GOLDER
MEMBER OF WSP

REPORT

Preliminary Geotechnical Investigation

Proposed Residential Subdivision, 5113 Old Brock Road, Hamlet of Claremont, Pickering, Ontario

Submitted to:

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Submitted by:

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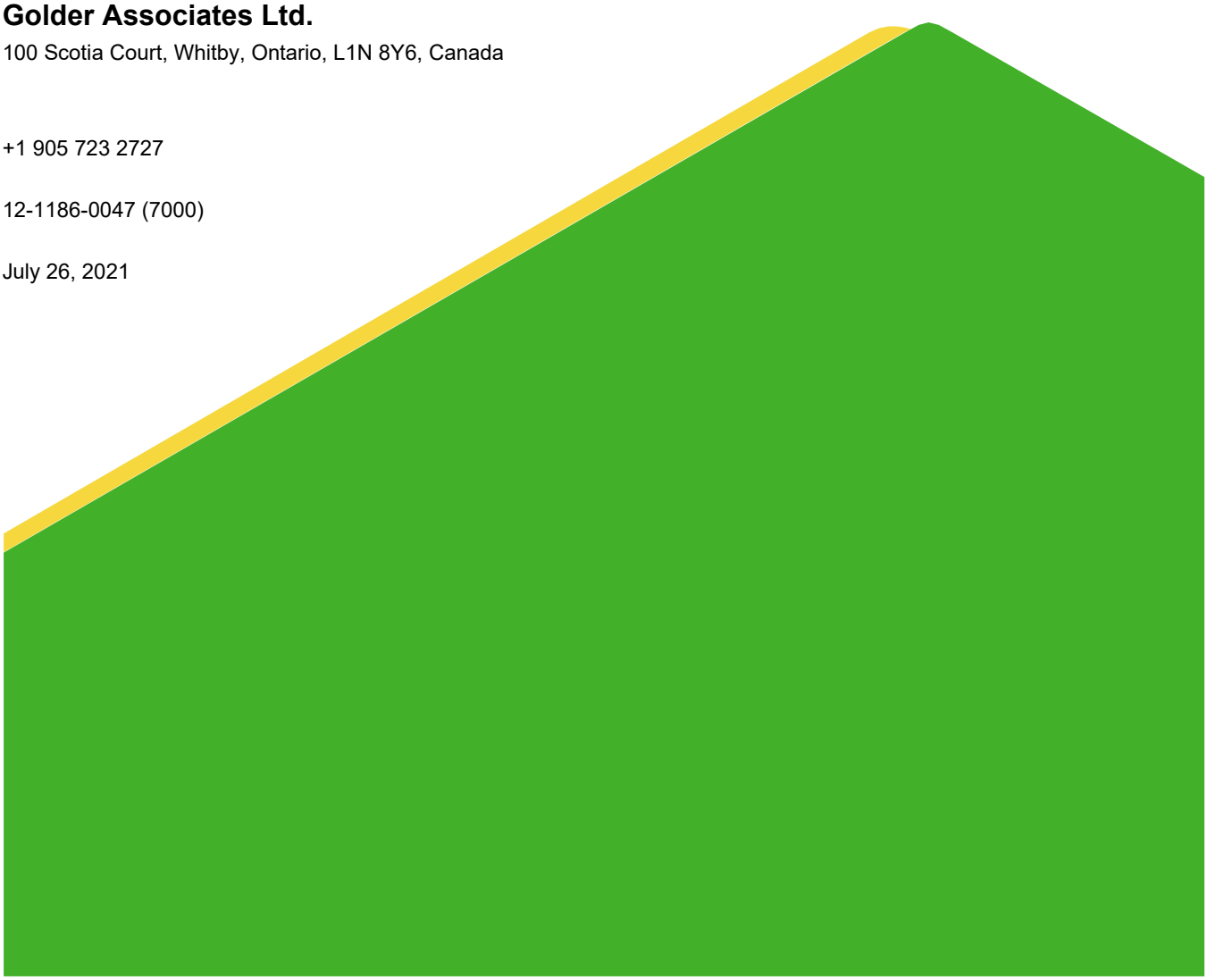

Distribution List

e-Copy - Claremont Developments Inc.

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ATTACHMENTS

APPENDIX A

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by Claremont Developments Inc. (CDI) to provide geotechnical consulting services in respect of the design of the proposed residential subdivision development (the project) to be constructed at 5113 Old Brock Road (the Site) in the Hamlet of Claremont, Ontario, as shown on Figure 1 (attached).

This report serves to update the geotechnical information in respect of the proposed zoning and subdivision of 5113 Old Brock Road, as fully described in the Planning Report by Malone Given Parsons dated July 2021.

This report draws on our previous report dated August 2012 for background information and where this information is applied it will be referenced.

The purpose of the investigation was to obtain information on the general subsurface soil and groundwater conditions at the Site by means of a limited number of boreholes and laboratory tests. Based on an interpretation of the factual information available for this Site, this report provides engineering comments, recommendations and parameters for the geotechnical design aspects of the project, including selected construction considerations which could influence design decisions. It should be noted that this report addresses only the geotechnical (physical) aspects of the subsurface conditions at the Site. The geo-environmental (chemical) aspects of the project area are addressed under separate cover.

This report provides the results of the geotechnical investigation and should be read in conjunction with the attached *"Important Information and Limitations of This Report"* which forms an integral part of this document. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report. The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, Golder should be given an opportunity to confirm that the recommendations in this report are still valid.

2.0 SITE AND PROJECT DESCRIPTION

The Site is located north of Central Street, between Brock Road (Claremont Bypass) and Old Brock Road in the Hamlet of Claremont, City of Pickering, Regional Municipality of Durham as shown on the Key Plan, Figure 1. The site is bounded by existing residential houses to the south, Old Brock Road to the west, Brock Road to the east, and residential properties and a woodlot to the north. The Site primarily consists of an irregularly shaped, agricultural parcel of land. The terrain of the subject property is uneven with complex multidirectional drainage pattern. Generally, higher elevations (about 278 m) are found at the central-east portion of the Site and the lowest (about 267 m) at the central-west portions of the Site.

The proposed residential subdivision will consist of residential lots serviced by private (water and sewage) services, two storm water management ponds, a park, open space blocks and local roads.

3.0 PREVIOUS WORKS

Golder completed a limited scope of geotechnical and hydrogeological work as part of the acquisition due diligence process in 2012. This work was presented in a technical memorandum entitled:

- *"Preliminary Geotechnical and Hydrogeological Investigation in Support of Draft Plan Submission for a Proposed Residential Subdivision, Lane Street and Brock Road, Claremont, City of Pickering, Ontario"* dated August 23, 2012.

The data obtained from the boreholes drilled for this memorandum are included in this report.

4.0 INVESTIGATION PROCEDURES

The drilling program for this preliminary geotechnical investigation was carried out in two phases: Boreholes 12-1 through 12-6 were drilled between February 23 and 28, 2012 and Boreholes 17-7 through 17-19 were drilled between October 4 and 10, 2017 at the locations shown on the Borehole Location Plan, Figure 2 (attached). Borehole locations were selected based on the proposed street and service block locations available at the time of our investigations with the intent of obtaining information on the general subsurface soil and groundwater conditions across the Site. The boreholes were drilled using a track mounted drillrig supplied and operated by specialist drilling subcontractor. The drilling subcontractors used for this investigation are Ontario Ministry of the Environment (MOE) licensed Water Well Contractors. Standard penetration testing and sampling were carried out at regular intervals of depth in the boreholes using conventional 35 mm internal diameter split spoon sampling equipment. The shallow groundwater conditions were noted in the open boreholes during drilling. Eleven 50 mm diameter monitoring wells were installed in selected boreholes to allow for further monitoring of the groundwater levels. The remaining boreholes were backfilled and sealed upon completion of drilling. All of the soil samples obtained during this investigation were brought to our Whitby laboratory for further examination and natural water content testing and selective classification testing.

The field work for this investigation was monitored by a member of our engineering staff who also determined the approximate borehole locations in the field, logged the boreholes and cared for the recovered samples. The ground surface gauge elevations were surveyed by Rady-Pentek & Edward Surveying Ltd., and the survey coordinates were provided to Golder. It is understood that the elevations were surveyed relative to a geodetic benchmark. The surveyed elevations are shown on the Record of Borehole sheets, attached.

5.0 SITE GEOLOGY AND STRATIGRAPHY

5.1 Regional Geology

The Site is located within the Southern Ontario region known as the South Slope but near the border with the Oak Ridges Moraine (*The Physiography of Southern Ontario,* Chapman and Putnam, 1984) as shown on Figure 1a.

The South Slope region slopes gradually downward towards Lake Ontario. The overburden immediately below ground surface within the South Slope generally consists of clayey silt till and silty clay till. The physiographic mapping in the general vicinity of the Site indicates a drumlinized till plain.

