GEOTECHNICAL INVESTIGATION REPORT

Proposed Redevelopment of Gas Service Station
623 Yonge Street and 515 Big Bay Point Road
Barrie, Ontario

February 1, 2024

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APPENDICES

1.0 INTRODUCTION

Terrapex Environmental Ltd. (Terrapex) has been retained by Suncor Energy Products Partnership (Suncor) to carry out a geotechnical investigation for the proposed redevelopment of the gas service station located at 623 Yonge Street and 515 Big Bay Point Road, Barrie, Ontario (the Site). Authorization to proceed with this study was given by Ms. Kelly Klassen from Suncor.

It is understood that the proposed development consists of decommissioning and replacing the existing underground fuel tank nest, demolishing and reconfiguring the existing canopy and pump islands, and demolishing the existing buildings and building a larger convenience store and drive-through restaurant.

The purpose of this investigation was to characterize the underlying soil and groundwater conditions, to determine the relevant geotechnical properties of encountered soils and to provide recommendations with respect to foundation type and design, slab-on-grade construction, seismic site classification, and other geotechnical aspects of the design and construction of the proposed gas station.

This report presents the results of the investigation performed in accordance with the general terms of reference outlined above and is intended for the guidance of the owner and the design architects or engineers only. It is assumed that the design will be in accordance with the applicable building codes and standards.

2.0 FIELDWORK

The fieldwork for this study was carried out during November 7 to 9, 2023. It consisted of eleven (11) boreholes advanced by a drilling contractor commissioned by **Terrapex**. The boreholes are designated as BH401, MW402, MW403, BH404, BH405, MW406, BH407, MW408, MW409, MW410, MW411, and advanced to depths ranging from 6.0 to 9.6 m below ground surface (mbgs). MW402, MW403, MW406, MW408, MW409, MW410, and MW411 were instrumented with monitoring wells for long-term monitoring of groundwater levels.

The locations of the boreholes were chosen by Terrapex to provide general coverage of the proposed redevelopment at the Site and are shown on the General Site Layout enclosed in Appendix B. Terrapex was required to daylight around all boreholes except MW410, and MW411 to a depth 2.5 mbgs to avoid potential conflict with buried utilities.

Bulk/grab samples were collected during the course of daylighting while Standard Penetration Tests (SPT) were carried out in the course of advancing the boreholes to take representative soil samples and to measure penetration index values (N-values) to characterize the condition of various materials. The number of blows of the striking hammer required to drive the split spoon

sampler through 300 mm depth increments was recorded and these are presented on the logs as penetration index values. Results of SPT tests are shown on the Borehole Log Sheets in Appendix C of this report.

Groundwater level observations were made in all boreholes during and upon the completion of advancing each borehole, and subsequently in the monitoring wells on November 17 and 23, 2023.

The ground surface elevations at the locations of the boreholes and monitoring wells were established by **Terrapex** using a Trimble GNSS Receiver.

The fieldwork for this project was carried out under the supervision of an experienced geo-environmental technician from this office who laid out the positions of the boreholes in the field; arranged locates of buried services, effected the drilling, sampling, and in situ testing, observed groundwater conditions, and prepared field borehole log sheets.

3.0 LABORATORY TESTS

The soil samples recovered from the split spoon sampler were properly sealed, labelled and brought to our laboratory.

Classification tests such as water content determination tests and grain size analyses were carried out on representative soil samples. The test results are reported on the Borehole Log Sheets enclosed in Appendix C, and are presented on Figures 1, 2, 3, and 4, enclosed in Appendix D.

In addition, two (2) native soil samples were submitted to AGAT Laboratories for determination of pH and sulphate content and to determine potential for sulphate attack on buried concrete. The results of these tests are enclosed in Appendix E; discussed in Section 5.8 of this report.

4.0 SITE AND SUBSURFACE CONDITONS

Full details of the subsurface and groundwater conditions at the Site are given on the Borehole Log Sheets attached in Appendix C of this report.

The following paragraphs present a description of the Site and a commentary on the engineering properties of the various soil materials contacted in the boreholes.

It should be noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are

intended to reflect transition zones for the purpose of geotechnical design, and therefore, should not be construed as exact planes of geological change.

4.1. SITE DESCRIPTION

The Site is located at the southeast corner of the intersection of Big Bay Point Road and Yong Street, east of Highway 400, municipally known as 623 Yonge Street and 515 Big Bay Point Road, Barrie, Ontario.

The Site is currently occupied by a gas station which contains a convenience store, pump island canopy, a fuel tank nest, and a drive-through car wash. The ground surface surrounding the structures is covered with asphaltic concrete and Portland cement concrete pavements for site access and surface parking, and landscaping consisting of short grass and some young trees.

The ground surface topography of the Site is relatively flat.

4.2. TOPSOIL

A surficial topsoil layer was encountered at the location of Boreholes BH407, MW408, MW410 and MW411 with an approximate thickness ranging from 150 to 600 mm in the landscaped area of the Site.

4.3. PAVEMENT STRUCTURE

Asphaltic concrete pavement is present at the location of Boreholes BH401, MW402, MW403, BH404, BH405, MW406, and MW409. The thickness of asphaltic concrete layer is about 110 mm at Boreholes MW403, MW405, and MW406; and ranges between 50 to 90 mm at Boreholes BH401, MW402, BH404 and MW409.

4.4. FILL MATERIAL

General fill material is present underneath the topsoil at the location of BH407, MW408, MW410, and MW411, and below the asphaltic concrete pavement at the Boreholes BH401, MW402, MW403, BH404, BH405, MW406, and MW409, extending to depths ranging from approximately 1.0 to 2.6 mbgs.

Fill material generally consists of silt, sand, sand and gravel, clayey silt with trace to some of sand, sandy silt with trace of clay and gravel, silty sand with trace of clay, and silty clay to clayey silt with trace of sand.

The fill material is brown, dark brown, black, and grey in color and the water content of the

samples obtained from Boreholes MW403, MW406, BH407, and MW411 range from 6% to 24% by weight; generally found to be moist to wet in appearance.

SPT carried out in the non-cohesive fill material provided N-values ranging from 2 to 21, indicating a loose to compact compactness condition. SPT carried out in the cohesive fill material provided N-values ranging from 4 to 18, indication a firm to very stiff consistency.

Due to daylighting in borehole BH407 the presence or thickness of the fill material was not measured.

4.5. NATIVE SOIL

The native soil below the fill material generally consists of sandy silt to silty sand till.

4.5.1 SANDY SILT TO SILTY SAND TILL

Non-cohesive to slightly cohesive till consisting of sandy silt till to silty sand till is present below the fill material in all boreholes extending to the explored depths of the boreholes.

The sandy silt to silty sand till soils are glacial deposits consisting of a random mixture of soil particles ranging from clay to gravel, with sand, and silt being the predominant fractions. It is brown to grey in colour and the water content of the samples of cohesive till obtained from Boreholes MW403, MW406, BH407, and MW411 are 7% to 15% by weight, moist to wet in appearance.

SPTs carried out in the non-cohesive till provided N-values ranging from 9 blows for 300 mm penetration to 94 blows for 250 mm of penetration, indicating a loose to very dense compactness condition, more typically being compact.

Grain size analysis and Atterberg Limits test were carried out on three (3) samples from the till. The test results are enclosed in Appendix D and are summarized in the following table.

Sample No. and Depth	Sample Description (According to CFEM, 4th Edition)	Gravel %	Sand %	Silt %	Clay %	Plastic Limit	Liquid Limit	Soil Classification (According to USCS)
MW406 Sample 4 2.3 m	SANDY SILT some clay trace gravel	5	28	48	19	13	20	Inorganic clay of low plasticity (CL)
MW407 Sample 6 3.2 m	GRAVELLY SILTY SAND trace to some clay	24	40	26	10	-	-	Non-Plastic
MW411 Sample 5 3.0 m	SILTY SAND some clay trace gravel	8	48	32	12	-	-	Non-Plastic

Based on the results of the grain size analysis, the Coefficient of Permeability (k) of the non-cohesive till is estimated to be less than 2 x 10^{-6} cm/sec, corresponding to medium relative permeability. Based on the Atterberg limits test the silty sand till has a low plasticity.

4.6. GROUNDWATER

Groundwater level in the monitoring wells were measured on November 17, and 23, 2023. The groundwater level measurements are shown on the individual borehole logs and are summarized in the following table.

