GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL DEVELOPMENT STELLAR ESTATES - PHASE 2 CALEDON, ONTARIO

Prepared for

ECOMETRIX INCORPORATED
6440 King Street
Caledon, Ontario
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REVISION 1 – FINAL

January 24, 2024

GeoTerre File Number: TG23-033

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1.0 INTRODUCTION

This report presents the results of a geotechnical investigation that was completed by GeoTerre Limited (GeoTerre) in relation to a Phase 2 Residential Development that is being proposed within the South-East quadrant of the overall Stellar Estates development as located in Caledon on the west side of Mount Pleasant Road a short distance north of Castlederg Side Road as indicated on attached Figures 1 and 2. The purpose of the investigation was to establish the prevalent soil and groundwater conditions within the limits of the site and, based on that information provide geotechnical design and associated construction recommendations for the proposed Phase 2 development works.

This report is subject to "*Limitations and Information Regarding Use of Report*" of attached Appendix A.

2.0 PROJECT AND SITE DESCRIPTION

As part of the on-going Stellar Estates Development, Mulloy Court, Caledon, Phase 2 of the proposed development consists of a series of five (5) new lots within the South-East quadrant of the overall development as indicated on attached Figures 2 and 3. The existing terrain within the Phase 2 limits is somewhat flat albeit dome shaped with overall gentle slopes to the north, east and south. A Natural Heritage Feature is also present in the South-West quadrant of the Phase 2 Developments Lands.

The phase 2 development lands presently serve an agricultural function with access to all five (5) proposed Phase 2 lots to be achieved from the access road to the development, i.e., Mulloy Court. In terms of site servicing, the Stellar Estates development has buried municipal water and hydro feeds, meaning that management of lot stormwater flows will be addressed on an individual basis and that septic tile beds will be required for each proposed new lot.

3.0 INVESTIGATION METHODOLOGY AND RESULTS

The investigation aspects of the project consisted of two parts as per the following:

- Part 1: Compilation of Pertinent Borehole Data from a Phase 1 Borehole Investigation.
- Part 2: Site Specific Soil Borehole Investigation.

Based on the soil borehole information presented in the Phase 1 Borehole Investigation study as prepared by Shaheen & Peaker in their report entitled "*Preliminary Geotechnical Investigation, 15462 Mount Pleasant Road, Caledon*" dated September 11, 2007, GeoTerre selected a total five (5) boreholes that were considered pertinent to the proposed Stellar Estates Phase 2 works, i.e., boreholes BH1 to BH4 and BH6 as located at the approximate locations shown on attached Figure 3 and presented in attached Appendix B.

The site-specific borehole investigation was completed under the full-time supervision of a GeoTerre representative on June 22 and 23, 2022 and consisted of a total of four (4) boreholes at the locations indicated on attached Figure 3 based on survey data provided by Ecometrix. Boreholes BH22-13, 14 and 16 were drilled using 150 mm solid stem augers to depths of 6.6 m each whereas BH22-15 was completed primarily using washboring to a final depth of 15.7 m.

During drilling of the boreholes, Standard Penetration Tests (SPT) and associated split spoon soil sampling was undertaken at 0.76 m intervals of depth to just under 5 m at which point the SPT sampling interval was increased to 1.5 m intervals for the remainder of the boreholes. SPT's were completed using an automatic SPT hammer that is generally assumed to have an 80% energy efficiency rating and hence, field recorded SPT 'N' values are generally referred to as SPT 'N_{80}' values. This is important because most empirical relationships between SPT 'N' values and strength and/or expected soil performance as based primarily on SPT 'N' values obtained well before the year 2000 using SPT hammers with 60% energy efficiency.

Groundwater conditions were noted during and upon completion of drilling of each borehole with 50 mm diameter monitoring wells being installed within the bottom reaches of each borehole. In addition, a second, 5.8 m deep 50 mm diameter monitoring well was installed in an unsampled borehole very close to borehole BH22-15. Boreholes with monitoring well installations were backfilled with low permeability bentonite from just above the top of the well screen to ground surface.

A log of encountered soil conditions within each borehole are presented on the borehole logs of attached Appendix C, which also include ground surface elevation as determined by Ecometrix, results and locations of all in-situ tests, groundwater observations/measurements and borehole backfill details. A summary of borehole, monitoring well details and subsequent water level readings are also presented in attached Table 1.

Soil samples retrieved from the boreholes were returned to the GeoTerre CCIL (Canadian Council of Independent Laboratories) certified soil testing laboratory for review by a senior engineer and completion of the following geotechnical laboratory soil index testing on select borehole samples:

- Water content on each retrieved intact sample.
- Fourteen (14) sieve and hydrometer grain size analyses on fine grained samples.
- Three (3) Atterberg Limit Soil Plasticity Tests.

The results of the water content and Atterberg Limit Soil Plasticity tests and a summary of the grain size data are presented on the borehole logs of attached Appendix C, with complete grain size distribution and Atterberg Limits Soil plasticity test data presented respectively in attached Appendix D and E.

4.0 SUBSURFACE CONDITIONS

Based on the soil conditions encountered at the location of site specific boreholes BH22-13 to 16 as presented on the logs of attached Appendix C, the sub-surface profile below the surface topsoil within the limits of the entire site appears to consist primarily of a series of low plasticity silty clay materials interbedded with occasional thin layers of more silt rich soils. The results of soil index tests obtained on select samples of the foregoing layers are presented in attached Appendix D and E as per the following:

Soil Unit	Grain Size Data (Appendix D)	Atterberg Limit Soil Plasticity Data (Appendix E)
Silty Clay Materials	Figure D1	Figure E1
Clayey Silt Materials	Figure D2	Not Tested
Silt With Some Clay Materials	Figure D3	Not Plastic
Sand and Silt Materials	Figure D4	Not Plastic

Field obtained SPT 'N_{80}' values obtained wholly within native inorganic soils of BH22-13 and 14 as located within the more elevated reaches of the Phase 2 Development Lands varied from 5 to 41. However, upon closer inspection, two (2) SPT 'N_{80}' values obtained wholly within native inorganic soils of BH22-13 and 14 above a depth of 1.4 m gave values of 5 and 8, whereas SPT 'N_{80}' values obtained within native inorganic soils materials below a depth of 1.4 m varied from 19 to 41. Hence, based on this data, the soils within the elevated Phase 2 development limits are described as follows:

- Firm degree of consistency/loose degree of compactness above a depth 1.4 m
- Very stiff to hard degree of consistency/compact to dense degree of compactness below 1.4 m.

Apart from 2007 borehole BH1 of attached Appendix B, remaining 2007 boreholes BH2 to 4 and 6, display similar SPT trends to that noted above.

Field obtained SPT 'N_{80}' values obtained within BH22-15 and 16 as located within the lower lying Natural Heritage Feature exhibit a similar trend of SPT 'N_{80}' values except that the depth interface between lower and more elevated SPT 'N_{80}' Values is 4.4 m, i.e., SPT 'N_{80}' values of BH22-15 and 16 above a depth of 4.4 m vary from 4 to 15 whereas below a depth of 4.4 m SPT 'N_{80}' values vary from 17 to 30. Hence, based on this data, the dominant low plasticity silty clay soils within the lower lying Natural Heritage Feature are described as having a firm to stiff degree of consistency above a depth 4.4 m and a very stiff degree of consistency below a depth 4.4 m.

Water level readings in the installed monitoring wells of BH22-13 and 14 as obtained on July 25, 2022 approximately one month after being installed, gave respective water level depths of 2.18 m (elevation 265.58 m) and 1.50 m (elevation 266.14). In comparison, water level readings in the installed monitoring wells of BH22-15 and 16 as obtained on the same date gave the following water levels:

- BH22-15A (Deep Monitoring Well): Water Level Depth of 0.84 (elevation 264.57 m)
- BH22-15B (Shallow Monitoring Well): Water Level Depth of 1.44 m (elevation 263.97 m)
- BH22-16: Water Level Depth of 2.02 m (elevation 262.58 m)

The foregoing water levels readings indicate that the water table across the site is quite shallow with an overflow flow direction from west to east, i.e., from the high terrain adjacent to Mulloy Court eastward toward the lower terrain. However, it should be noted that the foregoing measured water levels represent a short monitoring period that may not reflect stabilized conditions. In addition, the development water level regime can also be expected to be subject to some minor seasonal variations.

5.0 GEOTECHNICAL ENGINEERING ASSESSMENT AND RECOMMENDATIONS

5.1 General

As indicated on attached Figure 3, the proposed Stellar Estates Phase 2 development consists of a series of five (5) large rural residential lots that are expected to be developed with buildings with equally large footprints that have a maximum of two (2) above ground floors and a basement. Given the large, independent nature of the lots, site grading requirements will be determined on a lot by lot basis. In terms of building foundation support, it is considered vitally important that all foundations are formed at least 1.5 m below existing site grades to position the underside of the proposed foundations below the near surface weak soils that are expected to be routinely present to depths of approximately 1.5 m within each of proposed building footprints of attached Figure 3. This requirement will require particular attention within the rear portions of the proposed buildings due to sloping nature of the proposed Phase 2 lots away from the Mulloy Court development access road.

Provided the underside of all proposed building foundations are formed at least 1.5 m below existing site grades into anticipated very stiff to hard silty clay materials, building foundation support can be achieved using a series of traditional strip and/or pad foundations designed to SLS (Serviceability Limit State) and ULS (Ultimate Limit State) maximum bearing capacities of 150 kPa and 225 kPa respectively. However, notwithstanding the foregoing design bearing capacity recommendations, the minimum width of all strip and/or pad foundations must conform with the minimum size requirements of Section B, Part 9, Section 9.15 of the 2012 Ontario Building Code (OBC).

A more detailed discussion on anticipated site grading requirements and foundation aspects of the proposed residential dwellings together with appropriate geotechnical design recommendations are presented in Section 5.2 and 5.3 respectively. Similarly, appropriate geotechnical design recommendations related to site servicing and lot paving are presented respectively in Sections 5.4 and 5.5. Some general design considerations presented in Section 5.6.

The engineering assessment and design recommendations provided in the following sections are intended for the guidance and sole use of the designers and planners associated with the engineering design of the proposed development. Similarly, contractors undertaking or bidding on aspects of the work should make their own assessment of the available soil factual data and its potential impacts on equipment selection, productivity, construction methodology and the like, and any comments provided herein by GeoTerre are only intended for illustration purposes. Finally, please note that soil and groundwater conditions were only confirmed at the borehole locations and will vary between these locations.

