GEOTECHNICAL INVESTIGATION - FARSIGHT HOMES, BALLANTRAE, 5426, 5452 & 5584 LAKESHORE ROAD, WHITCHURCH-STOUFFVILLE, ONTARIO

FARSIGHT HOMES

CONFIDENTIAL

PROJECT NO.: 161-06960-00

DATE: MAY 5, 2021

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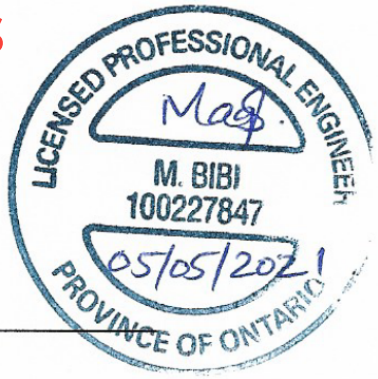
SIGNATURES



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1 INTRODUCTION

WSP Canada Inc. was retained by Far Sight Homes to undertake a geotechnical investigation for the proposed residential development at 5426, 5452 and 5584 Lakeshore Road, located southeast of the intersection of Highway 48 and Aurora Road in the Town of Whitchurch-Stouffville, Ontario.

The site is rectangular shaped, approximately 26.9 ha (66.5 acres) parcel of land and currently occupied by agricultural fields, wooded areas, uncultivated lands, three (3) residential dwellings and a pond in the southeast corner.

It is understood that the proposed development will consist of a residential subdivision with 142 single family homes with basements and internal serviced roads and underground services. The finished basement floor elevations of the proposed houses were not known to us at the time of previous submission of this report. The revised geotechnical report addresses the comments provided by R.J. Burnside.

During this investigation five (5) boreholes BH16-1 through BH16-5 were drilled at the site for geotechnical investigation, the borehole logs are attached in **Appendix A** and six boreholes OW16-1 through OW16-6 were drilled for hydrogeological investigation for which the logs are attached in **Appendix A1**.

A previous hydrogeological investigation in the south portion of the above noted site was carried out by WSP in 2014 and 2015. During this investigation six (6) test pits (TP14-01 to TP14-06) to depths ranging from 3 m to 4.5 m below ground surface and six (6) boreholes (MW15-1 through MW15-6) were drilled to a depth of 4.6 m below ground surface. Logs of these test pits and boreholes are attached in **Appendix A2** of this report.

The purpose of this geotechnical investigation was to obtain information about the subsurface conditions at the borehole locations and from the findings in the boreholes make recommendations pertaining to the geotechnical design of underground utilities and roads within the development and to comment on the foundations.

This report deals with the geotechnical issues only.

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 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 can cater to the changed design.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. The format and contents are guided by client specific needs and economics and do not conform to generalize standards for services. 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 Far Sight Homes and its architect and designers. Use of this report by third party without WSP consent is prohibited.

2 FIELD AND LABORATORY WORK

The field investigation consisted of drilling five (5) geotechnical exploratory boreholes (BH16-1 through BH16-5, see **Drawing 1** for borehole locations) at the subject site to a depth of 8.1 m below ground surface.

The boreholes were advanced with solid stem continuous flight auger equipment by a drilling sub-contractor under the direction and supervision of WSP 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 WSP laboratory for detailed examination by the project engineer and for laboratory testing.

As well as visual examination in the laboratory, all soil samples from geotechnical boreholes were tested for moisture contents. Grain size analyses of six (6) selected soil samples were conducted and the results are presented on **Figures 1** and **2** in **Appendix B**.

Prior to drilling operations, all underground utilities were cleared at the borehole locations by the representatives of the public utilities locate companies and a private locator.

The ground surface elevations at the borehole locations were estimated from the Draft Survey Plan provided by the client.

Water level observations were made during drilling and in the open boreholes at the completion of the drilling operations. Six (6) monitoring wells (OW16-1 through OW16-6, see **Appendix A1**) installed at the site for hydrogeological purposes were also used to monitor long-term groundwater levels.

3 SUBSURFACE CONDITIONS

The borehole location plan is shown on **Drawing 1**. Notes on soil samples description are presented on **Drawing 1A** attached in **Appendix A.** The subsurface conditions in the boreholes are presented in the individual borehole log sheets (**Encl. 1** to **5** inclusive) attached in **Appendix A**. The subsurface conditions in the boreholes are summarized in the following paragraphs.

3.1 SOIL CONDITIONS

TOPSOIL / FILL MATERIAL

A 150 to 280 mm thick layer of surficial topsoil was found at the boreholes as indicated on the individual borehole logs. 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.

Below the topsoil at boreholes BH16-1 and BH16-3, fill material consisting of silty sand was found extending to depths varying from 1.5 to 1.8 m below the existing ground surface. The fill material was present in a loose state, with measured SPT 'N' values ranging from 2 to 8 blows per 300 mm of penetration. Traces of organics were present in the fill material.

SAND/SILTY SAND/SANDY SILT (REWORKED/DISTURBED/POSSIBLE FILL)

Below the topsoil in boreholes BH16-2 and below clayey silt (reworked/disturbed) in BH16-4, reworked/disturbed deposits of sand and silty sand were found extending to depths varying from 0.8 to 1.5 m below ground surface. These deposits were present in a loose to compact state with measured SPT 'N' values ranging from 13 to 24 blows per 300 mm of penetration.

Below the topsoil in borehole BH16-5, reworked/disturbed or possible fill deposits of silty sand to sandy silt were found extending to a depth of 1.5 m below ground surface. These deposits were present in a very loose state with measured SPT 'N' values ranging from 2 to 3 blows per 300 mm of penetration.

CLAYEY SILT (REWORKED/DISTURBED)

Below the topsoil in borehole BH16-4, a reworked/disturbed deposit of clayey silt was found extending to a depth of 1.7 m below ground surface. This deposit was present in a firm to very stiff consistency with measured SPT 'N' values ranging from 7 to 25 blows per 300 mm of penetration.

A deposit of sand (reworked/disturbed) was embedded within the clayey silt (reworked/disturbed) deposit at a depth of 0.8 to 1.5 m.

SAND, SILTY SAND, SANDY SILT AND SILT

Below reworked silty sand and silty sand to sandy silt in boreholes BH16-2 and BH16-5, below fill material in BH16-1 and BH16-3 and below clayey silt (reworked) in BH16-4, native deposits of sand, silty sand, sandy silt and silt were found extending to the termination depth of the boreholes. These deposits were generally found to be in a compact to dense state, with occasional loose and/or very dense layers with measured SPT 'N' values ranging from 8 to more than 50 blows per 300 mm of penetration.

Grain size analysis of three (3) samples (BH16-1/SS4, BH16-4/SS6 and BH16-5/SS6) of sand were conducted. The gradation curves are presented on **Figure 1** in **appendix B**, with the following fractions:

Clay: 4-6%
Silt: 10-14%
Sand: 80-86%
Gravel: 0%

Grain size analysis of three (3) samples (BH16-1/SS7, BH16-2/SS5 and BH16-3/SS6) of silt and sandy silt were conducted. The gradation curves are presented on **Figure 2** in **appendix B**, with the following fractions:

Clay: 8-11%
Silt: 60-87%
Sand: 2-31%
Gravel: upto 2%

3.2 GROUNDWATER CONDITIONS

During drilling, short-term (unstabilized) groundwater table in the boreholes (BH16-1 to BH16-5) was found at depths varying from 0.8 to 4.3 m below ground surface.

Groundwater levels measured during 2015, 2016 and 2017 in the monitoring wells installed in the boreholes MW15-1 to MW15-6 and OW16-1 through OW16-6 were at depths varying from 0.20 to 4.6 m below ground surface, corresponding to Elev. 327.4 m to 332.1 m. Logs of boreholes MW15-1 to MW15-6 and OW16-1 to OW16-6 are attached in **Appendix A1**.

Table 3.1 summarizes the depths and elevations of groundwater levels in the monitoring wells.

Table 3-1: Measured Water Level in the Monitoring Wells

BOREHOLE NO	GROUND SURFACE ELEVATION (m)	SOIL TYPE AT SCREEN LOCATION (DEPTH, m)	DATE OF OBSERVATION	DEPTH OF GROUNDWATER TABLE (m)	ELEVATION OF GROUNDWATER TABLE (m)	NOTE
MW15-1	334.0	Sand/silt (1.6 - 4.6)	Sep 23, 2015 Aug 30, 2016 Oct 25, 2016 Dec 21, 2016 Feb 27, 2017 Apr 13, 2017	2.9 3.2 3.2 3.3 2.6 2.2	331.1 330.8 330.8 330.7 331.4 331.8	50 mm Monitoring well
MW15-2	333.5	Sand (2.4 - 4.6)	Sep 23, 2015 Aug 30, 2016 Oct 25, 2016 Dec 21, 2016 Feb 27, 2017 Apr 13, 2017	3.5 3.9 4.5 4.5 3.7 3.2	330.0 329.6 329.0 329.0 329.8 330.3	50 mm Monitoring well
MW15-3	332.5	Sand (2.4 - 4.6)	Sep 23, 2015 Aug 30, 2016 Oct 25, 2016 Dec 21, 2016 Feb 27, 2017 Apr 13, 2017	2.4 2.8 3.2 3.8 2.3 1.9	330.1 329.7 329.3 328.7 330.2 330.6	50 mm Monitoring well
MW15-4	334.0	Sand (1.6-4.6)	Sep 23, 2015 Aug 30, 2016 Oct 25, 2016 Dec 21, 2016 Feb 27, 2017 Apr 13, 2017	3.2 3.5 3.6 3.6 3.1 2.5	330.8 330.5 330.4 330.4 330.9 331.5	50 mm Monitoring well
MW15-5	334.0	Sand (2.4 - 4.6)	Sep 23, 2015 Aug 30, 2016 Oct 25, 2016 Dec 21, 2016 Feb 27, 2017 Apr 13, 2017	3.6 3.9 4.2 4.5 3.9 3.2	330.4 330.1 329.8 329.5 330.1 330.8	50 mm Monitoring well
MW15-6	333.5	Sand/silt (2.4 - 4.6)	Sep 23, 2015 Aug 30, 2016	3.7 4.1	329.8 329.4	50 mm Monitoring well