5.2 Subsurface Conditions

The subsurface soil and shallow groundwater conditions encountered in the boreholes, as well as a part of results of the field and laboratory testing, are shown in detail on the Record of Borehole, following the text of this report. Method of Soil Classification and Symbols and Terms Used on Records of Boreholes and Test Pits are provided

to assist in the interpretation of the borehole logs. It should be noted that the boundaries between the strata have been inferred from drilling observations and non-continuous samples. They generally represent a transition from one soil type to another and should not be inferred to represent an exact plane of geological change. Further, conditions will vary between and beyond the boreholes. The following is a summarized account of the subsurface conditions encountered in the boreholes drilled during this preliminary investigation, followed by more detailed descriptions of the major soil strata and shallow groundwater conditions.

Underlying 0.10 m to 0.46 m of topsoil, the native deposits encountered mainly consisted of surficial deposits of clayey silt, sandy silt and silt underlain by a major strata of glacial till. The till ranged in gradation from clayey silt till to sand and silt till. Minor deposits of clayey silt, sandy silt, silty sand and sand were also locally encountered at depth.

5.2.1 Topsoil

Topsoil was encountered at ground surface in all of the boreholes. The thickness of the topsoil encountered in the boreholes ranged from 0.10 m to 0.46 m.

5.2.2 Clayey Silt

Surficial deposits of clayey silt were encountered in Boreholes 12-3 through 12-6. Standard penetration testing carried out within the clayey silt gave N values ranging from 6 to 14 blows per 0.3 m penetration, indicating a firm to stiff consistency. The natural water contents of the clayey silt samples ranged from about 12 to 25 percent.

5.2.3 Sandy Silt and Silt

Surficial deposits of sandy silt and silt were encountered in Boreholes 17-7 through 17-19. Standard penetration testing carried out within the sandy silt and silt gave N values ranging from 7 to 20 blows per 0.3 m penetration, indicating a loose to compact state of compactness. The natural water contents of the sandy silt and silt samples ranged from about 5 to 18 percent.

5.2.4 Glacial Till

A predominant deposit of glacial till was encountered in all the boreholes drilled at the Site. The till ranged from non-cohesive sandy silt till to slightly cohesive clayey silt till, sand and silt till.

Standard penetration testing carried out within the predominantly slightly cohesive till gave N values ranging widely from 6 to greater than 100 blows per 0.3 m penetration, indicating a firm to hard consistency. The natural water contents of the cohesive till samples ranged from about 5 to 20 percent. Five grain size distribution curves for the slightly cohesive sand and silt till are shown on Figure 3. Five Atterberg limit testing results are shown on the Plasticity Chart, Figure 4, indicating that the slightly cohesive till can be classified as a ML-CL soil type under the Unified Soil Classification System.

Standard penetration testing carried out within the non-cohesive till gave N values ranging from 69 to greater than 100 blows per 0.3 m penetration, indicating a very dense compactness. The natural water contents of the non-cohesive till samples ranged from about 7 to 11 percent.

5.2.5 Silty Sand and Sandy Silt

Deposits of silty sand and sandy silt were encountered in Boreholes 12-1 and 12-4. Standard penetration testing carried out within the silty sand/sandy silt gave N values of greater than 100 blows per 0.3 m penetration, indicating a very dense compactness. The natural water contents of the silty sand and sandy silt samples were about 13 and 15 percent.

5.2.6 Sand

A deposit of sand was encountered in Boreholes 12-3 and 12-6. Borehole 12-6 was terminated in the sand. Standard penetration testing carried out within the sand gave N values of 56 blows and greater than 100 blows per 0.3 m penetration, indicating a very dense compactness. The natural water contents of the sand samples were about 15 and 20 percent. Our field observations and the relatively high natural water contents indicate that the sand is likely saturated and potentially water bearing.

5.2.7 Groundwater

The groundwater conditions encountered in each of the boreholes are shown in detail on the Record of Borehole sheets, following the text of this report.

Groundwater measurements are summarized in Table B1, Appendix B. Groundwater levels were measured in the available monitoring wells in March 2012, April 2012, October 2017, November 2017 and January 2018. Over this period groundwater was measured in these monitoring wells at depths ranging from 0.42 mbgs to 7.61 mbgs and from elevations of 261.11 masl to 273.86 masl.

It should be noted that groundwater observations reflect the groundwater conditions encountered in the boreholes and the piezometers during the time of the field investigation. Groundwater levels at the Site are anticipated to fluctuate normally with seasonal variations in precipitation. A preliminary hydrogeological assessment addressing broader hydrogeological issues for the Site was carried out by Golder and the results are presented in our report entitled:

- *"Preliminary Hydrogeological Investigation, Proposed Residential Subdivision, 5113 Old Brock Road, Claremont, City of Pickering, Ontario"* dated July 2021.

6.0 DISCUSSION

This section of the report provides preliminary geotechnical information based on our interpretation of the borehole data and on our understanding of the project requirements being subject to the limitations given in Appendix A. The information in this portion of the report is provided in respect of the draft plan submission and may not be sufficient for final design or construction purposes. Where comments are made on construction, they are provided only in order to highlight aspects of construction which could affect the design of the project. Contractors bidding on or undertaking any work at the Site should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction and make their own interpretation of the factual data as it affects their proposed construction techniques, schedule, equipment capabilities, costs, sequencing and the like.

Our professional services for this assignment address only the geotechnical (physical) aspects of the subsurface conditions at this Site as outlined above. The geo-environmental (chemical) aspects are outside of the terms of reference for this report but are presented under separate cover.

6.1 Preliminary Geotechnical Information

Based on the results of this investigation, the subsurface soil conditions encountered at the Site are generally considered to be suitable for the proposed development. The following preliminary geotechnical recommendations are provided for the planning and preliminary design of underground services, pavements, stormwater management ponds (SWM ponds) and building foundations at the Site.

6.1.1 Site Grading

Topsoil must be stripped off from the proposed development area. It may be reused for landscape purposes.

It is understood that the general site grading may result in cuts of up to 2.6 m and filling up to 1.5 m across the Site. The subsurface soils encountered in the boreholes are generally not considered to be compressible. As such, no long-term consolidation is anticipated as a result of the proposed site grading.

6.1.2 House Foundations

In general, the native subsoils at the Site are considered to be suitable for supporting conventional residential house (with or without basements) foundations for the proposed development. The reworked clayey silt till found in Borehole 12-5 and other locally softer materials will require removal prior to construction of the foundations. Localised removal in the order of 0.6 m is anticipated. A preliminary allowable bearing pressure in the order of 100 kPa to 150 kPa may be assumed for conventional shallow spread and/or strip footings bearing in the native, undisturbed, competent subsoils.

Engineered fill could also be used to support houses at the Site. Footings founded on approved engineered fill may be designed using a preliminary allowable bearing pressure of 100 kPa to 150 kPa. All exterior footings and footings in unheated areas must be protected with a minimum of 1.4 m of earth cover or equivalent insulation for frost protection.

The recommended type of foundation drainage system required (perimeter drains and/or underfloor drains; damp-proofing or water-proofing) depends upon the proposed basement founding elevations, soil types in the area and actual stabilized groundwater levels. Based on the results of this preliminary investigation, it is anticipated that conventional foundation drainage (i.e. perimeter drains and damp-proofing) would be adequate for basements founded at least 1 m above the prevailing groundwater tables. More extensive foundation drainage measures (underfloor drains and/or water-proofing) may be necessary where basements are proposed to be founded in the wet sands (as in the vicinity of Borehole 12-3). Further investigation during detailed design stage will be needed to determine the extent of the identified wet sandy deposits and the required foundation drainage measures.

6.1.3 Storm Sewers

We understand that most of the storm sewer inverts will be constructed at a nominal depth of approximately 3.5 m below the final grade. However, a relatively deep storm sewer (up to about 10 m in depth) is required in the southeast portion of the Site. We note that deeper boreholes will be required to further investigate the subsurface soil and groundwater conditions for the deeper storm sewer section.

It is anticipated that the trench excavations for underground servicing no deeper than 6 m below the ground surface would consist of conventional temporary open cuts with side slopes not steeper than 1 horizontal to 1 vertical. However, local flattening of side slopes may be required in looser zones in some areas or where significant water seepage is encountered. It is expected that groundwater control during excavation within the stiff to hard clayey silt and glacial tills can be provided, as required, by pumping from sumps within the trench

excavations. However, for excavations extending to the deeper sand deposits (vicinity of Boreholes 12-1 and 12-3), more extensive / active groundwater control measures will likely be required depending on the extent and thickness of this non-cohesive water bearing sand deposit. Once the final design details are available a further assessment of the need for either a Permit to Take Water (PTTW) or an Environmental Activity and Sector Registry (EASR) can be completed for the Site.

