

Geotechnical Investigation – Technical Study Report

DURHAM YORK RESIDUAL WASTE EA STUDY

PROJECT NO. 1009497



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GLOSSARY AND ABBREVIATIONS

* An asterisk (*) beside a defined term indicates that the term is defined in the Environmental Assessment Act.

Alternative Methods:	Alternative methods of carrying out the proposed undertaking are different ways of doing the same activity.
	Alternative methods could include consideration of one or more of the following: alternative technologies; alternative methods of applying specific technologies; alternative sites for a proposed undertaking; alternative design methods; and, alternative methods of operating any facilities associated with a proposed undertaking.
Alternatives:	Both alternative methods and alternatives to a proposed undertaking.
Alternatives To:	Alternatives to the proposed undertaking are functionally different ways of approaching and dealing with a problem or opportunity.
Caisson:	Caissons are cylindrical tubes, typically filled with concrete, that are used to transfer building foundation loads to underlying soil or bedrock layers.
Durham:	The Regional Municipality of Durham or its geographic area, as the context requires.
Durham/York Residual Waste EA Study:	The Durham/York Residual Waste Study is a joint initiative between the Region of Durham and York Region to work together to find a way to manage solid waste remaining after at-source diversion.
Energy-from-Waste (EFW):	The recovery of energy in the form of heat and/or power from the thermal treatment of waste. Generally applied to incineration, pyrolysis, gasification but can also include the combustion of landfill gas and gas produced from anaerobic digestion of organic materials.





Environment*:	The environment is broadly defined under the Environmental Assessment Act as follows:
	(a) Air, land or water;
	(b) Plant and animal life, including human life;
	(c) The social, economic and cultural conditions that influence the life of humans or a community;
	(d) Any building, structure, machine or other device or thing made by humans;
	(e) Any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities; or,
	(f) Any part or combination of the foregoing and the interrelationships between any two or more of them.
Environmental Assessment:	Environmental assessment is a study, which assesses the potential environmental effects (positive or negative) of a proposal. Key components of an environmental assessment include consultation with government agencies and the public; consideration and evaluation of alternatives; and, the management of potential environmental effects. Conducting an environmental assessment promotes good environmental planning before decisions are made about proceeding with a proposal.
Environmental Assessment Act.	The <i>Environmental Assessment Act</i> (and amendments and regulations thereto) is a provincial statute that sets out a planning and decision-making process to evaluate the potential environmental effects of a proposed undertaking. Proponents wishing to proceed with an undertaking must document their planning and decision-making process and submit the results from their environmental assessment to the Minister for approval.
Impact Management Measures:	Measures which can lessen potential negative environmental effects or enhance positive environmental effects. These measures could include mitigation, compensation, or community enhancement.
Impact Studies:	Studies that predict negative consequences (if any) of a proposed undertaking. Air, visual, natural environmental, traffic, hydrogeological, Noise, Health Risk, Land Use and Hydrological Impact Studies are required under the Environmental Protection Act.





Individual Environmental Assessment:	An Individual Environmental Assessment requires the following steps to fully address the requirements of the EAA:
	Preparation of the Proposed EA Terms of Reference;
	Submission of the EA Terms of Reference to the Minister of the Environment for Approval;
	Completion of the EA Study in accordance with approved EA Terms of Reference, and;
	Submission of the EA Study to the Minister of the Environment for Approval.
Ministry of the Environment (MOE) Ontario:	The MOE monitors pollution and restoration trends in Ontario and uses that information to develop environmental laws, regulations, standards, policies, programs, and guidelines. The MOE works to provide cleaner air, land, and water for Ontarians.
Mitigation:	Measures taken to reduce adverse impacts on the environment.
Modulus:	Modulus of subgrade reaction is a parameter used to determine the thickness of concrete slabs-on-grade and is a function of pressure on the soil and the resulting deformation.
Municipal Solid Waste (MSW):	Common garbage or trash generated by industries, businesses, institutions, and homes.
Proctor dry density:	A standardized method of determining the density of soil that has been subjected to a defined compactive energy. It is used for specifying the the level of compaction of soils.
Project:	Encompasses the design, construction (including construction financing) and operation of the EFW Facility, and includes, the EA Study, the supply of municipal waste, and the sale of energy.
Proponent*:	A person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.
Regions:	Durham and York collectively.





Terms of Reference:	A document prepared by the proponent and submitted to the Ministry of the Environment for approval. The terms of reference sets out the framework for the planning and decision-making process to be followed by the proponent during the preparation of an environmental assessment. In other words, it is the proponent's work plan for what is going to be studied. If approved, the environmental assessment must be prepared according to the terms of reference.
Thermal Treatment:	Use of elevated temperatures to treat wastes (e.g., combustion or gasification).
Till:	Till refers to sediments that have been deposited by glaciers. The sediments may consist of clay, silt. sand, gravel or boulders.
Waste-to-Energy (WTE) Facility/Municipal-Waste Combustor:	Facility where recovered municipal solid waste is converted into a usable form of energy, usually via combustion.
York:	The Regional Municipality of York or its geographic area, as context requires.

List of Abbreviations

ASTM	American Society for Testing Materials
EA	Environmental assessment
EAA	Environmental Assessment Act
ha	Hectares
Min	Minimum
MOE	Ontario Ministry of the Environment
OD	Outside Diameter
OPSS	Ontario Provincial Standard Specification
USC	Unified Soil Classification



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UNITS OF MEASUREMENT

Area

m³ cubic metre

Mass/Weight

Re. Orders of Magnitude: $x 10^2 = x 100$, $x10^3 = x 1000$, etc.

g	gram	
ng	nanogram	1 x 10 ⁻⁹ grams
kg	kilogram	1 x 10 ³ g
t	metric tonne	1 x 10 ³ kg
lb	pound	1 lb = 453.592 grams

Pressure

kPa	kilopascals
MPa/m	megaPascals per metre

Volume

L	litre	
mL	millilitre 1 L = 1	x 10 ³ mL
m ³	cubic metre	$1 \text{ m}3 = 1 \text{ x } 10^3 \text{ L}$

Time

S	second
min	minute
hr	hour
wk	week
у	year





Miscellaneous

- °C temperature in degrees Celsius
- N/A not available
- % percent





REPORT

1.0 INTRODUCTION

Durham and York Regions (the Regions) have partnered to undertake a joint Residual Waste Planning Study. Both municipalities are in need of a solution to manage the residual solid waste that remains after diversion. The Regions are working together to address the social, economic, and environmental concerns through an Environmental Assessment (EA) Study process to examine potential long-term residual waste management alternatives.

1.1 The Environmental Assessment Process

The purpose of the undertaking (i.e., what the outcome of this EA Study is intended to do) as described in the Approved EA Terms of Reference is:

"To process - physically, biologically and/or thermally - the waste that remains after the application of both Regions' at-source waste diversion programs in order to recover resources - both material and energy - and to minimize the amount of material requiring landfill disposal. In proceeding with this undertaking only those approaches that will meet or exceed all regulatory requirements will be considered."

The EA Study follows a planning approach where environmental constraints or opportunities are considered in the context of the broadly defined environment under the *Environmental Assessment Act* (EAA) (i.e., the natural environment as well as the social, economic and heritage and other "environments" relevant to the undertaking) and potential effects are understood and addressed before development occurs. In accordance with the approved EA Terms of Reference and EAA, the EA process evaluates: alternatives considering potential effects on the environment; the availability of mitigation measures that address, in whole or in part, the potential effects; and, the comparison of the advantages and disadvantages of the remaining or "net" effects. The result of this process provides the planning rationale and support for a preferred approach and method to implement the undertaking.

The EA document has been prepared and conducted in accordance with the EAA, and in accordance with the Terms of Reference approved by Ontario's Minister of the Environment on March 31, 2006. There are currently no federal environmental assessment process triggers identified and, therefore, this Project does not require approval under the *Canadian Environmental Assessment Act* (CEAA).

It is understood and contemplated that environmental management measures recommended as part of the EA process and this Technical Study Report will in many cases be refined, updated, modified and/or superceded as a result of subsequent approval processes.

This EA process essentially consists of three parts taking place in stages including:

- the Development and Approval of an EA Terms of Reference,
- the evaluation of "Alternatives to" the undertaking, and;







• the evaluation of "Alternative methods" of implementing the undertaking.

Refer to the EA for a detailed description of the EA process undertaken as part of the EA Study.

1.2 Purpose of this Report

This Report titled *Geotechnical Investigation – Technical Study Report* was carried out as part of the Durham/York Residual Waste Study at the Proposed Thermal Treatment Facility Site (the Site) on Osborne Road, Clarington, Ontario. The geotechnical investigation was carried out to determine the general subsurface conditions at the Site and to provide geotechnical parameters and recommendations to assist with the design for the development of the Site. The Technical Study Report presents all findings of the field and laboratory work undertaken for the investigation. Recommendations on the geotechnical aspects to assist with the design are also reported.

The geotechnical investigation was undertaken to provide information in regards to the general Site subsurface conditions. It was not intended to provide the geotechnical information required for specific designs nor should it be used for this purpose.

2.0 STUDY METHODOLOGY

The scope of work for the investigation was in general accordance with the JWSL proposal dated December 3, 2007. A potential disturbed area "footprint" equal to the projected maximum design capacity of 400,000 tonnes per year was assumed to carry out the investigation. The scope of work included the drilling of seventeen boreholes distributed on a grid throughout the Site and classification of soils samples. Fourteen boreholes were put down to an approximate depth of six metres and three were put down to at least twelve metres.

