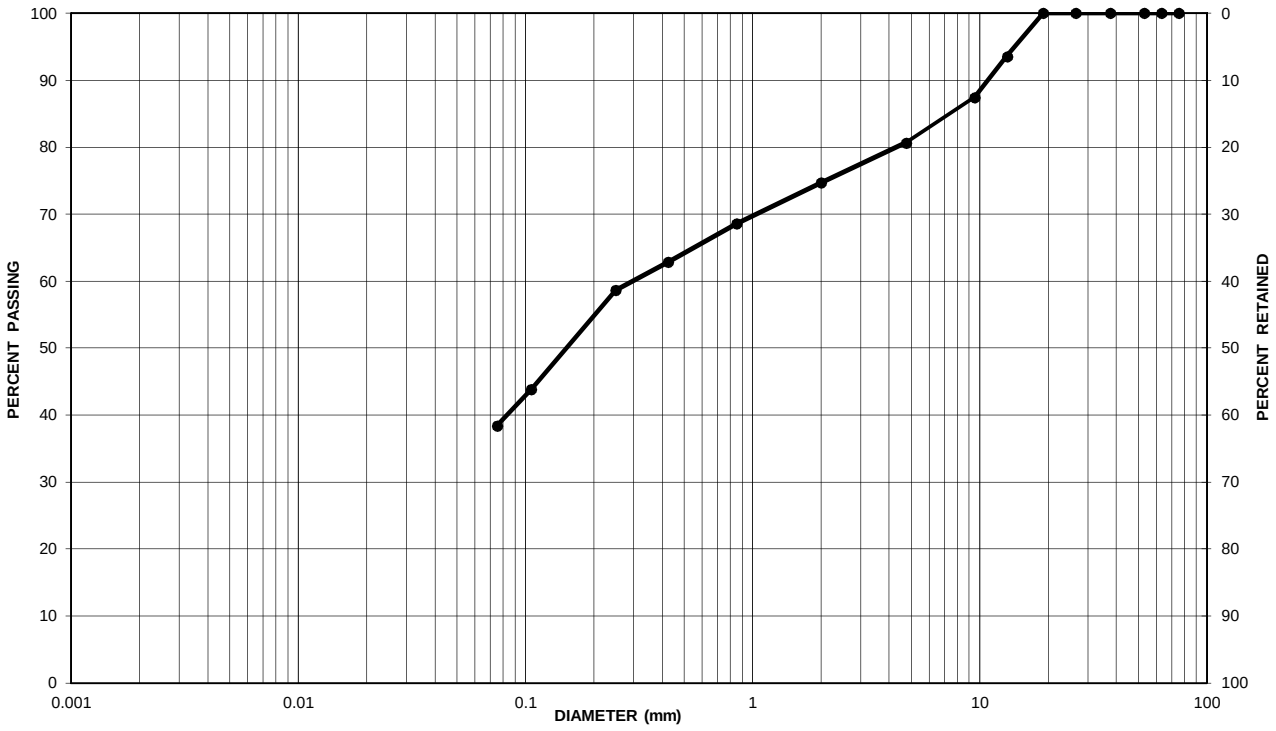
Soil Description	Gravel	Sand	Clay & Silt
BH6 SS5	8	33	59

REMARKS:

PERFORMED BY:		**DATE:**	January 6, 2015
VERIFIED BY:		**DATE:**	January 6, 2015

PARTICLE-SIZE ANALYSIS OF SOILS (GEOTECHNICAL) (USCS) (LS 702)

CLIENT:	2440332 Ontario Inc.	**LAB No.:**	SS-14-113
PROJECT/ SITE:	5262-5318 Main St, Whitchurch-Stouffville, ON	**PROJECT No.:**	11192167-02
Borehole No.:	BH2	Sample No.:	SS5
Depth:	3.1 - 3.5 m	Enclosure:	B-2



CLAY & SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE
UNIFIED SOIL CLASSIFICATION SYSTEM					

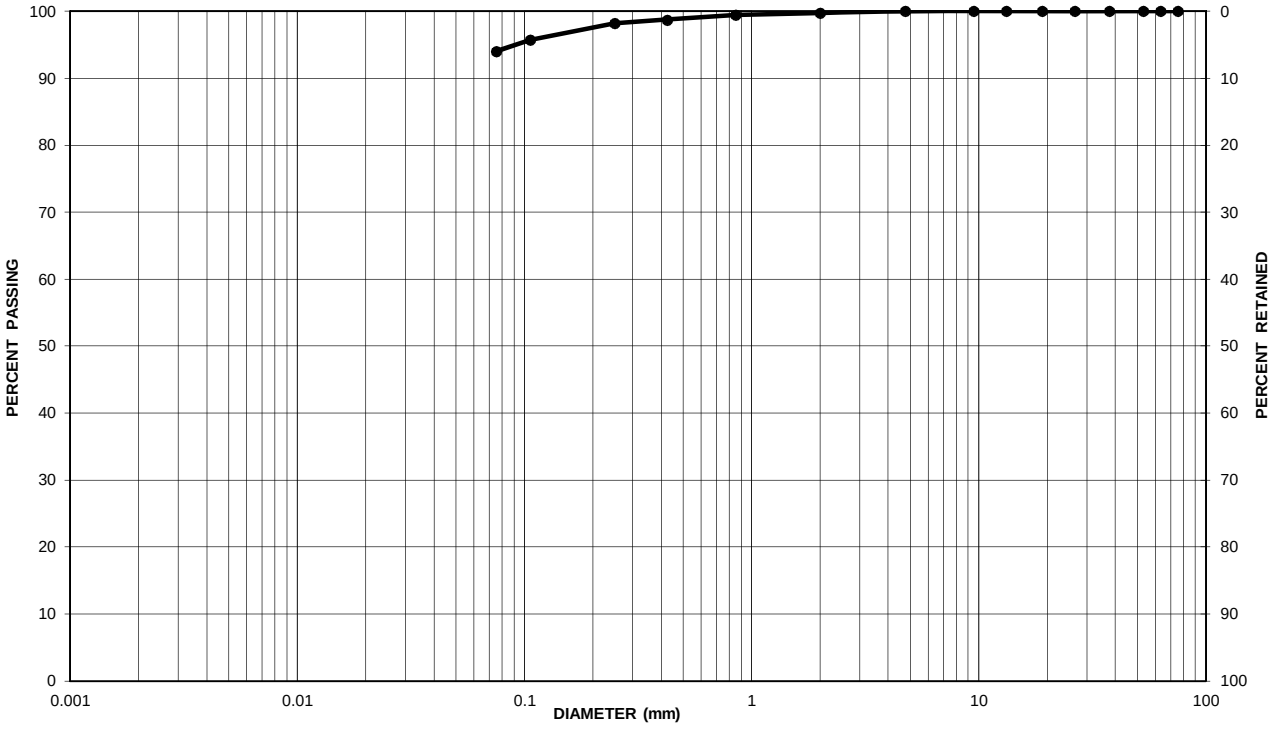
Soil Description	Gravel	Sand	Clay & Silt
BH2 SS5	20	42	38