Borehole No.	Ground Surface Elevation (m)	Date Measured	Groundwater Depth (mbgs)	Groundwater Elevation (m)
MW402	251.01	November 17, 2023	5.03	245.98
		November 23, 2023	5.12	245.89
MW403	250.84	November 17, 2023	4.80	246.04
		November 23, 2023	4.81	246.03
MW406	251.36	November 17, 2023	5.11	246.25
		November 23, 2023	5.25	246.11
MW408	251.90	November 17, 2023	5.74	246.16
		November 23, 2023	5.81	246.09
MW409	250.44	November 17, 2023	4.33	246.11
		November 23, 2023	4.41	246.03
MW410	251.21	November 17, 2023	4.89	246.32
		November 23, 2023	4.90	246.31
MW411	251.25	November 17, 2023	5.34	245.91
		November 23, 2023	5.39	245.86

It should be noted that groundwater levels are subject to seasonal fluctuations. A higher groundwater level condition may develop following significant rainfall events.

5 DISCUSSION AND RECOMMENDATIONS

The following discussions and recommendations are based on the factual data obtained from the boreholes advanced at the Site by **Terrapex** and are intended for use by the client and design architects and engineers only.

We understand that it is proposed to demolish the pump islands, remove the underground storage tanks, and redevelop the Site with reconfigured pump islands and a new tank nest installation at

the current tank nest location.
The subsurface soil conditions at the Site generally consist of asphaltic concrete pavement outside of the landscaping area, underlain by fill material, extending to 1.0 to 2.6 mbgs, followed by native deposits including, sandy silt to silty sand till with trace to some clay and gravel.

Contractors bidding on this project or conducting work associated with this project should make their own interpretation of the factual data and/or carry out their own investigations.

5.1. EXCAVATION

Based on the field results, excavations for the foundations are not expected to pose any unusual difficulty. Excavation of the soils at this site can be carried out with hydraulic excavators.

The native soil at this site is a glacial deposit, a non-sorted sediment, which may contain boulders. Provisions must be made in the foundation and excavation contracts for the removal of possible boulders.

All excavations must be carried out in accordance with the Occupational Health and Safety Act (OHSA). With respect to the OHSA, the fill materials are expected to conform to Type 3 soil. The native soil deposits are expected to conform to Type 3 soil above groundwater table and Type 4 soil below groundwater table.

Temporary excavation side-walls in Type 2 soils may be cut with vertical sidewalls within the lower 1.2 m height of excavation and 1.0 horizontal to 1.0 vertical above this height. Temporary excavation sidewalls in Type 3 soils should not exceed 1.0 horizontal to 1.0 vertical. Side slopes of excavations extended into Type 4 soil should not be any steeper than 3.0 horizontal to 1.0 vertical. Locally, where loose or soft soil is encountered at shallow depths or within zones of persistent seepage, it will be necessary to flatten the side slopes as necessary to achieve stable conditions.

Where workers must enter excavations extending deeper than 1.2 m below grade, the excavation sidewalls must be suitably sloped and/or braced in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavation side-slopes should not be unduly left exposed to inclement weather. Excavation slopes consisting of sandy soils will be prone to gullying in periods of wet weather unless the slopes are properly sheeted with tarpaulins.

5.2. GROUNDWATER CONTROL

Based on observations made during drilling of the boreholes and close examination of the soil samples extracted from the boreholes, significant groundwater seepage is not anticipated to be encountered within excavations above groundwater level and as such, it is anticipated that

adequate control of groundwater can be achieved with a series of filtered sump pumps at shallow depths.

The groundwater level measured in the monitoring wells was between geodetic elevations of 245.86 masl and 246.32 masl, given the generally non-cohesive nature of the soil, any excavation below groundwater level will require active dewatering using deep wells or wellpoint system, to lower the groundwater level to at least 1 m below the base of the excavation, otherwise it may result in unstable base and flowing sides. The dewatering contractor must ensure that there will be no impact to municipal supply wells within 300 m of the site.

Surface water should be directed away from open excavations.

5.3. REUSE OF ON-SITE EXCAVATED SOIL

On-site excavated inorganic soils are considered suitable for reuse as backfill provided their water content is within 2% of their optimum water content (OWC) as determined by Standard Proctor testing, and the materials are effectively compacted with a suitably sized compactor.

While the quality of the on-site soils is considered suitable for backfilling; the moisture content of the soils and the lift thickness for compaction must be properly controlled during backfilling.

On-site soils that are wetter than their OWC should be dried sufficiently prior to use as backfill in order to achieve the specified degree of compaction.

5.4. FOUNDATION DESIGN

5.4.1 CONVENIENCE STORE, CANOPY AND PUMP ISLANDS

We understand that redevelopment of the gas station will include reconstruction of the convenience store, canopy and fuel pump islands. The drawing “Proposed Site Plan”, SP1 dated September 29, 2023 prepared by K Paul Architects was provided for our use by Suncor.

The boreholes show that the conventional strip and spread footings founded at least 0.30 m into compact to dense native strata may provide a bearing capacity of 150 kPa at serviceability limit state (SLS) and 225 kPa at ultimate limit state (ULS). Alternatively, the proposed foundation could be supported by on engineered fill material for the above noted bearing capacities.

The total and differential settlements of spread footing foundations designed in accordance with the recommendations provided in this report should not exceed the conventional limits of 25 mm and 19 mm respectively.

All exterior footings should be provided with at least 1.2 m of soil cover or its equivalent for protection from frost penetration.

In the event the foundations are extended below the water level, it will be necessary to control the ingress of groundwater prior to the excavation for the foundations. The foundation excavations must be maintained stable and dry during construction.

The excavations resulting from the removal of the existing USTs, convenience store and pump islands foundations beyond the proposed footings will need to be backfilled with a suitable compactable fill material. The engineered fill operation should be monitored, and density tests should be performed on a full-time basis. The exposed subgrade soils must also be approved by the Geotechnical Engineer prior to any fill placement. Soils used as engineered fill should be free of organic and/or other unsuitable material. The engineered fill must be placed in lifts not exceeding 200 mm in thickness and compacted to 98% of the material's Standard Proctor maximum dry density (SPMDD).

As an alternative to soil or aggregate backfill, lean concrete with a minimum compressive strength of 1 MPa at 28 days may be used in lieu of engineered fill to support the proposed foundations.

5.4.2 UNDERGROUND FUEL STORAGE TANKS

Commonly, underground fuel storage tanks are installed with the base of the tank at a depth of about 4.5 m below the ground surface; it is anticipated that the soils encountered at this depth will consist of compact to dense non-cohesive till. Given the consistency of the subgrade is suitable to support the proposed underground fuel storage tanks.

Excavation backfill should be carried out in accordance with the tank manufacturer's specifications to the finished subgrade levels. The manufacturer's recommendations should be reviewed to confirm that the geotechnical recommendations provided in this report do not contravene the manufacturer's recommendations. Should conflicts exist between the manufacturer's recommendations and the recommendations provided in this report, the more stringent recommendations should apply. It is anticipated that the backfill will consist of pea gravel.

In the event that the backfill will consist of pea gravel or clear stone, it should be separated from the enclosing soil with a suitable needle-punched, non-woven geotextile. The geotextile should have an apparent opening size (AOS) of not more than 0.15 mm.

The fuel tank foundations should be designed for hydrostatic uplift pressure, assuming groundwater level at a depth of 1.0 mbgs. The uplift resistance will require the use of the dead weight of the foundation and the weight of the empty tanks and backfill soils above the tank footings. For design purposes, the unit weight of concrete may be taken as 24 kN/m^3 and the

backfill placed above the footing as 18 kN/m^3. If increased uplift capacities are required, then it will be necessary to increase the weight of the foundation, or alternatively, install anchors such as helical piles.

5.4.3 GENERAL CONSIDERATIONS

Due to variations in the consistency of the founding soils and/or softening caused by excavation disturbance and/or seasonal frost effects, all footing subgrades must be evaluated by the Geotechnical Engineer prior to placing foundation concrete to ensure that the soil exposed at the excavation base is consistent with the design geotechnical bearing resistance.

The subgrade susceptible to disturbance when wet, so construction scheduling should consider the amount of excavation left exposed to the elements during foundation preparation.

Rainwater or groundwater seepage entering the foundation excavation must be pumped away (not allowed to pond). The foundation subgrade soils should be protected from freezing, inundation and equipment traffic at all times.

The subgrade tends to weather and deteriorate rapidly on exposure to atmosphere or surface water. **Terrapex** recommends that footings placed on the exposed soil should be poured on the same day as they are excavated, after removal of all unsuitable founding materials and approval of the bearing surface. Alternatively, a concrete mud slab could be used to protect a bearing surface where footing construction is to be delayed.

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the footing bases and concrete must be provided.

