

TOWN OF CALEDON
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Report on
Preliminary Geotechnical Investigation
Proposed Innis Lake Secondary Plan Area
Caledon, Ontario

Prepared For:
Innis Lake Secondary Plan Area Landowners
c/o Mattamy (Innis Lake) Limited

Project No: 22-030-100/101
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1. INTRODUCTION

DS Consultants Ltd. (DS) was retained by the Innis Lake Secondary Plan Area Landowners c/o Mattamy (Innis Lake) Limited to undertake a preliminary geotechnical investigation for the proposed Innis Lake Secondary Plan Area, in Caledon Ontario. At the time of writing this report, permission to enter was only obtained for the properties located at 12351 Innis Lake Road and 12250 Centreville Creek Road, Caledon, Ontario.

Based on Conceptual Development Plan, the proposed development will consist of a mix of low-rise residential uses and dwelling types, an urban corridor which allows higher-intensity forms of development including retail and service commercial uses, offices and residential, as well as community and institutional uses such as schools and parks. A network of underground utilities, roads and SWM (Storm Water Management) ponds will be constructed for the proposed development. The finish floor elevation of the proposed development and the invert of the site services are not known at the time of writing this report.

Two (2) noticeable water courses/creeks with slopes are located at the site. Slope stability analysis and setback study will be addressed separately.

In 2022, DS conducted a preliminary geotechnical investigation for the property located at 12351 Innis Lake Road. The results of the preliminary geotechnical investigation were presented on report entitled 'Report on Preliminary Geotechnical Investigation, Proposed Residential Subdivision, 12351 Innis Lake Road, Caledon, Ontario', dated April 13, 2022, Project Number 22-030-100. Ten (10) boreholes BH22-1 to BH22-10 were drilled to depths ranging from 6.6 to 8.2 m during this investigation. Additional eleven (11) boreholes BH22-11 to BH22-21 were drilled to depths of 2.1 to 3.7 m to further explore the depths of fill materials encountered at 12351 Innis Lake Road property.

The current geotechnical investigation/monitoring installation includes ten (10) boreholes BH25-4 to BH25-10 and BH25-13 to BH25-15 to depths of 5.4 to 12.2 m below existing grade.

This report deals with geotechnical aspect only. This report supersedes the previous geotechnical report dated April 13, 2022.

The purpose of this preliminary geotechnical investigation was to obtain information about the subsurface conditions at borehole locations and from the findings in the boreholes to provide recommendations pertaining to the geotechnical design of underground utilities/SWM ponds, subdivision roads, and to comment on the foundation conditions for general house construction.

This report is provided on the basis of the terms of reference presented above and, on the assumption, that the design will be in accordance with the applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It

may then be necessary to carry out additional borings and reporting before the recommendations of this office can be relied upon.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for the Innis Lake Secondary Plan Area Landowners and its architect and designers. Third party use of this report without DS consent is prohibited.

2. FIELD AND LABORATORY WORK

A total of thirty-one (31) boreholes (BH22-1 to BH22-21, BH25-4 to BH25-10 and BH25-13 to BH25-15 see **Drawing 1** for borehole locations) were drilled to depths ranging from 2.1 to 12.2 m below existing grade.

The boreholes were drilled with solid/hollow stem continuous flight augers equipment and mud rotary by a drilling sub-contractor under the direction and supervision of DS personnel. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method. The samples were logged in the field and returned to the DS laboratory for detailed examination by the project engineer and for laboratory testing.

In borehole BH25-15, upon encountering the bedrock surface, shale bedrock was cored from 9.2 to 12.2 m. The bedrock was cored with HQ-2 double tube wireline equipment providing 63 mm dia. rock core samples. The coring was carried out under the full-time supervision of a representative from DS who identified and described the rock samples, noting and recording the percentages of total and solid rock core recovery, RQD values, fracture index and the percentage and thicknesses of hard layers.

In addition to visual examination in the laboratory, all soil samples were tested for moisture contents. Selected thirteen (13) soil samples were subjected to grain size analyses and seven (7) samples were conducted for Atterberg Limits testing. The results of lab testing are provided on the respective borehole logs and presented in **Appendix A**.

Water level observations were made during drilling and in the open boreholes at the completion of the drilling operations. Monitoring wells were installed in sixteen (16) boreholes (BH22-2 to BH22-4, BH22-7, BH22-8, BH22-10, BH25-4 to BH25-10 and BH25-13 to BH25-15) for the long-term groundwater level monitoring and hydrogeological study.

The elevation surveying of the borehole locations was undertaken by DS personnel, using the differential GPS unit. It should be noted that the elevations at the as-drilled borehole/well locations were not provided by a professional surveyor and should be considered to be approximate. Contractors

performing any work referenced to the borehole elevations should confirm the borehole elevations for their work.

3. SUBSURFACE CONDITIONS

The borehole location plan is shown on **Drawing 1**. General notes on sample description are provided on **Drawing 1A**. The subsurface conditions in the boreholes are presented in the individual borehole logs presented on **Drawings 2 to 32**. Generalized Sub-Surface Profiles of Cross Sections A-A, B-B and C-C are presented on **Drawings 33 to 35**.

3.1 SOIL CONDITIONS

Topsoil:

A surficial topsoil layer, ranging in thickness from 200 to 310 mm was encountered at all borehole locations.

It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative for the site and should not be relied on to calculate the amount of topsoil at the site. Shallow test-pits should be carried out to further explore the topsoil conditions.

Fill Materials:

Fill material consisting of clayey silt to silty clay was encountered in all boreholes and extended to depths ranging from 0.8 to 3.1 m below existing grade. The fill material contained trace topsoil, wood pieces and organics. The SPT 'N' values measured in clayey silt to silty clay fills ranged from 4 to 20 blows per 300 mm of penetration indicating a firm to very stiff consistency.

It should be noted that additional boreholes BH22-11 to BH22-21 were drilled to further explore the fill conditions at 12351 Innis Lake Road property during the due diligence time. The fill materials were found in a dark brown to dark color, trace topsoil, organics and wood pieces. The fill materials must be removed prior to engineered fill placement.

Silty Clay to Clayey Silt Till:

Silty clay to clayey silt till deposits were encountered below fill material in all boreholes and extended to depths ranging from 2.1 to 10.7 m below existing grade. The silty clay to clayey silt till deposits were present in a firm to hard consistency, with measured SPT 'N' values ranging from 5 to more than 50 blows per 300 mm of penetration. Cobbles/boulders were inferred within the till deposits during drilling.

Grain size analyses of twelve (12) soil samples from clayey till (BH22-8/SS5, BH22-10/SS5, BH25-4/SS6, BH25-5/SS2, BH25-5/SS6, BH25-6/SS6, BH25-8/SS2, BH25-9/SS6, BH25-10/SS7, BH25-13/SS6, BH25-13/SS9 and BH25-14/SS5) were conducted and the results are provided on the respective borehole logs and in **Appendix A**, with the following fractions:

Clay: 20 to 54%
Silt: 38 to 54%
Sand: 7 to 23%
Gravel: 0 to 8%

Atterberg limits tests of seven (7) silty clay to clayey silt till samples (BH22-10/SS5, BH25-4/SS6, BH25-5/SS2, BH25-8/SS2, BH25-9/SS6, BH25-10/SS7 and BH25-13/SS6) were conducted. The results are shown on the borehole logs and in **Appendix A** and are summarized as follows:

Liquid limit (W_L): 25.5 to 43.5 %
Plastic limit (W_p): 14.0 to 20.5%
Plasticity index (PI): 11.5 to 23.0

Clayey Silt/Clayey Silt to Silt:

Clayey silt/clayey silt to silt was encountered below silty clay till in BH22-6, BH25-5, BH25-9, BH25-13 and BH25-15, extending to depths of 6.6 to 11.3 m below existing grade. The clayey silt/clayey silt to silt was present in a hard consistency, with measured SPT 'N' values of 37 to greater than 50 blows per 300 mm of penetration.

Grain size analysis of one (1) clayey silt to silt sample (BH25-15/SS7) was conducted and the results are provided on the respective borehole log and in **Appendix A**, with the following fractions:

Clay: 18%
Silt: 80%
Sand: 2%
Gravel: 0

Silty Sand Till:

Silty sand till (pocket) was encountered overlying clayey silt till/shale complex in BH22-10 and extended to a depth of 6.3 m below existing grade, with a thickness of about 0.2 m. The silty sand till was present in a very dense state, with a measured SPT 'N' value of 62 blows per 300 mm of penetration. Occasional cobbles/boulders should be expected within the till deposits.

Clayey Silt Till / Shale Complex:

What is described as 'clayey silt till/shale complex' consists of a rather heterogeneous, hard silty clay matrix containing extensive broken bedrock (shale, limestone and siltstone) slabs and fragments. This stratum was reportedly difficult to auger due to the fragmented shale/limestone/siltstone content and given its hard condition. This complex is a transitional deposit between bedrock and the overlying clayey silt till or may be the completely to highly weathered bedrock. This deposit has characteristics of both the shale/limestone/siltstone bedrock and silty clay.

Clayey silt till/shale complex was found in all boreholes except for BH22-6 and BH22-7. The clayey silt till/shale complex was penetrated in BH22-1 and BH22-5 and the thickness of the till/shale complex in

these two boreholes ranged from 1.5 to 1.6 m. The clayey silt till/shale deposit was found to have generally a hard consistency, with measured SPT 'N' values over 50 blows per 300 mm of penetration.

Shale Bedrock:

Based on the observation of the shale fragments retrieved from sampler, probable weathered shale/shale bedrock was encountered in boreholes BH22-1, BH22-5, BH22-7, BH25-7, BH25-8 and BH25-14 at depths ranging from 2.3 m to 6.2 m below existing grade. Rock coring was conducted from depths of 9.2 to 12.2 m in borehole BH25-15. The approximate depths and elevations of shale bedrock surface are presented in **Table 1** below.

Table 1: Approximate Depth and Elevation of Shale Bedrock Surface

Borehole No.	Borehole Elevation	Depth of Shale Bedrock Surface below Existing Ground (m)	Approximate Elevation of Shale Bedrock Surface (m)	Notes
BH22-1	234.4	6.1	228.3	Bedrock was augered from 6.1 to 6.2 m
BH22-5	230.2	6.1	224.1	Bedrock was augered from 6.1 to 6.2 m
BH22-7	232.5	6.1	226.4	Bedrock was augered from 6.1 to 6.2 m
BH25-7	228.7	2.3	226.4	Bedrock was augered from 2.3 to 6.2 m
BH25-8	234.3	4.9	229.4	Bedrock was augered from 4.9 to 5.4 m
BH25-14	232.3	4.6	227.7	Bedrock was augered from 4.6 to 9.2 m
BH25-15	226.4	7.6	218.8	Bedrock was augered and cored from 7.6 to 12.2 m

Because of the method of drilling and sampling, the surface elevations of the bedrock can be different than indicated on the borehole logs. With augering, the auger may penetrate some of the more weathered shale and the coring may therefore begin below the bedrock surface. Commonly the overburden overlying the shale contains slabs of limestone which would give a false indication of the bedrock level. Similarly, the depth of weathering cannot be determined accurately due to the presence of limestone layers.

General comments on shale bedrock in Greater Toronto Area are presented in **Appendix B**. Photographs of recovered bedrock cores from BH25-15 are also presented in **Appendix B**. The following is detailed description of rock core samples obtained from BH25-15.

Total Core Recovery (TCR): The total core recovery indicates the total length of rock core recovered, expressed as a percentage of the actual length of the core run. The total core recovery in the corehole was 83% to 96%. Generally, less core recovery was experienced only near the surface of the rock, where the formation is slightly weathered and was almost full as depth increased.

Solid Core Recovery (SCR): The solid core recovery is the total length of solid, full diameter rock core that was recovered, expressed as a percentage of the length of the core run. Solid core recovery ranged from 79% to 92%, and also appears to generally improve with depth. The SCR index was generally influenced by the orientations of the fractures. SCR was low when fractures oblique to the borehole axis were intercepted.

Rock Quality Designation (RQD): The rock quality designation index is obtained by measuring the total length of recovered rock core pieces which are longer than 100 mm and expressing their sum total length as a percentage of the length of the core run. RQD is a function of the frequency of joints, bedding plane partings and fractures in the rock cores. While the use of double tube core barrels provided reasonably good protection of the core during drilling and core retrieval, the fissile nature of the shale greatly influences the RQD values of the rock cores. Consequently, it is believed that the RQD values recorded underestimate the rock quality classification of the laminated fissile shale. The recorded RQD values in the cores ranged from 62 to 88 percent which also improved with depth.

Hard Layers: Based on the visual examination of the rock cores, an attempt was made to identify and record the thickness and percentages of the relatively harder siltstone and limestone layers. The percentage of the “hard layers” per core run was 11% to 28%. The thickness of these layers varied but was generally less than 150 mm, however, thicker layers to be as much as 750 to 900 mm have been observed at other sites in GTA. The layers are actually lenses and they can vary significantly in thickness over short distance. Encountering such thick layers should be anticipated. It is also common to encounter closely spaced groupings of thin strong limestone/siltstone layers which individually may only be 25 to 50 mm thick but collectively can be 1 m in thickness.

Methane Gas: Although not detected during drilling at this site, methane gas may be existed in the bedrock as indicated in **Appendix B**. Appropriate care and monitoring is essential in all confined bedrock excavations.

3.2 GROUNDWATER CONDITIONS

Groundwater levels were recorded on March 31, 2022 and April 1, 2025, at depths ranging from 1.0 to 7.2 m below the existing grade, corresponding to Elevations 221.2 to 233.1 m. The monitoring wells in BH25-4 and BH25-5 were dry on April 1, 2025. The groundwater levels measured in the monitoring wells are summarized in **Table 2**.

Table 2: Summary of Groundwater Level Measurements in Monitoring Wells

Borehole No.	Ground Surface Elev. (m)	Date of Observation	Depth of Groundwater (m)	Elevation of Groundwater (m)
BH22-2	235.0	March 31, 2022	1.9	233.1
		April 1, 2025	2.7	232.3
BH22-3	234.2	March 31, 2022	2.4	231.8
		April 1, 2025	2.4	231.8
BH22-4	232.3	March 31, 2022	6.1	226.1
BH22-7	232.5	March 31, 2022	3.4	229.1
		April 1, 2025	3.4	229.1
BH22-8	232.6	March 31, 2022	2.8	229.8
		April 1, 2025	2.9	229.7
BH22-10	230.7	March 31, 2022	4.1	226.5
		April 1, 2025	4.1	226.5
BH25-4	235.9	April 1, 2025	Dry	-
BH25-5	232.3	April 1, 2025	Dry	-
BH25-6	233.9	April 1, 2025	6.0	227.9
BH25-7	228.7	April 1, 2025	1.5	227.2
BH25-8	234.3	April 1, 2025	2.5	231.8
BH25-9	229.9	April 1, 2025	2.3	227.6
BH25-10	228.6	April 1, 2025	7.2	221.4
BH25-13	233.0	April 1, 2025	Deep Well	230.2
			Shallow Well	228.3
BH25-14	232.3	April 1, 2025	Deep Well	228.4
			Shallow Well	231.1
BH25-15	226.4	April 1, 2025	Deep Well	221.2
			Shallow Well	225.4

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.

