GOLDER
MEMBER OF WSP

REPORT

Preliminary Geotechnical Investigation

Proposed Residential Redevelopment, Fergus Golf Club, 8243 and 8282 Wellington Road 19, Fergus, Ontario

Submitted to:

883890 Ontario Limited c/o Fergus Development Inc.
3190 Steeles Avenue West, Suite 300
Markham Ontario
L3R 1G9
Attention: Ms. Farrah Ward

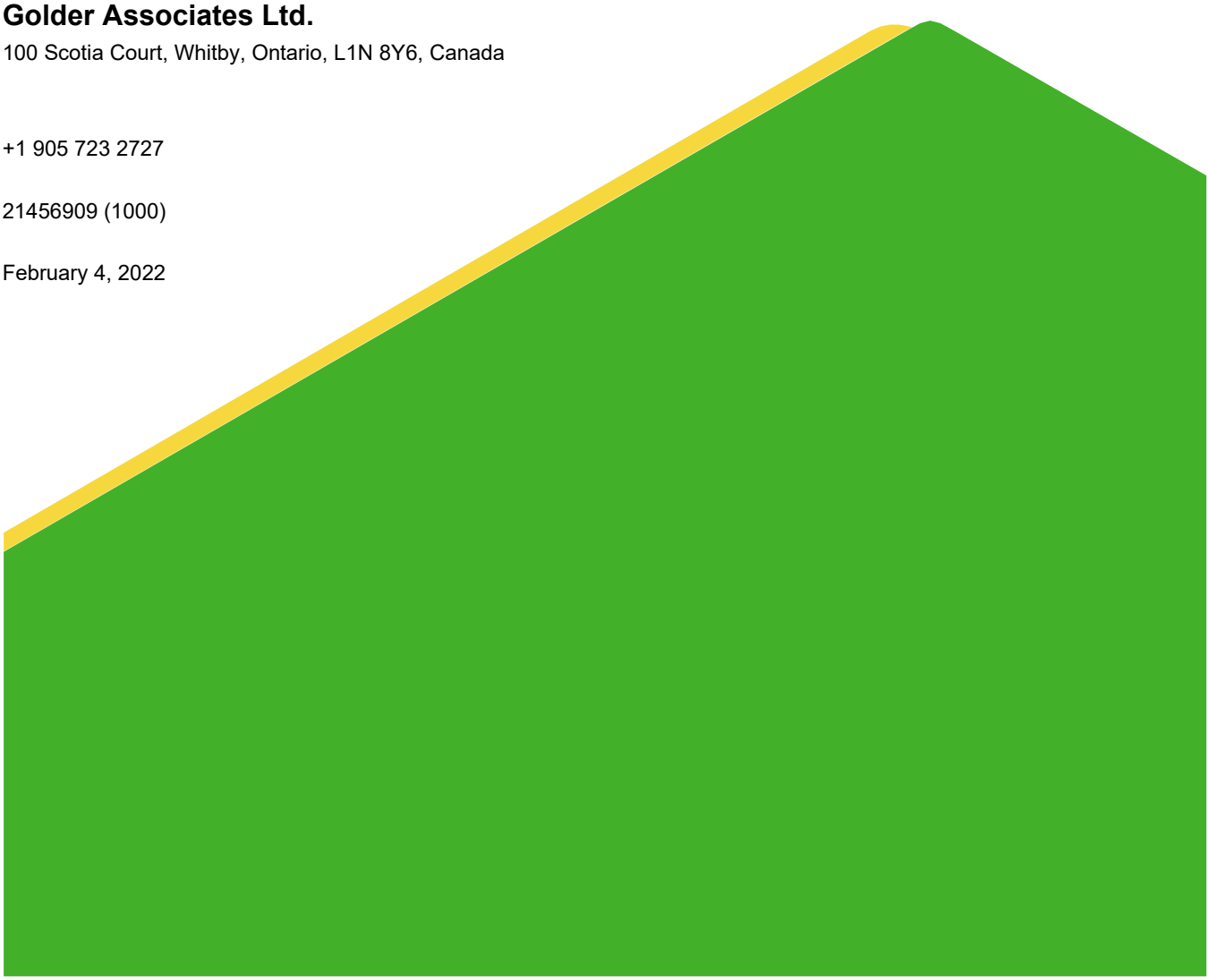
Submitted by:

Golder Associates Ltd.
100 Scotia Court, Whitby, Ontario, L1N 8Y6, Canada

+1 905 723 2727

21456909 (1000)

February 4, 2022



Distribution List

E-copy - 883890 Ontario Limited c/o Fergus Development Inc.

E-copy - Golder Associates Ltd.

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by 883890 Ontario Limited c/o Fergus Development Inc. to carry out Geotechnical and Hydrogeological Investigations, Phase One and Two Environmental Site Assessments (ESA), and Stage 1 Archaeological Assessment for a proposed residential redevelopment at 8243 & 8282 Wellington Road 19 in the Township of Centre Wellington, Ontario (the Site). As such, outlined below is the results and recommendations related to the geotechnical investigation. The Hydrogeological Investigation, Phase One and Two Environmental Site Assessments (ESA), and Stage 1 Archaeological Assessment are reported under separate cover.

This report should be read in conjunction *with "Important Information and Limitations of this Report"*, in Appendix A of this letter. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

2.0 SITE DESCRIPTION

The existing golf course (the "Site") consists of two parcels; the northwest parcel (the "NW Site") which is 42.35 ha, situated on the north side of Wellington Road 19, and the southeast parcel (the "SE Site") which is 39.85 ha, situated on the south side of Wellington Road 19, referred to as the Lake Belwood Golf Club (NW Site) and the Fairview Golf Club (SE Site) respectively. The proposed residential redevelopment is located on the SE Site and the proposed communal water and wastewater services are integrated into the existing Golf Course, which will remain, on the NW Site.

The SE Site is surrounded by Wellington Road 19 to the north, Third Line and a combination of existing residential development and farmland to the east, towards Lake Belwood, existing farmland to the south, and existing residential to the west. The SE Site is currently occupied by grass fields, a residential house and nine holes of a golf course. The SE site generally slopes down from County Road 19 to the south and east. There is a large wooded area surrounding two golf holes near the south end of the property that is largely flat, covering approximately one third of the total area south of County Road 19, with three small ponds adjacent to the north.

The conceptual plan provided by Fergus Development Inc. (dated December 10, 2021) indicates that the proposed development area on the SE Site will include about 118 approximately half acre lots,6.34 ha of open space, a stormwater management facility and associated roads and utilities.

3.0 FIELD INVESTIGATION PROCEDURE

The field work for the current geotechnical investigation was carried out between March 22 and March 31, 2021, during which time eighteen boreholes (designated as Boreholes BH21-1 to BH21-18) were advanced at the site to depths between about 3 m and 10 m below existing ground surface at the approximate locations shown on the Borehole Location Plan, Figure 1, attached.

The boreholes were advanced using a track-mounted drill rig supplied and operated by a specialist drilling contractor, subcontracted to Golder. Standard Penetration Testing (SPT) and sampling was carried out at regular intervals of depth in the boreholes using conventional 35 mm internal diameter split spoon sampling equipment advanced using an automatic hammer, in accordance with ASTM D1586 (99). The groundwater condition in the open boreholes was recorded immediately following drilling procedures for all boreholes. Sixteen of the eighteen boreholes advanced on site were equipped with 50 mm diameter monitoring wells to permit further monitoring of the groundwater levels. The well installation details and water level readings are presented on the Record of Borehole sheets in Appendix B.

The field work for this investigation was directed by a member of our technical staff who located the boreholes in the field, directed the sampling and in-situ testing operation, logged the boreholes and cared for the samples obtained. The samples were identified in the field, placed in appropriate containers, labelled and transported to Golder's Mississauga geotechnical laboratory for further examination and laboratory testing. Index and classification tests, consisting of water content determinations, Atterberg limits and grain size distribution, were carried out on selected soil samples. The results of the geotechnical laboratory tests are included in Appendix C and on the Record of Borehole sheets in Appendix B.

The borehole locations and elevations were surveyed by R-PE Surveying Ltd. of Woodbridge Ontario based on UTM coordinates and Geodetic elevation (CGVD2013). The coordinates and elevations are shown on the Record of Borehole sheets in Appendix B.

4.0 SUBSURFACE CONDITIONS

The subsurface soil and shallow groundwater conditions encountered in the boreholes and the results of the field and laboratory testing, are shown on the Record of Boreholes sheets, in Appendix B. Method of Soil Classification, Abbreviations and Terms used on Records of Boreholes and Test Pits, and List of Symbols 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, and 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 summary of the subsurface conditions of the boreholes advanced during this investigation followed by a more detailed description of the major soil strata and groundwater conditions.

Details of the observations of the groundwater conditions during, and upon completion of drilling, and recorded in the monitoring wells following the completion of the drilling investigation, are included on the Record of Borehole sheets in Appendix B and in Section 4.3.

4.1 North of Wellington Road 19 (NW Site)

Boreholes BH21-9, BH21-10, BH21-12, BH21-13, BH21-14 and BH21-15 were advanced on the north side of County Road 19 in the general area of the proposed dispersal beds. In general, the subsurface conditions encountered at these boreholes typically consist of a surficial topsoil layer underlain by a native soil deposit consisting of sandy silty clay, underlain by a silty clay to clayey silt glacial till deposit. A silty sand and gravel layer was encountered underlying or interlayered within the glacial till deposit at some borehole locations.

4.1.1 Topsoil and Surficial Organic Materials

Topsoil ranging from silty sand to organic silt and sand to clayey organic silt was encountered in all boreholes, ranging in depths from about 150 mm to 300 mm. The organic silt and sand topsoil in Borehole BH21-15 transitioned to a layer of very loose silty sand over a depth of approximately 0.3 m below the 300 mm of organic silt and sand topsoil.

It is important to note that materials identified as topsoil in this report were classified based on visual and textural evidence as no other testing for organic content or other nutrients was carried out. As such, the ability for these materials to support vegetation has not been assessed.

4.1.2 (CL) Sandy Silty Clay

A deposit of sandy silty clay was found underlying the topsoil and surficial organic materials in Boreholes 21-9, BH21-12, BH21-13, BH21-14 and BH21-15 extending to depths between about 1.3 m and 3.1 m below ground surface (Elevations 430.3 m to 427.6 m). Borehole BH21-14 was terminated in this deposit at a depth of 3.1 m below ground surface (Elevation 428.0 m) upon refusal to further auger penetration.

The SPT 'N' values measured in the silty clay deposit range from about 1 blow per 0.3 m of penetration to about 50 blows for 0.08 m of penetration but are generally less than 11 blows per 0.3 m of penetration, suggesting a very soft to hard, but generally very soft to stiff, consistency.

The results of grain size distribution tests carried out on one selected sample from this deposit is presented in Figure C1, in Appendix C. Atterberg limits tests were carried out on one sample from this deposit and measured a liquid limit of about 19 per cent, a plastic limit of about 12 per cent, and corresponding plasticity index of about 8 per cent. These results, which are plotted on a plasticity chart on Figure C2 in Appendix C, indicate that the deposit can be classified as silty clay of low plasticity.

The water content measured on selected samples of this deposit ranged from about 8 per cent to 20 per cent.

4.1.3 (CL-ML) Silty Clay to Clayey Silt Till

A deposit of silty clay to clayey silt glacial till some gravel to gravelly, some sand to with sand, was encountered below the topsoil in Borehole BH21-10, below the sandy silty clay in Boreholes BH21-9, BH21-13, and BH21-15, and below the silty sand and gravel interlayer in Borehole BH21-12. The till deposit was penetrated to depths between about 4.9 m to 8.3 m below ground surface (Elevations 427.3 m and 422.1 m). All of the boreholes containing the glacial till were terminated within the till deposit. The presence of cobbles and boulders throughout this deposit was inferred based on grinding of the augers and auger/sampler refusal at some locations, as noted on the borehole records.

The SPT 'N' values measured in the till deposit range from about 10 blows per 0.3 m of penetration to about 50 blows for 0.05 m of penetration, suggesting a stiff to hard consistency.

The results of grain size distribution tests carried out on selected samples from this deposit are presented in Figure C3, in Appendix C. Atterberg limits tests were carried out on five samples from this deposit and measured liquid limits between about 15 per cent and 21 per cent, plastic limits between about 11 per cent and 14 per cent, and corresponding plasticity indices between about 4 per cent and 9 per cent. These results, which are plotted on a plasticity chart on Figure C4 in Appendix C, indicate that the deposit can be classified as silty clay to clayey silt of low plasticity.

The water content measured on selected samples of this deposit ranged from about 1 per cent to 16 per cent.

4.1.4 Silty Sand and Gravel

A deposit of silty sand and gravel was found within the till deposit at varying depths in Boreholes BH21-9 and BH21-13 and layered between the silty clay and silty clay till deposits in Borehole BH21-12. The sand and gravel layer ranged in thickness between about 0.3 m to 1.1 m.

The SPT 'N' values measured in the sand and gravel layer range from about 50 blows for 0.07 m of penetration to about 50 blows for 0.05 m of penetration, indicating a very dense state of compactness.

The water content measured on selected samples of the sand and gravel layer ranged from about 3 per cent to 16 per cent.

4.2 South of Wellington Road 19 (SE Site)

Boreholes BH21-1 through BH21-8, BH21-11, BH21-16, BH21-17 and BH21-18 were advanced on the south side of County Road 19 in the area of the proposed residential development. In general, the subsurface conditions encountered at the boreholes advanced at the site typically consist of a surficial topsoil layer underlain by native soil deposits consisting of silty sand to sand or clayey silt with sand containing varying amounts of gravel. These deposits are in turn underlain by silty clay to clayey silt and silt and sand glacial till deposits. Some granular layers of silty sand and gravel are present within and above the till deposit.

4.2.1 Topsoil and Surficial Organic Materials

Topsoil was encountered in all boreholes on the south side of the site, ranging in thickness from about 50 mm to 300 mm. An underlying organic silt layer was found in Boreholes BH21-1 and BH21-3, extending to depths of about 0.7 m and 0.9 m (Elevations 425.7 m and 434.1 m).

Materials identified as topsoil in this report were classified based on visual and textural evidence as no other testing for organic content or other nutrients was carried out. As such, the ability for these materials to support vegetation has not been assessed.

Standard Penetration Test SPT ‘N’ values within the topsoil ranged between about 1 blow and 5 blows per 0.3 m of penetration suggesting a very soft to firm consistency.

4.2.2 (SP/SM) Sand to Silty Sand

A deposit of sand to silty sand, trace gravel to silty sand and gravel was encountered below the topsoil and surficial organic layers in Boreholes BH21-1, BH21-2, BH21-4, BH21-5, BH21-6, BH21-11, BH21-17 and BH21-18. This deposit extended to depths between about 0.7 m to 3.5 m below ground surface (Elevations 429.0 m and 423.0 m). This deposit was layered with a glacial till deposit in Borehole BH21-8 and contained a clayey silt to silt layer in Borehole BH21-18.