5.5. CONCRETE SLAB-ON-GRADE

It is anticipated that subgrade below the floor slab of the proposed convenience store will consist of existing fill materials which may be considered to be adequate to support a slab-on-grade construction provided the condition of the fill is improved.

Subgrade preparation should include the removal of all organic material and any weak, loose and disturbed soils. After removal of all unsuitable materials, the subgrade should be proof-rolled with heavy rubber-tired equipment. The proof-rolling operation should be witnessed by the Geotechnical Engineer. Any soft or wet subgrade areas which deflect significantly should be sub-excavated and replaced with suitable approved earth fill material compacted to at least 98% SPMDD. It is recommended that the condition of the existing fill is improved by applying compactive effort in order to increase the density of the materials; the existing fill material should be compacted to at least 98 % of the SPMDD.

It is recommended that a combined moisture barrier and a levelling course, having a minimum thickness of 150 mm and comprised of free draining material using Granular “A” be provided as a base for the slab-on-grade. The base material should be compacted to 98% SPMDD. Alternatively, 19 mm clear stone (OPSS 1004) may be used and compacted by vibration to a dense state, with filter fabric separating the clear stone and the subgrade soils.

Provided the subgrade, under-floor fill and granular base are prepared in accordance with the above recommendations, the Modulus of Subgrade Reaction (Ks) for floor slab design will be 25 mPa/m.

The soils at this site are susceptible to frost effects which would have the potential to deform hard landscaping adjacent to the building. At locations where the building is expected to have flush entrances, care must be taken in detailing the exterior slabs / sidewalks, providing insulation / drainage / non-frost susceptible backfill to maintain the flush threshold during freezing weather conditions.

5.6. PAVEMENT DESIGN

It is anticipated that the site will be resurfaced with asphaltic concrete and Portland cement concrete pavements.

Preparation for construction of the new pavement should include the removal of existing pavement components (asphaltic concrete and granular materials) and any unsuitable materials such as organic, weak/softened and/or disturbed soils. After removal of all unsuitable soils, the subgrade should be proof-rolled with heavy rubber tired equipment. The proof-rolling operation should be witnessed by the Geotechnical Engineer. Any soft or wet subgrade areas which deflect significantly should be sub-excavated and replaced with suitable approved earth fill material compacted to at least 98% of SPMDD.

Sub-excavated areas may be backfilled with excavated material from the site or similar clean imported fill material, free from topsoil, organic or other deleterious matter, provided the material is placed in large areas where it can be compacted with heavy compactors. Oversize particles (cobbles, boulders) larger than 150 mm should be discarded from fill materials. Fill materials should not be frozen and should not be too wet for efficient compaction (water content at optimum or within 2 % of optimum). The fill placement should not be performed during winter months when freezing temperatures occur persistently or intermittently. All fills must be placed in lifts not exceeding 200 mm in thickness and compacted to at least 98% of the material’s SPMDD.

It is assumed the proposed pavement will support heavy fuel delivery trucks, heavy tractor trailers and light passenger vehicles. The pavement thickness designs provided below consider these loading conditions.

Pavement Component	Light Duty Pavement (mm)	Heavy Duty Pavement (mm)
Asphaltic Concrete Surface Course (HL3)	40	50
Asphaltic Concrete Base Course (HL8)	50	60
Granular Base Course (OPSS Granular 'A')	150	150
Granular Base Course (OPSS Granular 'B' Type I)	300	450

The subgrade must be compacted to at least 98% of SPMMD. The granular materials should be placed in lifts not exceeding 200 mm thick and be compacted to a minimum of 100% SPMDD.

Asphaltic concrete materials should be rolled and compacted per OPSS 310. The granular and asphaltic concrete pavement materials and their placement should conform to OPSS 310, 501, 1010 and 1150, and the pertinent Municipality specifications.

Concrete (rigid) pavement is proposed in the area of the pump islands. It is recommended that the granular components placed at the underside of the concrete pavement are laid and compacted in accordance with the granular component layers recommended for the asphaltic concrete (flexible) pavement such that the subgrade profile is maintained at the interface between rigid and flexible pavement structures.

The pavement thickness designs provided above presume that construction will take place under favourable conditions. In the event that construction takes place during the spring thaw, the late fall, or following heavy rainfall events, a thicker granular sub-base layer may be required to compensate for reduced subgrade strength.

The long-term performance of the proposed pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved as much as practically possible when fill is placed, and that the subgrade is not disturbed and weakened after it is exposed. In addition, the need for adequate drainage cannot be over-emphasized. The finished pavement surface and underlying subgrade should be free of depressions and should be crowned and sloped to provide effective drainage. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas. Sub-drains may be provided to facilitate effective and assured drainage of the pavement structures as required to intercept excess subsurface moisture and minimize subgrade softening. The invert of sub-drains should be maintained at least 0.3 m below subgrade level.

5.7. EARTHQUAKE DESIGN PARAMETERS

The Ontario Building Code (2012) stipulates the methodology for earthquake design analysis, as set out in Subsection 4.18.7. The determination of the type of analysis is predicated on the importance of the structure, the spectral response acceleration and the site classification.

The parameters for determination of the Site Classification for Seismic Site Response are set out in Table 4.1.8.4.A of the Ontario Building Code (2012). The classification is based on the determination of the average shear wave velocity in the top 30 metres of the site stratigraphy, where shear wave velocity (vs) measurements have been taken. In the absence of such measurements, the classification is estimated on the basis of empirical analysis of undrained shear strength or penetration resistance. The applicable penetration resistance is that which has been corrected to a rod energy efficiency of 60% of the theoretical maximum or the (N60) value.

Based on the borehole information, the subsurface stratigraphy generally comprises fill material which extends to a maximum depths of 1.0 to 2.6 mbgs, underlain by a loose to very dense non-cohesive till. Based on the above, the site designation for seismic analysis is Class D.

The site specific 5% damped spectral acceleration coefficients, and the peak ground acceleration factors are provided in the 2006 Ontario Building Code - Supplementary Standard SB-1 (August 15, 2006), Table 1.2, location Barrie, Ontario.

5.8. CHEMICAL CHARACTERIZATION OF SUBSURFACE SOIL

Two (2) native soil samples obtained from Boreholes MW402 (Sample 4B; 2.6 m depth) and MW411 (Sample 3; 1.5 m depth) were submitted to AGAT Laboratories for pH index test and water-soluble sulphate content to determine the potential of attacking the subsurface concrete. The Certificate of Analysis provided by the analytical chemical testing laboratory is contained in Appendix E of this report.

The test results revealed that the pH index of the soil samples are 8.88 and 8.36; indicating a slight alkalinity.

The water-soluble sulphate contents of the soil samples are 0.0341% and 0.0056%. The concentration of water-soluble sulphate content of the tested samples is below the CSA Standard of 0.1% water-soluble sulphate (Table 12 of CSA A23.1, Requirements for Concrete Subjected to Sulphate Attack). Special concrete mixes against sulphate attack is therefore not required for the sub-surface concrete of the proposed building.

6 LIMITATIONS OF REPORT

The Limitations of Report, as quoted in Appendix 'A', are an integral part of this report.

Yours respectfully,
Terrapex Environmental Ltd.

Arash Heidari, EIT
Geotechnical Project Manager

Liam Gilmour, P.Eng.
Practice Area Manager – Geotechnical Investigations

Meysam Najari, Ph.D.
Vice President – Geotechnical Services

APPENDIX A

LIMITATIONS OF REPORT

LIMITATIONS OF REPORT

The conclusions and recommendations in this report are based on information determined at the inspection locations. Soil and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction which could not be detected or anticipated at the time of the soil investigation.

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 of alignment and elevations stated in the report. Since all details of the design may not be known to us, in our analysis certain assumptions had to be made as set out in this report. The actual conditions may, however, vary from those assumed, in which case changes and modifications may be required to our recommendations.

This report was prepared for Suncor Energy Products Partnership (Suncor) by Terrapex. The material in it reflects Terrapex's judgement in light of the information available to it at the time of preparation. Any use which a Third Party makes of this report, or any reliance on decisions which the Third Party may make based on it, are the sole responsibility of such Third Parties.

We recommend, therefore, that we be retained during the final design stage to review the design drawings and to verify that they are consistent with our recommendations or the assumptions made in our analysis. We recommend also that we be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the test holes. In cases where these recommendations are not followed, the company's responsibility is limited to accurately interpreting the conditions encountered at the test holes, only.

The comments given in this report on potential construction problems and possible methods are intended for the guidance of the design engineers and architects, only. The number of inspection locations may not be sufficient to determine all the factors that may affect construction methods and costs. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work.

