Appendix A

Geotechnical Report

Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

GEOTECHNICAL INVESTIGATION
SEAWALL AND WALKWAY CONSTRUCTION
BERTA POINT, WEST BANK
BRONTE INNER HARBOUR
OAKVILLE, ONTARIO

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1. INTRODUCTION

Terraprobe Inc. was retained by Town of Oakville to conduct a geotechnical investigation for the proposed shoreline protection works comprising installation of a new seawall and walkway along the west bank of the Bronte Creek at Berta Point (from the north end of existing block wall to the south of existing bridge at Lakeshore Road West), Bronte Inner Harbour, Oakville. The study area is located at the southeast corner of the intersection Lakeshore Road West and West River Street, in the Town of Oakville, Ontario. For site description purposes, Lakeshore Road West is assumed to be oriented in an east-west direction.

Terraprobe has previously conducted a geotechnical investigation for a portion of the Bronte Creek (Bronte Inner Harbour, south of the current study area) which included advancing a total of two (2) boreholes extending to a maximum depth of about 17 m below existing grade. The results of this investigation were submitted in our Geotechnical Investigation report (File No. 1-17-0069-01, dated January 4, 2018).

The current report encompasses the results of the geotechnical investigation conducted for the proposed shoreline protection works to determine the prevailing subsurface soil and shallow ground water conditions and provide geotechnical engineering recommendations for the design of seawall and walkway. In addition, geotechnical comments are also included on pertinent construction aspects, excavation, backfilling, ground water control, and earth pressure and earthquake design parameters.

It must be noted that the scope of the investigation including location, number and depth of the borehole(s) was finalized by the Town and included only the geotechnical investigation. The scope did not include any aspects of environmental assessment of the subsurface soil and groundwater; and/or to assess composition of subsurface material to comment on the origin of such materials, or to infer previous history/usage of the subject area.

2. SITE AND PROJECT DESCRIPTION

The subject site is located in the southeast quadrant of the intersection of Lakeshore Road West and West River Street, in the Town of Oakville, Ontario. The general location of the property is shown on Figure 1. The shoreline within the study area (at Berta Point) on the west bank of the Bronte Creek is in a relatively poor condition. The Town of Oakville is currently considering alternatives for improvements. The town has initiated a Municipal Class Environmental Assessment (EA) for the subject site.

A parkland/west bank of the creek is about 4 to 5 m high. The gravelled parking and driveway area facilitate access and vehicle parking which is located on the west side of the creek. A small building is also situated on the tableland. The harbour includes floating dock along the edge of water accessed by a concrete walkway located in the middle portion of the study area. A portion of shoreline of the west bank (immediate north of

the study area, near the bridge) is protected with riprap while the bank to the immediate south of study area is lined with block wall with a walkway located behind the block wall. Based on available preliminary project design information, we understand that the proposed shoreline protection works envisage two design options:

Option 1: Installation of a sheet pile wall along the waterline along with a concrete walkway constructed behind the sheet pile wall.

Option 2: Construction of a pile supported concrete walkway and a riprap stone revetment as shoreline protection.

The proposed works also include construction of a switchback ramp to provide access to the harbour /dock.

3. FIELD PROCEDURE

The field investigation was conducted on September 28, October 30 and November 3 and 4, 2020, and consisted of drilling and sampling of four (4) exploratory boreholes and eight (8) probe holes (without sampling) in the vicinity of the study area (as suggested by the client). The boreholes extended to depths varying from about 2.4 to 11.0 m below existing ground surface while probe holes extended to depths varying from about 0.9 to 7.2 m depth below ground/creek bed. The borehole and probe hole details are provided as follows:

- three (3) boreholes (Boreholes 1-20, 2-20 and 2A-20) were advanced along the parkland/tableland within in the study area, extending to auger refusal depths varying from about 2.4 m (Borehole 2-20) to 5.5 m (Borehole 1-20) below grade.

- one borehole (1) Borehole (Borehole 3-20) was advanced at the bottom of the slope near the dock/walkway in the vicinity of the study area, extending to a depth of about 11.0 m below grade with rock coring,

- five (5) probe holes (Probe Holes 1, 2, 2A, 3 and 4) were advanced along the bottom of slope (near the waterline of creek), extending to refusal depths varying from about 0.9 m (Probe Hole 1) to about 5.0 m (Probe Hole 4) below existing grade,

- three (3) probe holes (Probe Holes 5 to 7) were advanced into the water, extending to refusal depths varying from about 6.3 m (Probe Hole 5) to about 7.2 m (Probe Hole 6) below creek bed/sediment.

The approximate location of the boreholes and probe holes are presented on Figure 2. The boreholes and probe hole locations were staked out in the field by Terraprobe Inc. at locations provided by the client. The borehole and probe hole ground surface/creek bed/sediment elevations were estimated from the topographic survey drawing provided by Town of Oakville. The borehole and probe hole surface elevations are provided for the purpose of relating borehole soil stratigraphy, and should not be used or relied on for any other purposes.

Various utility locate agencies (including a private locate company) were contacted by Terraprobe to clear the borehole location of the possible underground utilities, prior to the commencement of the field investigation.

The borings were advanced using a continuous flight power auger machine (track/truck-mounted) with solid/hollow stem augers, and were sampled at 0.75 m and 1.5 m intervals with a conventional 50 mm diameter split barrel samplers when the Standard Penetration Test (SPT) was carried out (ASTM D 1586). The results of the penetration tests are reported as "N-Values" on the Borehole Logs at corresponding sampling depths. Bedrock coring (using NQ bit size) was carried in one (1) selected borehole (Borehole 3-20) to confirm and characterize the bedrock.

The probe holes were advanced by Sonic Soil Sampling (Ontario) using a portable Pionjar equipment with a solid cone assembly, without sampling. Probe Holes were advanced to refusal depths by utilizing a solid penetration cone (drive point) attached to the standard 'AW' drill rods.

The field work (drilling, sampling, rock coring and testing) was observed and recorded by a member of our field engineering staff, who logged the borings and examined the samples as they were obtained. All samples obtained during the investigation were sealed into plastic jars and transported to our geotechnical laboratory for detailed inspection and testing. The borehole samples were examined (tactile) in detail by a geotechnical engineer, and classified according to visual and index properties. Geotechnical laboratory testing consisted of water content determination on all samples and a Sieve and Hydrometer analysis on two (2) selected native soil samples (Borehole 2-20, Sample 2 and Borehole 3-20, Sample 8) and Atterberg Limits tests on one (1) selected native soil sample (Borehole 3-20, Sample 8). The results of the laboratory testing are plotted on the enclosed Borehole Logs at the respective sampling depths, summarized in Section 4.5 of this report, and appended.

Ground water levels were observed in the boreholes upon completion of drilling. Ground water level was monitored in the boreholes upon completion of drilling. Standpipe piezometer was not installed in the borehole as the long-term ground water level monitoring was beyond the scope of our work.

4. SUBSURFACE CONDITIONS

The results of the boreholes are summarized below and recorded on the accompanying Borehole Logs. This summary is intended to correlate this data to assist in the interpretation of the subsurface conditions encountered at the site.

It should be noted that the soil conditions are confirmed at the borehole locations only and may vary between and beyond the borehole locations. The stratigraphic boundaries as shown on the logs represent an inferred transition between the various strata, rather than a precise plane of geologic change.

In summary, the boreholes encountered topsoil layer at the ground surface underlain by earth fill zone and extending to depths varying from about 0.8 to 6.1 m below grade. The earth fill was underlain by bedrock of Georgian Bay Formation at Borehole 1-20 and undisturbed native soils at Boreholes 2-20 and 3-20. The native soil was further underlain by bedrock of Georgian Bay Formation. The boreholes extended to depths varying from about 2.4 to 11 m below grade.

4.1 Topsoil

A layer of topsoil (about 100 to 150 thick) was encountered at the ground surface in all boreholes. The topsoil was dark brown to black in colour and predominately consists of a silt matrix.

The topsoil thicknesses were estimated from the borings and are approximate, and may vary between and beyond the boreholes. The topsoil thickness noted on the Borehole Logs refers to the distinct topsoil layer present at the borehole location, however, organic inclusions extended deeper than the topsoil thickness layer noted on the Borehole Logs. The topsoil thickness to be removed/stripped from the site redevelopment may be greater than the topsoil thickness noted on the Borehole Logs. Therefore, this information is not sufficient for estimating topsoil quantities and/or associated costs.

4.2 Earth Fill/Organic Silt

A zone of earth fill materials was encountered beneath the topsoil layer and extended to a depths varying from about 0.8 m (Boreholes 1-20 and 2-20) to 6.1 m (grading to organic silt at a depth of about 0.8 m in Borehole 3-20) below grade. The earth fill material predominantly consisted of clayey silt with trace to some sand and trace amounts of gravel and organics as well as fragment of decayed wood. The earth fill material was underlain by bedrock of Georgian Bay Formation at Borehole 1-20 and undisturbed native soils at Boreholes 2-20 and 3-20.

The Standard Penetration Test results ('N' Values) obtained from the earth fill materials varied from 0 to

14 blows per 300 mm of penetration, indicating a very soft to stiff consistency.

The measured moisture contents of the earth fill samples varied from about 2 to 80 percent by weight, indicating a moist to wet condition. The relatively high measured moisture contents of some of earth fill soil samples are likely due to the presence of the organic matter/organic silt deposit.

4.3 Native Soils

Undisturbed native soils were encountered beneath the earth fill materials in Boreholes 2-20 and 3-20 at depths of 0.8 and 6.1 m below grade, respectively. The native soils deposit graded into weathered shale which extended to the full depth of investigation at all borehole locations.

Sandy silt with some clay to clayey and trace amounts of gravel and shale fragment was encountered in Borehole 2 -20 at about 0.8 depth and extended to about 1.7 m depth below grade.

Clayey silt to silt and clay with trace to some sand and trace amounts of gravel and shale fragment was encountered in Borehole 3 -20 at about 6.1 m depth and extended to about 7.8 m depth below grade.

The Standard Penetration Test results ('N' Value) obtained from the undisturbed native soils varied from 1 to 26 blows per 300 mm of penetration, indicating a very soft to very stiff consistency.

The measured moisture content of the clayey silt samples ranged from 4 to 25 percent by weight, indicating a moist condition.

4.4 Bedrock

Fill materials in Boreholes 1-20 and native soils in Boreholes 2-20 and 2A-20 graded into bedrock of Georgian Bay Formation which was inferred by split spoon samples and auguring resistance observations at depths varying from about 0.8 to 1.7 m below existing grade (Elev.79.0 to 78.0 m), respectively. These boreholes were terminated within the inferred bedrock.

Bedrock was confirmed by rock coring at Borehole 3-20 at a depth of about 7.8 m (Elev. 68.1 m) and extended to a depth of about 11.0 m (Elev. 64.9 m) depth below grade. Rock Core Log and photographs are appended. The bedrock is described as weathered to unweathered thinly laminated to very thinly bedded, grey shale with weak to medium strong light grey limestone interbeds.

The bedrock beneath the site is of the Georgian Bay Formation, which is a deposit predominantly comprised laminated to thinly bedded grey shale of Upper Ordovician age. The shale contains interbeds of grey calcareous shale, limestone/dolostone and calcareous sandstone, which are discontinuous and nominally 50

to 300 mm thick. Shale is a relatively low strength (weak) rock type, whereas the limestone/dolostone beds are considered medium strength rock. Where observed, the occurrence of stronger calcareous beds ("limestone") is reported on the rock core log. The percentage of limestone found in cored samples varied from 0 to 35% with an average about 18 %.

Joints occurring within the shale are generally closely to very closely spaced, and typically weathered sometimes with a veneer to coating of clay. Widely-spaced sub vertical joints (closed, planar, and clean) are also known to exist within this formation.

Rock Quality Designation (RQD) refers to the total length of pieces of sound core which are 100 mm or grater in length in a core run, expressed as a percentage of the total length of core run. A summary of Rock quality Designation, Rock Mass Quality, Total Core Recovery and Solid Core Recovery is presented below:

Borehole No.	Run No.	Rock Quality Designation (RQD)	Rock Mass Quality	Total Core Recovery (TCR)	Solid Core Recovery (SCR)
3-20	1	0 %	N/A	98 %	0 %
	2	43 %	Poor	100 %	85 %
	3	33 %	Poor	83 %	65 %

4.5 Geotechnical Laboratory Test Results

The geotechnical laboratory testing consisted of water content determination on all samples and a Sieve and Hydrometer analysis and Atterberg Limits Tests on selected native soil samples. The laboratory test results are plotted on the enclosed Borehole Logs at respective sampling depths, and the results of the Sieve and Hydrometer analysis are appended and summarized below:

Borehole No. Sample No.	Sampling Depth below Grade	Percentage				Description (MIT System)
		Gravel	Sand	Silt	Clay	
Borehole 2-20 Sample 2	1.1 m	2	24	58	16	SANDY SILT, some clay, trace gravel
Borehole 3-20 Sample 8	6.4 m	0	7	50	43	SILT AND CLAY, trace sand

The results of Atterberg Limits test were plotted on A-Line Graph (refer to enclosed figure, Atterberg Limits Test Results). The results of Atterberg Limits Test are appended and summarized as follows:

Borehole No. Sample No.	Sampling Depth below Grade	Liquid Limit (W_L) %	Plastic Limit (W_P) %	Plasticity Index (I_P) %	Natural Water Content (W_N) %	Plasticity
Borehole 3-20 Sample 8	6.4 m	38	19	19	25	Slightly Plastic

4.6 Ground Water

Observations pertaining to the depth of water level and caving were made in the boreholes upon completion of drilling, and are noted on the enclosed Borehole Logs. Standpipe piezometer were not installed in the boreholes as the long-term ground water level monitoring was beyond the scope of our work. A summary of ground water observation is provided below:

Borehole No.	Depth of Boring	Depth to Cave	Water level at the time of drilling
1-20	5.5 m BG	open	4.3 m BG
2-20	3.1 m BG	open	dry
2A-20	2.4 m BG	open	dry
3-20	11.0 m BG	n/a*	n/a*

* cased borehole with drill fluid BG = Below Grade

It should be noted that the groundwater levels may fluctuate seasonally depending on the amount of precipitation and surface runoff.

4.7 Creek Bed Probing

The following table summarises the refusal depths encountered at the probehole locations (advanced in the creek and along the bottom of the west bank). The probe hole refusal depth varied from about 0.9 m (Probe Hole 1) to 7.2 (Probe Hole 6) below the creek bed (top of sediment).

Probe Hole No.	Approx. Top of Sediment/Surface Elevation (m)	Approx. Refusal Elevation (m)	Refusal Depth/ Thickness of Sediment (m)
1	74.6	73.7	0.9
2	74.6	73.5	1.1
2A	74.9	73.0	1.9
3	74.6	72.9	1.7
4	74.6	69.6	5.0

Probe Hole No.	Approx. Top of Sediment/Surface Elevation (m)	Approx. Refusal Elevation (m)	Refusal Depth/ Thickness of Sediment (m)
5	72.9	66.6	6.3
6	73.2	66.0	7.2
7	73.6	66.5	7.1

It should be noted that the refusal depths noted above are based on the manual probing refusal of the probing rod fitted with a drive point (cone). While, the drive point refusal suggests a presence of a relatively hard stratum at refusal depths noted above, it should be noted that the drive point refusal does not necessarily indicate a presence of the bedrock. Further, hard stratum is inferred from the drive point refusal depth at the probe hole locations only, and may vary between and beyond the probe hole locations.

5. DISCUSSION AND RECOMMENDATIONS

The following discussion and recommendations are based on the factual data obtained from this investigation and are intended for use of the owner and the design engineer. Contractors bidding or providing services on this project should review the factual data and determine their own conclusions regarding construction methods and scheduling.

This report is provided on the basis of these terms of reference and on the assumption that the design features relevant to the geotechnical analyses will be in accordance with applicable codes, standards and guidelines of geotechnical engineering practice. If there are any changes to site development features, and/or there is any additional information relevant to the interpretations made of the subsurface information with respect to the geotechnical analyses or other recommendations, then Terraprobe should be retained to review the implications of these changes with respect to the contents of this report.

It should be noted that the project is in EA stage of developing design options. Based on available preliminary project design information, we understand that the proposed shoreline protection works envisages two design options:

Option 1: Installation of a sheet pile wall along the waterline of creek. The concrete walkway will be constructed behind the sheet pile wall.

Option 2: Construction of a pile supported concrete walkway and a riprap stone revetment as shoreline protection.

5.1 Seawall/Sheet Pile Wall Design Considerations

Four (4) exploratory boreholes were advanced within the study area and extended to depths varying from about 2.4 to 11.0 m below existing ground surface. Eight (8) probe holes (5 probe holes at the bottom of slope/near the edge of water while 3 probe holes into the water) were advance within the study area and extended to refusal depths varying from about 0.9 to 7.2 m depth below ground surface/creek bed.