The SPT ‘N’ values measured in the sand to silty sand deposit range from about 2 blows to about 43 blows for 0.3 m of penetration, indicating a very loose to dense state of compactness.

The results of grain size distribution tests carried out on selected samples from this deposit are presented in Figure C5, in Appendix C.

The water content measured on selected samples of this deposit ranged from about 5 per cent to 27 per cent.

4.2.3 (CL-ML) Silty Clay to Clayey Silt with Sand to Silt with Sand

A cohesive deposit of silty clay to clayey silt with sand to silt with sand was encountered below the topsoil in Boreholes BH21-3, BH21-7 and BH21-16, and below the sand to silty sand in Borehole BH21-2. This cohesive deposit extended to depths between about 2.2 m to 2.6 m below ground surface (Elevations 432.8 m and 426.4 m).

The SPT ‘N’ values measured in the cohesive deposit range from about 4 blows to about 17 blows per 0.3 m of penetration, suggesting a firm to very stiff consistency.

The results of grain size distribution tests carried out on selected samples from this deposit are presented in Figure C6, in Appendix C. Atterberg limits tests were carried out on three samples from this deposit and measured liquid limits between about 14 per cent and 18 per cent, plastic limits between about 11 per cent and 13 per cent, and corresponding plasticity indices between about 3 per cent and 5 per cent. These results, which are plotted on a plasticity chart on Figure C7 in Appendix C, indicate that the fines within the deposit can be classified as silty clay-clayey silt of low plasticity to silt with slight plasticity.

The water content measured on selected samples of this deposit ranged from about 8 per cent to 17 per cent.

4.2.4 (CL-ML) Silty Clay to Clayey Silt Till

A deposit of silty clay to clayey silt till was encountered below the sand to silty sand in Boreholes BH21-1, BH21-4, BH21-5, BH21-6, BH21-11, BH21-17 and BH21-18, below the silty clay to silt with sand in Boreholes BH21-2, BH21-3, BH21-7 and BH21-16 and the topsoil in BH21-08. The till deposit was penetrated to depths between about 5.0 m to 9.6 m below ground surface (Elevations 428.3 m and 419.4 m). In Borehole BH21-8, the till deposit contained interlayers of silty sand approximately 1.3 m thick. All boreholes containing the glacial till were terminated within the till except Borehole BH21-18. Presence of cobbles and boulders in the till deposit was inferred during the field investigation due to auger grinding and difficulty advancing the boreholes.

The SPT ‘N’ values measured in the till deposit range from about 7 blows per 0.3 m of penetration to about 50 blows for 0.03 m of penetration, suggesting a firm to hard consistency.

The results of grain size distribution tests carried out on selected samples from this deposit are presented in Figure C8, in Appendix C. Atterberg limits tests were carried out on six samples from this deposit and measured liquid limits between about 14 per cent and 25 per cent, plastic limits between about 11 per cent and 13 per cent, and corresponding plasticity indices between about 3 per cent and 11 per cent. These results, which are plotted on a plasticity chart on Figure C9 in Appendix C, indicate that this deposit can be classified as silty clay of low plasticity to silt with slight plasticity.

The water content measured on selected samples of this deposit generally ranged from about 5 per cent to 16 per cent. One sample in Borehole BH21-8 was measured at about 32 per cent.

4.2.5 (SM) Silty Sand

A deposit of silty sand was found underlying the cohesive till in Borehole BH21-18. This deposit was penetrated to a depth of about 9.1 m (Elevation 418.1 m) before the termination of the borehole within the deposit.

The SPT ‘N’ value measured in this deposit was about 32 blows per 0.3 m of penetration, indicating a dense state of compactness.

The water content measured on one selected sample of this deposit was about 18 per cent.

4.3 Groundwater Conditions

Groundwater level measurements were recorded immediately following drilling procedures and are noted on the borehole records in Appendix B. The groundwater level monitored in the boreholes at the completion of drilling ranged from about 0.6 m to 7.3 m below ground surface.

As noted above, monitoring wells were installed in sixteen of eighteen boreholes to monitor the groundwater level at the site. Details of the monitoring well installations are shown on the borehole logs in Appendix B. Groundwater level readings following drilling and from the installed wells are provided below:

Table 1: Groundwater Levels

Borehole	Depth to Groundwater (m)	Elevation of Groundwater (m)	Date
BH21-1	1.5	424.8	March 25, 2021
	1.6	424.7	April 14, 2021
BH21-2	3.4	426.4	March 25, 2021
BH21-3	2.1	432.9	March 29, 2021
	0.4	434.6	April 14, 2021
BH21-4	0.6	426.1	March 30, 2021
BH21-5	0.6	428.1	March 30, 2021
	0.8	427.9	April 14, 2021
BH21-6	0.9	426.4	March 30, 2021
	0.4	426.9	April 14, 2021
BH21-7 (Deep Well)	3.0	426.0	March 30, 2021
	0.5	428.5	April 14, 2021
BH21-7 (Shallow Well)	3.0	426.0	March 30, 2021
	0.7	428.3	April 14, 2021
BH21-8	0.2	427.6	March 30, 2021
	0.0	427.8	April 14, 2021
BH21-9	7.3	425.1	March 22, 2021
	1.6	430.8	April 14, 2021
BH21-10	3.0	430.2	March 26, 2021
	0.6	432.6	April 14, 2021
BH21-11	1.5	427.2	March 31, 2021
	1.1	427.6	April 14, 2021
BH21-12	3.7	428.3	March 23, 2021
	0.5	431.5	April 14, 2021
BH21-13	7.3	421.8	March 23, 2021
	1.3	427.8	April 14, 2021
BH21-14	1.7	429.4	March 23, 2021
	0.2	430.9	April 14, 2021
BH21-15	3.8	428.7	March 24, 2021
	0.3	432.2	April 14, 2021

Borehole	Depth to Groundwater (m)	Elevation of Groundwater (m)	Date
BH21-16	0.6	428.9	March 31, 2021
	0.1	429.4	April 14, 2021
BH21-17	2.1	426.8	March 26, 2021
	0.5	428.4	April 14, 2021
BH21-18	1.2	426.0	March 29, 2021
	1.1	426.1	April 14, 2021

It should be noted that the groundwater level in the area is subject to seasonal fluctuations and precipitation events and should be expected to be higher during wet periods of the year.

5.0 GEOTECHNICAL ENGINEERING DISCUSSION

This section of the report provides preliminary geotechnical engineering recommendations on the geotechnical aspects of the proposed development based on our interpretation of the limited borehole information and on our understanding of the project scope and requirements. The information in this portion of the report is provided for the guidance of the design engineers and professionals.

Based on the results of this investigation, the subsurface soil conditions encountered at the site are considered to be generally suitable for the proposed residential development.

As noted above, at the time of this report, only preliminary information about the proposed design grades (i.e. footing elevations, pavement subgrade and utility invert levels) were available for the proposed development. The following engineering recommendations regarding the geotechnical design aspects of the project including underground services, pavements and building foundations should be considered as preliminary only, and should be reviewed when the design grades and utility invert levels have been finalized as part of the detailed design.

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.

This report addresses only the geotechnical (physical) aspects of the subsurface conditions at this site. The geo-environmental (chemical), hydrogeological, and archaeological aspects are discussed in separate reports, and are outside of the scope of this report. A hydrogeological assessment has been undertaken on the site for the purposes of providing a water budget and will be provided under separate cover.

5.1 Site Preparation

The existing site vegetation, surficial topsoil/organics, fill materials and other near surface soils containing organic matter are not considered to be suitable for the subgrade support of building foundations and/or engineered fill materials and should be completely stripped from the site prior to placing any engineered fill. In addition, any below - grade features associated with the existing buildings at the site (e.g. foundations, services etc.) should also be removed prior to engineered fill placement.

The surficial topsoil deposit encountered at the borehole locations ranged from 50 mm to 700 mm in thickness but was generally about 300 m thick. The upper portion of the near-surface native soils below the topsoil layer were noted to be organic stained and to contain organic materials (e.g. roots). In this regard, portions of these stained materials containing organic matter would also need to be removed prior to engineered fill placement. For estimating purposes, it is recommended that an allowance be included for stripping a thickness of approximately 50 mm of these materials in addition to the complete removal of the overlying topsoil. The actual amount of stripping of the organic-stained soils will need to be determined at the time of construction. The stripping activities should be monitored by qualified geotechnical personnel to confirm that the extent of removal of surficial soils containing organics is suitable for the project requirements.

Following the stripping of the topsoil, existing fill material and soils containing organics and/or soft/disturbed surficial soils, the exposed subgrade materials should be proofrolled with a heavy roller in conjunction with an inspection by qualified geotechnical personnel to confirm that the exposed soils are native, undisturbed and competent, and have been adequately cleaned of ponded water and all disturbed, loosened, softened, organic and other deleterious material. Remedial work (i.e. further sub-excavation and replacement) should be carried out on poorly performing areas identified during the proofrolling activities as directed by geotechnical personnel.

Due to the relatively shallow groundwater levels noted during the field investigation, it is likely that removal of the surficial soils will result in large amounts of ponded water and over-saturated conditions of the subgrade. Consideration should be given to performing this task during a relatively dry time of year to mitigate this difficulty.

Complete removal of any existing septic systems, wells, old foundations, etc. would also be required as part of the site redevelopment.

Any filling carried out at the site in conjunction with regrading should be carried out as engineered fill procedures, as outlined in Section 5.1.2 of this report.

5.1.1 Topsoil Stripping and Reuse

The following geotechnical comments are provided regarding organic and topsoil stripping and reuse at the site:

- As noted above, surficial vegetation and topsoil should be stripped from the proposed development area.
- Consideration may be given to selective stripping operations, consisting of road allowances and building envelopes (including driveways).
- Outside of road allowances and building envelopes, topsoil, if encountered, may be buried and/or reused as general lot fill to raise grades. The primary factor controlling methane generation is the organic carbon content of the topsoil. The loss on ignition (LOI) test provides an indication of the organic carbon content of the sample. If topsoil is to be reused as general lot fill to raise grades, then LOI testing should be carried out and further recommendations provided by the geotechnical engineer in regard to the reuse of topsoil and the potential for methane generation.
- Where low organic content material (trace organics) is used as general lot fill, its thickness should be limited to about 0.6 m. The trace organics fill should be placed in maximum 300 mm loose lifts and uniformly compacted to 95 percent of standard Proctor maximum dry density. To have any success in placing topsoil as lot grading fill, it must be placed at or very close to its optimum water content to achieve workability and adequate compaction, in order to minimize post-construction settlements and/or lateral movements (e.g. of fences, etc.).

5.1.2 Engineered Fill Requirements

Based on the latest grading plan provided by R.J. Burnside & Associates Ltd. (January 21, 2022), the anticipated site grading activities will include both minor cutting and raising (filling) the original grade to meet the final design site grades. At the time of this report, the design cut and fill depths provided indicate that the site will largely require imported material to fill to design grade, generally between about 0.1 m and 2.0 m, with the greatest fill depth being approximately 3.0 m, near the north east section of the SE Site. It is estimated that the existing native materials subjected to up to 3.0 m of additional fill may experience settlement up to about 20 mm and will be differential relative to other areas subjected to smaller fill loads. The settlement would be greatest near the thickest sections of the newly loaded areas and reduce to negligible amounts near the edges of the new fills. The time to complete 90% consolidation settlement in these areas due to the additional filling is estimated to be on the order of two to three months.

In general, the existing native soils are considered to be acceptable for reuse as engineered fill. Based on the laboratory test results, the water content of soils present at the site are considered to be generally above their optimum water contents for compaction, and therefore will likely require drying prior to placement.

It should be noted that much of the native materials at the site are silty/clayey in nature, and as such are susceptible to over-wetting and subsequent freezing during inclement weather which should be considered before being carried out during late fall, winter, early spring seasons or any periods of inclement weather conditions. All oversized cobbles (i.e. greater than 150 mm in size) and boulders, if present, should be removed from excavated material that will be used as engineered fill material.

It is anticipated that imported material will be required for the engineered fill process, the material that is proposed for use as engineered fill should be approved by the geotechnical engineer at its source, prior to importing the material to the site. Suitable soils, free of topsoil, organic matter or other deleterious materials can be used as engineered fill provided that the water content of the soil at the time of placement does not vary by more than 2 percent above or below its optimum water content for compaction. Otherwise, the soils may require treatment (i.e., drying or wetting) prior to placement.

Following the inspection and approval of the subgrade as described previously in this report, engineered fill materials should be placed in maximum 300 mm-thick loose lifts and uniformly compacted to 98 percent of the Standard Proctor maximum dry density (SPMDD). Filling should continue until the design elevations are achieved.

Full-time monitoring and in-situ density testing should be carried out by Golder during placement of engineered fill.

The final surface of the engineered fill should be protected as necessary from construction traffic and should be sloped to provide positive drainage for surface water during the construction period. If the engineered fill materials will be left exposed (i.e. uncovered) during periods of freezing weather, additional soil cover should be placed above final subgrade to provide some level of frost protection. Prior to placing the granular subbase and/or base courses within pavement areas, the surface of the engineered fill/subgrade should be inspected by Golder.

5.2 Installation of Underground Services

5.2.1 Temporary Excavations

Based on the Conceptual Underground Servicing Plan prepared by Burnside (dated January 21, 2022), the maximum depth of the underground services is at about 6.9 m below the existing ground surface, with the exception of the proposed wet well at the pumping station, the depth of which will be confirmed at detailed design, but is assumed to be at about 14 m below ground surface. Once detailed design is completed, review of the underground services should be completed by this office for compliance with the recommendations contained herein. Additional boreholes should be completed as part of the detailed geotechnical investigation to support the detailed design of the underground services, including at the proposed pumping station location.

The founding soils are anticipated to generally consist of the native sand to silty sand, silty clay or glacial till. These materials are considered to be suitable for supporting the underground services provided that the integrity of the base of the trench excavations is maintained during construction. Where softened or disturbed native soils or other deleterious materials are encountered at the base of excavations for settlement-sensitive services, these materials should be subexcavated and replaced with compacted fills approved by the geotechnical engineer.

Care should be taken to direct surface water away from any open excavations and all temporary excavations should be carried out in accordance with the Occupational Health and Safety Act (OHSA) and Regulations for Construction Projects.

As described above, the site soils typically consist of cohesionless soils varying in composition from sand to silty sand underlain by deposits of silty clay to clayey silt and silty clay to clayey silt glacial till. Based on the initial measurements of water levels within the piezometers and monitoring wells, the groundwater level at the SE site varies greatly throughout the site but is anticipated to be at depths less than 1.5 m below finished ground surface, especially in the eastern portion of the SE Site (i.e. in the vicinity of Boreholes BH21-4, BH21-5, BH21-6, BH21-8 and BH21-16) where seepage was encountered at relatively shallow depths during drilling.