Conventional bedding thicknesses are anticipated for underground services founded within the native competent subsoils at the Site. Additional bedding thicknesses may be required for services founded in wet till-like clayey silt soils, depending upon the excavation depths and success of the contractor's groundwater control measures.

The majority of the native subsoils except for the reworked clayey silt till are generally near or above (but not excessively so) their estimated optimum water contents for compaction and will be suitable for reuse as trench backfill provided that the water contents are maintained at the time of construction. Any excavated materials that are significantly above their optimum water contents (more than about 4 percent) would likely require some drying in the field prior to placement.

6.1.4 Flexible Pavements

Based on the subsoil conditions encountered, conventional asphaltic (flexible) pavement designs, in accordance with the City of Pickering Series 700 drawings for residential streets, are considered to be appropriate for the proposed residential roads at the Site. For preliminary planning purposes, the pavement structure shown in the following table may be considered:

Material		Thickness of Pavement Elements (mm)
		Local Residential Streets
Asphaltic Material (OPSS 1150)	HL 3 Surface Course	35
	HL 8 Binder Course	50
Granular Material (OPSS 1010)	Granular A Base or 19 mm Crusher Run Limestone	150
	Granular B Type I Subbase or 50 mm Crusher Run Limestone	300
Prepared and Approved Subgrade		

6.1.5 Storm Water Management Ponds

The West SWM Pond (Block 73) will be constructed in the vicinity of Boreholes 17-8 and 17-11. The bottom elevation of the West pond will be at 267.35 m (approximately 0.5 to 1.8 m below the ground surface). The groundwater level in the piezometer installed at Borehole 17-8 is approximately 2.0 m below the level of the pond bottom. The groundwater level in the piezometer installed at Borehole 17-11 is approximately 5.3 m below the level of the pond bottom.

The South SWM Pond (Block 74) will be constructed in the vicinity of Boreholes 17-18 and 17-19. The bottom elevation of the South pond will be at 262.0 m (approximately 6.5 to 8.5 m below the existing ground surface). The groundwater levels in the piezometers installed at Boreholes 17-18 and 17-19 were measured at up to about 7.5 and 6.8 m above the level of the pond bottom respectively.

Preliminary permanent side slopes of 3H:1V are possible above the pond high water level and 4H:1V below the pond high water level. It is anticipated that both ponds will be completed in the predominate silt and sand to silty sand or silt and sand to silty clay glacial tills, however additional boreholes to depths of about 6 m below the proposed pond base elevations will be required at the detailed design stage to confirm the soil and groundwater conditions at both pond locations. An assessment of the need for a pond liner will be completed at that time.

7.0 CLOSURE

In general, the soil conditions encountered are generally suitable for the proposed residential development. As previously indicated, the preliminary geotechnical recommendations provided in this report are not sufficient for final design purposes. Once the development plans are further developed, the information in this report should be reviewed by Golder and additional investigative work carried out, compatible with the detailed development plans for the Site.

We trust that this report meets your current requirements. If you have any questions regarding the contents of this report or require additional information, please do not hesitate to contact this office.

Signature Page

Yours truly,

Golder Associates Ltd.

Andrew J. Hagner, P.Eng
Associate, Senior Geotechnical Engineer

Steven D. Keenan, C.E.T.
Principal

AJH/CLK/SDK/sv/af

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder cannot be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client can not rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Ground Water Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

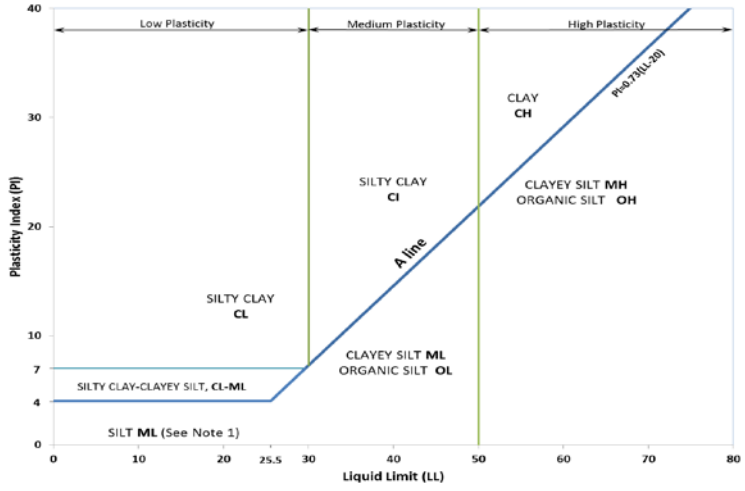
Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
				Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
				Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
				Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
			Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
				None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% **(see Note 2)**	CL	SILTY CLAY
			Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
			Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures							30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat							75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

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.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); 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.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DD	Diamond Drilling
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
GS	Grab Sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
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
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 - 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.
2. Definition of compactness terms are based on SPT-'N' ranges as provided in Terzaghi, Peck and Mesri (1996) and correspond to typical average N_{60} values. Many factors affect the recorded SPT-'N' value, including hammer efficiency (which may be greater than 60% in automatic trip hammers), groundwater conditions, and grainsize. As such, the recorded SPT-'N' value(s) should be considered only an approximate guide to the compactness term. These factors need to be considered when evaluating the results, and the stated compactness terms should not be relied upon for design or construction.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1,2] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH12-1

SHEET 1 OF 1

BORING DATE: February 23, 2012

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		268.79							
0	TRACK MOUNTED POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00							
				268.49	1	50 DO	9				
		(ML) CLAYEY SILT and SAND, trace gravel, zones of fine to medium sand; brown to grey, (TILL); W~PL, stiff to hard.		0.30							
1					2	50 DO	13			MH	
					3	50 DO	27				
2					4	50 DO	28				
3					5	50 DO	70				
4					6	50 DO	47				
5				263.30							▽
		(ML) sandy SILT, trace gravel; brown, (TILL); non-cohesive, moist, very dense.		5.49							
6					7	50 DO	50/.1				
				262.24							
		(SM) SILTY SAND, trace gravel; brown; non-cohesive, wet, very dense.		6.55							
7											
					8	50 DO	50/.13				
				260.92							
8		END OF BOREHOLE		7.87							Water encountered during drilling at a depth of 1.5 m below ground surface, Feb. 23/12 Water level in open portion of borehole at a depth of 3.0 m below ground surface upon completion of drilling, Feb. 23/12 Borehole caved to a depth of 5.5 m below ground surface upon completion of drilling, Feb. 23/12
9											
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DW

CHECKED: AJH

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH12-2

BORING DATE: February 23, 2012

SHEET 1 OF 2

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		269.61							
0	TRACK MOUNTED POWER AUGER 200 mm Dia. Hollow Stem Augers	TOPSOIL		0.00 / 269.15	1	50 DO	6				
		(ML) CLAYEY SILT and SAND, trace gravel; brown, (TILL); W~PL, stiff to hard.		0.46							
1					2	50 DO	10				
					3	50 DO	21				
2					4	50 DO	36				
											Bentonite Seal
3					5	50 DO	62				
				265.80							
4		(SM) sandy SILT, trace gravel; brown to grey, (TILL); moist, very dense.		3.81	6	50 DO	69				
5				264.28							
		(ML) CLAYEY SILT, trace sand; grey; moist, hard.		5.33							
6					7	50 DO	44				
				262.75							Silica Sand Filter
7		(ML) CLAYEY SILT and SAND, trace gravel; grey, (TILL); W<PL, hard.		6.86							
					8	50 DO	73			MH	Water encountered during drilling at a depth of 5.2 m below ground surface, Feb. 23/12
8				261.53							Water level in open borehole at a depth of 7.3 m below ground surface upon completion of drilling, Feb. 23/12
		END OF BOREHOLE		8.08							Water level in monitoring well measured at a depth of 0.93 m below ground surface, Mar. 5/12
9											Water level in
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DW

CHECKED: AJH

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PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH12-2

SHEET 2 OF 2

BORING DATE: February 23, 2012

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									monitoring well measured at a depth of 0.42 m below ground surface or at an elevation of 269.19 m above sea level, Jan. 23/18
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DW

CHECKED: AJH

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH12-3

SHEET 1 OF 1

BORING DATE: February 23, 2012

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		270.16							
0	TRACK MOUNTED POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00 / 269.88	1A						
		(ML) CLAYEY SILT, some sand, trace gravel; brown; W>PL, stiff.		0.28	1A	50 DO	14				
1					2	50 DO	9				
		(ML) CLAYEY SILT and SAND, trace gravel; brown, (TILL); W>PL, very stiff to hard.		268.79 / 1.37	3	50 DO	20				
2					4	50 DO	44				
		(SW) SAND, fine to medium, trace gravel; brown; wet, very dense.		267.26 / 2.90	5	50 DO	56				
3				266.35							
		(ML) sandy SILT, trace to some gravel; grey, (TILL); cohesive, moist, very dense.		3.81	6	50 DO	50/ .15				
4											
5											
6					7	50 DO	50/ .13				
7											
					8	50 DO	50/ .1				
8				262.08							
		END OF BOREHOLE		8.08							
9											
10											