Further groundwater monitoring must be carried out to confirm the groundwater conditions. Refer to hydrogeological study for more information regarding long-term groundwater levels at the site.

4. GEOTECHNICAL RECOMMENDATIONS FOR RESIDENTIAL DEVELOPMENT

Based on the borehole information, preliminary geotechnical discussion and recommendations for the proposed development are presented as follows.

4.1 SITE GRADING AND ENGINEERED FILL

The development of the site will require cut and fill operations to meet the design grading plans. In the areas where earth fill is required for the site grading purposes, an engineered fill can be constructed below foundations, roads/driveways, parking lots, etc.

It should be noted that additional boreholes BH22-11 to BH22-21 were drilled to further explore the fill conditions at 12351 Innis Lake Road property during the due diligence time. The fill materials were found in a dark brown to dark color, trace topsoil, organics and wood pieces. The fill materials must be removed prior to engineered fill placement.

Prior to the placement of engineered fill, all of the existing topsoil, fill materials and weathered/disturbed native soils must be removed, and the exposed surface proof rolled. Any soft spots revealed during proof rolling must be sub-excavated and re-engineered. The engineered fill consisting of approved inorganic material must be compacted to 100% Standard Proctor Maximum Dry Density (SPMDD) throughout. To reduce the risk of improperly placed engineered compacted fill, full-time supervision of the contractor is essential.

General guidelines for the placement and preparation of engineered fill are presented on **Appendix C**.

Relative weaker (firm) silty clay deposits were encountered in some boreholes (i.e. BH25-6 and BH25-10), with SPT 'N' values of 5 to 7 blows per 300 mm penetration. If grade raise is more than 1.5 m at the site, DS should be retained to evaluate the ground settlement and possible ground consolidation measures for the proposed development.

4.2 ROADS

The investigation has shown that the predominant subgrade soil, after stripping the topsoil and any other organic and otherwise unsuitable subsoil, will generally consist of clayey silt to silty clay (till).

Based on the above and assuming that traffic usage will be residential local road, the following minimum pavement thickness is recommended for road to be constructed within the development:

50 mm HL3 Asphaltic Concrete

60 mm HL8 Asphaltic Concrete

150 mm of 19mm Crusher Run Limestone (CRL)

350 mm of 50mm Crusher Run Limestone (CRL)

The site subgrade and weather conditions (i.e. if wet) at the time of construction may necessitate the placement of thicker granular sub-base layer in order to facilitate the construction. The need for filter fabric/geo-grid can be evaluated during construction stage. Furthermore, heavy construction equipment

may have to be kept off the newly constructed roads before the placement of asphalt and/or immediately thereafter, to avoid damaging the weak subgrade by heavy truck traffic.

4.2.1. STRIPPING, SUB-EXCAVATION AND GRADING

The site should be stripped of all topsoil, fill and any organic, weathered or otherwise unsuitable soils to the full depth of the roads, both in cut and fill areas. Following stripping, the site should be graded to the subgrade level and approved. The subgrade should then be proof-rolled, in the presence of the Geotechnical Engineer, by at least several passes of a heavy compactor having a rated capacity of at least 8 tonnes. Any soft spots thus exposed should be removed and replaced by select fill material, similar to the existing subgrade soil and approved by the Geotechnical Engineer. The subgrade should then be re-compacted from the surface to at least 98% of its Standard Proctor Maximum Dry Density (SPMDD). The final subgrade should be cambered or otherwise shaped properly to facilitate rapid drainage and to prevent the formation of local depressions in which water could accumulate.

Proper cambering is required to allow the surface water to escape towards the sides, where it can be removed by means of subdrains. Otherwise, any water collected in the granular sub-base materials could be trapped thus causing problems due to softened subgrade, differential frost heave, etc. For the same reason damaging the subgrade during and after placement of the granular materials by heavy construction traffic should be avoided. If the moisture content of the local material cannot be maintained at $\pm 2\%$ of the optimum moisture content, imported granular material may need to be used.

Any fill required for re-grading the site or backfill should be select, clean material, free of topsoil, organic or other foreign and unsuitable matter. The fill should be placed in thin layers and compacted to at least 98% of its SPMDD or as per City Standards. The compaction of the new fill should be checked by frequent field density tests.

4.2.2. ROAD CONSTRUCTION

Once the subgrade has been inspected and approved, the granular base and sub-base course materials should be placed in layers not exceeding 200 mm (uncompacted thickness) and should be compacted to 100% of their respective SPMDD. The grading of the material should conform to current OPS Specifications.

The placing, spreading and rolling of the asphalt should be in accordance with OPS Specifications or, as required by the local authorities.

Frequent field density tests should be carried out on both the asphalt and granular base and sub-base materials to ensure that the required degree of compaction is achieved.

4.2.3. DRAINAGE

The installation of full-length subdrains is required on all roads. The subdrains should be properly filtered to prevent the loss of (and clogging by) soil fines.

All paved surfaces should be sloped to provide satisfactory drainage towards catch-basins. As discussed in Section 4.2.1, by means of good planning any water trapped in the granular sub-base materials should be drained rapidly towards subdrains or other interceptors.

4.3 SEWERS

As a part of the site development, a network of new sewers will be constructed. The inverts of utility pipes are unknown at the time of preparing this report. For the discussion purpose of this report, the invert of utility pipes is assumed not greater than 5 m below existing grade.

4.3.1. TRENCHING

Excavations in soils can be carried out with heavy hydraulic backhoe. Cobbles and boulders are present at the site as evidence of auger grinding. Provisions should be provided in the contractor documents to deal with the boulders and cobbles encountered at the site.

Hard rock layers of limestone/siltstone are anticipated in the shale bedrock and clayey silt till/shale complex. Excavation in shale bedrock will require the use of hoe-ram or jack hammers to penetrate the limestone/siltstone layers. The removal of the underlying sound rock and especially the interbedded limestone and siltstone layers will be arduous and time consuming. The relative ease/difficulty in excavation of bedrock will also depend on the size (width) and depth of the excavation.

If sewers are to be installed in shale bedrock more than 2.0 m below the shale bedrock surface, a minimum of 100 mm thick polystyrene etc. layer will be required at both sides of the pipe to avoid rock squeezing. The polystyrene layer should extend vertically to at least 0.3 m above the pipe. The rock trench should be wide enough so that at each side, the horizontal distance between the pipe side and the cut rock surface is at least 0.3 m. This should be further evaluated during the design stage.

Groundwater levels were recorded on March 31, 2022 and April 1, 2025, at depths ranging from 1.0 to 7.2 m below the existing grade, corresponding to Elevations 221.2 to 233.1 m. Groundwater seepage within the clayey silt to silty clay (till) and till/complex is expected to be slow and manageable by gravity drainage and pumping from filtered sumps. More significant groundwater seepage/inflow would be expected from the cohesionless silt/silty sand soil and zone of sandy soils within tills below groundwater table. Depending upon the actual thickness and extent of these layers/deposits and groundwater levels, more vigorous groundwater control measures could be required to maintain the stability of the base and side slopes of the excavations in these areas.

More comments regarding the type and extent of groundwater control required during construction and permanent drainage can be referenced in hydrogeological report.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, fill material and firm to stiff clayey silt to silty clay (till) can be classified as Type 3 Soil above groundwater table and Type 4 Soil below groundwater table. Very stiff to hard clayey silt to silty clay (till) and till/shale complex deposits can be classified as Type 2 Soil above groundwater table and Type 3 Soil below groundwater table. Any cohesionless sandy/silty soil (silt, silty sand) can be classified as Type 3 Soil above groundwater table and Type 4 Soil below groundwater table.

4.3.2. BEDDING

The undisturbed native soils and engineered fill will provide adequate support for the sewer pipes and allow the use of normal Class B type bedding. The recommended minimum thickness of Class B bedding below the invert of the pipes is 150 mm. The thickness of the bedding may, however, have to be increased depending on the pipe diameter or in accordance with local standards.

As noted in Section 4.3.1, if sewers are to be installed in shale bedrock more than 2.0 m below the shale bedrock surface, a minimum 100 mm thick polystyrene etc. layer will be required at both sides of the pipe to avoid rock squeezing. The polystyrene layer should extend vertically to at least 0.3 m above the pipe. The rock trench should be wide enough so that at each side, the horizontal distance between the pipe side and the cut rock surface is at least 0.3 m.

It is recommended that the bedding material consist of well-graded granular material such as Granular 'A' (OPSS 1010). To avoid the loss of soil fines from the subgrade, uniformly graded clear stone should not be used unless, below the granular bedding material, a suitable, approved filter fabric (geotextile) is placed. The geotextile should extend along the sides of the trench and should be wrapped all around the uniformly graded bedding material.

4.3.3. BACKFILLING OF TRENCHES

Based on visual and tactile examination, the existing fill material free from topsoil and native soils can be reused as backfill material provided its moisture content is within 2 percent of optimum moisture content.

The clayey soils will have to be compacted using heavy equipment suitable for these soils which may be difficult to operate in the narrow confines of the trenches. Unless the clayey materials are properly pulverized and compacted in sufficiently thin lifts, post-construction settlements could occur. Their use in narrow trenches such as laterals (where heavy compaction equipment cannot be operated) may not be feasible.

The backfill should be placed in maximum 200 mm thick layers at or near ($\pm 2\%$) their optimum moisture content and each layer should be compacted to at least 95% SPMDD. In the upper 1.0 m of the

subgrade, underneath the road base, the compaction should be increased to 98% SPMDD. Unsuitable materials such as organic soils, boulders, cobbles, frozen soils, etc. should not be used for backfilling.

Granular B material should be used as backfill for trenches located under slab on grade or paved areas. Compaction of the granular soils should be carried out with vibratory compactors and loose lifts not exceeding about 200 mm.

Imported granular fill, which can be compacted with handheld equipment, should be used in confined areas.

The excavated soils are not considered to be free draining. Where free draining backfill is required, imported granular fill such as OPSS Granular B should be used.

It should be noted that the excavated soils are subject to moisture content increase during wet weather which would make these materials too wet for adequate compaction. Stockpiles should be compacted at the surface or be covered with tarpaulins to minimize moisture uptake.

4.4 FOUNDATION CONDITIONS

It is understood that the proposed subdivision will consist of residential houses with one level of basement.

Subject to the review of Site Grading Plan (see Section 4.1) by DS, the boreholes show that provided the foundation soils are undisturbed native soils during the construction, in general, bearing capacity values of 150 kPa at SLS (Serviceability Limit State), and 225 kPa at ULS (Ultimate Limit State) are feasible in the undisturbed inorganic native soils. These values would be suitable for the use of conventional spread footing foundations to support residential houses. High bearing capacities are available to support heavy structures, if required. The high bearing capacities can be provided once the founding level, size and type of structure are available. The bearing capacities of the native soils for footings and the corresponding founding elevations to support residential houses at the borehole locations are summarized in **Table 3**.

Table 3: Bearing Values and Founding Levels of Spread Footings on Undisturbed Native Soils

BH No.	Anticipated Founding Soil	Bearing Capacity at SLS (kPa)	Bearing Capacity at ULS (kPa)	Minimum Depth below Existing Ground (m)	Founding Level at or Below Elevation (m)
BH22-1	Silty clay till	150	225	1.0	233.4
BH22-2	Silty clay till	150	225	1.0	234.0
BH22-3	Silty clay till	150	225	0.9	233.3
BH22-4	Silty clay till	150	225	0.9	231.4
BH22-5	Silty clay till	150	225	0.9	229.3
BH22-6	Silty clay till	150	225	0.9	225.7

BH22-7	Silty clay till	150	225	3.0	229.5
BH22-8	Silty clay till	150	225	1.5	231.1
BH22-9	Silty clay till	150	225	1.6	232.0
BH22-10	Silty clay till	150	225	0.9	229.8
BH22-11	Silty clay till	150	225	1.6	231.4
BH22-12	Silty clay till	150	225	2.3	229.6
BH22-13	Silty clay till	150	225	1.0	227.5
BH22-14	Silty clay till	150	225	1.1	227.8
BH22-15	Silty clay till	150	225	2.6	229.9
BH22-16	Silty clay till	150	225	1.9	228.6
BH22-17	Silty clay till	150	225	3.2	227.5
BH22-18	Silty clay till	150	225	1.6	233.0
BH22-19	Silty clay till	150	225	1.6	232.1
BH22-20	Silty clay till	150	225	1.1	232.5
BH22-21	Silty clay till	150	225	2.4	230.2
BH25-4	Silty clay till	150	225	0.9	235.0
BH25-5	Silty clay till	150	225	0.9	231.4
BH25-6	Silty clay till	150	225	1.1	232.8
BH25-7	Clayey silt till	150	225	1.6	227.1
BH25-8	Silty clay till	150	225	0.9	233.4
BH25-9	Silty clay till	150	225	0.9	229.0
BH25-10	Silty clay till	150	225	1.2	227.4
BH25-13	Clayey silt to silty clay till	150	225	1.8	231.2
BH25-14	Silty clay till	150	225	1.8	230.5
BH25-15	Silty clay till	150	225	1.3	225.1

Where the grade needs to be raised, the proposed structures can be supported by spread and strip footings founded on engineered fill for bearing capacity values of 150 kPa at SLS (Serviceability Limit State), and for a factored geotechnical resistance of 225 kPa at ULS (Ultimate Limit State). The engineered fill supporting footings should be constructed in accordance with the guidelines presented in **Appendix C**. Other requirements of engineered fill are given in Section 4.1.

Variations in the soil conditions are expected in between the borehole locations, and during construction, the soil bearing pressures should be confirmed by the Geotechnical Engineer.

Foundations designed to the specified bearing capacities at the serviceability limit states (SLS) are expected to settle less than 25 mm total and 19 mm differential.

All footings exposed to seasonal freezing conditions must have at least 1.4 metres of soil cover for frost protection.

Where it is necessary to place footings at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing.

It should be noted that the recommended bearing capacities have been calculated by DS from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by DS to validate the information for use during the construction stage.

4.5 RECOMMENDATIONS FOR SWM PONDS

Based on the conceptual design for Phase 1 of the proposed Secondary Plan Area, seven (7) SWM ponds are proposed at the project site, four of which are located on lands which provided permission to enter in 2025. Boreholes BH22-3, BH22-7, BH22-10 were drilled near the proposed SWM pond areas, as shown on **Drawing 1**. No boreholes were drilled in the areas near the proposed SWM ponds at the east portion of the site. The subsurface conditions encountered at the boreholes near the proposed SWM ponds are presented in **Table 4** below.