Borehole 3-20 was advanced in the vicinity of the proposed walkway (at the bottom of the slope). The borehole encountered earth fill material and extended to about 6.1 m depth below grade. The earth fill material was underlain by undisturbed native soil deposit and extended to about 7.8 depth below grade. Bedrock of Georgian Bay Formation was encountered below the native soil (at about 7.8 m) and extended to about 11 m depth below grade.

Sheet Pile installation does not require special foundation support considerations and is designed to resist earth pressure and surcharge loading based on wall embedment and anchoring.

Walls or bracings subject to unbalanced earth pressures must be designed to resist a pressure that can be calculated based on the following equation:

$$P = K[\gamma (h-h_w) + \gamma' h_w + q] + \gamma_w h_w$$

where:

- P = the horizontal pressure at depth, h (m)
- K = the earth pressure coefficient,
- h_w = the depth below the ground water level (m),
- γ = the bulk unit weight of soil, (kN/m^3)
- γ' = the submerged unit weight of soil, (γ - 9.8 kN/m^3)
- γ_w = the unit weight of water (9.8 kN/m^3)
- q = the complete surcharge loading (kPa)

Where the wall backfill can be drained effectively to eliminate hydrostatic pressures on the wall, this equation can be simplified to:

$$P = K[\gamma h + q]$$

This equation assumes that free-draining granular backfill is used and positive drainage is provided to ensure that there is no hydrostatic pressure acting in conjunction with the earth pressure. However, typically sheet pile walls are designed to resist hydrostatic pressure.

In case of a sheet pile wall design, the design water level should be considered to be at the ground surface.

Resistance to sliding of earth retaining structures is developed by friction between the base of the footing and the soil. This friction ® depends on the normal load on the soil contact **(N)** and the frictional resistance of the soil **(tan ϕ)** expressed as **R = N tan ϕ**. This is an ultimate resistance value and does not contain a factor of safety. The factored geotechnical resistance at ULS is **0.8R**. In case of a sheet pile wall, the wall is generally secured with anchors.

Passive earth pressure resistance in front of the retaining structure is generally not considered as a resisting force against sliding for conventional retaining structure design because a structure must deflect significantly to develop the full passive resistance.

The appropriate values for use in the design of structures subject to unbalanced earth pressures at this site are tabulated as follows:

Parameter	Definition	Units
ϕ	internal angle of friction	degrees
γ	bulk unit weight of soil	kN/ m^3
K_a	active earth pressure coefficient (Rankin)	dimensionless
K_o	at-rest earth pressure coefficient (Rankin)	dimensionless
K_p	passive earth pressure coefficient (Rankin)	dimensionless

Soil	ϕ	γ	K_a	K_o	K_p
Compact Granular Fill	32	21.0	0.31	0.47	3.25
Earth Fill (Boreholes 1-20, 2-20 and 2A-20)	28	18.5	0.36	0.53	2.77
Sandy Silt (Borehole 2-20)	30	20.0	0.25	0.50	3.00
Organic Silt (alluvial)	22	18.5	0.46	0.63	2.20
Clayey Silt to Silt and Clay (Borehole 3-20)	26	19.5	0.39	0.56	2.56

The values of the earth pressure coefficients noted above are for a horizontal grade behind the wall. The earth pressure coefficients for an inclined grade (behind the wall) will vary based on its inclination.

Walkway (Behind the Sheet Pile Wall)

The proposed works would also include construction of a walkway behind the sheet pile wall. The proposed walkaway will likely be concrete/asphalt surfaced walkway.

Borehole data indicated that the exposed subgrade at the site (following removal of topsoil) is expected to consist of earth fill materials. The subgrade should be proof-rolled with a heavy rubber tire vehicle (such as a grader) and any weak, soft, wet or unstable areas should be sub-excavated, and backfilled with clean earth fill material placed in 150 mm thick lifts and compacted to a minimum of 98 percent Standard Proctor Maximum Dry Density (SPMDD). Local subexcavation in some areas may be required due to loose/soft, wet and incompetent subgrade conditions or excessive topsoil/organic presence, as identified during the proof roll. We note that subgarde stabilization measures such as additional granular base and/or geogrid may be required as deemed appropriate during construction.

The existing native and earth fill materials encountered on the site may be utilized for subgrade preparation provided they do not contain excessive amounts of organics and deleterious materials, as well as their in-situ moisture content is within 3 percent of the optimum moisture content. The selection and sorting of these soils for reuse should be conducted under the supervision of a geotechnical engineer. Pavement subgrade fill material should be compacted to a minimum of 95 percent SPMDD, while the upper zone (within 1.2 m of the design subgrade) should be compacted to a minimum of 98 percent SPMDD.

The following table provides the minimum recommended design for walkway:

Minimum Rigid Concrete Pavement Structure for Walkway

Pavement Layer	Compaction Requirements	Minimum Component Thickness
Portland Cement Concrete (CAN3-CSA A23.1) - Class C-2	CAN3-CSA A23.1	150 mm
Base Course: Granular A (OPSS.MUNI 1010) or 19 mm Crusher Run Limestone	100% Standard Proctor Maximum Dry Density (ASTM-D698)	200 mm

*** Town's walkway specifications must be referred and followed. Town specifications may require additional considerations above and beyond the above recommended design.**

Minimum Asphalt Pavement Structure for Walkway

Pavement Layer	Compaction Requirements	Minimum Component Thickness
HL3 Asphaltic Concrete (OPSS 1150) with PG asphalt cement (OPSS 1101)	as per OPSS 310	75 mm
Base Course: Granular A (OPSS.MUNI 1010) or 19 mm Crusher Run Limestone	100% Standard Proctor Maximum Dry Density (ASTM-D698)	200 mm

*** Town's walkway specifications must be referred and followed. Town specifications may require additional considerations above and beyond the above recommended design.**

The granular materials should be placed in lifts 150 mm thick or less and compacted to a minimum of 100 percent. Asphalt materials should be rolled and compacted as per OPSS 310. The granular and asphalt pavement materials and their placement should conform to applicable OPSS 310, 501, 1150 and OPSS.MUNI 1010 and pertinent Town specifications.

The granular base must extend a minimum of 300 mm beyond the each edge of the asphalt/concrete. The edge of asphalt must be hand tamped to a 45 degree angle. A 50 mm thick topsoil and sod cover can be

provided over granular base on each side of the pathway extending to the asphalt edge. The width of the walkway must conform to the pertinent Town/Community Services requirements.

Control of surface water is an important factor in achieving a good pavement life. The need for adequate subgrade drainage cannot be over-emphasized. The subgrade must be free of depressions and sloped (preferably at a minimum grade of 3 percent) to provide effective drainage toward subgrade drains. Grading adjacent to the pavement areas should be designed to ensure that water is not allowed to pond adjacent to the outside edges of the pavement.

It is recommended that regular inspection and testing should be conducted during construction to confirm material quality and thickness as well as and to ensure adequate compaction.

5.2 Pile Supported Walkway Design Considerations

Borehole 3-20 was advanced in the vicinity of the proposed walkway (at the bottom of creek bank). The proposed walkway will likely be supported on deep foundation (pile foundation).

The borehole encountered earth fill material and extended to about 6.1 m below grade. The earth fill material was underlain by undisturbed native soil deposit and extended to about 7.8 depth below grade. Bedrock of Georgian Bay Formation was encountered below the native soil (at about 7.8 m) and extended to about 11m depth below grade. In addition, eight (8) probe holes (5 probe holes at the bottom of slope/near the edge of water while 3 probe holes into the water) were advance within the study area (in the vicinity of the proposed walkway) and extended to refusal depths varying from about 0.9 to 7.2 m (Elev. 73.7 to 66.0 m) below ground surface/creek bed. The probe holes were advanced to determine the presence of hard stratum (inferred bedrock) to support the driven pile foundation.

The overburden weak soils (fill and native clayey silt) are not suitable to support the proposed walkway foundation. It is anticipated that the proposed walkway can be supported on deep foundation (driven piles).

Driven Piles

Based on the borehole and probehole information, it is understood that the proposed walkway will be supported on driven piles foundation.

Driven steel pile foundations are broadly categorized as either low displacement or high displacement units. Low displacement piles are normally constituted of HP steel sections. High displacement piles are made by driving closed end steel tubes. The design for both types of piles is based on sacrificial steel thickness.

Either type of pile would be expected to penetrated through the very loose to compact soils found beneath this site. Based on our experience, the high displacement piles would likely encounter practical refusal at or near the bedrock level while the low displacement piles are expected to penetrate into the weathered zone of shale bedrock near the bedrock surface before the 'set-up' during the pile driving process. The penetration of H-piles into the weathered zone to practical refusal in the bedrock, typically vary from about 1 to 1.5 metres depending upon the pile section selected and the weathered bedrock profile.

The actual pile tip "set-up" elevations will vary based upon the variations in the bedrock surface and 'hard' limestone/dolostone layers present in the bedrock. The actual installed pile lengths and set must be determined in the field based on continuous monitoring of the pile operations as required by the Ontario Building Code 4.2.2.3. The contractual arrangements for pile driving should include specified foundation levels and a plus/minus pricing structure to compensate for the actual driven length of the installed piles.

The pile driving results in ground vibrations. Prior to commencing the excavation and pile driving, it is strongly recommended that a pre-construction condition survey be carried out for the adjacent buildings/structures and roads to protect against gratuitous claims of damage.

The presence of obstruction within the overburden may also result in pile damage and bent piles. The pile refusal/set will have to be closely monitored during installation. The piles which do not properly 'set' will not be suitable as a foundation element and have to be discarded, removed and replaced.

The piles are to be driven to refusal in bedrock, and shall be fitted with manufactured driving points or shall be reinforced in accordance with the provisions of OPSD 3000.100. If piles need to be spliced then all splices shall be made in compliance with the requirements of OPSD 3000.200. Care must be taken to avoid over-driving and damaging the pile tip. It should be noted that for piles driving to bedrock, the current version of SP 903S01 requires the contractor to adequately seat the pile on bedrock without damaging the pile, and ensure that the rock points penetrate into the rock.

High Displacement Piles

High displacement piles are made by driving closed ended steel tubes. Based on the site specific subsurface conditions, closed ended steel tube piles will likely be the most economical pile foundation option. Typical Steel Tube Pile sections and capacities are tabulated based on steel tube of 240 and 350 MPa yield strengths.

Section diameter and wall thickness	Area of Steel (mm^2)	Factored axial resistance at ULS		Axial resistance at SLS	
		fy=240 MPa	fy=350 MPa	fy=240 MPa	fy=350 MPa
9-5/8 inches x 0.395 inches	7387	705 kN	1030 kN	530 kN	775 kN
9-5/8 inches x 0.472 inches	8839	845 kN	1235 kN	635 kN	925 kN
10-7/8 inches x 0.500 inches	10387	995 kN	1450 kN	745 kN	1090 kN
12-3/4 inches x 0.500 inches	12413	1190 kN	1753 kN	890 kN	1300 kN
12-3/4 inches x 1.00 inches	23812	2285 kN	3330 kN	1710 kN	2500 kN

If consideration is given to the use of 12.75 inch sections with a 1 inch wall thickness, then it would be necessary to carry out a load test to demonstrate that performance of the pile is adequate. The unit loading on the base of this pile at full structural capacity is significantly greater than for the other sections and the load settlement characteristics for this section and soil cannot be predicted with confidence, in the absence of a specific load test.

All other piles sections can be driven to practical refusal and evaluated based on the "setting" of the piles by reference of the Hiley Dynamic Formula, in accordance with MTO Standards SS103-10 or SS103-11 assuming the ultimate capacity of piles as follows:

Section - diameter and wall thickness	Area of Steel mm^2	Ultimate Capacity (working stress design) fy=240 MPa	Ultimate Capacity (working stress design) fy=350 MPa
9-5/8 inches x 0.395 inches	7387	1595 kN	2325 kN
9-5/8 inches x 0.472 inches	8839	1905 kN	2780 kN
10-7/8 inches x 0.500 inches	10387	2240 kN	3270 kN
12-3/4 inches x 0.500 inches	12413	2680 kN	3910 kN

Low Displacement Piles

For low displacement steel HP section, the maximum design capacity as derived from static analysis, to be field verified by dynamic analysis, as prescribed in CAN/CSA-S6-00 Canadian Highway Bridge Design Code, has been tabulated. If consideration were given to the use of *dynamic load testing* or *static load testing* to verify the pile capacity, at the time of construction, the maximum design capacity of the piles could potentially be 25% and 50% higher respectively if the tests demonstrate adequate performance under the higher loading.

Maximum Pile Capacity for Limit States Design Method

Section	Area of Steel (mm^2)	factored axial resistance at ULS fy = 350 MPa	axial resistance at SLS fy = 350 MPa
HP 310 x 125	15900	1975 kN	1645 kN
HP 310 x 110	14100	1763 kN	1469 kN
HP 310 x 79	9980	1247 kN	1039 kN
HP 250 x 85	10900	1357 kN	1100 kN
HP 250 x 62	7980	993 kN	800 kN
HP 200 x 54	6820	840 kN	700 kN

The pile sections are to be driven to practical refusal and a *dynamic analysis* to evaluate the "setting" of the piles shall be carried out using the *Hiley Dynamic Pile Driving Formula*, in accordance with MTO Standards SS103-10 or SS103-11. The Hiley Formula generates an unfactored ultimate pile capacity which must equal or exceed the following tabulated ultimate axial capacity values.

Unfactored Ultimate Capacity for Comparison to Hiley Dynamic Analysis

Section	Area of Steel (mm^2)	ultimate capacity fy = 350 MPa
HP 310 x 125	15900	4970 kN
HP 310 x 110	14100	4408 kN
HP 310 x 79	9980	3119 kN
HP 250 x 85	10900	3393 kN
HP 250 x 62	7980	2483 kN
HP 200 x 54	6820	2102 kN

Preliminary estimates of the actual required pile "set" requirements can be made when details of the proposed hammer and helmet configuration are known. In this regard, care should be taken in selection of the pile

driving hammer so that driving stresses in the piles are limited to a maximum of 90% of the yield strength of the steel.

Procedure and Methodology

During the driving of piles there should be a quite dramatic increase in driving resistance expected when the tip of the pile encounters the underlying bedrock.

For the purpose of estimating pile driving lengths, extrapolation can be made between the available borehole data. However, actual installed pile lengths and set must be determined in the field based on the continuous monitoring of the piling operation. Exterior grade beams and pile caps must be provided with a minimum soil cover of 1.2 m for adequate frost protection.

Piles must be surveyed for position, elevation and plumbness upon completion of driving, and again following the driving of adjacent piles. If significant heave or displacement occur, re-driving of the piles may be necessary.

Driven piles to bedrock should be reseated 24 hours later to the same required penetration resistance to counteract the potential relaxation of weathered shale. If more than one piles are required for a foundation element, the adjacent piles in a pile group should be installed at a spacing of at least three pile diameters. When driven in a group they tend to jack-up (heave) adjacent piles already driven. Also for adjacent piles which achieve the driving criteria at significantly different levels, the higher piles must be re-tapped. Allowance must be made in the piling contract for re-tapping of the piles.

All pile driving and 'restriking' should be carried out in accordance with SP 903S01. After each pile is installed, an elevation of the pile should be taken. This elevation should be periodically monitored to confirm that the pile has not heaved as a result of driving the adjacent piles. Piles which experience heave must be re-driven to the required resistance as required by the engineer. At least 10 percent of the piles should be re-tapped not less than 24 hours after the driving of the pile as per SP 903S01, to check that relaxation has not occurred. It relaxation is noted, then all piles should be re-tapped. While pile heave is not anticipated, if it is observed, it may be necessary to stagger the driving of the piles.

The coefficient of horizontal subgrade reaction in cohesive soils can be estimated as follows:

$$k_s = 67\ Cu/d$$

where k_s = coefficient of horizontal sub-grade reaction (kN/m^3)
c_u = undrained shear strength (kPa)
d = pile diameter (m)

The recommended values c_u are presented in the following table:

Borehole No.	Depth below Grade (m)	Soil Type	Elevation (m)	n_h, (kN/m^3)	Ground Water Elevation (m)	c_u (kPa)
3-20	0.2 to 6.1 6.1 to 7.8	Fill - Clayey Silt Clayey Silt	75.7 - 69.8 69.8 - 68.1	n/a n/a	74.6	10 10

The unfactored ultimate vertical bearing capacity for the design of a pile, embedded in the sound bedrock, is at least 20 MPa. The factored ultimate lateral bearing capacity of the sound rock is 1 MPa.

The lateral resistance of the upper 1.2 of soil should not be incorporated into the design due to frost considerations.

Micropiles

Alternatively, the proposed walkway may be supported on micropile foundation units. Micropiles, also known as minipiles, (and less commonly as pin piles, needle piles and root piles) are deep foundation elements constructed using high-strength, small-diameter steel casing and/or threaded bar. Capacities vary depending on the micropile size and subsurface profile. Allowable micropile capacities in excess of 1,000 tons have been achieved.