Groundwater seepage through the clayey silt till deposits is anticipated to be minor and can probably be handled by pumping from properly constructed and filtered sumps located within the excavations. For excavations that extend nominally into the wet cohesionless soils (i.e. to depths of less than 0.5 m below the water table/perched water table), groundwater seepage may also be controlled with the use of sumps and pumps. For deeper excavations that will extend below the groundwater table (i.e. excavations extending more than about 0.5 m below the water level), significant groundwater inflow into the excavations may be expected and there is a potential for sloughing of excavation sideslopes and/or disturbance/boiling of the base of the excavations. In order to reduce the potential for instability of the sidewalls and base of the excavation in these areas, an external groundwater control system (e.g. well point or eductor dewatering systems) is recommended to sufficiently lower the groundwater level in the granular deposits (e.g. to a level a minimum of 0.5 m below the base of the excavation) before the excavation is carried out. The dewatering system should be designed and installed by a specialist dewatering company.

The generally loose to compact sandy soils and firm to stiff clayey soils are classified as “Type 3” soils and very stiff to hard native till soils are classified as a “Type 2” soils under the OH&S Act provided the groundwater level is adequately controlled/lowered to below the base of the excavation. As such, all conventional temporary trench excavations should consist of open cuts with side slopes not steeper than 1 horizontal to 1 vertical in the overburden soils. Where engineered fill (based on silty clay material) is used or the native soil deposits exhibit

signs of water seepage or soft to firm consistency, the soil is classified as a “Type 3”, as such all conventional temporary trench excavations should consist of a gradient of 1 horizontal to 1 vertical.

Where the side slopes of excavations are required to be steepened to limit the extent of the excavation, then some form of trench support may be required. Some trench excavations could be carried out using a vertically-excavated, unsupported excavation (using a properly-engineered trench liner box for protection, certified by an experienced engineer); or by a supported (sheeted) excavation if conditions warrant so; such as in wet areas and/or in close proximity to adjacent underground services

5.2.2 Pipe Bedding and Cover

The bedding for the sewers and watermains should be compatible with the size, type and class of pipe and the surrounding subsoil and the requirements of the Township of Centre Wellington. If granular bedding is deemed to be acceptable, then Ontario Provincial Standard Specifications (OPSS) Granular A should be used from at least 150 mm below invert of the pipe to the springline. Clear stone should not be used as bedding material. From springline to 300 mm above the obvert of the pipe, sand cover could be used. All bedding and cover material should be placed in 150 mm loose lifts and uniformly compacted to at least 100 percent of SPMDD. Where variable fill materials, softened or disturbed native soils or other deleterious materials are encountered at the base of excavations for settlement-sensitive services, these materials should be subexcavated and replaced with compacted fills approved by the geotechnical engineer.

5.2.3 Trench Backfill

The excavated materials from the site will consist predominantly of either silty sand or clayey silt with sand. Based on the measured water contents, in general, the native materials encountered at the site are estimated to be above their optimum water contents for compaction, and therefore, will probably require drying prior to placement.

Care should be taken to maintain the water content of the soils close to/at the optimum water content for compaction during the construction operations. Soils that contain significant quantities of organics or construction debris are also not suitable for use as trench backfill within settlement-sensitive areas. In addition, all boulders and cobbles greater than 150 mm in size should be removed from the trench backfill materials. If there is a shortage of suitable in-situ material, an approved imported material such as Ontario Provincial Standard Specifications Select Subgrade Material should be used for trench backfill. Again, as noted above, the trench backfill materials are silty/clayey in nature and are very susceptible to wetting/freezing temperatures and the timing for construction should take this into account.

Trench backfill should be placed in maximum 300 mm loose lift thickness and uniformly compacted to at least 98 percent of the SPMDD of the material. Soil that is frozen should not be used as backfill.

Normal post-construction settlement of the compacted trench backfill should be anticipated with the majority of such settlement taking place within about 6 to 12 months following the completion of trench backfilling operations. If the trench backfill operations are completed during the winter months, post-construction settlements may increase beyond typical anticipated values. These settlements will be reflected at the ground surface. If the asphalt binder course is laid shortly following the completion of the trench backfilling operations, any settlement that may be reflected by subsidence of the surface of the binder asphalt should be compensated for by placing an additional thickness of binder asphalt or by padding. If possible, the surface course asphalt should not be placed over the binder course asphalt for about 12 months. Where scheduling requires that the surface course be placed

over the binder course asphalt before this period, trench backfill settlement would be reflected by subsidence and possible cracking of the finished pavement surface in these areas which, depending upon the extent and magnitude, may require local repairs.

5.2.4 Sanitary Pumping Station

Based on the most recent information received from the design team (Conceptual Underground Servicing Plan prepared by R.J. Burnside & Associates Ltd. dated January 21, 2022) the proposed development includes a 20 m long by 20 m wide sanitary pumping station between Boreholes BH21-04 and BH21-18. The sanitary pumping station has a proposed invert depth of about 7.2 m (Elevation 422.21 m) for a pipe connecting to the station. The base elevation is to be determined during detailed design.

Once the location of the pumping station and elevation of the underside of the holding tank are finalized, an additional borehole should be advanced in the vicinity of the pumping station to confirm the soil and groundwater conditions throughout the full depth.

The subsurface soil conditions encountered at Boreholes BH21-04 and BH21-18 indicate generally loose granular deposits of silt sand and gravel from surface to about 2.1 m to 2.5 m depth and stiff to hard silt to silty clay till to about 7.2 m depth, underlain by dense silty sand to the bottom of Borehole BH21-18 at about 9.1 m below ground surface. The water level in this area of the site was measured to be about 1 m below existing ground surface.

Unsupported excavations will require side slopes of 1 horizontal to 1 vertical as the upper soils would be classified as Type 3 soils under OHSA.

Subject to further review during the detailed design geotechnical investigation, it is anticipated that the relatively thin upper sand deposits present below the current groundwater table are discontinuous and upon excavation may drain relatively quickly. The upper sand layers are located below the current groundwater table and consideration should be given to either dewatering the sand deposits or construction of a groundwater cut-off system surrounding the excavation throughout the depth of the sand deposits. The glacial till is not expected to yield significant groundwater volumes, but may contain undetected water-bearing sand deposits. As noted earlier, the groundwater conditions in the area of the proposed wet well are not fully understood, and as such additional boreholes and test pits are recommended prior to installation.

For preliminary planning purposes, factored geotechnical soil resistance at ultimate limit states (ULS) of 225 kPa and a geotechnical soil reaction at serviceability limit states (SLS) of 150 kPa (for a total settlement of 25 m) may be used at a depth of about 10 m below the existing grade. As the pumping station will extend below the groundwater table, the potential for hydrostatic uplift and the need for waterproofing should be considered in its design.

5.3 Building Foundations

As previously indicated, the existing site vegetation, surficial topsoil/organics and other near-surface soils containing significant amounts of organic matter are not considered to be suitable for the subgrade support of engineered fill, building foundations, floor slabs, or other settlement sensitive structures. These materials should be completely stripped prior to placing any engineered fill or construction of foundations or interior or exterior slab-on-grades.

Based on the subsurface conditions encountered in the boreholes, strip and spread footings may be used, provided that the footings are founded on the native till deposits or on engineered fill (based on existing site soils)

placed in accordance with the recommendations outlined in Section 5.2.2, and maintained a minimum depth of soil embedment below finished adjacent ground surface and top of slab of 1.4 m.

For such strip and spread footings founded on native till or engineered fill, a factored geotechnical resistance at Ultimate Limit States (ULS) of 250 kPa and a geotechnical reaction at Serviceability Limit States (SLS) of 150 kPa may be assumed for design purposes, provided that the strip footings dimensions of 1.0 m in width or spread footings have a minimum width of 0.6 m and a maximum width of 1.0 m.

In general, for any houses placed wholly or in part on engineered fill, it is recommended that the foundations be provided with nominal reinforcement, consisting of reinforcing steel at the top and bottom of the foundation walls. However, once the final thicknesses and extent of engineered fill are known, the need for and design of any reinforcement can be determined on a lot-by-lot basis by the builder's structural engineer, in consultation with Golder.

The near surface firm to stiff silty clay and loose to compact silty sand deposits have variable SPT 'N' values. In general, the competency of these materials are considered to be not suitable for support of building foundations, floor slabs, or other settlement sensitive structures. This is particularly notable near the southeast corner of site. In any areas where the design calls for founding of structural elements at an elevation above the glacial till deposits, the surficial loose to compact, or soft to firm material should be reviewed by a geotechnical engineer through a proof-rolling operation and if required, removed and replaced with engineered fill. This can be done by constructing a pad of engineered fill below the founding element, extending at least 1 m beyond the edges of the footing, then outward and downward at 1H:1V. As an alternative, these near surface soils could be further evaluated through an additional test pit investigation.

All exterior footings, and interior footings in unheated areas, should be founded at a minimum depth of 1.4 m below finished grade level in order to provide adequate protection against frost penetration.

Where spread footings are constructed at different elevations, the difference in elevation between the individual footings should not be greater than one half the clear distance between the footings. In addition, the lower footings should be constructed first so that if it is necessary to construct the lower footings at a greater depth than anticipated, the elevation of the upper footings can be adjusted accordingly. Stepped strip footings should be constructed in accordance with the 2012 Ontario Building Code, Section 9.15.3.8.

The perimeter house basement walls should be backfilled with a free draining, non-frost susceptible granular material carefully placed and compacted in lifts and should be designed using a lateral earth pressure coefficient of 0.5 and a unit weight of backfill of 21 kN/m^3. Alternatively, where site excavated material is to be reused for backfill, an approved geocomposite drainage system should be used directly against the wall. The upper 0.3 m of backfill should be clayey material to provide a relatively impermeable cap and should be sloped away from the house.

The native soils are susceptible to disturbance from construction activity, especially during wet or freezing weather. Care should be taken to preserve the integrity of the materials as bearing strata. It is essential that the founding surface for the footings be inspected by qualified geotechnical personnel prior to placing concrete. If the concrete for the footings cannot be placed immediately after excavation and inspection of the subgrade, it is recommended that a working mat of lean concrete be placed in the excavation to protect the integrity of the bearing stratum.

Resistance to lateral forces/sliding resistance between the concrete footings and the subgrade should be calculated in accordance with Section 6.7.5 of the CHBDC. The unfactored coefficient of friction, tan δ, for the interface between the cast-in-place concrete footing and the properly prepared subgrade can be assumed to be 0.35.

5.4 Seismic Site Classification

Seismic hazard is defined in the 2012 Ontario Building Code (OBC) by uniform hazard spectra (UHS) at spectral coordinates of 0.2 second, 0.5 second, 1.0 second 2.0 seconds, 5.0 seconds and 10.0 seconds and a probability of exceedance of 2% in 50 years. The OBC method uses a site classification system defined by the average soil/bedrock properties (e.g. shear wave velocity, Standard Penetration Test (SPT) resistance, undrained soil shear strength, etc.) in the 30 m below the foundation level. There are six site classes from A to F, decreasing in ground stiffness from A, hard rock, to E, soft soil; with site class F used to denote problematic soils (e.g. sites underlain by thick peat deposits and/or liquefiable soils). The site class is then used to obtain acceleration and velocity-based site coefficients F_a and F_v; respectively, used to modify the UHS to account for the effects of site-specific soil conditions in design.

Based on the results of the preliminary geotechnical investigation and assuming soils below the maximum depth investigated exhibit similar properties / strengths, a Site Class C is estimated for planning purposes. The Site Class will need to be verified, and adjusted as necessary, once the final footing elevations have been determined during detail design.

5.5 SWM Pond Excavations and Recommendations

A SWM pond is proposed in the vicinity of Boreholes BH21-4 and BH21-18. As only preliminary pond designs have been prepared to date, the following comments and recommendations are general in nature, should be considered to be preliminary and are provided to assist in the preliminary design and location of the pond. Once the pond design is more advanced during detailed design, the recommendations should be revised and updated as appropriate along with additional investigatory field work carried out as needed.

The SWM pond is situated in the general vicinity of Boreholes BH21-4 and BH21-18. The subsurface soil conditions encountered in these boreholes consist of interlayered deposits of sand and gravel, sandy silt, silt and sand, and clayey silt to a depth of about 2.1 m to 2.6 m below ground surface, underlain by a glacial till deposit ranging in composition from silty clay to silt of slight plasticity. The groundwater level measured in the monitoring well installed in BH21-18 was at depths between about 1.1 m and 1.3 m below ground surface (Elevation 426.2 m to 426.0 m). The current SWM Pond Plan (Burnside Figure 7, dated January 21, 2022) indicate that the pond berm crests/access road will be at about Elevation 428.2 m. The elevation of the base of the SWM pond is proposed to be at about Elevation 424.6 m with a permanent pool operating level at about 426.1 m (i.e. about 1.5 m depth of water under normal operating conditions).

- Based on the recorded groundwater elevations in this area of the site and the design operating level it is anticipated that a pond liner may not be required for normal operating conditions. However, additional analysis (and possibly additional shallow investigation within the pond footprint) will be required to determine if a liner will be required for dewatering purposes to either ensure pump-out of the pond is possible for maintenance, or to maintain the stability of the base of the pond during dewatering.

- Any constructed berms around the pond should have a top width of at least 3 m to allow access by maintenance vehicles. The material used to construct the berms should be approved by the geotechnical engineer prior to placement. In this regard clayey silt and silty clay materials excavated to construct the ponds would be suitable for reuse provided they are at suitable moisture content. The natural water content of the clayey silt and silty clay is above the estimated optimum water content for compaction. The approved material used to construct berms should be placed in maximum 300 mm loose lifts and uniformly compacted to at least 98 per cent of the standard Proctor maximum dry density. Strict control over placement water content of the material will be necessary. In this regard some drying of the excavated soils will likely be required. Care should be taken to ensure homogeneity of the constructed berm (i.e. no erodible layers). Higher conductivity soils (i.e. sandy soils) should be removed from the footprint of the berm. The prepared foundation for the berm should be inspected by the geotechnical engineer prior to placement of berm fill material. A key trench, a minimum of 0.6 m deep and 2 m wide, keyed into the native silty clay to clayey silt site soils, should be provided along the full length of the constructed berm in order to provide a cut-off to water seepage under the base of the berm.
- Pond side slopes are proposed to be constructed above and below the permanent water level in the pond at about 5 horizontal to 1 vertical (5H:1V). Slope stability analysis of the proposed slope geometry has been carried out and indicate that the Factor of Safety against global instability is greater than 1.5 for the long term and 1.3 for short term conditions. These Factors of Safety are considered to be adequate for the proposed pond geometry.
- The pond base soils are susceptible to disturbance by heavy construction equipment which could affect trafficability during construction, especially during wet weather or where seepage is encountered.
- Cut side slopes of the ponds should be inspected by the geotechnical engineer during construction. Where erodible seams (e.g. sand or silt seams) are encountered, some form of blanketing, flattening of the slope angles or the like may be required. The need for and the design of any blanketing or other remedial measures should be determined during construction by the geotechnical engineer.
- The ponds should be equipped with an emergency spillway or similar structure(s) designed to eliminate the possibility of over-topping of the berms.
- Where pipes enter or exit the pond, they should be provided with a concrete collar and be backfilled with a relatively impermeable material (e.g. clayey silt or silty clay) to minimize preferential flow through the pipe bedding and backfill and possible loss of ground. Pipes entering or exiting the pond should be sized and designed to allow for cleaning. The exposed end of the riser portion should be provided with a protective wire mesh or the like to prevent unauthorized access (e.g. by children).
- Regular inspection by the geotechnical engineer should be carried out during the pond construction. The final pond side slopes should be sodded or otherwise treated to reduce erosion. Maintenance will be required until the vegetative mat has taken root.