Water encountered during drilling at a depth of 2.9 m below ground surface, Feb. 23/12

Water level in open portion of borehole at a depth of 2.4 m below ground surface upon completion of drilling, Feb. 23/12

Borehole caved to a depth of 2.9 m below ground surface upon completion of drilling, Feb. 23/12

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DW

CHECKED: AJH

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PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH12-4

BORING DATE: February 23, 2012

SHEET 1 OF 2

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		272.19									
	TRACK MOUNTED POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00	1A								
				271.73		50 DO	14						
		(ML) CLAYEY SILT, trace to some sand, trace gravel; brown; W>PL, firm.		0.46	1B								
1					2	50 DO	7						
				270.82									
		(ML) CLAYEY SILT and SAND, some gravel; brown, (TILL); W>PL, stiff to hard.		1.37									
2					3	50 DO	13						
					4	50 DO	39						Bentonite Seal
3					5	50 DO	100						
4													
					6	50 DO	50/ .15						
5													
6					7	50 DO	50/ .13						
				265.33									
7		(ML) SILT and SAND, trace gravel; brown; non-cohesive, wet, very dense.		6.86									Silica Sand Filter
					8	50 DO	50/ .1					MH	
				264.32									
8		END OF BOREHOLE		7.87									Water encountered during drilling at a depth of 1.5 m below ground surface, Feb. 23/12
9													Water level in open borehole at a depth of 1.8 m below ground surface upon completion of drilling, Feb. 23/12
													Water level in monitoring well at a depth of 4.92 m below ground surface, Mar. 5/12
10		*CONTINUED NEXT PAGE*											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DW

CHECKED: AJH

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PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH12-4

SHEET 2 OF 2

BORING DATE: February 23, 2012

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									Water level in monitoring well measured at a depth of 2.17 m below ground surface or at an elevation of 270.02 m above sea level, Jan. 23/18
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DW

CHECKED: AJH

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH12-5

SHEET 1 OF 1

BORING DATE: February 23, 2012

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○; 20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		271.49							
0	TRACK MOUNTED POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00 / 271.24							
		(ML) CLAYEY SILT, trace to some sand; dark brown, organic stained, (REWORKED TILL); W>PL, firm.		0.25 / 270.88	1A / 1B	50 DO	6		W ○		
		(ML) CLAYEY SILT and SAND, trace gravel; brown to grey, (TILL); W~PL, very stiff.		0.61							
1					2	50 DO	14		W ○		
					3	50 DO	14		W ○		
2					4	50 DO	17		W ○		
3					5	50 DO	18		W ○		
4											
					6	50 DO	29		W ○		
5				266.16							
		(ML) CLAYEY SILT, some sand, trace gravel; grey, (TILL-LIKE); W>PL, stiff.		5.33							
6					7	50 DO	12		W ○		
				264.63							
7		(ML) CLAYEY SILT and SAND, trace gravel, grey, (TILL); W~PL, hard.		6.86							▽
					8	50 DO	61		W ○		
8				263.41							
		END OF BOREHOLE		8.08							Water encountered during drilling at a depth of 7.3 m below ground surface, Feb. 23/12 Water level in open borehole at a depth of 7.3 m below ground surface upon completion of drilling, Feb. 23/12
9											
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DW

CHECKED: AJH

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PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH12-6

BORING DATE: February 23, 2012

SHEET 1 OF 2

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		267.03							
0	TRACK MOUNTED POWER AUGER 200 mm Dia. Hollow Stem Augers	TOPSOIL		0.00	1A	50 DO	10				
				266.57	1B						
		(ML) CLAYEY SILT, trace to some sand, trace gravel; brown; W~PL, stiff.		0.46	2	50 DO	8				
1											
				265.66							
		(ML) CLAYEY SILT and SAND, trace gravel; brown, (TILL); W>PL, very stiff to hard.		1.37	3	50 DO	22				
2					4	50 DO	25				
3					5	50 DO	55				Bentonite Seal
				263.07							
4		(ML) sandy SILT, trace gravel; brown to grey, (TILL); cohesive, moist, very dense.		3.96	6	50 DO	50/ .1				
5											
6					7	50 DO	50/ .1				
7											
					8	50 DO	50/ .13				
8				258.50							
		(SW) SILTY SAND, fine to medium; grey; wet, very dense.		8.53							Silica Sand Filter
9					9	50 DO	50/ .13			MH	
				257.43							
		END OF BOREHOLE		9.60							Water encountered during drilling at a depth
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DW

CHECKED: AJH

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PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH12-6

SHEET 2 OF 2

BORING DATE: February 23, 2012

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									of 5.2 m below ground surface, Feb. 23/12 Water level in open borehole at a depth of 7.3 m below ground surface upon completion of drilling, Feb. 23/12 Water level in monitoring well at a depth of 5.56 m below ground surface, Mar. 5/12 Water level in monitoring well measured at a depth of 5.84 m below ground surface or at an elevation of 261.19 m above sea level, Jan. 23/18
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DW

CHECKED: AJH

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-7

BORING DATE: October 05, 2017

SHEET 1 OF 1

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		274.95							
		TOPSOIL		0.00							
		(ML) sandy SILT; brown; non-cohesive, moist, compact to loose		0.15	1	SS	14		○		
1					2	SS	9		○		
				273.58							
		(ML-CL) SILT and SAND, some gravel; brown, oxidation staining (TILL); cohesive, w<PL to w~PL, stiff to hard		1.37	3	SS	9		○		
2					4	SS	30		○		
3					5	SS	23		⊖	MH	Bentonite Seal
4		- Auger grinding at 4.3 m			6	SS	21		○		
5											
6		- Grey at 6.3 m			7	SS	33		○		
7											Silica Sand Filter and Screen
8					8	SS	19		○		
		END OF BOREHOLE		266.87 8.08							
9		NOTE: 1. Borehole dry upon completion of drilling, Oct. 5/2017. 2. Groundwater level measured in monitoring well at a depth of 5.44 m on October. 26/2017. 3. Water level in monitoring well measured at a depth of 4.66 m below ground surface or at an elevation of 270.29 m above sea level, Jan. 23/18.									
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

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PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-8

BORING DATE: October 05, 2017

SHEET 1 OF 2

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		267.86							
0		TOPSOIL		0.00	1A						
				267.48		SS	17				
		(ML) sandy SILT, trace gravel; brown, oxidation staining; non-cohesive, moist, compact		0.38	1B						
					2A						
1				266.82							Bentonite Seal
		(ML-CL/CL) SILT and SAND to sandy SILTY CLAY, trace to some gravel; brown, oxidation staining (TILL); cohesive, w>PL to w~PL, stiff to hard		1.04	2B	SS	15				
					3	SS	11				
2					4	SS	18				
3		- Auger grinding at 2.9 m			5	SS	31				
4											
					6	SS	43				
5											
6											Silica Sand Filter and Screen
		- Grey and sand inclusion at 6.3 m			7	SS	32				
7											
					8	SS	22				
8				259.78							
		END OF BOREHOLE		8.08							
		NOTES:									
		1. Groundwater encountered at a depth of 4.5 m during drilling on Oct. 5 /2017.									
9		2. Groundwater measured in open borehole at a depth of 5.1 m upon completion of drilling on Oct. 5/2017.									
		3. Groundwater level measured in monitoring well at a depth of 4.09 m on Oct. 26/2017.									
		4. Water level in monitoring well									
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

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PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-8

SHEET 2 OF 2

BORING DATE: October 05, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									
		measured at a depth of 2.60 m below ground surface or at an elevation of 265.26 m above sea level, Jan. 23/18									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

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PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-9

BORING DATE: October 05, 2017

SHEET 1 OF 1

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		272.19							
0		TOPSOIL		0.00	1A	SS	12				
				271.99							
		(ML) sandy SILT, trace gravel; brown, oxidation staining; non-cohesive, moist, compact		0.20	1B						
				271.50							
		(ML-CL) SILT and SAND, some gravel; brown, oxidation staining (TILL); cohesive, w>PL to w<PL, stiff to hard		0.69							
1					2	SS	12				
2					3	SS	13				
					4	SS	11				
3											Bentonite Seal
					5	SS	15				
4											
					6	SS	13				
5											
6					7	SS	18				
7		- Silty sand inclusion at 7 m									Silica Sand Filter and Screen
					8	SS	57				
8				264.11							
		END OF BOREHOLE		8.08							
9											
10											

NOTES:

1. Borehole dry upon completion of drilling, Oct. 5/2017.

2. Groundwater level measured in monitoring well at a depth of 7.31 m on Oct. 30/2017.

3. Water level in monitoring well measured at a depth of 5.95 m below ground surface or at an elevation of 266.24 m above sea level, Jan. 23/18.