The micropile casing generally has a diameter in the range of 3 to 10 inches. Typically, the casing is advanced to the design depth using a drilling technique. Reinforcing steel in the form of an all-thread bar is typically inserted into the micropile casing. High-strength cement grout is then pumped into the casing. The casing may extend to the full depth or terminate above the bond zone with the reinforcing bar extending to the full depth. The finished micropile (minipile) resists compressive, uplift/tension and lateral loads and is typically load tested in accordance with ASTM D 1143 (compressive), ASTM D 3689 (uplift/tension), and ASTM D 3966 (lateral).

Due to the small pile diameter, any end-bearing contribution in micropiles is generally neglected. The grout/ground bond strength achieved is influenced primarily by the ground type and grouting method used, i.e., pressure grouting or gravity feed.

The micro-pile anchor zone must extend 2.5 m into bedrock, regardless of the loading. In compression, the micro-piles can be designed using a maximum geotechnical reaction for adhesion at SLS of 620 kPa for up to 10 mm of settlement. The maximum factored geotechnical resistance for adhesion at ULS is 800 kPa in compression. In tension, the maximum factored geotechnical resistance for adhesion at ULS is 600 kPa. The anchor zone must not be less than 2.5 m in length, regardless of the loading. A load test is not required, as these are values based on previous anchor and pile work of a similar nature within our experience.

Usually, the upper 1 m of the bedrock, is not normally considered part of the bond length since it may be weathered/fractured.

The pile foundation system should be designed for adequate lateral stability including ice action and creek current. The foundation system will also require protection from scouring. Proper erosion and scour protection measures must be provided along the creek bank. Storm events will cause temporary high water level at the site and this aspect should be considered when determining the lateral and vertical extent of the scour protection required.

The depth of scour will depend upon the hydrology of the channel, its cross-section and the engineering properties of the materials below the streambed. Suitable rip-rap/revetment protections are typically installed to provide protection against scouring. The design of riprap/revetment including the vertical and lateral extent of the scour protection work as well as the size and thickness of the rip-rap stones should be determined by a hydromorphologist, river/coastal engineer or other similarly qualified person. The rip-rap should be separated from the soil with a geotextile filter fabric or a filter zone of granular material. Alternatively, the foundation can be extended a safe depth below the predicted scour depth as determined by a river/coastal engineer.

It should be noted that Terraprobe Inc. will review the preferred design option and provide comments.

5.3 Switchback Ramp and Slope Regrading

Currently, the west bank slope within the study area is about 4 to 5 m high which extends from the asphalt paved/landscaped tableland to the edge of creek level. The slope inclination within the study area varies from about 1.4 to 2.6 horiz. to 1 vert. with locally flatter/steeper areas. The slope is generally vegetated and consisted of overburden of about 0.8 to 1.7 m depth and shale bedrock. As the major portion of the slope consisted of shale bedrock, an inclination of slope up to 1.4 horizontal to 1.0 vertical can be considered stable. The existing slope inclination is flatter than the above noted stable slope inclination, and therefore the site slope is considered to be stable. We understand that a switchback ramp will likely be constructed from the tableland to down shoreline bank to provide access to creek/dock. The creation of this ramp will require cutting the existing sloping ground which may require provision of a small retaining wall along the edge of proposed ramp to provide grade separation. A detailed global/slope stability analysis must be carried out once the detailed design and regrading information for the proposed work are available.

Borehole data indicated that the exposed subgrade at the site (following removal of topsoil) is expected to consist of earth fill, native soil and shale. The subgrade should be proof-rolled with a heavy rubber tire vehicle (such as a grader) and any weak, soft, wet or unstable areas should be sub-excavated, and backfilled with clean earth fill material placed in 150 mm thick lifts and compacted to a minimum of 98 percent

SPMDD. Local subexcavation in some areas may be required due to loose/soft, wet and incompetent subgrade conditions or excessive topsoil/organic presence, as identified during the proof roll. We note that subgarde stabilization measures such as additional granular base and/or geogrid may be required as deemed appropriate during construction.

The existing native and earth fill materials encountered on the site may be utilized for subgrade preparation provided they do not contain excessive amounts of organics and deleterious materials, as well as their in-situ moisture content is within 3 percent of the optimum moisture content. The selection and sorting of these soils for reuse should be conducted under the supervision of a geotechnical engineer. Pavement subgrade fill material should be compacted to a minimum of 95 percent SPMDD, while the upper zone (within 1.2 m of the design subgrade) should be compacted to a minimum of 98 percent SPMDD.

The following table provides the minimum recommended design for a switchback ramp:

Minimum Rigid Concrete Pavement Structure for Switchback Ramp

Pavement Layer	Compaction Requirements	Minimum Component Thickness
Portland Cement Concrete (CAN3-CSA A23.1) - Class C-2	CAN3-CSA A23.1	150 mm
Base Course: Granular A (OPSS.MUNI 1010) or 19 mm Crusher Run Limestone	100% Standard Proctor Maximum Dry Density (ASTM-D698)	200 mm

*** Town's walkway specifications must be referred and followed. Town specifications may require additional considerations above and beyond the above recommended design.**

Minimum Asphalt Pavement Structure for Switchback Ramp

Pavement Layer	Compaction Requirements	Minimum Component Thickness
HL3 Asphaltic Concrete (OPSS 1150) with PG asphalt cement (OPSS 1101)	as per OPSS 310	80 mm
Base Course: Granular A (OPSS.MUNI 1010) or 19 mm Crusher Run Limestone	100% Standard Proctor Maximum Dry Density (ASTM-D698)	200 mm

*** Town's walkway specifications must be referred and followed. Town specifications may require additional considerations above and beyond the above recommended design.**

The granular materials should be placed in lifts 150 mm thick or less and compacted to a minimum of 100 percent. Asphalt materials should be rolled and compacted as per OPSS 310. The granular and asphalt pavement materials and their placement should conform to applicable OPSS 310, 501, 1150 and OPSS.MUNI 1010 and pertinent Town specifications.

The granular base must extend a minimum of 300 mm beyond the each edge of the asphalt. The edge of asphalt must be hand tamped to a 45 degree angle. A 50 mm thick topsoil and sod cover can be provided over granular base on each side of the pathway extending to the asphalt edge. The width of the walkway and switchback ramp must conform to the pertinent Town/Community Services requirements.

Control of surface water is an important factor in achieving a good pavement life. The need for adequate subgrade drainage cannot be over-emphasized. The subgrade must be free of depressions and sloped (preferably at a minimum grade of three percent) to provide effective drainage toward subgrade drains. Grading adjacent to the pavement areas should be designed to ensure that water is not allowed to pond adjacent to the outside edges of the pavement.

It is recommended that regular inspection and testing should be conducted during construction to confirm material quality and thickness as well as and to ensure adequate compaction.

5.4 Excavations and Ground Water Control

The borehole data indicate that topsoil, earth fill, native soils and bedrock would be encountered in the excavations. Excavations must be carried out in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects. These regulations designate four broad classifications of soils to stipulate appropriate measures for excavation safety.

TYPE 1 SOIL

a. is hard, very dense and only able to be penetrated with difficulty by a small sharp object;
b. has a low natural moisture content and a high degree of internal strength;
c. has no signs of water seepage; and
d. can be excavated only by mechanical equipment.

TYPE 2 SOIL

a. is very stiff, dense and can be penetrated with moderate difficulty by a small sharp object;
b. has a low to medium natural moisture content and a medium degree of internal strength; and
c. has a damp appearance after it is excavated.

TYPE 3 SOIL

a. is stiff to firm and compact to loose in consistency or is previously-excavated soil;
b. exhibits signs of surface cracking;
c. exhibits signs of water seepage;
d. if it is dry, may run easily into a well-defined conical pile; and
e. has a low degree of internal strength

TYPE 4 SOIL

a. is soft to very soft and very loose in consistency, very sensitive and upon disturbance is significantly reduced in natural strength;
b. runs easily or flows, unless it is completely supported before excavating procedures;
c. has almost no internal strength;
d. is wet or muddy; and

e. exerts substantial fluid pressure on its supporting system.

The earth fill, organic silt, and native soils encountered in the boreholes are classified as Type 4 Soil, under these regulations.

Where workmen must enter excavations advanced deeper than 1.2 m, the trench walls should be suitably sloped and/or braced in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects. The regulation stipulates the steepest slopes of excavation by soil type as follows:

Soil Type	Base of Slope	Steepest Slope Inclination
1	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
2	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
3	from bottom of trench	1 horizontal to 1 vertical
4	from bottom of trench	3 horizontal to 1 vertical

Minimum support system requirements for steeper excavations are stipulated in the Occupational Health and Safety Act and Regulations for Construction Projects, and include provisions for timbering, shoring and moveable trench boxes.

Excavations made in bedrock can be near vertical, provided the rock faces are scaled and maintained to preclude the possibility of spauls. Where this is not possible, protective mesh can be draped over the rock face when work is required in the area immediately beside the cut rock face. However, based on the anticipated switchback ramp construction, significant excavation into the bedrock is not anticipated.

It should be noted that the fill and native soils may include debris/boulders. The size and distribution of such obstructions cannot be predicted with borings, because the borehole sampler size is insufficient to secure representative samples for particles of this size. Provision should be made in excavation contracts including piling work to allocate risks associated with time spent and equipment utilized to remove or penetrate such obstructions when encountered.

The overburden soils can be removed by conventional excavation equipment. The rock excavation may require special provision and methodology. As noted before, based on the anticipated switchback ramp construction, significant excavation into the bedrock is not anticipated and local practice for shallow bedrock excavation may suffice for this site, as required.

The site is underlain by predominantly fill and clayey silt soils (with organic silt) with high water table, therefore, significant ground water seepage is expected into the excavation extending into these soils below the prevailing ground water level. The amount of ground water seepage will depend on the prevailing water level at the time of construction and the depth of excavation. Depending upon the amount of groundwater seepage and depth of excavation, the ground water control methods may vary from a conventional sump pit and pump arrangement at the base of the excavation to positive dewatering or provision of coffer dam. The amount of water seepage is expected to increase with depth of excavation. Sloughing and caving of excavation walls are expected if excavations are to be extended below the water table.

Ministry of the Environment, Conservation and Parks (MECP) has made changes to the requirement for Permit to Take Water approvals for construction related activities. Under the revised requirements, specific construction-related water-taking activities are eligible for Environmental Activity and Sector Registry (EASR). The trigger volume for EASR registration is water taking of more than 50,000 L/day. This includes the ground water that is collected in the open excavation as well as any precipitation or surface run off that enters the excavation.

5.5 Earthquake Design Parameters

Ontario Building Code stipulates the methodology for earthquake design analysis, as set out in Subsection 4.1.8.7. 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 Site Classification for Seismic Site Response are set out in Table 4.1.8.4A of the Ontario Building Code. The classification is based on the determination of the average shear wave velocity in the top 30 meters of the site stratigraphy, where shear wave velocity (v_s) measurements have been taken. Alternatively, the classification is estimated on the basis of rational analysis of undrained shear strength (s_u) or penetration resistance (N-values).

$$\upsilon_{s-avg} = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{\upsilon_{si}}} \qquad S_{u-avg} = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{s_{ui}}} \qquad N_{avg} = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{N_i}}$$

Shear wave velocity | **Undrained shear strength** | **SPT – values**

At this site, four (4) boreholes were advanced in the vicinity the proposed structures and extended to a maximum depth of about 11 m below ground surface. For seismic design purposes, the weighted Average Standard Penetration Resistance can be taken as less than 15 blows per 300 mm of penetration. On this basis, the site designation for seismic analysis is Class E, according to Table 4.1.8.4.A of the Ontario Building Code (2012). Tables 4.1.8.4.B and 4.1.8.4.C. of the same code provide the applicable acceleration and velocity based site coefficients.

Site Class	Values of F_a (acceleration-based site coefficient)				
	$S_a(0.2) \leq 0.25$	$S_a(0.2) = 0.50$	$S_a(0.2) = 0.75$	$S_a(0.2) = 1.00$	$S_a(0.2) \geq 1.25$
E	2.1	1.4	1.1	0.9	0.9

Site Class	Values of F_v (velocity-based site coefficient)				
	$S_a(1.0) \leq 0.1$	$S_a(1.0) = 0.2$	$S_a(1.0) = 0.3$	$S_a(1.0) = 0.4$	$S_a(1.0) \geq 0.5$
E	2.1	2	1.9	1.7	1.7

The above site seismic designation is estimated on the basis of rational analysis of the limited penetration resistance (N-Values) information obtained from the borehole advanced at the site up to about 11 m depth below grade. Alternatively, a site specific Multichannel Analysis of Surface Waves (MASW) may be conducted to determine the average shear wave velocity in the top 30 metres of the site stratigraphy to establish the site designation for seismic analysis which may result in an improved site seismic designation.

5.6 Backfill

The earth fill materials contain excessive amounts of organics should not be reused as backfill in settlement sensitive areas. However, these materials may be stockpiled and reused for landscaping purposes. The earth fill materials with only trace amounts of organic inclusion may be utilized as backfill. The selection and sorting of earth fill materials should be conducted under the supervision of a geotechnical engineer.

The undisturbed native soils and clean earth fill soils are considered suitable for backfilling purposes provided these soils are within 3 percent of the optimum moisture content. It should be noted that soils excavated from below the ground water level will be too wet to compact. Any soil material with 3 percent or higher in-situ moisture content than its optimum moisture content could be put aside to dry, or be tilled to reduce the moisture content so that it can be effectively compacted. Alternatively, materials of higher moisture content could be wasted and replaced with imported material which can be readily compacted. Based on the borehole information, we note that earth fill materials, could be too wet to compact to required density in their current condition. Clayey silt to silt and clay deposit and alluvial soils/organic silt are not considered suitable for backfill.

In settlement sensitive areas the backfill should consist of clean earth and should be placed in lifts of 150 mm thicknesses or less, and heavily compacted to a minimum of 95 percent SPMDD at a water content close to optimum. The soils encountered on the site will be best compacted with a heavy sheepsfoot type roller. Organic soils should not be used as backfill in settlement sensitive areas.

It should be noted that the site soils are generally not free draining, and will be difficult to handle and compact should they become wetter as a result of inclement weather or seepage. Hence, it can be expected that earthworks will be difficult during the wet periods (i.e., spring and fall) of the year, and may result in increased earthwork costs.

5.7 Preliminary Soil Chemistry Analysis

Ten (10) soil samples were submitted for chemical analysis to a CAEAL Certified Laboratory (i.e. AGAT Laboratories). Based on the above project requirements, the analysis carried out on the selected soil samples for the following parameters groups, as specified in Ministry of Environment Conservation and Parks (MECP) *"Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act"*, July 1, 2011.

INORGANIC PARAMETER GROUPS

- Metals
- Metals, Hydride-Forming Parameters (H-M)
- Other Regulated Parameters (ORPs)
  - Boron (Hot water soluble) [B (HWS)]
  - Cyanide
  - Electrical Conductivity (EC)
  - Hexavalent Chromium
  - Mercury
  - pH
  - Sodium Adsorption Ratio (SAR)

ORGANIC PARAMETER GROUPS

- Volatile Organic Compounds (VOCs)
- Petroleum Hydrocarbons (PHCs)
- Benzene, Toluene, Ethylbenzene & Xylene (BTEX)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Polychlorinated Biphenyl (PCBs)

The soil samples selected for analysis are as follows:

Borehole No. Sample No.	Depth (m)	Strata	M	H-M	ORPs	VOC	PHC	BTEX	PAH	PCB
BH1-20 ,SS1A	0.2	Fill	✓	✓	✓	✓	✓	✓	✓	✓
BH1-20, SS1B	0.5	Fill	✓	✓	✓	✓	✓	✓	✓	✓
BH2-20, SS1	0.4	Fill	✓	✓	✓	✓	✓	✓	✓	✓
BH2-20, SS2	1	Native	✓	✓	✓	✓	✓	✓	✓	✓
BH3-20, SS1	0.3	Fill	✓	✓	✓					✓
BH3-20, SS2	1	Fill							✓	
BH3-20, SS4	2.4	Fill				✓	✓			
BH3-20, SS6	4	Fill							✓	
BH3-20, SS7	4.9	Fill	✓	✓	✓					✓
BH3-20, SS8	6.4	Native				✓	✓			

Standards For Receiving Site

The results of the chemical analysis were compared to the Ministry of Environment, Conversation and Parks (MECP) Standards as found in the "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*", April 15, 2011. The Standards which the results were compared to were the following for coarse textured soils:

- Table 1 Full Depth Background Site Condition Standards (Table 1).
- Table 2 Full Depth Generic Site Condition Standards in a Potable Ground Water Condition for Residential, Parkland and Institutional/Industrial, Commercial and Community Land Use (Table 2 RPI/ICC).
- Table 3 Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition for Residential, Parkland and Institutional/Industrial, Commercial and Community Land Use (Table 3 RPI/ICC).