Further comments on the design and construction of the ponds, including the requirements for a pond liner to be constructed, will be provided once the design details are finalized. Additional boreholes and / or test pits may be required in order to finalize the design of the ponds and provide sufficient geotechnical engineering recommendations for the design and construction of the proposed ponds.

6.0 OBSTRUCTIONS

The soils at this site are glacially derived and as such should be expected to contain cobbles and boulders, which could affect excavation for basements and services. The contractor should be made aware of the potential presence of cobbles and/or boulders within the overburden soils. As noted previously in this report, the presence of cobbles and boulders has been inferred from observations during borehole drilling. The borehole drilling method, without coring of boulders and the random distribution of boulders, does not permit measurement of the size of the cobbles and boulders nor an estimate to be made of the quantity (overall volume) of these materials. Should this information be required during the design and tender processes, further investigation would be required to determine the percentage and dimensions of the cobbles and boulders. It is recommended that test pits be excavated for this purpose, with the limitation that conditions will vary between test pit locations and the location of the basements and underground services.

7.0 INSPECTION AND TESTING

During construction, full-time observation should be carried out during engineered fill and site servicing backfill placement, and sufficient foundation inspections, subgrade inspections and in-situ materials testing should be carried out to confirm that the conditions exposed are consistent with those encountered in the boreholes and to monitor conformance to the pertinent project specifications.

8.0 CLOSURE

We trust that this preliminary report provides enough preliminary geotechnical engineering information to proceed with the detailed design of the proposed development. 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

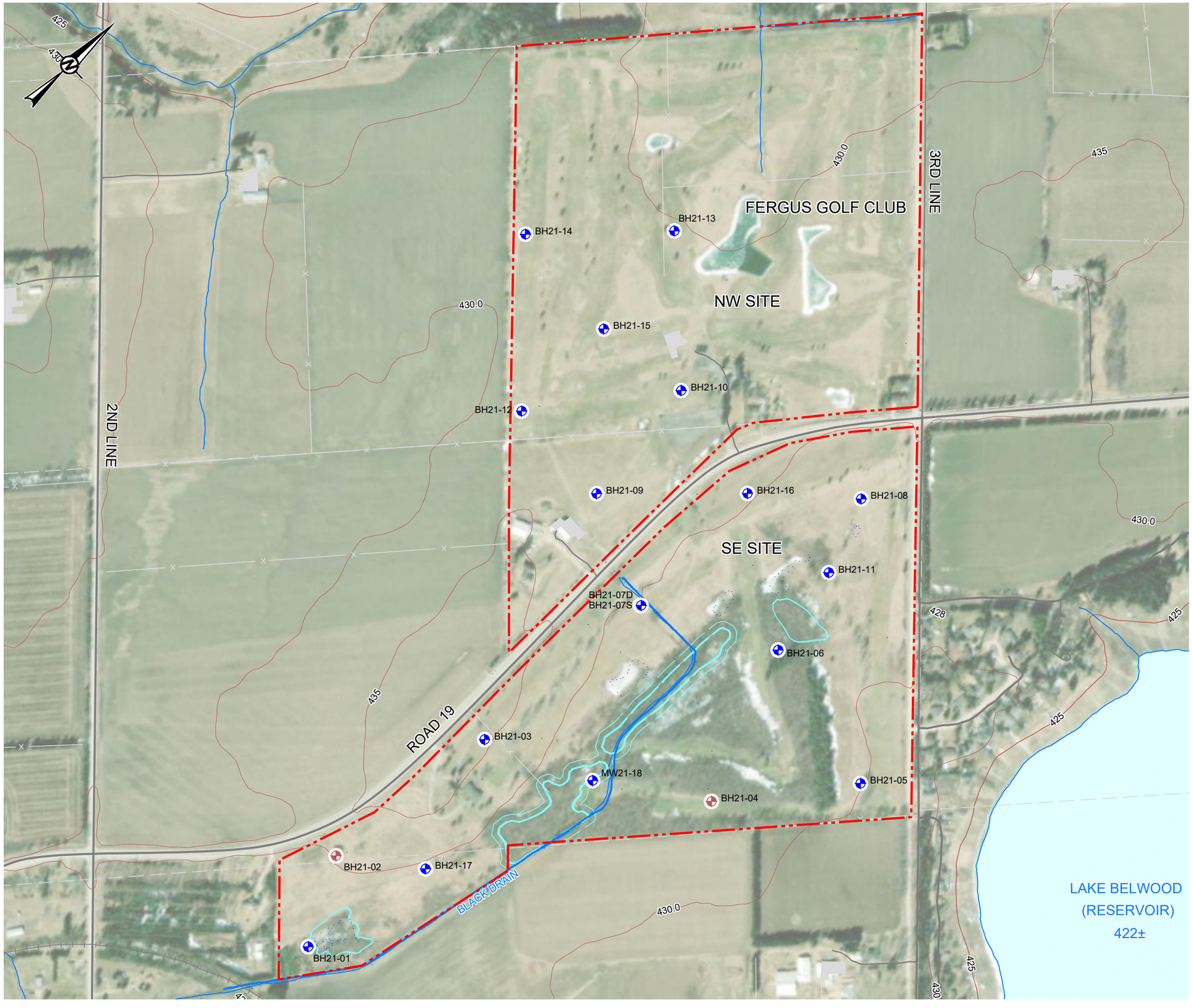
Yours truly,

Golder Associates Ltd.

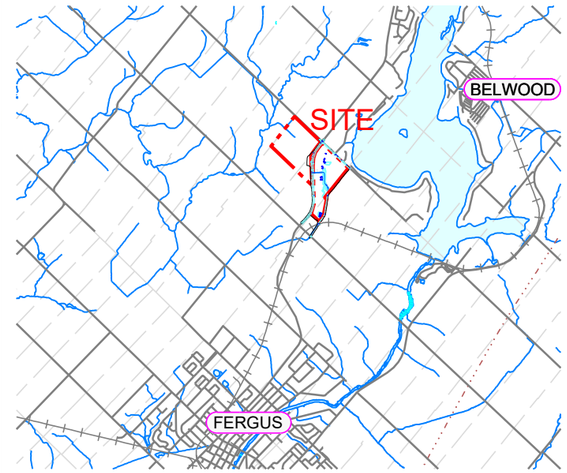
Matthew Kelly, P. Eng.
Senior Geotechnical Engineer

Jeff Tolton, C.E.T.
Associate, Senior Geotechnical Technologist

EN/MK/JT/en/sv



REGIONAL KEY PLAN 1:100,000



PLAN LEGEND

- PROPERTY BOUNDARY
- GEOTECHNICAL TEST BOREHOLE
- GEOTECHNICAL BOREHOLE WITH MONITORING WELL

REFERENCES & DISCLAIMERS

BASE IMAGERY - SOURCE: ESRI, MAXAR, GEOEYE; GIS USER COMMUNITY.

ALIGNMENT OF ORTHOGRAPHIC IMAGERY IS APPROXIMATED TO SELECT FEATURES ON DATUM. AWAY FROM POINTS OF ALIGNMENT THE ORTHOGRAPHIC IMAGE MAY BE DIMENSIONALLY SKEWED OR PROJECTED OFF THE MAP DATUM PLANE.

0 120 240 360 m

1:6000

PLOTTED 11X17" TABLOID

PROJECTION IS UTM NAD 83 ZONE 17

CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
GEOTECHNICAL INVESTIGATION

TITLE
SITE BOREHOLE PLAN

CONSULTANT
GOLDER

YYYY-MM-DD	2022-02-04
DESIGNED	
PREPARED	JPR
REVIEWED	
APPROVED	MK

PROJECT NO.	CONTROL	REV.	FIGURE
21456909	0001	----	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25 mm

0

Path: \\golder.gds\comp\lexdata\office\Ontario\SIM\Client\aGeranium\Fergus_GolfNorth_Properties\99_PROJ\21456909\40_PROD\0001_Geotech\ | File Name: 21456909-0001-BG-0002.dwg | Last Edited By: jregier Date: 2021-05-12 Time:11:09:58 AM | Printed By: JRegier Date: 2022-02-04 Time:9:10:57 AM

APPENDIX A

Important Information and Limitations of This Report

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.

APPENDIX B

Method of Soil Classification

Abbreviations and Terms used on Records of Boreholes and Test Pits

List of Symbols

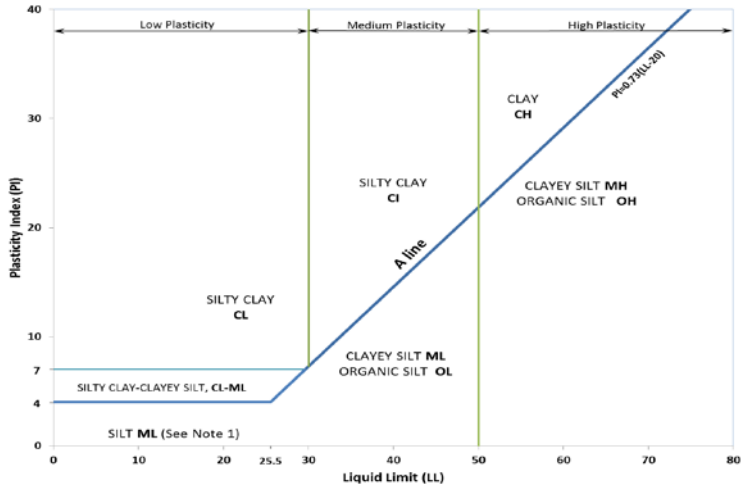
Record of Boreholes BH21-1 to BH21-18

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.). Values reported are as recorded in the field and are uncorrected.

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
GS	Grab Sample
MC	Modified California Samples
MS	Modified Shelby (for frozen soil)
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size (Shelby tube)
TP	Thin-walled, piston – note size (Shelby tube)
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 to 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 the effects of overburden pressure.
2. Definition of compactness terms are based on SPT 'N' ranges as provided in Terzaghi, Peck and Mesri (1996). Many factors affect the recorded SPT 'N' value, including hammer efficiency (which may be greater than 60% in automatic trip hammers), overburden pressure, groundwater conditions, and grainsize. As such, the recorded SPT 'N' value(s) should be considered only an approximate guide to the soil compactness. 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 = $(w_l - w_p)$
NP	non-plastic
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: 21456909

RECORD OF BOREHOLE: BH21-1

SHEET 1 OF 1

LOCATION: N 4843275.90; E 551475.50

BORING DATE: March 25, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		426.33							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (200 mm)		0.00 / 426.13	1A	SS	5				
		(OH) ORGANIC SILT; brown; non-cohesive, moist, loose		0.20 / 425.65	1B						
		(SP) SAND, some gravel to gravelly; black to brown; non-cohesive wet, compact to very dense		0.68	2	SS	16				
1											
					3	SS	12		○	MH	▽ April 14, 2021
2											Bentonite
					4	SS	12				
3					5A				○		
		(CL) SILTY CLAY, some gravel with silty sand seams; grey (TILL); cohesive, w<PL, hard - Auger grinding at 3.7 m		422.95 / 3.38	5B	SS	43		○		
4					6	SS	57				
					7	SS	50/ 0.10		○		Sand
5											Screen
6					8	SS	81/ 0.28				
				419.80							
		END OF BOREHOLE		6.53							
7		NOTES: 1. Groundwater measured at 1.5 m below ground surface upon completion of drilling. 2. Groundwater measured at 1.56 m below ground surface on April 14, 2021.									
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: EN

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-2

SHEET 1 OF 1

LOCATION: N 4843404.00; E 551401.70

BORING DATE: March 25, 2021

DATUM:

DRILL RIG: Geoprobe

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 WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		429.80							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (50 mm)		429.71 0.09	1A						
		(SM) SILTY SAND, some clay, some gravel, trace organics; brown; non-cohesive, moist, loose		0.09	1B	SS	9		○		
				428.97	2A	SS	8				
1		(CL) SILTY CLAY, some sand, some gravel; brown; cohesive, w<PL, firm		0.83	2B				○		
					3	SS	8		○		
2				427.59							
		(CL) Sandy SILTY CLAY, some gravel, sand seams; brown (TILL); cohesive, w<PL, very stiff to hard		2.21	4	SS	22				
3					5	SS	54		○ ⊢	MH	▽ March 25, 2021
4					6	SS	50/ 0.23				
					7	SS	69		○		
5											
6					8	SS	50/ 0.13				
				423.42							
		END OF BOREHOLE		6.38							
7		NOTE: 1. Groundwater measured at 3.4 m below ground surface upon completion of drilling.									
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: EN

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-3

SHEET 1 OF 1

LOCATION: N 4843696.30; E 551427.00

BORING DATE: March 29, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m
0		GROUND SURFACE		434.96			
	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (250 mm)		0.00 / 434.71	1A		
		(OH) Sandy ORGANIC SILT, some gravel; non-cohesive, moist, loose		0.25	1B	SS	1
				434.05	2A	SS	7
1		(CL-ML) SILTY CLAY-CLAYEY SILT, trace sand to sandy, some gravel; brown; cohesive, w<PL, firm		0.91	2B		
					3	SS	5
2		- Auger grinding between 2.1 m and 3.4 m		432.75			
		(CL) SILTY CLAY, trace sand to sandy, some gravel; brown to grey (TILL); cohesive, w~PL to w<PL, very stiff to hard		2.21	4	SS	29
3					5	SS	50/ 0.03
4					6	SS	50/ 0.13
5					7	SS	50/ 0.15
6					8	SS	30
				428.25			
7		END OF BOREHOLE		6.71			
8		NOTES: 1. Groundwater measured at 2.13 m below ground surface upon completion of drilling. 2. Groundwater measured at 0.4 m below ground surface on April 14, 2021.					
9							
10							