2.1 Site Description and Geology

The Site is located in Clarington, Ontario, south of Highway 401 and the South Service Road, east of Courtice Road and west of and adjacent to Osborne Road. The Site is about 12.1 hectares (ha), and is currently vacant land covered with grass, shrubs and trees. A communications tower is located to the southwest portion of the Site between BH9 and BH10.

The Site is generally trapezoidal in shape. The width (east-west) is approximately 320 m and the length (north-south) varies from 300 to 460 m. The ground surface is generally level but slopes gradually towards the south. The south end of the property slopes more steeply towards the rail road tracks. The Site was snow covered at the time of the investigation.

Based on the Ontario Geological Survey Preliminary Map P2204 – Quaternary Geology, published by the Ontario Ministry of Natural Resources, the overburden consists of glaciolacustrine deposits of silt and clay with sand tills.





2.2 Investigative Procedure

The geotechnical investigation consisted of drilling a series of boreholes to assess the subsurface soil and groundwater conditions within the area of the Site. During the investigation, Standard Penetration Tests (N values) were conducted within the overburden and samples of the soil were recovered and classified. Detailed logs of the soils encountered and the sampling carried out are found in **Appendix B** Borehole Records.

2.2.1 Boreholes

Prior to commencing the field investigation, the borehole locations were cleared of underground public services and utilities by private and public utility locators in the presence of a JWSL representative.

Seventeen boreholes were put down to depths ranging from 5.1 m to 12.2 m within the proposed development area using a track-mounted drill rig equipped for geotechnical testing. The borehole locations are shown on Drawing No. 1 in **Appendix B**.

Each of the boreholes was advanced through the soil using 55 mm, continuous flight hollow-stem augers. Soil samples were taken using conventional 50 mm split-spoon samplers while performing Standard Penetration Tests. The Standard Penetration Test (N-value) is used to determine the number of blows required to drive a 50 mm OD, split-spoon sampler 300 mm into the soil using a standard fall height and weight. N-values can be used as an indication of relative density, and can also be used to estimate other soil parameters.

Experienced JWSL geotechnical personnel logged all field drilling and sampling operations.

2.2.2 Surveying

The borehole locations and elevations were determined by JWSL representatives. The locations of the boreholes were determined by measuring the distances from the Site boundaries. The boreholes elevations were surveyed by JWSL personnel relative to a Temporary Benchmark established on Osborne Road approximately 30 m north of the southeast corner of the Site. This temporary elevation was assumed to be 100 metres.

2.2.3 Soil Sampling and Classification

Soil samples were recovered using the split-spoon sampling procedure in general accordance with ASTM Standard D1586, Standard Method for Penetration Tests and Split Barrel Sampling of Soils. In general, the samples were obtained at a regular interval of 750 mm from the surface to a depth of 3 metres, and subsequently at an interval of 1500 mm. The split-spoon samples were sealed in glass jars and/or plastic bags in the field to protect the soil and maintain the soil's natural moisture content. All soil samples were taken to our laboratory for final visual assessment, classification, and testing.

All samples were returned to the laboratory and were classified in general accordance with the Unified Soil Classification (USC) system, ASTM D 2487, Standard Practice for Classification of Soils for Engineering Purposes. Soil descriptions are given in the appended Borehole Records.





The soil samples collected for this investigation will be retained for a period of 90 days after which they will be discarded unless we are notified otherwise.

3.0 SUBSURFACE CONDITIONS

3.1 General

The subsurface conditions encountered are described on the Borehole Records in Appendix B.

In general, the subsurface conditions encountered at the test locations consisted of a surficial layer of sod/topsoil underlain with native glacial till. The Boreholes Records include soil stratification at the actual borehole locations with detailed soil descriptions for each stratum encountered in the boreholes. Variations in the soil stratification may occur and should be expected between borehole locations and elsewhere on the Site.

Summaries of the various soil strata and groundwater conditions at the borehole locations are provided in the following subsections.

3.1.1 Sod/Topsoil

A layer of sod and black to dark brown sandy silt and/or silty sand (topsoil) trace clay was encountered in all borehole locations on the ground surface. The thickness of the sod/topsoil layer ranged from 300 to 620 mm and averaged 395 mm over the Site.

3.1.2 Glacial Till

Glacial till consisting of mainly brown silty sand with traces of gravel and clay, was encountered in all borehole locations. At four locations (BH2, BH3, BH4 and BH11) a 700 to 900 mm thick layer of brown sandy silt till was encountered directly under the sod/topsoil. At three locations (BH6, BH7 and BH8) a 900 to 2400 mm thick layer of clayey silt was encountered directly under the sod/topsoil. In BH9 a stratum of sand and gravel was encountered underlying the silty sand till and the borehole was terminated in this layer.

3.1.3 Groundwater

Groundwater was encountered in ten of the boreholes during drilling and/or upon completion of drilling at depths ranging from 0.9 to 7.2 m below the existing ground surface. The groundwater level presented in this Report is the level that was encountered at the time of our activities and may not have become fully static at the time of measurement. It should be noted that groundwater levels are subject to fluctuations due to particular precipitation events and on a seasonal basis.





3.1.4 Summary

The following Table 1 summarizes the thickness of each of the layers found in boreholes BH1 to BH17. For a more detailed record of the subsurface conditions encountered, refer to the Borehole Records in **Appendix B**.

Borehole	e Sod/Topsoil Thickness (mm)	Surface Elevation (m)					
No.		Ground Surface	Sandy Silt Till	Clayey Silt Till	Silty Sand Till	Sand and Gravel Till	Groundwater ¹
BH1	450	99.2	-	-	98.7	-	98.3
BH2	450	99.1	98.6	-	97.7	-	96.1
BH3	620	99.3	98.7	-	97.9	-	-
BH4	460	99.7	99.2	-	98.5	-	98.8
BH5	460	98.8	-	-	99.3	-	-
BH6	320	99.2	-	98.9	96.5	-	96.6
BH7	320	99.4	-	99.1	98.0	-	93.7
BH8	450	99.5	-	99.0	98.1	-	-
BH9	450	97.7	-	-	97.2	96.2	96.8
BH10	450	99.1	-	-	98.6	-	-
BH11	450	99.8	99.3	-	98.4	-	-
BH12	340	99.6	-	-	99.3	-	94.2
BH13	320	96.5	-	-	97.2	-	-
BH14	300	97.5	-	-	97.2	-	92.4
BH15	300	99.4	-	-	99.1	-	94.0
BH16	300	99.3	-	-	99.0	-	92.1
BH17	300	97.1	-	-	96.8	-	-

Table 3-1 Summary of Soil and Groundwater Conditions

Note (1) Groundwater elevations were observed during drilling; piezometers were not installed.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 General

The geotechnical investigation of the Site was undertaken to provide general subsurface information for site development. It was understood that a further geotechnical investigation would be undertaken to satisfy the specific requirements of the Facility.

4.2 Sod/Topsoil Removal

The surficial layer of sod and topsoil should be removed in all building and pavement areas. These materials can be stockpiled for use in Site landscaping or can be removed from the Site.





4.3 Foundations

The following sections describe the requirements for Facility foundations.

4.3.1 Engineered Fill

Fill materials placed under footings or slabs-on-grade is considered to be engineered fill. Site till excavated from above the groundwater table can be used as engineered fill as long as it is maintained at a suitable moisture content to permit the specified compaction. Site till excavated from below the groundwater table can also be used as engineered fill but provision for drying will likely be necessary. All Site till materials are considered susceptible to softening with increased moisture contents and this should be considered when planning the development of the Site.

Engineered fill imported to the Site should meet the Ontario Provincial Standard Specification (OPSS) requirements for Select Subgrade Material.

Prior to placing engineered fill, the exposed till surface should compacted to at least 100 percent of the standard Proctor dry density. All engineered fills should be compacted in lifts that are compatible with the compaction equipment used to a minimum of 100 percent of standard Proctor dry density.

Where engineered fill is used under spread/strip footings and slab-on-ground construction, the engineered fill must be placed within the stress zone of influence of the proposed footings. The placement of the engineered fill should extend horizontally to include the conventional 1H:1V downward splay from the perimeter of the footings.

It is recommended that inspection by experienced geotechnical personnel be carried out during excavation and engineered fill placement to ensure that all unsuitable soils are removed, that approved fill materials are used, and that the required compaction is carried out.

4.3.2 Conventional Footings and Slabs-on Grade

Based on the conditions encountered at the borehole locations, use of spread/strip footing foundations and slab on ground construction is practical for the Site.

Spread/strip footings constructed on the native soils or on engineered fill, comprised and placed in accordance with the above recommendations may be designed using a net allowable bearing pressure of 250 kPa. If the base of any footing excavations becomes disturbed, the disturbed material should be excavated and replaced with a clean granular material compacted to the requirements for engineered fill. Associated total and differential settlements should be less than 25 mm and 20 mm, respectively. All footings founded on soil which will be subjected to freezing conditions should have a soil cover of at least 1.2 metres for frost protection.

Excavation to the anticipated required depth at some locations may require excavation below the groundwater table. A sump and pump arrangement is recommended to temporarily control the groundwater during excavation and fill placement.





For slab areas, all surficial sod/topsoil or any other deleterious materials encountered should be removed followed by cuts to design subgrades. Any organic materials and/or soft deformable area detected shall be excavated and replaced with compacted suitable site till or OPSS Select Subgrade Material.