REMARKS:

PERFORMED BY:		**DATE:**	January 6, 2015
VERIFIED BY:		**DATE:**	January 6, 2015

PARTICLE-SIZE ANALYSIS OF SOILS (GEOTECHNICAL) (USCS) (LS 702)

CLIENT:	2440332 Ontario Inc.	**LAB No.:**	SS-14-113
PROJECT/ SITE:	5262-5318 Main St, Whitchurch-Stouffville, ON	**PROJECT No.:**	11192167-02
Borehole No.:	BH6	Sample No.:	SS8
Depth:	7.6 - 8.1 m	Enclosure:	B-3



CLAY & SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE
UNIFIED SOIL CLASSIFICATION SYSTEM					

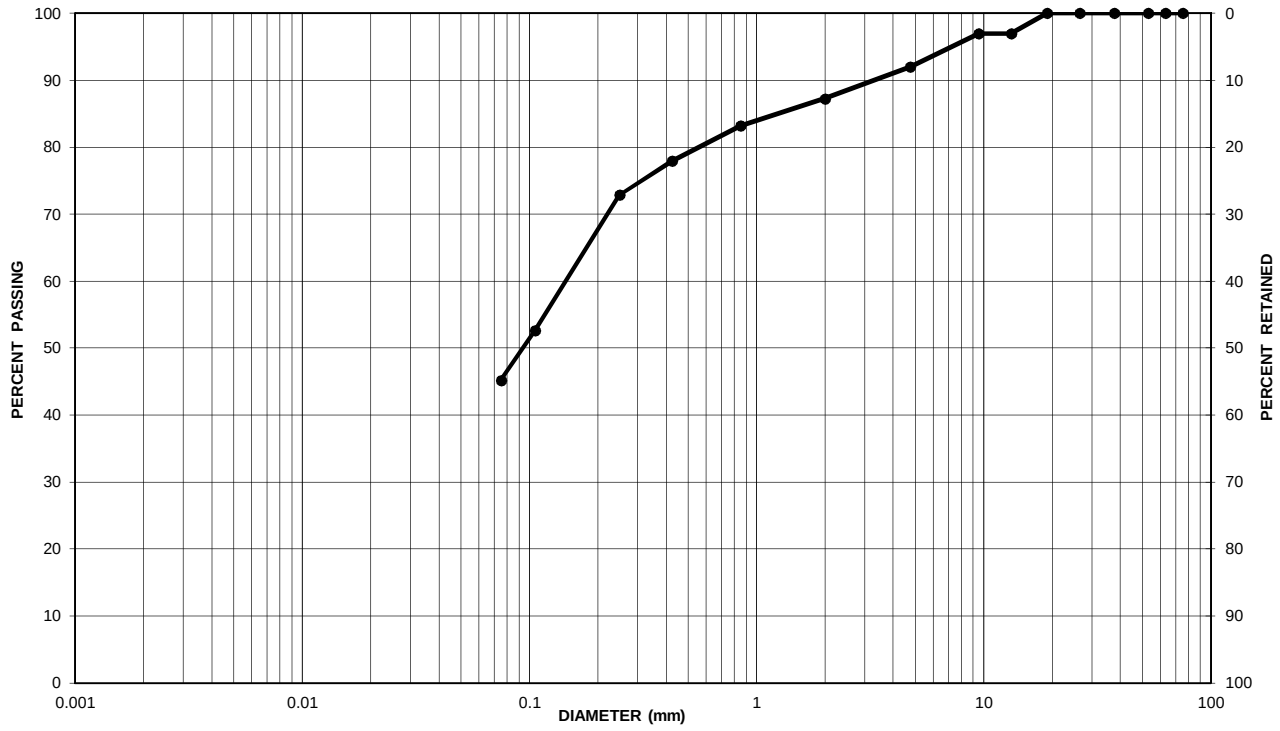
Soil Description	Gravel	Sand	Clay & Silt
BH6 SS8	0	6	94

REMARKS:

PERFORMED BY:		**DATE:**	January 6, 2015
VERIFIED BY:		**DATE:**	January 6, 2015

PARTICLE-SIZE ANALYSIS OF SOILS (GEOTECHNICAL) (USCS) (LS 702)