5.2 Site Grading

In the event that local lot grading is required outside of the building footprint areas, it is recommended that any required general site grading works be undertaken under the full-time direction of a suitably qualified geotechnical engineer in accordance with the following:

1. Remove all surface organic materials and/or otherwise unsuitable surface materials to expose the top surface of underlying inorganic materials, including as a minimum, the entire footprint area of any proposed paved areas and at least 3 m beyond.
2. Exposed base resulting from work element 1) above is compacted to achieve at least 98 % of its Standard Proctor Maximum Dry Density (SPMDD) in the upper 300 mm. Any soft spots revealed during this process must be removed and backfilled as per item 3) below.
3. Grade raise fill and/or backfill to any sub-excavated areas resulting from 2) above must consist of locally sub-excavated inorganic materials and/or imported good quality inorganic fill that is placed and compacted in lifts not exceeding 300 mm in thickness to achieve at least 98 % of its SPMDD, increasing to 100% SPMDD within the upper 300 mm under paved areas.
4. All fill placement works are to be completed while temperatures, including those at night, remain above zero degrees.

In the event that localized over-excavation is required within the footprint area of the proposed residential dwellings to achieve the 1.5 m minimum foundation depth below existing site grades as detailed in Section 5.3, backfill materials intended for the support of proposed buildings should be undertaken in accordance with the above noted recommendations except that all replacement materials should be compacted to at least 100 % of their SPMDD throughout.

5.3 Foundation Considerations

5.3.1 Building Foundations

As indicated on attached Figure 3, the proposed Stellar Estates Phase 2 development consists of a series of five (5) large rural residential lots that are expected to be developed with residential dwellings with equally large footprints that have a maximum of two (2) above ground floors and a basement. Given the large, independent nature of the lots, site grading requirements around each dwelling will be determined on a lot by lot basis, with the recommendation that paved areas be addressed as per Section 5.2.

In terms of building foundation support, it is considered vitally important that all foundations are formed at least 1.5 m below existing site grades to position the underside of the proposed foundation below the near surface weak soils that are expected to be routinely present to depths of approximately 1.5 m within each of proposed building footprints of attached Figure 3. This requirement will require particular attention within the rear portions of the proposed buildings due to sloping nature of all of the proposed Phase 2 lots away from the Mulloy Court development access road.

Provided the underside of all proposed building foundations are formed at least 1.5 m below existing site grades into anticipated very stiff to hard silty clay materials, building foundation support can be achieved using a series of traditional strip and/or pad foundations designed to SLS and ULS maximum bearing capacities of 150 kPa and 225 kPa respectively. However, notwithstanding the foregoing design bearing capacity recommendations, the minimum width of all strip and/or pad foundations must conform with minimum size requirements of Section B, Part 9, Section 9.15, 2012 Ontario Building Code (OBC).

Please note that the foregoing foundation design recommendations assume that the base of all footings are free of loose, disturbed, softened and/or other deleterious material in advance of placing concrete. To this end, it is recommended that the excavation and base preparation of all proposed foundations be completed under the inspection of a suitably qualified geotechnical engineer immediately in advance of, and during, concreting. Maximum total settlement of foundations that are designed and constructed in accordance with the foregoing provisions is not expected to exceed 25 mm with maximum differential settlement not expected to exceed 50 % of the estimated maximum total settlement.

All exterior footings or interior footings within unheated portions of proposed dwellings must be provided with soil or equivalent soil cover as per the recommendations of Section 5.5.1 for frost protection. All trench excavations for footings must be completed in accordance with the Occupational Health and Safety Act (and Regulations for Construction Projects).

5.3.2 Basement Wall Earth Pressures and Drainage Provisions

Provided that compaction within 2 m of constructed basement walls is completed with small, hand operated walk behind equipment to achieve at least 95 % of the SPMDD of the material, lateral earth pressures against the structure may be based on the following:

P = KγH + Kq
P - soil pressure at depth H below final grade.
γ - Soil Bulk Density (assume 20 kN/m^3)
q - Road (or other) surcharge loads when applied within a distance from the basement wall equal to the depth of the proposed basement footings
K - Soil At Rest Earth Pressure Coefficient (assume 0.50)

Please note that the foregoing recommendations assume that the proposed basement walls contain provisions that will allow for the positive drainage of any water that reports to the outside of the basement as per the general details of attached Figure 4.

5.3.3 Basement Slab-on-Grade Floor Slab

Based on the conditions encountered in boreholes BH22-13 and 14, and basement excavations that extend deeper than 1.5 m below existing site grades, it is expected that the underside of the proposed basement floor slabs will rest primarily on silty clay materials, possibly interspersed with some clayey silt areas. Accordingly, based on foregoing, basement floor slabs may be constructed as per the following:

1. Footprint area of the proposed floor slab is cleared of all wet, loose, disturbed, frozen and/or otherwise unsuitable material to expose the anticipated underlying competent native soils.
2. The exposed surface resulting from 1) above is compacted as necessary to achieve at least 98 % of the material SPMDD in the upper 300 mm.
3. Grade raise fill and/or general sub-floor fill within the sub-excavated areas resulting from 1) above to achieve final subgrade level is completed using good quality inorganic fill compacted in lifts not exceeding 300 mm in thickness compacted to achieve at least 95 % of its SPMDD throughout and 98 % in the upper 300 mm.
4. A moisture barrier consisting of at least 200 mm of lightly compacted 19 mm clearstone material is placed immediate below the floor slab concrete slab and provided with appropriate underfloor drainage as indicated on attached Figure 4.
5. Place 100 mm nominally thick slab using concrete with a minimum 28 day compressive strength on at least 25 MPa.

5.3.4 Seismic Design

With respect to the seismic design of the building, a Class D site may be assumed as defined by the 2012 version of the Ontario Building Code.

5.4 Site Servicing

As previously noted, the Stellar Estates Phase 2 development lands presently serve an agricultural function with access to all five (5) proposed Phase 2 lots to be achieved from the access road to the development, i.e., Mulloy Court. In terms of site servicing, the Stellar Estates development has buried municipal water and hydro feeds, meaning that in addition to Hydro each lot will be serviced with a 38 mm diameter water line connected to the existing watermain on Mulloy Court. Otherwise, management of lot stormwater flows will be addressed on an individual basis with septic tile beds being required for each proposed new lot. As such all individual site servicing works should be completed in accordance with applicable OPSD standards, with all required excavations undertaken in accordance with the Ontario Occupational Health and Safety Act (and Regulations for Construction Projects).

With respect to septic tile design, the vast majority of the site is underlain by low plasticity silty clay interspersed with thin layers/horizons of clayey silt/silt with some clay/sand and silt and silty fine sand, all with characteristic grain size distribution as detailed in attached Appendix D, except for the suspected silty fine sand to sand and silt materials of BH22-16 over the depth interval of 1.7 m to 2.6 m. Given the fine-grained nature of soil materials encountered in the upper 4.5 m of BH22-13 and 14 as located within developable areas of proposed Lots 1 to 5, i.e., primarily low plasticity silty clay with some thin zones/horizons or clayey silt, it is considered appropriate to design the proposed Septic Tile Beds based on the estimated “T-Time” infiltration factor of these soil types. To that end, using the Ontario Building Code (2012) Unified Soil Classification Approach, the estimated Soil Percolation Time (T) for the foregoing prevalent soil types is estimated to be greater than 50 mins/cm. As such, it can be assumed that all required tile beds will have to be designed and constructed as raised tile beds using appropriately graded materials.

5.5 Lot Entranceways and General Paving

Provided the subgrade area below all proposed paved and/or interlocking paving stone areas are prepared in accordance with the recommendations of Section 5.2, the following minimum pavement structure is recommended:

Asphalt	Surface Course (HL3)	40 mm	
	Basecourse (HL8)	50 mm	
		90 mm	90 mm
Granular Base (OPSS Granular A)			300 mm
			390 mm

Asphalt materials must be in accordance with their appropriate OPSS municipal specifications and similarly, placed and compacted in accordance with the requirements of OPSS.MUNI 310. Granular base materials are to be compacted to at least 100 % of their SPMDD, with granular sub-base materials to be compacted to at least 98 % of their SPMDD.

Please note that the recommended granular base thickness of 300 mm is 150 mm greater than the minimum specified by the Town of Caledon for entranceways. This increase is recommended to provide better resistance of the surface pavement structure to the frost susceptible near surface soils at the site.

5.6 General Design and Construction Considerations

5.6.1 Frost Penetration

The estimated depth of frost penetration for the site is 1.5 m. Accordingly, the underside of all proposed spread footings or other elements that are prone to freezing should be provided with this amount of soil or equivalent cover.

5.6.2 Concrete Sulphate Requirements

Soluble sulphate testing was not undertaken by GeoTerre as part of this study. Hence, given that the Stellar Eastes development has been under construction for some time, it is recommended that the same approach regarding concrete sulphate resistance be adopted for the Phase 2 site limits.

5.6.3 Protection of Existing Structures and Utilities

While not deemed to be a major issue for this proposed development, it should be noted that during the completion of any required trench and/or bulk excavation works, particular attention must be given to the design and support of excavation limits where existing structures or utilities are located within a 45 degree line emanating from the base of the proposed excavation to ensure that they are properly protected from damage.

5.6.4 Import/Export of Soils

Environmental issues related to the proposed works are beyond the scope of the GeoTerre works and the intent of this section is to highlight that the disposal of excess soils from the site must be undertaken in accordance with the applicable environmental legislation.

5.6.5 Borehole Abandonment

It is recommended that prior to of any existing boreholes with installed piezometers/monitoring wells that the installed piezometer pipes be abandoned in accordance with MOE Regulation 903.

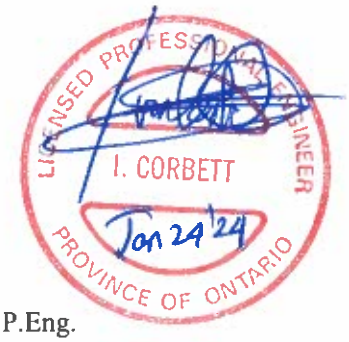
5.6.6 Construction Supervision

It is recommended that all of the geotechnical related works outlined within be completed under the direct supervision of GeoTerre who have the best familiarity with the soil conditions within the site boundaries and the rationale behind the development of the various geotechnical design recommendations presented within.

6.0 CLOSURE

We trust that this report is sufficient for your present requirements. Should you have any questions or require clarification on any matter, please do not hesitate to contact us.