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-10

SHEET 1 OF 1

BORING DATE: October 05, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		276.98							
0		TOPSOIL		0.00							
				276.75							
		(ML) sandy SILT, trace gravel; brown; non-cohesive, moist, compact		0.23	1	SS	11				
				276.29							
		(ML-CL) SILT and SAND, some gravel; brown, oxidation staining (TILL); cohesive, w~PL to w<PL, stiff to hard		0.69	2	SS	18				
1											
					3	SS	13				
2											
					4	SS	25				
3											
					5	SS	42				
4											
					6	SS	55				
5		- Auger grinding at 5.5 m									
					7	SS	40				
6				270.88							
		END OF BOREHOLE		6.10							
		NOTE:									
		1. Borehole dry upon completion of drilling, Oct. 5/2017.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-11

SHEET 1 OF 2

BORING DATE: October 05, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		269.14							
		TOPSOIL		0.00							
		(ML) sandy SILT, trace gravel; brown to dark brown, oxidation staining, rootlets; non-cohesive, moist, compact		0.10	1	SS	17				
1					2	SS	16				
				267.77							
		(ML-CL/ML) SILT and SAND to sandy SILT, some gravel; brown, oxidation staining (TILL); cohesive, w>PL to w<PL, stiff to hard		1.37	3	SS	7				
2					4	SS	15				
3					5	SS	31				Bentonite Seal
		- Wet inclusion at 3.3 m									
4											
					6	SS	79/ 0.23			MH	
5											
6											
					7	SS	99/ 0.25				
		- Auger grinding at 6.7 m									Silica Sand Filter and Screen
7											
					8	SS	94/ 0.25				
8				261.11							
		END OF BOREHOLE		8.03							
		NOTES:									
		1. Groundwater encountered at a depth of 3.0 m during drilling on Oct. 5 /2017.									
9		2. Groundwater measured in open borehole at a depth of 3.6 m upon completion of drilling on Oct. 5/2017.									
		3. Groundwater level measured in monitoring well at a depth of 6.91 m on Oct. 26/2017.									
		4. Water level in monitoring well									
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-11

SHEET 2 OF 2

BORING DATE: October 05, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									
		measured at a depth of 7.14 m below ground surface or at an elevation of 262.00 m above sea level, Jan. 23/18.									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-12

SHEET 1 OF 1

BORING DATE: October 06, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		271.00							
		TOPSOIL		0.00							
		(ML) sandy SILT, trace gravel; brown, oxidation staining, rootlets; non-cohesive, moist, compact		0.15	1	SS	15				
				270.31							
1		(ML-CL) SILT and SAND, some gravel; brown, oxidation staining (TILL); cohesive, w<PL to w~PL, stiff to very stiff		0.69	2	SS	12				
					3	SS	18				
2		- Auger grinding at 2.1 m			4	SS	20				
3					5	SS	22				
4											
					6	SS	22				
5											
					7	SS	23				
6				264.90							
		END OF BOREHOLE		6.10							
		NOTE:									
		1. Borehole dry upon completion of drilling on Oct. 6/2017.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

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PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-13

SHEET 1 OF 1

BORING DATE: October 06, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		272.32							
0		TOPSOIL		0.00 / 272.12							
		(ML) SILT, some sand; dark brown; non-cohesive, moist, loose		0.20 / 271.63	1	SS	7				
1		(ML-CL) SILT and SAND, some gravel; brown, oxidation staining (TILL); cohesive, w>PL to w~PL, firm to hard		0.69	2	SS	10				
					3	SS	6				
2					4	SS	17				
3					5	SS	21				
4											
					6	SS	34				
5		- Auger grinding at 5.2 m - Grey at 5.3 m									
					7	SS	11				
6		END OF BOREHOLE		266.22 / 6.10							
		NOTE: 1. Borehole dry upon completion of drilling on Oct. 6/2017.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

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PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-14

SHEET 1 OF 1

BORING DATE: October 04, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○; 20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		278.67							
0		TOPSOIL		0.00	1A						
		(ML) SILT, some sand, trace gravel; light brown to brown, rootlets; non-cohesive, moist, loose to compact		0.15	1B	SS	9		○		
1					2	SS	11		○		
				276.89	3A	SS	16		○		
		(ML-CL/ML) SILT and SAND to sandy SILT, some gravel; brown, oxidation staining (TILL); cohesive, w<PL, very stiff to hard		1.78	3B				○		
2					4	SS	36		○ W ⊢	MH	Bentonite Seal
3					5	SS	33		○		
4					6	SS	63		○		
5		- Sand inclusion at 4.8 m and 6.4 m									
6					7	SS	64		○		
7		- Auger grinding at 7.3 m									Silica Sand Filter and Screen
				270.91	8	SS	50/ 0.14		○		
		END OF BOREHOLE		7.76							
8		NOTE:									
		1. Borehole dry upon completion of drilling on Oct. 4/2017.									
		2. Monitoring well dry on Oct. 30/2017.									
9		3. Monitoring well was dry on Jan. 23/18.									
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

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PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-15

SHEET 1 OF 1

BORING DATE: October 10, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		276.53							
		TOPSOIL		0.00 / 276.33							
		(ML) SILT, some sand; light brown, rootlets; non-cohesive, moist, compact		0.20 / 275.84	1	SS	14				
1		(ML-CL) SILT and SAND, trace to some gravel; brown, oxidation staining (TILL); cohesive, w~PL to w<PL, stiff to hard - Auger grinding at 1.2 m, 4.5 m and 5.5 m		0.69	2	SS	13				
2					3	SS	23				
					4	SS	49				
3					5	SS	42				
		- Sand inclusion at 3.4 m									
4											
					6	SS	65				
5											
					7	SS	50/ 0.13				
6		END OF BOREHOLE		270.61 / 5.92							
		NOTE: 1. Borehole dry upon completion of drilling on Oct. 10/2017.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

GTA-BHS 001 X:\CAD_ARCHIVE (PRE-2014)\MISSISSAUGA\PROJECTS\2012\12-1186-0047 (GERANIUM, PICKERING)\LOG\1211860047.GPJ GAL-MIS.GDT 2/27/18 MK 2012

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-16

SHEET 1 OF 2

BORING DATE: October 06, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		275.11							
0		TOPSOIL		0.00 / 274.91							
		(ML) SILT, some sand; brown, rootlets; non-cohesive, moist, compact		0.20	1	SS	17				
				274.42							
1		(ML-CL/ML) SILT and SAND to sandy SILT, some gravel; brown, oxidation staining (TILL); cohesive, w~PL to w<PL, very stiff to hard		0.69	2	SS	21				
					3	SS	15				
2					4	SS	31				
		- Auger grinding at 2.7 m, 4.5 m, 5.1 m and 6.9 m									Bentonite Seal
3					5	SS	50/ 0.05				
4											
					6	SS	50/ 0.10				
5											
6					7	SS	98/ 0.25			MH	
											Silica Sand Filter and Screen
7		- Grey at 7 m			8	AS					
					9	SS	50/ 0.13				
				267.21							
8		END OF BOREHOLE		7.90							
		NOTES:									
		1. Groundwater encountered at a depth of 6.0 m during drilling on Oct. 6/2017.									
9		2. Groundwater measured in open borehole at a depth of 7.1 m upon completion of drilling on Oct. 6/2017.									
		3. Groundwater measured in monitoring well at a depth of 2.47 m on Oct. 30/2017.									
		4. Water level in monitoring well measured at a depth of 1.25 m below									
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

GTA-BHS 001 X:\CAD_ARCHIVE (PRE-2014)\MISSISSAUGA\PROJECTS\2012\12-1186-0047 (GERANIUM, PICKERING)\LOG\1211860047.GPJ GAL-MIS.GDT 2/27/18 MK 2012

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-16

SHEET 2 OF 2

BORING DATE: October 06, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10		ground surface or at an elevation of 273.86 m above sea level, Jan. 23/18.									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-17

BORING DATE: October 10, 2017

SHEET 1 OF 1

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		273.59							
		TOPSOIL		0.00 273.39							
		(ML) sandy SILT, trace gravel; brown, trace rootlets; non-cohesive, moist, compact		0.20	1	SS	20				
				272.90							
		(ML-CL) SILT and SAND, some gravel; brown, oxidation staining (TILL); cohesive, w~PL to w<PL, stiff to hard		0.69	2	SS	13				
1											
					3	SS	10				
2											
					4	SS	29				
3											
					5	SS	13				
4											
					6	SS	52				
5		- Auger grinding at 5.5 m									
					7	SS	87				
6				267.49							
		END OF BOREHOLE		6.10							
7		NOTES: 1. Groundwater encountered at a depth of 4.0 m during drilling on Oct. 10/2017. 2. Groundwater measured in open borehole at a depth of 4.8 m upon completion of drilling on Oct. 10/2017.									
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