Table 4 – Subsurface Conditions Encountered in Boreholes near SWM Ponds

SWM Pond I.D.	Boreholes Near SWM Pond	Soil Stratigraphy	Groundwater Depth/Elevation (m)
SWM Pond (1.3 Ha)	BH22-3	0-0.8m fill/topsoil 0.8-4.6m silty clay till 4.6-6.2m clayey silt till/shale complex	2.4/231.8
SWM Pond (1.6 Ha)	BH22-10	0-0.8m fill/topsoil 0.8-6.1m silty clay till 6.1-6.3m silty sand till 6.3-6.7m clayey silt till/shale complex	4.1/226.6
SWM Pond (1.3 Ha)	Shallow Boreholes BH22-15 and BH22-16	0-1.8/2.5m fill/topsoil 2.5-3.7m (BH25-15); 1.8-2.9m (BH22-16) silty clay till	-
SWM Pond (2.46 Ha)	No Boreholes	-	-

The design information for the proposed SWM ponds is unknown, as such the following comments and recommendations should be considered preliminary and must be further reviewed and amended once the design of the SWM pond is available. Additional boreholes within the footprints of SWM ponds are required prior to the final pond design.

-
- The native silty clay till is considered having a low hydraulic conductivity. Grain size analyses and Atterberg Limits on silty clay till samples were conducted. The testing results show that the silty clay till possess the following soil properties:
 - a) 27 to 54 % clay size (<2 micron) particles
 - b) Plasticity Index 17 to 22
 - The native silty clay till is considered having a low hydraulic conductivity. However, interlayered sandy/silty zones (silt, silty sand with relatively high permeability) within the silty clay till may render the soil more pervious at a local scale. Any sandy/silty zones within this soil should therefore be replaced with clayey soil under the direction of the geotechnical engineer.
 - During pond construction, there may be a need to control groundwater levels to provide a dry stable base and side slopes. Groundwater seepage within the silty clay till is expected to be slow and manageable by gravity drainage and pumping from filtered sumps. More significant groundwater seepage may be expected from the zone of sandy soils within tills below groundwater table.
 - The pond side slopes below the normal water level in the pond should be not steeper than 4 horizontal to 1 vertical (4H:1V) and not steeper than 3H:1V above normal water level. The inclination of the proposed pond slopes should meet the requirements of the local municipality's standards.
 - For pond bottom and side slopes consisting of silty clay/clayey silt deposits and shale bedrock, a liner (i.e. clay liner) will not be required. This should be further reviewed by DS when pond design information are available.

Additional boreholes must be drilled within the footprints of proposed SWM ponds. As the groundwater levels are expected to fluctuate, further groundwater measurements should be carried out and the above geotechnical recommendations should be reviewed by the geotechnical engineer prior to finalizing the pond design.

5. GENERAL COMMENTS AND LIMITATIONS OF REPORT

DS Consultants Ltd. (DS) should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, DS will assume no responsibility for interpretation of the recommendations in the report.

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to DS at the time of preparation. Unless otherwise agreed in writing by DS, it shall not be used to express or imply warranty as to the fitness of the property for a particular

purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the test hole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.


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. DS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

DS Consultants Ltd.



Derek Wang, P.Eng.
Senior Geotechnical Engineer



Fanyu Zhu, Ph.D., P.Eng.



Fanyu Zhu, Ph.D., P.Eng.
Principal Engineer



Alka Sangar, M.Eng., P.Eng.



Alka Sangar, M.Eng., P.Eng.
Principal Engineer

Drawings

J:\2022 Projects\22-030-101 Geo - Monitoring Wells and Piezometers Installation, 12351 Innis Lake Road, Caledon\Geotechnical\GIS\1-QGIS\Drawing 1 Updated Borehole Location Plan - May 2026.qgs



Legend

- Approx Site Boundary
- Borehole With Monitoring Well - DS 2025
- Borehole - DS 2022 Shallow Boreholes to Explore Fill Depths
- Borehole - DS 2022
- ⊕ Borehole With Monitoring Well - DS 2022



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Project: **GEOTECHNICAL INVESTIGATION**
 Monitoring Well & Piezometer Installations - 12351 Innis Lake Road,
 Caledon, ON

Title: **BOREHOLE LOCATION PLAN**

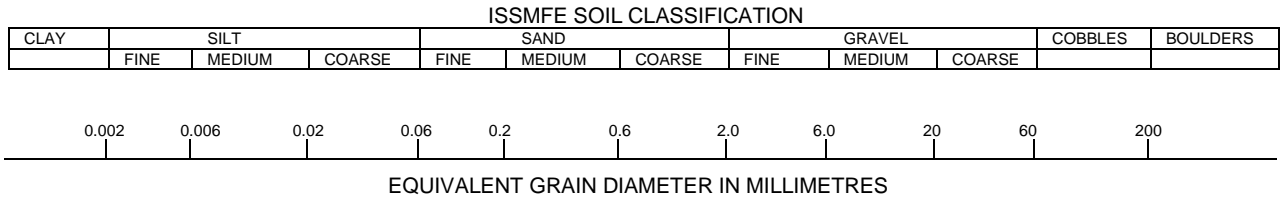


Client:
**INNIS LAKE SECONDARY PLAN AREA
 LANDOWNERS**

Size: 11x17	Approved By: D.W	Drawn By: K.T	Date: May 2026
	Rev: 0	Scale: As Shown	Project No.: 22-030-101
		Image/Map Source: <i>Google Satellite Image</i>	Drawing No.: 1

Drawing 1A: Notes On Sample Descriptions

1. All sample descriptions included in this report generally follow the Unified Soil Classification. Laboratory grain size analyses provided by DS also follow the same system. Different classification systems may be used by others, such as the system by the International Society for Soil Mechanics and Foundation Engineering (ISSMFE). Please note that, with the exception of those samples where a grain size analysis and/or Atterberg Limits testing have been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.



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

UNIFIED SOIL CLASSIFICATION

2. **Fill:** Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.
3. **Till:** The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-29-2022
BH LOCATION: See Drawing 1 N 4851046.75 E 600134.98	ENCL NO.: 2

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE			"N" BLOWS 0.3 m	SHEAR STRENGTH (kPa)						
234.4	TOPSOIL: 250mm		1	SS	9									GR SA SI CL
234.0	FILL: clayey silt, trace organics, trace topsoil, dark brown, moist, stiff													
233.5	SILTY CLAY TILL: trace to some sand, trace gravel, occasional cobble/boulder, brown, moist, very stiff to hard trace shale pieces, grey below 2.3m		2	SS	18									
			3	SS	24									
			4	SS	56									
			5	SS	50/ 75mm									
			6	SS	50/ 100mm									
229.8	CLAYEY SILT TILL/SHALE COMPLEX: trace to some sand, trace to some gravel, boulders, grey, moist, hard													
228.3	SHALE BEDROCK: grey, weathered		7	SS	50/ 75mm									
228.1	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.													

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

PROJECT: Geotechnical Investigation
 CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation
 PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm
 DATUM: Geodetic
 BH LOCATION: See Drawing 1 N 4851543.28 E 600079.92

DRILLING DATA
 Method: Solid Stem Auger
 REF. NO.: 22-030-100/101
 Date: Mar-30-2022
 ENCL NO.: 4

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20 40 60 80 100	20 40 60 80 100						
234.2	TOPSOIL: 300mm														
233.9	FILL: silty clay, trace sand, trace gravel, brown, moist, stiff		1	SS	8		234								
233.4	SILTY CLAY TILL: trace to some sand, trace gravel, occasional cobble/boulder, pieces of shale, brown, moist, very stiff to hard grey at 1.5m greyish brown, pieces of shale at 3.1m		2	SS	28		233								
232.8			3	SS	26		232								
232.2			4	SS	48		232								
231.6			5	SS	50/ 130mm		231								
231.0			6	SS	50/ 130mm		230								
229.6	CLAYEY SILT TILL/SHALE COMPLEX: trace to some sand, trace to some gravel, boulders, grey, moist to wet, hard		7	SS	50/ 130mm		229								
228.0	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbg): Mar. 31, 2022 2.38 April 1, 2025 2.4						228								

W. L. 231.8 m
Mar. 31, 2022

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS
 Measurement 1st 2nd 3rd 4th

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

PROJECT: Geotechnical Investigation
 CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation
 PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm
 DATUM: Geodetic
 BH LOCATION: See Drawing 1 N 4851790.46 E 600276.41

DRILLING DATA
 Method: Solid Stem Auger
 REF. NO.: 22-030-100/101
 ENCL NO.: 5
 Date: Mar-30-2022

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20 40 60 80 100	20 40 60 80 100						
232.3	TOPSOIL: 200mm														
230.9 0.2	FILL: silty clay, trace sand, trace rootlets/topsoil, trace organics, grey, moist, stiff		1	SS	8		232				○				
231.5 0.8	SILTY CLAY TILL: trace to some sand, trace gravel, occasional cobble/boulder, brown, moist, very stiff to hard		2	SS	22		231				○				
			3	SS	39						○				
	grey below 2.3m		4	SS	49		230				○				
			5	SS	33		229				○				
227.7 4.6	CLAYEY SILT TILL/SHALE COMPLEX: trace to some sand, trace to some gravel, boulders/cobbles, grey, moist, hard		6	SS	50/ 30mm		228				○				
			7	SS	63		227				○				
							226.1				○				
							225								
224.6 7.7	END OF BOREHOLE: Notes: 1) Auger Refusal at 7.6m. 2) 50mm dia. monitoring well installed upon completion. 3) Water Level Readings: Date: Water Level(mbgl): Mar. 31, 2022 6.14		8	AG	50/		225								

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS
 Measurement 1st 2nd 3rd 4th

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

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-30-2022
BH LOCATION: See Drawing 1 N 4851498.93 E 600558.96	ENCL NO.: 6

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)	
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40							60
230.2																
229.9	TOPSOIL: 250mm	1	SS	7												
0.3	FILL: silty clay, trace sand, trace rootlets/topsoil, trace organics, brown, moist, firm	2	SS	25												
229.4		3	SS	38												
0.8	SILTY CLAY TILL: trace to some sand, trace gravel, occasional cobble/boulder, brown, moist, very stiff to hard	4	SS	44												
		5	SS	28												
	grey below 3.1m	6	SS	80												
225.6	CLAYEY SILT TILL/SHALE COMPLEX: trace to some sand, trace to some gravel, boulders/cobbles, grey, moist, hard	7	SS	50/25mm												
224.1	SHALE BEDROCK: grey, weathered															
224.0	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.															

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GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-30-2022
BH LOCATION: See Drawing 1 N 4851259.34 E 600816.71	ENCL NO.: 7

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)	
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40	60	80				100
226.6	TOPSOIL: 250mm	[Symbol]													
226.4	FILL: silty clay, trace sand, trace rootlets/topsoil, trace organics, brown, moist, firm	[Symbol]	1	SS	7										
225.8	SILTY CLAY TILL: trace to some sand, trace gravel, occasional cobble/boulder, brown, moist, very stiff to hard	[Symbol]	2	SS	28										
225.4		[Symbol]	3	SS	34										
224.4		[Symbol]	4	SS	30										
223.4		[Symbol]	5	SS	17										
222.4		[Symbol]	6	SS	43										
220.6	grey below 4.6m	[Symbol]													
220.0	CLAYEY SILT: trace sand, grey, moist, hard	[Symbol]	7	SS	50/130mm										
6.6	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.														

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GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-29-2022
BH LOCATION: See Drawing 1 N 4850979.39 E 600453.4	ENCL NO.: 8

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40						
232.5	TOPSOIL: 300mm													
232.2	FILL: clayey silt, trace organics, trace topsoil, brown, moist, firm to stiff some organics, trace wood pieces, dark brown at 1.5m	1	SS	9										
0.3		2	SS	5										
1		3	SS	10										
2		4	SS	12										
229.6	SILTY CLAY TILL: trace to some sand, trace gravel, occasional cobble/boulder, brown, moist, very stiff to hard	5	SS	21										
2.9		6	SS	50/ 30mm										
226.4	SHALE BEDROCK: grey, weathered END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Mar. 31, 2022 3.41 April 1, 2025 3.4	7	SS	50/ 30mm										
6.2														

W. L. 229.1 m
Mar.31,2022

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

PROJECT: Geotechnical Investigation
 CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation
 PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm
 DATUM: Geodetic
 BH LOCATION: See Drawing 1 N 4850813.2 E 600462.67

DRILLING DATA
 Method: Solid Stem Auger
 REF. NO.: 22-030-100/101
 ENCL NO.: 9
 Date: Mar-29-2022

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40						
232.6														
232.4	TOPSOIL: 250mm													
0.3	FILL: clayey silt, trace organics, trace topsoil/rootlets, dark brown, moist, firm to stiff some organics, trace rootlets, grey at 0.8m	1	SS	5										
231.2		2	SS	14										
1.4	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, very stiff to hard no recovery at 2.3m	3	SS	25										
		4	SS	50/ 25mm										
		5	SS	50/ 100mm										8 12 53 27
228.0														
4.6	CLAYEY SILT TILL/SHALE COMPLEX: trace to some sand, trace to some gravel, grey, moist, hard	6	SS	50/ 25mm										
227.0														
5.6	END OF BOREHOLE: Notes: 1) Auger refusal at 5.6m due to possible shale bedrock. 2) 50mm dia. monitoring well installed upon completion. 3) Water Level Readings: Date: Water Level(mbgl): Mar. 31, 2022 2.83 April 1, 2025 2.9	7	SS	50/ 25mm										

W. L. 229.8 m
Mar. 31, 2022

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-29-2022
BH LOCATION: See Drawing 1 N 4851277.55 E 600311.54	ENCL NO.: 10

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)	
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)							W _p
233.6	TOPSOIL: 250mm														
230.4	FILL: silty clay, some organics, trace topsoil/rootlets, brown to dark brown, moist, firm		1	SS	5										
0.3			2	SS	5										
232.1	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, very stiff to hard		3	SS	17										
1.5			4	SS	30										
			5	SS	40										
	grey below 4.6m		6	SS	32										
227.5	CLAYEY SILT TILL/SHALE COMPLEX: trace to some sand,		7	SS	50/100mm										
6.1	trace to some gravel, grey, moist, hard														
227.1	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.														
6.5															

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GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-30-2022
BH LOCATION: See Drawing 1 N 4851277.37 E 600645.13	ENCL NO.: 11

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40						
230.7	TOPSOIL: 250mm														
230.4 0.3	FILL: silty clay, some organics, trace topsoil/rootlets, brown to dark brown, moist, firm		1	SS	8										
229.9 0.8	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, very stiff to hard		2	SS	27										
			3	SS	29										
			4	SS	31										
	grey below 3.1m		5	SS	28										3 13 46 38
			6	SS	32										
224.6 6.3	SILTY SAND TILL: trace to some clay, trace gravel, grey, moist, very dense		7	SS	62										
224.0 6.7	CLAYEY SILT TILL/SHALE COMPLEX: sandy, trace gravel, grey, moist, hard END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Mar. 31, 2022 4.11 April 1, 2025 4.1														

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GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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



PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Apr-25-2022
BH LOCATION: See Drawing 1 N 4850981 E 600370.66	ENCL NO.: 12

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40	60	80						
233.0	TOPSOIL: 250mm																GR SA SI CL
232.0 0.3	FILL: silty clay, some organics, trace topsoil/rootlets, brown to dark brown, moist, firm to very stiff		1	SS	5												
231.5 1.5	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, very stiff to hard		2	SS	17												
230.1 2.9	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.		3	SS	15												
			4	SS	37												

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS
Measurement

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



<p>PROJECT: Geotechnical Investigation CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm DATUM: Geodetic BH LOCATION: See Drawing 1 N 4850897.97 E 600488.98</p>	<p>DRILLING DATA Method: Solid Stem Auger REF. NO.: 22-030-100/101 ENCL NO.: 13 Date: Apr-25-2022</p>
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SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)	
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40	60	80				100
231.9															
231.8	TOPSOIL: 280mm		1	SS	6										
0.3	FILL: silty clay, trace to some organics, trace topsoil/rootlets, brown, moist, firm to very stiff		2	SS	8										
			3	SS	20										
229.7															
2.2	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, hard		4	SS	34										
229.0															
2.9	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.														