The Standards were chosen for the following reasons:

- Table 1 - The results were compared to the Table 1 Standards in order to determine if the soil material was suitable as clean fill meeting Table 1 at any potential receiving site.
- Table 2 RPI & ICC- The results were compared to the Table 2 RPI & ICC Standards in order to determine if the soil was suitable for use as a material meeting Table 2 at a potential receiving site.

- Table 3 RPI & ICC- The results were compared to the Table 3 RPI & ICC Standards in order to determine if the soil was suitable for use as a material meeting Table 3 at a potential receiving site or to determine if the soil should be considered a waste.

Sample Results

The results of the chemical analysis indicated the following:

Borehole No. Sample No.	Table 1 RPI/ICC	Table 2 RPI/ICC	Table 3 RPI/ICC
BH1-20 ,SS1A	Meets	Meets	Meets
BH1-20, SS1B	Meets	Meets	Meets
BH2-20, SS1	Meets	Meets	Meets
BH2-20, SS2	Meets	Meets	Meets
BH3-20, SS1	Meets	Meets	Meets
BH3-20, SS2	Meets	Meets	Meets
BH3-20, SS4	Meets	Meets	Meets
BH3-20, SS6	Meets	Meets	Meets
BH3-20, SS7	Exceeds Zinc	Exceeds Zinc	Exceeds Znic
BH3-20, SS8	Meets	Meets	Meets

In addition to the O.Reg. 153/04 analysis noted above, one (1) sample was submitted for analysis of O.Reg. 347 Schedule 4 parameters for Toxicity Characteristics Leaching Procedures (TCLP analysis) for waste classification purposes. The analysis was conducted for the following parameters:

- Benzo(a) pyrene
- Metals & Inorganics
- Volatile Organic Compounds (VOCs)
- Polychlorinated Biphenyls (PCBs)

The results of chemical analysis indicate that all soil is considered non-hazardous solid waste for offsite disposal and transportation.

It should be noted that the results of the chemical analysis refer only to the soil samples collected specific locations, and the soil chemistry may vary between and beyond the locations of the samples tested. The receiving sites accepting the fill may have a soil fill management plan with specific aesthetic, property requirements and/or specific requirements for chemical analysis (additional parameters and/or frequency of sampling) that have not been assessed in this letter.

The analytical results contained in this report should not be considered a warranty with respect to the soil quality or the use of the soil for any specific purpose. This letter provides the factual results of the chemical analysis only for the specific parameters analysed. No opinion is presented regarding the earthwork/suitability of the soil for any purpose. Earthworks related to the soil removal at the site should be conducted under the supervision of qualified personnel, thus ensuring that the soil material is properly inspected and that any deleterious materials, if present, are properly identified and removed. If there is indication of soil quality variation and/or other chemical/environmental concerns, further chemical testing should be carried out as necessary. Further, it must be noted that our scope of work, as directed by the client, was only limited to collecting soil samples and review of the analytical results.

The laboratory Certificates of Analysis are enclosed.

6. LIMITATIONS AND USE OF REPORT

It must be recognized that there are special risks whenever engineering or related disciplines are applied to identify subsurface conditions. A comprehensive sampling and testing programme implemented in accordance with the most stringent level of care may fail to detect certain conditions. Terraprobe has assumed for the purposes of providing advice, that the conditions that exist between sampling points are similar to those found at the sample locations. The conditions that Terraprobe has interpreted to exist between sampling points can differ from those that actually exist.

It must also be recognized that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site have the potential to alter subsurface conditions.

The discussion and recommendations are based on the factual data obtained from the investigation and are intended for use by the owner and its retained designers in the design phase of the project. Since the project is still in the design stage, all aspects of the project relative to the subsurface conditions cannot be anticipated. Terraprobe should review the design drawings and specifications prior to the construction. If there are changes to the project scope and development features; the interpretations made of the subsurface information, the geotechnical design parameters and comments relating to contractibility issues and quality control may not be relevant to the revised project. Terraprobe should be retained to review the implications of changes with respect to the contents of this report.

The investigation at this site was conceived and executed to provide information for project design. It may not be possible to drill a sufficient number of boreholes or samples and report them in a way that would provide all the subsurface information that could have an effect on construction costs, techniques, equipment, and scheduling. Contractors bidding on or undertaking work on this project should therefore, in this light, be directed to decide on their own investigations, as well as their own interpretations of the factual

investigation results. They should be cognizant of the risks implicit in subsurface investigation activities so that they may draw their own conclusions as to how the subsurface conditions may affect them.

This report was prepared for the express use of Town of Oakville and its retained design consultants. It is not for use by others. This report is copyright of Terraprobe Inc. and no part of this report may be reproduced by any means, in any form, without the prior written permission of Terraprobe Inc. and Town of Oakville, who are the authorized users.

We trust the foregoing information is sufficient for your present requirements. If you have any questions, or if we can be of further assistance, please do not hesitate to contact us.

Yours truly,

Terraprobe Inc.

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ENCLOSURES

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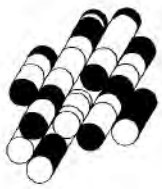

APPENDICES

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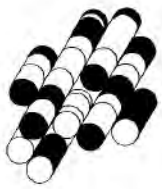

Terraprobe

ABBREVIATIONS AND TERMINOLOGY

SAMPLING METHODS

AS	auger sample
CORE	cored sample
DP	direct push
FV	field vane
GS	grab sample
SS	split spoon
ST	shelby tube
WS	wash sample

PENETRATION RESISTANCE

Standard Penetration Test (SPT) resistance ('N' values) is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a standard 50 mm (2 in.) diameter split spoon sampler for a distance of 0.3 m (12 in.).

Dynamic Cone Test (DCT) resistance is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a conical steel point of 50 mm (2 in.) diameter and with 60° sides on 'A' size drill rods for a distance of 0.3 m (12 in.)."

COHESIONLESS SOILS

Compactness	'N' value
very loose	< 4
loose	4 – 10
compact	10 – 30
dense	30 – 50
very dense	> 50

COHESIVE SOILS

Consistency	'N' value	Undrained Shear Strength (kPa)
very soft	< 2	< 12
soft	2 – 4	12 – 25
firm	4 – 8	25 – 50
stiff	8 – 15	50 – 100
very stiff	15 – 30	100 – 200
hard	> 30	> 200

COMPOSITION

Term (e.g)	% by weight
trace silt	< 10
some silt	10 – 20
silty	20 – 35
sand *and* silt	> 35

TESTS AND SYMBOLS

MH	mechanical sieve and hydrometer analysis
w, w_c	water content
w_L, LL	liquid limit
w_P, PL	plastic limit
I_P, PI	plasticity index
k	coefficient of permeability
γ	soil unit weight, bulk
G_s	specific gravity
φ'	internal friction angle
c'	effective cohesion
c_u	undrained shear strength

	Unstabilized water level
	1st water level measurement
	2nd water level measurement
	Most recent water level measurement
3.0	Undrained shear strength from field vane (with sensitivity)
C_c	compression index
c_v	coefficient of consolidation
m_v	coefficient of compressibility
e	void ratio

FIELD MOISTURE DESCRIPTIONS

Damp	refers to a soil sample that does not exhibit any observable pore water from field/hand inspection.
Moist	refers to a soil sample that exhibits evidence of existing pore water (e.g. sample feels cool, cohesive soil is at plastic limit) but does not have visible pore water
Wet	refers to a soil sample that has visible pore water

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ROCK CORE TERMINOLOGY

RECOVERY

TCR **Total Core Recovery** is the total length of core pieces, irrespective of their individual lengths obtained in a core run, and expressed as a percentage of the length of that core run.

SCR **Solid Core Recovery** is the total length of sound full-diameter core pieces obtained in a core run, expressed as a percentage of the length of that core run .

RQD **Rock Quality Designation** pertains to the sum of those pieces of sound core which are 10 cm or greater in length obtained in a core run, expressed as a percentage of the length of that core run.

RQD (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
QUALITY	**very poor**	**poor**	**fair**	**good**	**excellent**

JOINT CHARACTERISTICS

Joint Spacing (adapted from *Bieniawski 1989, ISRM 1981*)

Classification	Spacing
very close	< 60 mm
close	60 – 200 mm
moderately close	0.2 to 0.6 m
wide	0.6 to 2 m
very wide	> 2 m

Natural Fracture Frequency (per 0.3 m)
Refers to the number of natural fractures (joints, faults, etc.) which are present per 0.3m. Ignores mechanical or drill-induced breaks, and closed discontinuities (e.g. bedding planes).

Orientation

Orientation	Angle from horiz.
horizontal/flat	0 - 20°
dipping	20 - 50°
vertical	50 - 90°

Joint Filling

Description	Approx. φ`
tight, hard, non-softening	25 - 35
oxidation, surface staining only	25 - 30
slightly altered, clay-free	25 - 30
sandy particles, clay-free	2 - 25
sandy and silty, minor clay	1 - 24
non-softening clays	6 - 12
swelling clay fillings	n/a

Joint Aperture

Classification	Aperture
closed / tight	< 0.5 mm
gapped	0.5 to 10 mm
open	> 10 mm

Planarity
- Planar
- Undulating
- Stepped
- Irregular
- Discontinuous

Roughness
- Very rough
- Rough
- Smooth
- Slickensided
- Polished

Coating	Description
clean	no filling
veneer	< 1 mm filling
coating / infill	> 1 mm filling

GENERAL

Degree of Weathering (*after MTO, RR229 Evaluation of Shales for Construction Projects*)

Zone	Degree	Description
Z1	unweathered	shale, regular jointing
Z2	partially weathered	angular blocks of unweathered shale, no matrix, with chemically weathered but intact shale
Z3		soil-like matrix with frequent angular shale fragments < 25mm diameter
Z4a		soil-like matrix with occasional shale fragments < 3mm diameter
Z4b	fully weathered	soil-like matrix only

Strength classification (*after Marinos and Hoek, 2001*)

Grade	Term	UCS (MPa)	Field Estimate (Description)
R6	extremely strong	> 250	can only be chipped by geological hammer
R5	very strong	100 - 250	requires many blows from geological hammer
R4	strong	50 - 100	requires more than one blow from geological hammer
R3	medium strong	25 - 50	can't be scraped, breaks under one blow from geological hammer
R2	weak	5 - 25	can be peeled / scraped with knife with difficulty
R1	very weak	1 - 5	easily scraped / peeled, crumbles under firm blow of geo. hammer
R0	extremely weak	< 1	indented by thumbnail

Bedding Thickness (*Quarterly Journal of Engineering Geology, Vol 3, 1970*)

Very thickly bedded	> 2 m	Medium bedded	200 – 600mm	Very thinly bedded	20 – 60mm	Thinly Laminated	< 6mm
Thickly bedded	0.6 – 2m	Thinly bedded	60 – 200mm	Laminated	6 – 20mm		

BOREHOLE LOGS

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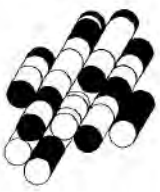

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LOG OF BOREHOLE 1-20

Project No. : 1-17-0069-02	Client : Town of Oakville	Originated by : SM
Date started : September 28, 2020	Project : Bronte Harbour (Inner)	Compiled by : AS
Sheet No. : 1 of 1	Location : Town of Oakville, Ontario	Checked by : MMT

Position : E: 604148, N: 4805095 (UTM 17T) Elevation Datum : Geodetic

Rig type : Truck-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
0	**79.8**	**GROUND SURFACE**											
	79.6 / 0.2	150mm **TOPSOIL**		1A	SS	14				PID: 0			1A Analysis: M&I, PAH, PCB, VOC, PHC
		FILL, clayey silt, trace sand, trace gravel, trace organics, stiff, dark brown, moist		1B									
	79.0 / 0.8	**INFERRED BEDROCK**, weathered to partially unweathered shale with intermittent limestone/dolostone stringers, reddish brown (QUEENSTON FORMATION)		2	SS	50 / 125mm	79			PID: 0			1B Analysis: M&I, PAH, PCB, VOC, PHC auger grinding
1				3	SS	50 / 125mm	78			PID: 0			
2				4	SS	50 / 125mm				PID: 0			
				5	SS	50 / 50mm	77			PID: 0			auger from 3.0m to 5.5m without sampling
3													
4							76						
							75						auger grinding
5	74.3 / 5.5			6	SS	50 / 50mm				PID: 0			spoon and auger refusal

Penetration Test Values (Blows / 0.3m): X Dynamic Cone; 10 20 30 40

Undrained Shear Strength (kPa): O Unconfined, ● Pocket Penetrometer, + Field Vane, ■ Lab Vane; 40 80 120 160

Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit; PL MC LL; 10 20 30

Lab Data and Comments: GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

END OF BOREHOLE

Auger refusal on inferred bedrock

Unstabilized water level measured at 4.3 m below ground surface; borehole was open upon completion of drilling.

file: 1-17-0069-02 bh logs.gpj

Terraprobe

LOG OF BOREHOLE 2-20

Project No. : 1-17-0069-02 | Client : Town of Oakville | Originated by : SM

Date started : September 28, 2020 | Project : Bronte Harbour (Inner) | Compiled by : AS

Sheet No. : 1 of 1 | Location : Town of Oakville, Ontario | Checked by : MMT

Position : E: 604213, N: 4805089 (UTM 17T) | Elevation Datum : Geodetic

Rig type : Truck-mounted | Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
0	79.7	**GROUND SURFACE**											
		100mm **TOPSOIL**											
		FILL, clayey silt, trace sand, trace gravel, trace organics, stiff, dark brown, moist		1	SS	12				PID: 0			SS1 Analysis: M&I, PAH, PCB, VOC, PHC
	78.9												
	0.8	**SANDY SILT**, some clay to clayey, trace gravel, shale fragment inclusions, very stiff, reddish brown, moist		2	SS	26				PID: 0			2 24 58 16 SS2 Analysis: M&I, PAH, PCB, VOC, PHC
1	78.0			3A	SS	50 / 100mm	79			PID: 0			auger grinding, spoon refusal
	1.7	**INFERRED BEDROCK**, weathered to partially unweathered shale with intermittent limestone/dolostone stringers, reddish brown (QUEENSTON FORMATION)		3B									
2				4	SS	50 / 100mm	78			PID: 0			spoon refusal
							77						
3	76.6			5	SS	50 / 75mm				PID: 0			spoon refusal
	3.1												

Penetration Test Values (Blows / 0.3m): X Dynamic Cone; 10 20 30 40

Undrained Shear Strength (kPa): O Unconfined, + Field Vane, ● Pocket Penetrometer, ■ Lab Vane; 40 80 120 160

Moisture / Plasticity: Plastic Limit (PL) | Natural Water Content (MC) | Liquid Limit (LL); 10 20 30

Lab Data and Comments: GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

END OF BOREHOLE

Auger refusal on inferred bedrock

Borehole was dry and open upon completion of drilling.

file: 1-17-0069-02 bh logs.gpj

Terraprobe

LOG OF BOREHOLE 2A-20

Project No. : 1-17-0069-02 | Client : Town of Oakville | Originated by : SM

Date started : September 28, 2020 | Project : Bronte Harbour (Inner) | Compiled by : AS

Sheet No. : 1 of 1 | Location : Town of Oakville, Ontario | Checked by : MMT

Position : | Elevation Datum : Geodetic

Rig type : Truck-mounted | Drilling Method : Solid stem augers

Depth Scale (m)	Elev / Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	79.8	**GROUND SURFACE**				
		Augered to about 1.5m below ground surface without sampling				
1	78.3					
	1.5	**INFERRED BEDROCK**, weathered to partially unweathered shale with intermittent limestone/dolostone stringers, reddish brown (QUEENSTON FORMATION)		1	SS	50 / 75mm
2				2	SS	50 / 75mm
	77.4					
	2.4	**END OF BOREHOLE** Auger refusal on inferred bedrock				

Borehole was dry and open upon completion of drilling.