GTA-BHS 001 X:\CAD_ARCHIVE (PRE-2014)\MISSISSAUGA\PROJECTS\2012\12-1186-0047 (GERANIUM, PICKERING)\LOG\1211860047.GPJ GAL-MIS.GDT 2/27/18 MK 2012

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-18

SHEET 1 OF 2

BORING DATE: October 10, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		270.47							
		TOPSOIL		0.00 / 270.27							
		(ML) sandy SILT; light brown, rootlets; non-cohesive, moist, compact		0.20	1	SS	10				
				269.78							
1		(ML-CL/ML) SILT and SAND to sandy SILT, some gravel; brown to grey, oxidation staining (TILL); cohesive, w~PL to w<PL, stiff to hard		0.69	2	SS	12				
					3	SS	20				
2											Bentonite Seal
					4	SS	27				
3					5	SS	18				
4											
					6	SS	57				
5		- Auger grinding at 5.1 m and 6.6 m									
6		- Sand inclusion at 6 m			7	SS	86/ 0.28				Silica Sand Filter and Screen
7											
					8	SS	15				
8				262.39							
		END OF BOREHOLE		8.08							
		NOTES:									
		1. Groundwater encountered at a depth of 6.0 m during drilling on Oct. 10/2017.									
9		2. Groundwater measured at a depth of 5.7 m upon completion of drilling on Oct. 10/2017.									
		3. Groundwater level measured in monitoring well at a depth of 2.18 m on Oct. 30/2017.									
		4. Water level in monitoring well									
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

GTA-BHS 001 X:\CAD_ARCHIVE (PRE-2014)\MISSISSAUGA\PROJECTS\2012\12-1186-0047 (GERANIUM, PICKERING)\LOG\1211860047.GPJ GAL-MIS.GDT 2/27/18 MK 2012

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-18

SHEET 2 OF 2

BORING DATE: October 10, 2017

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									
		measured at a depth of 0.82 m below ground surface or at an elevation of 269.65 m above sea level, Jan. 23/18.									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH

PROJECT: 12-1186-0047

LOCATION: SEE FIGURE 2

RECORD OF BOREHOLE: BH17-19

BORING DATE: October 10, 2017

SHEET 1 OF 1

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		268.56							
		TOPSOIL		0.00 / 268.36							
		(ML) sandy SILT, trace gravel; dark brown to brown, rootlets; non-cohesive, moist, compact to loose		0.20	1	SS	10				
1				267.49	2A						
		(ML-CL) SILT and SAND, some gravel; brown to grey, oxidation staining (TILL); cohesive, w~PL to w<PL, firm to hard		1.07	2B	SS	4				
					3	SS	13			MH	
2					4	SS	50				
3		- Grey at 2.9 m			5	SS	47				Bentonite Seal
4		- Sand inclusion at 4.0 m			6	SS	50/ 0.13				
5		- Auger grinding at 5.2 m									
6					7	SS	50/ 0.10				
7				260.84	8	SS	50/ 0.10				Silica Sand Filter and Screen
		END OF BOREHOLE		7.72							
8		NOTES:									
		1. Groundwater encountered at a depth of 6.0 m during drilling on Oct. 10/2017.									
		2. Groundwater measured at a depth of 6.2 m upon completion of drilling on Oct. 10/2017.									
9		3. Groundwater level measured in monitoring well at a depth of 1.16 m on Oct. 26/2017.									
		4. Water level in monitoring well measured at a depth of 0.22 m above ground surface or at an elevation of 268.78 m above sea level, Jan. 23/18									
10											

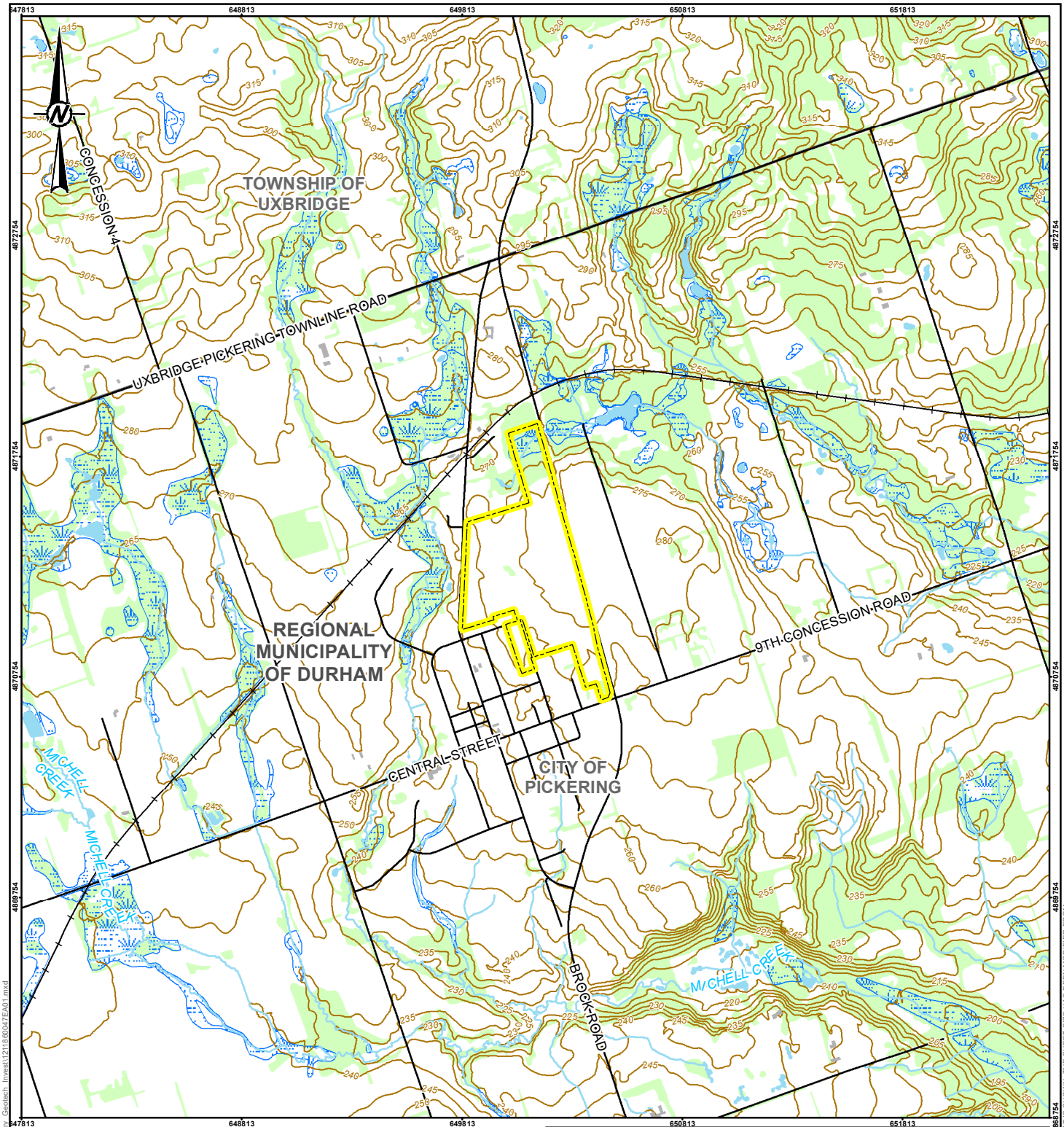
DEPTH SCALE

1 : 50

GOLDER

LOGGED: RV

CHECKED: AJH



LEGEND

- CONTOURS (M)
- RAILWAY
- ROAD
- WATERCOURSE
- APPROXIMATE SITE BOUNDARY
- BUILDING
- MUNICIPAL BOUNDARY
- WATERBODY
- WETLAND
- WOODED AREA

0 500 1,000

1:25,000 METRES

REFERENCE(S)

BASE DATA - MNR LIO, OBTAINED 2017
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2017
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CLAREMONT DEVELOPMENTS INC.