BOREHOLE NO	GROUND SURFACE ELEVATION (m)	SOIL TYPE AT SCREEN LOCATION (DEPTH, m)	DATE OF OBSERVATION	DEPTH OF GROUNDWATER TABLE (m)	ELEVATION OF GROUNDWATER TABLE (m)	NOTE
			Oct 25, 2016	4.6	328.9	
			Dec 21, 2016	-dry-	-	
			Feb 27, 2017	3.0	330.5	
			Apr 13, 2017	2.6	330.9	
OW16-1	328.9	Sand (3.1 – 6.1)	Jun 25, 2016	0.9	328.0	50 mm Monitoring well
			Jun 28, 2016	0.9	327.9	
			Aug 30, 2016	1.0	327.9	
			Oct 25, 2016	1.4	327.5	
			Dec 21, 2016	1.5	327.4	
			Feb 27, 2017	0.3	328.6	
			Apr 13, 2017	0.2	328.7	
OW16-2	331.4	Sand (3.1 – 6.1)	Jun 25, 2016	3.2	328.2	50 mm Monitoring well
			Jun 28, 2016	3.2	328.2	
			Aug 30, 2016	3.5	327.9	
			Oct 25, 2016	3.8	327.6	
			Dec 21, 2016	3.9	327.5	
			Feb 27, 2017	3.1	328.3	
			Apr 13, 2017	2.6	328.8	
OW16-3	330.1	Sand (3.1 – 6.1)	Jun 25, 2016	1.7	328.4	50 mm Monitoring well
			Jun 28, 2016	1.7	328.4	
			Aug 30, 2016	1.9	328.2	
			Oct 25, 2016	2.3	327.9	
			Dec 21, 2016	2.3	327.8	
			Feb 27, 2017	1.2	328.9	
			Apr 13, 2017	0.9	329.2	
OW16-4	331.4	Sand and Silt (3.1 – 6.1)	Jun 25, 2016	3.1	328.3	50 mm Monitoring well
			Jun 28, 2016	3.1	328.3	
			Aug 30, 2016	3.4	328.0	
			Oct 25, 2016	3.6	327.8	
			Dec 21, 2016	3.7	327.7	
			Feb 27, 2017	3.3	328.1	
			Apr 13, 2017	2.7	328.7	

BOREHOLE NO	GROUND SURFACE ELEVATION (m)	SOIL TYPE AT SCREEN LOCATION (DEPTH, m)	DATE OF OBSERVATION	DEPTH OF GROUNDWATER TABLE (m)	ELEVATION OF GROUNDWATER TABLE (m)	NOTE
OW16-5	334.1	Sand/Silt (3.1 – 6.1)	Jun 25, 2016 Jun 28, 2016 Aug 30, 2016 Oct 25, 2016 Dec 21, 2016 Feb 27, 2017 Apr 13, 2017	2.6 2.6 2.9 3.2 3.3 2.5 2.0	331.5 331.5 331.2 331.0 330.9 331.6 332.1	50 mm Monitoring well
OW16-6	333.2	Sand/Silt (3.1 – 6.1)	Jun 25, 2016 Jun 28, 2016 Aug 30, 2016 Oct 25, 2016 Dec 21, 2016 Feb 27, 2017 Apr 13, 2017	2.3 2.2 2.4 2.5 2.4 1.7 1.5	330.9 331.0 330.8 330.7 330.8 331.5 331.7	50 mm Monitoring well

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

3.3 SOIL CORROSIVITY AND WATER SOLUBLE SOIL SULPHATE TEST RESULTS

Three (3) soil samples (BH16-2/SS6, BH16-4/SS4 and BH16-5/SS5A) were analyzed for corrosivity parameters as per ANSI/AWWA to assess their aggressivity towards buried ferrous metal. The test results are provided in **Appendix D** and are summarized in the following Table 3.2.

Table 3-2: Summary of Corrosivity Test Results

BOREHOLE/ SAMPLE NO.	DEPTH (m)	SOIL TYPE	RESISTIVITY (ohm. cm) (point)	pH (point)	REDOX POTENTIAL (mV) (point)	SULPHIDE (%) (point)	MOISTURE (point)	TOTAL POINTS
BH16-2 / SS6	4.6 - 5.2	Silt	10600 (0)	8.63(3)	292 (0)	<0.05 (0)	Saturated (2)	5
BH16-4 / SS4	2.3 - 2.9	Sand	16400 (0)	9.01 (3)	276 (0)	<0.05 (0)	Wet (2)	5
BH16-5/ SS5A	3.1 - 3.4	Silt	12300(0)	8.59 (3)	300 (0)	<0.05 (0)	Wet (2)	5

Scoring of less than 10 on the basis of these test results is indicative, according to ANSI/AWWA, of soil which is not unusually corrosive towards gray or ductile/cast iron pipe.

Three (3) soil samples (BH16-2/SS6, BH16-4/SS4 and BH16-5/SS5A) were tested for pH and water soluble soil sulphate content in order to evaluate the degree of risk posed by the subsoils for sulphate attack on buried concrete. The test results are presented in **Appendix D** and are also shown in the following Table 3.3.

Table 3-3: Summary of Water Soluble Soil and Sulphate Content Test Results

BOREHOLE / SAMPLE NO.	DEPTH (m)	SOIL TYPE	pH (point)	WATER SOLUBLE SULPHATE (µg/g*)
BH16-2 / SS6	4.6 - 5.2	Silt	8.63	6
BH16-4 / SS4	2.3 - 2.9	Sand	9.01	2
BH16-5/ SS5A	3.1 - 3.4	Silt	8.59	2

* 1µg/g = 1mg/kg = 0.0001%

The foregoing results, based on Table 3 of CSA Standard CAN/CSA-A23.1-04, present negligible risk of sulphate attack towards buried concrete and therefore normal Portland cement can be used in the subsurface concrete.

4 DISCUSSION AND RECOMMENDATIONS

It is proposed to develop the site as a residential development entailing single family homes. The lots will therefore be serviced by a network of roads, storm and sanitary sewers and watermains.

Based on the borehole and monitoring well information, groundwater was encountered within 0.2 to 2 m below the ground surface at the locations of the boreholes/monitoring wells. The soils at the site generally consisted of cohesionless deposits (sand to silty sand etc.). Any excavation below the groundwater will require dewatering. More comments on groundwater control at the site are included in WSP's hydrogeological investigation report. From a geotechnical perspective, where the groundwater table is relatively high, consideration can be given to raising the grade using engineered fill so that the basement of the proposed houses can be constructed above the groundwater table.

4.1 ROADS

The investigation has shown that the predominant subgrade soil, after stripping the topsoil, loose fill and disturbed/reworked native and any other organic and otherwise unsuitable subsoil, will generally consist of compact sand, silty sand, sandy silt, silt and/or very stiff clayey silt.

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

40 mm HL3 Asphaltic Concrete

80 mm HL8 Asphaltic Concrete

150 mm Granular 'A'

350 mm Granular 'B'

These values may need to be adjusted according to the Town of Whitchurch-Stouffville Standards. 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. 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.

4.1.1 STRIPPING, SUB-EXCAVATION AND GRADING

The site should be stripped of all topsoil and loose fill material or disturbed/reworked native and any organic 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.

Owing to the clayey (i.e. impervious) nature of the subsoil at some locations at the site, proper cambering and allowing the water to escape towards the sides (where it can be removed by means of subdrains) is considered to be beneficial for this project. 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 ±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 95% of its SPMDD. The degree of compaction should be increased to 98% within the top 1.0 m of the subgrade, or as per City Standards. The compaction of the new fill should be checked by frequent field density tests.

4.1.2 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 at least 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.

4.1.3 DRAINAGE

The Town of Whitchurch-Stouffville requires the installation of full-length subdrains 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 catchbasins. As discussed in Section 4.1.1, by means of good planning any water trapped in the granular sub-base materials should be drained rapidly towards subdrains or other interceptors.

4.2 SEWERS

As a part of the site development, a network of new storm and sanitary sewers are assumed to be generally within 4 to 5 m below the existing grade.

4.2.1 TRENCHING

Based on the boreholes, the trenches will be dug through fill material and/or disturbed native soils, sand to silty sand, sandy silt, silt and clayey silt deposits. Groundwater seepage is anticipated from perched water in fill material. The stabilized groundwater was found to be in the range of 0.2 to 4.6 m below the existing ground surface corresponding to Elev. 327.4 m to 332.1 m. Wet to saturated sand, silty sand, sandy silt and silt was present below the depths ranging from 0.8 to 4.3 m below ground surface. Based on the borehole information, it is anticipated that for excavation below the groundwater table Elev. 332.1 to 327.4 m in water bearing silty and sandy soils, positive dewatering will be required such as eductors or well points. The groundwater table must be lowered to at least 1.0 m below the deepest excavation base. Otherwise, it will result in an unstable base and flowing sides. A contractor specializing in dewatering should be retained to design the dewatering systems, if the excavation will continue below the groundwater table.

Reference should be made to WSP's Hydrogeological Report for the proposed development at this site for more comments on groundwater control.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA).

In accordance with OHSA, the fill/disturbed/reworked material, firm clayey silt, sand, silty sand, sandy silt and silt can be classified as Type 3 soil above groundwater table and as Type 4 soil below groundwater table or in perched water. The very stiff clayey silt can be classified as Type 2 Soil above groundwater table.

4.2.2 BEDDING

The compact to dense sand, silty sand, sandy silt and silt will provide adequate support for the watermain and sewer pipes and allow the use of normal Class B type bedding. The recommended minimum thickness of granular bedding below the invert of the pipes is 150 mm. The thickness of the bedding may, however, should be increased depending on the pipe diameter or in accordance with local standards or if wet or weak subgrade conditions are encountered, especially when the soil at the trench base level consists of wet, dilatant silt.

The bedding material should consist of well graded granular material such as Granular 'A'. Or 19 mm crusher run limestone used for bedding material must wrapped with a non-woven geotextile. After installing the pipe on the bedding, a granular surround of approved bedding material, which extends at least 300 mm above the obvert of the pipe, or as set out by the local Authority, should be placed. The subgrade condition must be inspected and approved by geotechnical personnel. The bedding should conform to the current Ontario Provincial Standard specifications and/or standards set by the local municipalities.

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 poorly graded bedding material.

Localized, wet and unstable soils encountered within generally stable soil zones can be stabilized by 'punching' a 50 mm clear crushed limestone or 50 mm well graded crusher run limestone pad into the soft subgrade prior to bedding placement. The thickness of pad will depend on field conditions.

4.2.3 BACKFILLING OF TRENCHES

Based on visual and tactile examination, the select on-site excavated inorganic native soils are considered to be suitable for re-use as backfill in the service trenches provided their moisture contents at the time of construction are at or near (±2%) optimum. The organics in the fill and disturbed/reworked native soils must be separated and discarded from the excavated fill and disturbed soils. The sandy soils are in wet to saturated state and will require significant aeration prior to backfill.