GeoTerre Limited



Ivan Corbett, M.Sc., P.Eng.
President

TABLES

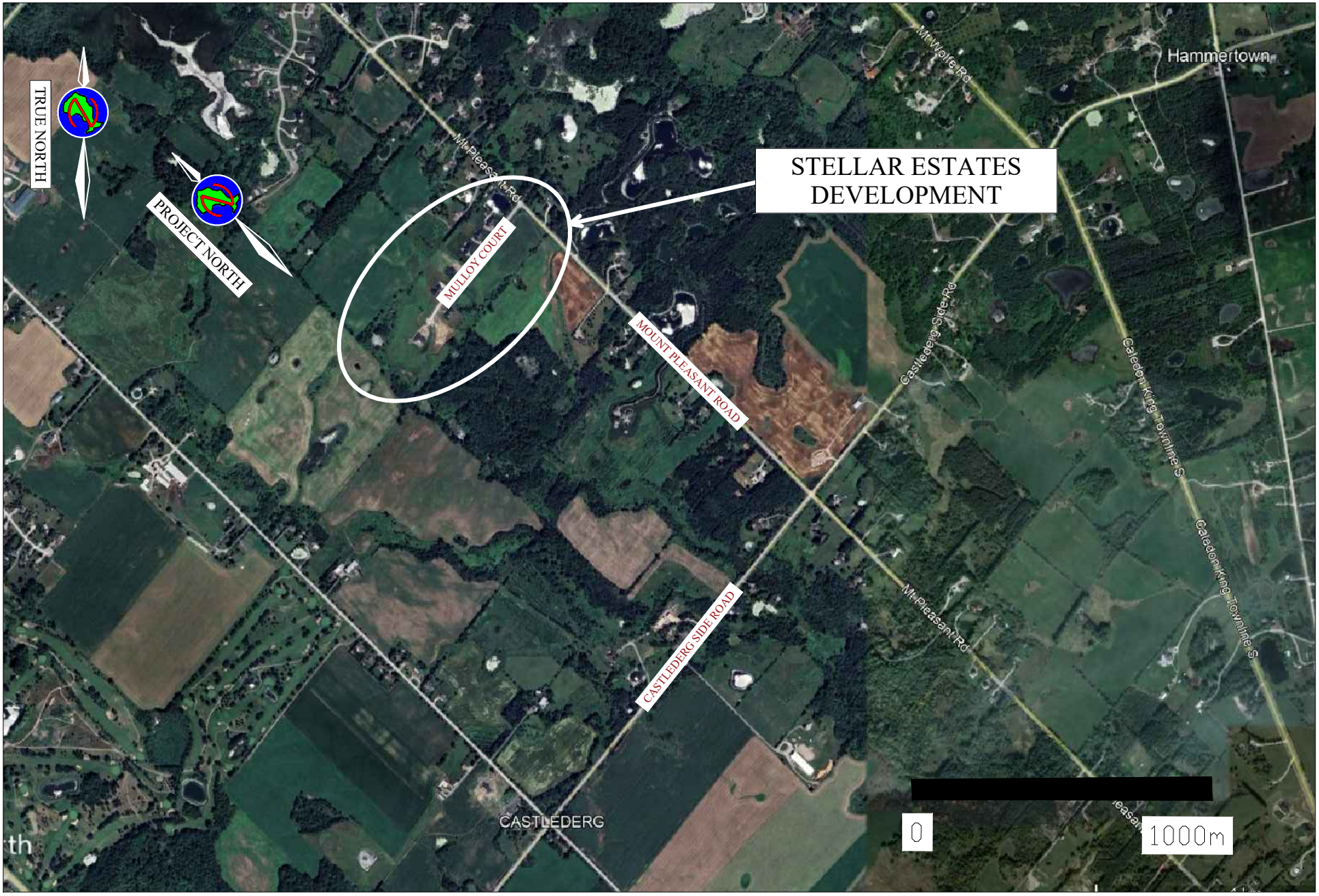
GeoTerre

TABLE 1
STELLER ESTATES PHASE 2 RESIDENTIAL DEVELOPMENT - MULLOY COURT, CALEDON
GEOTECHNICAL INVESTIGATION REPORT
Summary of Borehole, Monitoring Well Details and Groundwater Level Measurements

Borehole No.	Borehole Depth (m)	Ground Elevation (m)[1]	Standpipe Piezometer Details						Measured Groundwater Depth/Elevation (m)		
			General	Type	Tip Depth (m)	Screen Length (m)	Tip Formation	Installation Date	Upon Installation	2022-07-25[2]	
2022 GEOTERRE BOREHOLES [1]											
BH22-13	6.6	267.76		50 mm PVC Pipe	6.1	3.0	Silt/Silty Clay	22-Jun-22	Dry	2.18/265.58	
BH22-14	6.6	267.64		50 mm PVC Pipe	6.1	3.0	Silt/Silty Clay	22-Jun-22	Dry	1.50/266.14	
BH22-15	15.7	265.41	Deep Well A	50 mm PVC Pipe	15.7	3.0	Silty Clay	23-Jun-22	Not Recorded	0.84/264.57	
		265.56	Shallow Well B	50 mm PVC Pipe	5.8	3.0	Silty Clay	23-Jun-22	Not Recorded	1.44/263.97	
BH22-16	6.6	264.60		50 mm PVC Pipe	4.1	3.0	Silty Clay/Silty Fine Sand & Clayey Silt	22-Jun-22	1.50/263.10	2.02/262.58	
2007 BOREHOLES [3]											
BH1	5.03	97.90	NO PIEZOMETERS INSTALLED								
BH2		101.00									
BH3		100.90									
BH4		100.50									
BH6	2.0	97.60									

Notes: (1) Elevations of 2022 Boreholes provided to GeoTerre by Ecometrix Inc. and understood to be Geodetic.
(2) Water level information for July 25, 2022 provided by Ecometrix Inc..
(3) Elevations of 2007 Boreholes based on a local temporary benchmark and as such should only be used to determine elevations differences between boreholes.

FIGURES



ECOMETRIX INCORPORATED.
STELLAR ESTATES PHASE 2
GEOTECHNICAL INVESTIGATION REPORT

SITE LOCATION PLAN

GEOTERRE

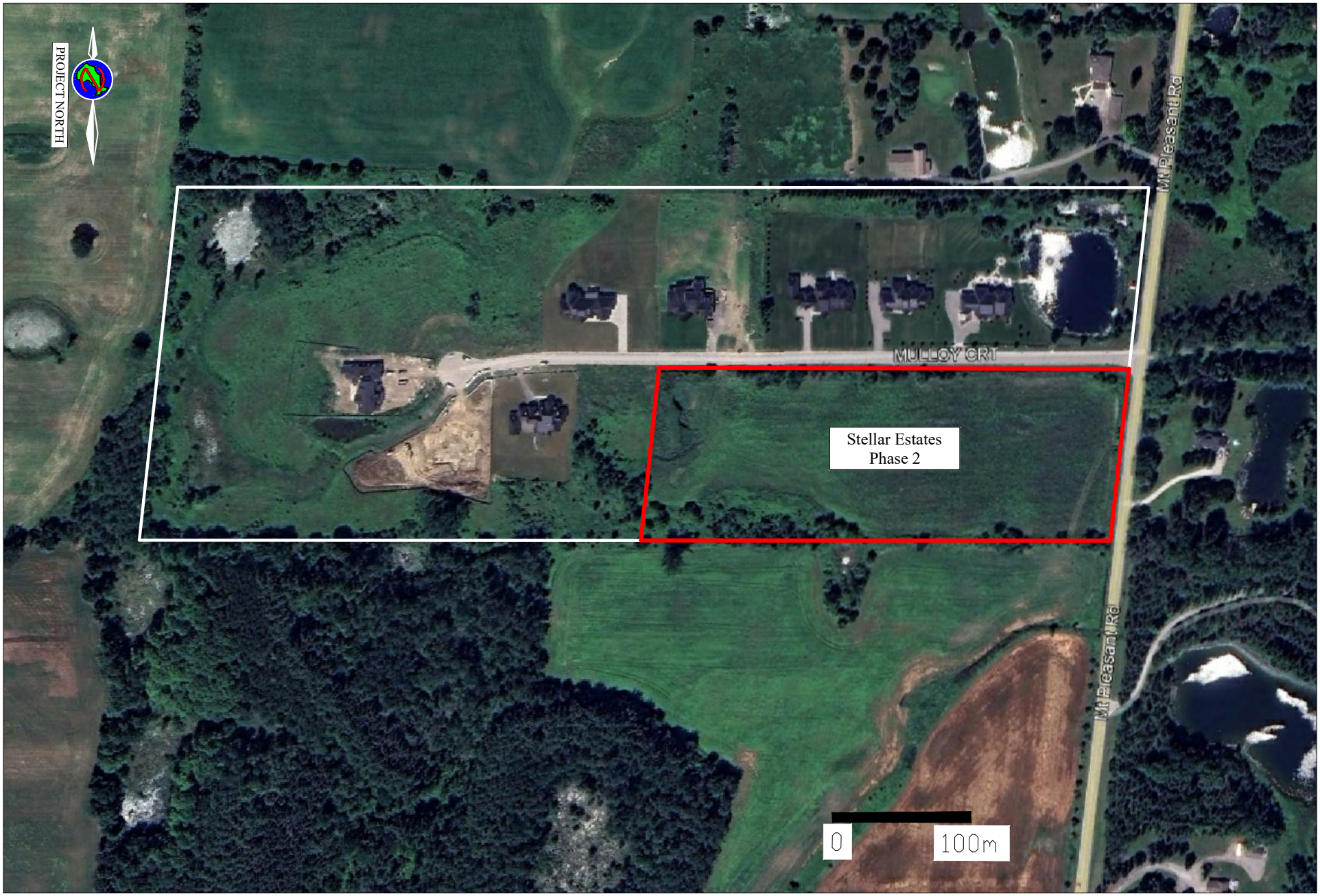
215 ADVANCE BLVD. - UNIT 5/6
BRAMPTON, ONTARIO, L6T 4V9
TEL (905) 455-5666
FAX (905) 455-5639