CLIENT:	2440332 Ontario Inc.	**LAB No.:**	SS-14-113
PROJECT/ SITE:	5262-5318 Main St, Whitchurch-Stouffville, ON	**PROJECT No.:**	11192167-02
Borehole No.:	BH7	Sample No.:	SS1
Depth:	0 - 0.6 m	Enclosure:	B-4



CLAY & SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE
UNIFIED SOIL CLASSIFICATION SYSTEM					

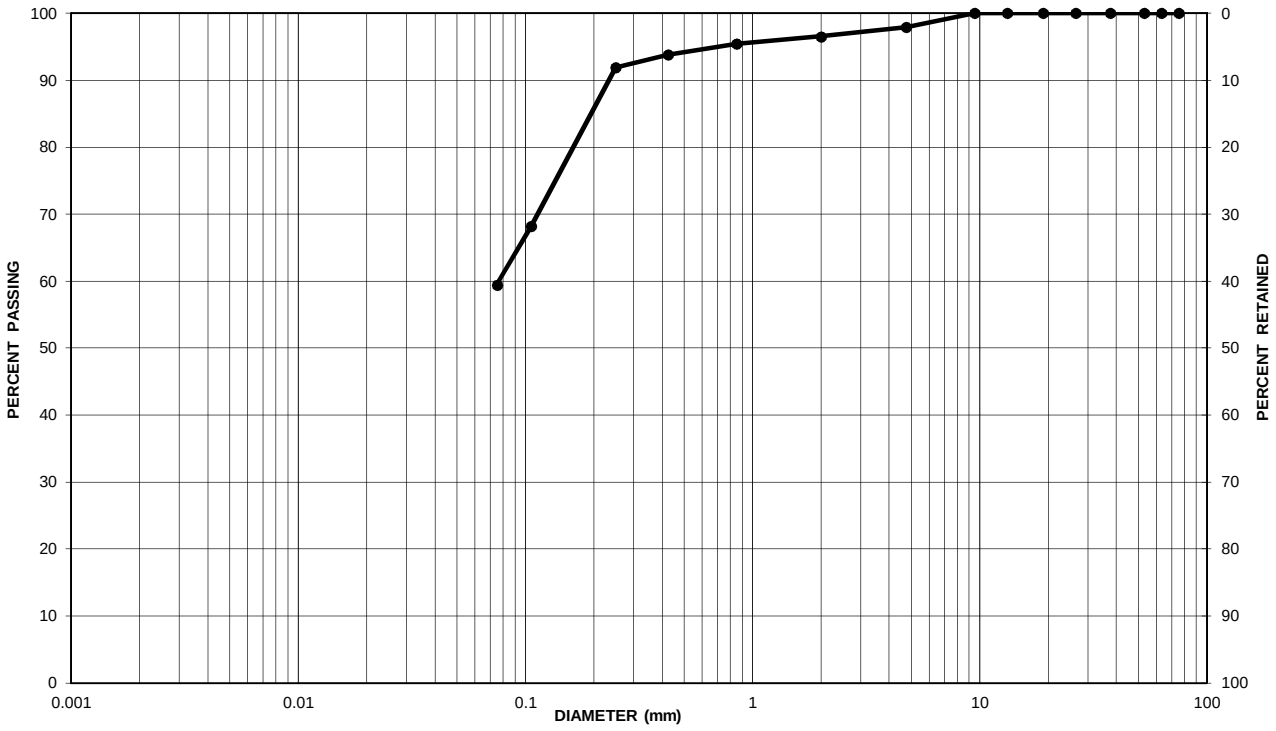
Soil Description	Gravel	Sand	Clay & Silt
BH7 SS1	8	47	45

REMARKS:

PERFORMED BY:		**DATE:**	January 6, 2015
VERIFIED BY:		**DATE:**	January 6, 2015

PARTICLE-SIZE ANALYSIS OF SOILS (GEOTECHNICAL) (USCS) (LS 702)

CLIENT:	2440332 Ontario Inc.	**LAB No.:**	SS-14-113
PROJECT/ SITE:	5262-5318 Main St, Whitchurch-Stouffville, ON	**PROJECT No.:**	11192167-02
Borehole No.:	BH10	Sample No.:	SS13
Depth:	15.2 - 15.7 m	Enclosure:	B-5