The clayey till especially when its consistency is hard is likely to be excavated in cohesive chunks or blocks and will be difficult to compact in confined areas. For use as backfill, the clayey material will have to pulverized and placed in thin layers. 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 (±2%) their optimum moisture content, and each layer should be compacted to at least 95% SPMDD. The degree of compaction should be increased to 98% within the top 1.0 m of the subgrade. Unsuitable materials such as organic soils, boulders, cobbles, frozen soils, etc. should not be used for backfilling.

The on-site excavated soils and especially the clayey soils should not be used in confined areas (e.g. around catch basins and laterals under roadways) where heavy compaction equipment cannot be operated. The use of imported granular fill together with an appropriate frost taper would be preferable in confined areas and around structures, such as catch basins.

4.3 ENGINEERED FILL

In the areas where earth fill is required for site grading purposes, engineered fill may be constructed below house foundations, roads, boulevards, etc.

Based on the borehole information, all the existing fill material and disturbed/reworked native soils must be removed. The base must be thoroughly proof-rolled. Any loose soils detected during the proof rolling must be sub-excavated and replaced with engineered fill. Dewatering will be required for any excavation below groundwater. The stripped native subgrade must be examined and approved by a WSP engineer prior to placement of fill.

General guidelines for the placement and preparation of engineered fill are presented in **Appendix C**. Bearing capacity values of 150 kPa at SLS and 225 kPa at ULS can be used on engineered fill, provided that all the existing fill is removed and replaced with engineered fill and requirements in **Appendix C** are adhered to.

To reduce the risk of improperly placed engineered compacted fill, full-time supervision of the contractor is essential. Despite full time supervision, it has been found that contractors frequently bulldoze loose fill into areas and compact only the surface. The inspector, either busy on other portions of the site or absent during “off hours” will be unaware of this condition. For this reason, we cannot guarantee the performance of the engineered fill, and this guarantee must be the responsibility of the contractor. The owner and his representatives must accept the risk involved in the use of engineered fill and offset this risk with the monetary savings of avoiding deep foundations. This potential problem must be recognized and discussed at a pre-construction meeting. Procedures can then be instigated to reduce the risk of settlement resulting from un-compacted fill.

The following is a recommended procedure for engineered fill:

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 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 WSP. Without this confirmation no responsibility for the performance of the structure can be accepted by WSP. 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 WSP engineer prior to placement of fill.

5. The excavated fill is in the wet state and will require significant aeration prior to its reuse. The organics in the fill must be separated and discarded. The fill to be reused must be selected by a geotechnical technician.

6. The approved engineered fill must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Granular fill is preferred. Engineered fill should not be placed (where it will support footings) 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.

7. Full-time geotechnical inspection by WSP during placement of engineered fill is required. Work cannot commence or continue without the presence of the WSP representative.

8. The fill must be placed such that the specified geometry is achieved. Refer to 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.

9. Bearing capacity values of 150 kPa at SLS and 225 kPa at ULS may be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested and footings should be provided with nominal steel reinforcement.

10. All excavations must be done in accordance with the Occupational Health and Safety Regulations of Ontario.

11. After completion of the pad a second contractor may be selected to install footings. All excavations must be backfilled under full time supervision by WSP 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 WSP.

12. After completion of compaction, the surface of the pad must be protected from disturbance from traffic, rain and frost.

13. 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.

The inorganic clayey silt, silty sand and sandy silt are considered suitable for use as engineered fill, provided that their moisture contents at the time of construction are at or near optimum. As mentioned before in Section 4.2.3 of this report, the clayey soils are likely to be excavated in cohesive chunks or blocks and will be difficult to compact. They should be pulverized and placed in thin layers not exceeding 150 to 200 mm and compacted using heavy equipment suitable for these types of soils (e.g. heavy sheep's foot compactors).

5 FOUNDATIONS

It is understood that the proposed residential development will consist of single family homes with basements. The finish basement floor elevations of these proposed houses are not known to us at the time of writing this report.

Based on the Preliminary Grading Plan **Figure 3** by Sabourin Kimble & Associates Ltd. (SKA) entitled "Farsight Homes Preliminary Grading" printing date April 26, 2021, Project Number 13:286 provided to us by the client, the underside of footing elevation was estimated to be 2.2 to 2.4 metres below final grade for standard depth basement floor. It is understood that all 142-single dwelling lots have full basements. Most of the house lots will be requiring engineered fill below the underside of footing to a maximum approximate thickness of 3.65m, corresponding to underside footing elevations of 331.5 m to 333.5 m.

The existing fill, disturbed/reworked materials and loose soils are not suitable for supporting the foundations. The proposed houses (with a basement) can be supported by spread and strip footings founded on the undisturbed native compact to dense sand, silty sand, sandy silt and silt and very stiff clayey silt for a bearing capacity of 150 kPa at SLS (Serviceability Limit State), and for a factored geotechnical resistance of 225 kPa at ULS (Ultimate Limit State).

Alternatively, the proposed houses can also be supported by spread and strip footings founded on engineered fill for a bearing capacity of 150 kPa at the serviceability limit states (SLS) and for a factored geotechnical resistance of 225 kPa at the ultimate limit states (ULS), provided all requirements in **Appendix C** are adhered to. Prior to the placement of the engineered fill, all of the existing fill and surficially softened 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 throughout. To reduce the risk of improperly placed engineered compacted fill, full-time supervision of the contractor is essential.

It is recommended that the footings of the development be kept a minimum of 1.0 m above seasonally high groundwater level.

Foundations designed to the specified bearing capacity at the Serviceability Limit States (SLS) are expected to settle less than 25 mm total and 19 mm differential. All footing bases must be inspected by this office to confirm the design bearing values.

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.

In the vicinity of the existing buried utilities, all footings must be lowered to undisturbed native soils, or alternatively the services must be structurally bridged.

It should be noted that the recommended bearing capacities have been calculated by WSP 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 WSP to validate the information for use during the construction stage.

6 GENERAL COMMENTS AND LIMITATIONS OF 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 WSP Canada Inc. at the time of preparation. Unless otherwise agreed in writing by WSP Canada Inc., 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 the 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. WSP Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

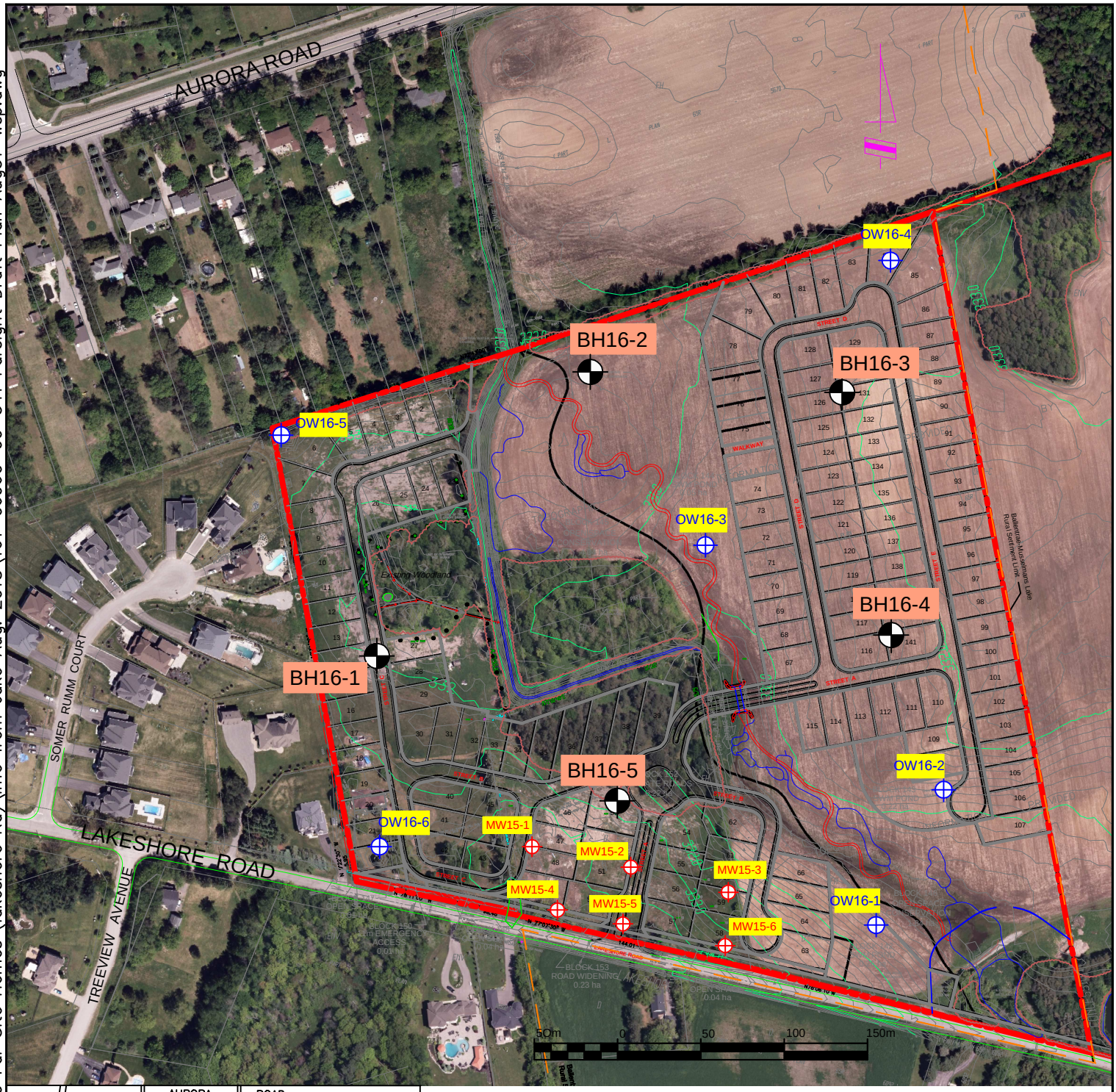
We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

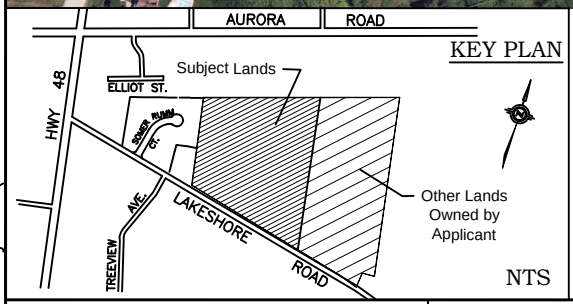
We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