Slabs-on-ground should be constructed on a compacted bedding layer with a minimum thickness of 150 mm of free-draining gravel such as OPSS Granular A. A modulus of subgrade reaction of 30 MPa/m can be used for design of slabs on ground. Perimeter foundation drains, with a positive outlet, should be provided at locations where slabs are below exterior finished grade.

4.3.3 Caisson Foundations

The Site is also suitable for the of caisson foundations Caissons should be founded to a depth of at least 3.0 m below existing surface and a net allowable bearing pressure of 450 kPa can be used.

4.3.4 Earthquake Criteria

For the purpose of earthquake design the term relevant to the geotechnical conditions is the Site Classification for Seismic Site Response. Based on the conditions encountered in the boreholes, and in accordance with Table 4.1.8.4A of the 2006 Ontario Building Code, Site Class "D" soil profile should be applied to this Site.

4.4 Excavations

Tills encountered onsite are considered to be Type 3 and excavations should be sloped at a 1H:1V from the bottom of the excavation. If sufficient room is not available to slope the excavated walls, shoring will be required to maintain the stability of the excavation.

Based on the information obtained from the investigation, it is considered unlikely that the presence of groundwater will be a factor with respect the planned scope of development. Should excavations remain open for extended periods, water seepage and infiltration from perched pockets or zones in the fill materials or native soils can be expected. However, the quantity of seepage and accumulation should be manageable using conventional sump pits and contractors pumps.

The site slopes of any excavations should be protected from exposure to precipitation and associated ground surface runoff to prevent further softening and loss of strength and could lead to additional sloughing and caving.

4.5 Site Grading Considerations

The fine grained nature of the silty and clayey Site soils make them conductive to deterioration from trafficking, particularly during wet weather. Therefore, construction should be well planned to minimize rendering material which is initially suitable to a deteriorated unsuitable condition.





Surface water drainage should be provided at the up gradient side of the Site to prevent water from flowing onto active working areas. Suitable erosion protection and sediment control measures (e.g. silt fences, check dams) should be provided as required.

4.6 Pavements

The pavement designs for the Site should be carried out when the Site traffic loadings have been determined. It is expected that the pavement structures will generally be as follows:

 Table 4-1
 Summary of Soil and Groundwater Conditions

Material		Pavement Type											
Material	Light Duty Asphalt	Heavy Duty Asphalt	Heavy Duty Concrete										
Asphalt Surface Course	40 mm	40 mm	-										
Asphalt Base Course	50 mm	75 mm	-										
Portland Cement Concrete	-	-	250 mm										
Granular A Base	300 mm	500 mm	200 mm										
Granular B subbase	-	300 mm	-										

All of the materials used in the construction of Site pavements should be produced and placed in accordance with the respective OPSS requirements.

5.0 CLOSURE

This Report presents the geotechnical soil, bedrock and groundwater conditions encountered at the time of the field program and provides general geotechnical interpretation for the development of the Site. A further geotechnical investigation will be required as more information on the Site development is determined.





Symbols and Terms Used on Borehole and Test Pit Records

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

Topsoil	-	mixture of soil and humus capable of supporting good vegetative growth
Peat Till	-	fibrous fragments of visible and invisible decayed organic matter unstratified and unsorted glacial deposit which may include particle
Fill		sizes from clay to boulders materials not identified as deposited by natural geological processes

Terminology describing soil structure:

Desiccated	-	having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured		
	-	material breaks along plane of fracture
Varved	-	composed of regular alternating layers of silt and clay
Stratified	-	alternating layers or beds greater than 6mm (1/4") thick
Laminated	-	alternating layers or beds less than 6mm (1/4") thick
Blocky	-	material can be broken into small and hard angular lumps
Lensed	-	irregular shaped pockets of soil with differing textures
Seam	-	a thin, confined layer of soil having different particle size, texture, or color from materials above and below
Well Graded	-	having wide range in grain sizes and substantial amounts of all intermediate particles sizes
Uniformly Grad	ed -	predominantly one grain size

Soil descriptions and classification are based on the Unified Soil Classification System (USCS) (ASTM D-2488), which classifies soils on the basis of engineering properties. The system divides soils into three major categories: (1) coarse grained, (2) fine-grained, and (3) highly organic. The soil is then subdivided based on either gradation or plasticity characteristics. This system provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification. The classification excludes particles larger than 76 mm.

Terminology describing materials outside the USCS, (e.g. particles larger than 76 mm, visible organic matter, construction debris) is based upon the proportion of these materials present and as described below in accordance with the standard of the Ministry of Transportation of Ontario:

Trace or occasional	Less than 10%
Some	10-20%
With	20-30%

The standard terminology to describe cohesionless soils includes the compactness as determined by the Standard Penetration Test 'N'-value*.

Compactness	'N'-value
Very loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50
•	

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

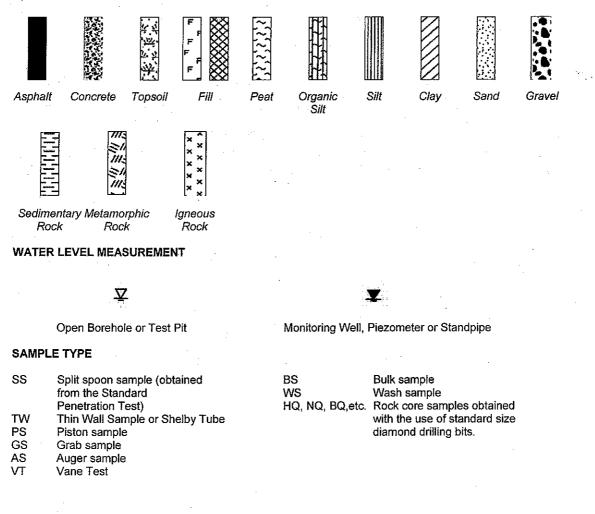
The standard terminology to describe cohesive soils includes consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer tests, unconfined compression tests or similar field and laboratory analysis. Standard Penetration Test 'N'-values* can also be used to provide an approximate indication of the consistency and shear strength of fine grained, cohesive soils.

Consistency	Undrained Shear Strength (kPa)	'N'-Value
Very Soft	<12.5	<2
Soft	12.5-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

Note: **N'-VALUE- The Standard Penetration Test records the number of blows of a 140 pound (64kg) hammer falling 30 inches (760mm), required to drive a 2 inch (50.8mm) O.D. split spoon sampler 1 foot (305mm). For split spoon samples where full penetration is not achieved, the number of blows is reported over the sampler penetration in millimeters (e.g. 50/75).

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols:



G:\Symbols and Terms Used on BH &TP Records\symbols & terms for BH & TP V2.doc Last update: June 2007

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

ROCK DESCRIPTION

Total Core Recovery (TCR): The percentage of drill core recovered, regardless of quality, or length measured relative to the length of the total core run.

Solid Core Recovery (SCR): The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.

Rock Quality Designation (RQD): The percentage of solid drill core, greater than 100 mm length, recovered at full diameter, measured relative to the length of the total core run.

RQD	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very Poor, crushed, very severely fractured

Terminology describing rock mass:

Disco	ntinuities	Bedding, Lamination, Bands
Spacing	Description	
		and a start of the start of the start of the start of the
2000-6000	Very Wide	Very Thick
600-2000	Wide	Thick
200-600	Moderate	Medium
60-200	Close	Thin
20-60	Very Close	Very Thin
6-20	Extremely Close	Laminated
<6	,	Thinly Laminated

Strength classification of rock:

oriengui classification		
Strength	Field Identification Method	Range of Unconfined
Classification		Compressive Strength
		(MPa)
Extremely weak	Indented by thumbnail	<1
Very weak	Crumbles under firm blows of geological	1-5
	hammer; can be peeled with a pocket knife	
Weak rock	Can be peeled by a pocket knife with difficulty;	5-25
	shallow indentations made by a firm blow with	
	point of geological hammer	
Medium strong	Cannot be scraped or peeled with a pocket	25-50
_	knife; specimen can be fractured with a single	
	firm blow of geological hammer	
Strong	Specimen requires more than one blow of	50-100
. •	geological hammer to fracture	
Very strong	Specimen requires many blows of geological	100-250
	hammer to fracture	
Extremely strong	Specimen can only be chipped by geological	>250
<i>, , , ,</i>	hammer	

Weathering:

Unweathered: no signs of discoloration or oxidation of rock material

Slightly Weathered: discontinuities are stained or discolored; rock material partially discolored Moderately Weathered: total discoloration; generally surface of core is intact and not friable; discontinuities may contain filling of altered material

Highly Weathered: total discoloration; surface of core is friable and usually pitted due to washing out of highly altered minerals by drilling water; discontinuities frequently contain filling of altered material *Completely Weathered:* total discoloration; appearance of core is that of soil although internally the rock texture is usually partly preserved; discontinuities frequently contain filling of altered material