CLAY & SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE
UNIFIED SOIL CLASSIFICATION SYSTEM					

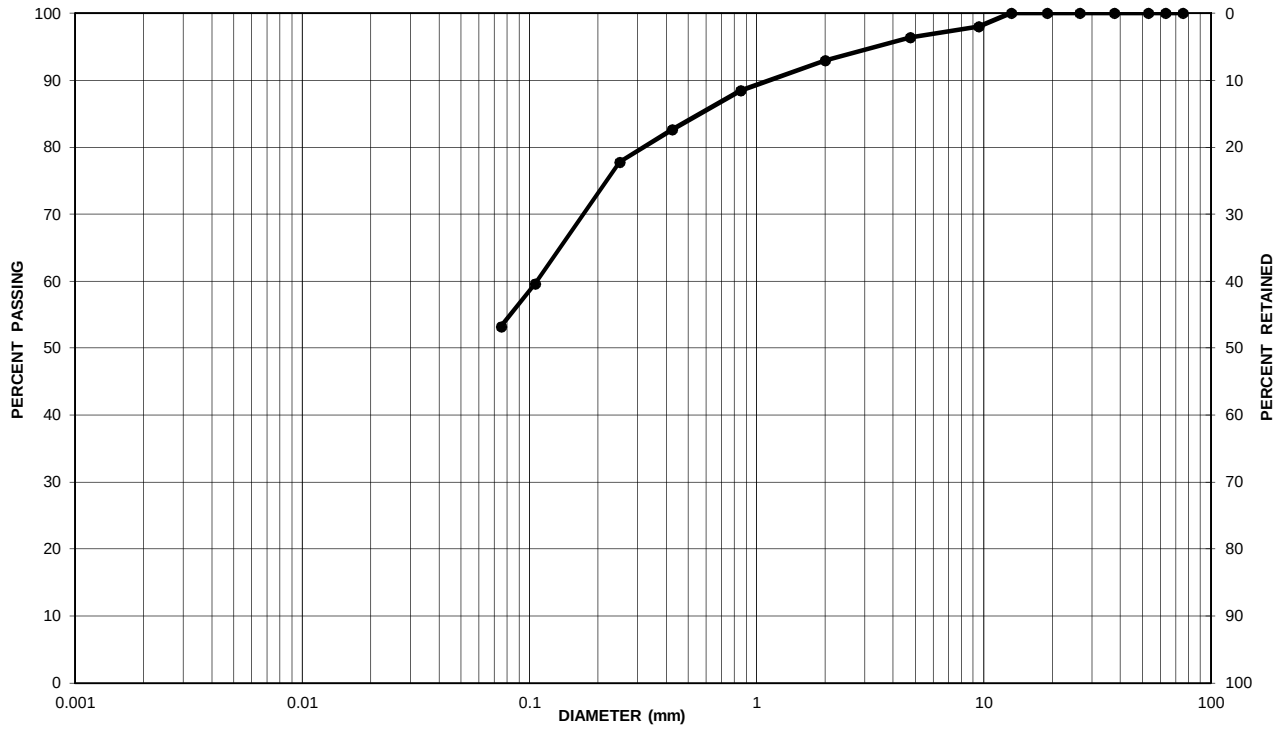
Soil Description	Gravel	Sand	Clay & Silt
BH10 SS13	2	39	59

REMARKS:

PERFORMED BY:		**DATE:**	January 6, 2015
VERIFIED BY:		**DATE:**	January 6, 2015

PARTICLE-SIZE ANALYSIS OF SOILS (GEOTECHNICAL) (USCS) (LS 702)

CLIENT:	2440332 Ontario Inc.	**LAB No.:**	SS-14-113
PROJECT/ SITE:	5262-5318 Main St, Whitchurch-Stouffville, ON	**PROJECT No.:**	11192167-02
Borehole No.:	BH11	Sample No.:	SS3
Depth:	1.5 - 2 m	Enclosure:	B-6



CLAY & SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE
UNIFIED SOIL CLASSIFICATION SYSTEM					

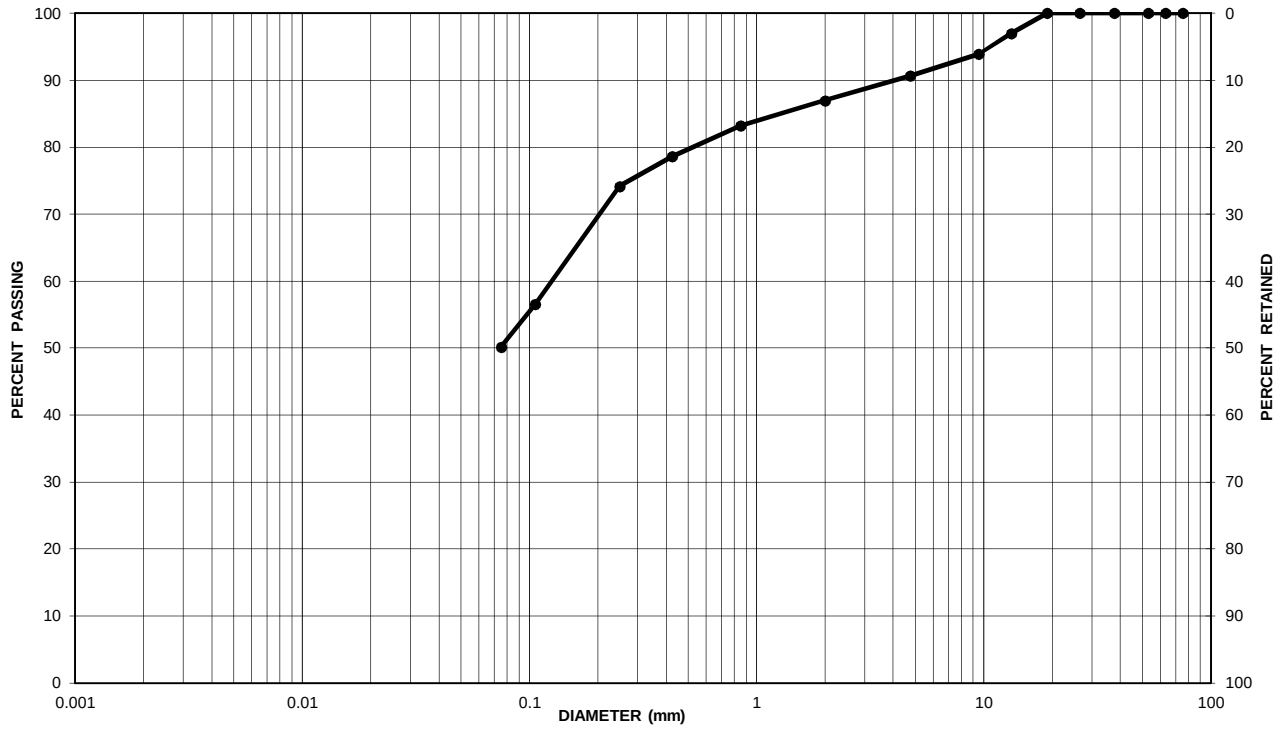
Soil Description	Gravel	Sand	Clay & Silt
BH11 SS3	4	43	53