DRAWINGS

DRAWING 1: BOREHOLE LOCATION PLAN

FIGURE 3: PRELIMINARY GRADING PLAN





LEGEND

- Geotechnical Borehole Location
- Monitoring Wells Location 2016 (Hydrogeological)
- Monitoring Wells Location 2015 (Hydrogeological)

51 CONSTELLATION COURT
TORONTO, ONTARIO CANADA M9W 1K4
TEL.: 416-798-0065 | FAX: 416-798-0518 | WWW.WSP.COM

CLIENT: FAR SIGHT HOMES		PROJECT NO: 161-06960-00	DRAWING NO: 1
TITLE: BOREHOLE LOCATION PLAN		DRAWN BY: ZMO	CHECKED BY: MB
PROJECT: GEOTECHNICAL INVESTIGATION - 5426, 5452 & 5584 LAKESHORE ROAD, WHITCHURCH-STOUFVILLE, ONTARIO		DATE: AUGUST, 2018	SCALE: AS SHOWN
		ORIGINAL SIZE: LETTER	REV. # N/A

T:\Geotech\161 WSP Projects\161-06960-00 Far Site Homes (lakeshore Rd)\Info from Jake Aug. 2018\161-06960-00-341 Farsight Draft Plan Aug31-wsp.dwg

CHANNEL DESIGN PREPARED BY GEO MORPHIX. REFER TO DRAWINGS GEO-1, GEO-2, DET-1

CHANNEL DESIGN PREPARED BY GEO MORPHIX REFER TO DRAWINGS GEO-1, GEO-2, DET-1

STREET E
STREET D
STREET A
STREET B
STREET C
BLOCK 145
BLOCK 144 SWM
BLOCK 143 SWM
BLOCK 147 OPEN SPACE CONSERVATION
BLOCK 148 OPEN SPACE CONSERVATION
BLOCK 155 EMERGENCY ACCESS
BLOCK 156 PUMPING STATION
BLOCK 154 EMERGENCY ACCESS
BLOCK 152 EMERGENCY ACCESS
BLOCK 157 EMERGENCY ACCESS
DRY POND MEADOW
EXISTING WETLAND
EXISTING WOODLAND
EMERGENCY OVERLAND FLOW ROUTE
CAKESHORE ROAD
GW - 328.5
GW - 329
GW - 329.5
GW - 330
GW - 330.5
GW - 331.5
GW - 332

LEGEND:

- PROPOSED CHANNEL REALIGNMENT
- 334.84 PROPOSED GRADE
- PROPOSED SLOPE 3:1 SLOPE (MAX)
- PROPOSED OVERLAND FLOW DIRECTION
- PROPOSED SWALE
- 333 ORIGINAL GROUND CONTOUR
- 329.00 PROPOSED GROUND CONTOUR
- LOT MAY REQUIRE SUMP PUMP SYSTEM TO STORM SEWERS
- SD SPLIT DRAINING LOT
- FD FRONT DRAINING LOT
- WO WALKOUT BASEMENT
- 227.34 PRELIMINARY UNDERSIDE OF FOOTING

SCALE 1:750

WALKWAY GRADING DETAIL
SCALE 1:250

FARSIGHT HOMES
PRELIMINARY GRADING

SABOURIN KIMBLE & ASSOCIATES LTD.
CONSULTING ENGINEERS

PROJECT NUMBER	FIGURE NUMBER
13:286	3

191(W)-19.00

PLOT DATE: 4/26/2020, 1:38 PM, CAD FILE: P:\13\286\Drawings Files\Plans \Figure\120 - 2nd FSSR Submission - Sept 2020\286 Fig 03 Prelim Grading.dwg

APPENDIX

A

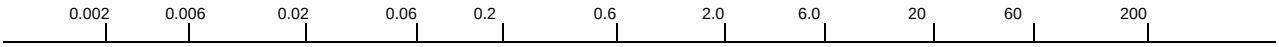
NOTES ON SAMPLE DESCRIPTIONS (DRAWING 1A)
EXPLANATION OF TERMS USED IN THE RECORD OF BOREHOLE
BOREHOLE LOGS (BH16-1 TO BH16-5)

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 WSP 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.

ISSMFE SOIL CLASSIFICATION

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



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

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

UNIFIED SOIL CLASSIFICATION

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

Explanation of Terms Used in the Record of Borehole

Sample Type

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Dimension type sample
FS	Foil sample
NR	No recovery
RC	Rock core
SC	Soil core
SS	Spoon sample
SH	Shelby tube sample
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

Penetration Resistance

Standard Penetration Resistance (SPT), N:
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) required to drive a 50 mm (2 in) drive open sampler for a distance of 300 mm (12 in).

WH – Samples sinks under "weight of hammer"

Dynamic Cone Penetration Resistance, N_d:
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) to drive uncased a 50 mm (2 in) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in).

Textural Classification of Soils (ASTM D2487-10)

Classification	Particle Size
Boulders	> 300 mm
Cobbles	75 mm - 300 mm
Gravel	4.75 mm - 75 mm
Sand	0.075 mm - 4.75 mm
Silt	0.002 mm - 0.075 mm
Clay	<0.002 mm(*)

(*) Canadian Foundation Engineering Manual (4th Edition)

Coarse Grain Soil Description (50% greater than 0.075 mm)

Terminology	Proportion
Trace	0-10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. sand and gravel)	> 35%

Soil Description

a) Cohesive Soils(*)

Consistency	Undrained Shear Strength (kPa)	SPT "N" Value
Very soft	<12	0-2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very stiff	100-200	15-30
Hard	>200	>30

(*) Hierarchy of Shear Strength prediction

1. Lab triaxial test
2. Field vane shear test
3. Lab. vane shear test
4. SPT "N" value
5. Pocket penetrometer

b) Cohesionless Soils

Density Index (Relative Density)	SPT "N" Value
Very loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Soil Tests

w	Water content
w_p	Plastic limit
w_l	Liquid limit
C	Consolidation (oedometer) test
CID	Consolidated isotropically drained triaxial test
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement
D_R	Relative density (specific gravity, Gs)
DS	Direct shear test
ENV	Environmental/ chemical analysis
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified proctor compaction test
SPC	Standard proctor compaction test
OC	Organic content test
U	Unconsolidated Undrained Triaxial Test
V	Field vane (LV-laboratory vane test)
γ	Unit weight

LOG OF BOREHOLE BH16-1

PROJECT: Geotechnical Investigation for Far Sight Homes, Ballantrae
REF. NO.: 161-06960-00
CLIENT: Far Sight Homes
Method: Solid Stem Auger
ENCL NO.: 1
PROJECT LOCATION: 5426, 5452 and 5584 Lakeshore Road
Diameter: 115 mm
DATUM: Geodetic
Date: Jun/02/2016
BH LOCATION: N 4877285 E 636940

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
332.0	Ground Surface											
0.0 / 331.8	**TOPSOIL:** 180 mm											
0.2	**FILL:** silty sand, trace clay, trace rootlets, trace organics, brown, moist, very loose to loose		1	SS	2							
	saturated below 0.8 m		2	SS	3		331					
330.2			3	SS	8							
1.8 / 329.7	**SILTY SAND:** trace clay, brown, saturated, loose						330					
2.3	**SAND:** some silt, trace clay, trace gravel, brown, saturated, compact		4	SS	30							0 82 13 5
							329					
	50 mm thick layer of silt/clayey silt at 3.4 m		5	SS	14							
							328					
			6	SS	29							
	100 mm thick layer of clayey silt at 5.1 m						327					
325.9												
6.1	**SILT:** some clay, trace sand, brown, saturated, compact		7	SS	27							0 2 87 11
							326					
	very dense below 7.6 m						325					
323.9			8	SS	61							
							324					
8.1	**END OF BOREHOLE**											

Notes:
1) Groundwater level was at 0.8 m below ground surface during drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

LOG OF BOREHOLE BH16-2

PROJECT: Geotechnical Investigation for Far Sight Homes, Ballantrae
REF. NO.: 161-06960-00
CLIENT: Far Sight Homes
Method: Solid Stem Auger
ENCL NO.: 2
PROJECT LOCATION: 5426, 5452 and 5584 Lakeshore Road
Diameter: 115 mm
DATUM: Geodetic
Date: Jun/03/2016
BH LOCATION: N 4877454 E 637068

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
331.5	Ground Surface							
0.0 / 331.3	**TOPSOIL:** 250 mm							
0.3	**SILTY SAND:** (reworked/disturbed) trace clay, trace rootlets, trace organics, trace cobbles, brown, moist, compact		1	SS	13		331	
330.7								
0.8 / 1	**SILT:** trace to some clay, trace sand, trace gravel, brown, wet, compact		2	SS	12			
330.0							330	
1.5 / 2	**SANDY SILT:** trace clay, trace gravel, brown, wet, compact		3	SS	16			
329.2								
2.3 / 3	**SILTY SAND:** trace clay, brown, saturated, compact		4	SS	18		329	
328.4								
3.1 / 4	**SILT:** some sand, trace clay, trace gravel, brown, wet to saturated, compact		5	SS	16		328	2 17 72 9
5			6	SS	20		327	
6	some clay to clayey, moist below 6.1m		7	SS	21		326	
325.0								
6.5 / 7	**SAND:** trace silt, trace clay, brown, saturated, compact to dense						325	
	dense below 7.6 m		8	SS	44		324	
323.4								
8.1	**END OF BOREHOLE**							

Notes:
1) Groundwater level was at 0.8 m below ground surface during drilling.