PROJECT
PRELIMINARY GEOTECHNICAL INVESTIGATION
5113 OLD BROCK ROAD, HAMLET OF CLAREMONT, CITY OF PICKERING, ONTARIO

TITLE
KEY PLAN

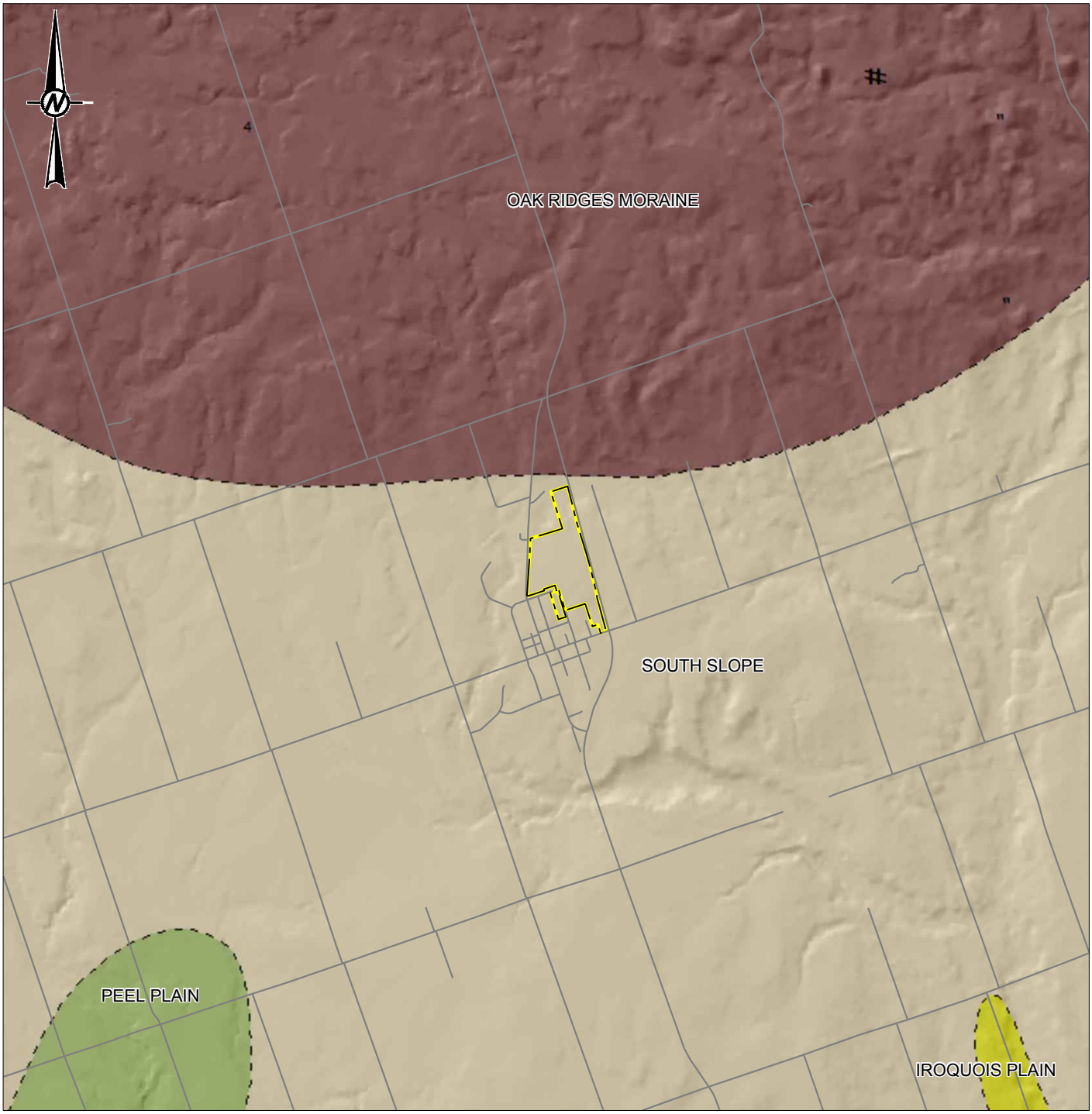
CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-07-22
DESIGNED	
PREPARED	MK
REVIEWED	SDK
APPROVED	AJH

PROJECT NO.	CONTROL	REV.	FIGURE
12-1186-0047 (7000)			1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm 0

Path: G:\Projects\2012\12-1186-0047 Genmium Pickering\GIS\MXDs\Reporting\EA Preliminary Geotech Invest\12118600047EA01.mxd



0 1,000 2,000
1:50,000 METRES

LEGEND

APPROXIMATE SITE LOCATION

NOTE(S)

1. ALL LOCATION ARE APPROXIMATE
2. CHAPMAN & PUTNAM, OPEN GOVERNMENT OF CANADA LICENCE

REFERENCE(S)

PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CLAREMONT DEVELOPMENTS INC.

PROJECT
PRELIMINARY HYDROGEOLOGICAL ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
5113 OLD BROCK ROAD, CLAREMONT

TITLE
PHYSIOGRAPHY

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-07-22
DESIGNED	
PREPARED	JPR
REVIEWED	
APPROVED	CMK

PROJECT NO.	CONTROL	REV.	FIGURE
1211860047	0002	----	1A

649344 649844 650344 650844

4871616 4871116

HOXTON STREET

TRACK STREET

WOODED AREA

BLOCK 75
Open Space
3.55 ha

BLOCK 79
30m Open Space Buffer
0.92 ha

BLOCK 80
Noise Attenuation
0.89 ha

BLOCK 81
Road Widening
0.65 ha

BLOCK 82
Road Widening
0.76 ha

BLOCK 73
SWM Pond
1.93 ha

BLOCK 74
SWM Pond
1.93 ha

BLOCK 72
Park
1.70 ha

BLOCK 76
Open Space
0.27 ha

BLOCK 77
Open Space
0.03 ha

Existing Lot 1A
0.65 ha

STREET 'A'

STREET 'B'

LANE STREET

BROCK ROAD

WIXON STREET

JOSEPH STREET

FRANKLIN STREET

BARBER STREET

CONCESSION ROAD 9

City of Pickering Official Plan
Rural Settlement Boundary

BH17-7
BH17-8
BH17-9
BH17-10
BH17-11
BH17-12
BH17-13
BH17-14
BH17-15
BH17-16
BH17-17
BH17-18
BH17-19
BH12-1
BH12-2
BH12-3
BH12-4
BH12-5
BH12-6

LEGEND

- BORHEOLE DRILLED IN 2012
- BOREHOLE DRILLED IN 2017

0 200 400
1:5,000 METRES

NOTE(S)
1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)
BASE PLAN PROVIDED BY MALONE GIVEN PARSONS LTD., ENTITLED "DRAFTPLAN OF SUBDIVISION 21T-", PROJECT NO. 12-2110, DATED JANUARY 31, 2018.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N
BASE PLAN PROVIDED BY MALONE, ENTITLED "DRAFT PLAN OF SUBDIVISION 21T-", PROJECT NO. 12-2110, DATED JANUARY 31, 2018.

CLIENT
CLAREMONT DEVELOPMENTS INC.

PROJECT
PRELIMINARY GEOTECHNICAL INVESTIGATION
5113 OLD BROCK ROAD, HAMLET OF CLAREMONT, CITY OF PICKERING, ONTARIO

TITLE
BOREHOLE LOCATION PLAN

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-07-21
DESIGNED	
PREPARED	MK
REVIEWED	SDK
APPROVED	SDK

PROJECT NO. 12-1186-0047 (7000) CONTROL REV. FIGURE **2**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm 0

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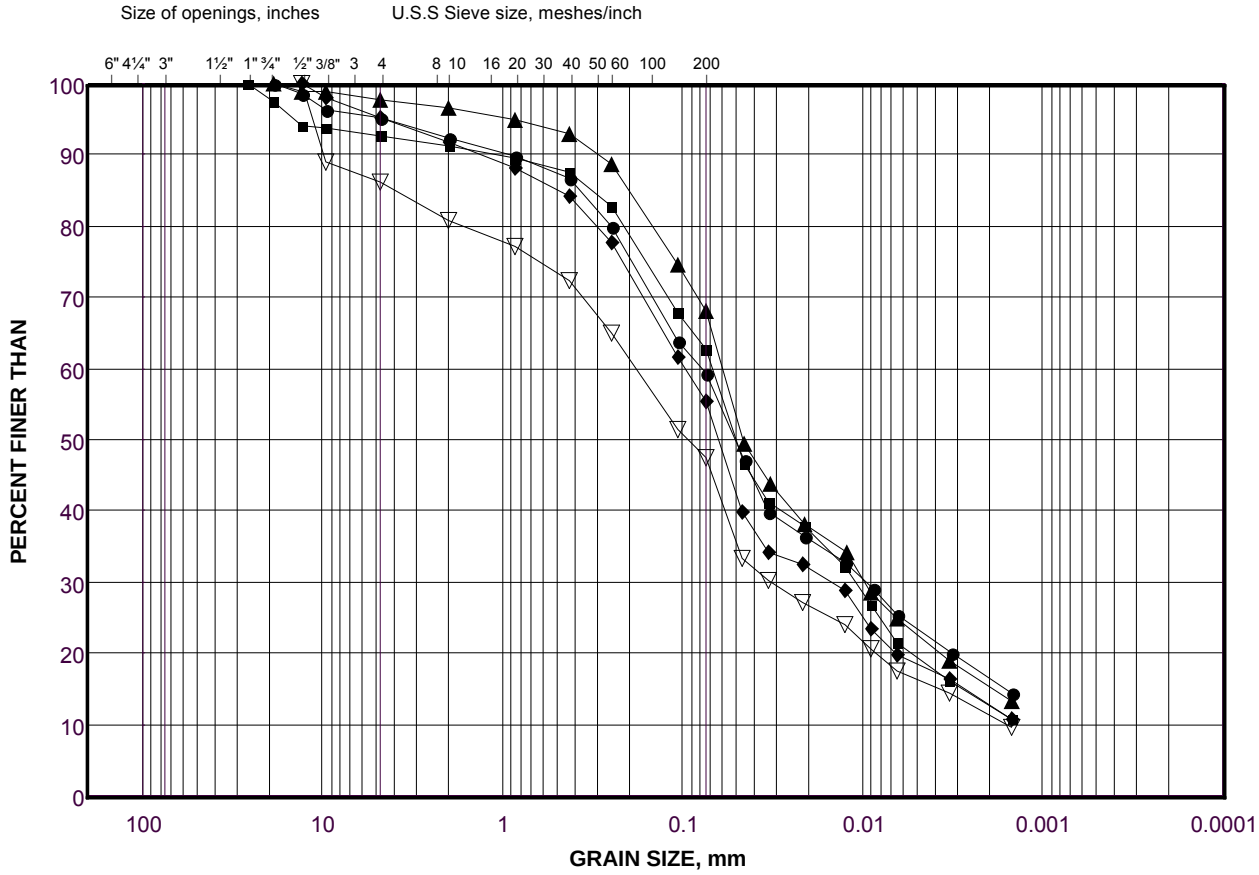
GRAIN SIZE DISTRIBUTION