APPENDIX B

Borehole Records 1 to 17

JA	ACQUE	S WHITFORD LIMITED	E	30]	RE	OH	LF	E RI	ECO	RD		BH	1	SHE	ET I of 2					
с	CLIENT Region of Durham											PROJEC	CT No.	<u>1009497.01</u>						
		NOsbourne Rd., Clarington, O	ntar	io								1	Local							
D	DATES: BORING January 16, 2008 WATER LEVEL										TPC ELEV									
	z		ち d SAMPLE								IDRAINED 5 50	HEAR STRE	EAR STRENGTH (kPa) 100 150 200							
<u>Е</u> Т			PL	Ē	H (H			mm) t(%)		├ ── ;					щ					
DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	щ	BER	RY (DC(%	ł		TTERBERG LIMI	rs 🖡	-0-	-1					
			STI	MA		ТҮРЕ	NUMBER	DVE %)/	N-VALUE OR RQD(%)	1	MIC CONE PENI DARD PENETRA		n V	& GRAIN SIZE						
	99.2						2	RECOVERY (mm) TCR(%) / SCR(%)	<u>5</u>	10		0 50 60		90 100	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA_SI_CL					
0-		TOPSOIL	177	1																
	<u>98.7</u>	Compact to very dense brown silty	1 1 1 1		1 - 2 -	ss	1	<u>360</u> 460	10					H						
		SAND		Ţ	3 -			100						Ē						
1-		- with gravel - weathered and trace clay at upper			4 -	ss	2	<u>460</u> 460	27											
-		layer			5 -	N <u>22</u>		460												
2				1	6 -	/		420												
4					7 -	X SS	3	<u>430</u> 460	32											
			<u>iii</u>		8 -									L L						
3					9 -	∬ss	4	$\frac{150}{460}5$	0/150m	n										
5		- grey below 3m			10- 11															
. .					11- 12-															
4					13-															
- 1 -						ss	5	<u>460</u> 460	24											
-					15-	133		460	24					Ē						
5 -					16-															
- -					17-															
-					18-									E						
6 -					19-	ss	6	<u>430</u> 460	30		•									
Ť					20- 21															
-				. 1	21- 22-															
7 -					23-															
-					24-	ss	7	360	44					Ē						
-		<i>.</i>			25-	133	'	<u>360</u> 460												
8 -	i				26-															
 					27-															
-					28-															
9					29-	ss	8	$\frac{380}{460}6$)/100m	n										
		· .			30-															
ļ					31-										i					
10					32-									Liit I						

Field Vane Test (kPa)

□ Remoulded Vane Test (kPa)△ Pocket Penetrometer Test (kPa)

Jacques Whitford

BOREHOLE RECORD

BH 1 SHEET 2 of 2

	LIENT _	Region of Durham Osbourne Rd., Clarington, C	intar	0				. <u></u>								DJEC TUM	T No	• -		09497.01 .ocal
	CATIO	ORING January 16, 2008				WAT	ER L	EVEL		TPC ELEV										
										UNDRAINED SHEAR STRENGTH (kPa)										
DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	түрЕ	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	DYN	AMIC	CON	E PÉN	ATTER	TION T	EST, E	150 s 31.OWS		200) H REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
10-	89.2				77			ЩĊ		10) 2	0	30 4	10 5	0 6	0 7	0 8	0 90	0 100	GR SA SI CL
11-					33- 34- 35- 36- 37- 38- 39-	X SS	9		0/150m 0/30mr											
12-	87.0		<u> </u>	<u> </u>	-40-		10	460 ~	0, 50111											
13 14 15	87.0	- Water table at a depth of 0.9m at the end of Boring			-40 41 - 42 - 43 - 44 - 45 - 46 - 47 - 48 - 50 - 51 - 52 - 53 - 54 - 55 -															
17-					56~ 57- 58-															
18 - 18 - - - - -				-	59- 60- 61-															
19-	·				62- 63- 64- 65-															
20-			1	.l	ı	L.I	L,.	.I.,	L		Re	mou	Ided V	est (k /ane ' rome	Fest (Pa)	/	√ ;	Jacques Whitford

JACQUES WHITFORD LIMITED BOREHOLE RECORD

BH 2

സ	.ient _	Region of Durham														PRO	OJEC	t TC	No.	_		09497.0	1
	CATION		<u>itari</u>	0											-	DA	TUN	1			<u> </u>	Local	.
	ATES: B					WAT	ERL	EVEL									CEL						_
			5	Ē			SAN	/PLES]	U	NDF	RAIN 50		SF		R S 00	TRE	ENG 15	11H 60	(KPa	a) 20⁄1	D	ļ
DEPTH (m)	ELEVATION (m)	E STRATA DESCRIPTION ELEVEN		WATER LEVEL	DEPTH (ft)		ĸ	RECOVERY (mm) TCR(%) / SCR(%)	ы (%)	18/4-	+	-		+			- H			→ ₩p		ж — 1	
DEP			TRA	VATE	Ы	ТҮРЕ	NUMBER	/ER/)/ S(N-VALUE OR RQD(%)	DYN	AMIC	CON	NE PE	ENER	IRAT	TION 1	TEST,	, BLO'			¥	REMARK	
			l s				z	лсо) Ж(%	Ϋ́ς								, BLO 60				• 0 10	GRAIN SI DISTRIBUT 0 (%) 0 GR SA SI	ION
0 -	99.1	Dark brown clayey silty sand,	<u></u>		-0-	┝┰╌┤	\square	ΨĔ			0 2	1	30	40 			Ĩ	Ť				IGR SA SL	CL
-		organic matter and rootlets:	4.1		1 -																		ļ
T T			ŀŀ		2 -																		
1		Compact brown sandy SILT - trace gravel and clay	ŀŀ.		3-	∬ss	1	<u>460</u> 460	14														
	97.7	- weathered		ţ	4 - 5 -																		
-		Dense brown silty SAND - with gravel			6-	ss	2		37														
2		~		1	7 -																	:]	
					8 -	ss	3	<u>410</u> 460	42						•							-	
	1			Y	9 -		 															;	
3 -		- trace clay below 3m		1	10-	∬ss	4	<u>430</u> 460	36														
					11- 12-			400														-	
		- grey below 3.6m			12-																	-	
4 -				•	14-																	•	
	-				15-			160														Ę	
5				()		∦ss	5	<u>460</u> 460	22										4				
		- Very dense below 5m		•	17-																		
1.	•	- -			18-	1		1															
6 -					19- - 20		<u> </u>	L														₽ ₽ 	
-	00.7			•	21-	ss	6	$\frac{360}{460}$ 5	0/150m	n													
-	92.5	- Water table at a depth of 3.0m at		4	22-	\parallel	<u> </u>	1		1													
7 -		the end of Boring			23-																	H	
-					24-	11																	
-			1		25-	11			1														
8 -	l I				26-	1		1														Ħ	
-					27- 28-]																F	
					28-				1														
9 -	1		1		30-	41																	
-	1				31-	11																	
	1				32-	4														[
10-	┣		<u> </u>			<u> </u>			<u> </u>				Vane								./	.lacaw	6e
																	: (kPa Fest (ſ	W	Jacqu Whitfo	rd
										1 4	P	ooke	a r ci	n-m	ouic			() ()	/	-			

BOREHOLE RECORD

BH 3

CI	LIENT	Region of Durham														1	PRO	JEC	TN	0.	1	100	<u>9497.0</u> 1
	DCATIO	NOsbourne Rd., Clarington, C	Intari	0														UM				L	cal
D	ATES: B	ORING January 16, 2008			~	WAT		EVEL										ELE		-	7-1		
(z		5	ΈĽ	ť)		SAN	MPLES		U	IN	DR	AIN 50	ED S	эНЕ	EAF 100		RE	NGT 150			200	
DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEI	DEPTH (ft)		~	RECOVERY (mm) TCR(%) / SCR(%)	(%		+			;		+		-1	1	 Wp	w	4	щ
ЕРТ	EVA. (m	STRATA DESCRIPTION	RAT.	TER	DEP1	түре	BER	RY (ALUE aD(%					NT &					's Blow	Ĥ S/03		r	REMARKS
Δ	Ш		ST	WA		≿	NUMBER	OVE (%)/	N-VALUE OR RQD(%)										VS/0.3				& GRAIN SIZE DISTRIBUTION
	99.3							REC	0	1	0	20) 3	0	40	50	6	0 7	70	30	90 1	00,	(%) GR_SA_SI_CL
0 -		Dark brown clayey silty sand,	<u>.</u>		- 0 1 -																	Ē	
, . l .	98.7	organic matter and rootlets: TOPSOIL	<u></u>		2 -																	H	
•		Compact brown sandy SILT	1		- 3 -	SS	1	460	19													ŀ	
1 -	97.9	- trace gravel			4 -	100	1	<u>460</u> 460	19														
	97.9	Compact to dense brown silty	詂		5 -	<u> </u>																	
		SAND			6 -	(ss	2	<u>460</u> 460	26				٠										
2 -		- with gravel			7 -																		
1	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$															H							
	$3 - \frac{1}{10} + \frac{1}{$																						
3 -	$3 - \frac{1}{10}$															E							
																H							
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4 -																	T						
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5 -																Ħ							
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					19-																		
6 -				ļ	20		<u> </u>								-								<u></u>
	92.7	,			21 -	∬ss	6	<u>460</u> 460	22				•									E	
1.1.1	72.1	- Borehole is dry at the end of			22-	1																	
7		Boring			23-						:											E	
-			1		24-																		
	•				25-																		
8 -					26-						ł												
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1					28-	1																E	
9-					29-	<u> </u>					ŀ						<u></u>					H	
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10-					32-	11																E	
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BOREHOLE RECORD