SAMPLES

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: MH

PIEZOMETER OR STANDPIPE INSTALLATION

GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

April 14, 2021

Bentonite

Sand

Screen

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: EN

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-4

SHEET 1 OF 1

LOCATION: N 4843888.70; E 551737.90

BORING DATE: March 30, 2021

DATUM:

DRILL RIG: Geoprobe

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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		426.73							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (300 mm)		0.00	1A						
				426.43		SS	4				
		(SM/ML) SILT and SAND, trace gravel; brown; non-cohesive, moist to wet, loose		0.30	1B						▽ March 30, 2021
1					2	SS	8		○	MH	
					3	SS	6				
2				424.62							
		(CL) SILTY CLAY, trace sand to Sandy, trace to some gravel; grey (TILL); cohesive, w~PL to w<PL, stiff to very stiff		2.11	4	SS	8		○		
3					5	SS	20				
4					6	SS	29				
					7	SS	20		○	MH	
5				421.55							
		END OF BOREHOLE		5.18							
6		NOTE: 1. Groundwater measured at 0.6 m below ground surface upon completion of drilling.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: EN

CHECKED: MWK

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-5

SHEET 1 OF 1

LOCATION: N 4844077.10; E 551875.60

BORING DATE: March 30, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		428.71							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (150 mm)		0.00	1A	SS	2				Bentonite
		(SM) SILTY SAND, trace gravel, trace organics; brown; non-cohesive, moist, very loose to loose		0.15	1B				○		
				427.80	2A	SS	7				April 14, 2021 Sand
1		(SM/ML) SILT and SAND, trace gravel; brown; non-cohesive, wet, loose to compact		0.91	2B						
					3	SS	7		○	MH	
2					4	SS	10				Screen
3		- gravel seam at 3.45 m			5A				○		
				425.21	5B	SS	10				
		(CL) CLAYEY SILT, trace sand, trace gravel; brown to grey (TILL); cohesive, w~PL to w<PL, stiff to very stiff		3.50	6	SS	20				Sand
4					7	SS	16		○		
5				423.53							
		END OF BOREHOLE		5.18							
6		NOTES:									
		1. Groundwater measured at 0.6 m below ground surface upon completion of drilling.									
		2. Groundwater measured at 0.76 m below ground surface on April 14, 2021.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: EN

CHECKED: MWK

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-6

SHEET 1 OF 1

LOCATION: N 4844124.90; E 551636.50

BORING DATE: March 30, 2021

DATUM:

DRILL RIG: Geoprobe

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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		427.33							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (150 mm)		0.00	1A						
		(SP) SAND, some silt; brown; non-cohesive, moist to wet, loose to compact		0.15	1B	SS	4		W		April 14, 2021
1					2	SS	13				Bentonite
2					3	SS	15		W	MH	
				424.89	4A	SS	20				
		(SM) SILTY SAND; brown; non-cohesive, wet, compact		2.44	4B						
3				424.36							Screen
		(CL) Sandy SILTY CLAY, some gravel with sand seams; grey (TILL); cohesive, w<PL, firm to stiff		2.97	5A	SS	9				
					5B				W		
4					6A						
					6B	SS	7		W	MH	
5				422.15	7	SS	7				
		END OF BOREHOLE		5.18							
6		NOTES:									
		1. Groundwater measured at 0.9 m below ground surface upon completion of drilling.									
		2. Groundwater measured at 0.41 m below ground surface on April 14, 2021.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: MWK

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

LOCATION: N 4844015.70; E 551439.30

RECORD OF BOREHOLE: BH21-7

SHEET 1 OF 2

BORING DATE: March 30, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		428.99							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (75 mm)		0.00	1A						
		(CL-ML) SILTY CLAY-CLAYEY SILT with SAND, some gravel; brown; cohesive, w<PL, firm to stiff		0.07	1B	SS	4				Bentonite; April 14, 2021 (D); April 14, 2021 (S)
1					2	SS	6		W	MH	Sand
					3	SS	9				
2					4A	SS					Screen
				426.39		SS	37				
		(CL-ML) Sandy SILTY CLAY-CLAYEY SILT, some gravel; brown to grey (TILL); cohesive, w<PL, hard		2.60	4B						
3					5	SS	64		W	MH	
4					6	SS	67				
					7	SS	100/ 0.25				Bentonite
5											
6					8	SS	78				
7											Sand
					9	SS	80/ 0.18				
8											Screen
9					10	SS	67				Sand
				419.39							
		END OF BOREHOLE		9.60							
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: EN

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-7

SHEET 2 OF 2

LOCATION: N 4844015.70; E 551439.30

BORING DATE: March 30, 2021

DATUM:

DRILL RIG: Geoprobe

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. + 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 / GRAIN SIZE DISTRIBUTION (%)
		--- CONTINUED FROM PREVIOUS PAGE ---									GR SA SI CL
10		NOTES: 1. Groundwater measured at 3.0 m below ground surface upon completion of drilling. 2. Groundwater measured at 0.74 m below ground surface in shallow well and at 0.53 m below ground surface in deep well on April 14, 2021.									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: EN

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

LOCATION: N 4844379.70; E 551552.80

RECORD OF BOREHOLE: BH21-8

SHEET 1 OF 1

BORING DATE: March 30, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		427.75							GR SA SI CL ▽
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (200 mm)		0.00 / 427.55	1	SS	WH				April 14, 2021
		(CL) CLAYEY SILT, trace sand, trace gravel; brown (TILL); cohesive, w<PL, stiff to very stiff		0.20							Bentonite
1					2	SS	14		W		Sand
					3A						
2		(SM) SILTY SAND, trace gravel; brown; non-cohesive, wet, compact to dense		425.77 / 1.98	3B	SS	19				
					4	SS	30				
3					5A						Screen
		(CL) CLAYEY SILT, trace sand, trace gravel; grey (TILL); cohesive, w<PL, very stiff		424.40 / 3.35	5B	SS	15				
		(SM) SILTY SAND, some gravel; grey; non-cohesive, wet, compact		423.94 / 3.81	6	SS	29			MH	
4					7	SS	22				
5				422.72							
		END OF BOREHOLE		5.03							
6		NOTES:									
		1. Groundwater measured at 0.2 m below ground surface upon completion of drilling.									
		2. Groundwater measured at -0.02 m below ground surface on April 14, 2021.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: EN

CHECKED: MWK

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-9

SHEET 1 OF 1

LOCATION: N 4844084.50; E 551266.00

BORING DATE: March 22, 2021

DATUM:

DRILL RIG: Geoprobe

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 - ○)	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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		432.43							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (150 mm)- (SM) SILTY SAND		0.00	1A						
		(CL) Sandy SILTY CLAY, some gravel, occasional cobbles; brown; cohesive, w<PL, firm		0.15	1B	SS	6				
1					2	SS	9				
					3	SS	7				April 14, 2021
2				429.99							
		- Auger grinding between 2.4 m and 4.5 m		2.44	4	SS	46			MH	
		(CL-ML) Sandy SILTY CLAY-CLAYEY SILT, some gravel; brown (TILL); cohesive, w<PL, hard									
3					5	SS	50/ 0.05				Bentonite
4					6	SS	50/ 0.07				
				427.93							
		(SM-GM) SILTY SAND and GRAVEL; brown; non-cohesive, dry, very dense - Auger grinding between 4.5 m and 5.6 m		4.50	7	SS	50/ 0.07				
5											
				426.83							
		(CL) Sandy SILTY CLAY, some gravel; grey (TILL); cohesive, w<PL, hard - Auger grinding between 5.6 m and 6.1 m		5.60							
6					8	SS	50/ 0.07				Sand
7											Screen
					9	SS	50/ 0.07				
8				424.15	10	SS	50/ 0.05				
		END OF BOREHOLE		8.28							
9		NOTES: 1. Groundwater measured at 7.3 m below ground surface upon completion of drilling. 2. Groundwater measured at 1.57 m below ground surface on April 14, 2021.									
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: MWK

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-10

SHEET 1 OF 1

LOCATION: N 4844290.00; E 551238.50

BORING DATE: March 24, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		433.20							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (300 mm) - Sandy ORGANIC SILT		0.00	1A	SS	3				
				432.90							
		(CL) Sandy SILTY CLAY, some gravel with occasional cobbles; brown to grey at 4.57 m (TILL); cohesive, w<PL, soft to hard		0.30	1B						
1					2	SS	12				Bentonite
2					3	SS	11				
					4	SS	35				
3											Sand
					5	SS	28				
4											
											Screen
5					6	SS	10				
6											
					7	SS	40			MH	
7											Bentonite
				425.35	8	SS	50/ 0.07				
8		END OF BOREHOLE		7.85							
		NOTES:									
9		1. Groundwater in monitoring well measured at 3.0 m below ground level on March 26, 2021.									
		2. Groundwater measured at 0.62 m below ground surface on April 14, 2021.									
10											

April 14, 2021

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: EN

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-11

SHEET 1 OF 1

LOCATION: N 4844264.70; E 551602.20

BORING DATE: March 31, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		428.46							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (250 mm)		0.00 / 428.21	1	SS	3				
		(SP) SAND, some silt; brown; non-cohesive, moist, loose to compact		0.25							
1					2	SS	7				April 14, 2021
2					3	SS	11				
				426.02	4A	SS	8				Hole Plug
		(CL) SILTY CLAY, some sand to SANDY, some gravel; grey (TILL); cohesive, w<PL, firm		2.44	4B						
3					5	SS	14				
4					6	SS	12				
5					7	SS	11			MH	Sand
6											Screen
					8	SS	11				
				421.75							
7		END OF BOREHOLE		6.71							
8		NOTES: 1. Groundwater in open borehole at 1.5 m below ground surface upon completion of drilling. 2. Groundwater measured at 1.07 m below ground surface on April 14, 2021.									
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: EN

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-12

SHEET 1 OF 1

LOCATION: N 4844086.60; E 551092.60

BORING DATE: March 23, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		431.95							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (200 mm)-SILTY SAND		0.00 / 431.75	1A						
		(CL) SILTY CLAY, some sand, some gravel; brown; cohesive, w<PL, soft to stiff		0.20	1B	SS	8		○		April 14, 2021 ▽
1					2	SS	7				Hole Plug
				430.12	3	SS	9				
2		(SM-GM) SILTY SAND and GRAVEL; brown; non-cohesive, moist, compact		1.83 / 429.74							
		(CL-ML) Gravelly SILTY CLAY-CLAYEY SILT with SAND; brown (TILL); cohesive, w<PL, very stiff to hard		2.21	4	SS	28		○		Sand
3					5	SS	28				
4											Screen
					6	SS	50/ 0.13		○ ⊢	MH	
				427.10							
5		END OF BOREHOLE		4.85							
		NOTES:									
		1. Groundwater measured at 3.7 m below ground surface upon completion of drilling.									
6		2. Groundwater measured at 0.52 m below ground surface on April 14, 2021.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: MWK

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-13

SHEET 1 OF 1

LOCATION: N 4844451.50; E 551049.00

BORING DATE: March 23, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		429.07							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (300 mm)- (OH) CLAYEY ORGANIC SILT		0.00 / 428.77	1A	SS	5				
		(CL) SILTY CLAY, some sand, some gravel, some organics to 0.61 m; brown; non-cohesive, w<PL, firm		0.30	1B	SS	5				
1					2	SS	5				
				427.62							April 14, 2021 ▽
		(CL) SILTY CLAY, some sand, some gravel, occasional cobbles; brown to grey (TILL); cohesive, w<PL, stiff to hard		1.45	3	SS	10		○	MH	
2					4	SS	30				
											Hole Plug
3					5	SS	50/ 0.13		○		
4		- Auger grinding between 4.6 m and 6.9 m			6	SS	91				
5											Sand
6					7	SS	93/ 0.25		○		Screen
				422.14							
7		(SM-GM) SILTY SAND and GRAVEL; grey; non-cohesive, wet, very dense		6.93 / 421.70	8	SS	50/ 0.05		○		
		END OF BOREHOLE		7.37							
		NOTE:									
8		1. Groundwater measured at 1.31 m below ground surface on April 14, 2021.									
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: MWK

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-14

SHEET 1 OF 1

LOCATION: N 4844278.70; E 550895.00

BORING DATE: March 23, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		431.06							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (300 mm)		0.00	1A	SS	1				April 14, 2021
				430.76	1B						Hole Plug
		(CL) Sandy SILTY CLAY, some gravel, cobbles present; brown; cohesive, w<PL, very soft to very stiff		0.30							
1					2	SS	6				Sand
					3	SS	17			MH	
2		- Auger grinding between 2.1 m and 6.9 m			4	SS	50/ 0.15				Screen
3				427.94	5	SS	50/ 0.08				
		END OF BOREHOLE		3.12							
4		NOTES: 1. Groundwater measured at 1.7 m below ground surface upon completion of drilling. 2. Groundwater measured at 0.2 m below ground surface on April 14, 2021.									
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: MWK

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-15

SHEET 1 OF 1

LOCATION: N 4844267.20; E 551086.40

BORING DATE: March 24, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		432.46							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (300 mm) - ORGANIC SILT and SAND		0.00	1A	SS	1				April 14, 2021
				432.16							
		(SM) SILTY SAND, some gravel		0.30	1B						
				431.85							
		(CL) SILTY CLAY, some gravel with occasional cobbles; brown; cohesive, w<PL, firm to stiff		0.61							
1					2	SS	4				Hole Plug
2					3	SS	11		○		
				430.25							
		(CL) Sandy SILTY CLAY, some gravel; brown to grey (TILL); cohesive, w<PL, hard - Auger grinding at 2.3 m		2.21	4	SS	30				Sand
3											
					5	SS	33		○⊢	MH	
											Screen
4											
					6	SS	50				
5				427.30							
		END OF BOREHOLE		5.16							
6		NOTES: 1. Groundwater measured at 3.8 m below ground surface upon completion of drilling. 2. Groundwater measured at 0.34 m below ground surface on April 14, 2021.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: EN

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

LOCATION: N 4844256.07; E 551424.87

RECORD OF BOREHOLE: BH21-16

SHEET 1 OF 1

BORING DATE: March 31, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		429.46							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (50 mm)		0.05							April 14, 2021
		(SM/ML) Gravelly SILT with slight plasticity and SAND, cobbles; brown; cohesive, w<PL, firm to very stiff			1	SS	4				
1					2	SS	17				
					3	SS	13			MH	Hole Plug
2				427.25							
		(CL-ML) SILTY CLAY-CLAYEY SILT, some sand, some gravel, some cobbles; brown to grey (TILL); cohesive, w<PL, hard		2.21	4	SS	61				
3					5	SS	64				Sand
4					6	SS	66				Screen
					7	SS	88				
5											
6					8	SS	50/ 0.13				
				423.08							
		END OF BOREHOLE		6.38							
7		NOTES:									
		1. Groundwater at 0.6 m below ground surface upon completion of drilling.									
8		2. Groundwater measured at 0.13 m below ground surface on April 14, 2021.									
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: EN