APPENDIX B

BOREHOLE LOCATION PLAN

LEGEND

- SITE BOUNDARY
- BOREHOLE
- MONITORING WELL

0 10 20 30
Metres

DATA SOURCE: CITY OF BARRIE
MAP PROJECTION: NAD 1983 UTM ZONE 17N

CLIENT: SUNCOR ENERGY

SITE LOCATION:
623 YONGE STREET AND 515 BIG BAY ROAD
BARRIE, ONTARIO

TERRAPEX

TITLE:
BOREHOLE LOCATION PLAN

DRAWN BY:	PROJECT NO.:	CHECKED BY:
JS	CH321.00	AH
REVISION:	DATE:	FIGURE:
00	DECEMBER 2023	1

C:\Users\JSerrouil\OneDrive - Terrapex Environmental Ltd\PROJECTS\Hamilton\CH300\CH321.00 623 Yonge Street, Barrie\MXD\GEOTECH\CH321.00 FIG 1 BOREHOLE LOCATION PLAN.mxd

APPENDIX C

BOREHOLE LOG SHEETS

CLIENT: SUNCOR ENERGY PARTNERSHIPS | PROJECT NO.: CH321.00 | **RECORD OF: BH401**

ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD

CITY/PROVINCE: BARRIE, ONTARIO | NORTHING (m): 4912397.772 | EASTING (m): 607854.263 | ELEV. (m) 250.872

CONTRACTOR: PONTIL DRILLING | METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): - | SCREEN SLOT #: - | SAND TYPE: #2 | SEALANT TYPE: BENTONITE

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 / N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		ASPHALT (50mm)	0	250.5									
		FILL compact, moist, brown sand and gravel some asphalt chunks	0.5				1		80	<5			
		FILL loose, moist, black sand trace asphalt chunks	1	250	9		2		30	<5			
		FILL firm, moist, brown clayey silt some sand	1.5	249.5			3A		80	<5			
			2	249	4		3B						
		compact to dense, moist, brownish grey SANDY SILT to SILTY SAND trace clay, trace gravel (TILL)	2.5	248.5	18		4		100	<5			
			3	248									
			3.5	247.5	43		5		10	<5			
			4	247									
					28		6		70	<5			DUP BH2000-6
			4.5	246.5									
			5	246	13		7		95	<5			
			5.5	245.5									
					19		8		95	40			
			6	245									
			6.5	244.5	30		9			<5			
		END OF BOREHOLE											

TERRAPEX

LOGGED BY: DF/AC | DRILLING DATE: 7-NOV-23

INPUT BY: SW | MONITORING DATE:

REVIEWED BY: | PAGE 1 OF 1

CLIENT: SUNCOR ENERGY PARTNERSHIPS | PROJECT NO.: CH321.00 | **RECORD OF: MW402**

ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD

CITY/PROVINCE: BARRIE, ONTARIO | NORTHING (m): 4912408.108 | EASTING (m): 607874.237 | ELEV. (m) 251.006

CONTRACTOR: PONTIL DRILLING | METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): 5 | SCREEN SLOT #: - | SAND TYPE: #2 | SEALANT TYPE: HOLE PLUG

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) / N-VALUE (Blows/300mm)	WATER CONTENT (%) PL W.C. LL	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		ASPHALT (80mm)	0	251								Bentonite	
		FILL compact, moist, brown to light brown sand and gravel	0.5	250.5	25		1		50	<5			
		FILL firm, moist, brown sandy clayey silt	1	250	7		2A		80	<5			
							2B			<5			
		FILL compact, moist, brown sandy silt some clay, trace gravel	1.5	249.5									50 mm monitoring well was installed. Waterlevel measured: on Nov 17th, 2023 at 5.03mbgs on Nov 23rd, 2023 at 5.12mbgs
			2	249	15		3		87	<5			
		FILL moist, brown silty sand	2.5	248.5	56		4A		89	<5			
							4B			<5			Sand
		moist, brownish grey SANDY SILT to SILTY SAND trace clay, trace gravel (TILL)	3	248									Screen + Sand
		very dense	3.5	247.5	53		5		44	<5			
		---- compact	4	247	21		6		100	<5			
			4.5	246.5									
			5	246	29		7		13	<5			
			5.5	245.5	22		8		100	<5			
		---- very moist	6	245									Sand
			6.5	244.5	26		9		100	<5			
		END OF BOREHOLE											

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CLIENT: SUNCOR ENERGY PARTNERSHIPS	PROJECT NO.: CH321.00	**RECORD OF: MW403**
ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD		
CITY/PROVINCE: BARRIE, ONTARIO	NORTHING (m): 4912415.702	EASTING (m): 607850.952 ELEV. (m) 250.835
CONTRACTOR: PONTIL DRILLING	METHOD: HOLLOW STEM AUGER	
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: - SAND TYPE: #2 SEALANT TYPE: HOLE PLUG

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

SOIL DESCRIPTION

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
0	250.5	ASPHALT (100mm) FILL dense, moist, light brown sand and gravel	1		64	<5			Bentonite
0.5	250	FILL firm, slightly moist, dark brown silty clay to clayey silt trace coarse sand, trace gravel	2		100	<5			
1	249.5	--- moist to wet							
1.5	249		3		84	<5			50 mm monitoring well was installed. Waterlevel measured: on Nov 17th, 2023 at 4.80mbgs on Nov 23rd, 2023 at 4.81mbgs
2	248.5	FILL dense, moist to wet, greyish brown silt trace clay, trace gravel	4		51	<5			Sand
2.5	248	moist, brownish grey SANDY SILT to SILTY SAND trace clay, trace gravel (TILL)							Screen + Sand
3	247.5	dense	5		100	<5			
3.5	247	---- compact							
4	246.5	--- grey	6		100	<5			
4.5	246		7		64	<5			
5	245.5	---- very moist							
5.5	245		8		100	<5			
6	244.5		9		100	<5			Sand
6.5		END OF BOREHOLE							

SHEAR STRENGTH (kPa) 40 80 120 160 ● / N-VALUE (Blows/300mm) 20 40 60 80 ▲: 46, 5, 4, 39, 40, 18, 24, 18, 22

WATER CONTENT (%) PL W.C. LL 20 40 60 80 ■: 2, 24, 15, 13, 8, 10, 10, 11, 10

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CLIENT: SUNCOR ENERGY PARTNERSHIPS | PROJECT NO.: CH321.00 | **RECORD OF: BH404**

ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD

CITY/PROVINCE: BARRIE, ONTARIO | NORTHING (m): 4912394.853 | EASTING (m): 607889.251 | ELEV. (m) 251.472

CONTRACTOR: PONTIL DRILLING | METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): - | SCREEN SLOT #: - | SAND TYPE: - | SEALANT TYPE: -

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 / N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		ASPHALT (80mm)	0	251	5		1		41	<5			
		FILL loose, moist, brown sand and gravel	0.5										
		FILL firm, moist, brown silty clay trace gravel, oxidation	1	250.5	7		2		67	<5			
		FILL very stiff, wet, brown silty clay trace to some gravel	1.5	250									
		moist, brownish grey SANDY SILT to SILTY SAND trace clay, trace gravel (TILL)	2	249.5	18		3		100	<5			
		compact ---- ---- gravely sand seam ---- dense	2.5	249	28		4		93	<5			
			3	248.5									
			3.5	248	55		5		57	<5			
			4	247.5	20		6		100	<5			
		---- trace small to medium sized rocks	4.5	247									
			5	246.5	21		7		90				
			5.5	246									
			6	245.5									
			6.5	245	27		8		100				
		END OF BOREHOLE											

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CLIENT: SUNCOR ENERGY PARTNERSHIPS | PROJECT NO.: CH321.00 | **RECORD OF: BH405**

ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD

CITY/PROVINCE: BARRIE, ONTARIO | NORTHING (m): 4912398.282 | EASTING (m): 607912.001 | ELEV. (m) 251.707

CONTRACTOR: PONTIL DRILLING | METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): - | SCREEN SLOT #: - | SAND TYPE: #2 | SEALANT TYPE: BENTONITE

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 / N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		ASPHALT (120m)	0	251.5	9		1		10	<5			
		FILL loose, moist, brown sand and gravel	0.5	251									
		FILL firm to stiff, moist, brown silty clay some sand, trace gravel	1	250.5	4		2		70	<5			
			1.5	250	12		3		100	<5			
		moist, brownish grey SANDY SILT to SILTY SAND trace clay, trace gravel (TILL)	2	249.5									
			2.5	249	46		4		100	<5			
		dense ---- very dense	3	248.5	58		5		60	<5			
		---- silty sand seam ----	3.5	248									
			4	247.5	31		6		90	<5			
		--- grey	4.5	247	31		7A 7B		100	<5			
			5	246.5									
			5.5	246	45		8		10	<5			
		---- compact	6	245.5									
			6.5	245	25		9		100	<5			
		END OF BOREHOLE											