BH 4

വ	LIENT	Region of Durham													P	ROJ	EC	ΓNo).	1(0 <u>09497.0</u> 1
LC	CATIO	N Osbourne Rd., Clarington, O	ntar	io												ATI		_			Local
D	ATES: B	ORING January 16, 2008	<u></u>			WAT	ER I	EVEL								PC I					
(z		5	Щ			SAN	MPLES		UN	IDF	RAIN 50	IED	SHE	AR 100		REN	IGTI 150	H (KF	°a) 20	10
DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	:		(mm)		+ 						+		-	+ Wp	w	И _L
EPT	-EV Γ	STRATA DESURIPTION	RAT,	TER	JEP1	ТҮРЕ	NUMBER	SCF SCF	ALUE	WA'TE DYNA									ŕ	-0-	REMARKS
Δ	Ш·		STI	WA		≿	NUM	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	STAN										•	& GRAIN SIZE DISTRIBUTION
	99.7							TCR	0	10	2	0	30	40	50	60	7	0 8	0 9	90 10	
0 -		Dark brown clayey silty sand,	4		- 0 1 -																-
	99.2	organic matter and rootlets: TOPSOIL	ĥŤ		2 -																-
-		Compact brown sandy SILT		T		ss	1	<u>460</u> 460	.23												-
1-	98.5	- with clay trace gravel			4 -	100	1	460													
		Compact to dense brown silty SAND			5 -	<u>_</u>		400													
,		- with gravel			6 -	SS	2	<u>460</u> 460	18		•						<u></u>				
2 -		- trace clay at upper layer			7 -	_															
					8 -	ss	3	460 460	28												-
3 -					9 - 10						<u></u>						<u></u>				
3 1					10-	ss	4	410	32				•								
-		- grey below 3.3m				1		100													
* -																					
					15-			420													
5 -					16-	X SS	5	<u>430</u> 460	20												
, , , , , , , , , , , , , , , , , , ,					17-																
-					18-																
6					19-																
Ĭ				1	20	ss	6	<u>460</u> 460	22			•									
	93.1	- Water table at a depth of 1.0m at			21-			400													
7 -		the end of Boring			23-																
• • •					24-																
		i			25-																Ħ
8-					26-																El .
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BOREHOLE RECORD

BH 5

	lent _	Region of Durham													-		_			EC JM	ΓN	0.	_			9497. cal	<u>0</u> 1
	OCATIO	N <u>Osbourne Rd., Clarington, O</u> ORING <u>January 17, 2008</u>	narj	0		WAT	ER I	.EVEL									-			ELE	- .v						_
			<u>-</u>					MPLES			U	NDF			ED	Sł			STR	REN	IGT		kPa				
DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	ТҮРЕ	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	D	ΥN	AMIC	201 C C	ONE	PE	NEI	TER	TION	TE		150 ————————————————————————————————————	۷ ۱ (5/0	-∔- ₩₽ .3m	20 W •		REMAF REMAF GRAIN S DISTRIBL	SIZE JTION
0 -	99.8				_0			Ш Ц Ц Ц Ц Ц Ц Ц			10	2	20	3	0	40	5	0 1:::	60	7	0	80	90	10)0 G	(%) R SA S	
		Dark brown clayey silty sand, organic matter and rootlets:	1		1 -																						
1-	99.3	TOPSOIL Compact to very dense brown silty SAND			2 - 3 - 4 -	ss	1	<u>460</u> 460	30																		
2 -		- with gravel			5 - 6 -	ss	2	<u>410</u> 5 460	0/125m	n															-		
					7 - 8 - 9 -	∬ss	3	<u>230</u> 460	0/75mr	'n																	
3					10- 11- 12-	ss	4	<u>100</u> 5 460	0/100m	'n																	
4 -		- grey below 4m			13- 14- 15-																						
5					16- 17-	∦ss 	5	<u>430</u> 460	68											•							
6	93.7	- Borehole is dry at the end of			18- 19- 20			100	0/75																	<u>-</u> .	
7 -		Boring .			21- 22- 23-	∬ss	6	460	0/75mi																		
					24- 25-			-																	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.		
8		х. - С С С С С С С С			26- 27- 28-																						
9					29- 30- 31-																						
10-					32-																				E	<u></u> .	
10-				-						1		Re	em	oulo	led	Va	ne '	Pa) Fest ter T		Pa) : (kř	°a)	V	A		Ja	ncqu hitfo	es prei

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BOREHOLE RECORD

BH 6

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	CATIO		ntar	io									<u> </u>	.		DA	TUN	1.			L	ocal
D.	ATES: B	ORING January 17, 2008				WAT	TER I	EVEL									CEL		_			
			٢				SAI	MPLES	5	Ļ	IND		INE 0	DS		AR S 00	TRE	NGT 150			200	
DЕРТН (m)	ELEVATION (m)		STRATA PLOT	WATER LEVEL	DEPTH (ft)			(m)	(-		i	1				P		-	
РТН	(m)	STRATA DESCRIPTION	ATA	ER	Цd	ш	ER	ZCR(⊂	UE D(%	WA	TER	CON	TEN	Т&А	TTER	RBERG	6 LIMF	TS	₩j	, v e	∨ >	ж_ _
Ш О	ELE		STR.	VAT	ö	ТҮРЕ	NUMBER	VER / (9	N-VALUE OR ROD(%)									BLOW		m	۷	REMARKS
		·····	 "	É			ž	RECOVERY (mm) TCR(%) / SCR(%)	R R									WS/0.		00	•	GRAIN SIZE DISTRIBUTION (%)
0 -	99.2	Dark brown clayey silty sand,	195	<u> </u>	0					1	0	20 : ::	30 	4	0 5	50 (50 :::	70	80	90		(%) <u>GR SA SI CL</u>
	<u>98.9</u>	organic matter and rootlets:	ŀπ'		1 -																Ē	
		TOPSOIL	H		2 -																E	
1-1		Compact to dense brown clayey SILT	H		3 -	ss	1	<u>430</u> 460	19													
		- trace sand and gravel, weathered	H	1	4 -	<u> </u>		100														
, hu			Ю	1	5 -	M aa	-	460														
2			IX	1	6 -	∦ ss	2	<u>460</u> 460	43						•						ŧ	
4			H		7 -																	
	06.5		Ĥ	▼		ss	3	<u>430</u> 460	27												Ē	
	96.5	Compact to very dense silty SAND			9 -	-																
3 -		- with gravel			10-	ss	4	<u>430</u> 460	28.													
1,1	•				11-	135	-	460	20 +												÷	
		- grey below 3.6m			12-																	
4 -				1	13-																	
1					14-																	
111					15- 16-	ss	5	$\frac{150}{460}$	0/50m	h												
5 -					10-	<u> </u>		400					Ħ									
-		•			17-																	
			$\left \cdot \right $		19-																	
6 -	93.1				20																	
-		- Water table at a depth of 2.7m at			21-	ss	6	$\frac{150}{460}$	0/50m	h											Ĭ	
-		the end of Boring			22-	1															ΞĒ	
7 -					23-																	
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											Re	emo	ulde	ed V	ane	Fest (./		/ J	acques Whitford
										⊿	Pc	ocke	t Pe	metr	omet	ter Te	est (k	Pa)	V			

BOREHOLE RECORD

BH 7 SHEET 1 of 2

LOCATION Osbourne Rd., Clarington, Ontario DATUM Location DATES: BORING January 17, 2008 WATER LEVEL TPC ELEV. Image: Clarington in the second	C	LIENT .	Region of Durham													PRO	OJEC	T No).	10) <u>09497.0</u> 1
Image: Strata Description I	LO	OCATIO	NOsbourne Rd., Clarington, C	Intar	io											-				I	local
E STRATA DESCRIPTION E E E SO 100 150 200 W E	D.	ATES: E	ORING January 17, 2008			<u> </u>	WAT				· .										
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	_ ع	N		LoT	VEL	ŧ		SAI		; r		NDF		ED S			IRE		⊣ (КР		0
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	TH ((ATIC	STRATA DESCRIPTION	TA PI	R L L	TH (£	(mm R(%	ы%			- 1			1		- i	Wp	w	щ
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	DEP) ELEV		TRA.	ATE	Ш	ΥPE	MBE	/ SO	ALU Rad(1								5/0.3m	_ _	REMARKS
9Dark brown clayey sity sand, torganic matter and rootlets: TOPSOIL Compact brown clayey SILT - with sand tace gravel, weathered - with gravel012Compact to very dense sity SAND - with gravel1 460 1845678999101199141516SS517181921SS640952223242526SS727282929292021222324252627282929-20-<		ш 		0	3		F	N	N00 20 20 20 20	N-N N-N H	STA	NDAF	RD PEI	NETRA	TION	TEST,	BLOV	VS/0.3	m	٠	GRAIN SIZE
99.1 organic matter and rootlets: ITOPSOIL. Compact trown clayey SILT - with and trace gravel, weathered 98.0 1 <td>0 -</td> <td></td> <td>Desta beeren alasses ailes aand</td> <td>1172</td> <td></td> <td>0</td> <td>1</td> <td></td> <td></td> <td></td> <td>1</td> <td>0 2</td> <td>0 3</td> <td>0 4</td> <td>0 5</td> <td>50 é</td> <td>50 7 1::::</td> <td>0 8</td> <td>09</td> <td>0 10</td> <td>GR SA SI CL</td>	0 -		Desta beeren alasses ailes aand	1172		0	1				1	0 2	0 3	0 4	0 5	50 é	50 7 1::::	0 8	09	0 10	GR SA SI CL
1 Compact brown clayey SILT - with sand trace gravel, weathered - with gravel 3 3 3 4 40 18 -		99.1		ľa:		1 -															
1 98.0 - with sand trace gravel, weathered 1				IH.		2 -															
98.0 Compact to very dense silty SAND - with gravel - SS 2 4 400 20 - with gravel - SS 3 400 33 - grey below 4.0m - SS 4 460 46 - trace clay between depth 3m to 4m - grey below 4.0m - trace clay between depth 3m to 4m - grey below 4.0m - trace clay between depth 3m to 4m - grey below 4.0m - trace clay between depth 3m to 4m - grey below 4.0m - trace clay between depth 3m to 4m - grey below 4.0m - trace clay between depth 3m to 4m - grey below 4.0m - trace clay between depth 3m to 4m - grey below 4.0m - trace clay between depth 3m to 4m - grey below 4.0m - trace clay between depth 3m to 4m - grey below 4.0m - grey below 4.0m <td>1 -</td> <td></td> <td></td> <td>H</td> <td></td> <td></td> <td>(ss</td> <td>1</td> <td>460 460</td> <td>18</td> <td></td> <td>•</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>_</td>	1 -			H			(ss	1	460 460	18		•									_
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I D Field Vane Test (kPa)																	(Pa)			√J	acques Whitford
△ Pocket Penetrometer Test (kPa)																		a)	V	V V	Vhitford