Date: January 24, 2024

Project No: TG22-033

Scale: As Shown

FIGURE 1



ECOMETRIX INCORPORATED.
STELLAR ESTATES PHASE 2
GEOTECHNICAL INVESTIGATION REPORT

STELLAR ESTATES PHASE 2 LIMITS

GEOTERRE

215 ADVANCE BLVD. - UNIT 5/6
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TEL (905) 455-5666
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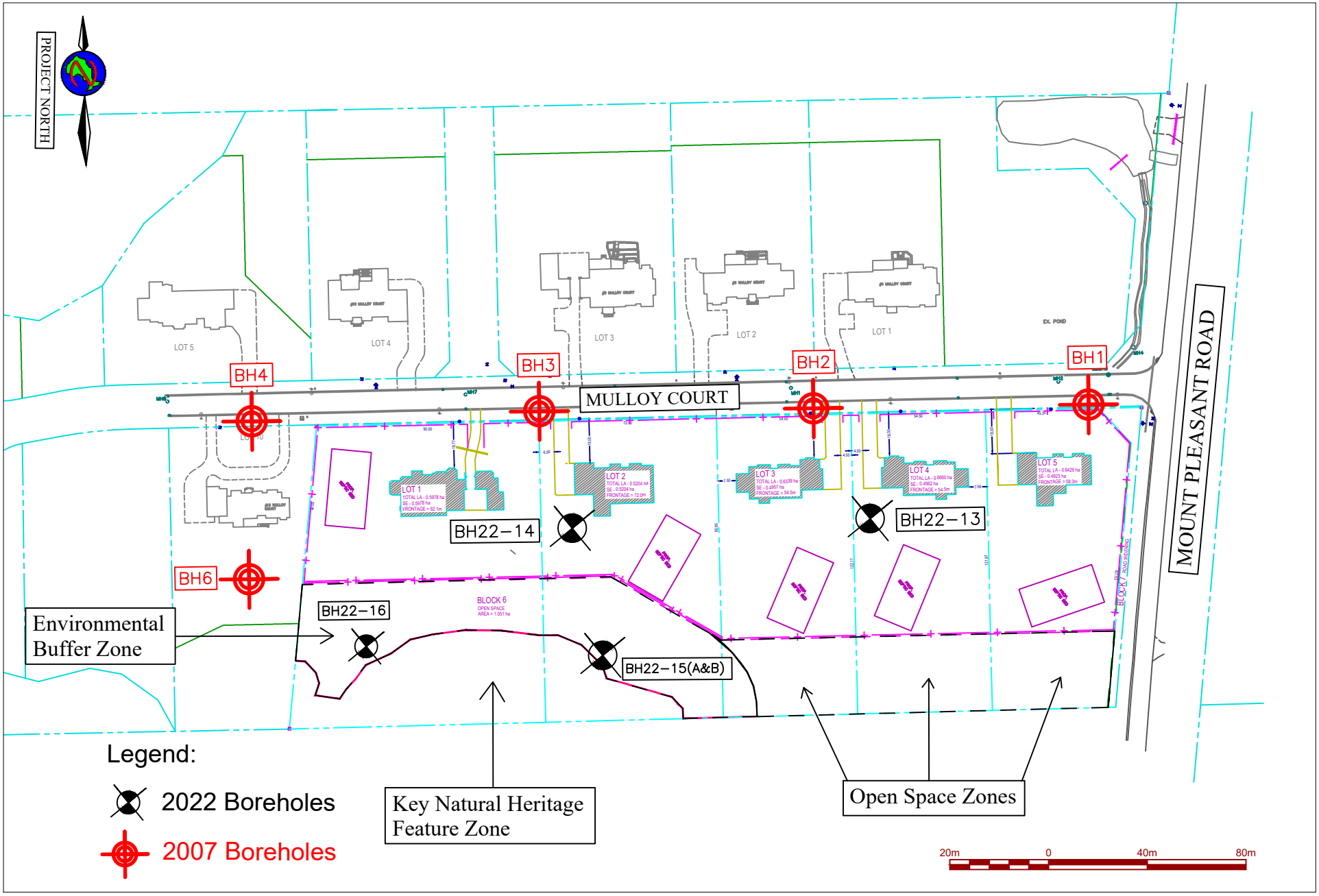
Date: January 24, 2024

Project No: TG22-033

Scale: As Shown

FIGURE 2



ECOMETRIX INCORPORATED
STELLAR ESTATES PHASE 2
GEOTECHNICAL INVESTIGATION REPORT

BOREHOLE LOCATION PLAN AND LOT DEVELOPMENT LIMITS

GEOTERRE
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TEL (905) 455-5666
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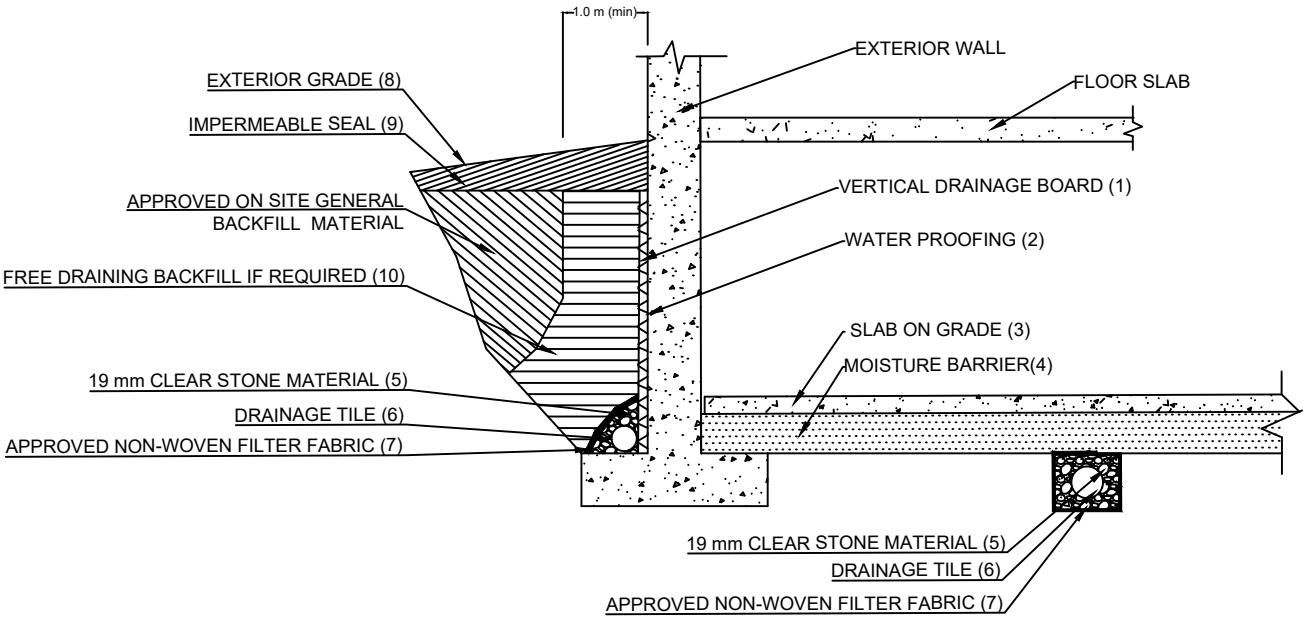
Date: JANUARY 24, 2024

Project No: TG22-033

Scale: AS SHOWN

FIGURE 3



PERIMETER FOOTING

NOTES

1. VERTICAL DRAINAGE BOARD MIRA-DRAIN 6000 OR EQUIVALENT WITH FILTER CLOTH SHOULD BE CONTINUOUS JUST BELOW EXTERIOR FINISHED GRADE TO TOP OF EXTERIOR WALL FOOTING.

2. THE BASEMENT WALLS SHOULD BE WATER PROOFED USING SUITABLE WATER-PROOFING SYSTEM TO BE DETERMINED BY OTHERS.

3. SLAB ON GRADE SHOULD NOT BE STRUCTURAL CONNECTED TO THE EXTERIOR WALL OR FOOTING.

4. MOISTURE BARRIER TO BE AT LEAST 200 mm (8") OF COMPACTED CLEAR 20 mm (3/4") STONE OR EQUIVALENT FREE DRAINING MATERIAL. A VAPOUR BARRIER MAY BE REQUIRED FOR SPECIALTY FLOORS.

5. 19 mm CLEAR STONE BEDDING MATERIAL - MINIMUM OF 75 mm (3") TOP AND BOTTOM OF DRAINAGE TILE AND 100 mm (4") TO EITHER SIDE.

6. DRAINAGE TILE TO CONSIST OF 100 mm (4") DIAMETER, WEEPING TILE OR EQUIVALENT PERFORATED PIPE WITH GEOTEXTILE SOCK LEADING TO A POSITIVE SUMP OR OUTLET.

7. APPROVED NON-WOVEN FILTER FABRIC (TERRAFIX 270R OR EQUIVALENT).

8. EXTERIOR GRADE TO SLOPE AWAY FROM BUILDING.

9. IMPERMEABLE BACKFILL SEAL - COMPACTED CLAY, CLAYEY SILT OR EQUIVALENT. IF ORIGINAL SOIL IS FREE-DRAINING, SEAL MAY BE OMITTED. MAXIMUM THICKNESS OF SEAL TO BE 0.5 m.

10. FREE DRAINING BACKFILL - OPSS GRANULAR B OR EQUIVALENT COMPACTED TO THE SPECIFIED DENSITY. DO NOT USE HEAVY COMPACTION EQUIPMENT WITHIN 2 m OF WALL. FREE DRAINING BACKFILL CAN BE OMITTED OR REDUCED IN THICKNESS IF VERTICAL DRAINAGE BOARD IS USED.

11. DO NOT CONNECT THE UNDERFLOOR DRAIN WITH THE PERIMETER DRAIN.

12. REVIEW THE GEOTECHNICAL REPORT FOR SPECIFIC DETAILS.

ECOMETRIX INCORPORATED **STELLAR ESTATES PHASE 2** GEOTECHNICAL INVESTIGATION REPORT	GEOTERRE 215 ADVANCE BLVD. - UNIT 5/6 BRAMPTON, ONTARIO, L6T 4V9 TEL (905) 455-5666 FAX (905) 455-5639	Date: January 24, 2024	Project No: TG22-033
BASEMENT AND UNDERFLOOR DRAINAGE DETAILS		Scale: NTS	FIGURE 4

APPENDIX A

LIMITATIONS AND INFORMATION REGARDING USE OF REPORT

LIMITATIONS AND INFORMATION REGARDING USE OF REPORT

This report was prepared by GeoTerre Limited (GeoTerre) in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently working under similar conditions in the jurisdiction in which the services were provided. No other warranty, expressed or implied is made

This report was prepared by GeoTerre Limited (GeoTerre) for the sole use of the named client and for review and use by its designated consultants and government agencies during realization of the project. Any use by a third party of this report other than those named in the preceding sentence, or any reliance on, or decisions to be made based on it, are the responsibility of such third parties. GeoTerre accepts no responsibility for damages, if any, suffered by any third party as of a result of decisions made or actions based on this report.