Elevation Scale (m): 79, 78

Penetration Test Values (Blows / 0.3m): X Dynamic Cone; 10 20 30 40

Undrained Shear Strength (kPa): O Unconfined, ● Pocket Penetrometer, + Field Vane, ■ Lab Vane; 40 80 120 160

Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit; PL MC LL; 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)

GR SA SI CL

file: 1-17-0069-02 bh logs.gpj

Terraprobe

LOG OF BOREHOLE 3-20

Project No. : 1-17-0069-02 | Client : Town of Oakville | Originated by : SM

Date started : November 4, 2020 | Project : Bronte Harbour (Inner) | Compiled by : AS

Sheet No. : 1 of 2 | Location : Town of Oakville, Ontario | Checked by : MMT

Position : | Elevation Datum : Geodetic | Core Diameter : **NQ3**, OD=76mm, ID=48mm

Rig type : Track-mounted | Drilling Method : Hollow stem augers, NQ3 rock coring

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) X Dynamic Cone 10 20 30 40; Undrained Shear Strength (kPa) O Unconfined + Field Vane ● Pocket Penetrometer ■ Lab Vane 40 80 120 160	Moisture / Plasticity: Plastic Limit PL, Natural Water Content MC, Liquid Limit LL (10 20 30)	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments; GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
0	75.9	**GROUND SURFACE**											
	75.7	150mm **TOPSOIL**											
	0.2	**FILL**, clayey silt, trace to some sand, trace gravel, trace organics, very soft to stiff, reddish brown, moist to wet		1	SS	8				PID: 0			SS1 Analysis: M&I, PCB
1		...organic silt (alluvial) inclusions below		2	SS	3	75			46 PID: 0.1			SS2 Analysis: PAH
2				3	SS	0	74			44 PID: 0.2			
				4	SS	1				55 PID: 0.4			SS4 Analysis: VOC, PHC
3				5	SS	0	73			72 PID: 0			
		...decayed wood fragment inclusions		6	SS	0	72			PID: 0			SS6 Analysis: PAH
4		...decayed wood fragment inclusions		7	SS	0				80 PID: 0			SS7 Analysis: M&I, PCB
5							71						
6	69.8												
	6.1	**CLAYEY SILT to SILT AND CLAY**, trace to some sand, trace gravel, trace shale fragments, very soft, reddish brown, moist to wet		8	SS	1	70			PID: 0			0 7 50 43 SS8 Analysis: VOC, PHC
7							69						
	68.1	...shale fragment inclusions, hard		9	SS	54				PID: 0.3			
	7.8	**GEORGIAN BAY FORMATION** (See rock core log for details)		1	RUN		68						
8													
				2	RUN		67						
9													
				3	RUN		66						
10													

(continued next page)

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LOG OF BOREHOLE 3-20

Project No. : 1-17-0069-02 | Client : Town of Oakville | Originated by : SM

Date started : November 4, 2020 | Project : Bronte Harbour (Inner) | Compiled by : AS

Sheet No. : 2 of 2 | Location : Town of Oakville, Ontario | Checked by : MMT

Position : | Elevation Datum : Geodetic | Core Diameter : **NQ3**, OD=76mm, ID=48mm

Rig type : Track-mounted | Drilling Method : Hollow stem augers, NQ3 rock coring

Depth Scale (m)	Elev / Depth (m)	Description (continued)	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) X Dynamic Cone 10 20 30 40; Undrained Shear Strength (kPa) O Unconfined + Field Vane ● Pocket Penetrometer ■ Lab Vane 40 80 120 160	Moisture / Plasticity: Plastic Limit PL 10	Natural Water Content MC 20	Liquid Limit LL 30	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments; GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
11	64.9 / 11.0	**GEORGIAN BAY FORMATION** (See rock core log for details) *(continued)*		3	RUN		65								

END OF BOREHOLE

Borehole contained drill water upon completion of drilling. Unstabilized water level and cave not measured.

ROCK CORE LOG

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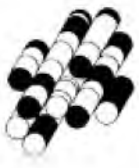

Terraprobe

ROCK CORE LOG 3-20

Project No. : 1-17-0069-02 | Client : Town of Oakville | Originated by : SM

Date started : November 4, 2020 | Project : Bronte Harbour (Inner) | Compiled by : AS

Sheet No. : 1 of 1 | Location : Town of Oakville, Ontario | Checked by : MMT

Position : | Elevation Datum : Geodetic | Core Diameter : **NQ3**, OD=76mm, ID=48mm

Rig type : Track-mounted | Drilling Method : Hollow stem augers, NQ3 rock coring

Depth (m)	Graphic Log	GENERAL DESCRIPTION	Run / Elev Depth (m)	Recovery	Elevation (m)	Shale Weathering Zones	UCS (MPa) / Estimated Strength	Natural Fractures: Frequency	Natural Fractures: Spacing	Laboratory Testing	Comments	Elevation (m)
		Rock coring started at 7.8m below grade	**68.1**									
8		**GEORGIAN BAY FORMATION** **Shale**, grey, thinly laminated to very thinly bedded, weak to medium strong, weathered to unweathered; joints are horizontal, closed to gapped, clean to veneer, planar to undulating, rough to smooth, flat;	7.8 R1 8.0	TCR = **98%** SCR = **0%** RQD = **0%**	68			8				68
		interbedded with **limestone**, light grey, thinly laminated, medium strong	R2	TCR = **100%** SCR = **85%** RQD = **43%**				6 2 2 2			**8.4m:** *vertical fracture* **8.7m:** *vertical fracture* **9.0m:** *vertical fracture* **9.4m:** *vertical fracture*	
9		*Run 1 : 0% limestone* *100% shale*	66.4 9.5		67							67
		Run 2 : 18% limestone *82% shale*						4 4			**9.6m:** *vertical fracture* **9.7m:** *horizontal fracture*	
10			R3	TCR = **83%** SCR = **65%** RQD = **33%**	66			2 2			**10.0m:** *horizontal fracture* **10.0m:** *vertical fracture* **10.2m:** *vertical fracture* **10.5m:** *vertical fracture*	66
		Run 3 : 35% limestone *65% shale*						1				
11			64.9 **11.0m**		65						**11.0m:** *horizontal fracture*	65

END OF COREHOLE

file: 1-17-0069-02 bh logs.gpj

Rock Core Samples- Borehole 3-20
Runs: 1, 2 & 3
Depth: 7.8 to 11.0 meters

GRAIN SIZE ANALYSIS

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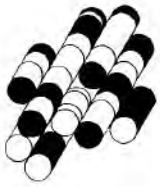

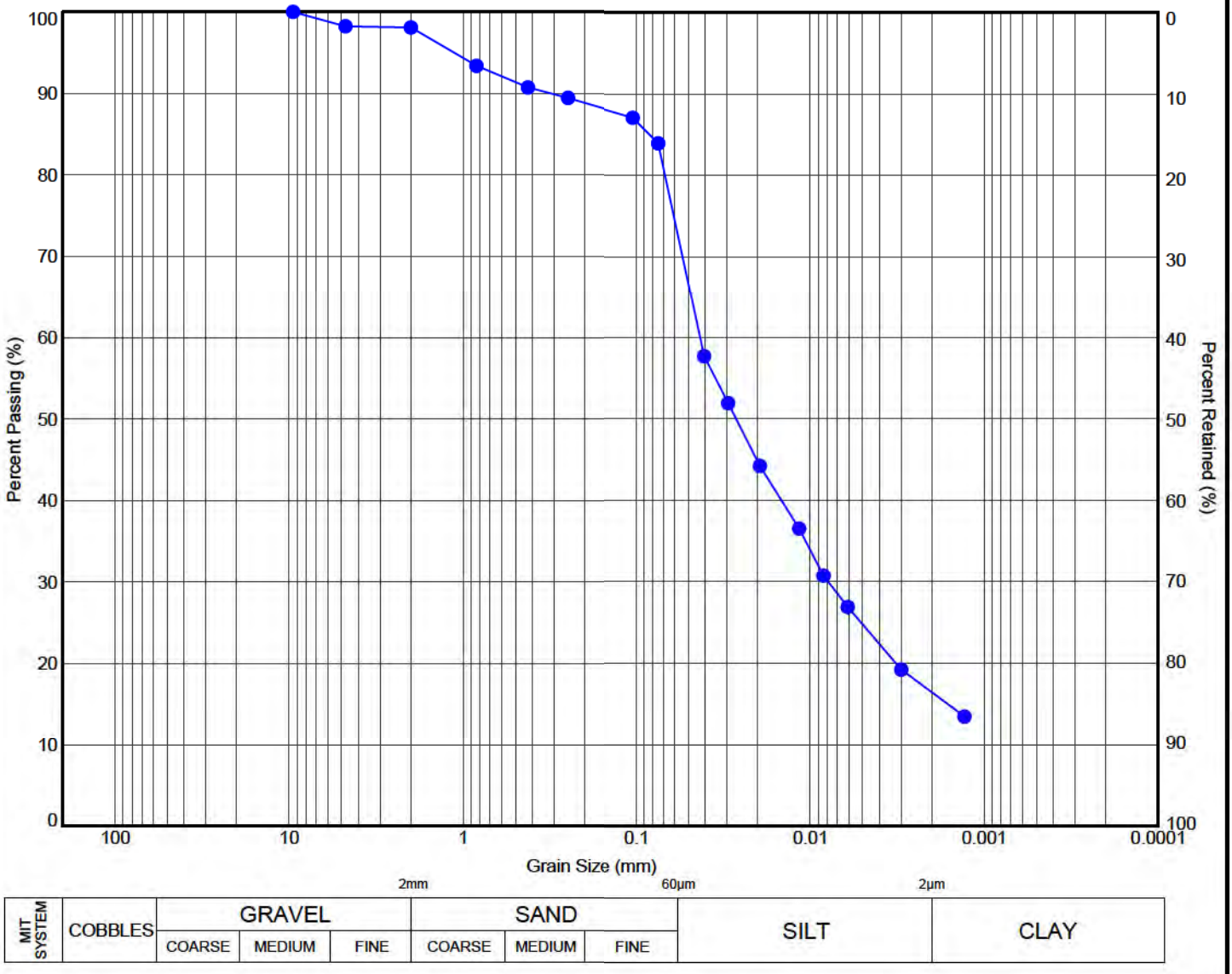

MIT SYSTEM

	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**2-20**	SS2	1.1	78.6	2	24	58	16	

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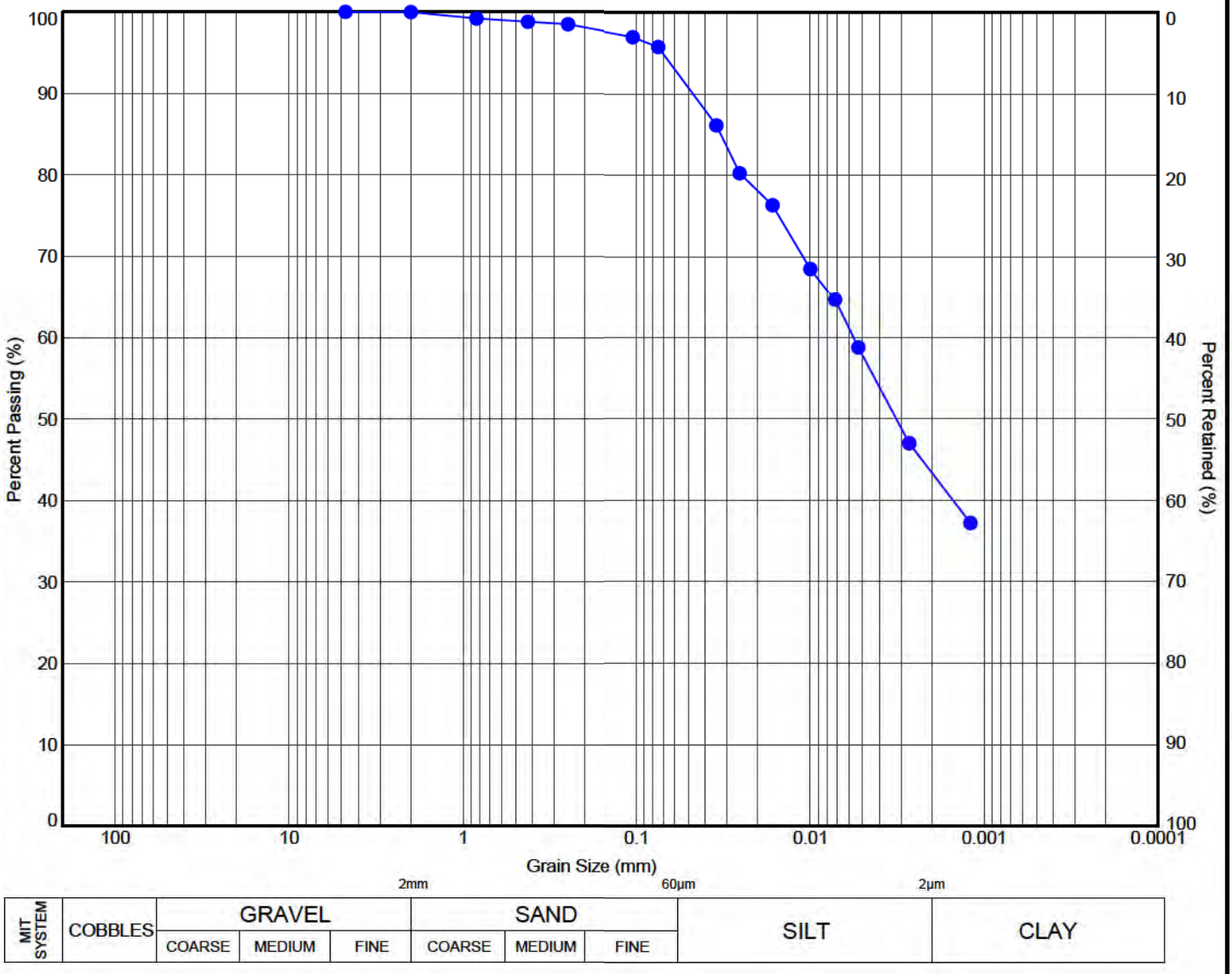
Title: **GRAIN SIZE DISTRIBUTION**
SANDY SILT, SOME CLAY, TRACE GRAVEL

File No.: **1-17-0069-02**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**3-20**	SS8	6.4	69.5	0	7	50	43	

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(905) 796-2650

Title: **GRAIN SIZE DISTRIBUTION**
SILT AND CLAY, TRACE SAND

File No.: **1-17-0069-02**

ATTERBERG LIMITS TEST RESULTS

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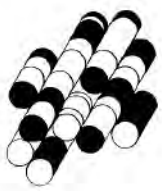

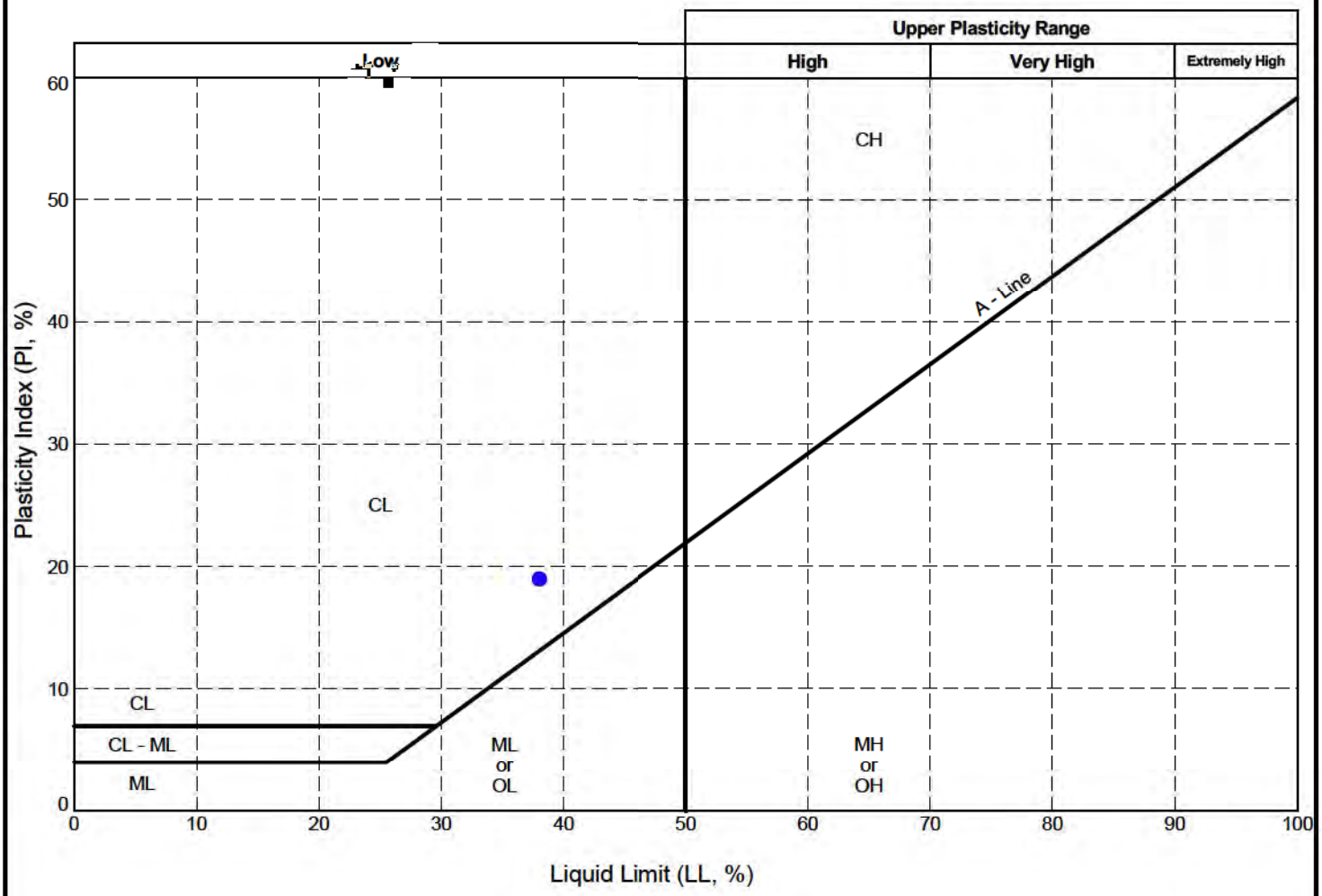

	Borehole	Sample	Depth (m)	Elev. (m)	LL (%)	PL (%)	PI (%)	Description
●	3-20	SS8	6.4	69.5	38	19	19	MEDIUM PLASTIC