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CLIENT: SUNCOR ENERGY PARTNERSHIPS | PROJECT NO.: CH321.00 | **RECORD OF: MW406**

ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD

CITY/PROVINCE: BARRIE, ONTARIO | NORTHING (m): 4912380.044 | EASTING (m): 607866.855 | ELEV. (m) 251.356

CONTRACTOR: PONTIL DRILLING | METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): 5 | SCREEN SLOT #: 10 | SAND TYPE: #2 | SEALANT TYPE: BENTONITE

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) ● 40 80 120 160 / N-VALUE (Blows/300mm) ▲ 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		ASPHALT (120mm)	0	251	▲15	■6	1		40	<5		Bentonite	
		FILL compact, moist, brown sand and gravel	0.5										
		FILL loose, silty sand trace clay	1	250.5	▲5	■21	2		70	<5			
			1.5	250		■15							50 mm monitoring well was installed. Waterlevel measured: on Nov 17th, 2023 at 5.11mbgs on Nov 23rd, 2023 at 5.25mbgs
			2	249.5	▲5		3		100	<5			
		moist, brownish grey SANDY SILT to SILTY SAND trace clay, trace gravel (TILL)	2.5	249	▲34	■8	4		80	<5		Sand	
		dense to compact	3	248.5									Screen + Sand
		---- loose	3.5	248	▲17	■8	5		100	<5			
			4	247.5	▲9	■9	6		20	25			
		---- compact to very dense	4.5	247									
			5	246.5	▲22	■9	7		100	<5			
			5.5	246	▲77	■10	8		5	<5			
		--- very moist	6	245.5								Sand	
			6.5	245	▲31	■9	9		100	<5			
		END OF BOREHOLE											

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CLIENT: SUNCOR ENERGY PARTNERSHIPS | PROJECT NO.: CH321.00 | **RECORD OF: BH407**

ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD

CITY/PROVINCE: BARRIE, ONTARIO | NORTHING (m): 4912432.271 | EASTING (m): 607872.923 | ELEV. (m) 251.104

CONTRACTOR: PONTIL DRILLING | METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): - | SCREEN SLOT #: - | SAND TYPE: #2 | SEALANT TYPE: HOLE PLUG

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 / N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		TOPSOIL (600mm)	0	251		21	1			<5			
		FILL brown, very moist silty sand trace organics	0.5 1	250.5 250		20	2			<5			
		FILL very moist, brown sand trace silt, trace gravel --- grey	1.5 2	249.5 249		10 12	3 4			<5 <5			
		moist, brownish grey SANDY SILT to SILTY SAND trace clay, trace gravel (TILL) compact	2.5 3 3.5 4	248.5 248 247.5 247	16 21 10	9 8 10	5 6 7		100 80 90	<5 <5 <5			
		--- very moist	4.5 5 5.5	246.5 246 245.5	17 21	9 10	8 9		80 100	<5 <5			
		END OF BOREHOLE	6										

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CLIENT: SUNCOR ENERGY PARTNERSHIPS | PROJECT NO.: CH321.00 | **RECORD OF: MW408**

ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD

CITY/PROVINCE: BARRIE, ONTARIO | NORTHING (m): 4912365.247 | EASTING (m): 607893.059 | ELEV. (m) 251.903

CONTRACTOR: PONTIL DRILLING | METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): 5 | SCREEN SLOT #: 10 | SAND TYPE: #2 | SEALANT TYPE: BENTONITE

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 / N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		TOPSOIL (150mm) FILL loose, moist, brown sandy silt, some clay	0 0.5 1 1.5 2	251.5 251 250.5 250	18 5 8		1 2 3		80 80 100	<5 <5 <5		Bentonite 50 mm monitoring well was installed. Waterlevel measured: on Nov 17th, 2023 at 5.74mbgs on Nov 23rd, 2023 at 5.81mbgs
		moist, brownish grey SANDY SILT to SILTY SAND trace clay, trace gravel (TILL) dense to very dense	2.5 3 3.5 4	249.5 249 248.5 248	51 23 36		4 5 6		80 100 30	<5 <5 <5		Sand Screen + Sand
		---- compact to dense	4.5 5 5.5	247.5 247 246.5	17 41		7 8		100 100	<5 <5		
		--- very moist	6 6.5	246 245.5	17		9		100	<5		Sand
		END OF BOREHOLE										

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CLIENT: SUNCOR ENERGY PARTNERSHIPS | PROJECT NO.: CH321.00 | **RECORD OF: MW409**

ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD

CITY/PROVINCE: BARRIE, ONTARIO | NORTHING (m): 4912418.044 | EASTING (m): 607829.459 | ELEV. (m) 250.444

CONTRACTOR: PONTIL DRILLING | METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): 5 | SCREEN SLOT #: 10 | SAND TYPE: #2 | SEALANT TYPE: BENTONITE

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 / N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		ASPHALT (90mm)	0	250	16		1		50	<5		Bentonite	
		FILL compact, wet, brown sand and gravel	0.5										
		FILL loose to compact, moist, brown sandy silt some clay, trace organics	1	249.5	5		2		60	<5			
			1.5	249									50 mm monitoring well was installed. Waterlevel measured: on Nov 17th, 2023 at 4.33mbgs on Nov 23rd, 2023 at 4.41mbgs
			2	248.5	11		3		50	<5			
		compact, moist, brownish grey SANDY SILT to SILTY SAND trace clay, trace gravel (TILL)	2.5	248	19		4		80	<5		Sand	
			3	247.5									Screen + Sand
			3.5	247	21		5		90	35			
		--- very moist	4	246.5	14		6		60	<5			
			4.5	246									
			5	245.5	20		7		20	5			
			5.5	245									
			6	244.5	22		8		80	10			
			6.5	244	24		9		100	5		Sand	
		END OF BOREHOLE											

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CLIENT: SUNCOR ENERGY PARTNERSHIPS | PROJECT NO.: CH321.00 | **RECORD OF: MW410**

ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD

CITY/PROVINCE: BARRIE, ONTARIO | NORTHING (m): 4912434.383 | EASTING (m): 607884.469 | ELEV. (m) 251.21

CONTRACTOR: PONTIL DRILLING | METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): 5 | SCREEN SLOT #: 10 | SAND TYPE: WELL GRAVEL | SEALANT TYPE: BENTONITE

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 / N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		TOPSOIL (350mm)	0	251	4		1		70	<5		Bentonite	
		FILL very loose, moist, brown sand	0.5	250.5									
			1	250	2		2		50	<5			
		FILL compact, wet, brown sandy silt trace clay	1.5	249.5	16		3		60	<5			50 mm monitoring well was installed. Waterlevel measured: on Nov 17th, 2023 at 4.89mbgs on Nov 23rd, 2023 at 4.90mbgs
		moist, brownish grey SANDY SILT to SILTY SAND trace clay, trace gravel (TILL)	2	249									
			2.5	248.5	21		4		70	10		Sand	
			3	248									Screen + Sand
			3.5	247.5	21		5		80	35			
		compact ---- dense to very dense	4	247	16		6		100	10			
			4.5	246.5									
			5	246	66		7		40	<5			
			5.5	245.5	33		8		40	10			
		--- very moist	6	245								Sand	
			6.5		64/280		9		100	<5			
		END OF BOREHOLE											

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CLIENT: SUNCOR ENERGY PARTNERSHIPS | PROJECT NO.: CH321.00 | **RECORD OF: MW411**

ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD

CITY/PROVINCE: BARRIE, ONTARIO | NORTHING (m): 4912417.208 | EASTING (m): 607889.523 | ELEV. (m) 251.252

CONTRACTOR: PONTIL DRILLING | METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): 5 | SCREEN SLOT #: 10 | SAND TYPE: WELL GRAVEL | SEALANT TYPE: BENTONITE

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) / N-VALUE (Blows/300mm)	WATER CONTENT (%) PL W.C. LL	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		TOPSOIL (250mm)	0	251	5	24	1		40	<5		Bentonite	
		FILL loose, moist, brown silty sand	0.5	250.5	12	10	2		100	<5			
		compact, moist, brownish grey SANDY SILT to SILTY SAND trace clay, trace gravel (TILL)	1	250									50 mm monitoring well was installed. Waterlevel measured: on Nov 17th, 2023 at 5.34mbgs on Nov 23rd, 2023 at 5.39mbgs
		---	1.5	249.5	21	8	3		80	25			
		sand seam (some gravel)	2	249									
		---	2.5	248.5	29	8	4		100	5		Sand	
			3	248	30	9	5		100	35		Screen + Sand	
			3.5	247.5									
			4	247	26	7	6		80	5			
			4.5	246.5	20	10	7		90	25			
			5	246									
		----	5.5	245.5									
		very moist	6	245	12	10	8		100	10		Sand	
			6.5	244.5									
			7	244									
		----	7.5	243.5	35	10	9		80	35			
		dense to very dense	8	243									
			8.5	242.5									
			9	242									