REMARKS:

PERFORMED BY:		**DATE:**	January 6, 2015
VERIFIED BY:		**DATE:**	January 6, 2015

PARTICLE-SIZE ANALYSIS OF SOILS (GEOTECHNICAL) (USCS) (LS 702)

CLIENT:	2440332 Ontario Inc.	**LAB No.:**	SS-14-113
PROJECT/ SITE:	5262-5318 Main St, Whitchurch-Stouffville, ON	**PROJECT No.:**	11192167-02
Borehole No.:	BH13	Sample No.:	SS10
Depth:	12.2 - 12.65 m	Enclosure:	B-7



CLAY & SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE
UNIFIED SOIL CLASSIFICATION SYSTEM					

Soil Description	Gravel	Sand	Clay & Silt
BH13 SS10	9	41	50

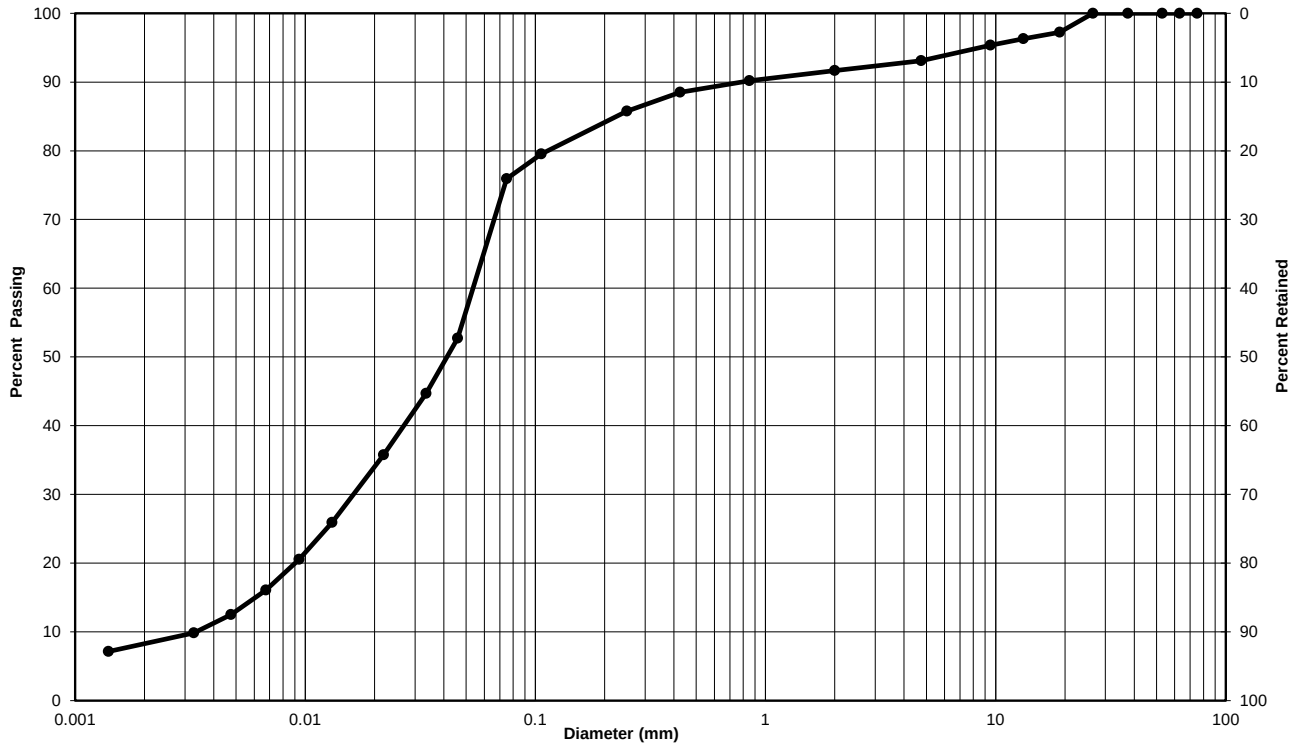
REMARKS:

PERFORMED BY:		**DATE:**	January 6, 2015
VERIFIED BY:		**DATE:**	January 6, 2015

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	2440332 Ontario Inc.	**Lab no.:**	SS-19-27
Project/Site:	5262-5318 Main Street, Stouffville ON	**Project no.:**	11192167-02