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(905) 796-2650

Title: **ATTERBERG LIMITS CHART**

File No.: **1-17-0069-02**

FIGURES

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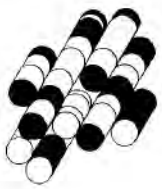

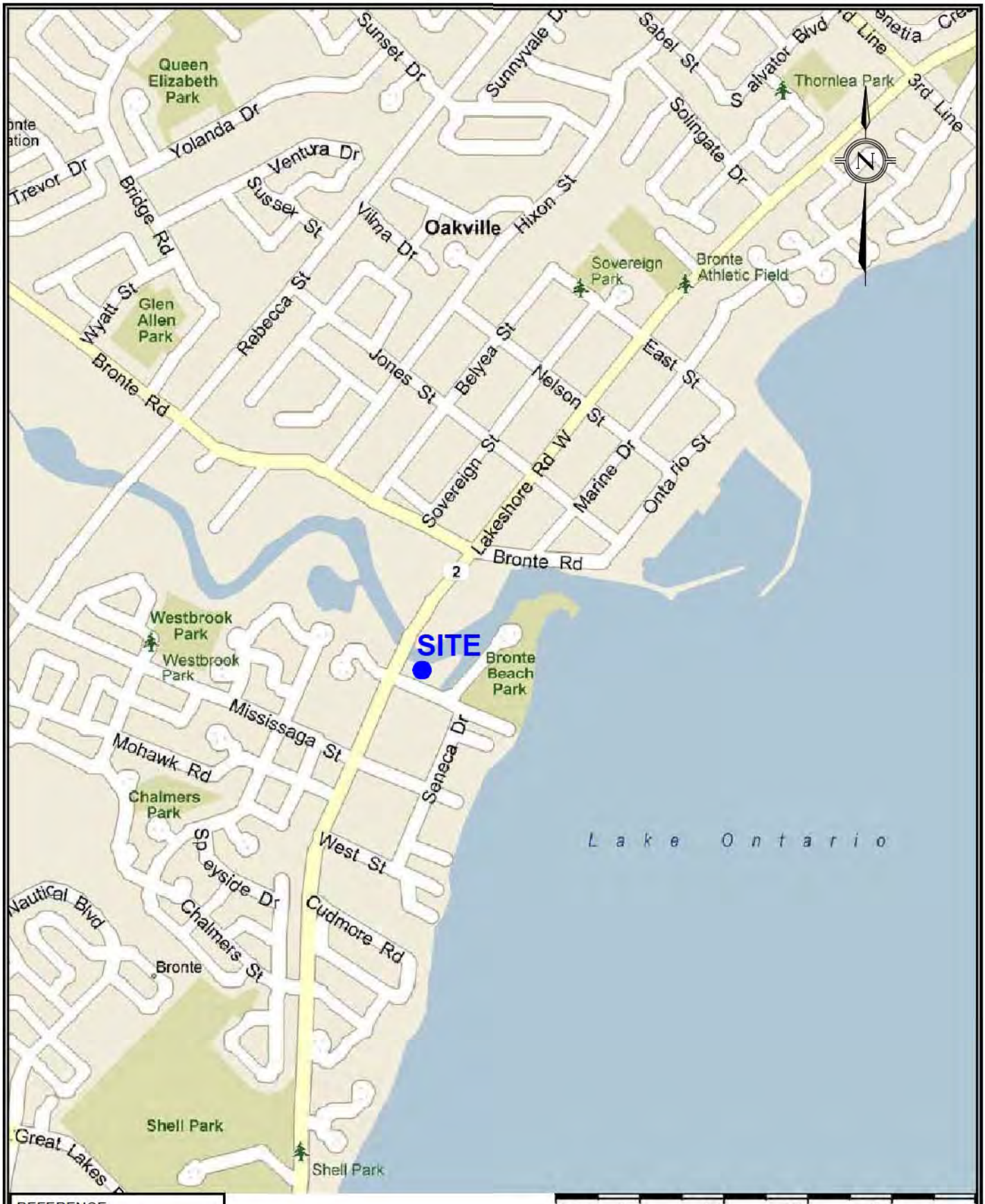

REFERENCE
Microsoft Streets & Trips 2012

Terraprobe
11 Indell Lane, Brampton, Ontario, L6T 3Y3
Tel: (905) 796-2650 Fax: (905) 796-2250

Title: SITE LOCATION PLAN

File No. 1-17-0069-02

FIGURE : 1

\\192.168.1.16\tss1\1-Project Files\2017\1-17-0069 - Bronte Inner Harbour, Oakville\dwg\02-GEO - Seawall & Boat Slips\A. Dwgs Logs\AutoCAD\1-17-0069-02 FIG 1.dwg, DWG to PDF.pc3, Kamal, Kamal


PH7
PH6
BH1-20
PH5
PH4
PH3
PH2A
PH2
PH1
BH2A-20
BH3-20
BH2-20
Legend
Project Limit
Limit of Survey

CERTIFICATE OF CHEMICAL ANALYSIS

TERRAPROBE INC.

AGAT Laboratories

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ATTENTION TO: Madan Talukdar

PROJECT: 1-17-0069-02

AGAT WORK ORDER: 20T661605

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Lab Manager

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Nov 30, 2020

PAGES (INCLUDING COVER): 26

VERSION*: 1

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

*Notes

Disclaimer:

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AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2020-10-08

DATE REPORTED: 2020-11-30

		SAMPLE DESCRIPTION:		BH1-20, SS1A	BH1-20, SS1B	BH2-20, SS1	BH2-20, SS2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2020-09-28	2020-09-28	2020-09-28	2020-09-28
Parameter	Unit	G / S	RDL	1544871	1544889	1544919	1544924
Antimony	µg/g	1.3	0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	5	6	4	4
Barium	µg/g	220	2	109	108	86	96
Beryllium	µg/g	2.5	0.5	0.6	0.7	0.7	0.7
Boron	µg/g	36	5	16	18	11	12
Boron (Hot Water Soluble)	µg/g	NA	0.10	0.55	0.77	0.36	0.23
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/g	70	5	24	26	20	20
Cobalt	µg/g	21	0.5	10.5	12.0	9.1	8.8
Copper	µg/g	92	1	25	27	21	19
Lead	µg/g	120	1	26	20	11	9
Molybdenum	µg/g	2	0.5	0.7	0.9	<0.5	<0.5
Nickel	µg/g	82	1	23	27	18	17
Selenium	µg/g	1.5	0.4	0.5	0.4	<0.4	<0.4
Silver	µg/g	0.5	0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/g	1	0.4	<0.4	<0.4	<0.4	<0.4
Uranium	µg/g	2.5	0.5	0.6	0.7	0.6	0.6
Vanadium	µg/g	86	1	33	38	28	29
Zinc	µg/g	290	5	135	96	55	53
Chromium, Hexavalent	µg/g	0.66	0.2	<0.2	<0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	0.57	0.005	0.194	0.167	0.141	0.144
Sodium Adsorption Ratio	NA	2.4	NA	0.170	0.289	0.213	0.222
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.44	7.58	7.64	7.65

Certified By:

Results relate only to the items tested. Results apply to samples as received.

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Certificate of Analysis

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2020-10-08

DATE REPORTED: 2020-11-30

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1544871-1544889 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

1544919-1544924 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.
Samples were analyzed beyond recommended hold time for Cyanide and mercury analyses.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Results relate only to the items tested. Results apply to samples as received.

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AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

O. Reg. 558 Metals and Inorganics

DATE RECEIVED: 2020-10-08

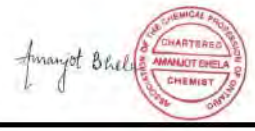
DATE REPORTED: 2020-11-30

		SAMPLE DESCRIPTION:		TCLP
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2020-09-28
Parameter	Unit	G / S	RDL	1544891
Arsenic Leachate	mg/L	2.5	0.010	<0.010
Barium Leachate	mg/L	100	0.100	0.439
Boron Leachate	mg/L	500	0.050	<0.050
Cadmium Leachate	mg/L	0.5	0.010	<0.010
Chromium Leachate	mg/L	5	0.010	<0.010
Lead Leachate	mg/L	5	0.010	<0.010
Mercury Leachate	mg/L	0.1	0.01	<0.01
Selenium Leachate	mg/L	1	0.010	<0.010
Silver Leachate	mg/L	5	0.010	<0.010
Uranium Leachate	mg/L	10	0.050	<0.050
Fluoride Leachate	mg/L	150	0.05	0.16
Cyanide Leachate	mg/L	20	0.05	<0.05
(Nitrate + Nitrite) as N Leachate	mg/L	1000	0.70	<0.70

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Results relate only to the items tested. Results apply to samples as received.

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Certificate of Analysis

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2020-10-08

DATE REPORTED: 2020-11-30

		SAMPLE DESCRIPTION:		BH1-20, SS1A	BH1-20, SS1B	BH2-20, SS1	BH2-20, SS2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2020-09-28	2020-09-28	2020-09-28	2020-09-28
Parameter	Unit	G / S	RDL	1544871	1544889	1544919	1544924
Naphthalene	µg/g	0.09	0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	µg/g	0.093	0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	µg/g	0.072	0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	µg/g	0.12	0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	µg/g	0.69	0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	µg/g	0.16	0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/g	0.56	0.05	0.09	0.06	<0.05	<0.05
Pyrene	µg/g	1	0.05	0.07	<0.05	<0.05	<0.05
Benz(a)anthracene	µg/g	0.36	0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	µg/g	2.8	0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g	0.47	0.05	0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/g	0.48	0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	µg/g	0.3	0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	µg/g	0.23	0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	µg/g	0.1	0.05	<0.05	<0.05	<0.05	<0.05
Benzo(g,h,i)perylene	µg/g	0.68	0.05	<0.05	<0.05	<0.05	<0.05
1 and 2 Methlynaphthalene	µg/g	0.59	0.05	<0.05	<0.05	<0.05	<0.05
Moisture Content	%		0.1	9.4	7.9	7.9	8.9
Surrogate	**Unit**	**Acceptable Limits**					
Naphthalene-d8	%	50-140		113	99	89	74
Acenaphthene-d10	%	50-140		117	104	89	76
Chrysene-d12	%	50-140		100	119	95	75

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1544871-1544924 Results are based on the dry weight of the soil.
Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

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Certificate of Analysis

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Soil)

DATE RECEIVED: 2020-10-08

DATE REPORTED: 2020-11-30

		SAMPLE DESCRIPTION:		BH1-20, SS1A	BH1-20, SS1B	BH2-20, SS1	BH2-20, SS2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2020-09-28	2020-09-28	2020-09-28	2020-09-28
Parameter	Unit	G / S	RDL	1544871	1544889	1544919	1544924
F1 (C6 to C10)	µg/g	25	5	<5	<5	<5	8
F1 (C6 to C10) minus BTEX	µg/g	25	5	<5	<5	<5	8
F2 (C10 to C16)	µg/g	10	10	<10	<10	<10	<10
F2 (C10 to C16) minus Naphthalene	µg/g		10	<10	<10	<10	<10
F3 (C16 to C34)	µg/g	240	50	<50	<50	<50	<50
F3 (C16 to C34) minus PAHs	µg/g		50	<50	<50	<50	<50
F4 (C34 to C50)	µg/g	120	50	<50	<50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g	120	50	NA	NA	NA	NA
Moisture Content	%		0.1	9.4	7.9	7.9	8.9
Surrogate	**Unit**	**Acceptable Limits**					
Terphenyl	%	60-140		81	100	74	77

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1544871-1544924 Results are based on sample dry weight.
The C6-C10 fraction is calculated using toluene response factor.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX and PAH contributions.
C>10 – C16 (F2- Naphthalene) is a calculated parameter. The calculated value is F2 - Naphthalene.
C>16 - C34 (F3-PAH) is a calculated parameter. The calculated value is F3-PAH (PAH: sum of Phenanthrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-c,d)pyrene and Pyrene).
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

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AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2020-10-08

DATE REPORTED: 2020-11-30

		SAMPLE DESCRIPTION:		BH1-20, SS1A	BH1-20, SS1B	BH2-20, SS1	BH2-20, SS2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2020-09-28	2020-09-28	2020-09-28	2020-09-28
Parameter	Unit	G / S	RDL	1544871	1544889	1544919	1544924
Dichlorodifluoromethane	µg/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Vinyl Chloride	ug/g	0.02	0.02	<0.02	<0.02	<0.02	<0.02
Bromomethane	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Trichlorofluoromethane	ug/g	0.25	0.05	<0.05	<0.05	<0.05	<0.05
Acetone	ug/g	0.5	0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Methylene Chloride	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Methyl tert-butyl Ether	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
1,1-Dichloroethane	ug/g	0.05	0.02	<0.02	<0.02	<0.02	<0.02
Methyl Ethyl Ketone	ug/g	0.5	0.50	<0.50	<0.50	<0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g	0.05	0.02	<0.02	<0.02	<0.02	<0.02
Chloroform	ug/g	0.05	0.04	<0.04	<0.04	<0.04	<0.04
1,2-Dichloroethane	ug/g	0.05	0.03	<0.03	<0.03	<0.03	<0.03
1,1,1-Trichloroethane	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Carbon Tetrachloride	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Benzene	ug/g	0.02	0.02	<0.02	<0.02	<0.02	<0.02
1,2-Dichloropropane	ug/g	0.05	0.03	<0.03	<0.03	<0.03	<0.03
Trichloroethylene	ug/g	0.05	0.03	<0.03	<0.03	<0.03	<0.03
Bromodichloromethane	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Methyl Isobutyl Ketone	ug/g	0.5	0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	ug/g	0.05	0.04	<0.04	<0.04	<0.04	<0.04
Toluene	ug/g	0.2	0.05	<0.05	<0.05	<0.05	<0.05
Dibromochloromethane	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04	<0.04	<0.04	<0.04	<0.04
Tetrachloroethylene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g	0.05	0.04	<0.04	<0.04	<0.04	<0.04
Chlorobenzene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
m & p-Xylene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05

Certified By: N Popowich

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Certificate of Analysis

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2020-10-08

DATE REPORTED: 2020-11-30

		SAMPLE DESCRIPTION:		BH1-20, SS1A	BH1-20, SS1B	BH2-20, SS1	BH2-20, SS2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2020-09-28	2020-09-28	2020-09-28	2020-09-28
Parameter	Unit	G / S	RDL	1544871	1544889	1544919	1544924
Bromoform	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Styrene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
o-Xylene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
1,3-Dichlorobenzene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
1,4-Dichlorobenzene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
1,2-Dichlorobenzene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Xylenes (Total)	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
1,3-Dichloropropene (Cis + Trans)	µg/g	0.05	0.04	<0.04	<0.04	<0.04	<0.04
n-Hexane	µg/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05
Moisture Content	%		0.1	9.4	7.9	7.9	8.9
Surrogate	**Unit**	**Acceptable Limits**					
Toluene-d8	% Recovery	50-140		99	106	107	108
4-Bromofluorobenzene	% Recovery	50-140		88	91	88	90

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1544871-1544924 The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

Results relate only to the items tested. Results apply to samples as received.