BOREHOLE RECORD

BH 7 SHEET 2 of 2

	JENT _								~					<u> </u>	PRO	DJEC	T No). .		<u>09497.0</u> 1
LC	OCATIO	N Osbourne Rd., Clarington, O	ntari	0				.								TUM			<u> I.</u>	ocal
D/	ATES: B	ORING January 17, 2008	 T			WAT		EVEL										H (kP	<u></u>	
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n) H	ATIO	STRATA DESCRIPTION	API	S LE	ТН (~	(mm R(%	%		-	-	+		1		i	Wp	w	ЖL
DEPTH (m)	ELEVATION (m)		STRATA PLOT	WATER LEVEL	DEPTH (ft)	ТҮРЕ	1BEF	/ SCI	ALUF					ATTER				⊢ S/0.3m	- -	REMARKS
Ц	Ш		ST	W/	_	₽	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	STA	NDA	RD PE	NETR	ATION	TEST,	BLOV	VS/0.3	m	٠	& GRAIN SIZE DISTRIBUTION
10	89.4		\square	<u> </u>				REC	0	1	0 2	20	30	40 5	50 6	60 7	70 8	0 9	0 100	(%) GR SA SI CL
10-		<u> </u>			33-	Τ														
-					34-															
					35- 36-	ss	9	$\frac{100}{460}$	0/50mr	1										
11-					30- 37-	1		400												
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					<u>39</u> -	Vee	10	100 4	0/50mr										Ē	
12-	87.2		<u></u>		-40-	135	10	460 ~	0/ JOIII		::::									
-		- Water table at a depth of 5.7m at the end of Boring			41-															
-		-			42-														E	
13-					43 -			1											ŀ	
-					44 -															-
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20-			1	<u> </u>	L	<u> </u>	<u> </u>	L.,	I		نندا Fi	ننا: eld V	/ane 1	liii lest (k	:L::: (Pa)	:1:::	.1			-
											Re	emov	lded	Vane	Test (W :	lacques Nhitford
										△	Pc	cket	Pene	trome	ter Te	est (k	Pa)	V_	-	

BOREHOLE RECORD

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CI	IENT _	Region of Durham															ΓΝα).		09497.01
	CATIO		ntari	io		WAT									DAT TPC				<u> </u>	.ocal
D/ 	TES: B		1.			WAI				ι	JNDF	RAIN	ED S	SHEA			_	H (kP	'a)	
(L) H	ELEVATION (m)		STRATA PLOT	WATER LEVEL	(tt) H.			<u> </u>			-+	50	+		0	+	150	`+ Wp	200) <i>W</i> _
DEPTH (m)	(m EVA	STRATA DESCRIPTION	LRAT/	ATER	DEPTH (ft)	түре	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)					ATTER ETRAT				ŀ	-ô-	REMARKS
			<u>ເ</u>	Ň		ſ	NN	ECOV	N-V OR F	STA	NDAF	ND PEI	NETRA	NTION "	TEST,	BLOW	/S/0.3	m	•	GRAIN SIZE
0 -	99.5	Dark brown clayey silty sand,	197.		-0			125			0 2	20 3	30 4	10 5	0 6	u 7			0 100	(%) GR_SA_SI_CL
	99.0	organic matter and rootlets: TOPSOIL			1 - 2 -															-
1-		Compact brown clayey SILT - with sand trace gravel, weathered			3 -	ss	1	<u>460</u> 460	25											
	98.1	Compact to very dense silty SAND			4 - 5 -															4
,		 with gravel trace clay at upper layer 			5 6-	ss	2	<u>460</u> 460	25											-
4	2 - trace clay at upper layer $7 - \frac{1}{8} - \frac{1}{460} 21$ 9															-				
3 -																				
-	- grey below 3.6m $10 - \frac{10}{11 - \sqrt{SS}} 4 - \frac{230}{460} - \frac{30}{12} - \frac{10}{12} - \frac{10}$																			
4	$11 - 85 + \frac{230}{460} = 30$																			
																ł				
						ss	5	<u>460</u> 460	25											
5 -					17-															
					18- 19-															
6	93.4	T	<u> </u>]	1	20	<u> </u>														
-		- Borehole is dry at the end of Boring			21-	ss	6	$\frac{100}{460}$	0/30m	h										-
					22-															
7 -					23- 24-															
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8 -					26-															
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10														est (kl 7ane 7		(Pa)			.	Jacques Nhitford
										_ △				romet			a)	V		nnittori

BOREHOLE RECORD

CI	lient _	Region of Durham												,		PRO)JEC	T No).			94 <u>97.0</u> 1
	DCATIO	NOsbourne Rd., Clarington, O	ntar	io												DA	ГUМ	~			Lc	<u>cal</u>
DA	ATES: B	ORING January 17, 2008				WAT	TER I	EVEL									ELE					
	_		5				SAM	MPLES		U	IND			DS		.RS 20	FREI	NGTI 150	H (kl		:00	
DEPTH (m)	ELEVATION (m)		STRATA PLOT	WATER LEVEI	DEPTH (#)			(m.)	_		+		0 			ļ—	-+	170	 		-	77
ΗT	(m)	STRATA DESCRIPTION	ATA	L.	μ	111	н	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	WA	TER	CON	ITEN	IT & A	TTER	BERG	LIMIT	s	₩p ┣─	w 0		Щ Н
ШO			TR	ATI	Н	түре	NUMBER	/ER/	KAL									BLOW		n T	7	REMARKS &
			1 00	>		-	ž	0%	л ^о В	STA	NDA	RD	PENE	ETRA	TION	TEST,		VS/0.3		•		& GRAIN SIZE DISTRIBUTION
0 -	97.7		-	<u> </u>		- -		22		1	0	20 :] : :	30) 4 ::::	0 5	0 6	i0 7	70 8	30 	90 1	00,	(%) GR SA SI CL
Ĭ		Dark brown clayey silty sand, organic matter and rootlets:	<u>x97</u> 1/	1	1 -																Ē	
-	97.2	TOPSOIL	m]	2 -																F	
-		Compact to very brown dense silty		Y	3 -			430	23												E	
1-		SAND			4 -	∬ss	1	<u>430</u> 460	23												È.	
	96.2	- with gravel			5 -																H	
-		- Very dense SAND and GRAVEL		1	6 -	∬ss	2	230 4	5/75mi	i											E	
2 -			ð.		7 -	\square																
					8 -																Ē	
			ð,		9 -																	
3 -			þČ		10-			_						<u></u>								
		- grey below 3m	Ŏ		11-	∬ss	3	$\frac{51}{460}$	0/75m	n											Ē	
. 1 .					12-	Η	-														F	
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			ð.		15	∬ss	4	$\frac{150}{460}$	0/125m	n ::												
5-				4	17-	μ_															E	
4-1-1			õ,		18-				1													
1 1					10-	┣—		100														
6 -	91.6		Ő]	20	∦ss	5	460	0/50m	n 	:::			<u></u>								<u></u>
-		- Water table at a depth of 0.9m at			21-				1												剈	
- -		the end of Boring			21-																F	
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10-		L <u>a.</u>													est (k					6 m l		2681102
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	I										- Pe	ock	et P	enet	rome	ter Te	:SU (K	ra)				

BOREHOLE RECORD

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DA	TES: B	ORING January 18, 2008	1.	r. 1		WAT		EVEL					IED	SHE			NGTI		a)	
Ê	NO		STRATA PLOT	WATER LEVEL	(¥)		SAN	/IPLES				50			100		150)
DEPTH (m)	(m)	STRATA DESCRIPTION	ITA B	ΞRΓ	DEPTH (ft)		К	CR(9	ПE (%)	WA	TERO	XONTE	ENT 8	ATTE	RBER	зымп	rs	₩ _P	w - 0	<i>W</i>
ШО	ELEVATION (m)		STR/	NATE	끰	ТҮРЕ	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)								BLOW		•	REMARKS & GRAIN SIZE
		····					ž	CR(%	żК		NDAF						NS/0.3 70 8		• 0 100	GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0 -	99.1	Dark brown clayey silty sand,	1.17		-0	1		ΨĒ												IGK SA SI UL
	98.6	organic matter and rootlets:			1 -															
-		TOPSOIL Very dense brown silty SAND			2 - 3 -			410												
1-		- with gravel			- - -	∦ss	1	<u>410</u> 460	90											
					5 -			410												
2 -					6 -	∦ss	2	<u>410.</u> 460	95											
-	:				7 -														Ē	
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3 -					10-	ļ														-
-					11-	∦ss	3	$\frac{100}{460}$	0/75mr	1										
					12-															
4 -			隊		13-															1
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					16-	∬ss	4	<u>380</u> 460	88									•		
5 -		- grey below 4.8m			17-															
					18-															
: 6 -	93.0				19-															·
	<u></u>	- Borehole is dry at the end of			20 21-	ss	5	<u>410</u> 460	85											
		Boring			22-	\cap														1
7 -					23-															
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BOREHOLE RECORD