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PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Apr-25-2022
BH LOCATION: See Drawing 1 N 4850966.81 E 600585.67	ENCL NO.: 14

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)							
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40	60	80							100	20	40	60	80	100	10
228.5	TOPSOIL: 275mm	[diagonal lines]																						
228.0 0.3	FILL: silty clay, some organics, trace topsoil/rootlets, brown to dark brown, moist, firm	[diagonal lines]	1	SS	4																			
227.6 0.9	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, very stiff	[diagonal lines]	2	SS	21																			
226.4 2.1	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.																							

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS
Measurement

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

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Apr-25-2022
BH LOCATION: See Drawing 1 N 4851037.16 E 600545.52	ENCL NO.: 15

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)				
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40	60	80							100	20	40	60
228.9																					
0.0 228.8	TOPSOIL:300mm																				
0.3	FILL: silty clay, trace organics, trace topsoil/rootlets, brown, moist, firm to stiff		1	SS	6																
227.9																					
1.0	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, stiff to hard		2	SS	14																
226.8																					
2.1	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.																				

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Apr-25-2022
BH LOCATION: See Drawing 1 N 4851135.68 E 600427.13	ENCL NO.: 16

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)						
232.5	TOPSOIL: 280mm													
232.9	FILL: silty clay, some organics, trace topsoil/rootlets, wood pieces, brown to black, moist, firm to stiff		1	SS	5									
0.3			2	SS	8									
1			3	SS	10									
2			4	SS	12									
230.0			5	SS	22									
2.5	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, stiff to very stiff													
228.8	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.													
3.7														

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS
 Measurement

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

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Apr-25-2022
BH LOCATION: See Drawing 1 N 4851236.24 E 600494.93	ENCL NO.: 17

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)									
230.5	TOPSOIL: 300mm																
230.2	FILL: silty clay, trace to some organics, trace topsoil/rootlets, brown to dark brown, moist, firm to very stiff	[Cross-hatched pattern]	1	SS	5												
0.3			2	SS	7												
228.7	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, very stiff	[Diagonal hatched pattern]	3	SS	18												
1.8			4	SS	23												
227.6	END OF BOREHOLE:																
2.9	Notes: 1) Borehole dry upon completion.																

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS Measurement

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

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Apr-25-2022
BH LOCATION: See Drawing 1 N 4851419.62 E 600394.63	ENCL NO.: 18

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)	
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40							60
230.7																
230.6	TOPSOIL:200mm		1	SS	5											
0.2	FILL: silty clay, some organics, trace topsoil/rootlets, brown to dark brown, moist, firm to stiff		2	SS	10											
			3	SS	8											
			4	SS	9											
227.6	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, very stiff		5	SS	30											
3.1																
227.0	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.															
3.7																

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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



<p>PROJECT: Geotechnical Investigation CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm DATUM: Geodetic BH LOCATION: See Drawing 1 N 4851352.74 E 600218.15</p>	<p>DRILLING DATA Method: Solid Stem Auger REF. NO.: 22-030-100/101 ENCL NO.: 19 Date: Apr-25-2022</p>
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SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)						
234.6	TOPSOIL: 300mm													
234.3	FILL: silty clay, some organics, trace topsoil/rootlets, brown to dark brown, moist, stiff	[Cross-hatched pattern]	1	SS	8									
233.1			2	SS	10									
233.1	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, stiff to very stiff	[Dotted pattern]	3	SS	12									
231.7			4	SS	27									
2.9	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.													

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<p>PROJECT: Geotechnical Investigation CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm DATUM: Geodetic BH LOCATION: See Drawing 1 N 4851170.83 E 600283.62</p>	<p>DRILLING DATA Method: Solid Stem Auger REF. NO.: 22-030-100/101 ENCL NO.: 20 Date: Apr-25-2022</p>
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SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)	
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)							WATER CONTENT (%)
							20	40	60	80	100	W _p	W	W _L	GR SA SI CL
233.7	TOPSOIL: 310mm														
233.4	FILL: silty clay, some organics, trace topsoil/rootlets, brown to dark brown, moist, firm to stiff	[Cross-hatched pattern]	1	SS	4										
0.3			2	SS	10										
232.2	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, very stiff	[Diagonal lines pattern]	3	SS	15										
1.5			4	SS	23										
230.8	END OF BOREHOLE:														
2.9	Notes: 1) Borehole dry upon completion.														

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS
 Measurement

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



PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Solid Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Apr-25-2022
BH LOCATION: See Drawing 1 N 4851076.83 E 600283.18	ENCL NO.: 21

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE			"N" BLOWS 0.3 m	SHEAR STRENGTH (kPa)								
233.6																
233.3	TOPSOIL: 290mm		1	SS	5											
0.3	FILL: silty clay, trace to some organics, trace topsoil/rootlets, brown, moist, firm to very stiff															
232.6	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, very stiff		2	SS	16											
1.0																
231.5			3	SS	24											
2.1	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.															

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS Measurement

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



<p>PROJECT: Geotechnical Investigation CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 150mm DATUM: Geodetic BH LOCATION: See Drawing 1 N 4851061.98 E 600411.79</p>	<p>DRILLING DATA Method: Solid Stem Auger REF. NO.: 22-030-100/101 ENCL NO.: 22</p>
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SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)						
232.6	TOPSOIL: 290mm													
232.3	FILL: silty clay, trace to some organics, trace topsoil/rootlets, brown, moist, firm to stiff		1	SS	5									
0.3			2	SS	12									
			3	SS	14									
230.3	SILTY CLAY TILL: trace to some sand, trace to some gravel, occasional cobble/boulder, brown, moist, very stiff		4	SS	19									
2.3														
229.7	END OF BOREHOLE: Notes: 1) Borehole dry upon completion.													
2.9														

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Hollow Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 200mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-19-2025
BH LOCATION: See Drawing 1 N 4852296 E 600577.5	ENCL NO.: 23

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40						
235.9	TOPSOIL: 250mm													
235.9 0.3	FILL: clayey silt to silty clay, trace sand, trace rootlets, trace organics, dark brown to brown, moist, firm SILTY CLAY TILL: trace to some sand, trace gravel, moist, brownish grey to grey, moist, stiff to very stiff brownish grey at 2.3m grey below 3.1m stiff below 4.6m	1	SS	7										
235.1 0.8		2	SS	20										
2		3	SS	27										
3		4	SS	28										
4		5	SS	20										
5		6	SS	13										2 11 44 43
6		7	SS	10										
229.2 6.7	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbg): April 1, 2025 dry													

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Hollow Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 200mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-19-2025
BH LOCATION: See Drawing 1 N 4851772.4 E 600484.9	ENCL NO.: 24

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)						
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40	60	80				100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	GR	SA
232.3	TOPSOIL: 230mm																			
232.0	FILL: clayey silt to silty clay, trace sand, trace rootlets, trace organics, dark brown to brown, moist, firm SILTY CLAY TILL: trace to some sand, trace gravel, moist, brown to grey, moist, stiff to very stiff stiff below 3.1m grey below 4.6m		1	SS	7															
231.5			2	SS	22								43.5						0 9 38 53	
231.0			3	SS	24															
230.0			4	SS	17															
229.0			5	SS	13															
228.0																				
227.0																				
226.2	CLAYEY SILT TO SILT: trace sand, trace gravel, grey, moist, hard		6	SS	10														1 12 42 45	
225.6																				
6.7	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbg): April 1, 2025 dry																			

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Hollow Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 200mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-20-2025
BH LOCATION: See Drawing 1 N 4852133.7 E 600871.4	ENCL NO.: 25

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)						
233.9	TOPSOIL: 200mm	1												
233.0	FILL: clayey silt to silty clay, trace sand, trace rootlets, trace organics, dark brown to brown, moist, firm	2	SS		6									
232.9	SILTY CLAY TILL: trace to some sand, trace gravel, brown, moist, firm to very stiff	3	SS		16									
		4	SS		22									
		5	SS		13									
		6	SS		11									
		7	SS		8									
	stiff below 2.3m	8	SS		7									
	firm at 6.1m	9	SS		8									
		10	SS		11									
		11	SS		13									
		12	SS		11									
		13	SS		8									
		14	SS		7									
		15	SS		8									
		16	SS		7									
		17	SS		7									
		18	SS		7									
		19	SS		7									
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		118	SS		7									
		119	SS		7									
		120	SS		7									
		121	SS		7									
		122	SS		7									
		123	SS		7									

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Hollow Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 200mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-14-2025
BH LOCATION: See Drawing 1 N 4851476.4 E 600387.6	ENCL NO.: 26

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40						
228.7	TOPSOIL: 280mm													
228.4	FILL: clayey silt to silty clay, trace sand, trace rootlets, trace organics, dark brown to brown, moist, firm to stiff	1	SS	6										
0.3		2	SS	10										
227.2	CLAYEY SILT TILL: trace to some sand, trace gravel, brown, moist, very stiff	3	SS	22										
1.5		4	SS	50/ 30mm										
226.4	SHALE BEDROCK: Georgian Bay Formation, grey, weathered	5	SS	50/ 25mm										
2.3		6	SS	50/ 50mm										
222.5		7	SS	50/ 50mm										
6.2	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbg): April 1, 2025 1.5													

W. L. 227.2 m
Apr 01, 2025

auger grinding

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Hollow Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 200mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-17-2025
BH LOCATION: See Drawing 1 N 4851084 E 600181.1	ENCL NO.: 27

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)	
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40							60
234.3	TOPSOIL: 200mm	[Pattern]	1	SS	10											
234.0	FILL: clayey silt to silty clay, trace organics, trace rootlets, dark brown to brown, moist, stiff	[Pattern]	2	SS	13											
233.5	SILTY CLAY TILL: trace sand, trace gravel, brown to grey, moist, stiff to hard	[Pattern]	3	SS	19											
233.0		[Pattern]	4	SS	28											
232.0		[Pattern]	5	SS	76											
231.0	hard below 3.1m	[Pattern]	6	SS	66											
229.4	SHALE BEDROCK: Georgian Bay Formation, grey, weathered	[Pattern]	7	SS	50/75mm											
228.9	END OF BOREHOLE: Notes: 1) Auger refusal on possible bedrock at 5.4m. 2) 50mm dia. monitoring well installed upon completion. 3) Water Level Readings: Date: Water Level(mbg): April 1, 2025 2.5	[Pattern]														

W. L. 231.8 m
Apr 01, 2025

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<p>PROJECT: Geotechnical Investigation CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 200mm DATUM: Geodetic BH LOCATION: See Drawing 1 N 4851552.5 E 600687.6</p>	<p>DRILLING DATA Method: Hollow Stem Auger REF. NO.: 22-030-100/101 ENCL NO.: 28 Date: Mar-19-2025</p>
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SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40						
229.9	TOPSOIL: 200mm													
229.0	FILL: clayey silt to silty clay, trace sand, trace rootlets, trace organics, dark brown to brown, moist, stiff SILTY CLAY TILL: trace sand, trace gravel, brown, moist, stiff to very stiff grey, stiff at 4.6m	1	SS	10										
229.1		2	SS	18										
228.8		3	SS	22										
228.5		4	SS	18										
228.2		5	SS	14										
227.8		6	SS	8									40.7	
223.8	CLAYEY SILT TO SILT: trace sand, grey, moist, hard	7	SS	50/ 130mm										
223.3	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbg): April 1, 2025 2.3													

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

PROJECT: Geotechnical Investigation	DRILLING DATA
CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation	Method: Hollow Stem Auger
PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 200mm	REF. NO.: 22-030-100/101
DATUM: Geodetic	Date: Mar-19-2025
BH LOCATION: See Drawing 1 N 4851799.8 E 600890.7	ENCL NO.: 29

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)						
228.6	TOPSOIL: 250mm												
228.4	FILL: clayey silt to silty clay, trace sand, trace rootlets, trace organics, dark brown to brown, moist, firm to stiff	1	SS	5									
227.5	SILTY CLAY TILL: trace to some sand, trace gravel, brown, moist, firm to very stiff	2	SS	25									
		3	SS	17									
		4	SS	12									
		5	SS	12									
	grey below 4.6m	6	SS	9									
	firm at 6.1m	7	SS	5									1 7 40 52
		8	SS	17									
220.4	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbg): April 1, 2025 7.2												

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ DS.GDT 25-11-5

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

PROJECT: Geotechnical Investigation
 CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation
 PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 200mm
 DATUM: Geodetic
 BH LOCATION: See Drawing 1 N 4852074.6 E 600533.2

DRILLING DATA
 Method: Hollow Stem Auger
 REF. NO.: 22-030-100/101
 Date: Mar-19-2025
 ENCL NO.: 30

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40						
233.0														GR SA SI CL
232.0	TOPSOIL: 250mm													
0.3	FILL: clayey silt to silty clay, trace sand, trace rootlets, trace organics, dark brown to brown, moist, firm to stiff	1	SS	5										
		2	SS	11										
231.3	CLAYEY SILT TO SILTY CLAY TILL: some sand to sandy, trace gravel, brown, moist, stiff to hard	3	SS	18										
1.7		4	SS	20										
		5	SS	17										
	grey below 4.6m	6	SS	10										3 19 44 34
		7	SS	8										
		8	SS	10										
		9	SS	32										3 23 54 20
222.3	CLAYEY SILT TO SILT: trace sand, grey, moist, hard	10	SS	83										
10.7														
221.7	END OF BOREHOLE: Notes: 1) Two 50mm dia. monitoring well installed at 6.1mbgl and 10.7mbgl upon completion. 2) Water Level Readings: Date: Water Level (mbgl): April 1, 2025 4.7 (Shallow well) April 1, 2025 2.8 (Deep well)													

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GROUNDWATER ELEVATIONS
 Measurement 1st 2nd 3rd 4th