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AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

O. Reg. 558 - PCBs

DATE RECEIVED: 2020-10-08

DATE REPORTED: 2020-11-30

		SAMPLE DESCRIPTION:		TCLP
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2020-09-28
Parameter	**Unit**	**G / S**	**RDL**	**1544891**
Polychlorinated Biphenyls	mg/L	0.3	0.005	<0.005
Surrogate	**Unit**	**Acceptable Limits**		
Decachlorobiphenyl	%	60-130		76

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1544891 The soil sample was leached using the Regulation 558 procedure. Analysis was performed on the leachate.
PCB total is a calculated parameter. The calculated value is the sum of Aroclor 1242, Aroclor 1248, Aroclor 1254 and Aroclor 1260.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

O. Reg. 558 - SVOCs

DATE RECEIVED: 2020-10-08

DATE REPORTED: 2020-11-30

		SAMPLE DESCRIPTION:		TCLP
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2020-09-28
Parameter	Unit	G / S	RDL	1544891
Pyridine	mg/L	5.0	0.010	<0.010
Cresols	mg/L	200	0.012	<0.012
Ortho-Cresol	mg/L	200	0.004	<0.004
Meta & Para-Cresol	mg/L	200	0.008	<0.008
Hexachloroethane	mg/L	3	0.004	<0.004
Nitrobenzene	mg/L	2.0	0.004	<0.004
Hexachlorobutadiene	mg/L	0.5	0.004	<0.004
2,4,6-Trichlorophenol	mg/L	0.5	0.05	<0.05
2,4,5-Trichlorophenol	mg/L	400	0.004	<0.004
2,4-Dinitrotoluene	mg/L	0.13	0.004	<0.004
2,3,4,6-Tetrachlorophenol	mg/L	10	0.004	<0.004
Hexachlorobenzene	mg/L	0.13	0.004	<0.004
Dinoseb	mg/L	1	0.004	<0.004
Benzo(a)pyrene	mg/L	0.001	0.001	<0.001
BNA Extr	NA			Y
Surrogate	**Unit**	**Acceptable Limits**		
2-Fluorophenol	%	30-130		85
Phenol-d6	%	30-130		84
2,4,6-Tribromophenol	%	50-140		77
Chrysene-d12	%	50-140		102

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1544891 The sample was leached according to Regulation 558 protocol. Analysis was performed on the leachate.
Cresols total is a calculated parameter. The calculated value is the sum o-Cresol and m&p-Cresol.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popowich

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Certificate of Analysis

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

O. Reg. 558 - VOCs

DATE RECEIVED: 2020-10-08

DATE REPORTED: 2020-11-30

		SAMPLE DESCRIPTION:		TCLP
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2020-09-28
Parameter	Unit	G / S	RDL	1544891
Vinyl Chloride	mg/L	0.2	0.030	<0.030
1,1 Dichloroethene	mg/L	1.4	0.020	<0.020
Dichloromethane	mg/L	5.0	0.030	<0.030
Methyl Ethyl Ketone	mg/L	200	0.090	<0.090
Chloroform	mg/L	10.0	0.020	<0.020
1,2-Dichloroethane	mg/L	0.5	0.020	<0.020
Carbon Tetrachloride	mg/L	0.5	0.020	<0.020
Benzene	mg/L	0.5	0.020	<0.020
Trichloroethene	mg/L	5.0	0.020	<0.020
Tetrachloroethene	mg/L	3.0	0.050	<0.050
Chlorobenzene	mg/L	8.0	0.010	<0.010
1,2-Dichlorobenzene	mg/L	20.0	0.010	<0.010
1,4-Dichlorobenzene	mg/L	0.5	0.010	<0.010
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	50-140		112

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1544891 Sample was prepared using Regulation 558 protocol and a zero headspace extractor.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

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AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

Total PCBs (soil)

DATE RECEIVED: 2020-10-08

DATE REPORTED: 2020-11-30

		SAMPLE DESCRIPTION:		BH1-20, SS1A	BH1-20, SS1B	BH2-20, SS1	BH2-20, SS2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2020-09-28	2020-09-28	2020-09-28	2020-09-28
Parameter	**Unit**	**G / S**	**RDL**	**1544871**	**1544889**	**1544919**	**1544924**
Polychlorinated Biphenyls	µg/g	0.3	0.1	<0.1	<0.1	<0.1	<0.1
Moisture Content	%		0.1	9.4	7.9	7.9	8.9
Surrogate	**Unit**	**Acceptable Limits**					
Decachlorobiphenyl	%	60-130		112	104	96	88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1544871-1544924 Results are based on the dry weight of soil extracted.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

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Quality Assurance

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

Soil Analysis

RPT Date: Nov 30, 2020			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
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	1546036		<0.8	<0.8	NA	< 0.8	113%	70%	130%	86%	80%	120%	72%	70%	130%
Arsenic	1546036		3	3	NA	< 1	113%	70%	130%	100%	80%	120%	107%	70%	130%
Barium	1546036		60	60	0.0%	< 2	108%	70%	130%	99%	80%	120%	103%	70%	130%
Beryllium	1546036		<0.5	<0.5	NA	< 0.5	82%	70%	130%	105%	80%	120%	81%	70%	130%
Boron	1546036		7	7	NA	< 5	77%	70%	130%	101%	80%	120%	77%	70%	130%
Boron (Hot Water Soluble)	1736670		0.36	0.38	NA	< 0.10	103%	60%	140%	99%	70%	130%	95%	60%	140%
Cadmium	1546036		<0.5	<0.5	NA	< 0.5	109%	70%	130%	104%	80%	120%	103%	70%	130%
Chromium	1546036		14	14	NA	< 5	105%	70%	130%	103%	80%	120%	106%	70%	130%
Cobalt	1546036		4.5	4.6	2.2%	< 0.5	97%	70%	130%	102%	80%	120%	100%	70%	130%
Copper	1546036		10	10	0.0%	< 1	87%	70%	130%	102%	80%	120%	92%	70%	130%
Lead	1546036		9	9	0.0%	< 1	99%	70%	130%	98%	80%	120%	94%	70%	130%
Molybdenum	1546036		1.2	1.2	NA	< 0.5	106%	70%	130%	109%	80%	120%	113%	70%	130%
Nickel	1546036		8	8	0.0%	< 1	99%	70%	130%	106%	80%	120%	101%	70%	130%
Selenium	1546036		<0.4	<0.4	NA	< 0.4	130%	70%	130%	108%	80%	120%	112%	70%	130%
Silver	1546036		<0.2	<0.2	NA	< 0.2	96%	70%	130%	101%	80%	120%	94%	70%	130%
Thallium	1546036		<0.4	<0.4	NA	< 0.4	107%	70%	130%	100%	80%	120%	97%	70%	130%
Uranium	1546036		0.7	0.7	NA	< 0.5	110%	70%	130%	103%	80%	120%	106%	70%	130%
Vanadium	1546036		23	23	0.0%	< 1	110%	70%	130%	101%	80%	120%	105%	70%	130%
Zinc	1546036		50	51	2.0%	< 5	98%	70%	130%	104%	80%	120%	90%	70%	130%
Chromium, Hexavalent	1533068		<0.2	<0.2	NA	< 0.2	97%	70%	130%	85%	80%	120%	78%	70%	130%
Cyanide, Free	1544871	1544871	<0.040	<0.040	NA	< 0.040	94%	70%	130%	99%	80%	120%	92%	70%	130%
Mercury	1546036		<0.10	<0.10	NA	< 0.10	107%	70%	130%	100%	80%	120%	99%	70%	130%
Electrical Conductivity (2:1)	1523751		0.307	0.308	0.3%	< 0.005	101%	80%	120%	NA			NA		
Sodium Adsorption Ratio	1523751		0.376	0.362	3.8%	NA	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	1544889	1544889	7.58	7.60	0.3%	NA	100%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

O. Reg. 558 Metals and Inorganics															
Arsenic Leachate	1533029		<0.010	<0.010	NA	< 0.010	106%	70%	130%	102%	80%	120%	106%	70%	130%
Barium Leachate	1533029		0.591	0.602	1.8%	< 0.100	108%	70%	130%	102%	80%	120%	103%	70%	130%
Boron Leachate	1533029		0.055	0.057	NA	< 0.050	96%	70%	130%	89%	80%	120%	83%	70%	130%
Cadmium Leachate	1533029		<0.010	<0.010	NA	< 0.010	102%	70%	130%	103%	80%	120%	98%	70%	130%
Chromium Leachate	1533029		<0.010	<0.010	NA	< 0.010	104%	70%	130%	109%	80%	120%	96%	70%	130%
Lead Leachate	1533029		<0.010	<0.010	NA	< 0.010	100%	70%	130%	99%	80%	120%	89%	70%	130%
Mercury Leachate	1533029		<0.01	<0.01	NA	< 0.01	101%	70%	130%	96%	80%	120%	88%	70%	130%
Selenium Leachate	1533029		<0.010	<0.010	NA	< 0.010	103%	70%	130%	109%	80%	120%	109%	70%	130%
Silver Leachate	1533029		<0.010	<0.010	NA	< 0.010	99%	70%	130%	100%	80%	120%	84%	70%	130%
Uranium Leachate	1533029		<0.050	<0.050	NA	< 0.050	101%	70%	130%	104%	80%	120%	97%	70%	130%

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Quality Assurance

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

Soil Analysis (Continued)

RPT Date: Nov 30, 2020			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
Fluoride Leachate	1533029		0.16	0.16	NA	< 0.05	101%	90%	110%	100%	90%	110%	100%	70%	130%
Cyanide Leachate	1533029		<0.05	<0.05	NA	< 0.05	94%	70%	130%	99%	80%	120%	105%	70%	130%
(Nitrate + Nitrite) as N Leachate	1533029		<0.70	<0.70	NA	< 0.70	102%	80%	120%	95%	80%	120%	103%	70%	130%
Comments: NA Signifies Not Applicable															
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	1729773		<0.8	<0.8	NA	< 0.8	130%	70%	130%	81%	80%	120%	106%	70%	130%
Arsenic	1729773		2	2	NA	< 1	112%	70%	130%	106%	80%	120%	103%	70%	130%
Barium	1729773		455	463	1.7%	< 2	102%	70%	130%	98%	80%	120%	106%	70%	130%
Beryllium	1729773		1.0	1.0	NA	< 0.5	99%	70%	130%	102%	80%	120%	103%	70%	130%
Boron	1729773		<5	<5	NA	< 5	82%	70%	130%	97%	80%	120%	87%	70%	130%
Boron (Hot Water Soluble)	1736670		0.36	0.38	NA	< 0.10	103%	60%	140%	99%	70%	130%	95%	60%	140%
Cadmium	1729773		<0.5	<0.5	NA	< 0.5	108%	70%	130%	105%	80%	120%	106%	70%	130%
Chromium	1729773		125	129	3.1%	< 5	95%	70%	130%	96%	80%	120%	118%	70%	130%
Cobalt	1729773		25.9	27.0	4.2%	< 0.5	93%	70%	130%	98%	80%	120%	94%	70%	130%
Copper	1729773		45	46	2.2%	< 1	91%	70%	130%	106%	80%	120%	94%	70%	130%
Lead	1729773		8	8	0.0%	< 1	106%	70%	130%	103%	80%	120%	102%	70%	130%
Molybdenum	1729773		<0.5	<0.5	NA	< 0.5	92%	70%	130%	94%	80%	120%	95%	70%	130%
Nickel	1729773		67	70	4.4%	< 1	94%	70%	130%	101%	80%	120%	98%	70%	130%
Selenium	1729773		0.5	<0.4	NA	< 0.4	100%	70%	130%	102%	80%	120%	103%	70%	130%
Silver	1729773		<0.2	<0.2	NA	< 0.2	94%	70%	130%	99%	80%	120%	97%	70%	130%
Thallium	1729773		0.6	0.5	NA	< 0.4	106%	70%	130%	103%	80%	120%	102%	70%	130%
Uranium	1729773		0.9	0.9	NA	< 0.5	111%	70%	130%	109%	80%	120%	113%	70%	130%
Vanadium	1729773		120	124	3.3%	< 1	93%	70%	130%	92%	80%	120%	108%	70%	130%
Zinc	1729773		149	152	2.0%	< 5	100%	70%	130%	103%	80%	120%	109%	70%	130%
Chromium, Hexavalent	1726948		<0.2	<0.2	NA	< 0.2	92%	70%	130%	93%	80%	120%	88%	70%	130%
Cyanide, Free	1729809		<0.040	<0.040	NA	< 0.040	106%	70%	130%	97%	80%	120%	104%	70%	130%
Mercury	1729773		<0.10	<0.10	NA	< 0.10	104%	70%	130%	105%	80%	120%	108%	70%	130%
Electrical Conductivity (2:1)	1736670		0.327	0.326	0.4%	< 0.005	101%	80%	120%	NA			NA		
Sodium Adsorption Ratio	1741652		0.142	0.141	0.7%	NA									
pH, 2:1 CaCl2 Extraction	1729809		7.58	7.53	0.7%	NA	100%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:

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Quality Assurance

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

Trace Organics Analysis

RPT Date: Nov 30, 2020			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
O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Soil)															
F1 (C6 to C10)	1546878		< 5	< 5	NA	< 5	101%	60%	140%	104%	60%	140%	93%	60%	140%
F2 (C10 to C16)	1541222		< 10	< 10	NA	< 10	106%	60%	140%	100%	60%	140%	106%	60%	140%
F3 (C16 to C34)	1541222		< 50	< 50	NA	< 50	95%	60%	140%	100%	60%	140%	93%	60%	140%
F4 (C34 to C50)	1541222		< 50	< 50	NA	< 50	96%	60%	140%	104%	60%	140%	101%	60%	140%
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	1540595		<0.05	<0.05	NA	< 0.05	87%	50%	140%	110%	50%	140%	115%	50%	140%
Acenaphthylene	1540595		<0.05	<0.05	NA	< 0.05	119%	50%	140%	104%	50%	140%	90%	50%	140%
Acenaphthene	1540595		<0.05	<0.05	NA	< 0.05	114%	50%	140%	115%	50%	140%	107%	50%	140%
Fluorene	1540595		<0.05	<0.05	NA	< 0.05	114%	50%	140%	115%	50%	140%	104%	50%	140%
Phenanthrene	1540595		<0.05	<0.05	NA	< 0.05	104%	50%	140%	112%	50%	140%	114%	50%	140%
Anthracene	1540595		<0.05	<0.05	NA	< 0.05	92%	50%	140%	105%	50%	140%	97%	50%	140%
Fluoranthene	1540595		<0.05	<0.05	NA	< 0.05	96%	50%	140%	111%	50%	140%	106%	50%	140%
Pyrene	1540595		<0.05	<0.05	NA	< 0.05	100%	50%	140%	106%	50%	140%	109%	50%	140%
Benz(a)anthracene	1540595		<0.05	<0.05	NA	< 0.05	110%	50%	140%	100%	50%	140%	97%	50%	140%
Chrysene	1540595		<0.05	<0.05	NA	< 0.05	116%	50%	140%	100%	50%	140%	106%	50%	140%
Benzo(b)fluoranthene	1540595		<0.05	<0.05	NA	< 0.05	112%	50%	140%	103%	50%	140%	103%	50%	140%
Benzo(k)fluoranthene	1540595		<0.05	<0.05	NA	< 0.05	109%	50%	140%	100%	50%	140%	107%	50%	140%
Benzo(a)pyrene	1540595		<0.05	<0.05	NA	< 0.05	109%	50%	140%	95%	50%	140%	104%	50%	140%
Indeno(1,2,3-cd)pyrene	1540595		<0.05	<0.05	NA	< 0.05	87%	50%	140%	85%	50%	140%	85%	50%	140%
Dibenz(a,h)anthracene	1540595		<0.05	<0.05	NA	< 0.05	82%	50%	140%	81%	50%	140%	82%	50%	140%
Benzo(g,h,i)perylene	1540595		<0.05	<0.05	NA	< 0.05	79%	50%	140%	86%	50%	140%	95%	50%	140%
O. Reg. 153(511) - VOCs (Soil)															
Dichlorodifluoromethane	1543989		<0.05	<0.05	NA	< 0.05	105%	50%	140%	106%	50%	140%	105%	50%	140%
Vinyl Chloride	1543989		<0.02	<0.02	NA	< 0.02	103%	50%	140%	91%	50%	140%	95%	50%	140%
Bromomethane	1543989		<0.05	<0.05	NA	< 0.05	98%	50%	140%	83%	50%	140%	82%	50%	140%
Trichlorofluoromethane	1543989		<0.05	<0.05	NA	< 0.05	78%	50%	140%	92%	50%	140%	101%	50%	140%
Acetone	1543989		<0.50	<0.50	NA	< 0.50	94%	50%	140%	90%	50%	140%	92%	50%	140%
1,1-Dichloroethylene	1543989		<0.05	<0.05	NA	< 0.05	84%	50%	140%	102%	60%	130%	95%	50%	140%
Methylene Chloride	1543989		<0.05	<0.05	NA	< 0.05	110%	50%	140%	82%	60%	130%	103%	50%	140%
Trans- 1,2-Dichloroethylene	1543989		<0.05	<0.05	NA	< 0.05	77%	50%	140%	95%	60%	130%	94%	50%	140%
Methyl tert-butyl Ether	1543989		<0.05	<0.05	NA	< 0.05	83%	50%	140%	90%	60%	130%	106%	50%	140%
1,1-Dichloroethane	1543989		<0.02	<0.02	NA	< 0.02	90%	50%	140%	90%	60%	130%	95%	50%	140%
Methyl Ethyl Ketone	1543989		<0.50	<0.50	NA	< 0.50	75%	50%	140%	87%	50%	140%	99%	50%	140%
Cis- 1,2-Dichloroethylene	1543989		<0.02	<0.02	NA	< 0.02	100%	50%	140%	90%	60%	130%	98%	50%	140%
Chloroform	1543989		<0.04	<0.04	NA	< 0.04	88%	50%	140%	95%	60%	130%	102%	50%	140%
1,2-Dichloroethane	1543989		<0.03	<0.03	NA	< 0.03	94%	50%	140%	87%	60%	130%	106%	50%	140%
1,1,1-Trichloroethane	1543989		<0.05	<0.05	NA	< 0.05	95%	50%	140%	83%	60%	130%	92%	50%	140%
Carbon Tetrachloride	1543989		<0.05	<0.05	NA	< 0.05	97%	50%	140%	82%	60%	130%	91%	50%	140%