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CLIENT: SUNCOR ENERGY PARTNERSHIPS | PROJECT NO.: CH321.00 | **RECORD OF: MW411**

ADDRESS: 623 YONGE STREET AND 515 BIG BAY ROAD

CITY/PROVINCE: BARRIE, ONTARIO | NORTHING (m): 4912417.208 | EASTING (m): 607889.523 | ELEV. (m) 251.252

CONTRACTOR: PONTIL DRILLING | METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): 5 | SCREEN SLOT #: 10 | SAND TYPE: WELL GRAVEL | SEALANT TYPE: BENTONITE

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 / N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) ▲ PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	CV/TOV (ppm or %LEL)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
			9.5		94/250 ▲	7	10		100	5			
		END OF BOREHOLE											

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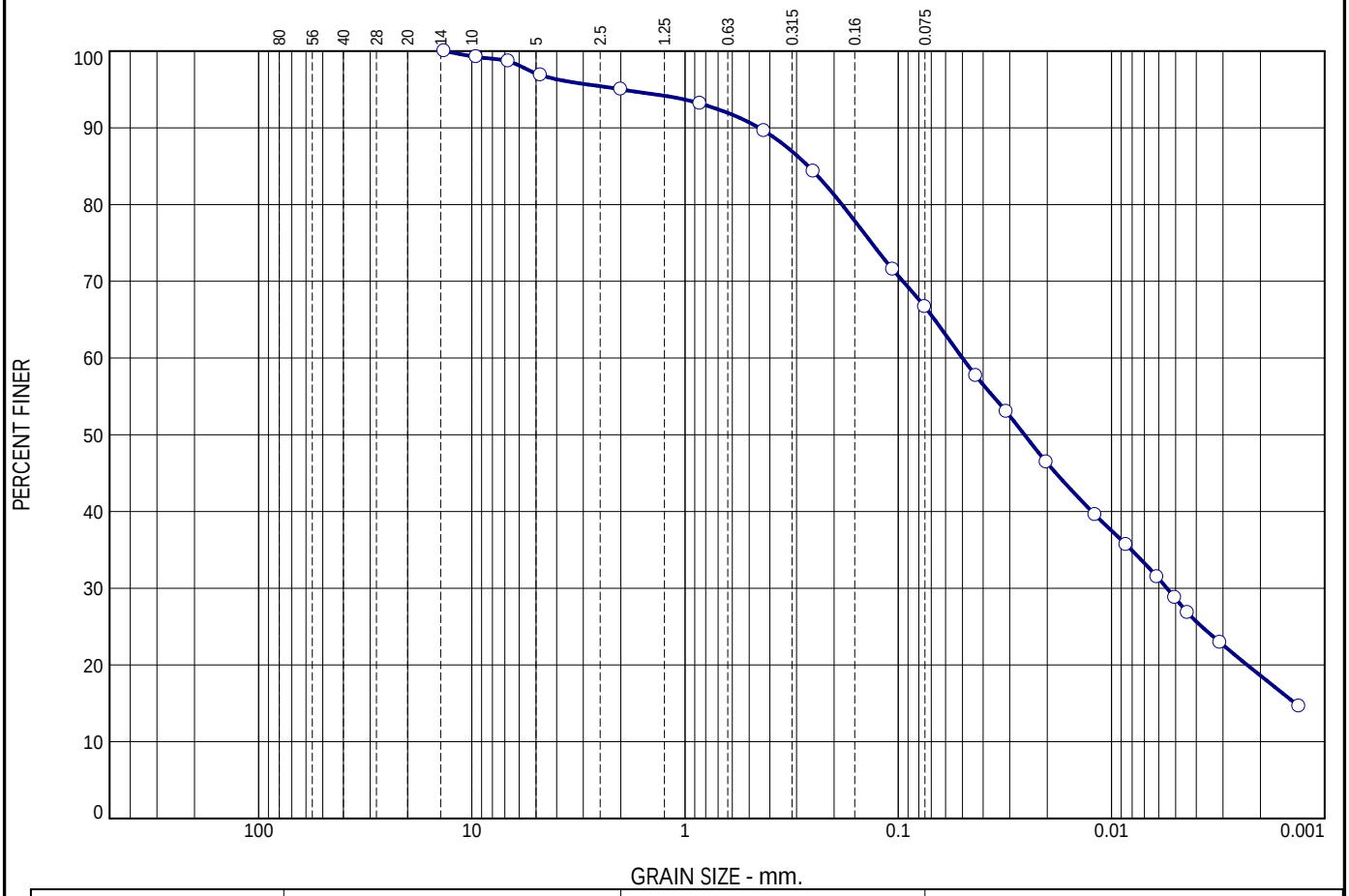
APPENDIX D

GEOTECHNICAL LABORATORY TEST RESULTS

Particle Size Distribution Report

ASTM D422



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0.0	5.0	5.4	22.9	48.1	18.6

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	20.2	12.7	0.2645	0.0500	0.0256	0.0055	0.0014			

Material Description	Test Date	USCS	NM
○ SANDY SILT some clay trace gravel	Nov 21/23	CL-ML	

Project No. CH321.00 Client: Suncor

Project: 623 Yonge Street and 515 Big Bay Point Road, Barrie ON

○Sample Number: MW406, SS4

Terrapex

Toronto, Ontario

Remarks:

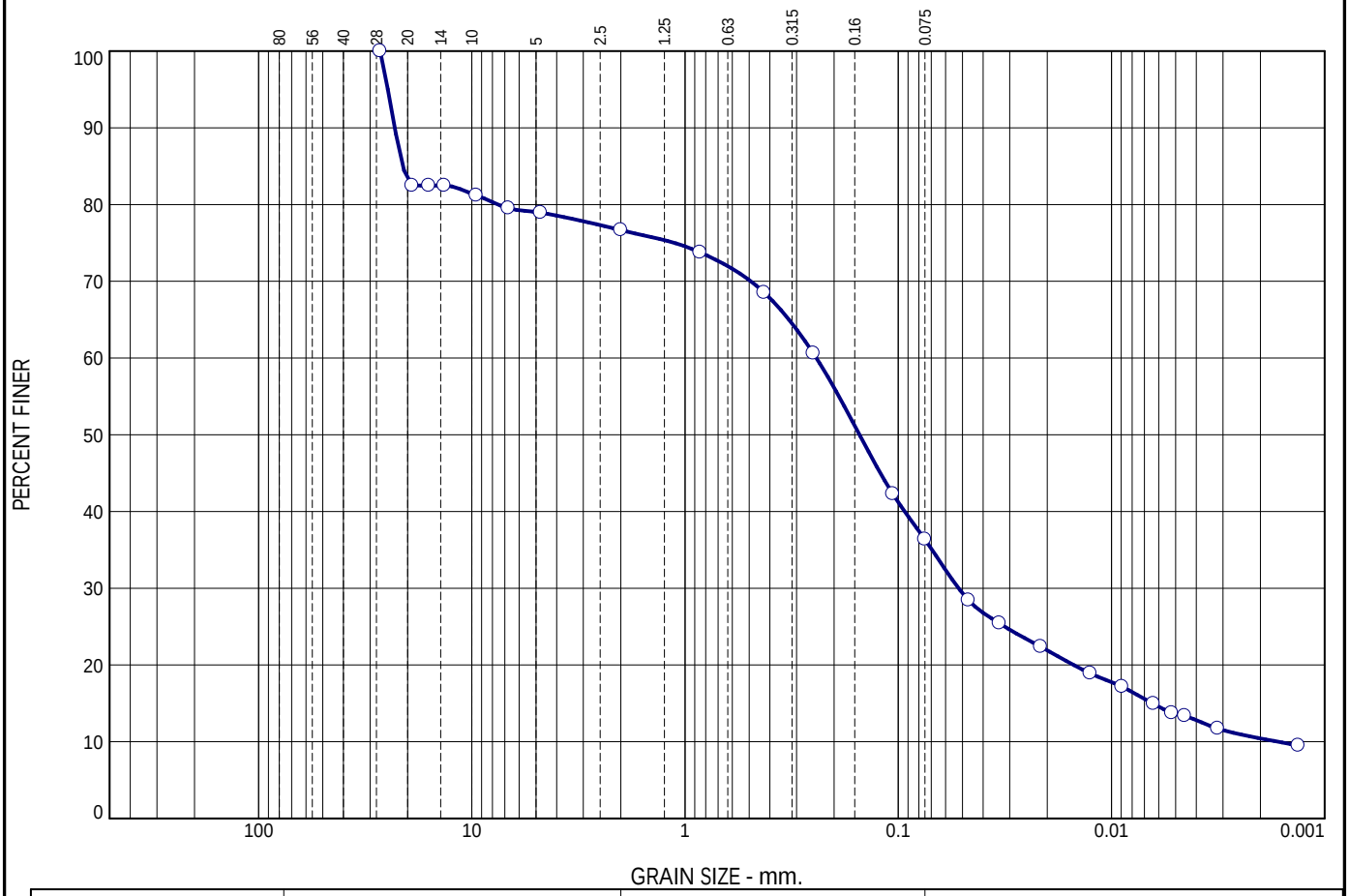
○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb= 53cm^3; L2=13.8cm; L1= 10.7cm; hs=0.16cm/Div; A= 30.2cm^2; Mass of Disp. Agent=40g/1