The conclusions and recommendations presented in this report are based on information determined at the borehole locations. Subsurface and groundwater conditions between and beyond the boreholes may differ from those encountered at the specific locations tested, and conditions may become apparent during construction which were not detected and could not be anticipated at the time of the site investigation. Unless otherwise noted, the information contained herein in no way reflects on environmental aspects of either the site or the subsurface conditions.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

During construction, we recommend that GeoTerre 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 considered by GeoTerre in the preparation of this report and to confirm and document that construction activities do not adversely affect the recommendations, opinions and suggestions contained in the GeoTerre report. Adequate field review, observation and testing during construction are necessary for GeoTerre 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, the GeoTerre responsibility is limited to the accurate interpretation of the information encountered at the borehole locations at the time of their initial measurement, determination or estimation during the preparation of this report.

The comments given in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of boreholes may not be sufficient to determine all the factors that may affect construction methods and costs, e.g. the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. Contractors bidding on this project or undertaking the construction should therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work.

APPENDIX B

2007 BOREHOLE LOGS

GeoTerre

Log of Borehole BH1

Project No. SPN1131R

Drawing No. 2

Project: GEOTECHNICAL INVESTIGATION

Sheet No. 1 of 1

Location: 15462 MOUNT PLEASANT ROAD

Date Drilled: August 8, 2006

Drill Type: Skidder Mounted CME 75

Datum: Non-Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test
Sensitivity
Piezometric Water Level

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
		200 mm - TOPSOIL	97.90
		FILL sandy silt to clayey silt, mixed organics, wood debris, leaves, brown, moist to very moist, loose	97.70
		SILT some clay, trace sand, grey, very moist, compact	95.40
		END OF BOREHOLE - borehole backfilled upon completion	92.87

DEPTH 0 1 2 3 4 5

N Value 20 40 60 80
Shear Strength MPa 0.1 0.2

Combustible Vapour Reading (ppm) 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight) 10 20 30

SAMPLES

Natural Unit Weight kN/m³

S & P Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	DRY	OPEN

Log of Borehole BH2

Project No. SPN1131R

Drawing No. 3

Project: GEOTECHNICAL INVESTIGATION

Sheet No. 1 of 1

Location: 15462 MOUNT PLEASANT ROAD

Date Drilled: August 8, 2006

Drill Type: Skidder Mounted CME 75

Datum: Non-Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test ——
Shelby Tube ■
Field Vane Test ✚
Sensitivity S
Piezometric Water Level ▼

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢—○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		200 mm - TOPSOIL	101.00	0
			100.80	
		SILT some sand, some clay, brown, very moist, compact		1
				2
				3
				4
			95.97	5
		END OF BOREHOLE - borehole backfilled upon completion		

N Value: 20 40 60 80
Shear Strength: 0.1 MPa 0.2
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

S & P Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	DRY	OPEN

Log of Borehole BH3

Project No. SPN1131R

Drawing No. 4

Project: GEOTECHNICAL INVESTIGATION

Sheet No. 1 of 1

Location: 15462 MOUNT PLEASANT ROAD

Date Drilled: August 8, 2006

Drill Type: Skidder Mounted CME 75

Datum: Non-Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test
Sensitivity S
Piezometric Water Level

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		150 mm - TOPSOIL	100.90 100.75	0
		SILT trace sand, trace clay, brown, moist to very moist, compact to dense		1 2 3 4
			95.87	5
		END OF BOREHOLE - borehole backfilled upon completion		

N Value: 20 40 60 80
Shear Strength: 0.1 MPa 0.2
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

S & P Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	4.3	OPEN

Log of Borehole BH4

Project No. SPN1131R

Drawing No. 5

Project: GEOTECHNICAL INVESTIGATION

Sheet No. 1 of 1

Location: 15462 MOUNT PLEASANT ROAD

Date Drilled: August 8, 2006

Drill Type: Skidder Mounted CME 75

Datum: Non-Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test
Sensitivity
Piezometric Water Level

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		200 mm - TOPSOIL	100.50	0
		100.30		
		SILT trace sand, trace clay, brown, moist to very moist, compact		1
				2
				3
				4
			95.47	5
		END OF BOREHOLE - borehole backfilled upon completion		

N Value: 20 40 60 80
Shear Strength: 0.1 MPa 0.2
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

S & P Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	DRY	OPEN

Log of Borehole BH6

Project No. SPN1131R

Drawing No. 7

Project: GEOTECHNICAL INVESTIGATION

Sheet No. 1 of 1

Location: 15462 MOUNT PLEASANT ROAD

Date Drilled: August 8, 2006

Drill Type: Skidder Mounted CME 75

Datum: Non-Geodetic

Auger Sample ⊠
SPT (N) Value ○ ▨
Dynamic Cone Test
Shelby Tube ■
Field Vane Test ✚
Sensitivity S
Piezometric Water Level ▼

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value 20 40 60 80 / Shear Strength MPa 0.1 0.2	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 10 20 30	SAMPLES	Natural Unit Weight kN/m³
		150 mm - TOPSOIL	97.60 97.45	0				
		SILT some sand, some clay, brown, very moist, compact		1				
			95.62					
		END OF BOREHOLE - borehole backfilled upon completion						

S & P Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	DRY	OPEN

APPENDIX C

2022 BOREHOLE LOGS

GeoTerre

SYMBOLS AND TERMS FOR BOREHOLE LOG SOIL DESCRIPTION

BASIC SOIL SYMBOLS

 Gravel

 Sand

 Silt

 Clay

 Fill

 Topsoil

 Bedrock

EXAMPLE SOIL REPRESENTATIONS

 Sandy Gravel

 Sand and Silt

 Silty Clay

 Silty Clay Till

 Sand and Gravel

 Silty Sand

 Clayey Silt

 Sand and Silt Till

 Gravelly Sand

 Sandy Silt

 Sandy Silt Till

CLASIFICATION BY PARTICLE SIZE (UNIFIED SOIL CLASSIFICATION SYSTEM)

NAME		PARTICLE SIZE RANGE		
		MM	U. S. STANDARD SIEVE SIZE	
			RETAINED	PASSING
Boulders		>200	8 inch	-
Cobbles		75 to 200	3 inch	8 inch
Gravel	**coarse**	19 to 75	0.75 inch	3 inch
	fine	4.75 to 19	No. 4	0.75 inch
Sand	**coarse**	2 to 4.75	No. 10	No. 4
	medium	0.425 to 2	No. 40	No. 10
	fine	0.075 to 0.425	No. 200	No. 40
Fines (Silt and Clay Particles)		<0.075	-	No. 200

PROPORTION OF MINOR COMPONENTS BY WEIGHT

noun	gravel, sand, silt, clay	>35 % and main fraction
"and"	and gravel, and silt, etc.	35 to 50 %
adjective	gravelly, sandy, silty, clayey, etc.	20 to 35 %
"some"	some sand, some silt, etc.	10 to 20 %
"trace"	trace sand, trace silt, etc.	0 to 10%

DEGREE OF PLASTICITY

DEFINITION	CATEGORY
W_L<30	Low
30<W_L<50	Medium
W_L>50	High

COMPACTNESS OF GRANULAR SOILS BASE ON SPT

COMPACTNESS CONDITION	UNCORRECTED FIELD SPT N-VALUES (BLOWS/300 MM)
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

CONSISTENCY AND UNDRAINED SHEAR STRENGTH OF COHESIVE SOILS

CONSISTENCY OF COHESIVE SOILS	UNDRAINED SHEAR STRENGTH (KPA)	UNCORRECTED FIELD SPT N-VALUES (BLOWS/300 MM)
Very Soft	<12	<2
Soft	12 to 25	2 to 4
Firm	25 to 50	5 to 8
Stiff	50 to 100	9 to 15
Very Stiff	100 to 200	16 to 30
Hard	>200	>30

LOG OF BOREHOLE BH22-13

PROJECT No.: **TG22-033**
CLIENT: **Ecometrix**
PROJECT: **Stellar Estates-Phase 2**
LOCATION: **Ontario**
SURFACE ELEV.: **267.76 metres (Geodetic)**

Drilling Data
METHOD: **Solid Stem Augers**
DIAMETER: **150 mm**
PREP. BY: **VTM** APPR. BY: **IC**
DATE: **June 22 2022**

ELEV. (m) / DEPTH (m)	Water/Backfill Data	% MOISTURE (W_P W W_L)	Symbol	MATERIAL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	'N' VALUE	VANE (kPa) / Pocket Pen (kPa) / SPT (N) Blows/0.3m / DCPT	GRAIN SIZE DISTRIBUTION (%) Gr	Sa	Si	Cl
267.6 0.2				TOPSOIL (200 mm)	1A							
				SILTY CLAY (low plasticity), trace sand, soft to firm, brown	1B		4					
					2		5		0	6	54	40
266.4 1.4				CLAYEY SILT, trace sand, compact, brown	3		21		0	6	73	22
265.6 2.1				SILTY CLAY (low plasticity), trace sand, occasional higher silt content zones, very stiff, grey/brown	4A							
					4B		22					
					5		18		0	8	67	24
					6		21		0	7	55	38
263.0 4.8					7A							
				SILT, some sand, some clay and occasional clay layers, compact to dense, grey	7B		24					
					8		41		0	14	74	13
261.2 6.6				END OF BOREHOLE AT TARGET DEPTH OF 6.6 M.								

BOREHOLE OPEN WITH STANDING WATER AT A DEPTH OF 6.1 M UPON COMPLETION OF DRILLING.

STANDPIPE PIEZOMETER (50 mm diameter) INSTALLED TO A TIP DEPTH OF 6.1 M (3.0 M LONG SCREEN) UPON COMPLETION OF DRILLING.

PIEZOMETER WATER LEVEL READINGS

DATE	Depth(m)	Elevation(m)
Jun 22'22 (noon)	dry	< 261.66
Jun 22'22 (3 pm)	2.95	264.81
Jun 23'22 (9 am)	1.36	266.40
Jul 25' 22	2.18	265.58

REPORTED SPT 'N' VALUES OBTAINED USING AN AUTOMATIC DROP HAMMER.