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

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

LOG OF BOREHOLE BH16-3

PROJECT: Geotechnical Investigation for Far Sight Homes, Ballantrae
REF. NO.: 161-06960-00
CLIENT: Far Sight Homes
Method: Solid Stem Auger
ENCL NO.: 3
PROJECT LOCATION: 5426, 5452 and 5584 Lakeshore Road
Diameter: 115 mm
DATUM: Geodetic
Date: Jun/03/2016
BH LOCATION: N 4877442 E 637220

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
331.8	Ground Surface											
0.0 / 331.5	**TOPSOIL:** 280 mm		1	SS	5		331		○			
0.3	**FILL:** silty sand, trace clay, trace rootlets/organics, brown, moist, loose		2	SS	4				○			
1 / 330.3												
1.5	**SAND:** trace silt, trace gravel, trace clay, brown, moist, compact		3	SS	16		330		○			
2	dense at 2.3 m		4	SS	31				○			
3	compact below 3.1 m		5	SS	27		329		○			
4 / 327.2							328					
4.6	**SANDY SILT:** trace clay, trace gravel, seams of silt, seams of clay, brown, saturated, compact		6	SS	14		327		○			1 31 60 8
5 / 325.7							326					
6.1	**SAND:** trace to some silt, trace clay, brown, saturated, compact to dense		7	SS	10		325		○			
7	dense below 7.6 m		8	SS	49		324		○			
8 / 323.7												
8.1	**END OF BOREHOLE** Notes: 1) Groundwater level was at 4.3 m below ground surface upon completion of drilling.											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

LOG OF BOREHOLE BH16-4

PROJECT: Geotechnical Investigation for Far Sight Homes, Ballantrae
REF. NO.: 161-06960-00
CLIENT: Far Sight Homes
Method: Solid Stem Auger
ENCL NO.: 4
PROJECT LOCATION: 5426, 5452 and 5584 Lakeshore Road
Diameter: 115 mm
DATUM: Geodetic
Date: Jun/03/2016
BH LOCATION: N 4877298 E 637249

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
331.3	Ground Surface						
0.0 / 331.0	**TOPSOIL:** 280 mm						
0.3 / 330.5	**CLAYEY SILT:** (reworked/disturbed) sandy, some gravel, trace rootlets, brown, moist, firm		1	SS	7		331
0.8 / 329.8	**SAND:** (reworked/disturbed) some silt, some gravel, brown, moist, compact		2	SS	24		330
1.5 / 329.6	**CLAYEY SILT:** (reworked/disturbed) some sand, some gravel, brown, moist, very stiff		3	SS	25		
1.7	**SAND:** some silt, trace gravel, trace clay, brown, moist, compact						
	wet below 2.3 m		4	SS	24		329
			5	SS	21		328
	saturated below 4.6 m		6	SS	17		327
			7	SS	23		326
	very dense below 7.6 m		8	SS	62		325
323.2							324
8.1	**END OF BOREHOLE** Notes: 1) Groundwater level was at 2.3 m below ground surface during drilling.						

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

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

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

WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
0	80	14	6

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

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

LOG OF BOREHOLE BH16-5

PROJECT: Geotechnical Investigation for Far Sight Homes, Ballantrae
REF. NO.: 161-06960-00
CLIENT: Far Sight Homes
Method: Solid Stem Auger
ENCL NO.: 5
PROJECT LOCATION: 5426, 5452 and 5584 Lakeshore Road
Diameter: 115 mm
DATUM: Geodetic
Date: Jun/02/2016
BH LOCATION: N 4877199 E 637084

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
332.7	Ground Surface					
332.6	**TOPSOIL:** 150 mm					
0.2	**SILTY SAND TO SANDY SILT:**(reworked/disturbed) trace clay, trace rootlets, trace organics, brown, moist, very loose (POSSIBLE FILL)	1	SS	2		
1	wet below 0.8 m	2	SS	3	332	
331.2						
1.5	**SAND:** some silt, trace gravel, trace clay, occasional cobble, brown, wet, compact	3	SS	20	331	
2						
330.3	100 mm thick layer of clayey silt at 2.3 m					
2.4	**SILT:** trace to some sand, trace clay, brown, wet, compact	4	SS	27	330	
3		5	SS	16		
	130 mm thick layer of clayey silt at 3.4m				329	
4						
328.1						
4.6	**SAND:** trace to some silt, trace clay, brown, wet to saturated, compact	6	SS	20	328	0 86 10 4
5						
6	dense to very dense below 6.1 m	7	SS	59	327	
7					326	
	trace gravel below 7.6 m	8	SS	40	325	
324.6						
8.1	**END OF BOREHOLE** Notes: 1) Groundwater level was at 0.8 m below ground surface during drilling.					

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

APPENDIX

A-1 BOREHOLE LOGS OF HYDROGEOLOGICAL BOREHOLES (OW16-1 TO OW16-6) DRILLED IN 2016

LOG OF BOREHOLE OW16-1

PROJECT: Hydrogeological Investigation
REF. NO.: 161-06960-00
CLIENT: Far Sight Homes
Method: Geoprobe 782DT
ENCL NO.: 1
PROJECT LOCATION: 5426 - 5584 Lakeshore Road, Whitchurch-Stoufville, Ontario
Diameter: 127 mm
DATUM: Geodetic
Date: May/30/2016
BH LOCATION: N 4877124 E 637240

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
328.9	Ground Surface										
0.0 / 328.5	**TOPSOIL:** 360 mm										
0.4	**SAND:** trace to some silt, trace clay, brown to grey, wet to saturated		1	GRAB			W. L. 328.7 m Apr 17, 2017				
							328				
							Bentonite Holeplug				
							327				
			2	GRAB				○			0 87 10 3
							326				
			3	GRAB			325				
							Sand				
							Screen				
							324				
			4	GRAB							
322.8							323				
6.1	**END OF BOREHOLE**										

Notes:
1) 50 mm diameter monitoring well installed upon completion, screened 3.1 to 6.1 m.
2) Water Level Readings:

Date	Depth (mbgs)
June 25, 2016	0.85
June 28, 2016	0.94
Aug. 30, 2016	0.98
Oct. 25, 2016	1.4
Dec. 21, 2016	1.5
Feb. 27, 2017	0.33
April 13, 2017	0.20

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

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

LOG OF BOREHOLE OW16-2

PROJECT: Hydrogeological Investigation
REF. NO.: 161-06960-00
CLIENT: Far Sight Homes
Method: Geoprobe 782DT
ENCL NO.: 2
PROJECT LOCATION: 5426 - 5584 Lakeshore Road, Whitchurch-Stoufville, Ontario
Diameter: 127 mm
DATUM: Geodetic
Date: May/30/2016
BH LOCATION: N 4877205 E 637280

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
331.4	Ground Surface											
0.0 / 331.2	**TOPSOIL:** 230 mm											
0.2	**SAND:** some silt, trace clay, trace gravel, brown, moist		1				331					
								Bentonite Holeplug				
							330					
	grey, wet to saturated below 2 m		2						○			0 68 29 3
							329					
						▽		W. L. 328.8 m Apr 17, 2017				
							328					
			3									
								Sand				
							327					
								Screen				
			4				326					
325.3												
6.1	**END OF BOREHOLE**											

Notes:
1) 50 mm diameter monitoring well installed upon completion, screened 3.05 to 6.1 m.
2) Water Level Readings:

Date	Depth (mbgs)
June 25, 2016	3.2
June 28, 2016	3.2
Aug. 30, 2016	3.5
Oct. 25, 2016	3.8
Dec. 21, 2016	3.9
Feb. 27, 2017	3.1
April 13, 2017	2.6

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

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

LOG OF BOREHOLE OW16-3

PROJECT: Hydrogeological Investigation
REF. NO.: 161-06960-00
CLIENT: Far Sight Homes
Method: Geoprobe 782DT
ENCL NO.: 3
PROJECT LOCATION: 5426 - 5584 Lakeshore Road, Whitchurch-Stoufville, Ontario
Diameter: 127 mm
DATUM: Geodetic
Date: May/31/2016
BH LOCATION: N 4877351 E 637137

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
330.1	Ground Surface											
0.0	**SANDY SILT:** some clay, brown to grey, moist to wet		1				330					
328.6												
1.5	**SAND:** trace silt, trace clay, grey, wet to saturated		2				328					
	coarse sand below 3 m		3				327		○			0 94 3 3
							326					
			4				325					
324.0							324					
6.1	**END OF BOREHOLE**											

W. L. 329.2 m
Apr 17, 2017
Bentonite Holeplug
Sand
Screen

Notes:
1) 50 mm diameter monitoring well installed upon completion, screened 3.05 to 6.1 m.
2) Water Level Readings:

Date	Depth (mbgs)
June 25, 2016	1.7
June 28, 2016	1.7
Aug. 30, 2016	1.9
Oct. 25, 2016	2.2
Dec. 21, 2016	2.3
Feb. 27, 2017	1.2
April 13, 2017	0.9

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

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

LOG OF BOREHOLE OW16-4

PROJECT: Hydrogeological Investigation
REF. NO.: 161-06960-00
CLIENT: Far Sight Homes
Method: Geoprobe 782DT
ENCL NO.: 5
PROJECT LOCATION: 5426 - 5584 Lakeshore Road, Whitchurch-Stoufville, Ontario
Diameter: 127 mm
DATUM: Geodetic
Date: May/30/2016
BH LOCATION: N 4877521 E 637248

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
331.4	Ground Surface											
0.0	**SAND:** trace silt, trace topsoil, brown to grey, moist to wet		1				331					
							Bentonite Holeplug					
			2				330					
	wet to saturated below 2.8 m						329					
328.3							W. L. 328.7 m Apr 17, 2017					
3.1	**SAND AND SILT:** trace clay, grey, wet to saturated		3				328					0 48 49 3
							Sand					
							327					
							Screen					
			4				326					
325.3												
6.1	**END OF BOREHOLE**											

Notes:
1) 50 mm diameter monitoring well installed upon completion, screened 3.05 to 6.1 m.
2) Water Level Readings:

Date	Depth (mbgs)
June 25, 2016	3.1
June 28, 2016	3.1
Aug. 30, 2016	3.4
Oct. 25, 2016	3.6
Dec. 21, 2016	3.7
Feb. 27, 2017	3.3
April 13, 2017	2.7

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

LOG OF BOREHOLE OW16-5

PROJECT: Hydrogeological Investigation
REF. NO.: 161-06960-00
CLIENT: Far Sight Homes
Method: Geoprobe 782DT
ENCL NO.: 6
PROJECT LOCATION: 5426 - 5584 Lakeshore Road, Whitchurch-Stoufville, Ontario
Diameter: 127 mm
DATUM: Geodetic
Date: May/31/2016
BH LOCATION: N 4877417 E 636884

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
334.1	Ground Surface											
0.0 / 333.9	**TOPSOIL:** 230 mm						334					
0.2	**SAND:** trace silt, trace clay, brown, moist to wet		1									
							Bentonite Holeplug					
							333					
			2				W. L. 332.1 m Apr 17, 2017					
	some silt, saturated below 3.5 m		3				331					
							Sand					
							Screen					
329.5							330					
4.6	**SILT:** some sand, trace clay, grey, saturated		4									
							329					
			5						○			0 13 80 7
328.0							328					
6.1	**END OF BOREHOLE**											

Notes:
1) 50 mm diameter monitoring well installed upon completion, screened 3.05 to 6.1 m.
2) Water Level Readings:

Date	Depth (mbgs)
June 25, 2016	2.6
June 28, 2016	2.6
Aug. 30, 2016	2.9
Oct. 25, 2016	3.1
Dec. 21, 2016	3.3
Feb. 27, 2017	2.5
April 13, 2017	2.0