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-17

SHEET 1 OF 1

LOCATION: N 4843491.90; E 551511.50

BORING DATE: March 26, 2021

DATUM:

DRILL RIG: Geoprobe

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 WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		428.92									GR SA SI CL
0		TOPSOIL (50 mm)		0.00									
		(SP) SAND, some gravel, trace organics; brown; non-cohesive, wet		0.05	1	SS	2						April 14, 2021
				428.24									
1		(CL-ML) Sandy SILTY CLAY-CLAYEY SILT, some gravel; brown to grey (TILL); cohesive, w>PL to w<PL, soft to hard at 3.05 m		0.68	2	SS	3						
					3	SS	10						Hole Plug
2	Power Auger 102 mm O.D. Solid Stem	- Auger grinding at 2.3 m			4	SS	31					MH	
					5	SS	41						Sand
3													
4					6	SS	58						Screen
					7	SS	50/ 0.13						
5				423.89									
		END OF BOREHOLE		5.03									
6		NOTES:											
		1. Groundwater measured at 2.13 m below ground surface on completion of drilling.											
		2. Groundwater measured at 0.46 m below ground surface on April 14, 2021.											
7													
8													
9													
10													

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: SM

CHECKED: EN

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-18

SHEET 1 OF 2

LOCATION: N 4843775.60; E 551588.20

BORING DATE: March 29, 2021

DATUM:

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	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 / GRAIN SIZE DISTRIBUTION (%)
		GROUND SURFACE		427.24							GR SA SI CL
0	Power Auger 102 mm O.D. Solid Stem	TOPSOIL (50 mm)		0.00							
		(SP-GP) SAND and GRAVEL, some silt; brown; non-cohesive, moist, compact		0.05	1	SS	10				Bentonite
				426.56							
		(CL) CLAYEY SILT, some gravel, some sand, trace organics; cohesive, w<PL, very stiff		0.68	2A						Sand
1				426.17		SS	5				
		(ML) Sandy SILT, some gravel; brown (TILL); non-cohesive, moist, loose		1.07	2B						April 14, 2021
				425.79							
		(SM-GM) SILTY SAND and GRAVEL; brown; non-cohesive, moist, compact		1.45	3		16				
2											
					4A						Screen
				424.64							
		(CL) SILTY CLAY, some gravel, trace sand; brown (TILL); cohesive, w~PL, stiff		2.60	4B		11				
3					5		33				
				423.51							
		(SM/ML) SILT with slight plasticity and SAND, some gravel, trace clay; grey (TILL); cohesive, w<PL, hard		3.73	6		68				
4											
					7		66			MH	
5											
6					8		85/ 0.28				
				420.08							
		(SM) SILTY SAND, some gravel; grey; non-cohesive, wet, dense		7.16							
7											
					9		32				
8											
9				418.10							
		END OF BOREHOLE		9.14							
		NOTES:									
		1. Groundwater measured at 1.2 m below ground surface upon completion of drilling.									
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: EN

CHECKED: MWK

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

PROJECT: 21456909

RECORD OF BOREHOLE: BH21-18

SHEET 2 OF 2

LOCATION: N 4843775.60; E 551588.20

BORING DATE: March 29, 2021

DATUM:

DRILL RIG: Geoprobe

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. + 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 / GRAIN SIZE DISTRIBUTION (%)
		--- CONTINUED FROM PREVIOUS PAGE ---									GR SA SI CL
10		2. Groundwater measured at 1.05 m below ground surface on April 14, 2021.									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: EN

CHECKED: MWK

GTA-BHS 005 S:\CLIENTS\GERANIUM\FERGUS_GOLFNORTH_PROPERTIES\02_DATA\GINT\FERGUS_GOLFNORTH_PROPERTIES.GPJ GAL-MIS.GDT 11/29/21

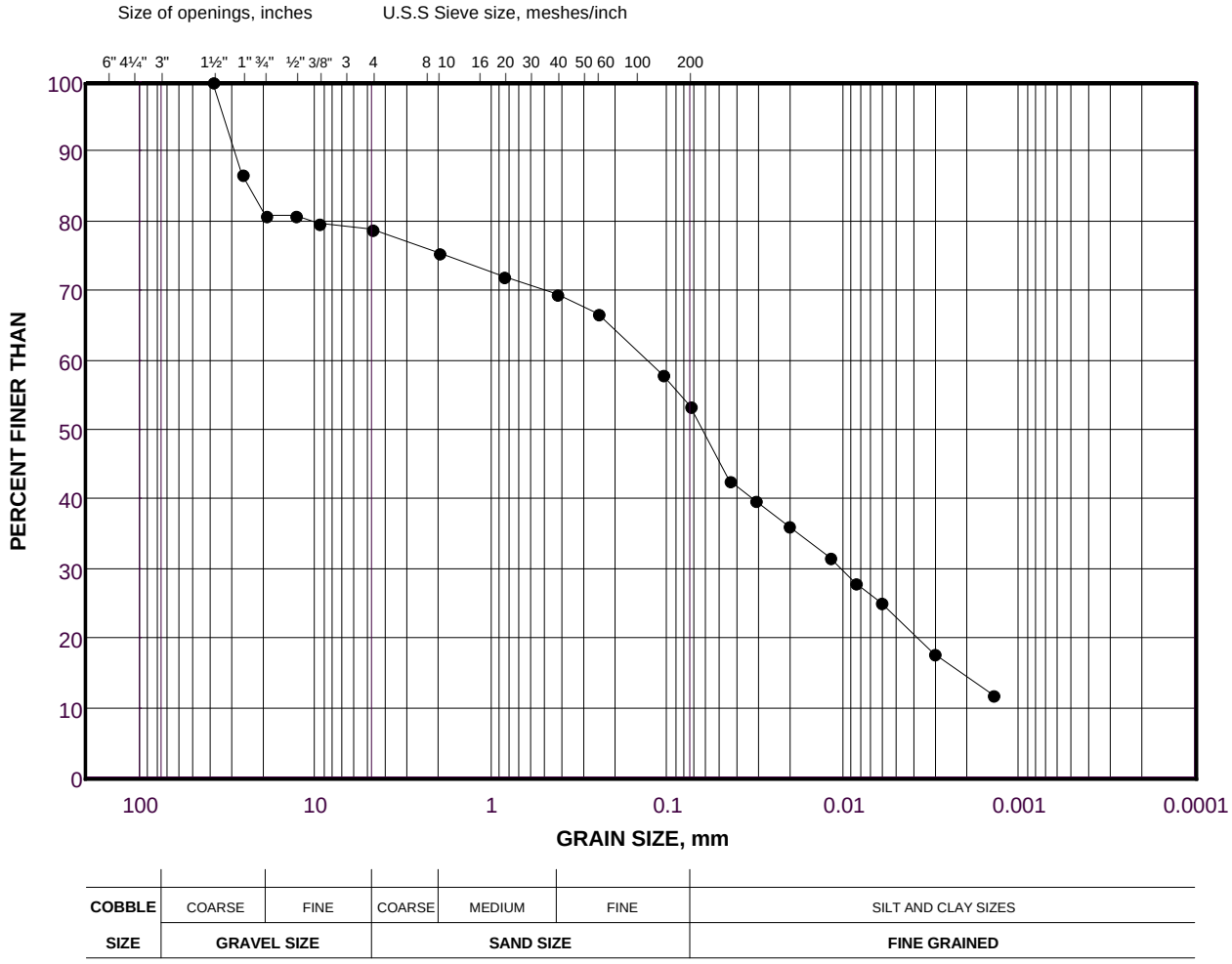
APPENDIX C

Figures C1 to C10 - Laboratory Test Results

GRAIN SIZE DISTRIBUTION

(CL) Sandy Silty Clay

FIGURE C1



LEGEND

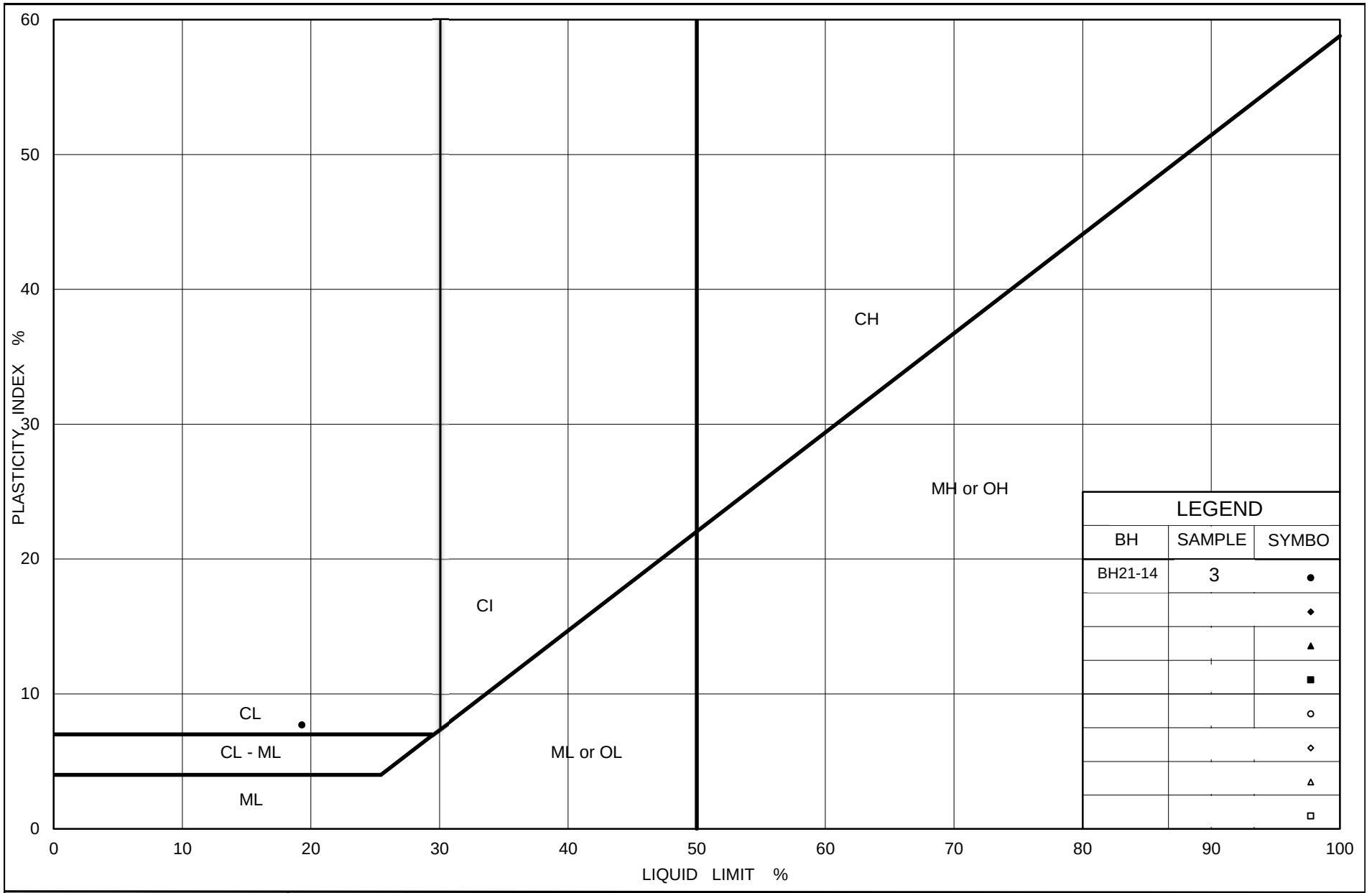
SYMBOL	Borehole	SAMPLE	ELEVATION(m)
●	BH21-14	3	429.3

Project Number: 21456909 (1000)

Checked By: EN

Golder Associates

Date: 04-May-21



GOLDER

PLASTICITY CHART
(CL) Sandy Silty Clay

Figure No. C2

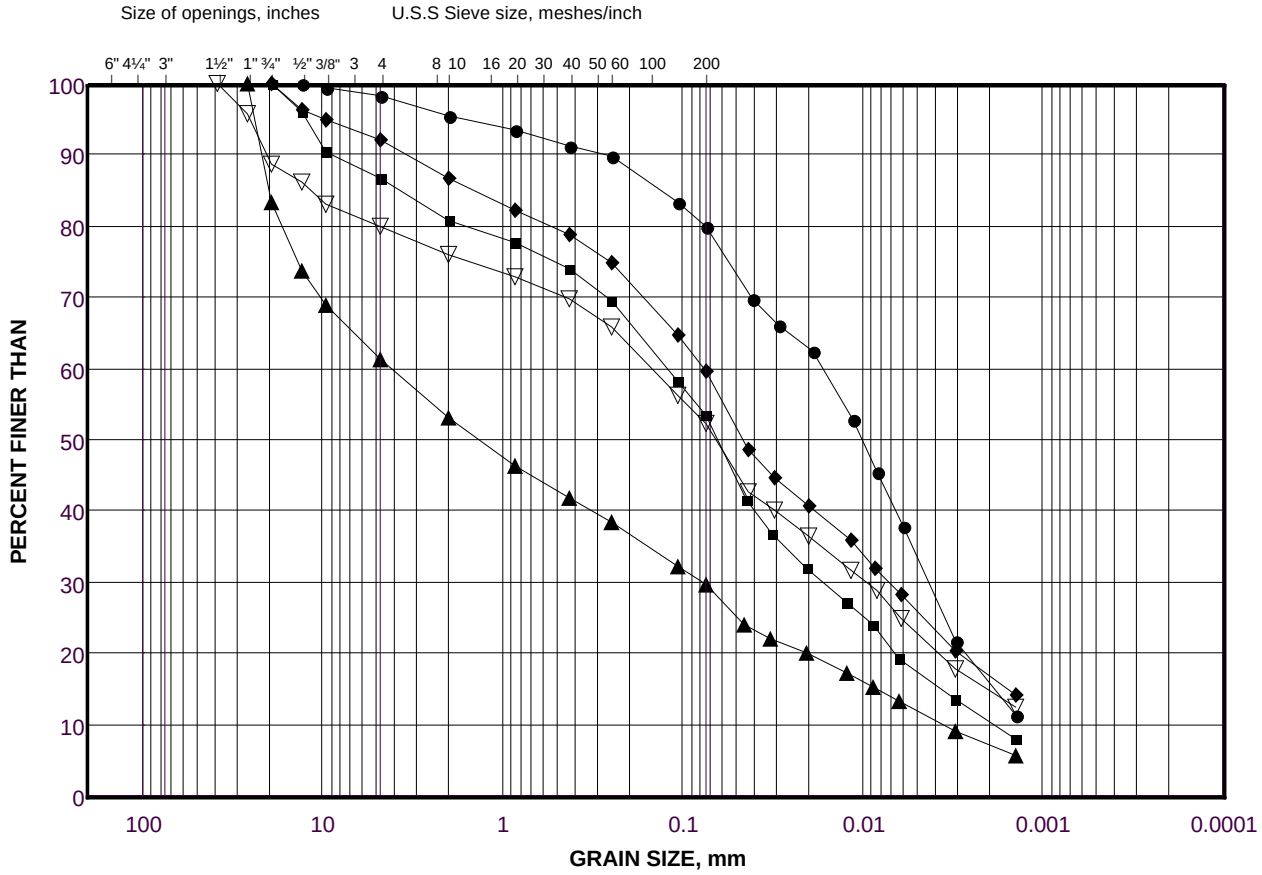
Project No. 21456909 (1000)