СІ	.IENT _	Region of Durham	<u>.</u>			.						<u></u>					DEC	T No).			9497.01
	OCATIO		Ontari	io					·						_		rum : ele	- .v			<u>L(</u>	xcal
D/	TES: B	ORING January 18, 2008				WAT		EVEL		ι	IND	RAI	NE	D S	HEA					°a)		<u></u>
(E) T	ELEVATION (m)		STRATA PLOT	WATER LEVEL	H (ft)						+	5)0 	+	150	· Wp	2 	00 	ĸ
DEPTH (m)	ΞĂ	STRATA DESCRIPTION	RATA	TER	оертн (()	түре	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	1							EST, E		Ĥ	-ö-	, [REMARKS
Ω	Ш		ST	WP		Ţ	NUN	SOVE (%)	N-N-N-N-N-N-N-N-N-N-N-N-N-N-N-N-N-N-N-								BLOW			•		& GRAIN SIZE DISTRIBUTION
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	00 3	Dark brown clayey silty sand, organic matter and rootlets:	<u>174</u>		1 -																Ē	
	<u>,,,</u>	TOPSOIL	<u>آآ</u>		2 -																Ē	
1-		Compact brown sandy SILT - with gravel trace clay			3 -	ss	1	$\frac{410}{460}$	19												ŀ	
	98.4		-		4 -	<u> </u>															Ē	
		Very dense brown silty SAND - with gravel			5 - 6 -	ss	2	$\frac{410}{460}5$	0/100m	n											È	
2 -					7 -	η		400													ŀ	
					8 -																F	
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3-					10-	ss	3	150 6	0/125m												ŀ	
					11-			460 0													Ē	
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4 -					14-																Ę	
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5-		- grey below 4.7m			16-	ss	4	$\frac{230}{460}$	0/75m	n:::											-	
					17-																-	
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6	93.7				19- 20 -			_														
		- Borehole is dry at the end of			20	ss	5	150 c	р/125 п	m											إحدد	
		Boring			22-	<u> </u>	\vdash															
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																	(kPa) est (k		\checkmark	W	Ŵ	acques hitford

BOREHOLE RECORD

	.IENT _	Region of Durham Osbourne Rd., Clarington, O	ntor			<u> </u>									PRO DAT	JECT	' No	• -		<u>09497.0</u> 1 .o <u>cal</u>
	OCATIOI ATES: B		ntari			WAT	ER I	.EVEL				•		_		ELE	v. –			
			I-	Ŀ				MPLES		U	NDF		ED S			REN		l (kPa		
DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	ш	ËR	KY (mm) SCR(%)	-UE D(%)						BERG	-i		₩ _P	200 	ж —1
Ë			STR	WAT	10	түре	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	STA	NDAF	RD PEN	NETRA	TION "	iest, I	est, Bl Blow D 7(S/0.3r	n	▼ ● 0 100	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0 -	99.6	TOPSOIL	127		-0-					1		0 3					, ,		;;;;; <u></u>	GR SA SI CL
	99.3	Compact to very dense brown silty	<u></u>		1 -															
Ţ	1	SAND			2 -															
1		- with gravel				ss	1	$\frac{430}{460}$	24			•								
-					4 - 5 -															
-					5- 6-	(ss	2	<u>230</u> 460	20											
2 -					7 -															
•		- trace silt below 2.1m			8 -															
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3 -					10-			100												
-					11-	∦ss	3	460	0/75mr	а 									Ē	-
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5 -					10-	η 		400												
-		- grey below 5.1m		₹.	18-															· .
-						ss	5	360 6	0/100m										E	
6 -	93.5				20-	135	5	460 0												-
-		- Water table at a depth of 5.4m at the end of Boring			21 -															
					22 -															
7					23 -			-	:											-
-				:	24 -															
					25-															
8-					26~															-
					27-															
					28-														ŀ	
9 -					29-					:::: ::::										
]					30- 31-															
					31- 32-															
10-				[54	<u> </u>		<u> </u>	L											
														est (kl ′ane T		(Pa)		Á	/ :	lacques Nhitford
										Δ						st (kP	a)	<u>V'</u>		MILITOPA

BOREHOLE RECORD

CI	LIENT _	Region of Durham					<u></u>									ÆCT	No.	_		<u>09497.0</u> 1
	DCATIO		Intar	io	<u></u>										DAT	UM ELEV			<u> </u>	. <u>ocal</u>
D.	ATES: E	ORING January 17, 2008	T			WA'I		.EVEL MPLES			NDI		IED S	SHËA	R ST			(kPa	a)	
(n	NO		STRATA PLOT	NEL	(ft)		SAI -					50		1(50	` 	200)
DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	TAP	WATER LEVEI	DEPTH (ft)		Ľ	RECOVERY (mm) TCR(%) / SCR(%)	JE (%)	14/ 4			-		BERG L	IMITS	,	W _P	w	щ
DEP	ELEV		TRA	ATE	DEF	түре	NUMBER	ERY / SC	N-VALUE OR RQD(%)						ION TE		ows	/0.3m	`▼	REMARKS
	HP	·	N N	3			N	00% 20%	N-NOR P	SŤA	NDAI	RD PE	NETR	ATION '	TEST, B	BLOWS			٠	& GRAIN SIZE DISTRIBUTION (%) GR SA_SI CL
0 -	96.5		1.197		-0	- T				1 	0 2	20 : 1	30 4	10 5	0 60	70	80 :::	90) 100	GR SA SI CL
	96.2	TOPSOIL	<u>- 1</u> - 17		1 -															
. 1		Compact to very dense brown silty SAND			2 -															
1 -		- with gravel			3 -	ss	1	<u>460</u> 460	16	<u></u>									E E	-
					4 -	<u> </u>		-100												
-					5 -	ss	2	<u>460</u> 460	58										Ē	
2 -					6 -	132		460	50										F	
-					7- 8-															
				•	0- 9-															
3 -																	#			-
-					11-	∬ss	3	<u>460</u> 460	87									×		
-					12-		-												E	· .
4		- grey below 4m			13-															
		- grey below thi			14-														ļ	
					15-	Mee		100	0/75-											
5 -	21				16-	∦ss	4	460	0/75m											
Ì					17-															
-					18- 10			100											E	
6 -	90.4		[.].]		19- - 20-	∬ss	5	460	7/75m	1										
-		- Borehole is dry at the end of Boring			20 21 -														Ē	
		Boring			22 -														E	
7					23-															
-					24-															
-					25-														E	
8 -					26-															-
-					27-														Ē	
-					28-														Ē	
9 -					29-												<u></u>		<u></u>	-
					30-															
					31-															1
10					32 -														<u>iii</u>	
-~														est (kl Zane T	Pa) Test (ki	Pal			J	lacques Vhitford
															er Test			<u>/</u>	V N	Vhitford

BOREHOLE RECORD

CI	LIENT _	Region of Durham	<u></u>						<u> </u>						PRC	JECI	ΓŇα			0949 <u>7.0</u> 1
	DCATIO		ntari	0												ГUM			<u> </u>	.ocal
D/	ATES: B	ORING January 18, 2008	1	1		WAT		EVEL		· ·					TPC AR S				(a)	
Ê	NC		5		(f t)		SAN	/PLES ିହିତ୍ରୋ				50			00		150	- (N) 	200)
DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)		ĸ	RECOVERY (mm) TCR(%) / SCR(%)	Э́Е (%)	167 4	,	-T سران			I RBERG	, i Maita	1	Wp	w	иL
DEP)) ELEV	* .as	TRA	IATE	DEF	ТҮРЕ	NUMBER	/ERΥ	N-VALUE OR RQD(%)						TION T			s/0.3m		REMARKS &
			N N	3		Ц Н	N	COV R(%)	N-V OR H	STA	NDA	RD PE	NETR		TEST,				٠	& GRAIN SIZE DISTRIBUTION (%) GR_SA_SI_CL
0 -	97.5	CONCOL	Nº2.	L	-0-			щŪ		1	0 : ::::	20 1::::	30 : :::	40	50 6	0 7	0 8	0 9	0 100	GR SA SI CL
-	97.2	TOPSOIL Very dense brown silty SAND	<u> </u>		1 -															
-	1	- with gravel			2 -															
1 -					3 -	ss	1	<u>430</u> 460	56											-
-					4 -	<u> </u>													Ē	
·		- dense between depth 1.3m to 2.4m			5 -	ss	2	<u>410</u> 460	28											
2					6 - 7		-	460												4
					7 - 8 -]
-		- very dense below 2.4m			9-															
3 -					10-						:::									-
-					11-	ss	3	<u>230</u> 460 5	0/50mr	n										
				ł	12-			-												
4 -		- grey below 4m			13-															
· •		Broh eeren in			14-															
-	:				15-	ss	4	150.6	0/100m											
5 -				¥	16-		-	460 °												-
					17- 18-															
-					10-															
6 -	91.4				20															
1		- Water table at a depth of 5.1m at the end of Boring				ss	5	$\frac{360}{460}6$)/100m	'n										_
-					22-															
7 -					23-															-
-					24 -															
-					25-															
8 -					26-															
1					27-															
Ī					28-															
9 -					29- 30-															
1					31-															
Ī					32-															
10-							L				 1111	di ii ad V	ane T	iliii `est (k	:]:::: (Pa)	1	1::::			, ,
															Test (l	kPa)	-		N :	lacques Nhitford
										△	Ро	cket	Pene	rome	ter Te	st (kP	a)	<u>V</u>	1	THEFT ALL