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

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

LOG OF BOREHOLE OW16-6

PROJECT: Hydrogeological Investigation
REF. NO.: 161-06960-00
CLIENT: Far Sight Homes
Method: Geoprobe 782DT
ENCL NO.: 7
PROJECT LOCATION: 5426 - 5584 Lakeshore Road, Whitchurch-Stoufville, Ontario
Diameter: 127 mm
DATUM: Geodetic
Date: May/31/2016
BH LOCATION: N 4877170 E 636942

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
333.2	Ground Surface											
333.0	**TOPSOIL:** 130 mm											
0.1	**SAND:** trace to some silt, trace clay, brown to grey, moist to wet		1				333					
								Bentonite Holeplug				
	trace gravel, wet to saturated below 1.6 m		2			▽		W. L. 331.7 m Apr 17, 2017				
							331					
	50 mm coarse sand layer at 3.1 m		3				330					
								Sand				
								Screen				
328.0			4									
5.2	**SILT:** trace clay, trace sand, grey, saturated		5				328		○			0 9 58 3
327.1												
6.1	**END OF BOREHOLE**											

Notes:
1) 50 mm diameter monitoring well installed upon completion, screened 3.1 to 6.1 m.
2) Water Level Readings:

Date	Depth (mbgs)
June 25, 2016	2.3
June 28, 2016	2.2
Aug. 30, 2016	2.4
Oct. 25, 2016	2.5
Dec. 21, 2016	2.4
Feb. 27, 2017	1.7
April 13, 2017	1.5

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

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

A-2

BOREHOLE LOGS OF HYDROGEOLOGICAL BOREHOLES (MW15-1 TO MW15-6) DRILLED IN 2015

TEST PIT LOGS TP14-01 TO TP14-06

BOREHOLE NO. MW15-1

PROJECT NAME: 5452 LAKESHORE ROAD
PROJECT NO.: 141-15539-01 105
CLIENT: ALCORN & ASSOCIATES LTD.
DATE COMPLETED: Sep 14, 2015
BOREHOLE TYPE: 110 mm SOLID STEM AUGER
SUPERVISOR: KSR
GROUND ELEVATION: 334.0 mASL
REVIEWER: TVK

DEPTH (m)	ELEV (mASL)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0	334.0											**UTM CO-ORDINATES** UTM Zone: 17 NAD: 83 Easting: 637023 Northing: 4877197
0.1	333.9	TOPSOIL: DARK BROWN SILTY SAND TOPSOIL.										
		SAND: BROWN FINE TO MEDIUM SAND, TRACE SILT, MOIST TO SATURATED.			SS1	4		33				
					SS2	4		100				
					SS3	14		100				
					SS4	18		83				WATER LEVEL MEASURED AT 2.89 mBGL ON 09/23/2015
					SS5	19		92				
3.5	330.5	SANDY SILT: BROWN SANDY SILT, TRACE CLAY, MOIST TO WET.										
					SS6	8		100				
4.1	329.9	SAND: BROWN FINE TO MEDIUM SAND, TRACE SILT, MOIST TO SATURATED. - 5 cm SAND AND GRAVEL LAYER AT 4.15 m.										
4.6	329.4	SANDY SILT: BROWN SANDY SILT, TRACE CLAY, MOIST TO WET - 7.5 cm BROWN FINE TO MEDIUM SAND LAYER AT 5.12 m			SS7	22		100				
5.3	328.7	BOREHOLE TERMINATED AT 5.3 m IN SANDY SILT.										

BOREHOLE NO. MW15-2

PROJECT NAME: 5452 LAKESHORE ROAD
PROJECT NO.: 141-15539-01 105
CLIENT: ALCORN & ASSOCIATES LTD.
DATE COMPLETED: Sep 14, 2015
BOREHOLE TYPE: 110 mm SOLID STEM AUGER
SUPERVISOR: KSR
GROUND ELEVATION: 333.5 mASL
REVIEWER: TVK

DEPTH (m)	ELEV (mASL)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	UTM CO-ORDINATES / REMARKS
0.0	333.5									10 20 30	10 20 30	UTM Zone: 17 NAD: 83 Easting: 637040 Northing: 4877136
0.2	333.3	TOPSOIL: LIGHT TO DARK BROWN SILTY SAND TOPSOIL.										
		SAND: BROWN - GREY FINE TO MEDIUM SAND, TRACE SILT, TRACE GRAVEL, MOIST.			SS1	4		57				
1.5	332.0	SANDY SILT: BROWN - GREY SANDY SILT, TRACE CLAY, TRACE GRAVEL.			SS2	19		80				
2.1	331.4	SAND: GREY MEDIUM SAND, TRACE SILT, MOIST TO WET.		▼	SS3	24		70				WATER LEVEL MEASURED AT 3.46 mBGL ON 09/23/2015
4.6	328.9	SILTY SAND: GREY SILTY FINE SAND, WET TO SATURATED.			SS4	21		70				
5.3	328.2	BOREHOLE TERMINATED AT 5.3 m IN SILTY SAND.										

BOREHOLE NO. MW15-3

PROJECT NAME: 5452 LAKESHORE ROAD
PROJECT NO.: 141-15539-01 105
CLIENT: ALCORN & ASSOCIATES LTD.
DATE COMPLETED: Sep 14, 2015
BOREHOLE TYPE: 110 mm SOLID STEM AUGER
SUPERVISOR: KSR
GROUND ELEVATION: 332.5 mASL
REVIEWER: TVK

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting: 637104
Northing: 4877164

DEPTH (m)	ELEV (mASL)	STRATIGRAPHIC DESCRIPTION	TYPE	N VALUE	% WATER	% RECOVERY	RQD (%)	REMARKS
0.0	332.5	TOPSOIL: DARK BROWN SILTY SAND TOPSOIL.						
0.3	332.2	SAND: LIGHT BROWN TO GREY FINE TO MEDIUM SAND, TRACE SILT, MOIST.	SS1	3		57		
			SS2	12		60		
1.7	330.8	SAND AND GRAVEL : COARSE SAND AND GRAVEL, TRACE COBBLE, MOIST.	SS3	14		63		
1.9	330.6	SILT: GREY SILT, SOME CLAY, TRACE SAND.						
2.3	330.2	SILTY SAND: GREY SILTY SAND, TRACE CLAY, TRACE GRAVEL, WET TO SATURATED.	SS4	20		83		WATER LEVEL MEASURED AT 2.38 mBGL ON 09/23/2015
			SS5	9		40		
			SS6	19		79		
5.0	327.5	SILT: GREY SILT, SOME SAND, TRACE CLAY, WET TO SATURATED.	SS7	14		83		
5.3	327.2	BOREHOLE TERMINATED AT 5.3 m IN SILT.						

CONE PENETRATION "N" VALUE: 10 20 30 — SHEAR STRENGTH

WATER CONTENT %: 10 20 30 — W_P W_L

BOREHOLE NO. MW15-4

PROJECT NAME: 5452 LAKESHORE ROAD
PROJECT NO.: 141-15539-01 105
CLIENT: ALCORN & ASSOCIATES LTD.
DATE COMPLETED: Sep 14, 2015
BOREHOLE TYPE: 110 mm SOLID STEM AUGER
SUPERVISOR: KSR
GROUND ELEVATION: 334.0 mASL
REVIEWER: TVK

DEPTH (m)	ELEV (mASL)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0	334.0											**UTM CO-ORDINATES** UTM Zone: 17 NAD: 83 Easting: 637158 Northing: 4877130
0.2	333.8	TOPSOIL: BROWN SILTY SAND TOPSOIL.										
		SAND: BROWN FINE SAND, TRACE SILT, MOIST.			SS1	3		63				
					SS2	2		67				
1.6	332.4	SILT AND SAND: BROWN SILT AND SAND, TRACE CLAY.			SS3	15		63				
2.1	331.9	SAND: GREY FINE TO MEDIUM SAND, TRACE SILT, MOIST TO SATURATED - 10.2 cm GREY SILTY SAND LAYER AT 3.3 m, SATURATED.		▼	SS4	9		8				WATER LEVEL MEASURED AT 3.19 mBGL ON 09/23/2015
4.6	329.4	SILTY SAND: GREY SILTY SAND, TRACE CLAY, WET TO SATURATED.			SS5	14		100				
5.3	328.7	BOREHOLE TERMINATED AT 5.3 m IN SILTY SAND.										

BOREHOLE NO. MW15-5

PROJECT NAME: 5452 LAKESHORE ROAD
PROJECT NO.: 141-15539-01 105
CLIENT: ALCORN & ASSOCIATES LTD.
DATE COMPLETED: Sep 14, 2015
BOREHOLE TYPE: 110 mm SOLID STEM AUGER
SUPERVISOR: KSR
GROUND ELEVATION: 334.0 mASL
REVIEWER: TVK

DEPTH (m)	ELEV (mASL)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0	334.0	TOPSOIL: BROWN SILTY SAND TOPSOIL										**UTM CO-ORDINATES** UTM Zone: 17 NAD: 83 Easting: 637148 Northing: 4877105
0.3	333.7	SAND: BROWN MEDIUM TO FINE SAND, TRACE TO SOME SILT, TRACE TO SOME GRAVEL, MOIST TO WET. - GREY BELOW 1.0 m - SATURATED BELOW 3.7 m			SS1	4		67				
					SS2	16		67				
					SS3	15		73				
					SS4	44		73		44		
					SS5	13		60				WATER LEVEL MEASURED AT 3.62 mBGL ON 09/23/2015
4.0	330.0	SILTY SAND: BROWN AND GREY SILTY SAND, TRACE CLAY, SATURATED.			SS6	14		90				
4.6	329.4	SAND: LIGHT BROWN COARSE TO FINE SAND, SOME SILT, TRACE CLAY, SATURATED.			SS7	14		87				
5.3	328.7	BOREHOLE TERMINATED AT 5.3 m IN SAND.										