GRAPH NOTES +3, x3: Numbers refer to Sensitivity ○ = 3% Strain at Failure

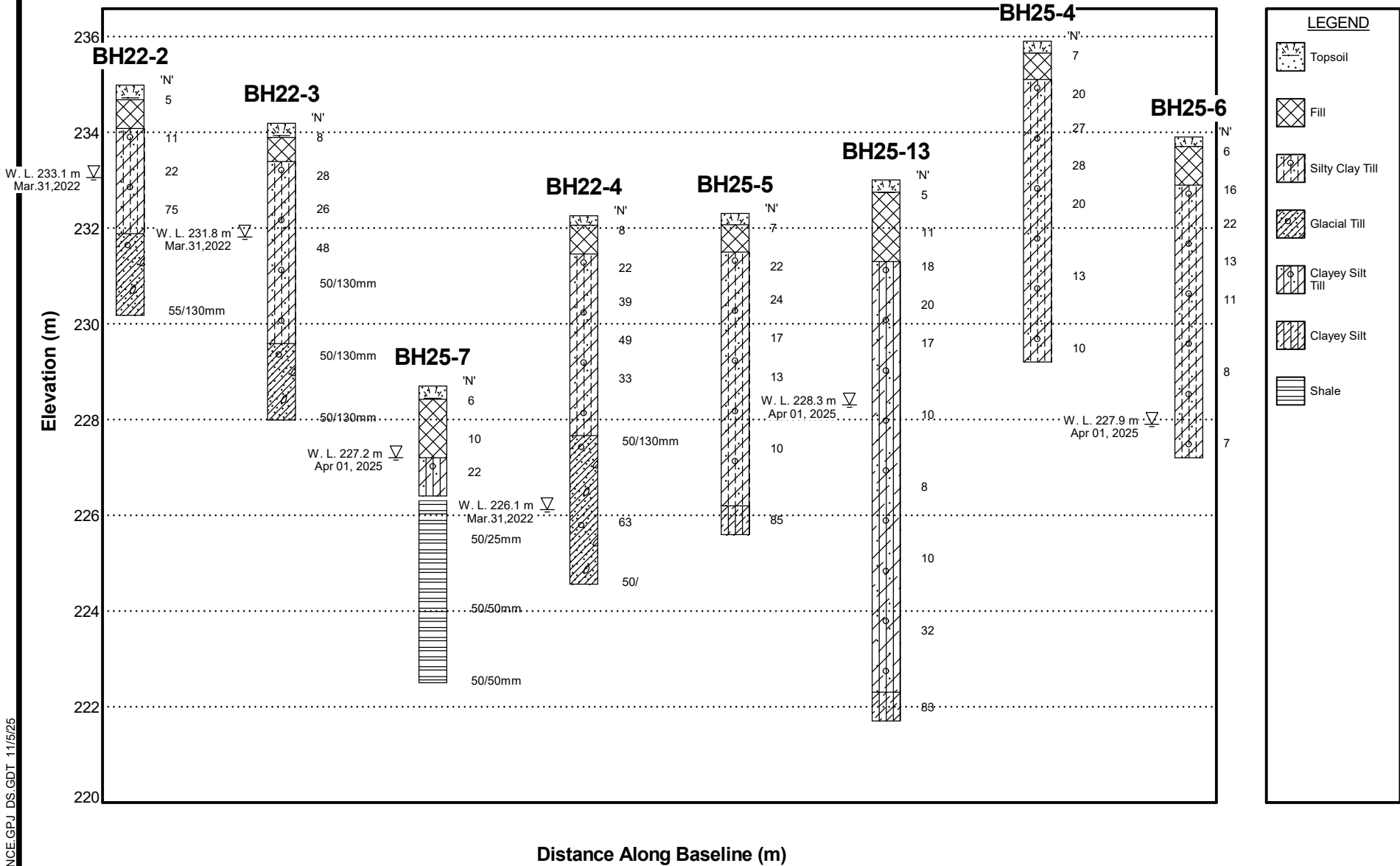
PROJECT: Geotechnical Investigation
 CLIENT: Mattamy (Innis Lake) Ltd. c/o Mattamy Development Corporation
 PROJECT LOCATION: 12351 Innis Lake & 12250 Centreville Creek Rd., Caledon Diameter: 200mm
 DATUM: Geodetic
 BH LOCATION: See Drawing 1 N 4851261.9 E 600793.4

DRILLING DATA
 Method: Hollow Stem Auger/Mud Rotary
 REF. NO.: 22-030-100/101
 ENCL NO.: 32
 Date: Mar-14-2025

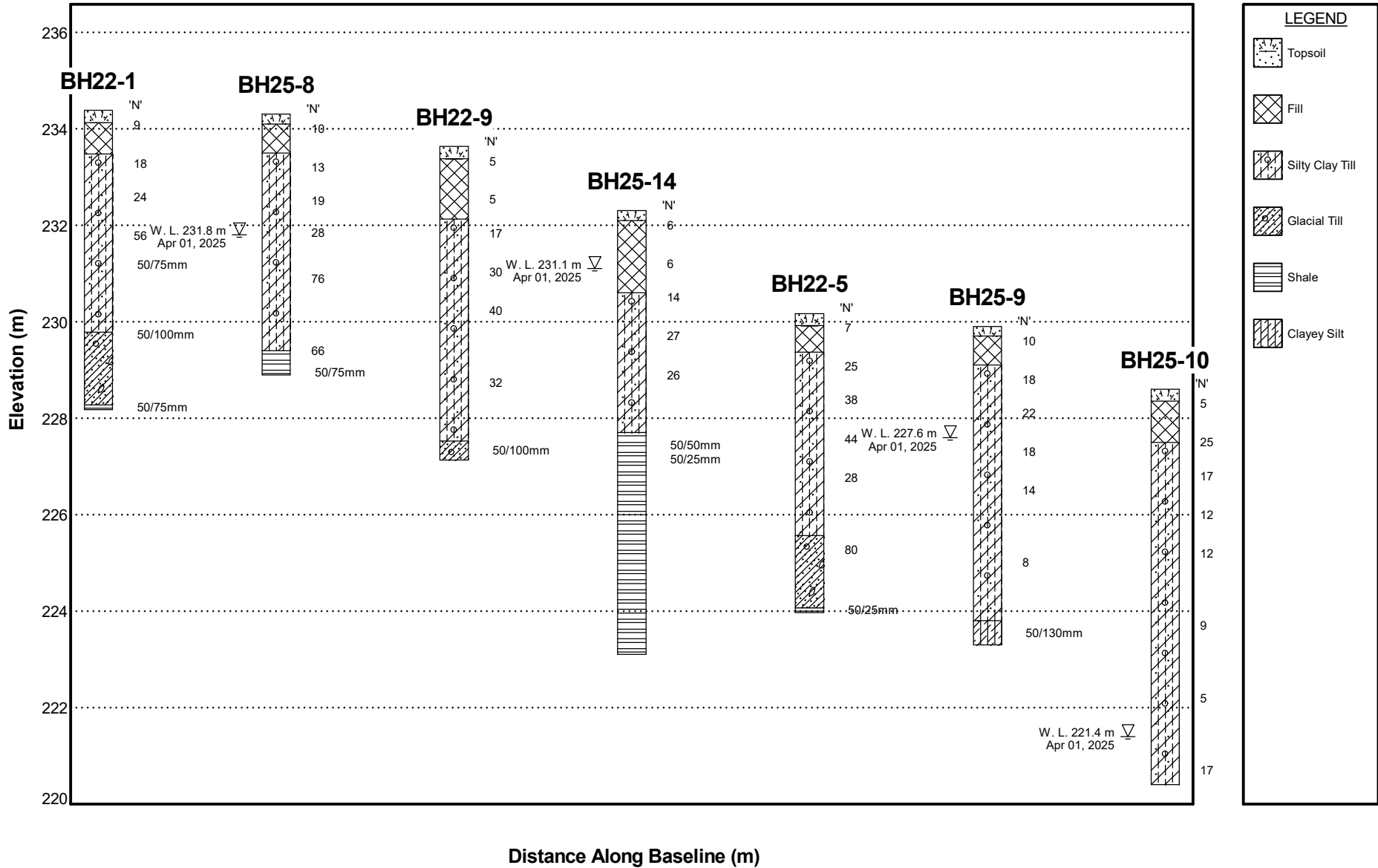
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)							
(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m			20	40	60	80							100	20	40	60	80	100	10
226.4	TOPSOIL: 250mm																						
226.0	FILL: clayey silt to silty clay, trace sand, trace rootlets, trace organics, dark brown to brown, moist, firm to very stiff	1	SS	6																			
225.2	SILTY CLAY TILL: trace sand, trace gravel, brown, moist, stiff to very stiff	2	SS	15																			
224.0		3	SS	19																			
223.0		4	SS	18																			
222.0		5	SS	12																			
221.8	CLAYEY SILT TO SILT: trace sand, grey, moist, hard	6	SS	50/ 50mm																			
220.0		7	SS	37																			
219.0																							
218.8	SHALE BEDROCK: Georgian Bay Formation, grey, weathered	8	SS	50/ 50mm																			
217.2		9	SS	50/ 75mm																			
216.6	TCR=83%, SCR=79%, RQD=62% Hard layer=12%, Maximum hard layer thickness=50mm	R1	SS																				
216.0	TCR=96%, SCR=92%, RQD=78% Hard layer=28%, Maximum hard layer thickness=150mm	R2	SS																				
215.1																							
214.2	TCR=91%, SCR=91%, RQD=88% Hard layer=11%, Maximum hard layer thickness=100mm	R3	SS																				
12.2	END OF BOREHOLE: Notes: 1) Two 50mm dia. monitoring well installed at 7.6mbgl and 12.2mbgl upon completion 2) Water Level Readings: Date: Water Level(mbgl): April 1, 2025 1.0 (Shallow well) April 1, 2025 5.2 (Deep well)																						

DS SOIL LOG-2021-FINAL 22-030-101 COMBINED COPY GEO.GPJ_DS.GDT_25-11-5

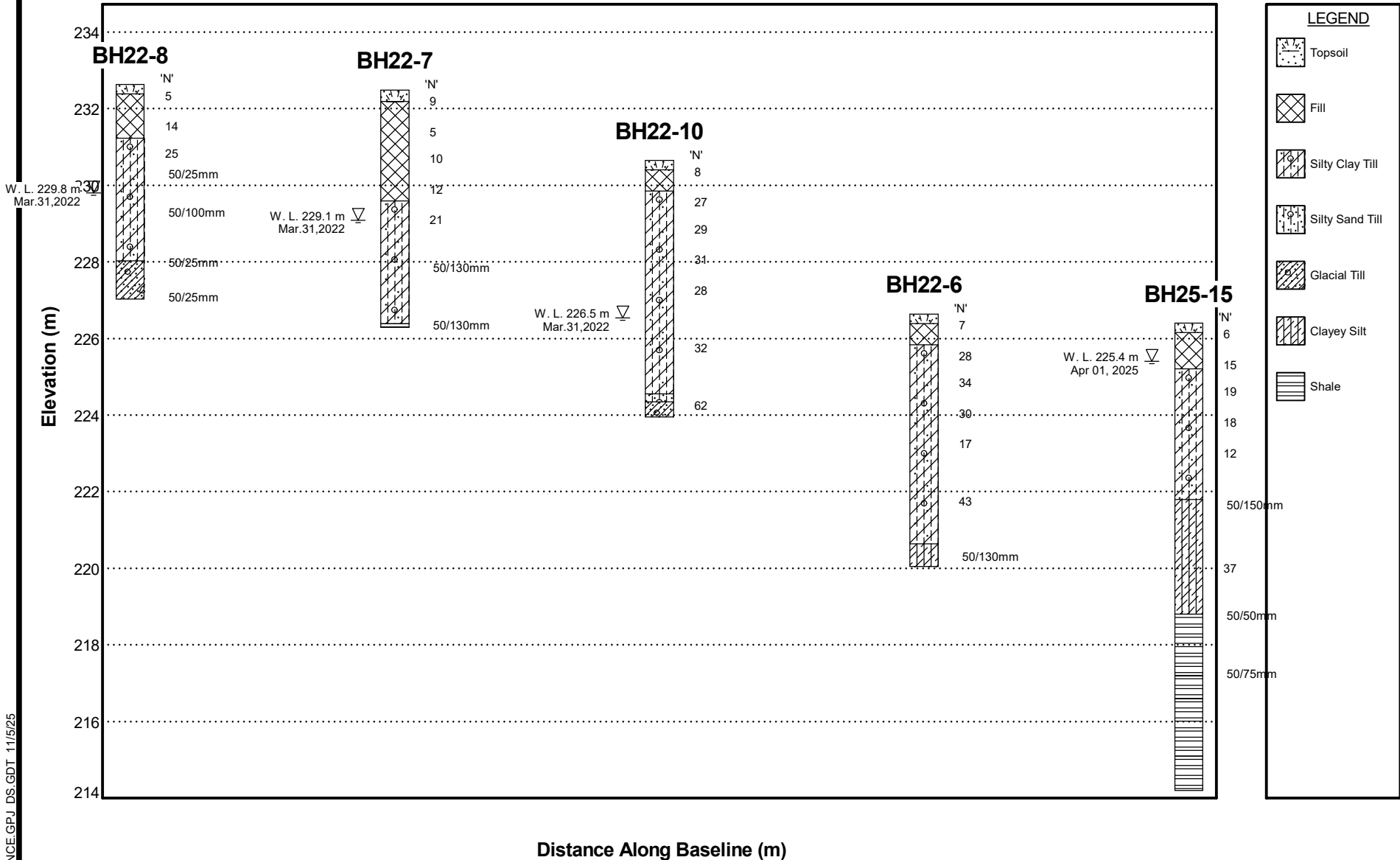
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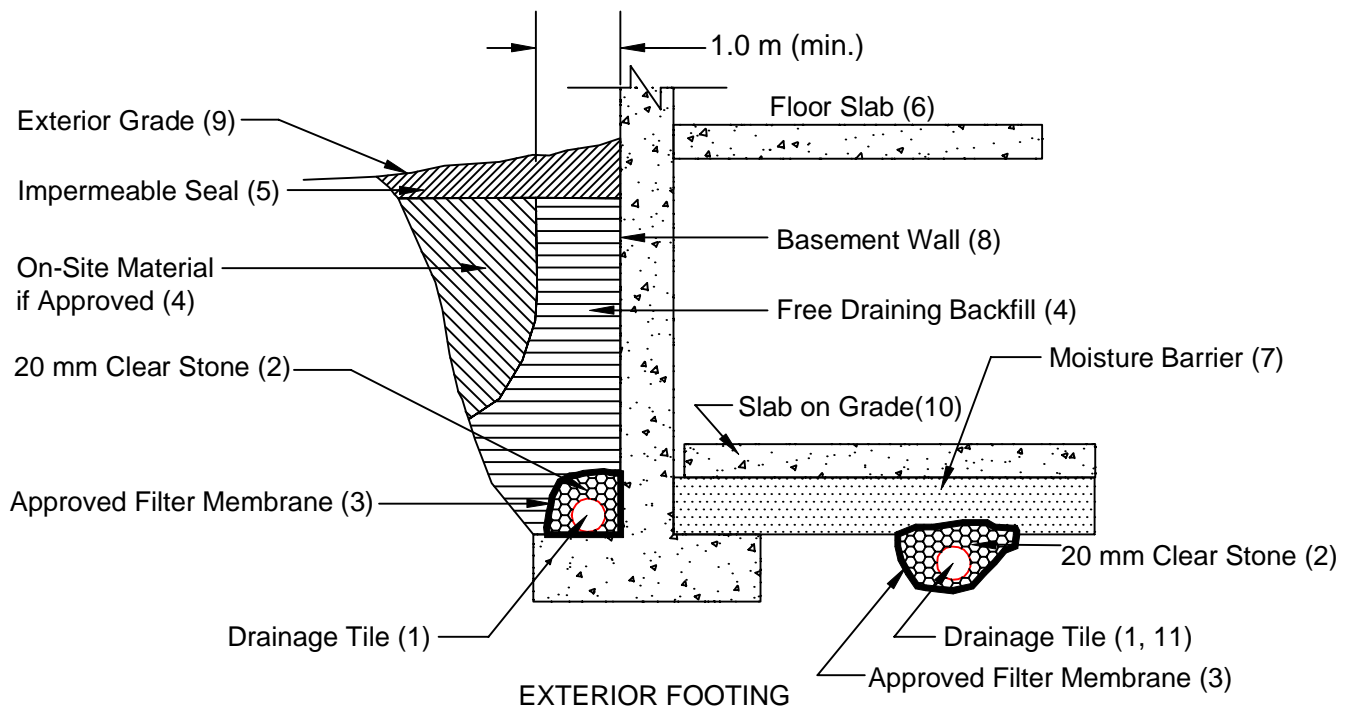


DS FENCE (M) FENCE.GPJ_DS.GDT_11/3/25



DS FENCE (M) FENCE.GPJ DS.GDT 11/5/25





Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place 100 mm (4 inches) of stone below drain.
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Free Draining backfill - OPSS Granular B or equivalent compacted to the specified density. Do not use heavy compaction equipment within 450 mm (18") of the wall. Use hand controlled light compaction equipment within 1.8 m (6') of wall. The minimum width of the Granular 'B' backfill must be 1.0 m.
5. Impermeable backfill seal - compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted. Maximum thickness of seal to be 0.5 m.
6. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.
7. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
8. Basement wall to be damp proofed /water proofed.
9. Exterior grade to slope away from building.
10. Slab on grade should not be structurally connected to the wall or footing.
11. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab.
12. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
13. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
14. Do not connect the underfloor drains to perimeter drains.
15. Review the geotechnical report for specific details.