Checked By: EN

GRAIN SIZE DISTRIBUTION

(CL) Silty Clay to Clayey Silt Till

FIGURE C3



LEGEND

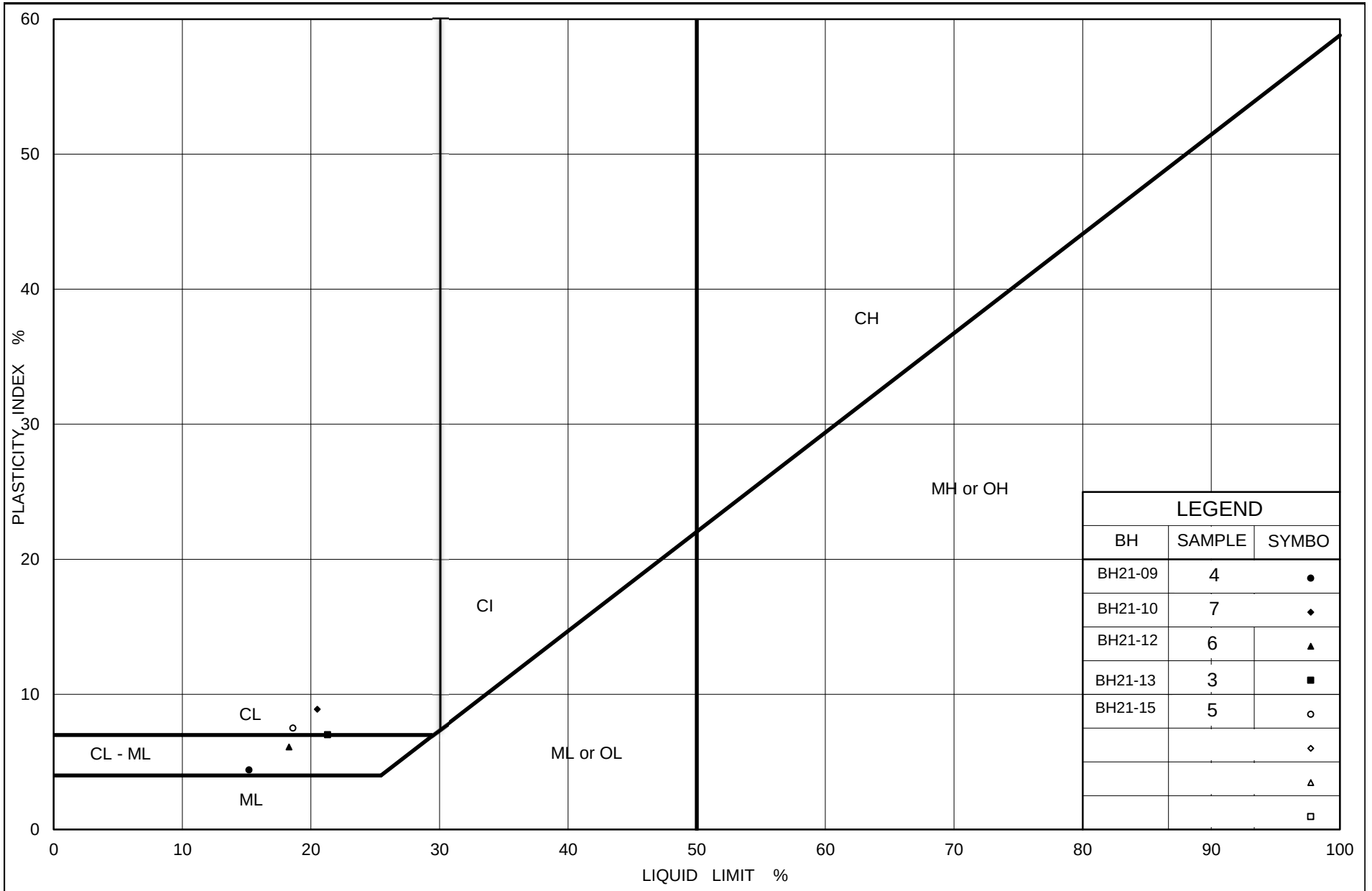
SYMBOL	Borehole	SAMPLE	ELEVATION(m)
●	BH21-13	3	427.3
■	BH21-09	4	429.8
◆	BH21-15	5	429.2
▲	BH21-12	6	427.3
▽	BH21-10	7	428.3

Project Number: 21456909 (1000)

Checked By: EN

Golder Associates

Date: 04-May-21



GOLDER

PLASTICITY CHART
(CL) Silty Clay to Clayey Silt Till

Figure No. C4

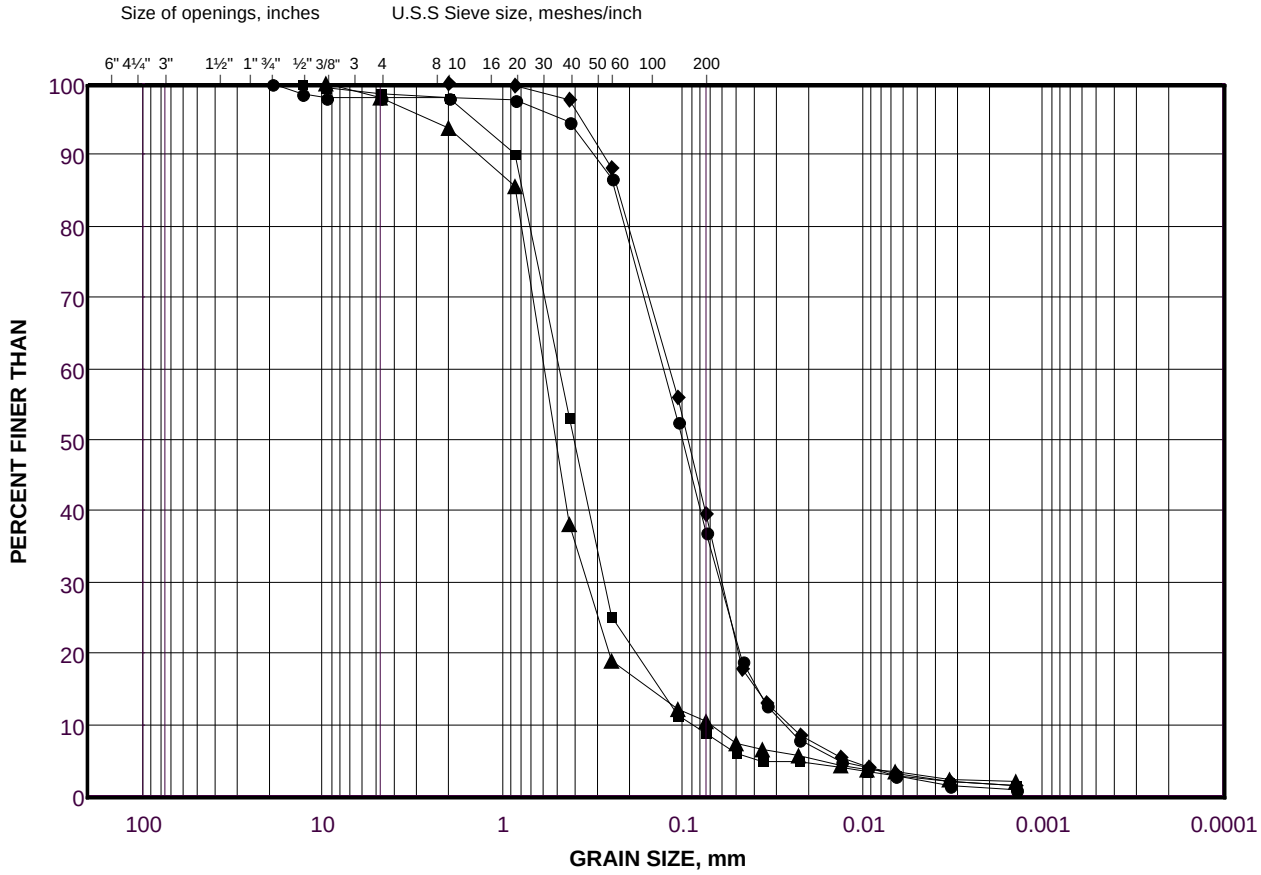
Project No. 21456909 (1000)

Checked By: EN

GRAIN SIZE DISTRIBUTION

(SP/SM) Sand to Silty Sand

FIGURE C5



LEGEND

SYMBOL	Borehole	SAMPLE	ELEVATION(m)
●	BH21-04	2	425.6
■	BH21-06	3	425.5
◆	BH21-05	3	426.9
▲	BH21-01	3	424.5

Project Number: 21456909 (1000)