Figure 1

Tested By: SC

Particle Size Distribution Report

ASTM D422



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0.0	23.3	8.2	32.1	26.0	10.4

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	12.8	NP	21.0617	0.2420	0.1520	0.0521	0.0064	0.0017	6.79	146.38

Material Description	Test Date	USCS	NM
○ GRAVELLY SILTY SAND trace to some clay	Nov 21/23	SM	

Project No. CH321.00 Client: Suncor

Project: 623 Yonge Street and 515 Big Bay Point Road, Barrie ON

○Sample Number: MW407, SS6

Terrapex

Toronto, Ontario

Remarks:

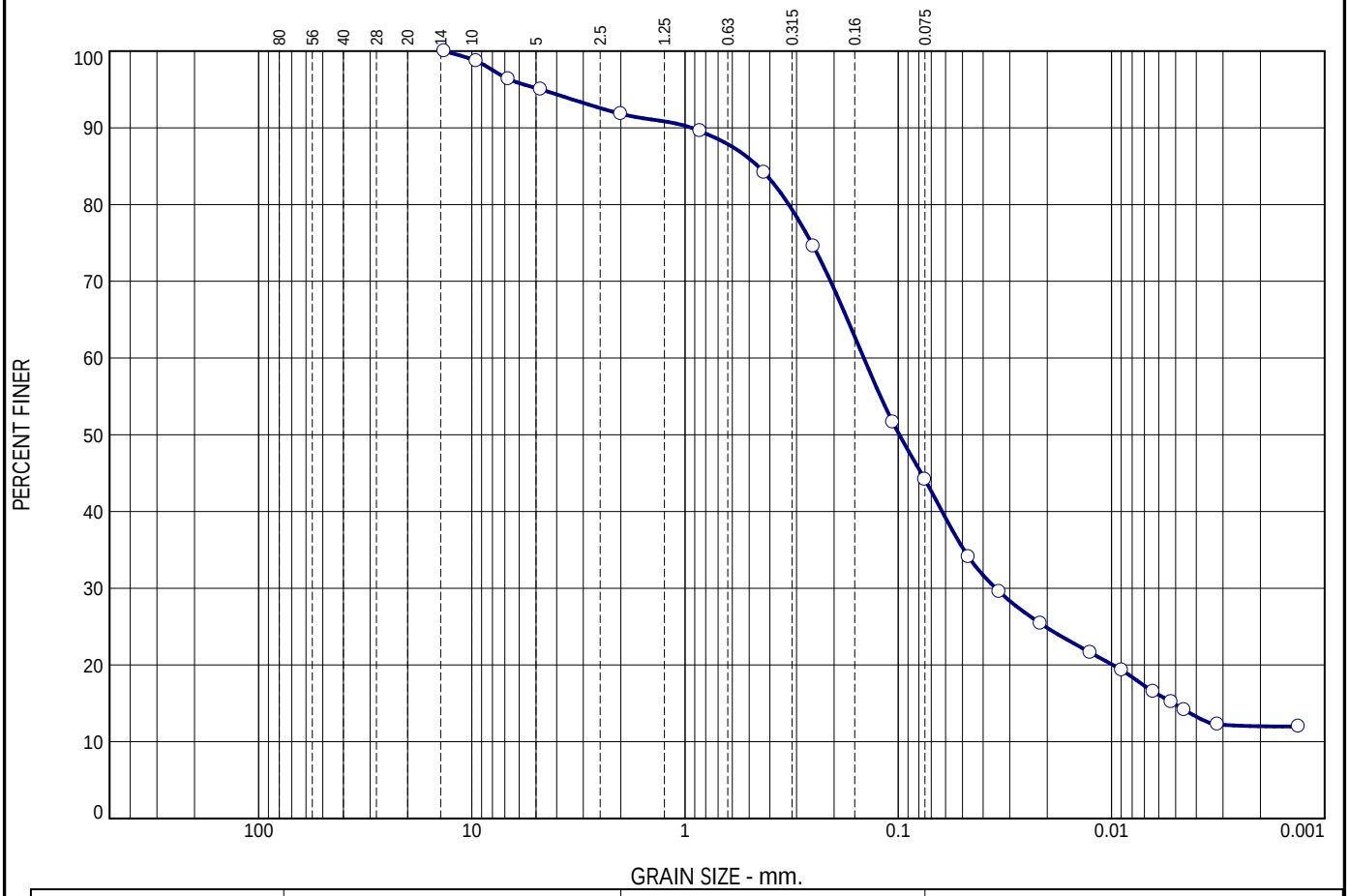
○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb= 53cm^3; L2=13.8cm; L1= 10.7cm; hs=0.16cm/Div; A= 30.2cm^2; Mass of Disp. Agent=40g/1

Figure 2

Tested By: SC

Particle Size Distribution Report

ASTM D422



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0.0	8.2	7.6	40.0	32.2	12.0

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	13.7	NP	0.4551	0.1451	0.0988	0.0349	0.0051			

Material Description	Test Date	USCS	NM
○ SILTY SAND some clay trace gravel	Nov 21/23	SM	

Project No. CH321.00 Client: Suncor

Project: 623 Yonge Street and 515 Big Bay Point Road, Barrie ON

○Sample Number: MW411, SS5

Terrapex

Toronto, Ontario

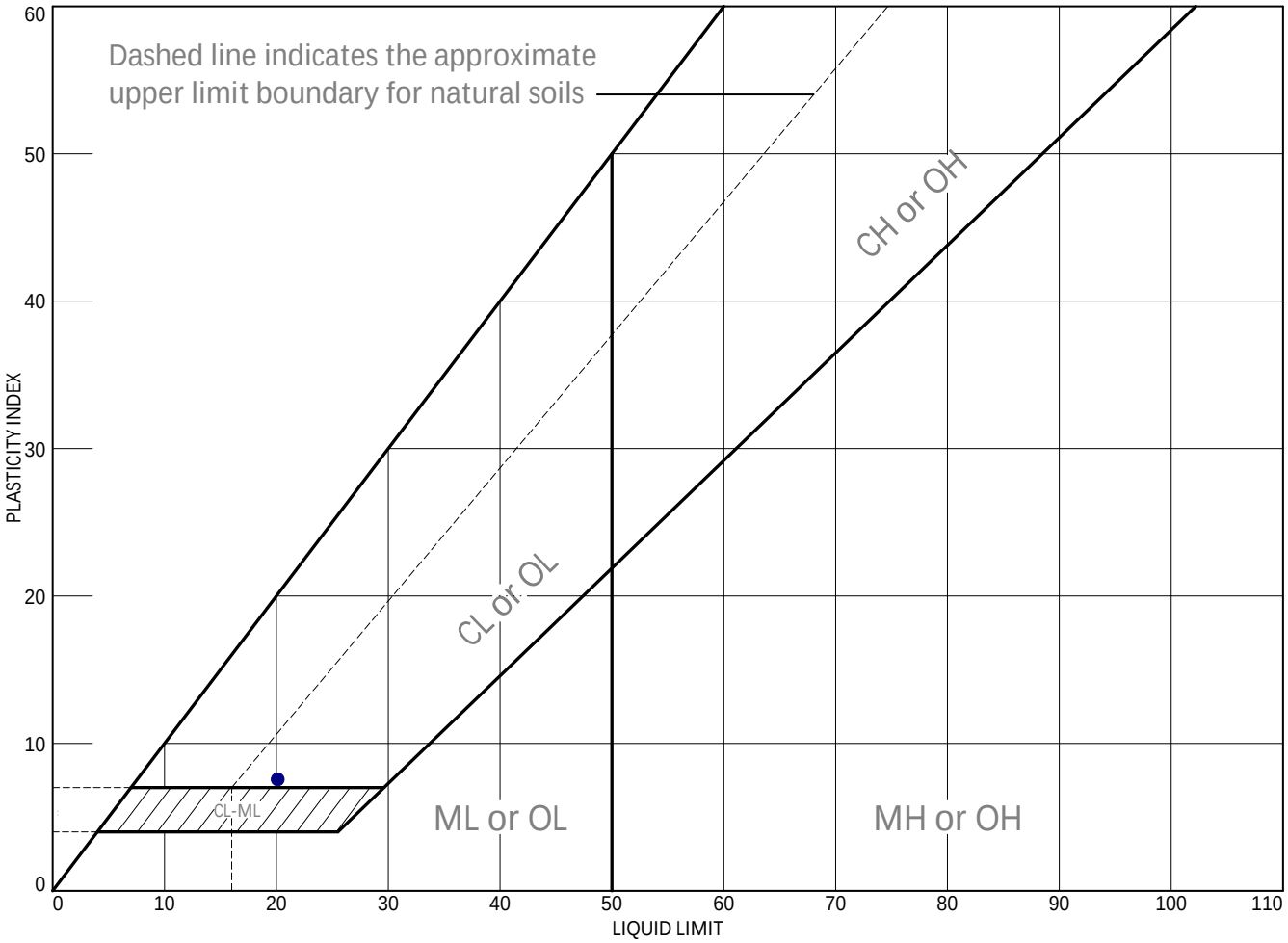
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb= 53cm^3; L2=13.8cm; L1= 10.7cm; hs=0.16cm/Div; A= 30.2cm^2; Mass of Disp. Agent=40g/1