Borehole no.:	MW-16	Sample no.:	SS-12
Depth:	13.7 - 14.3 m	Enclosure:	B-8



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
	7	17	76

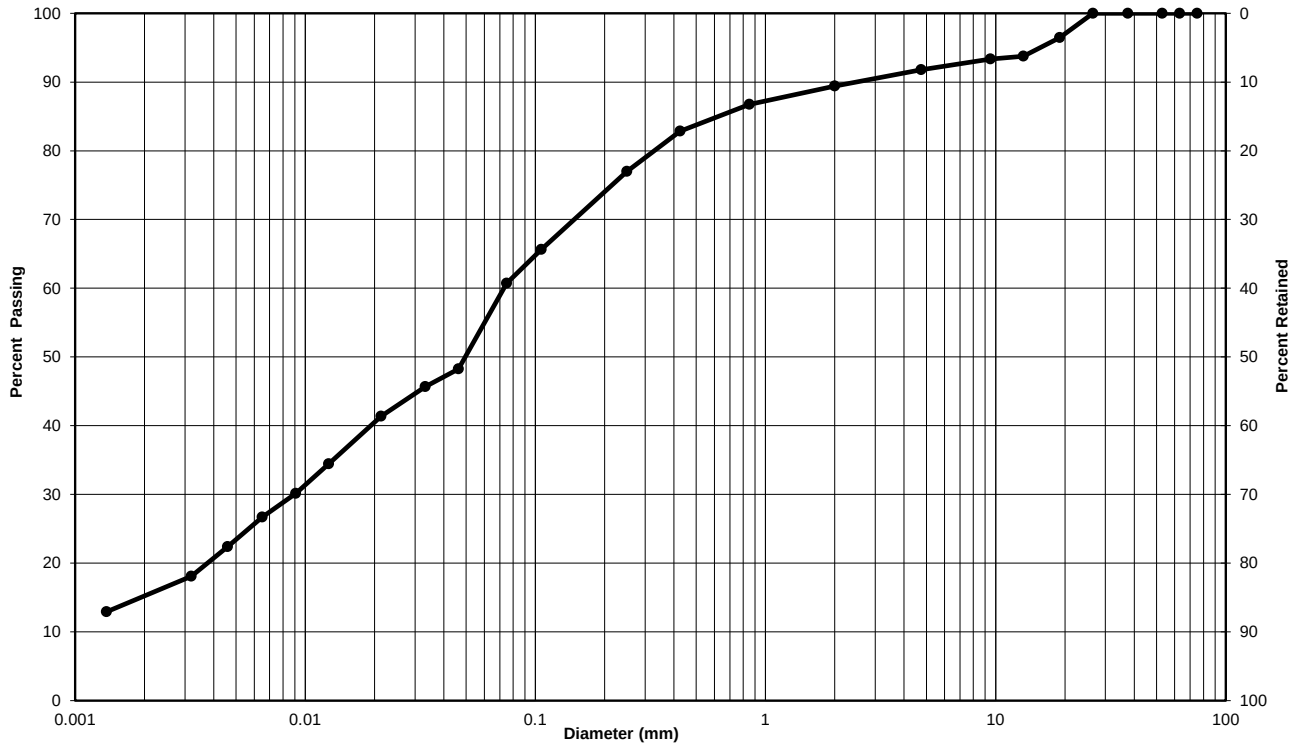
Remarks:

Performed by:	Alex Fawcett	**Date:**	May 7, 2019
Verified by:		**Date:**	May 8, 2019

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	2440332 Ontario Inc.	**Lab no.:**	SS-19-27
Project/Site:	5262-5318 Main Street, Stouffville ON	**Project no.:**	11192167-02

Borehole no.:	MW-16	Sample no.:	SS-3
Depth:	2.3 - 2.9 m	Enclosure:	B-9



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
	8	31	61

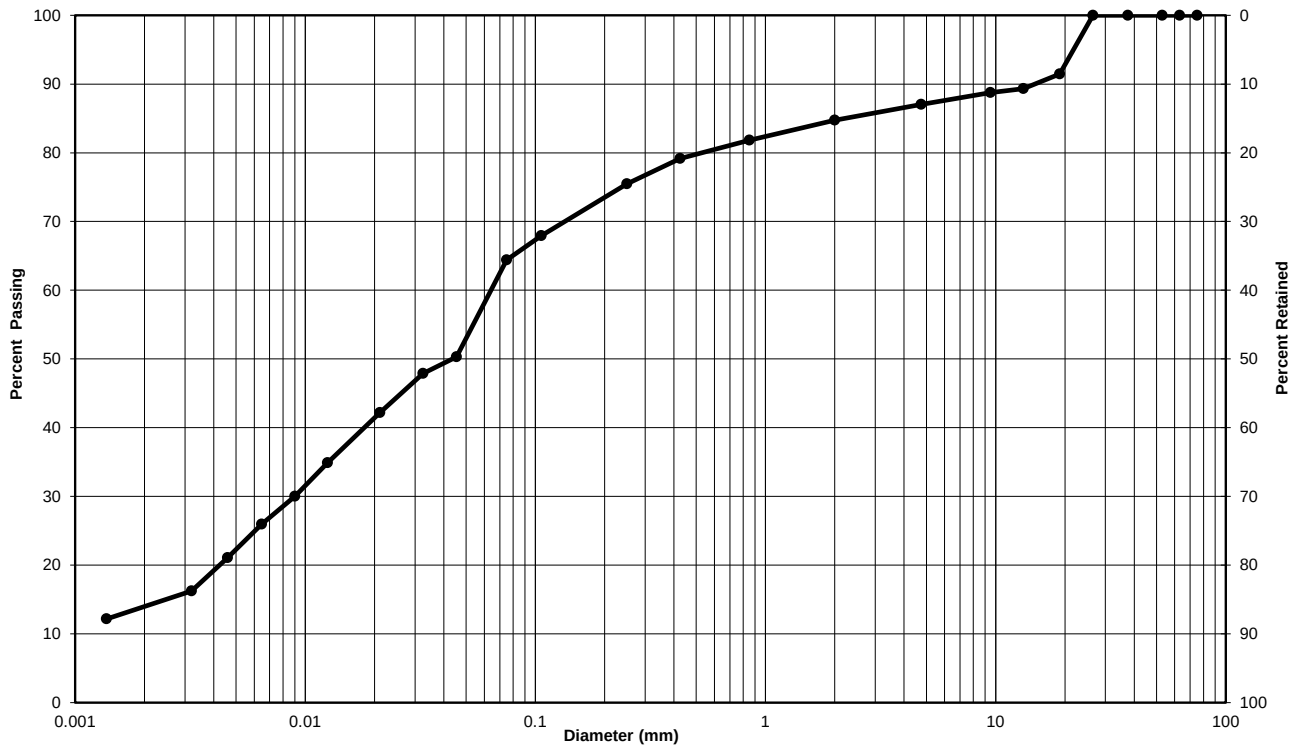
Remarks:

Performed by:	Alex Fawcett	**Date:**	May 7, 2019
Verified by:		**Date:**	May 8, 2019

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	2440332 Ontario Inc.	**Lab no.:**	SS-19-27
Project/Site:	5262-5318 Main Street, Stouffville ON	**Project no.:**	11192167-02

Borehole no.:	MW-16	Sample no.:	SS-6
Depth:	4.6 - 5.2 m	Enclosure:	B-10



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
	13	23	64

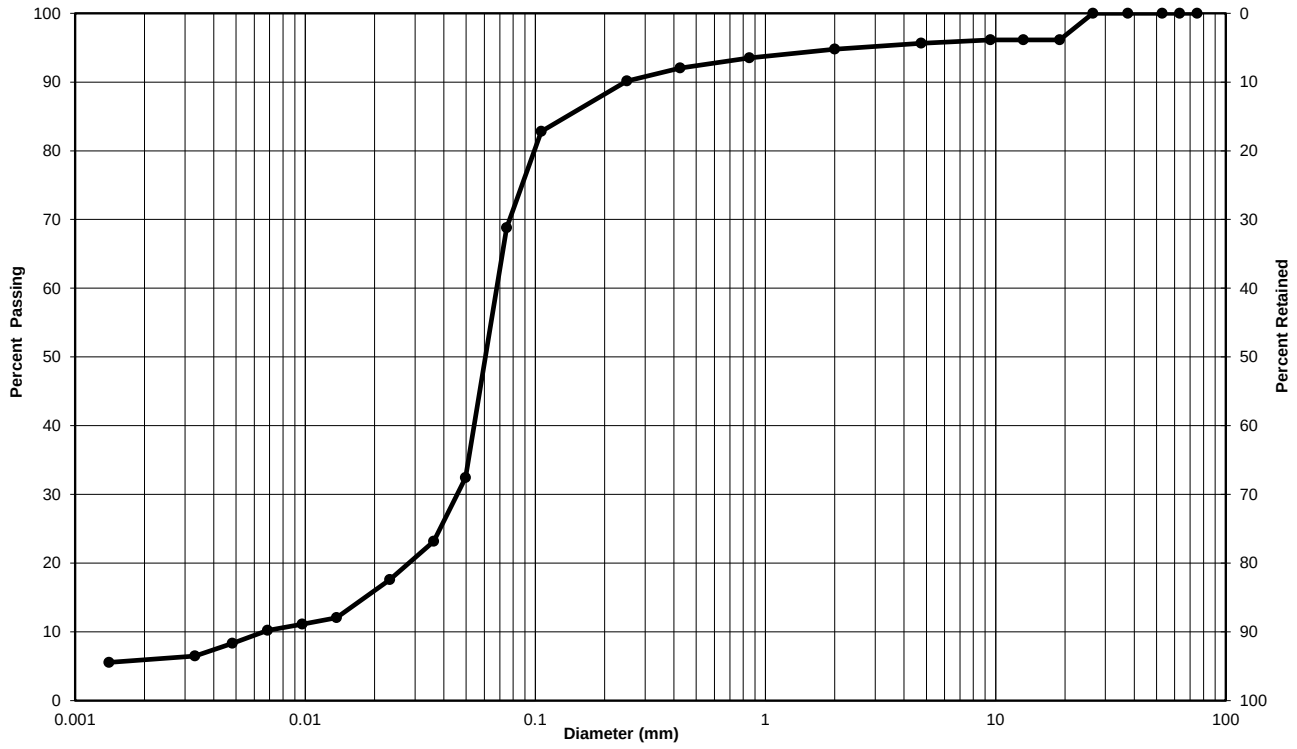
Remarks:

Performed by:	Alex Fawcett	**Date:**	May 7, 2019
Verified by:		**Date:**	May 8, 2019

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	2440332 Ontario Inc.	**Lab no.:**	SS-19-27
Project/Site:	5262-5318 Main Street, Stouffville ON	**Project no.:**	11192167-02