Checked By: EN

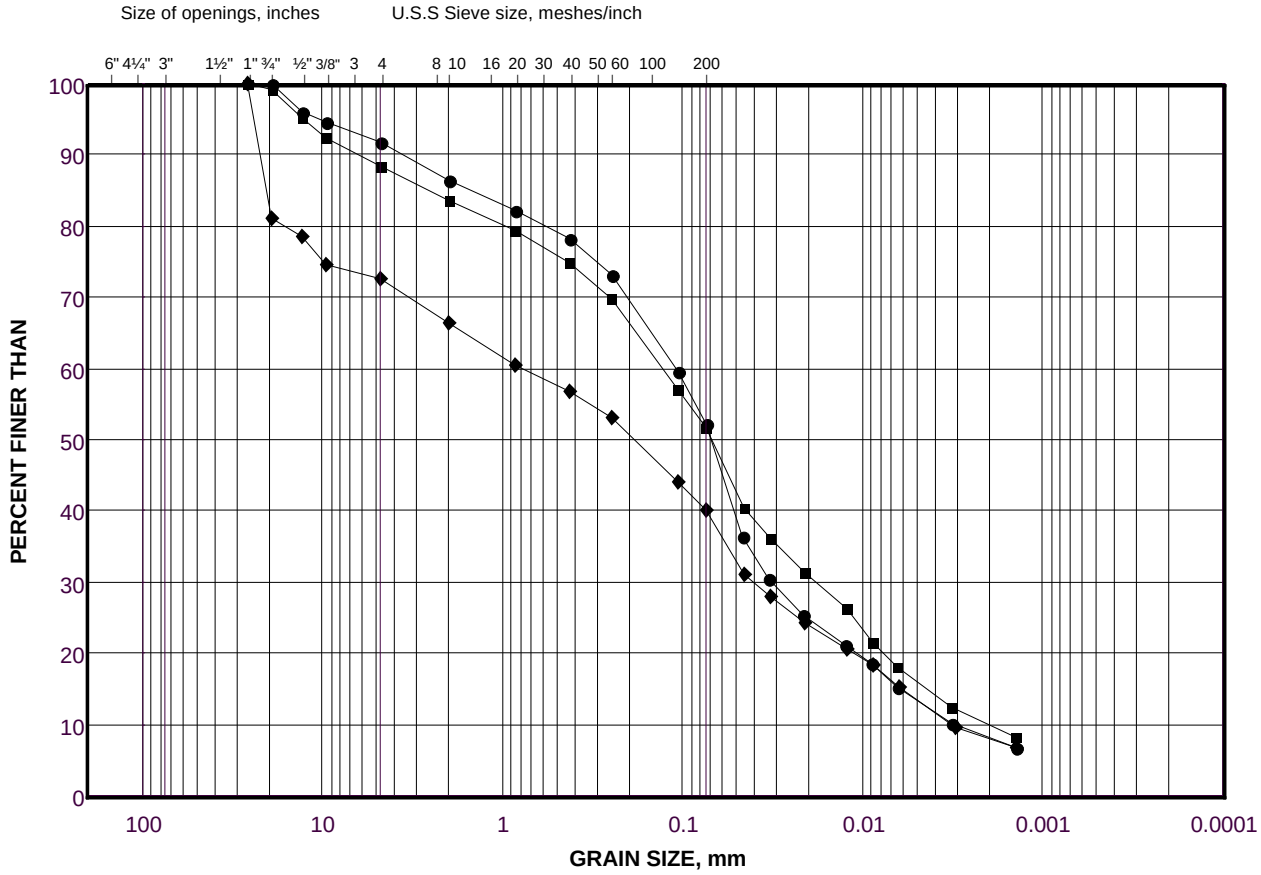
Golder Associates

Date: 04-May-21

GRAIN SIZE DISTRIBUTION

(CL-ML) Silty Clay to Clayey Silt with Sand to Silt with Sand

FIGURE C6



LEGEND

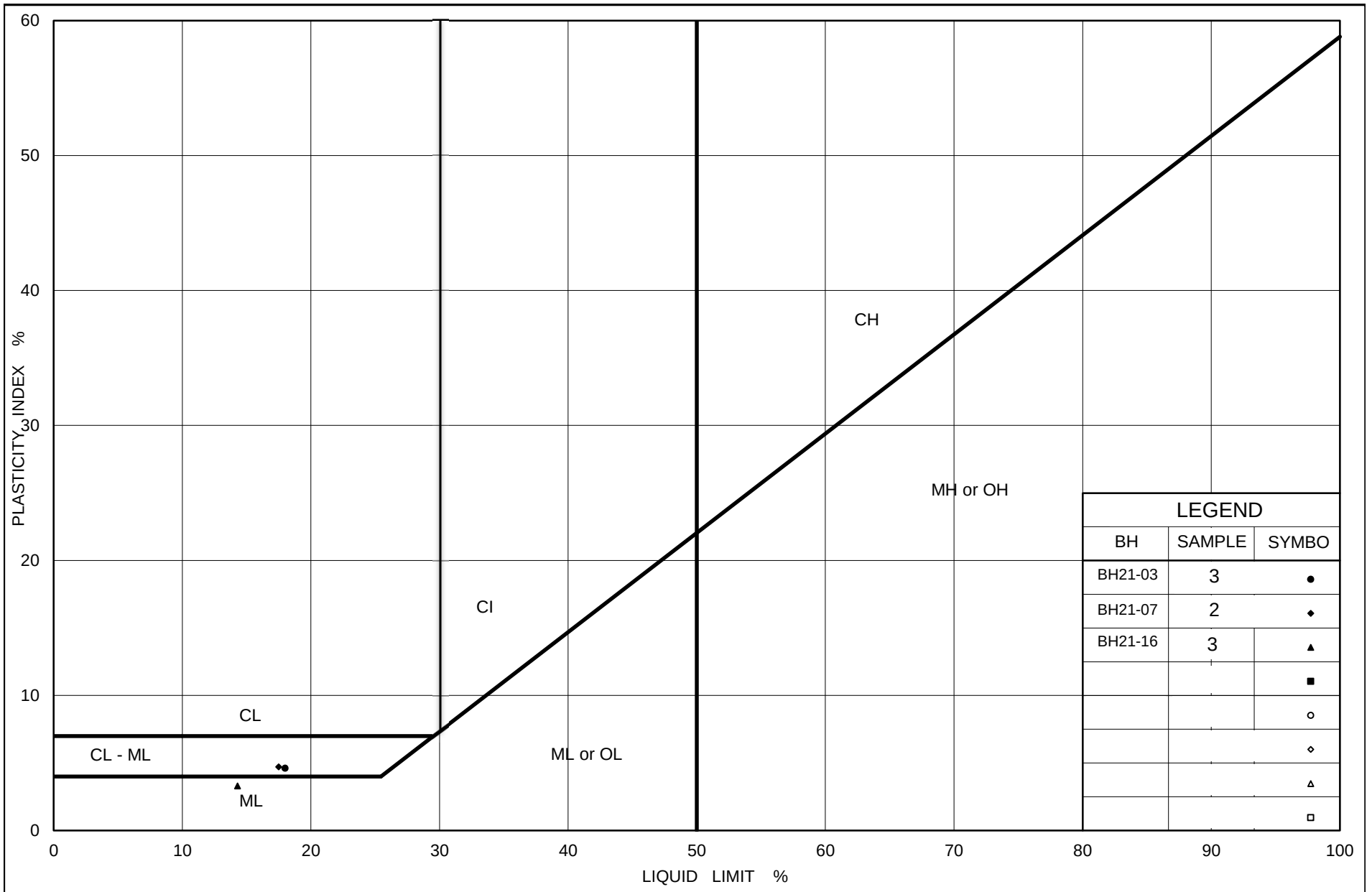
SYMBOL	Borehole	SAMPLE	ELEVATION(m)
●	BH21-07	2	427.9
■	BH21-16	3	427.7
◆	BH21-03	3	433.2

Project Number: 21456909 (1000)

Checked By: EN

Golder Associates

Date: 04-May-21



GOLDER

PLASTICITY CHART

(CL-ML) Silty Clay to Clayey Silt with Sand to Silt with Sand

Figure No. C7

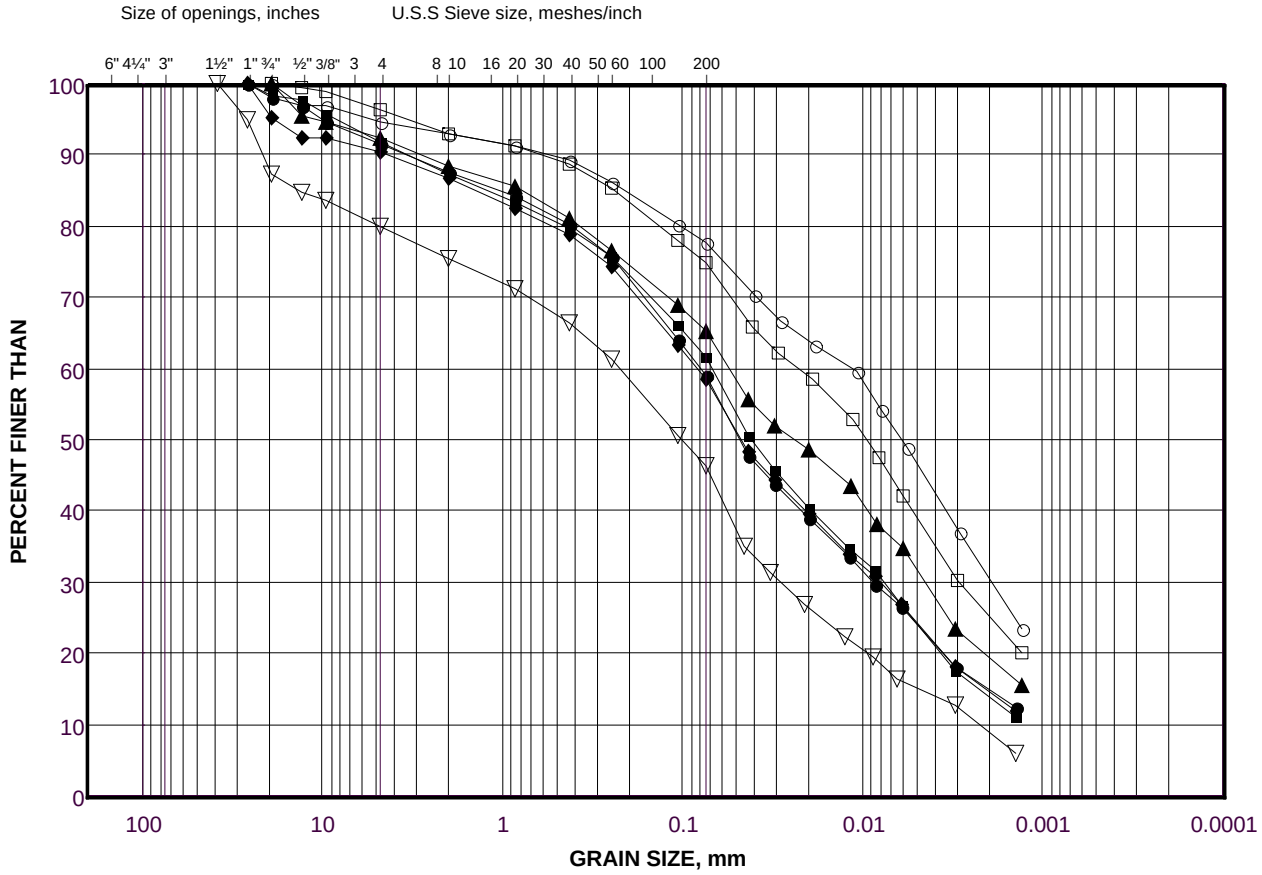
Project No. 21456909 (1000)

Checked By: EN

GRAIN SIZE DISTRIBUTION

(CL-ML) Silty Clay to Clayey Silt Till

FIGURE C8



LEGEND

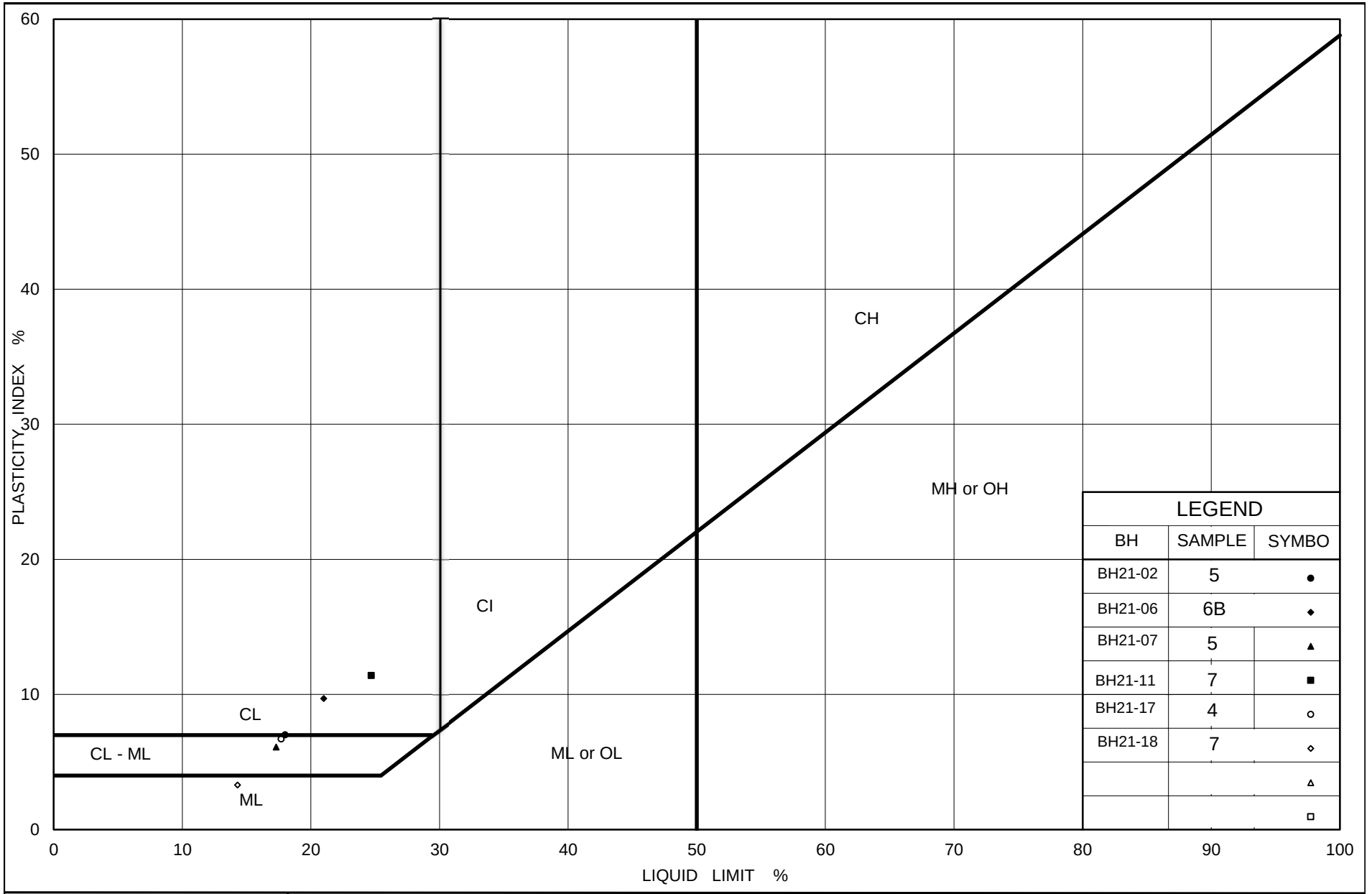
SYMBOL	Borehole	SAMPLE	ELEVATION(m)
●	BH21-17	4	426.3
■	BH21-07	5	425.6
◆	BH21-02	5	426.4
▲	BH21-06	6B	423.0
▽	BH21-18	7	422.3
❍	BH21-11	7	423.6
□	BH21-04	7	421.8

Project Number: 21456909 (1000)

Checked By: EN

Golder Associates

Date: 04-May-21



GOLDER

PLASTICITY CHART
(CL-ML) Silty Clay to Clayey Silt

Figure No. C9

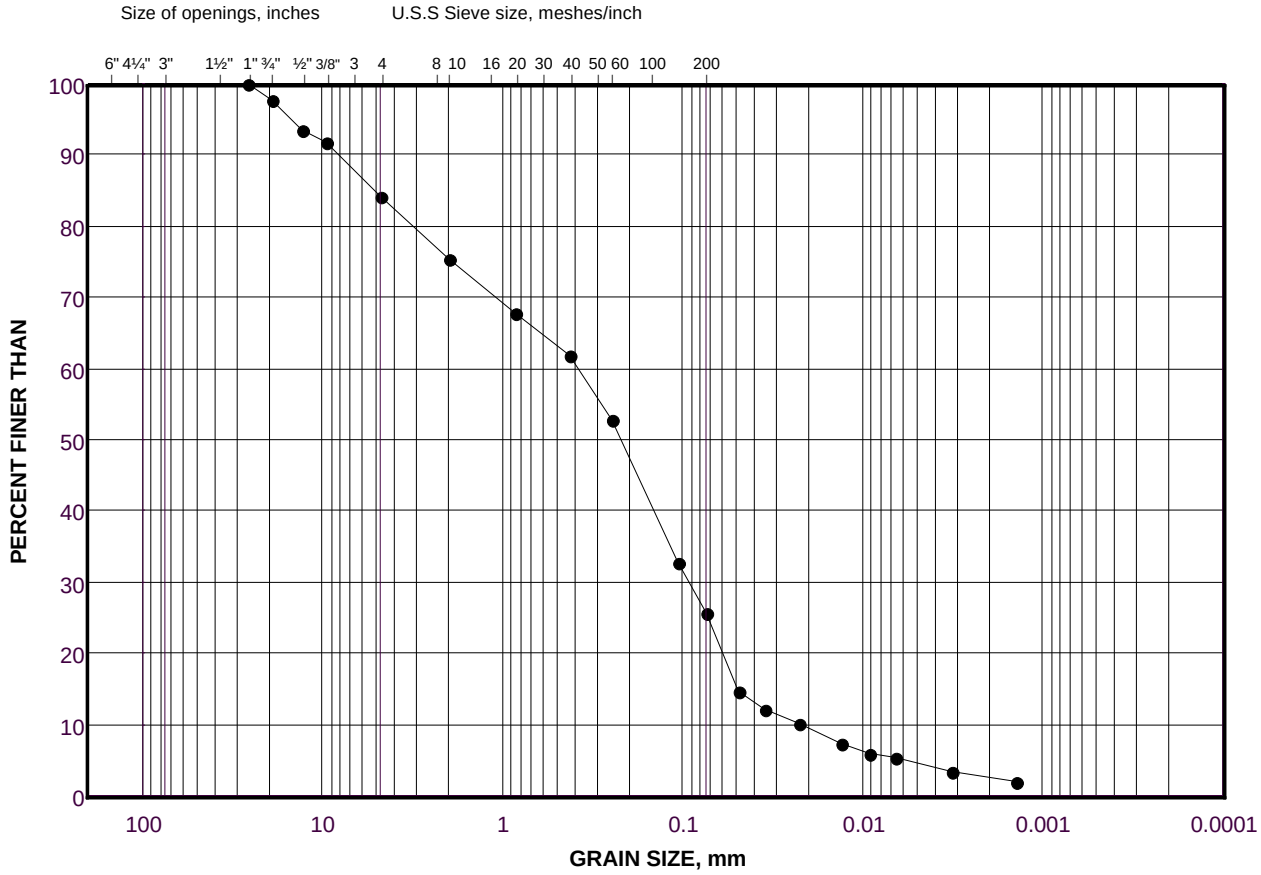
Project No. 21456909 (1000)

Checked By: EN

GRAIN SIZE DISTRIBUTION

(SM) Silty Sand

FIGURE C10



LEGEND

SYMBOL	Borehole	SAMPLE	ELEVATION(m)
●	BH21-08	6	423.7

Project Number: 21456909 (1000)

Checked By: EN

Golder Associates

Date: 04-May-21

golder.com