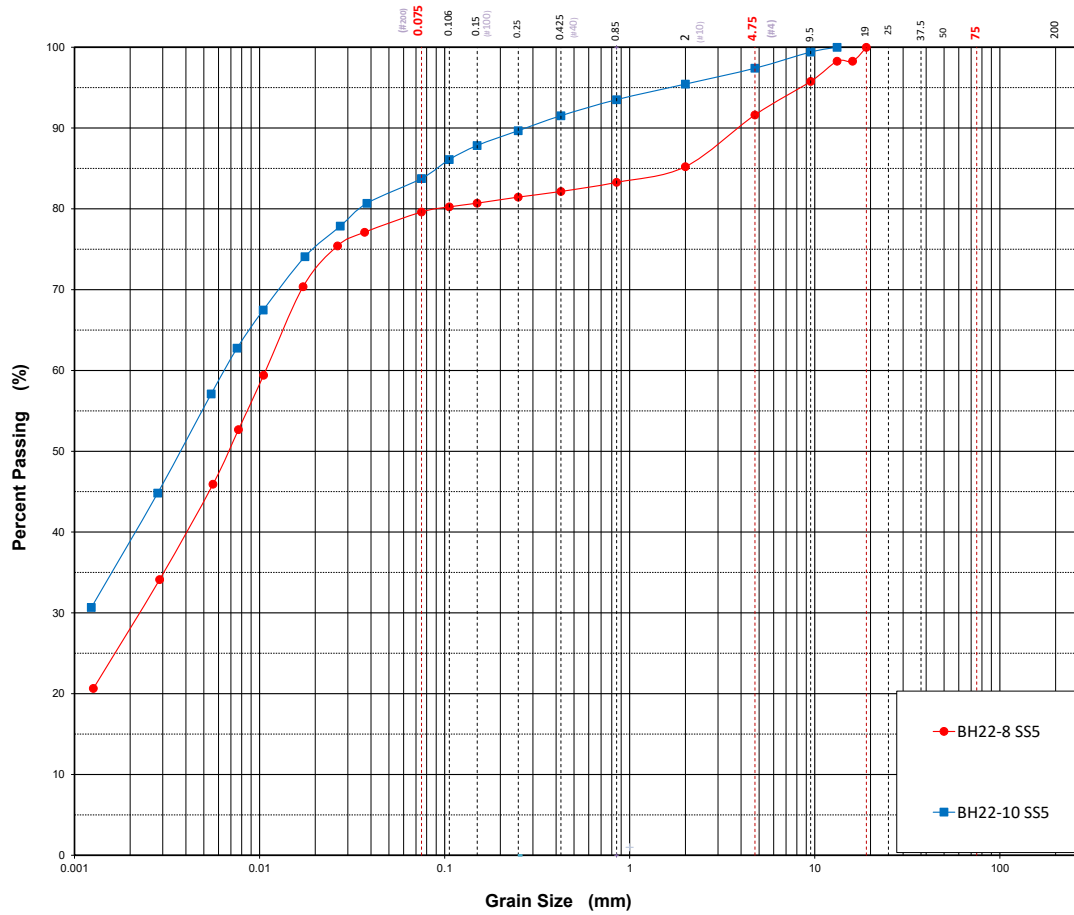
DRAINAGE AND BACKFILL RECOMMENDATIONS Basement with Underfloor Drainage


(not to scale)

Appendix A

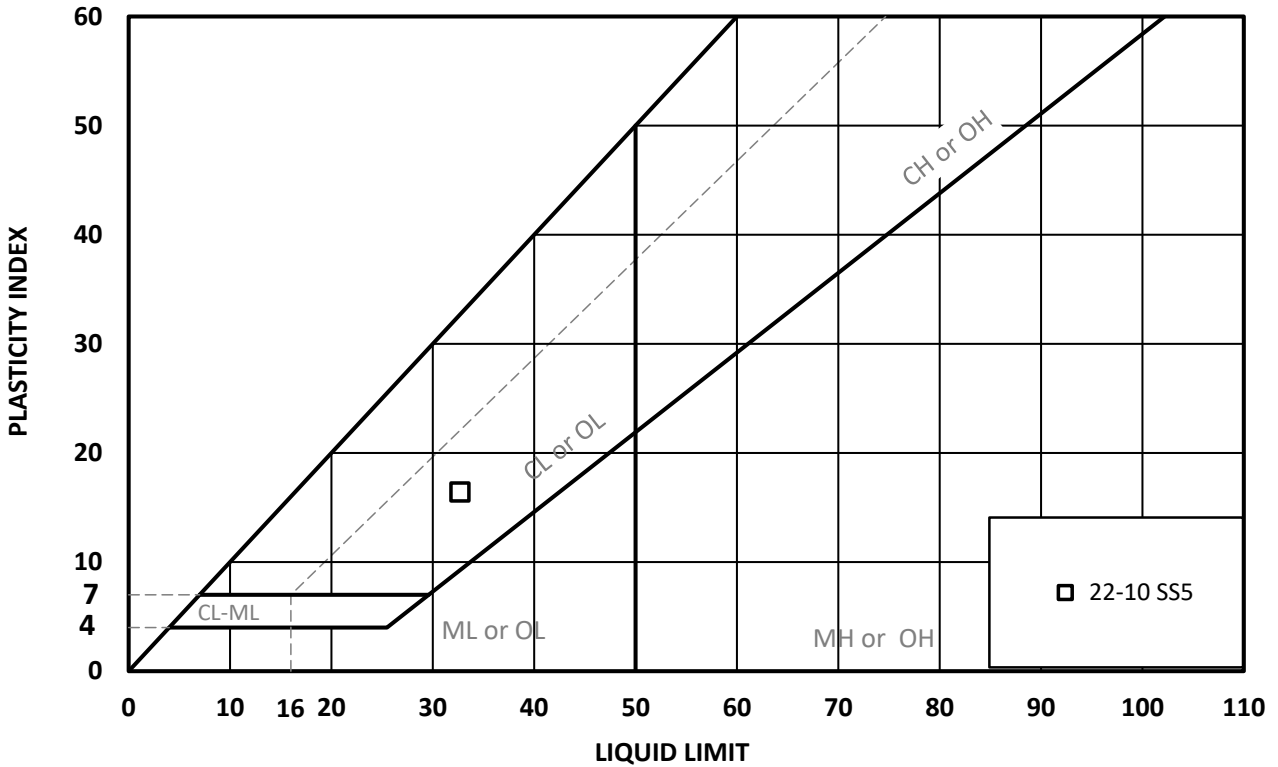
Lab Testing Results

Particle Size Distribution (ASTM-D421/D422)



Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	
 DS CONSULTANTS LTD. 6221 Highway 7, Unit 16 Vaughan, Ontario, L4H 0K8 Telephone: (905) 264-9393 www.dsconsultants.ca	Project	Preliminary Geotechnical Investigation. Investigation				Project No	22-030-100/101
	Location	12351 Innis Lake Road & 12250 Centreville Creek Road, Caledon				Date	Apr-04-2022
	Client	Mattamy (Innis Lake) Limited c/o Mattamy Development Corporation				Figure No	A-1

Atterberg Test (ASTM D-4318)



Code	Sample ID	Sample No.	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Symbol
1	□	22-10 SS5	17	32.7	16.3	16.4	CL

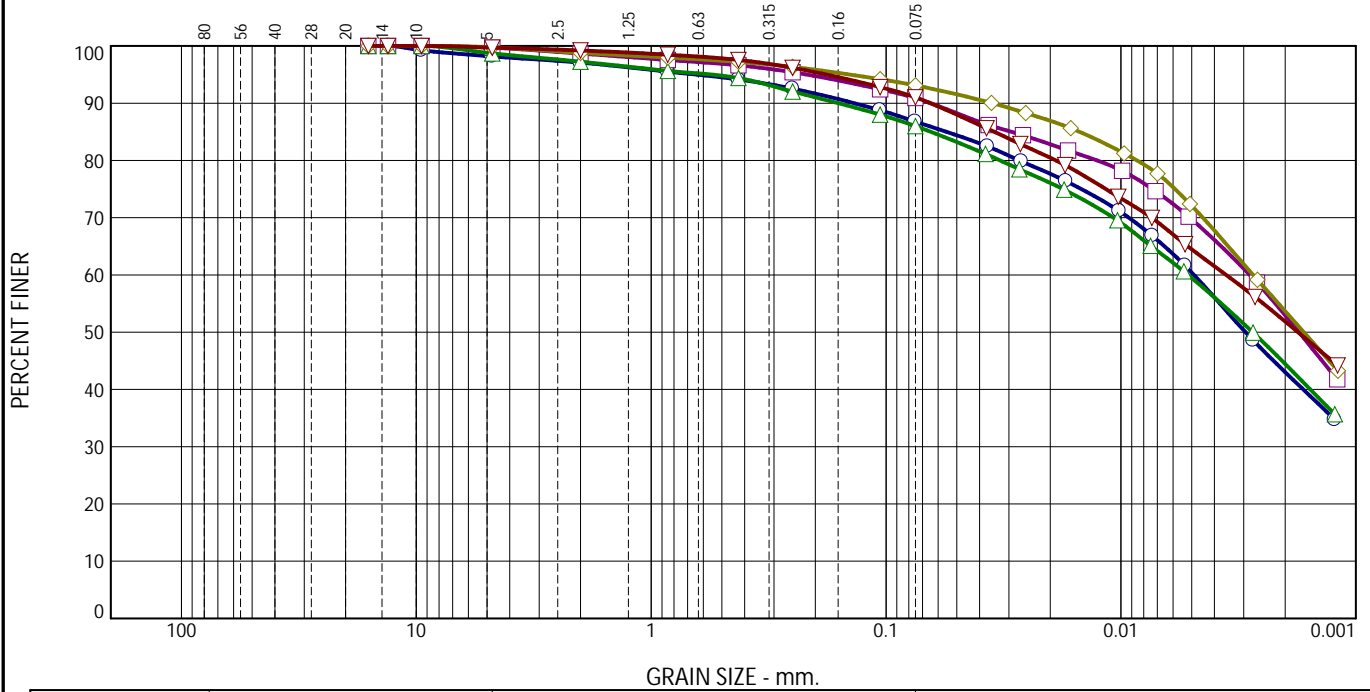


DS CONSULTANTS LTD.
 6221 Highway 7, Unit 16
 Vaughan, Ontario, L4H 0K8
 Telephone: (905) 264-9393
www.dsconsultants.ca

Project	Preliminary Geotechnical Investigation	Project No	22-030-100/101
Location	12351 Innis Lake Road & 12250 Centreville Creek Road, Caledon	Date	Apr-04-2022
Client	Mattamy (Innis Lake) Limited c/o Mattamy Development Corporation	Figure No	A-2

Particle Size Distribution Report

ASTM D422



	% +75mm	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
○	0.0	0.0	1.8	1.1	3.0	7.3	43.8	43.0		
□	0.0	0.0	0.3	1.0	2.1	5.7	37.9	53.0		
△	0.0	0.0	1.3	1.5	2.8	8.4	41.5	44.5		
◇	0.0	0.0	0.2	1.0	1.6	4.1	39.4	53.7		
▽	0.0	0.0	0.3	0.5	1.6	6.6	39.1	51.9		
⊗	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○	39.2	18.4	0.0554	0.0049	0.0029					
□	43.5	20.5	0.0293	0.0028	0.0017					
△			0.0645	0.0052	0.0027					
◇			0.0150	0.0027	0.0017					
▽	42.1	19.1	0.0346	0.0036	0.0018					

Material Description	USCS	AASHTO
○ Silty clay till, some sand, trace Gravel	CL	A-6(18)
□ Silty clay till, trace sand	CL	A-7-6(23)
△ Silty clay till, some sand, trace gravel		
◇ Silty clay till, trace sand		
▽ Silty clay till, trace sand	CL	A-7-6(22)

Project No. 22-030-100/101 Client: Mattamy (Innis Lake) Limited c/o Mattamy Development Corporation
 Project: 12351 Innis Lake Road & 12250 Centreville Creek Road, Caledon
 ○ Location: BH25-4, SS6 Sample Number: VM-6444
 □ Location: BH25-5, SS2 Sample Number: VM-6444
 △ Location: BH25-5, SS6 Sample Number: VM-6444
 ◇ Location: BH25-6, SS6 Sample Number: VM-6444
 ▽ Location: BH25-8, SS2 Sample Number: VM-6444