BOREHOLE RECORD

LC	LIENT _	N Osbourne Rd., Clarington, C	Ontar	0)JEC TUM	ΓNo —			09497.01 .ocal
D/	ATES: B	ORING January 18, 2008				WAT	ER I	EVEL			~					ELE		_		
<u> </u>	7		5	Щ			SAN	NPLES		U	NDF	RAIN 50	ED S	HEA	RS1 Ю	FREN	1GTH 150	Η (kΡ	a) 200)
DEPTH (m)	ELEVATION (m)		STRATA PLOT	WATER LEVEL	DEPTH (ft)			(%)	(9			+	+		<u> </u>	+	+	⊦ ₩p	w	щ
Π	EV EV	STRATA DESCRIPTION	MT	ER	ЕРТ	Ц	BER	RY (D(%					ATTER				ŕ-	-ö-	REMARKS
ō	Ц		STE	WA.		ТҮРЕ	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)					ETRAT					•	
	99.4						2	Ц Ц Ц Ц Ц Ц Ц Ц Ц Ц Ц Ц Ц Ц Ц Ц Ц Ц Ц	20	1	0 2					0 7			0 100	GRAIN SIZE DISTRIBUTION (%) GR SA_SI_CL
0 -	99.1	TOPSOIL	132	-	-0-	1													E	
-	<u>, , , , , , , , , , , , , , , , , , , </u>	Dense to very dense brown silty	Ť1		1-															-
+ - -		SAND - with gravel			2 -			420												
1 -		- with graver			3 -	∬ss	1	$\tfrac{430}{460}$	28											-
-					5 -				. <u> </u>										E	
-					6 -	∬ss	2	<u>410</u> 460	62							•				
2 -					7 -															
					8 -															-
					9 -															
3 -					10-			100 /	0/76											1
					11-	≬ss	3	460	0/75m	n										ł
				•	12-															
4					13-															1
-					14-															-
					15- 16-	ss	4	$\frac{100}{460}$	0/75m	 1										
5 -		- grey below 4.8m			17-	<u> </u>		400												1
i				Ŧ	18-															ļ
1					19-	ss	5	250	0/75m											
6 -	<u>93.3</u>		<u> :[]</u>		-20-	N 22		460												
-		- Water table at a depth of 5.4m at the end of Boring	1		21-															
-		Ū			22-															
7 -					23-															-
-					24-															_
1					25-															
8 -					26-															-
1					27-															
-					28-															
9 -		н - Солон С - Солон С			29-															-
-					30- 31-															
+					32-			1												
10-					54														liiif A	·]
														est (k) 7ane]		kPa)			N :	Jacques Nhitford
										△				romet			'a)	V		whitterd

BOREHOLE RECORD

BH 16 SHEET 1 of 2

CI	lient _	Region of Durham				<i></i>									PRO	JEC	ΓNα	· .		<u>)09497.0</u> 1
LC	CATIO)ntari	0				<u>.</u>	678 I							TUM			I	_ocal
D/	ATES: B	ORING January 18, 2008	 T	1		WAT		EVEL					ED SI			BEN			a)	
Ê	Z		L01	VEL	(t		SAM	MPLES				50		10			150	- (14	20	0
DEPTH (m)	m) (ATIC	STRATA DESCRIPTION	TA P	R LE	DEPTH (ft)		ĸ	(mn ;R(%	ш%					-T) (KAPT		Wp	w	<i>и</i> <u>г</u>
DEP	ELEVATION (m)		STRATA PLOT	WATER LEVEL	DEF	ТҮРЕ	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)				NT & A					5/0.3m	•	REMARKS &
	ш 	·	0 0	N		Ĥ	N	COV	N-N N-N	STA	NDAR		IETRAT						٠	GRAIN SIZE
0 -	99.3		37.		-0-			<u>n</u> L		1 :	0 2	0 3 	0 40) 50	6	0 7	0 8	09	0 10	(%) GR SA SI CL
	99.0	TOPSOIL	<u></u>		1 -															
		Very dense brown silty SAND - with gravel			2 -															
1 -		-			3 -	ss	1	<u>430</u> 460	73											-
					4 -	<u></u>														
-					5 -	ss	2	430 -	5/75mr											
2 -		:			6- 7		4	460 -												-
-		- trace silt below 2.1m			7- 8-															
-					9-															
3 -					10-															
-					11-	∦ss	3	$\frac{150}{460}$	5/50mr	n										
					12-															
4 -					13-															
-					14-															
1					15-	ss	4	<u>230</u> 460	74											
5 -		- grey below 4.8m			16- 17-	<u> </u>	-	460												
-					17-															
					10 19-															
6 -					20-															
-					21-	SS	5	$\tfrac{430}{460}$	60											-
					22-															
7 -				Ţ	23-															-
-					24-															: -
-		- trace clay below 7.5m			25-	ss	6	<u>460</u> 460	31											
8-					26- 27			460												:
					27- 28-															
-					20- 29-															
9 -					<u> </u>	<u> </u>														:
					31-	∬ss	7	$\frac{380}{460}5$	0/125m	n										-
					32-					1										
10-			111	1	E	Ц.,	L	L	I		Fie	ld Va	l::::l me Te	st (kP	:::: 'a)		1::::	::::: بر		
										□	Re	moule	ied Va	ane T	est (l				Wi	Jacques Nhitford
										Δ	Po	cket I	enetro	omete	r Te	st (kF	a)		-	

BOREHOLE RECORD

BH 16 SHEET 2 of 2

	.IENT _	Region of Durham							<u> </u>								ΓNo) . .		009497.01
	CATIO		ntari	io			י הידוי							_	DAT TPC		 v		1	_ocal
DA	ATES: E	ORING January 10, 2000		1		WA'l		LEVEL		U	NDF	RAIN	ED S	HEA				l (kP	a)	
DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	ТҮРЕ	NUMBER	RECOVERY (mm)	N-VALUE OR RQD(%)	WA1 DYN	ER C	50 ONTE	NT & A		DO BERG ION TI	LIMIT EST, E	150 	Wp I 5/0.3m	200	₩ REMARKS
10-	89.3							TOR TOR	-0	10) 2	0 3	0 4	0 5	0 6	0 7	0 8	0 9	0 10	GRAIN SIZE DISTRIBUTION (%) GR.SA SI CL
10				• • •	33- 34-															· · · · · · · · · · · · · · · · · · ·
11				•	35- 36-	∦ss	8	$\frac{230}{460}$	0/75mr	1										· · · ·
11-					37- 38-															· · · · · · · · · · · · · · · · · · ·
12-	87.1				39- 40	(ss	9	<u>-280</u> 460	0/75m	1										
بعيليه		- Water table at a depth of 7.2m at the end of Boring			40 41-															
13-					42- 43-															
. .					44- 45-															· • •
14-					46- 47-				-											•
. .					47-															-
15-					49- 50-															- - - -
					51-															• •
16-					52 - 53 -															-
					54- 55-															-
17-					56-															- - - -
					57- 58-															-
18-					59-															
					60 - 61 -															-
19-					62-															
					63- 64-															-
20-					65-															-
~~											Re	moul	ded V	est (k) /ane] romet	Fest (Pa)		₩;	Jacques Nhitford

BOREHOLE RECORD

	LIENT _									<u>.</u>							CT N	0.			<u>9497.0</u> 1
		N Osbourne Rd., Clarington, (Ontar	io												ATU PC F				Lo	ocal
D,	ATES: B	ORING January 17, 2008	1.	Γ.		WAT						RAI	NFD	SH			LEV. ENGT	— Н (k	Pa)		······································
DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)			VPLES (mm) /			-+	50) .	1	100		150		2	:00 	<i>Щ</i> .
			STRA	WATE	DE	түре	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	DYN ST/	VAMIC NDAI	CO RD P	NE PE ENETI	NETF	RATION ON TES	N TEST ST, BL	r, BLOW OWS/0.:	3m	•	,	REMARKS & GRAIN SIZE DISTRIBUTION (%)
0 -	97.1	TOPSOIL	1	<u> </u>	0			<u> 22</u>		1		20	30	40	50	60 	70	80	90 1	100	(%) GR SA SI CL
	96.8	Dense to very dense brown silty	1	-	1 -															Ē	
1		SAND - with gravel			2 - 3 -	ss	1	<u>460</u> 460	42					•							
		- trace clay at upper layer			4 - 5 -				0/125												
2					6 - 7 -	∦ss 	2		0/125m											-	
				•	8 - 9 -	∬ss	3	<u>100</u> 460	0/75mr	n											
3		- grey below 3.3m		•	10- 11-	ss	4	$\frac{230}{460}$	0/75mr	1											
4					12- 13-																
				•	14- 15-	∬ss	5	100	0/50mr	1											
5	<u>92.1</u>	- Borehole is dry at the end of Boring	1		16- 17- 18-			400												-	
6 -					10 19- 20-															-	
					21 - 22-																
7 -					23-															-	
					24- 25																
8					25- 26-															F	
-					27-																
-					28- 29-															Ē	٠.
9-					30- 21																
, , , ,					31- 32-															F	
10-			1	<u>.</u>		LL	1	L	1		Fie	eld V	/ane '	Test	(kPa)		.:.::				
															e Tes				W	Ji W	acques hitford
										△	Po	cket	Pene	tron	ieter '	i est (кРа)				



Drawing No. 1, Borehole Locations