GEOTERRE LIMITED
215 Advance Blvd, Unit 5&6
Brampton, Ontario, L6T 4V9
Phone: 9054555666
e-mail: toronto@geoterre.ca

SAMPLE TYPE
Auger Sample
Split Spoon Sample
Bulk Sample
Thin Wall Tube Sampler
Pionjar Sample
Soil Core (PQ)

BACKFILL LEGEND
Concrete
Drill Cuttings
Asphalt
Bentonite
Filter Sand
Slotted Pipe
Grout
Slough

LOG OF BOREHOLE BH22-14

PROJECT No.: **TG22-033**
CLIENT: **Ecometrix**
PROJECT: **Stellar Estates-Phase 2**
LOCATION: **Ontario**
SURFACE ELEV.: **267.64 metres (Geodetic)**

Drilling Data
METHOD: **Solid Stem Augers**
DIAMETER: **150 mm**
PREP. BY: **VTM** APPR. BY: **IC**
DATE: **June 22 2022**

ELEV. (m) / DEPTH (m)	Water/Backfill Data	% MOISTURE (W_P W W_L)	Symbol	MATERIAL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	'N' VALUE	VANE (kPa) / Pocket Pen (kPa) / SPT (N) Blows/0.3m / DCPT	GRAIN SIZE DISTRIBUTION (%) Gr	Sa	Si	Cl
267.4 0.3				TOPSOIL (250 mm)	1A		5					
				CLAYEY SILT, trace sand, loose, grey/brown	1B							
					2		8		0	5	70	25
266.3 1.4				SILTY CLAY (low plasticity), trace sand, very stiff, grey/brown becoming grey at Sample 6	3		19					
					4		25		0	7	63	30
					5		21					
263.2 4.5					6		24					
				SILT, some clay, trace sand, compact to dense, grey	7		22		0	4	81	15
					8		33					
261.1 6.6				END OF BOREHOLE AT TARGET DEPTH OF 6.6 M.								

BOREHOLE OPEN WITH STANDING WATER AT A DEPTH OF 6.1 M UPON COMPLETION OF DRILLING.

STANDPIPE PIEZOMETER (50 mm diameter) INSTALLED TO A TIP DEPTH OF 6.1 M (3.0 M LONG SCREEN) UPON COMPLETION OF DRILLING.

PIEZOMETER WATER LEVEL READINGS

DATE	Depth(m)	Elevation(m)
Jun 22'22 (10 am)	dry	< 261.54
Jun 22'22 (3 pm)	2.60	265.04
Jun 23'22 (9 am)	2.01	265.63
Jul 25'22	1.50	266.14

REPORTED SPT 'N' VALUES OBTAINED USING AN AUTOMATIC DROP HAMMER.

GEOTERRE LIMITED
215 Advance Blvd, Unit 5&6
Brampton, Ontario, L6T 4V9
Phone: 9054555666
e-mail: toronto@geoterre.ca

SAMPLE TYPE
Auger Sample
Split Spoon Sample
Bulk Sample
Thin Wall Tube Sampler
Pionjar Sample
Soil Core (PQ)

BACKFILL LEGEND
Concrete
Drill Cuttings
Asphalt
Bentonite
Filter Sand
Slotted Pipe
Grout
Slough

LOG OF BOREHOLE BH22-15

PROJECT No.: **TG22-033**
CLIENT: **Ecometrix**
PROJECT: **Stellar Estates-Phase 2**
LOCATION: **Ontario**
SURFACE ELEV.: **265.41 metres (Geodetic)**

Drilling Data
METHOD: **See Note 1)**
DIAMETER:
PREP. BY: **PSH** APPR. BY: **IC**
DATE: **June 23 2022**

ELEV. (m) / DEPTH (m)	Water/Backfill Data	% MOISTURE (W_P 10 20 30 40 W W_L)	Symbol	MATERIAL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	'N' VALUE	VANE (kPa) ✖ / Pocket Pen (kPa) + 20 40 60 80; SPT (N) ● Blows/0.3m / DCPT ◆ 20 40 60 80	GRAIN SIZE DISTRIBUTION (%) Gr	Sa	Si	Cl
264.8 / 0.6				TOPSOIL (600 mm)	1A		5					
					1B							
				SAND AND SILT, trace gravel, trace clay and frequent thin layers of clay, very loose to loose, brown	2		4					
					3		9		3	39	49	9
263.3 / 2.1				SILTY CLAY (low plasticity), trace sand, frequent thin layers of silt, firm, grey	4		9					
					5		11		0	6	62	32
261.8 / 3.7				NO SAMPLE RECOVERY	6		6					
261.0 / 4.4				SILTY CLAY (low plasticity), frequent thin layers of sand, very stiff, grey	7		17					
259.8 / 5.6				CLAYEY SILT, some sand, trace gravel, compact, loose, grey	8		20					
					9		25		1	14	61	24
					10		24					
255.3 / 10.1				SILTY CLAY (low plasticity), trace sand, very stiff, grey	11		25					

LOG OF BOREHOLE ECOMETRIX-STELLARESTATE-PHASE2.GPJ GEOTERRE.GDT 1-17-24

GEOTERRE LIMITED
215 Advance Blvd, Unit 5&6
Brampton, Ontario, L6T 4V9
Phone: 9054555666
e-mail: toronto@geoterre.ca

SAMPLE TYPE
- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Thin Wall Tube Sampler
- Pionjar Sample
- Soil Core (PQ)

BACKFILL LEGEND
- Concrete
- Drill Cuttings
- Asphalt
- Bentonite
- Filter Sand
- Slotted Pipe
- Grout
- Slough

LOG OF BOREHOLE BH22-15

PROJECT No.: **TG22-033**
CLIENT: **Ecometrix**
PROJECT: **Stellar Estates-Phase 2**
LOCATION: **Ontario**
SURFACE ELEV.: **265.41 metres (Geodetic)**

Drilling Data
METHOD: **See Note 1)**
DIAMETER:
PREP. BY: **PSH** APPR. BY: **IC**
DATE: **June 23 2022**

ELEV. (m) / DEPTH (m)	Water/Backfill Data	% MOISTURE (W_P W W_L)	Symbol	MATERIAL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	'N' VALUE	VANE (kPa) / Pocket Pen (kPa) / SPT (N) Blows/0.3m / DCPT	GRAIN SIZE DISTRIBUTION (%) Gr	Sa	Si	Cl
				SILTY CLAY (low plasticity), trace sand, very stiff, grey	12		28		0	5	59	36
					13		29					
250.7 / 14.7				NO SAMPLE RECOVERY	14		23					
249.7 / 15.7				END OF BOREHOLE AT TARGET DEPTH OF 15.7 M.								

BOREHOLE OPEN UPON COMPLETION OF DRILLING WITH WATER LEVEL A SHORT DISTANCE BELOW GROUND DUE TO BEING DRILLED USING WASHBORING.

REPORTED SPT 'N' VALUES OBTAINED USING AN AUTOMATIC DROP HAMMER.

LOWER MONITORING WELL A (50 mm diameter) INSTALLED TO A TIP DEPTH OF 15.7 M (3.0 M LONG SCREEN) UPON COMPLETION OF DRILLING.

MONITORING WELL A WATER LEVEL READINGS

DATE	Depth (m)	Elevation (m)
Jul 25'22	0.84	264.57

UPPER MONITORING WELL B (50 mm diameter) INSTALLED TO A TIP DEPTH OF 5.8 M (3.0 M LONG SCREEN) IN CLOSELY ADJACENT (3 M EAST) UNSAMPLED BOREHOLE UPON COMPLETION OF DRILLING. GROUND ELEVATION AT WELL B, 0.15 M HIGHER THAN WELL A.

MONITORING WELL B WATER LEVEL READINGS

DATE	Depth (m)	Elevation (m)
Jul 25'22	1.44	263.97

NOTES
1) SOLID STEM AUGERS (150mm diameter) TO 3.0 M, FOLLOWED BY WASHBORING IN CONJUCTION WITH 96MM TRI-CONE FOR REMAINDER OF BOREHOLE.

GEOTERRE LIMITED
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Brampton, Ontario, L6T 4V9
Phone: 9054555666
e-mail: toronto@geoterre.ca

SAMPLE TYPE
Auger Sample
Split Spoon Sample
Bulk Sample
Thin Wall Tube Sampler
Pionjar Sample
Soil Core (PQ)

BACKFILL LEGEND
Concrete
Drill Cuttings
Asphalt
Bentonite
Filter Sand
Slotted Pipe
Grout
Slough

LOG OF BOREHOLE BH22-16

PROJECT No.: **TG22-033**
CLIENT: **Ecometrix**
PROJECT: **Stellar Estates-Phase 2**
LOCATION: **Ontario**
SURFACE ELEV.: **264.60 metres (Geodetic)**

Drilling Data
METHOD: **Solid Stem Augers**
DIAMETER: **150 mm**
PREP. BY: **VTM** APPR. BY: **IC**
DATE: **June 22 2022**

ELEV. (m) / DEPTH (m)	Water/Backfill Data	% MOISTURE (W_P W W_L)	Symbol	MATERIAL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	'N' VALUE	VANE (kPa) / Pocket Pen (kPa) / SPT (N) / DCPT Blows/0.3m	GRAIN SIZE DISTRIBUTION (%) Gr	Sa	Si	Cl
264.4 0.2				TOPSOIL (150 mm)	1A							
				CLAYEY SILT, trace sand, loose, grey/brown	1B		5					
					2		10		0	1	76	24
262.9 1.7				SILTY FINE SAND TO SAND AND SILT, trace clay, compact, brown	3A							
					3B		15					
262.0 2.6				SILTY CLAY (low plasticity), trace gravel, trace sand, firm to stiff, grey	4A		11					
					4B							
					5		9					
					6		13		2	6	55	37
260.2 4.4				SILTY CLAY (low plasticity), trace sand and frequent thin layers of silt, very stiff, grey	7		20					
					8		30					
258.0 6.6				END OF BOREHOLE AT TARGET DEPTH OF 6.6 M.								

BOREHOLE OPEN TO DEPTH OF 3.4 M WITH STANDING WATER AT 2.1 M UPON COMPLETION OF DRILLING.

STANDPIPE PIEZOMETER (50 mm diameter) INSTALLED TO A TIP DEPTH OF 4.1 M (3.0 M LONG SCREEN) UPON COMPLETION OF DRILLING.

PIEZOMETER WATER LEVEL READINGS

DATE	Depth(m)	Elevation(m)
Jun 22'22 (3 pm)	1.50	263.10
Jul 25'22	2.02	262.58

REPORTED SPT 'N' VALUES OBTAINED USING AN AUTOMATIC DROP HAMMER.