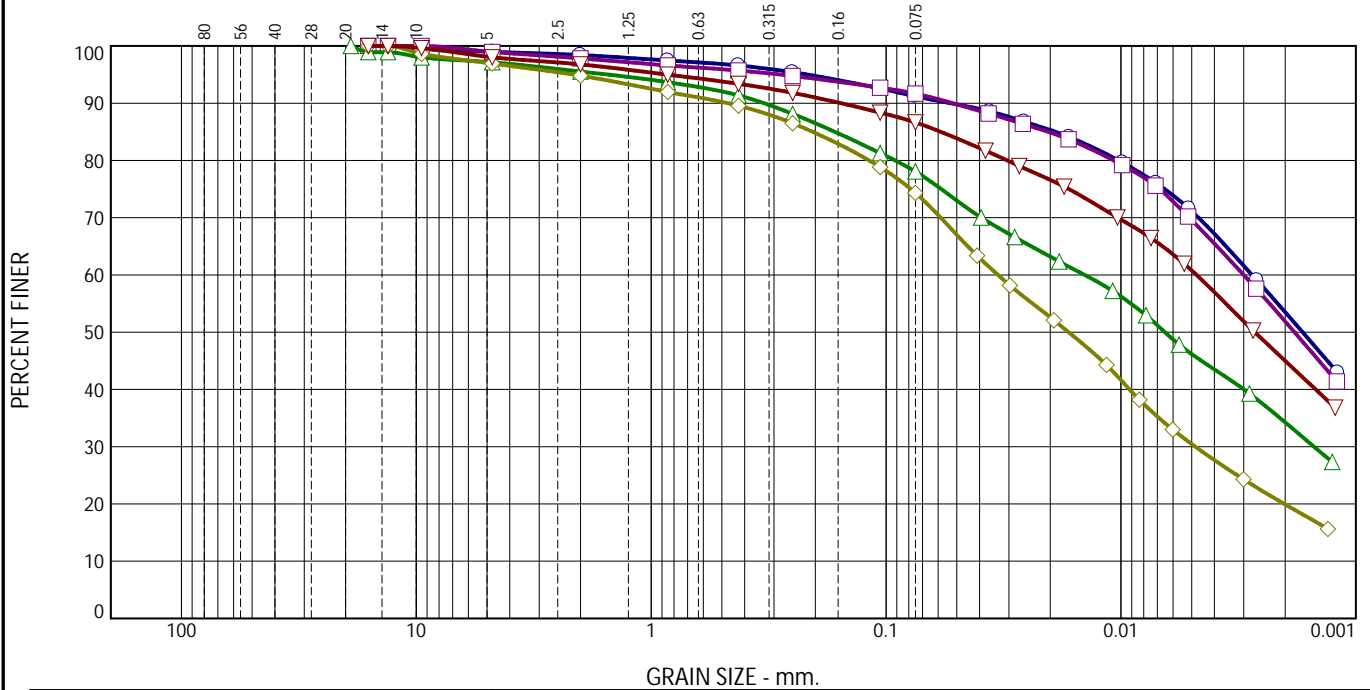
Remarks:
 ○ F.M.=0.31
 □ F.M.=0.17
 △ F.M.=0.30
 ◇ F.M.=0.14
 ▽ F.M.=0.13



Figure A-3

Particle Size Distribution Report

ASTM D422



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.0	0.6	1.8	5.4	37.7	53.5
□	0.0	0.0	1.1	1.1	2.1	4.0	39.8	51.9
△	0.0	0.0	2.9	1.6	4.1	13.3	43.8	34.3
◇	0.0	0.0	3.1	2.1	5.2	15.3	54.4	19.9
▽	0.0	0.0	2.0	1.2	3.4	6.8	41.6	45.0

	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○	40.7	18.8	0.0190	0.0028	0.0017					
□	38.0	18.0	0.0204	0.0030	0.0018					
△	25.5	14.0	0.1652	0.0143	0.0065	0.0015				
◇			0.2054	0.0334	0.0167	0.0048				
▽			0.0585	0.0048	0.0027					

Material Description	USCS	AASHTO
○ Silty clay till, trace sand	CL	A-7-6(21)
□ Silty clay till, trace sand	CL	A-6(19)
△ Clayey silt till, some sand, trace gravel	CL	A-6(7)

Project No. 22-030-100/101 Client: Mattamy (Innis Lake) Limited c/o Mattamy Development Corporation
 Project: 12351 Innis Lake Road & 12250 Centreville Creelk Road, Caledon
 ○ Location: BH25-9, SS6 Sample Number: VM-6444
 □ Location: BH25-10, SS7 Sample Number: VM-6444
 △ Location: BH25-13, SS6 Sample Number: VM-6444
 ◇ Location: BH25-13, SS9B Sample Number: VM-6444
 ▽ Location: BH25-14, SS5 Sample Number: VM-6444

Remarks:
 ○ F.M.=0.18
 □ F.M.=0.21
 △ F.M.=0.48
 ◇ F.M.=0.55
 ▽ F.M.=0.33

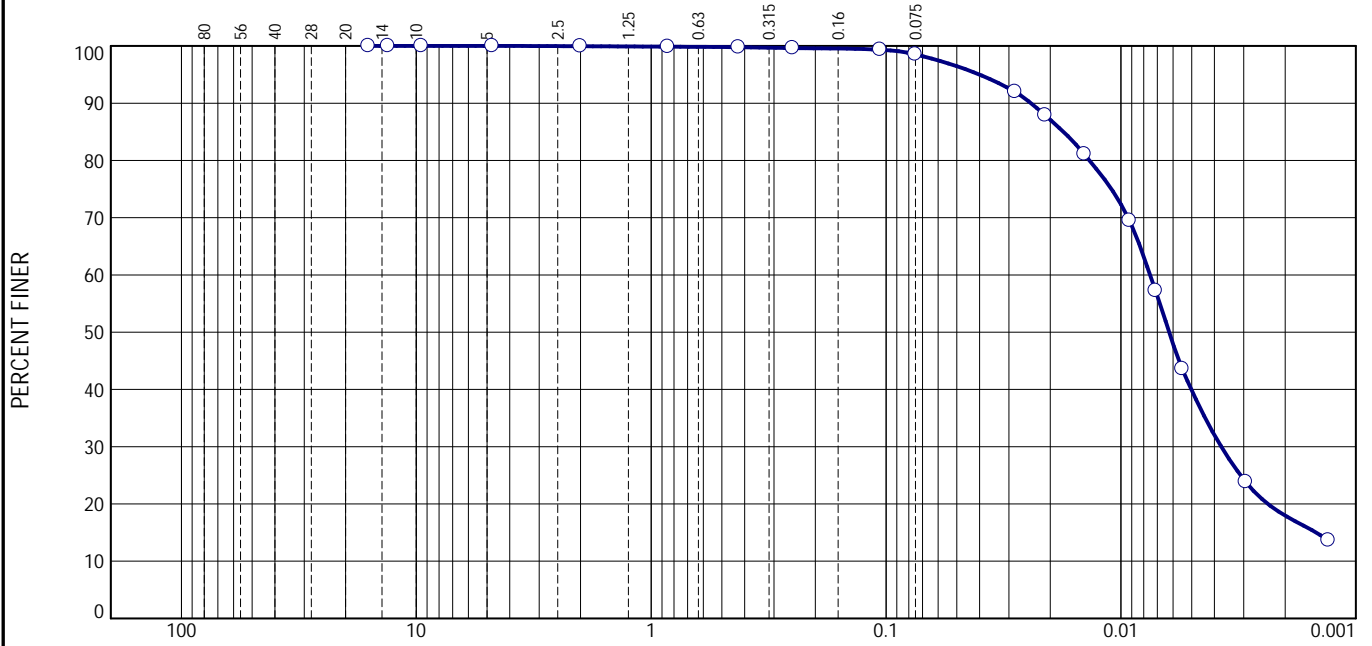


Figure A-4

Tested By: Helen/Disha Checked By: Jordan Gadjanov

Particle Size Distribution Report

ASTM D422



GRAIN SIZE - mm.

%	+75mm	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
○	0.0	0.0	0.0	0.0	0.2	1.3	80.5	18.0		
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			0.0176	0.0075	0.0062	0.0037	0.0015			

Material Description	USCS	AASHTO
○ Silt, some clay, trace sand		



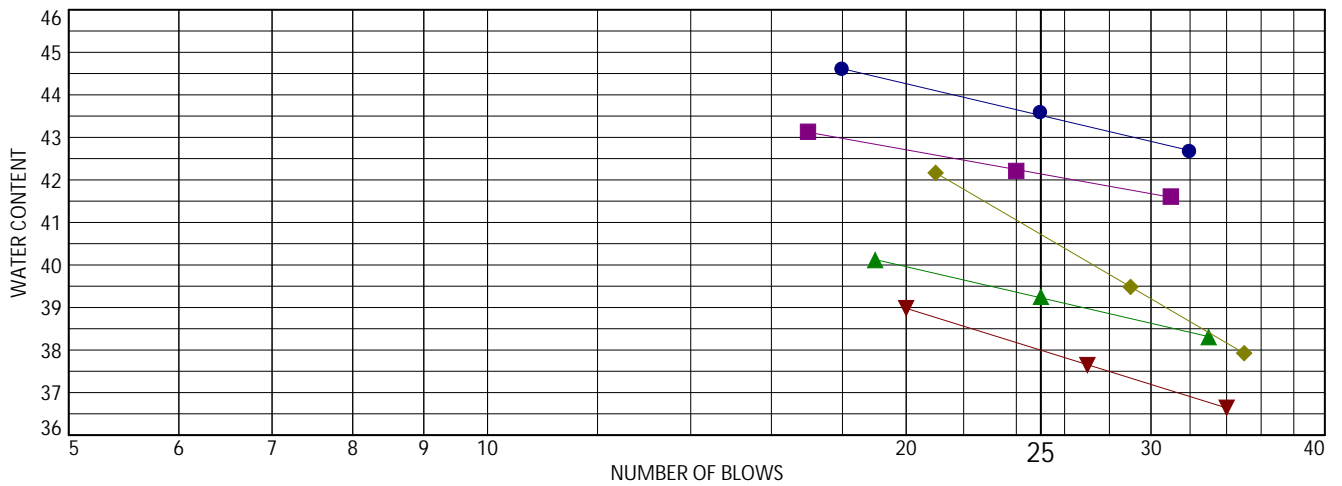
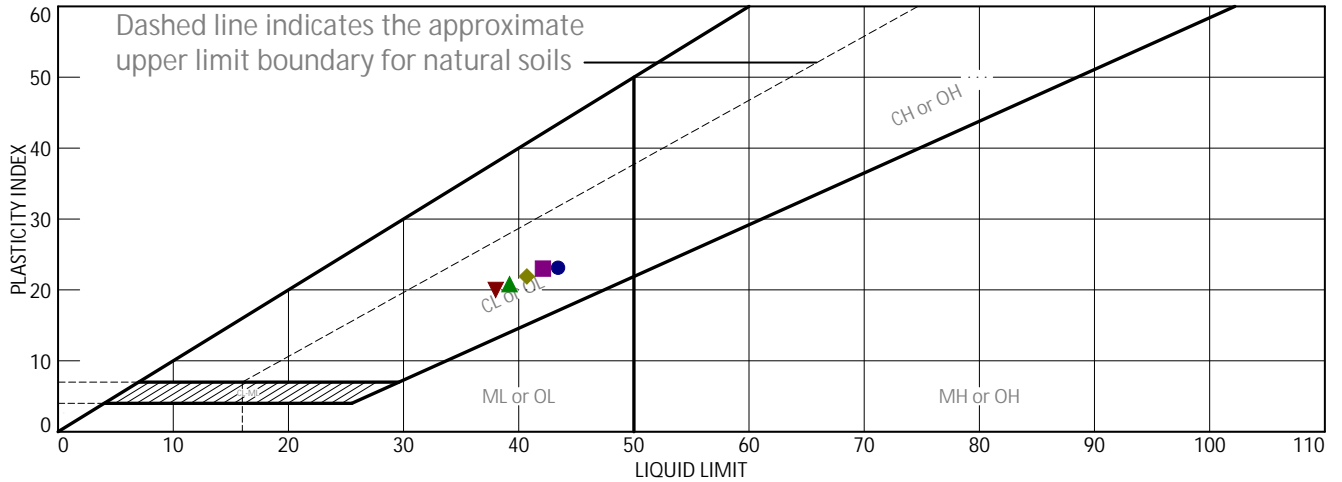
Project No. 22-030-100/101 Client: Mattamy (Innis Lake) Limited c/o Mattamy Development Corporation Project: 12351 Innis Lake Road & 12250 Centreville Creek Road, Caledon Location: BH25-15, SS7 Sample Number: VM-6444	Remarks: ○ F.M.=0.01
 DS CONSULTANTS LTD. <small>Geotechnical ♦ Environmental ♦ Materials ♦ Hydrogeology</small> 	

Figure A-5

Tested By: Helen/Disha Checked By: Jordan Gadjanov

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty clay till, trace sand	43.5	20.5	23.0	96.6	90.9	CL
■	Silty clay till, trace sand	42.1	19.1	23.0	97.6	91.0	CL
▲	Silty clay till, some sand, trace Gravel	39.2	18.4	20.8	94.1	86.8	CL
◆	Silty clay till, trace sand	40.7	18.8	21.9	96.6	91.2	CL
▼	Silty clay till, trace sand	38.0	18.0	20.0	95.7	91.7	CL

Project No. 22-030-100/101 Client: Mattamy (Innis Lake) Limited c/o Mattamy Development Corporation
 Project: 12351 Innis Lake Road & 12250 Centreville Creek, Caledon

● Location: BH25-5, SS2 Sample Number: VM-6444
 ■ Location: BH25-8, SS2 Sample Number: VM-6444
 ▲ Location: BH25-4, SS6 Sample Number: VM-6444
 ◆ Location: BH25-9, SS6 Sample Number: VM-6444
 ▼ Location: BH25-10, SS7 Sample Number: VM-6444