Borehole no.:	MW-16	Sample no.:	SS-8
Depth:	7.6 - 8.2 m	Enclosure:	B-11



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
	4	27	69

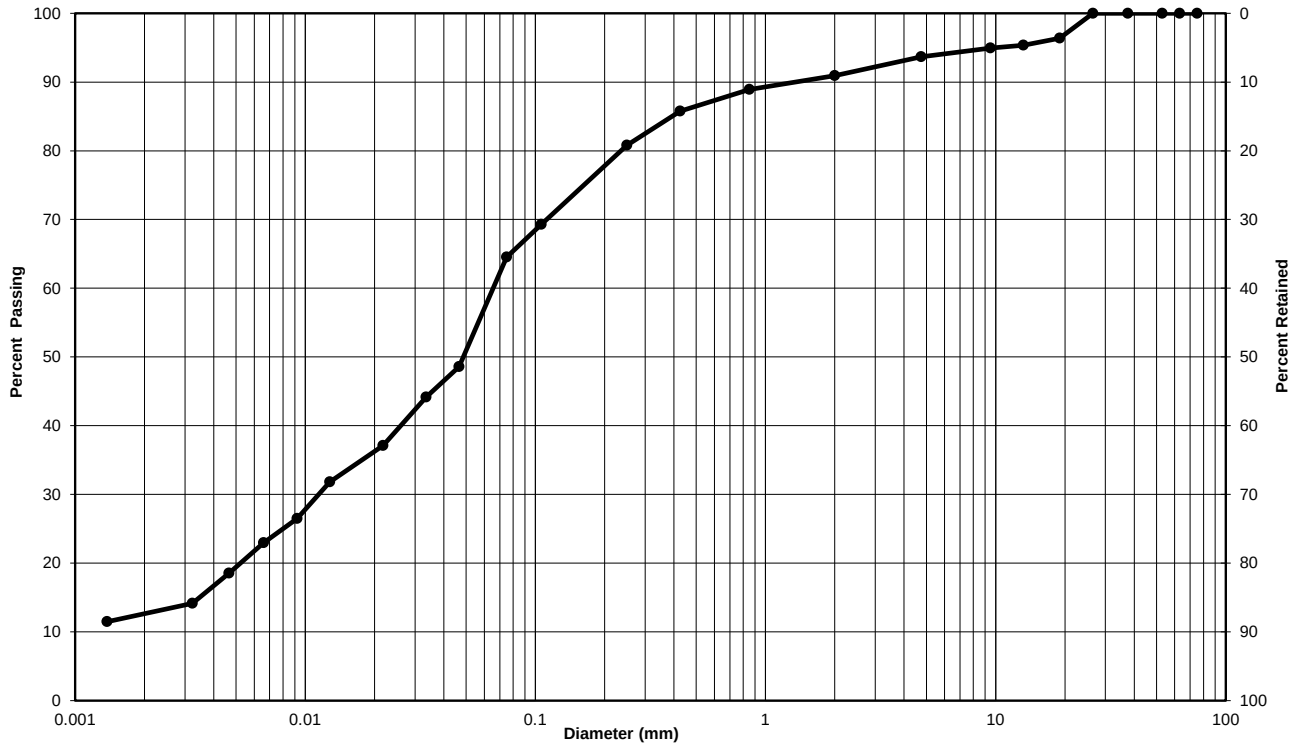
Remarks:

Performed by:	Alex Fawcett	**Date:**	May 7, 2019
Verified by:		**Date:**	May 8, 2019

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	2440332 Ontario Inc.	**Lab no.:**	SS-19-27
Project/Site:	5262-5318 Main Street, Stouffville ON	**Project no.:**	11192167-02

Borehole no.:	MW-18	Sample no.:	SS-5
Depth:	3.05 - 3.7 m	Enclosure:	B-12



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
	6	29	65

Remarks:

Performed by:	Alex Fawcett	**Date:**	May 7, 2019
Verified by:		**Date:**	May 8, 2019

Appendix E

2020 National Building Code of Canada Seismic Hazard Tool

Government of Canada Gouvernement du Canada

Canada.ca › Natural Resources Canada › Earthquakes Canada

2025 - 2020 National Building Code of Canada Seismic Hazard Tool

This application provides seismic values for the design of buildings in Canada under Part 4 of the National Building Code of Canada (NBC) 2020 and 2025, as prescribed in Article 1.1.3.1. of Division B of the respective NBC editions.

Seismic Hazard Values

User requested values

Code edition	NBC 2025
Site designation X_S	X_D
Latitude (°)	43.966
Longitude (°)	-79.279

Please select one of the tabs below.

NBC 2025 | Additional Values | Plots | API | Background Information

The 5%-damped spectral acceleration (S_a(T,X), where T is the period, in s, and X is the site designation) and peak ground acceleration (PGA(X)) values are given in units of acceleration due to gravity (g, 9.81 m/s^2). Peak ground velocity (PGV(X)) values are given in m/s. Probability is expressed in terms of percent exceedance in 50 years. Further information on the calculation of seismic hazard is provided under the *Background Information* tab.

The 2%-in-50-year seismic hazard values are provided in accordance with Article 4.1.8.4. of the NBC 2025. The 5%- and 10%-in-50-year values are provided for additional performance checks in accordance with Article 4.1.8.23. of the NBC 2025.

See the *Additional Values* tab for additional seismic hazard values, including values for other site designations, periods, and probabilities not defined in the NBC 2025.

NBC 2025 - 2%/50 years (0.000404 per annum) probability

$S_a(0.2, X_D)$	$S_a(0.5, X_D)$	$S_a(1.0, X_D)$	$S_a(2.0, X_D)$	$S_a(5.0, X_D)$	$S_a(10.0, X_D)$	PGA(X_D)	PGV(X_D)
0.313	0.295	0.176	0.0837	0.0221	0.00692	0.187	0.189

The log-log interpolated 2%/50 year S_a(4.0, X_D) value is : **0.0306**

▼ Tables for 5% and 10% in 50 year values

NBC 2025 - 5%/50 years (0.001 per annum) probability

$S_a(0.2, X_D)$	$S_a(0.5, X_D)$	$S_a(1.0, X_D)$	$S_a(2.0, X_D)$	$S_a(5.0, X_D)$	$S_a(10.0, X_D)$	PGA(X_D)	PGV(X_D)
0.194	0.183	0.105	0.0485	0.0119	0.00377	0.115	0.109

The log-log interpolated 5%/50 year S_a(4.0, X_D) value is : **0.0168**

NBC 2025 - 10%/50 years (0.0021 per annum) probability

$S_a(0.2, X_D)$	$S_a(0.5, X_D)$	$S_a(1.0, X_D)$	$S_a(2.0, X_D)$	$S_a(5.0, X_D)$	$S_a(10.0, X_D)$	$PGA(X_D)$	$PGV(X_D)$
0.123	0.118	0.066	0.0293	0.00673	0.00213	0.072	0.0664

The log-log interpolated 10%/50 year $S_a(4.0, X_D)$ value is : **0.0096**

Download CSV

← Go back to the seismic hazard calculator form

Date modified: 2026-01-21