GEOTERRE LIMITED
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Phone: 9054555666
e-mail: toronto@geoterre.ca

SAMPLE TYPE
- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Thin Wall Tube Sampler
- Pionjar Sample
- Soil Core (PQ)

BACKFILL LEGEND
- Concrete
- Drill Cuttings
- Asphalt
- Bentonite
- Filter Sand
- Slotted Pipe
- Grout
- Slough

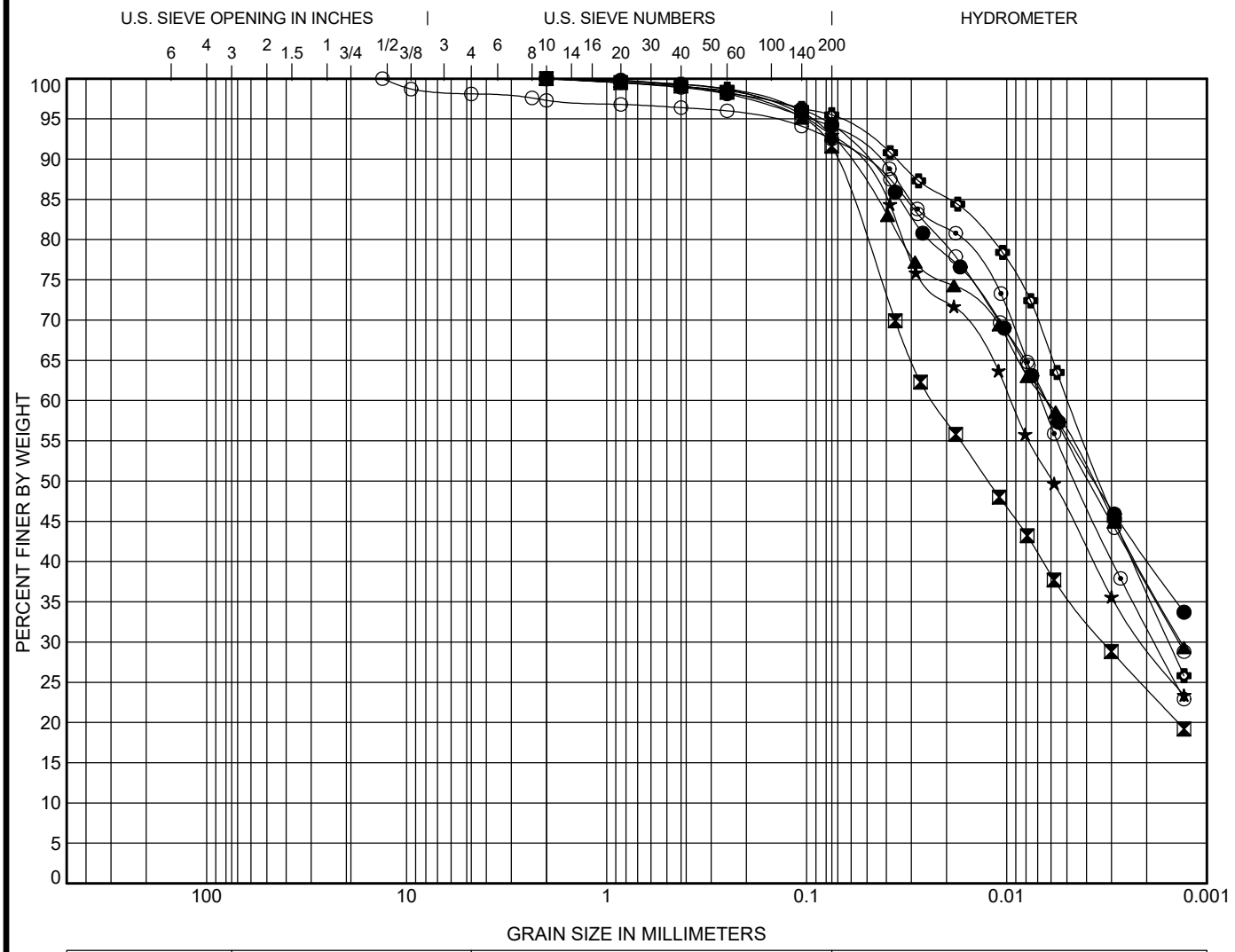
LOG OF BOREHOLE ECOMETRIX-STELLARESTATE-PHASE2.GPJ GEOTERRE.GDT 1-17-24

APPENDIX D

2022
LABORATORY GRAIN SIZE DATA

GeoTerre

GRAIN SIZE ANALYSIS
SILTY CLAY MATERIALS



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification and Depth (m)		Classification	LL	PL	PI	Cc	Cu
●	BH22-13	0.99						
⊠	BH22-13	3.28						
▲	BH22-13	4.04		**27**	**15**	**12**		
★	BH22-14	2.51						
⊙	BH22-15	3.28		**25**	**16**	**9**		
✿	BH22-15	12.42		**26**	**16**	**10**		
○	BH22-16	4.04						

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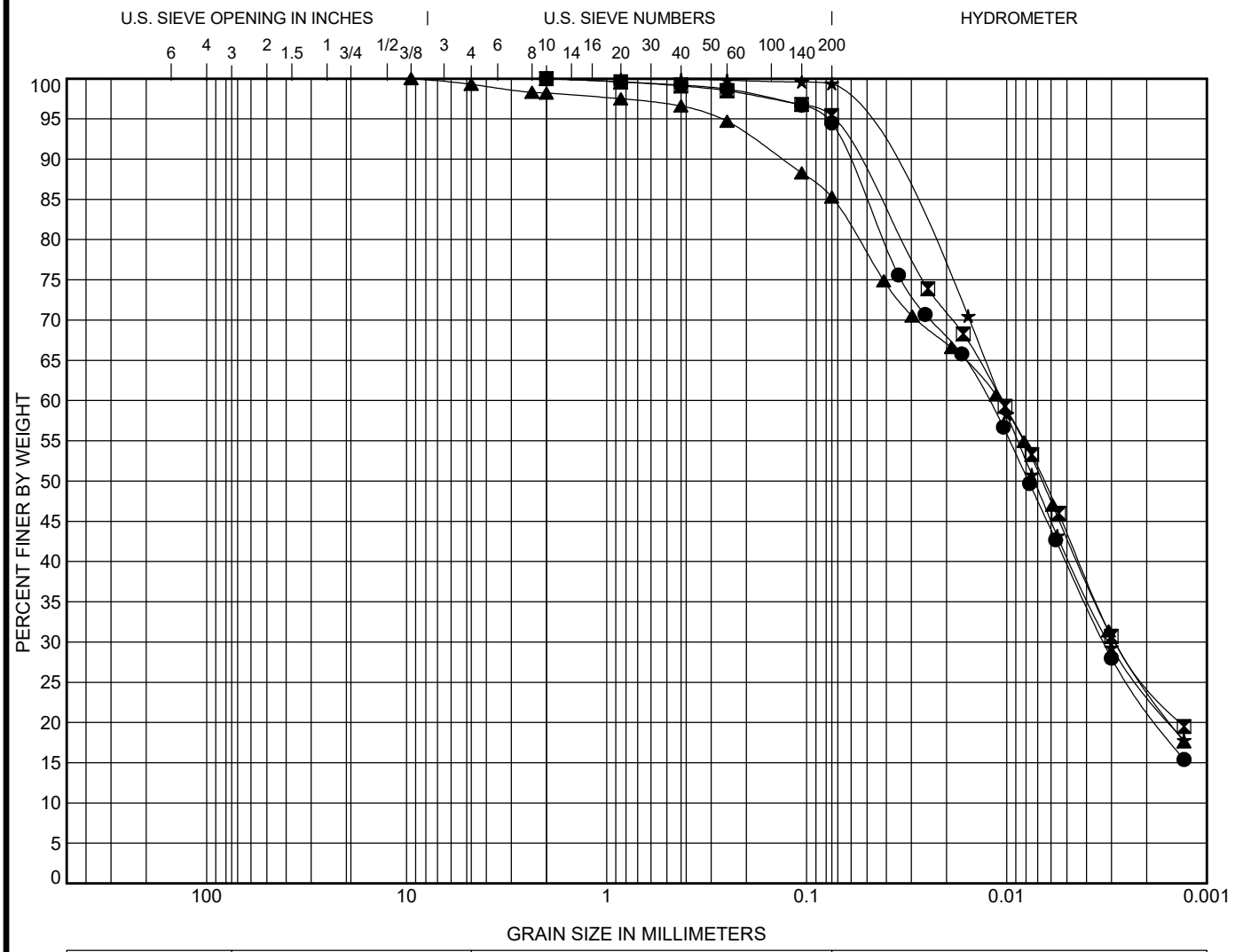
e-mail: toronto@geoterre.ca

FIGURE D1

Project No.: TG22-033
Client: Ecometrix
Project: Stellar Estates-Phase 2
Location: Ontario

GRAIN SIZE ANALYSIS
CLAYEY SILT MATERIALS



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification and Depth (m)		Classification	LL	PL	PI	Cc	Cu
●	BH22-13	1.75						
⊠	BH22-14	0.99						
▲	BH22-15	7.85						
★	BH22-16	0.99						