BOREHOLE NO. MW15-6

PROJECT NAME: 5452 LAKESHORE ROAD
PROJECT NO.: 141-15539-01 105
CLIENT: ALCORN & ASSOCIATES LTD.
DATE COMPLETED: Sep 14, 2015
BOREHOLE TYPE: 110 mm SOLID STEM AUGER
SUPERVISOR: KSR
GROUND ELEVATION: 333.5 mASL
REVIEWER: TVK

DEPTH (m)	ELEV (mASL)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0	333.5											**UTM CO-ORDINATES** UTM Zone: 17 NAD: 83 Easting: 637092 Northing: 4877133
0.2	333.3	TOPSOIL: BROWN SILTY SAND TOPSOIL.										
		SAND: BROWN AND GREY FINE TO MEDIUM SAND, TRACE TO SOME SILT, TRACE CLAY MOIST.			SS1	3		40				
					SS2	15		63				
3.0	330.5	SILTY SAND: GREY SILTY SAND, WET TO SATURATED.		▼	SS3	20		70				
3.8	329.7	SILTY SAND TO SANDY SILT: GREY SILTY SAND TO SANDY SILT, TRACE TO SOME CLAY, SATURATED.			SS4	26		60				WATER LEVEL MEASURED AT 3.73 mBGL ON 09/23/2015
5.3	328.2	BOREHOLE TERMINATED AT 5.3 m IN SAND.										

Table 1 – Test Pit Logs
141-15539-00
5452 Lakeshore Road, Ballantrae

Depth	Description
TP14-01	
0.00 – 0.12 m	Brown-black silty sand topsoil, trace rootlets, moist.
0.12 – 0.90 m	Brown fine sand, some silt, moist.
0.90 – 2.30 m	Grey silty sand, trace clay, trace gravel, moist.
2.30 – 3.00 m	Grey coarse sand, some gravel, trace cobble, moist to wet.
3.00 – 3.10 m	Grey clayey silt, trace sand, trace gravel, moist to wet.
	➢ Sample #1 taken at 0.2 – 0.5 m. ➢ Sample #2 taken at 1.0 – 1.2 m (Submitted). ➢ Sample #3 taken at 2.3 – 2.7 m. ➢ Sample #4 taken at 3.0 – 3.1 m. ➢ Groundwater seepage at 2.3 m.
TP14-02	
0.00 – 0.17 m	Brown-black silty sand topsoil, trace rootlets, moist.
0.17 – 1.80 m	Brown fine sand, some silt, trace clay moist.
1.80 – 2.20 m	Grey fine sand, some silt, trace clay moist.
2.20 – 2.50 m	Grey coarse sand, some gravel, some pebble, trace cobble, moist to wet.
2.50 – 3.00 m	Grey clayey silt, trace sand, trace gravel, moist to wet.
	➢ Sample #1 taken at 0.5 – 0.8 m (Submitted). ➢ Sample #2 taken at 2.0 – 2.2 m. ➢ Sample #3 taken at 2.2 – 2.5 m. ➢ Sample #4 taken at 2.8 – 3.0 m. ➢ Groundwater seepage at 2.2 m.
TP14-03	
0.00 – 0.22 m	Brown-black silty sand topsoil, trace rootlets, moist.
0.22 – 0.70 m	Brown fine sand, some silt, trace clay, moist.
0.70 – 2.20 m	Grey silt and sand, trace clay, moist.
2.20 – 3.05 m	Grey coarse sand, some gravel, some pebble, trace cobble, moist to wet.

- Sample #1 taken at 0.5 – 0.7 m.
- Sample #2 taken at 2.0 – 2.2 m (Submitted).
- Sample #3 taken at 2.2 – 2.4 m.
- Sample #4 taken at 2.9 – 3.05 m.
- Groundwater seepage at 2.2 m.

TP14-04

0.00 – 0.10 m	Brown-black silty sand topsoil, trace rootlets, moist.
0.10 – 2.20 m	Brown fine sand, some silt, trace clay, moist.
2.20 – 3.10 m	Grey fine sand, some silt, trace clay, moist.
3.10 – 4.50 m	Grey clayey silt, trace sand, trace gravel, moist to wet.

- Sample #1 taken at 0.5 – 0.8 m (Submitted).
- Sample #2 taken at 2.0 – 2.2 m.
- Sample #3 taken at 2.8 – 3.0 m.
- Sample #4 taken at 4.0 – 4.5 m.
- Groundwater seepage at 2.2 m.

TP14-05

0.00 – 0.18 m	Brown-black silty sand topsoil, trace rootlets, moist.
0.18 – 1.30 m	Brown fine sand, some silt, moist.
1.30 – 2.15 m	Grey medium sand, trace silt, trace clay, moist.
2.15 – 3.00 m	Grey clayey silt, trace sand, trace gravel, moist to wet.

- Sample #1 taken at 0.5 – 0.8 m.
- Sample #2 taken at 1.8 – 2.15 m (Submitted).
- Sample #3 taken at 2.7 – 3.0 m (Submitted).
- No seepage.

TP14-06

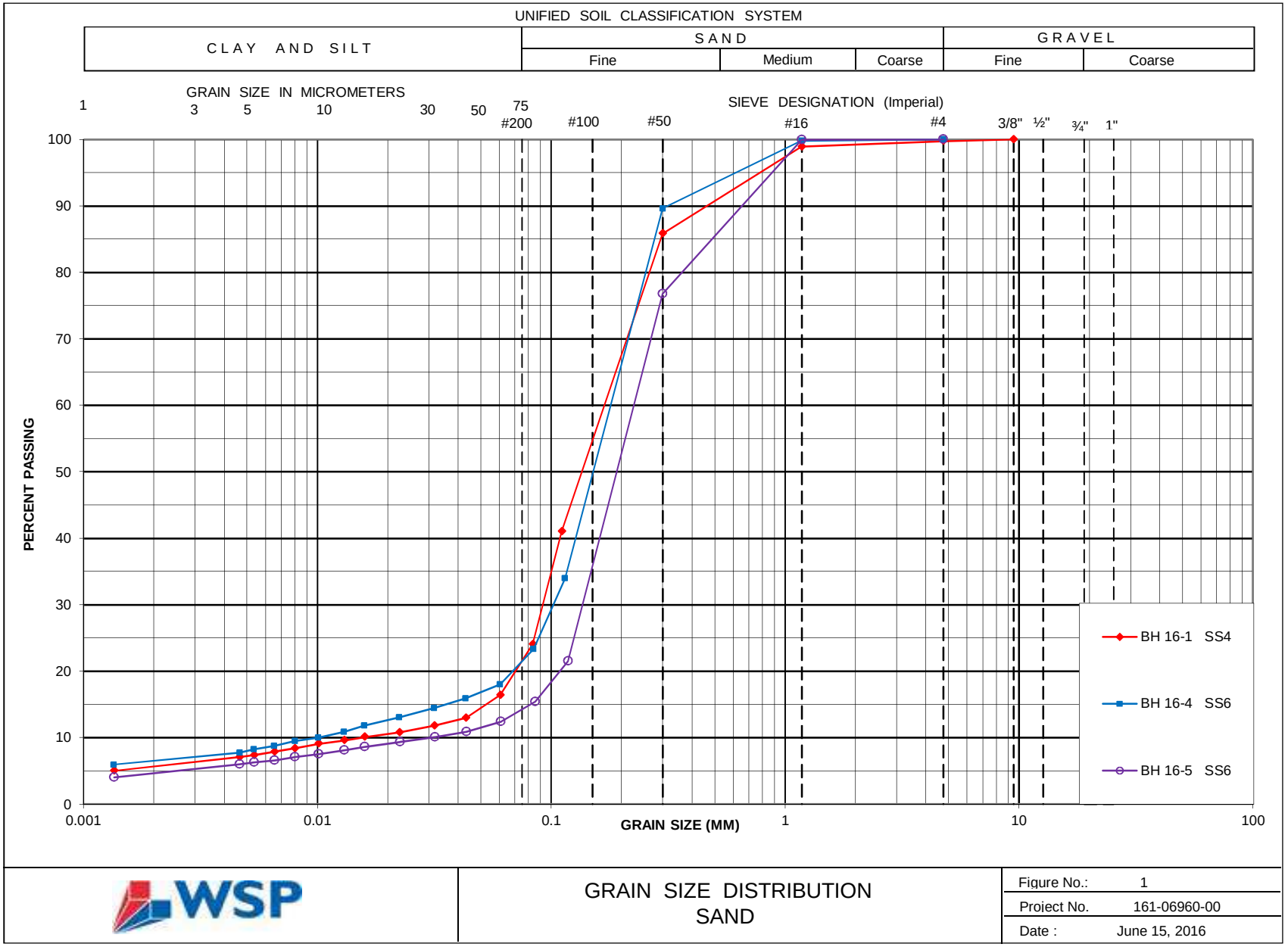
0.00 – 0.12 m	Brown-black silty sand topsoil, trace rootlets, moist.
0.18 – 1.70 m	Brown fine sand, some silt, trace clay, moist.
1.70 – 3.30 m	Grey clayey silt, trace sand, trace gravel, moist.
3.30 – 4.40 m	Grey medium sand, moist to wet.

- Sample #1 taken at 0.2 – 1.0 m (Submitted).
- Sample #2 taken at 3.0 – 3.3 m.
- Sample #3 taken at 4.0 – 4.4 m.
- Groundwater seepage at 4.3 m.