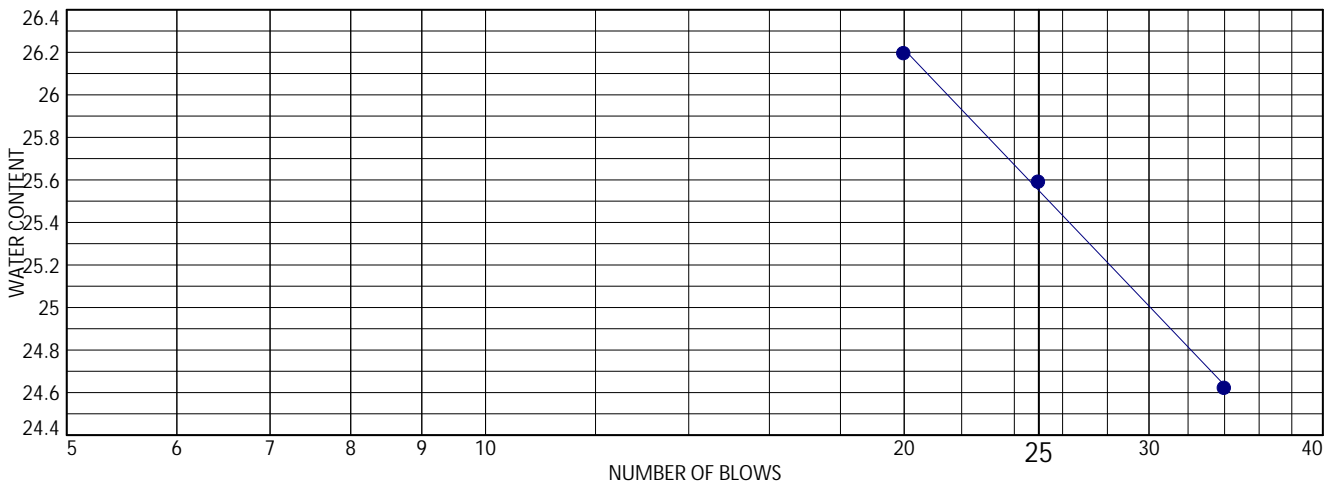
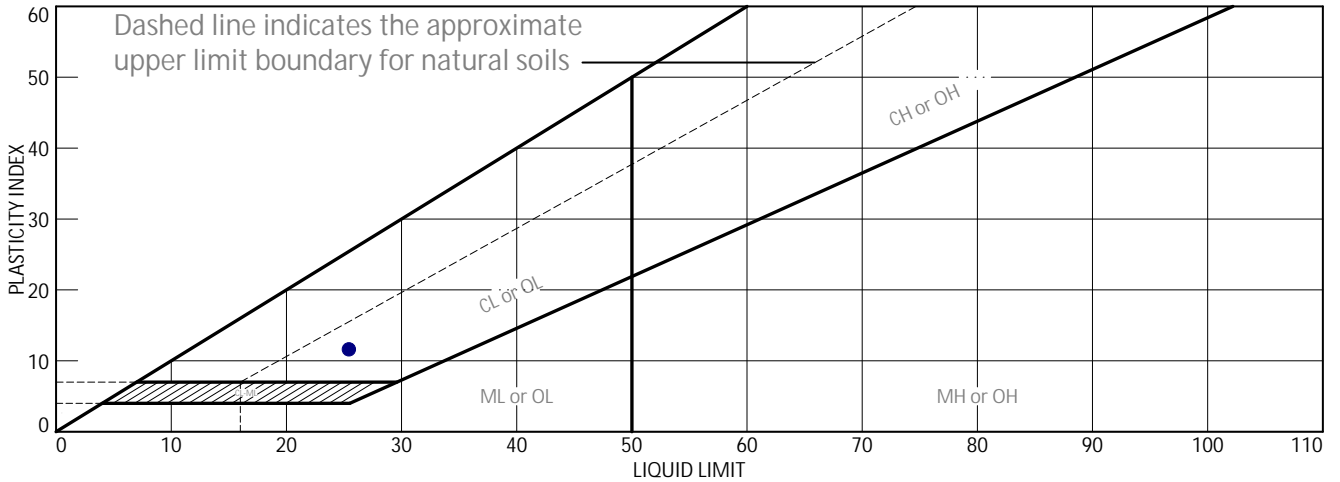
Remarks:



Figure A-6

Tested By: Disha Checked By: Jordan Gadjanov

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey silt till, some sand, trace gravel	25.5	14.0	11.5	91.4	78.1	CL

Project No. 22-030-100/101 Client: Mattamy (Innis Lake) Limited c/o Mattamy Development Corporation
 Project: 12351 Innis Lake Road & 12250 Centreville Creek Road, Caledon
 ● Location: BH25-13, SS6 Sample Number: VM-6444

Remarks:



Figure A-7

Tested By: Disha Checked By: Jordan Gadjanov

Appendix B

General Bedrock Comments in Metro Toronto Area Photographs of Rock Coring

General Comments – Bedrock in Greater Toronto Area

The bedrock that makes spread footings or caissons a popular choice for high-rise foundation support is a shale or shale limestone composition. The highest member, the Queenston Formation, is generally found west of Toronto, while the Georgian Bay Formation underlies most of Metro Toronto, with the Collingwood Formation east of Toronto. The Queenston is, relatively speaking, the weaker of the three formations that are likely to support caissons or footings.

The Georgian Bay as well as the Queenston and Collingwood Formation are of Middle Ordovician Age. It is defined as the rock unit that overlies the bluish grey shales of the Collingwood Formation and is in turn overlain by the red shale of the Queenston Formation. The Georgian Bay Formation consists of bluish and grey shale with interbeds of sandstone, limestone and dolostone. Towards the west where the Georgian Bay formation underlies the Queenston Formation, the limestone content increases significantly and limestone and/or sandstone may comprise as much as 70 to 90 percent of the bedrock. The hard layers are usually less than about 100 to 150 mm thick but some layers are much thicker. The thicker layers have been observed to be as much as 750 to 900 mm at some sites. The layers are actually lenses and they can vary significantly in thickness over short distances.

The upper portion of the bedrock is commonly weathered for a depth of 600 to 1000 mm and within this weathered zone hard limestone layers or lenses are common. These hard limestone layers can result in contractual problems for augers, and can provide misleading bedrock elevations. Where the weathering is more extensive a shale till layer may be found above the bedrock. In the sound bedrock, the limestone, sandstone, dolostone is hard to very hard.

Stress relief features such as folds and faults are common in the bedrock. In these features, the rock is heavily fractured and sheared, and contains layers of shale rubble and clay. Weathering is much deeper than the surrounding rock in these features and often there is a lateral migration of the stress relief features resulting in sound unweathered bedrock overlying fractured and weather bedrock. The stress relief features are usually in the order of 4 to 6 m wide, but the depth can vary from 4 to 5 m to in excess of 10 m. These features occur randomly.

The bedrock contains significant high locked in horizontal stresses. These stresses can impose significant loads on tunnel walls but the slower rate of construction for basements allows for a relaxation of these stresses and they are not normally a problem for basement construction.

Groundwater seepage below the top 1000 mm is generally small, however, at several locations in Toronto and Mississauga large quantities have been encountered.

Bedding joints in the bedrock are very close-to-close, smooth planar in the shale and rough planar in the limestone. Significant vertical jointing is common.

Where the bedrock was cored, a detailed description of the rock core is appended to the borehole log.

Design features related to the bedrock are discussed in other sections of this report, and these general comments must be considered with these comments.

Methane gas exists in the bedrock, normally below the top 1000 mm and more concentrated with depth. Appropriate care and monitoring are essential in all confined bedrock excavations, particularly caissons and tunnels.

22-030-100/101

BH25-15

R1: ~30' ~32'

R2: ~32' ~37'

R3: ~37' ~40'



Appendix C

General Requirements for Engineered Fill

GENERAL REQUIREMENTS FOR ENGINEERED FILL

Compacted imported soil that meets specific engineering requirements and is free of organics and debris and that has been continually monitored on a full-time basis by a qualified geotechnical representative is classified as engineered fill. Engineered fill that meets these requirements and is bearing on suitable native subsoil can be used for the support of foundations.

Imported soil used as engineered fill can be removed from other portions of a site or can be brought in from other sites. In general, most of Ontario soils are too wet to achieve the 100% Standard Proctor Maximum Dry Density (SPMDD) and will require drying and careful site management if they are to be considered for engineered fill. Imported non-cohesive granular soil is preferred for all engineered fill. For engineered fill, we recommend use of OPSS Granular 'B' sand and gravel fill material.

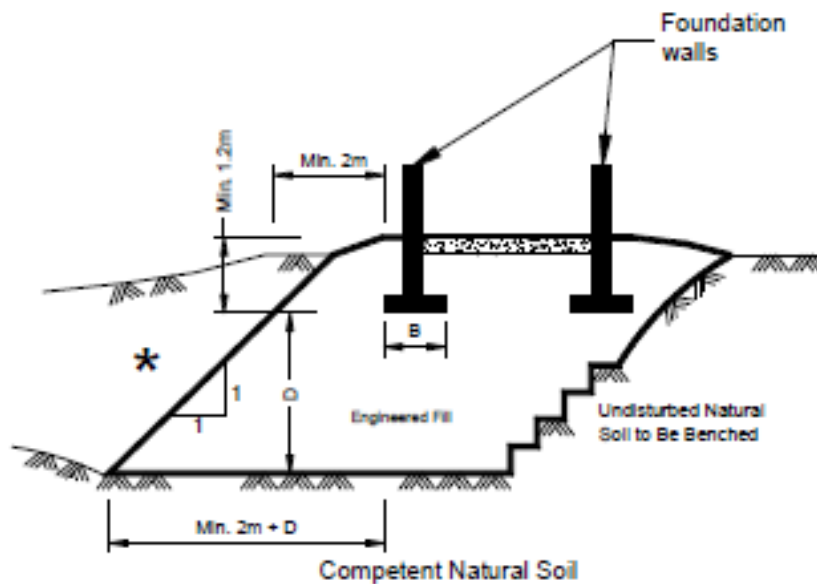
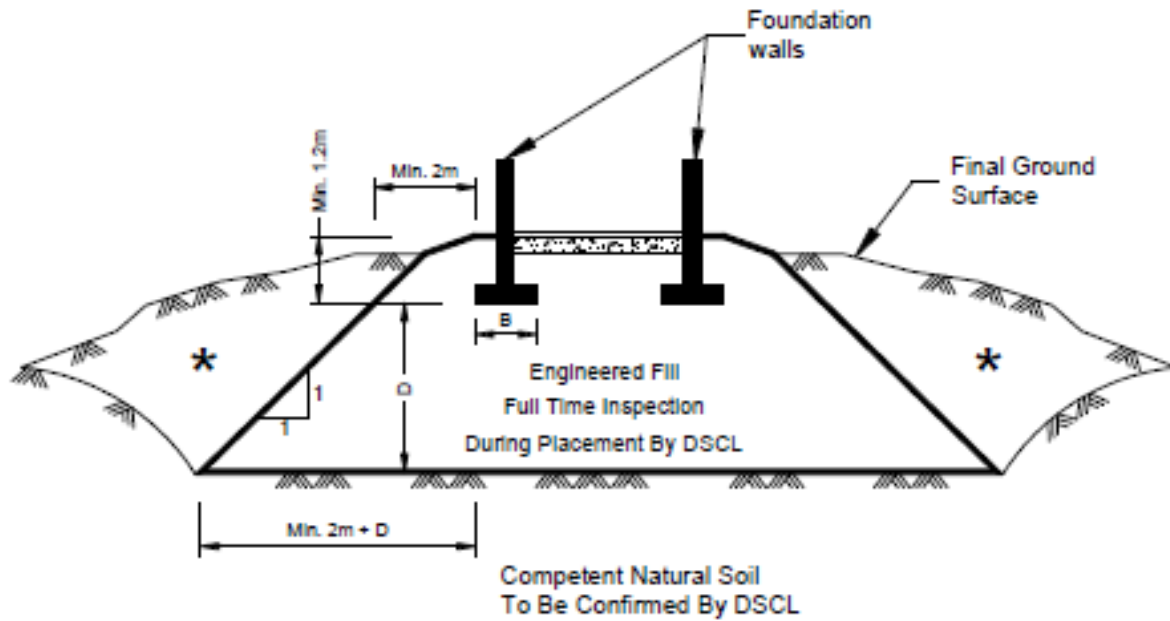
Adverse weather conditions such as rain make the placement of engineered fill to the required degree of density difficult or impossible; engineered fill cannot be placed during freezing conditions, i.e. normally not between December 15 and April 1 of each year.

The location of the foundations on the engineered fill pad is critical and certification by a qualified surveyor that the foundations are within the stipulated boundaries is mandatory. Since layout stakes are often damaged or removed during fill placement, offset stakes must be installed and maintained by the surveyors during the course of fill placement so that the contractor and engineering staff are continually aware of where the engineered fill limits lie. Excavations within the engineered fill pad must be backfilled with the same conditions and quality control as the original pad.

To perform satisfactorily, engineered fill requires the cooperation of the designers, engineers, contractors and all parties must be aware of the requirements. The minimum requirements are as follows; however, the geotechnical report must be reviewed for specific information and requirements.

1. Prior to site work involving engineered fill, a site meeting to discuss all aspects must be convened. The surveyor, contractor, design engineer and geotechnical engineer must attend the meeting. At this meeting, the limits of the engineered fill will be defined. The contractor must make known where all fill material will be obtained from and samples must be provided to the geotechnical engineer for review, and approval before filling begins.
2. Detailed drawings indicating the lower boundaries as well as the upper boundaries of the engineered fill must be available at the site meeting and be approved by the geotechnical engineer.
3. The building footprint and base of the pad, including basements, garages, etc. must be defined by offset stakes that remain in place until the footings and service connections are all constructed. Confirmation that the footings are within the pad, service lines are in place, and that the grade conforms to drawings, must be obtained by the owner in writing from the surveyor and DS Consultants Ltd (DSCL). Without this confirmation no responsibility for the performance of the structure can be accepted by DSCL. Survey drawing of the pre and post fill location and elevations will also be required.
4. The area must be stripped of all topsoil and fill materials. Subgrade must be proof-rolled. Soft spots must be dug out. The stripped native subgrade must be examined and approved by a DSCL engineer prior to placement of fill.

5. The approved engineered fill material must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Engineered fill should not be placed during the winter months. Engineered fill compacted to 100% SPMDD will settle under its own weight approximately 0.5% of the fill height and the structural engineer must be aware of this settlement. In addition to the settlement of the fill, additional settlement due to consolidation of the underlying soils from the structural and fill loads will occur and should be evaluated prior to placing the fill.
6. Full-time geotechnical inspection by DSCL during placement of engineered fill is required. Work cannot commence or continue without the presence of the DSCL representative.
7. The fill must be placed such that the specified geometry is achieved. Refer to the attached sketches for minimum requirements. Take careful note that the projection of the compacted pad beyond the footing at footing level is a minimum of 2 m. The base of the compacted pad extends 2 m plus the depth of excavation beyond the edge of the footing.
8. A bearing capacity of 150 kPa at SLS (225 kPa at ULS) can be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested and footings must be provided with nominal steel reinforcement.
9. All excavations must be done in accordance with the Occupational Health and Safety Regulations of Ontario.
10. After completion of the engineered fill pad a second contractor may be selected to install footings. The prepared footing bases must be evaluated by engineering staff from DSCL prior to footing concrete placements. All excavations must be backfilled under full time supervision by DSCL to the same degree as the engineered fill pad. Surface water cannot be allowed to pond in excavations or to be trapped in clear stone backfill. Clear stone backfill can only be used with the approval of DSCL.
11. After completion of compaction, the surface of the engineered fill pad must be protected from disturbance from traffic, rain and frost. During the course of fill placement, the engineered fill must be smooth-graded, proof-rolled and sloped/crowned at the end of each day, prior to weekends and any stoppage in work in order to promote rapid runoff of rainwater and to avoid any ponding surface water. Any stockpiles of fill intended for use as engineered fill must also be smooth-bladed to promote runoff and/or protected from excessive moisture take up.
12. If there is a delay in construction, the engineered fill pad must be inspected and accepted by the geotechnical engineer. The location of the structure must be reconfirmed that it remains within the pad.
13. The geometry of the engineered fill as illustrated in these General Requirements is general in nature. Each project will have its own unique requirements. For example, if perimeter sidewalks are to be constructed around the building, then the projection of the engineered fill beyond the foundation wall may need to be greater.
14. These guidelines are to be read in conjunction with DS Consultants Ltd report attached.



* Backfill in this area to be as per the DSCL report.