(ML-CL) SILT and SAND TILL

FIGURE 3



LEGEND

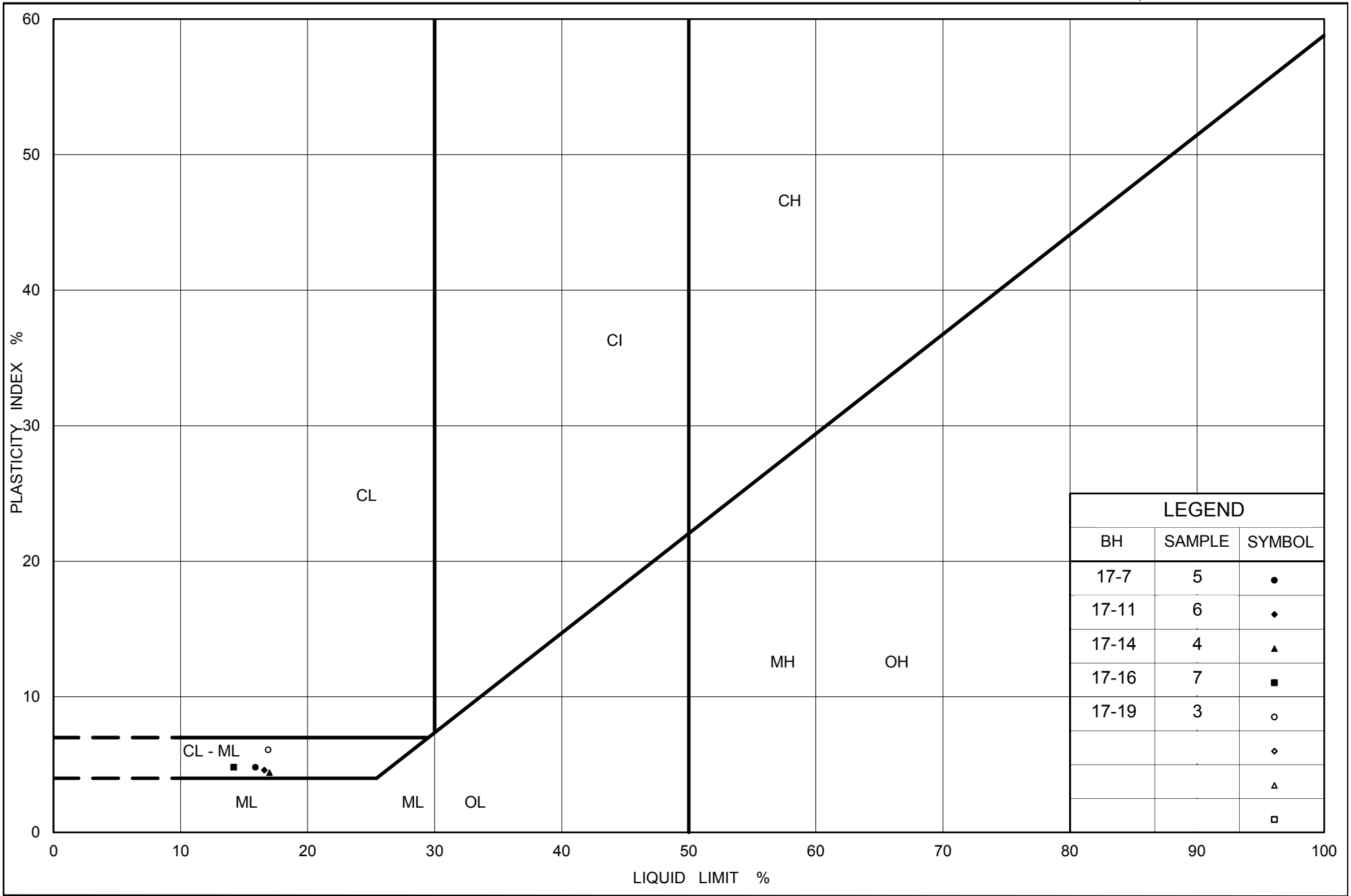
SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	17-19	3	1.7
■	17-14	4	2.5
◆	17-7	5	3.2
▲	17-11	6	4.8
▽	17-16	7	6.3

Project Number: 12-1186-0047

Checked By: AJH

Golder Associates

Date: 03-Nov-17



Golder Associates

PLASTICITY CHART
(ML-CL) SILT and SAND TILL

Figure No.	4
Project No.	12-1186-0047
Checked By:	AJH

APPENDIX A

Table B1 – Water Level Data

Table B-1: Groundwater Depths and Elevations

Proposed Residential Subdivision, Claremont, City of Pickering, Ontario

Location	Ground Surface	Top of Pipe Elev.	2-Mar-2012		5-Mar-2012		2-Apr-2012		26,30-Oct-17		9-Nov-2017		14-Nov-2017		18-Jan-2018		23-Jan-2018	
	(masl)	(masl)	(mbgs)	(masl)	(mbgs)	(masl)	(mbgs)	(masl)	(mbgs)	(masl)	(mbgs)	(masl)	(mbgs)	(masl)	(mbgs)	(masl)	(mbgs)	(masl)
BH12-2	269.61	270.59	1.00	268.61	1.01	268.60	1.18	268.43	3.27	266.34	3.28	266.34	3.27	266.34	1.57	268.04	0.42	269.19
BH12-4	272.19	273.20	4.43	267.76	4.85	267.34	4.52	267.67	7.24	264.95	7.43	264.76	-	-	2.63	269.56	2.17	270.02
BH12-6	267.03	267.93	5.57	261.46	5.60	261.43	5.57	261.46	5.91	261.12	5.89	261.14	5.92	261.11	5.89	261.14	5.84	261.19
BH17-7	274.95	275.91	-	-	-	-	-	-	5.53	269.42	5.71	269.24	5.75	269.20	4.59	270.36	4.66	270.29
BH17-8	267.86	268.82	-	-	-	-	-	-	4.14	263.73	4.03	263.84	4.08	263.78	2.68	265.18	2.60	265.26
BH17-9	272.19	273.12	-	-	-	-	-	-	7.36	264.83	7.55	264.64	7.61	264.58	6.43	265.76	5.95	266.24
BH17-11	269.14	269.97	-	-	-	-	-	-	7.01	262.13	7.11	262.03	7.13	262.01	7.24	261.90	7.14	262.00
BH17-14	278.67	279.62	-	-	-	-	-	-	dry	<271.07	dry	<271.07	dry	<271.07	dry	<271.07	dry	<271.07
BH17-16	275.11	275.91	-	-	-	-	-	-	2.62	272.50	2.63	272.48	2.59	272.52	1.35	273.76	1.25	273.86
BH17-18	270.47	271.31	-	-	-	-	-	-	2.27	268.20	1.79	268.68	1.76	268.71	1.05	269.42	0.82	269.65
BH17-19	268.56	269.55	-	-	-	-	-	-	1.23	267.33	0.66	267.90	0.46	268.10	***-0.09***	***268.65***	-0.22	268.78

Notes:

1. Elevations based on survey coordinates provided by Rady-Pentek Edwards

masl = metres above sea level

mbgs = metres below ground surface

- = no data available

0.73 = data in ***bold italicized*** font represents ice surface

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