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FIGURE D2

Project No.: TG22-033

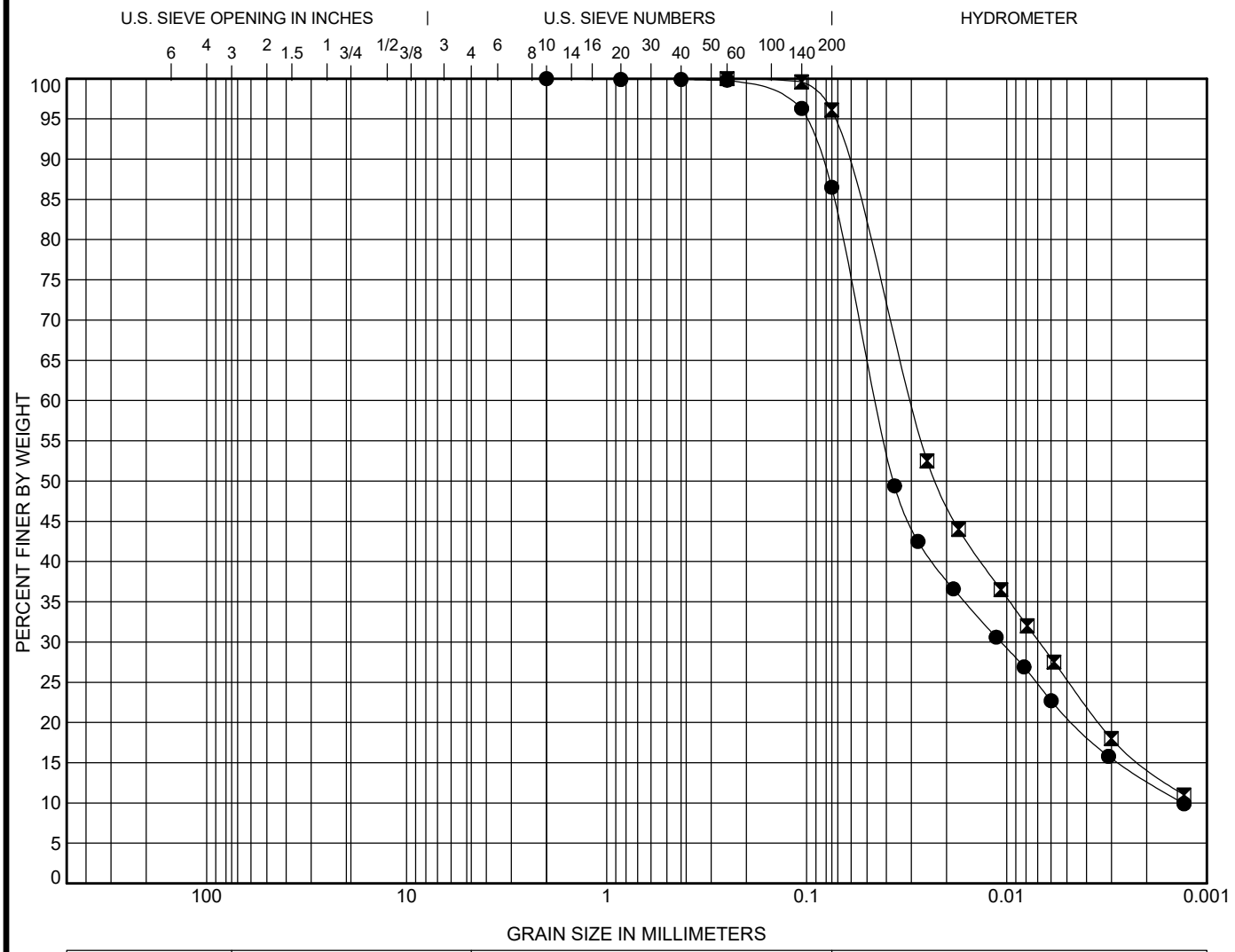
Client: Ecometrix

Project: Stellar Estates-Phase 2

Location: Ontario

GRAINSIZE - GEOTERRE ECOMETRIX-STELLARESTATE-PHASE2.GPJ GEOTERRE.GDT 1-16-24

GRAIN SIZE ANALYSIS
SILT WITH SOME CLAY MATERIALS



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification and Depth (m)		Classification	LL	PL	PI	Cc	Cu
●	BH22-13	6.32					**1.95**	**33.92**
⊠	BH22-14	4.80						

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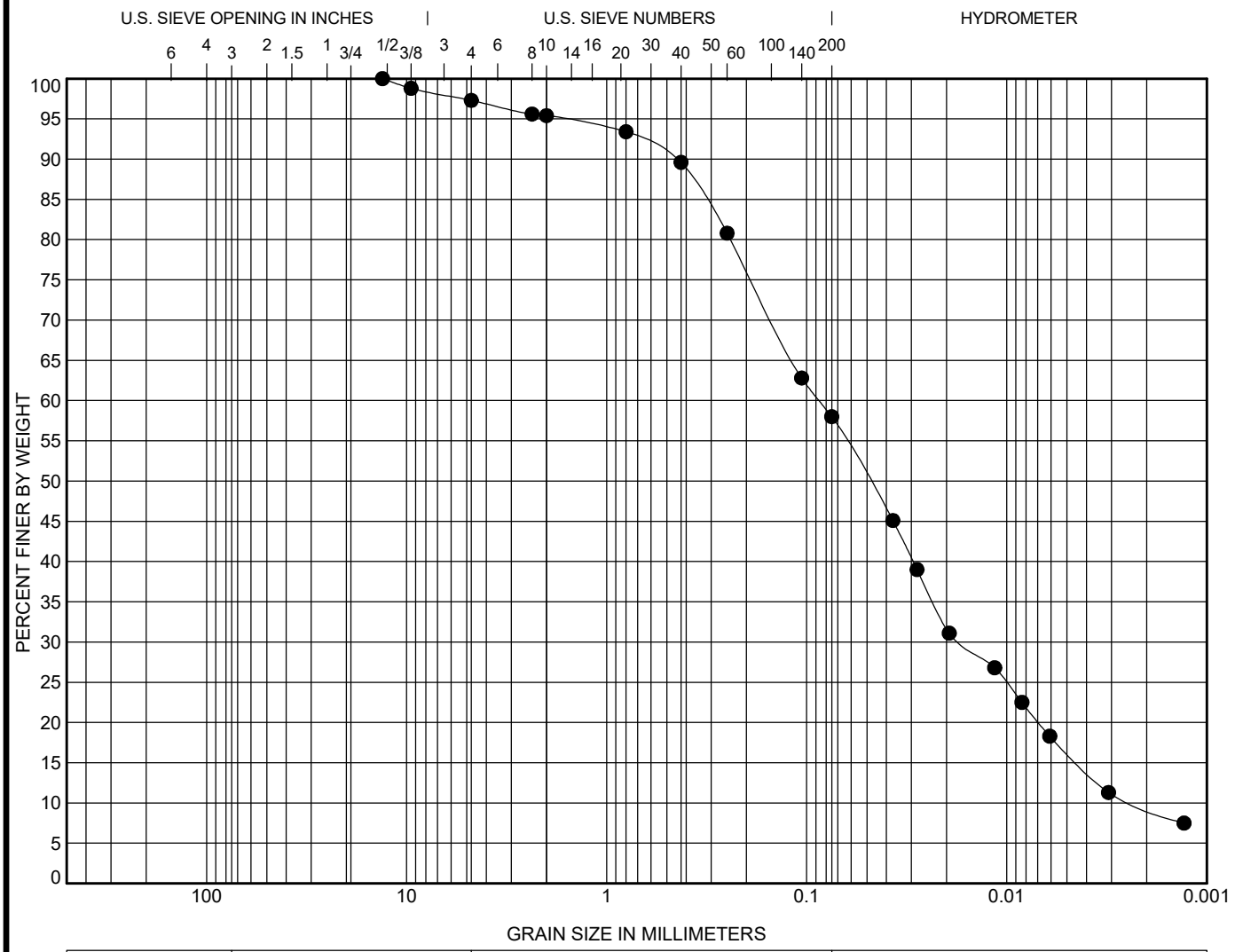
FIGURE D3

Project No.: TG22-033
Client: Ecometrix
Project: Stellar Estates-Phase 2
Location: Ontario

GRAINSIZE - GEOTERRE ECOMETRIX-STELLARESTATE-PHASE2.GPJ GEOTERRE.GDT 1-16-24

GRAIN SIZE ANALYSIS
SAND AND SILT MATERIALS



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification and Depth (m)		Classification	LL	PL	PI	Cc	Cu
●	BH22-15	1.75					**1.44**	**37.62**

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FIGURE D4

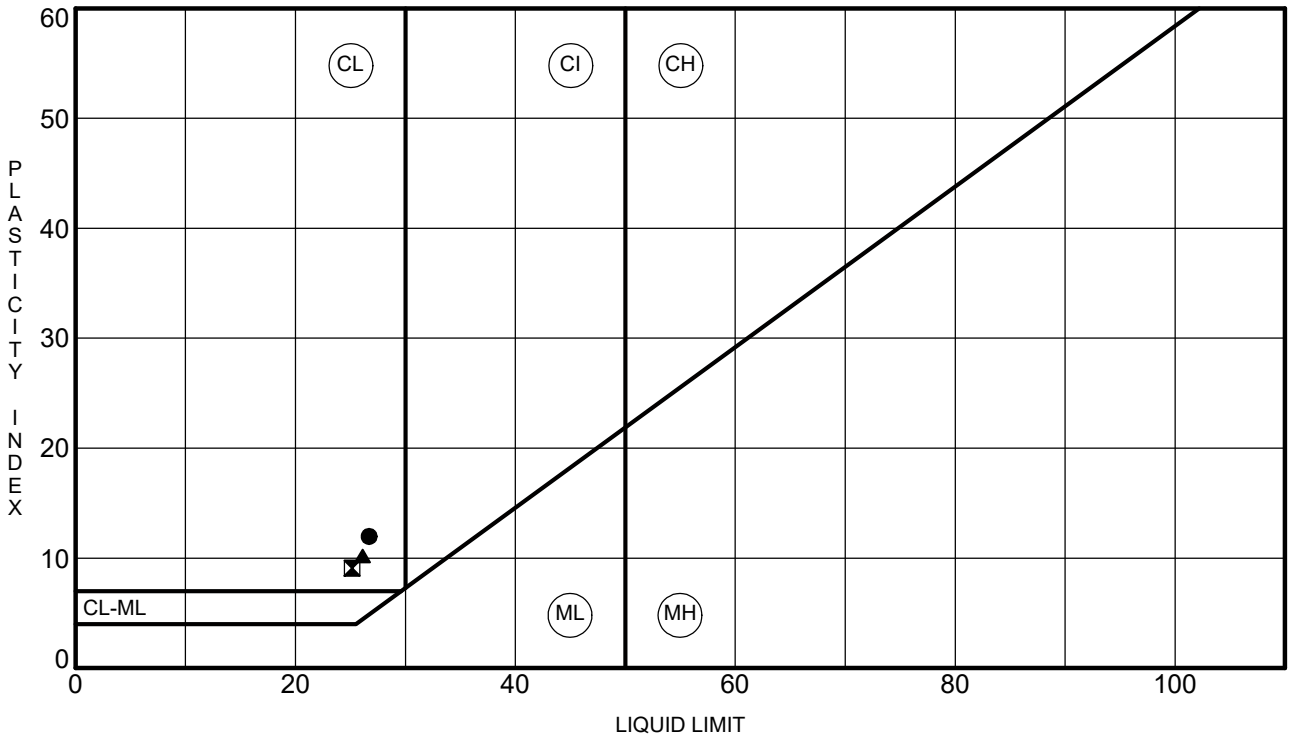
Project No.: TG22-033
Client: Ecometrix
Project: Stellar Estates-Phase 2
Location: Ontario

APPENDIX E

2022
SOIL PLASTICITY DATA

GeoTerre

ATTERBERG LIMIT TEST RESULTS
SILTY CLAY MATERIALS



	Specimen Identification and Depth (m)		LL	PL	PI	Fines	Classification
●	BH22-13	4.04	**27**	**15**	**12**	**93**	**LEAN CLAY(CL)**
⊠	BH22-15	3.28	**25**	**16**	**9**	**94**	**LEAN CLAY(CL)**
▲	BH22-15	12.42	**26**	**16**	**10**	**96**	**LEAN CLAY(CL)**

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FIGURE E1

Project No.: TG22-033
Client: Ecometrix
Project: Stellar Estates-Phase 2
Location: Ontario

GEOTERRE ATTERBERG LIMITS ECOMETRIX-STELLARESTATE-PHASE2.GPJ GEOTERRE.GDT 1-16-24