Figure 3

Tested By: SC

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SANDY SILT some clay trace gravel	20.2	12.7	7.5	89.6	66.7	CL-ML
■	GRAVELLY SILTY SAND trace to some clay	12.8	NP	NP	68.5	36.4	SM
▲	SILTY SAND some clay trace gravel	13.7	NP	NP	84.2	44.2	SM

Project No. CH321.00 Client: Suncor

Project: 623 Yonge Street and 515 Big Bay Point Road, Barrie ON

●Sample Number: MW406, SS4
■Sample Number: MW407, SS6
▲Sample Number: MW411, SS5

Terrapex

Toronto, Ontario

Remarks:
●Test Date: November 23, 2023
■Test Date: November 23, 2023
▲Test Date: November 23, 2023

Figure 4

Tested By: AM

APPENDIX E

CERTIFICATE OF CHEMICAL ANALYSIS

AGAT Laboratories

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

CLIENT NAME: TERRAPEX ENVIRONMENTAL LIMITED
90 SCARSDALE RD
TORONTO, ON M3B2R7
(905) 474-5265

ATTENTION TO: Arash Heidari

PROJECT: CH321.00; Outlet# 00830

AGAT WORK ORDER: 23T095638

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganic Team Lead

DATE REPORTED: Nov 27, 2023

PAGES (INCLUDING COVER): 6

VERSION*: 1

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

*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

AGAT Laboratories

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

Certificate of Analysis

AGAT WORK ORDER: 23T095638

PROJECT: CH321.00; Outlet# 00830

CLIENT NAME: TERRAPEX ENVIRONMENTAL LIMITED

ATTENTION TO: Arash Heidari

SAMPLING SITE:623 Yonge St. Barrie, ON

SAMPLED BY:JF

pH, Sulphate

DATE RECEIVED: 2023-11-21

DATE REPORTED: 2023-11-27

			SAMPLE DESCRIPTION:	BH402-SS4B	MW411-SS3
			SAMPLE TYPE:	Soil	Soil
			DATE SAMPLED:	2023-11-08 10:45	2023-11-14 11:00
Parameter	Unit	G / S	RDL	5478398	5478543
Sulphate (2:1)	µg/g		2	341	56
pH (2:1)	pH Units		NA	8.88	8.36

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

5478398-5478543 pH and Sulphate were determined on the extract obtained from the 2:1 leaching procedure (2 parts DI water: 1 part soil).

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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

Quality Assurance

CLIENT NAME: TERRAPEX ENVIRONMENTAL LIMITED
AGAT WORK ORDER: 23T095638
PROJECT: CH321.00; Outlet# 00830
ATTENTION TO: Arash Heidari
SAMPLING SITE:623 Yonge St. Barrie, ON
SAMPLED BY:JF

Soil Analysis

RPT Date: Nov 27, 2023			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
pH, Sulphate															
Sulphate (2:1)	5469752		95	96	1.0%	< 2	98%	70%	130%	105%	80%	120%	98%	70%	130%
pH (2:1)	5476166		8.19	8.22	0.4%	NA	95%	80%	120%						

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

Certified By:

AGAT Laboratories

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Time Markers

AGAT WORK ORDER: 23T095638

PROJECT: CH321.00; Outlet# 00830

CLIENT NAME: TERRAPEX ENVIRONMENTAL LIMITED

ATTENTION TO: Arash Heidari

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5478398	BH402-SS4B	Soil	08-NOV-2023	21-NOV-2023

pH, Sulphate

Parameter	Date Prepared	Date Analyzed	Initials
Sulphate (2:1)	24-NOV-2023	24-NOV-2023	LC
pH (2:1)	24-NOV-2023	24-NOV-2023	XL

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5478543	MW411-SS3	Soil	14-NOV-2023	21-NOV-2023

pH, Sulphate

Parameter	Date Prepared	Date Analyzed	Initials
Sulphate (2:1)	24-NOV-2023	24-NOV-2023	LC
pH (2:1)	24-NOV-2023	24-NOV-2023	XL

AGAT Laboratories

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

Method Summary

CLIENT NAME: TERRAPEX ENVIRONMENTAL LIMITED

AGAT WORK ORDER: 23T095638

PROJECT: CH321.00; Outlet# 00830

ATTENTION TO: Arash Heidari

SAMPLING SITE:623 Yonge St. Barrie, ON

SAMPLED BY:JF

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Sulphate (2:1)	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
pH (2:1)	INOR 93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

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

Chain of Custody Record

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

Laboratory Use Only
Work Order #: 23T095638
Cooler Quantity: 1 med
Arrival Temperatures: 7.1 | 7.2 | 7.3
Custody Seal Intact: ☐Yes ☐No ☐N/A
Notes: 100 ml

Report Information:
Company: TERRAPEX
Contact: ARASH HEIDARI
Address: 90 Scarsdale Road, Toronto, ON. M3B 2R7
Phone: 647-472-8147 (Cell) Fax: 416-529-9215
Reports to be sent to:
1. Email: a.heidari@terrapex.com
2. Email: S.Sutherland@terrapex.com

Regulatory Requirements:
☑ No Regulatory Requirement
(Please check all applicable boxes)

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

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

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

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

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

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

Project Information:
Project: CH321.00
Site Location: 623 Yonge St., Barrie, ON.
Outlet #: 00830
Sampled By: JF
AGAT Quote #: ____ PO: ____
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:
Bill To Same: Yes ☑ No ☐
Company: ____
Contact: ____
Address: ____
Email: accountspayable@terrapex.com

Activity
Assessment
☐A1 ☐A2 ☐AR ☐AV
Remediation
☐RE ☐RX ☐RI ☐RA
Contaminant Management
☐M ☐MW ☐MV

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N (Field Filtered - Metals, Hg, CrVI)	O. Reg 153: Metals and Inorganics (☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals ☐ 153 Metals (Incl. Hydrides))	O. Reg 153: ORPs: ☐ B-HWS ☐ Cl⁻ ☐ CN ☐ Cr^{6+} ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	O. Reg 153: Full Metals Scan	O. Reg 153: Regulation/Custom Metals	O. Reg 153: Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_2+NO_2	O. Reg 153: Volatiles: ☐ VOC ☐ BTEX ☐ THM	O. Reg 153: PHCs F1 - F4	O. Reg 153: ABNs	O. Reg 153: PAHs	O. Reg 153: PCBs: ☐ Total ☐ Aroclors	O. Reg 153: Organochlorine Pesticides	O. Reg 153: TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 153: Sewer Use	pH	Water - Routine Analysis			Potentially Hazardous or High Concentration (Y/N)
BH402-SS4B	8/11/23	10:45am	1	S																					NA
MW411-SS3	14/11/23	11:00am	1	S																					NA

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
John R	20/11/23	5:00pm	[signature]	Nov 21	1:52pm
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

# of Jars used and not returned: ____

N°: SS-T-01853