APPENDIX

B

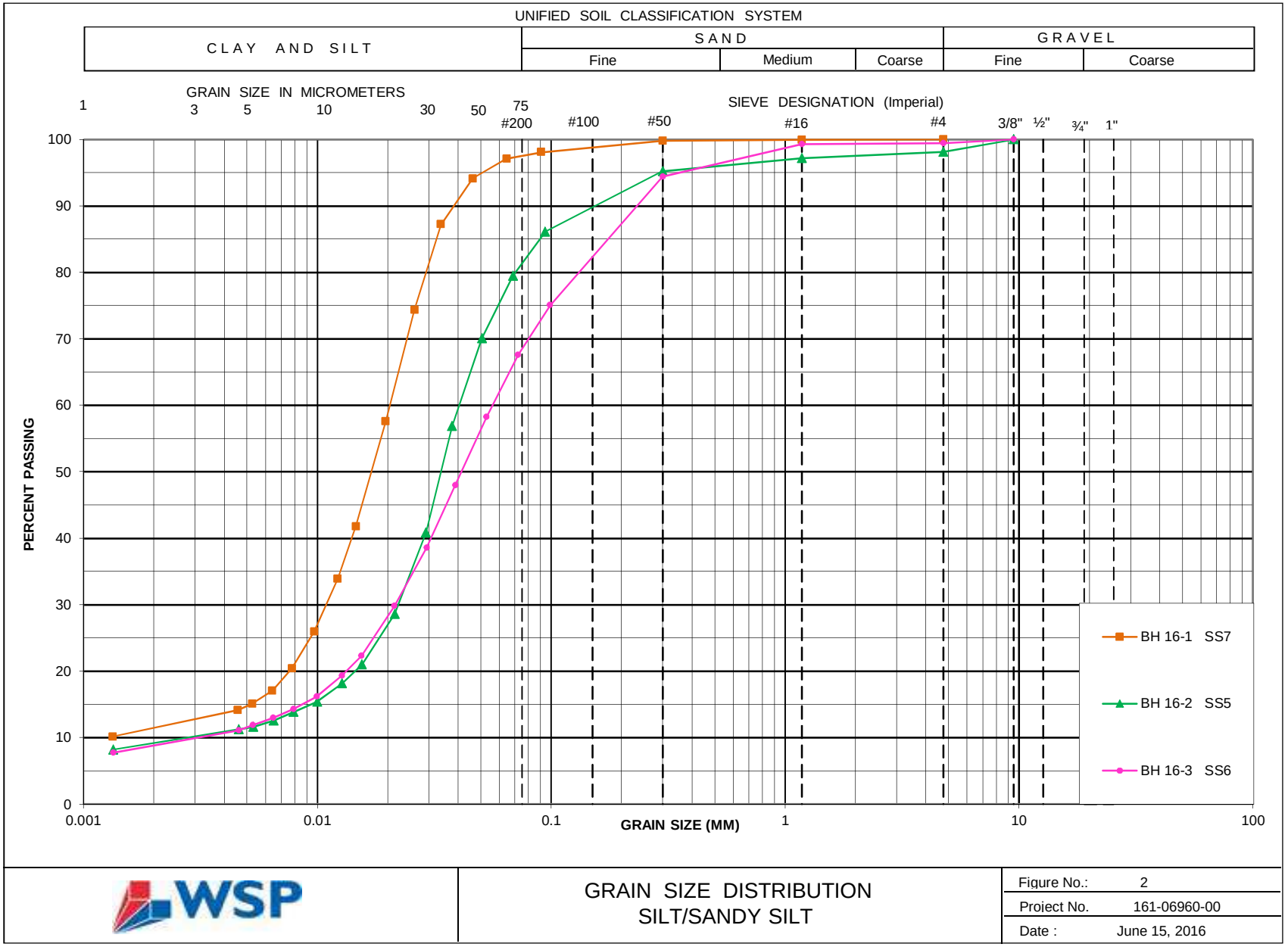
GRAIN SIZE DISTRIBUTION CURVES (FIGURES 1 & 2)



WSP

GRAIN SIZE DISTRIBUTION
SAND

Figure No.:	1
Project No.	161-06960-00
Date :	June 15, 2016



WSP

GRAIN SIZE DISTRIBUTION
SILT/SANDY SILT

Figure No.: 2
Project No. 161-06960-00
Date : June 15, 2016

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 WSP. Without this confirmation no responsibility for the performance of the structure can be accepted by WSP. 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 WSP Canada Inc. 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 WSP Canada Inc. during placement of engineered fill is required. Work cannot commence or continue without the presence of the WSP Canada Inc. 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 WSP Canada Inc. prior to footing concrete placements. All excavations must be backfilled under full time supervision by WSP Canada Inc. 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 WSP.

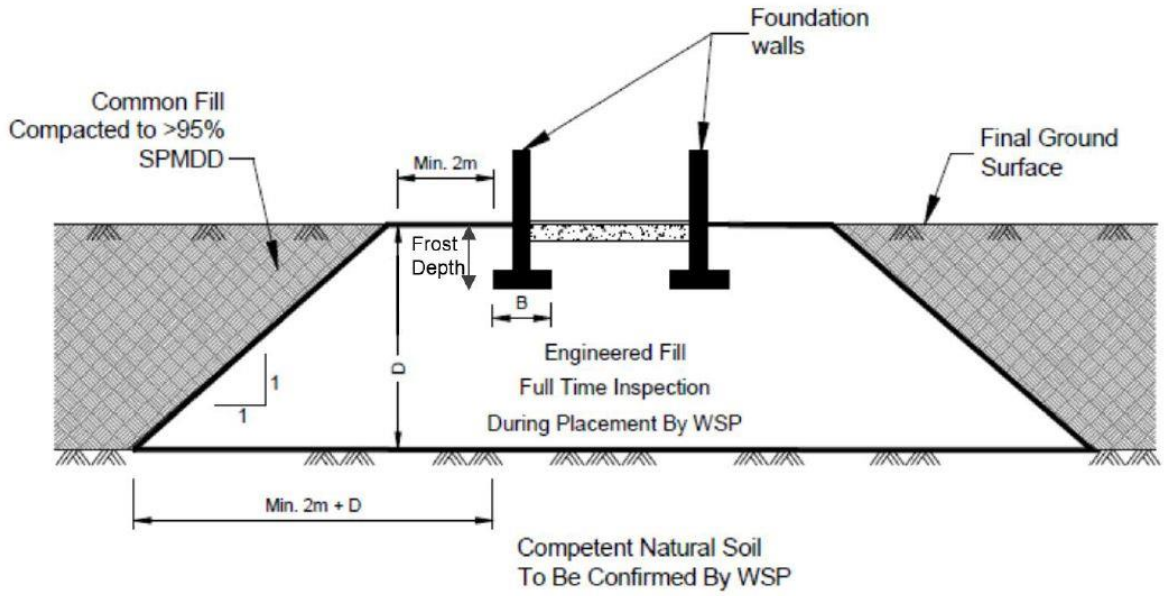
11. After completion of compaction, the surface of the engineered fill pad must be protected from disturbance from traffic, rain and frost. During the course of fill placement, the engineered fill must be smooth-graded, proof-rolled and sloped/crowned at the end of each day, prior to weekends and any 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 WSP Canada Inc. report attached.



APPENDIX

D

LAB CERTIFICATES OF ANALYSIS (SULPHATE AND CORROSIVITY TESTS)

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: WSP CANADA INC.
51 CONSTELLATION COURT
TORONTO, ON M9W1K4
(416) 798-0065

ATTENTION TO: Naeem Ehsan

PROJECT: 161-06960-00

AGAT WORK ORDER: 16T103702

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

DATE REPORTED: Jun 20, 2016

PAGES (INCLUDING COVER): 5

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 16T103702

PROJECT: 161-06960-00

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Naeem Ehsan

SAMPLING SITE:

SAMPLED BY:

Corrosivity Package

DATE RECEIVED: 2016-06-09

DATE REPORTED: 2016-06-20

		SAMPLE DESCRIPTION:		BH16-2/SS6	BH16-4/SS4	BH16-5/SS5A
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		6/3/2016	6/3/2016	6/3/2016
Parameter	Unit	G / S	RDL	7622820	7622823	7622824
Sulphide	%		0.05	<0.05	<0.05	<0.05
Chloride (2:1)	µg/g		2	6	3	2
Sulphate (2:1)	µg/g		2	6	2	2
pH (2:1)	pH Units		NA	8.63	9.01	8.59
Electrical Conductivity (2:1)	mS/cm		0.005	0.094	0.061	0.081
Resistivity (2:1)	ohm.cm		1	10600	16400	12300
Redox Potential (2:1)	mV		5	292	276	300

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

7622820-7622824 EC/Resistivity, pH, Chloride, Sulphate and Redox Potential were determined on the extract obtained from the 2:1 leaching procedure (2 parts DI water: 1 part soil).

Certified By: Amanjot Bhela

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 16T103702

PROJECT: 161-06960-00

ATTENTION TO: Naeem Ehsan

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Jun 20, 2016			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Corrosivity Package															
Sulphide	7622820	7622820	< 0.05	< 0.05	NA	< 0.05	91%	80%	120%	NA			NA		
Chloride (2:1)	7619089		68	69	1.5%	< 2	105%	80%	120%	108%	80%	120%	110%	70%	130%
Sulphate (2:1)	7619089		12	12	0.0%	< 2	100%	80%	120%	107%	80%	120%	108%	70%	130%
pH (2:1)	7622684		8.17	8.24	0.9%	NA	101%	90%	110%	NA			NA		
Electrical Conductivity (2:1)	7619089		0.295	0.295	0.0%	< 0.005	99%	90%	110%	NA			NA		
Redox Potential (2:1)	7622684		296	296	0.2%	< 5	110%	70%	130%	NA			NA		

Comments: NA signifies Not Applicable.
Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By: Amanjot Bhela

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 16T103702

PROJECT: 161-06960-00

ATTENTION TO: Naeem Ehsan

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Sulphide	MIN-200-12025	ASTM E1915-09	GRAVIMETRIC
Chloride (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
Sulphate (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
pH (2:1)	INOR 93-6031	MSA part 3 & SM 4500-H+ B	PH METER
Electrical Conductivity (2:1)	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Resistivity (2:1)	INOR-93-6036	McKeague 4.12, SM 2510 B,SSA #5 Part 3	CALCULATION
Redox Potential (2:1)		McKeague 4.12 & SM 2510 B	REDOX POTENTIAL ELECTRODE

SRS

AGAT Laboratories
5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
www.agatlabs.com webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

Report Information:

Company: WSP Group
Contact: Naeem Ehsan
Address: 51 Constellation Crt, Toronto, ON M9W 1K4
Phone: 416-798-0065 Fax: 416-798-0518
Reports to be sent to:
1. Email: Naeem.Ehsan@wspgroup.com
2. Email:

Project Information:

Project: 161-06960-00
Site Location:
Sampled By:
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☒ No ☐
Company:
Contact:
Address:
Email:

Regulatory Requirements:

☐ No Regulatory Requirement
(Please check all applicable boxes)

☒ Regulation 153/04
Table 1 / Ind/Com / Res/Park / Agriculture
Soil Texture *(Check One)* ☐ Coarse ☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region _____ *Indicate One*

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other _____ *Indicate One*

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Laboratory Use Only

Work Order #: 16T103702
Cooler Quantity: Box
Arrival Temperatures: 12.9 | 13.3 | 12.5 / 9.7 | 9.5 | 9.7
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes:

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ 1 Business Day
OR Date Required (Rush Surcharges May Apply):
Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	(Check Applicable) ORPs: ☐ B-HWS ☐ Cl⁻ ☐ CN⁻ ☐ Cr⁶⁺ ☐ EC ☐ FOC ☐ NO_3/NO_2 ☐ Total N ☐ Hg ☐ pH ☐ SAR	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_2	Volatiles: ☐ VOC ☐ BTEX ☐ THM	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	Corrosivity Package
BH16-2/SS6	03/06/2016		1	Soil																✓
BH16-4/SS4	03/06/2016		1	Soil																✓
BH16-5/SS5A	02/06/2016		1	Soil																✓

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Magsonda Bibi	07/06/16		Ron	2016/6/9	8:28
Ron	2016/6/9	11:53			

Page _____ of _____
N°: T 004966