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Quality Assurance

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

Trace Organics Analysis (Continued)

RPT Date: Nov 30, 2020			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
Benzene	1543989		<0.02	<0.02	NA	< 0.02	84%	50%	140%	83%	60%	130%	110%	50%	140%
1,2-Dichloropropane	1543989		<0.03	<0.03	NA	< 0.03	81%	50%	140%	106%	60%	130%	98%	50%	140%
Trichloroethylene	1543989		<0.03	<0.03	NA	< 0.03	98%	50%	140%	101%	60%	130%	98%	50%	140%
Bromodichloromethane	1543989		<0.05	<0.05	NA	< 0.05	86%	50%	140%	94%	60%	130%	84%	50%	140%
Methyl Isobutyl Ketone	1543989		<0.50	<0.50	NA	< 0.50	89%	50%	140%	100%	50%	140%	95%	50%	140%
1,1,2-Trichloroethane	1543989		<0.04	<0.04	NA	< 0.04	106%	50%	140%	98%	60%	130%	92%	50%	140%
Toluene	1543989		<0.05	<0.05	NA	< 0.05	95%	50%	140%	91%	60%	130%	111%	50%	140%
Dibromochloromethane	1543989		<0.05	<0.05	NA	< 0.05	101%	50%	140%	108%	60%	130%	113%	50%	140%
Ethylene Dibromide	1543989		<0.04	<0.04	NA	< 0.04	95%	50%	140%	100%	60%	130%	90%	50%	140%
Tetrachloroethylene	1543989		<0.05	<0.05	NA	< 0.05	90%	50%	140%	99%	60%	130%	101%	50%	140%
1,1,1,2-Tetrachloroethane	1543989		<0.04	<0.04	NA	< 0.04	85%	50%	140%	91%	60%	130%	86%	50%	140%
Chlorobenzene	1543989		<0.05	<0.05	NA	< 0.05	98%	50%	140%	95%	60%	130%	94%	50%	140%
Ethylbenzene	1543989		<0.05	<0.05	NA	< 0.05	100%	50%	140%	95%	60%	130%	96%	50%	140%
m & p-Xylene	1543989		<0.05	<0.05	NA	< 0.05	86%	50%	140%	87%	60%	130%	95%	50%	140%
Bromoform	1543989		<0.05	<0.05	NA	< 0.05	84%	50%	140%	73%	60%	130%	72%	50%	140%
Styrene	1543989		<0.05	<0.05	NA	< 0.05	75%	50%	140%	79%	60%	130%	97%	50%	140%
1,1,2,2-Tetrachloroethane	1543989		<0.05	<0.05	NA	< 0.05	91%	50%	140%	89%	60%	130%	86%	50%	140%
o-Xylene	1543989		<0.05	<0.05	NA	< 0.05	93%	50%	140%	104%	60%	130%	112%	50%	140%
1,3-Dichlorobenzene	1543989		<0.05	<0.05	NA	< 0.05	100%	50%	140%	104%	60%	130%	111%	50%	140%
1,4-Dichlorobenzene	1543989		<0.05	<0.05	NA	< 0.05	98%	50%	140%	92%	60%	130%	104%	50%	140%
1,2-Dichlorobenzene	1543989		<0.05	<0.05	NA	< 0.05	102%	50%	140%	100%	60%	130%	103%	50%	140%
n-Hexane	1543989		<0.05	<0.05	NA	< 0.05	75%	50%	140%	75%	60%	130%	86%	50%	140%
Total PCBs (soil)															
Polychlorinated Biphenyls	1540549		< 0.1	< 0.1	NA	< 0.1	107%	60%	140%	105%	60%	140%	89%	60%	140%
O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Soil)															
F2 (C10 to C16)	1731721		< 10	< 10	NA	< 10	88%	60%	140%	87%	60%	140%	80%	60%	140%
F3 (C16 to C34)	1731721		< 50	< 50	NA	< 50	94%	60%	140%	80%	60%	140%	83%	60%	140%
F4 (C34 to C50)	1731721		< 50	< 50	NA	< 50	91%	60%	140%	82%	60%	140%	81%	60%	140%
O. Reg. 558 - VOCs															
Vinyl Chloride	1543651		<0.030	<0.030	NA	< 0.030	113%	50%	140%	97%	50%	140%	104%	50%	140%
1,1 Dichloroethene	1543651		<0.020	<0.020	NA	< 0.020	102%	50%	140%	76%	60%	130%	86%	50%	140%
Dichloromethane	1543651		<0.030	<0.030	NA	< 0.030	97%	50%	140%	104%	60%	130%	96%	50%	140%
Methyl Ethyl Ketone	1543651		<0.090	<0.090	NA	< 0.090	92%	50%	140%	83%	50%	140%	79%	50%	140%
Chloroform	1543651		<0.020	<0.020	NA	< 0.020	106%	50%	140%	89%	60%	130%	91%	50%	140%
1,2-Dichloroethane	1543651		<0.020	<0.020	NA	< 0.020	92%	50%	140%	104%	60%	130%	87%	50%	140%
Carbon Tetrachloride	1543651		<0.020	<0.020	NA	< 0.020	85%	50%	140%	78%	60%	130%	84%	50%	140%
Benzene	1543651		<0.020	<0.020	NA	< 0.020	112%	50%	140%	88%	60%	130%	90%	50%	140%
Trichloroethene	1543651		<0.020	<0.020	NA	< 0.020	114%	50%	140%	88%	60%	130%	89%	50%	140%

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Quality Assurance

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

Trace Organics Analysis (Continued)

RPT Date: Nov 30, 2020			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
Tetrachloroethene	1543651		<0.050	<0.050	NA	< 0.050	96%	50%	140%	97%	60%	130%	93%	50%	140%
Chlorobenzene	1543651		<0.010	<0.010	NA	< 0.010	99%	50%	140%	100%	60%	130%	93%	50%	140%
1,2-Dichlorobenzene	1543651		<0.010	<0.010	NA	< 0.010	108%	50%	140%	98%	60%	130%	104%	50%	140%
1,4-Dichlorobenzene	1543651		<0.010	<0.010	NA	< 0.010	107%	50%	140%	96%	60%	130%	111%	50%	140%
O. Reg. 558 - SVOCs															
Pyridine	1533061		< 0.010	< 0.010	NA	< 0.010	85%	30%	140%	96%	30%	140%	85%	30%	140%
Cresols	1533061		< 0.012	< 0.012	NA	< 0.012	112%	50%	140%	93%	50%	140%	84%	50%	140%
Ortho-Cresol	1533061		< 0.004	< 0.004	NA	< 0.004	114%	50%	140%	85%	50%	140%	112%	50%	140%
Meta & Para-Cresol	1533061		< 0.008	< 0.008	NA	< 0.008	74%	50%	140%	81%	50%	140%	105%	50%	140%
Hexachloroethane	1533061		< 0.004	< 0.004	NA	< 0.004	96%	50%	140%	74%	50%	140%	115%	50%	140%
Nitrobenzene	1533061		< 0.004	< 0.004	NA	< 0.004	95%	50%	140%	80%	50%	140%	114%	50%	140%
Hexachlorobutadiene	1533061		< 0.004	< 0.004	NA	< 0.004	85%	50%	140%	96%	50%	140%	116%	50%	140%
2,4,6-Trichlorophenol	1533061		< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	92%	50%	140%	103%	50%	140%
2,4,5-Trichlorophenol	1533061		< 0.004	< 0.004	NA	< 0.004	102%	50%	140%	82%	50%	140%	110%	50%	140%
2,4-Dinitrotoluene	1533061		< 0.004	< 0.004	NA	< 0.004	104%	50%	140%	102%	50%	140%	96%	50%	140%
2,3,4,6-Tetrachlorophenol	1533061		< 0.004	< 0.004	NA	< 0.004	74%	50%	140%	85%	50%	140%	85%	50%	140%
Hexachlorobenzene	1533061		< 0.004	< 0.004	NA	< 0.004	85%	50%	140%	74%	50%	140%	84%	50%	140%
Dinoseb	1533061		< 0.004	< 0.004	NA	< 0.004	80%	50%	140%	96%	50%	140%	74%	50%	140%
Benzo(a)pyrene	1533061		< 0.001	< 0.001	NA	< 0.001	81%	50%	140%	90%	50%	140%	85%	50%	140%
O. Reg. 558 - PCBs															
Polychlorinated Biphenyls	1525707		< 0.005	< 0.005	NA	< 0.005	108%	60%	130%	107%	60%	130%	107%	60%	130%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

O. Reg. 153(511) - VOCs (Soil)															
Dichlorodifluoromethane	1741643		<0.05	<0.05	NA	< 0.05	72%	50%	140%	94%	50%	140%	109%	50%	140%
Vinyl Chloride	1741643		<0.02	<0.02	NA	< 0.02	101%	50%	140%	77%	50%	140%	73%	50%	140%
Bromomethane	1741643		<0.05	<0.05	NA	< 0.05	86%	50%	140%	77%	50%	140%	70%	50%	140%
Trichlorofluoromethane	1741643		<0.05	<0.05	NA	< 0.05	99%	50%	140%	73%	50%	140%	73%	50%	140%
Acetone	1741643		<0.50	<0.50	NA	< 0.50	103%	50%	140%	98%	50%	140%	97%	50%	140%
1,1-Dichloroethylene	1741643		<0.05	<0.05	NA	< 0.05	78%	50%	140%	72%	60%	130%	78%	50%	140%
Methylene Chloride	1741643		<0.05	<0.05	NA	< 0.05	94%	50%	140%	83%	60%	130%	82%	50%	140%
Trans- 1,2-Dichloroethylene	1741643		<0.05	<0.05	NA	< 0.05	107%	50%	140%	81%	60%	130%	82%	50%	140%
Methyl tert-butyl Ether	1741643		<0.05	<0.05	NA	< 0.05	95%	50%	140%	108%	60%	130%	105%	50%	140%
1,1-Dichloroethane	1741643		<0.02	<0.02	NA	< 0.02	80%	50%	140%	78%	60%	130%	82%	50%	140%
Methyl Ethyl Ketone	1741643		<0.50	<0.50	NA	< 0.50	82%	50%	140%	98%	50%	140%	97%	50%	140%
Cis- 1,2-Dichloroethylene	1741643		<0.02	<0.02	NA	< 0.02	81%	50%	140%	71%	60%	130%	79%	50%	140%
Chloroform	1741643		<0.04	<0.04	NA	< 0.04	73%	50%	140%	79%	60%	130%	90%	50%	140%
1,2-Dichloroethane	1741643		<0.03	<0.03	NA	< 0.03	87%	50%	140%	80%	60%	130%	87%	50%	140%

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Trace Organics Analysis (Continued)

RPT Date: Nov 30, 2020			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
1,1,1-Trichloroethane	1741643		<0.05	<0.05	NA	< 0.05	112%	50%	140%	74%	60%	130%	76%	50%	140%
Carbon Tetrachloride	1741643		<0.05	<0.05	NA	< 0.05	72%	50%	140%	82%	60%	130%	81%	50%	140%
Benzene	1741643		<0.02	<0.02	NA	< 0.02	77%	50%	140%	72%	60%	130%	71%	50%	140%
1,2-Dichloropropane	1741643		<0.03	<0.03	NA	< 0.03	71%	50%	140%	86%	60%	130%	88%	50%	140%
Trichloroethylene	1741643		<0.03	<0.03	NA	< 0.03	95%	50%	140%	96%	60%	130%	111%	50%	140%
Bromodichloromethane	1741643		<0.05	<0.05	NA	< 0.05	108%	50%	140%	76%	60%	130%	77%	50%	140%
Methyl Isobutyl Ketone	1741643		<0.50	<0.50	NA	< 0.50	85%	50%	140%	97%	50%	140%	81%	50%	140%
1,1,2-Trichloroethane	1741643		<0.04	<0.04	NA	< 0.04	100%	50%	140%	100%	60%	130%	91%	50%	140%
Toluene	1741643		<0.05	<0.05	NA	< 0.05	74%	50%	140%	77%	60%	130%	71%	50%	140%
Dibromochloromethane	1741643		<0.05	<0.05	NA	< 0.05	87%	50%	140%	87%	60%	130%	76%	50%	140%
Ethylene Dibromide	1741643		<0.04	<0.04	NA	< 0.04	99%	50%	140%	95%	60%	130%	84%	50%	140%
Tetrachloroethylene	1741643		<0.05	<0.05	NA	< 0.05	77%	50%	140%	85%	60%	130%	79%	50%	140%
1,1,1,2-Tetrachloroethane	1741643		<0.04	<0.04	NA	< 0.04	85%	50%	140%	92%	60%	130%	79%	50%	140%
Chlorobenzene	1741643		<0.05	<0.05	NA	< 0.05	78%	50%	140%	87%	60%	130%	82%	50%	140%
Ethylbenzene	1741643		<0.05	<0.05	NA	< 0.05	76%	50%	140%	71%	60%	130%	72%	50%	140%
m & p-Xylene	1741643		<0.05	<0.05	NA	< 0.05	108%	50%	140%	76%	60%	130%	72%	50%	140%
Bromoform	1741643		<0.05	<0.05	NA	< 0.05	107%	50%	140%	110%	60%	130%	96%	50%	140%
Styrene	1741643		<0.05	<0.05	NA	< 0.05	71%	50%	140%	75%	60%	130%	85%	50%	140%
1,1,2,2-Tetrachloroethane	1741643		<0.05	<0.05	NA	< 0.05	106%	50%	140%	94%	60%	130%	75%	50%	140%
o-Xylene	1741643		<0.05	<0.05	NA	< 0.05	73%	50%	140%	79%	60%	130%	75%	50%	140%
1,3-Dichlorobenzene	1741643		<0.05	<0.05	NA	< 0.05	86%	50%	140%	96%	60%	130%	93%	50%	140%
1,4-Dichlorobenzene	1741643		<0.05	<0.05	NA	< 0.05	92%	50%	140%	101%	60%	130%	100%	50%	140%
1,2-Dichlorobenzene	1741643		<0.05	<0.05	NA	< 0.05	90%	50%	140%	97%	60%	130%	92%	50%	140%
n-Hexane	1741643		<0.05	<0.05	NA	< 0.05	108%	50%	140%	79%	60%	130%	74%	50%	140%
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	1734675		<0.05	<0.05	NA	< 0.05	89%	50%	140%	86%	50%	140%	91%	50%	140%
Acenaphthylene	1734675		<0.05	<0.05	NA	< 0.05	96%	50%	140%	109%	50%	140%	90%	50%	140%
Acenaphthene	1734675		<0.05	<0.05	NA	< 0.05	117%	50%	140%	102%	50%	140%	87%	50%	140%
Fluorene	1734675		<0.05	<0.05	NA	< 0.05	111%	50%	140%	102%	50%	140%	86%	50%	140%
Phenanthrene	1734675		<0.05	0.06	NA	< 0.05	93%	50%	140%	91%	50%	140%	89%	50%	140%
Anthracene	1734675		<0.05	<0.05	NA	< 0.05	119%	50%	140%	108%	50%	140%	89%	50%	140%
Fluoranthene	1734675		0.08	0.20	NA	< 0.05	107%	50%	140%	98%	50%	140%	95%	50%	140%
Pyrene	1734675		0.07	0.16	NA	< 0.05	106%	50%	140%	97%	50%	140%	99%	50%	140%
Benz(a)anthracene	1734675		<0.05	0.06	NA	< 0.05	114%	50%	140%	100%	50%	140%	90%	50%	140%
Chrysene	1734675		<0.05	0.09	NA	< 0.05	112%	50%	140%	110%	50%	140%	101%	50%	140%
Benzo(b)fluoranthene	1734675		<0.05	0.06	NA	< 0.05	65%	50%	140%	79%	50%	140%	72%	50%	140%
Benzo(k)fluoranthene	1734675		<0.05	<0.05	NA	< 0.05	98%	50%	140%	97%	50%	140%	90%	50%	140%
Benzo(a)pyrene	1734675		<0.05	<0.05	NA	< 0.05	76%	50%	140%	90%	50%	140%	91%	50%	140%
Indeno(1,2,3-cd)pyrene	1734675		<0.05	<0.05	NA	< 0.05	86%	50%	140%	97%	50%	140%	96%	50%	140%

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AGAT Laboratories

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Quality Assurance

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

Trace Organics Analysis (Continued)

RPT Date: Nov 30, 2020			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
Dibenz(a,h)anthracene	1734675		<0.05	<0.05	NA	< 0.05	76%	50%	140%	88%	50%	140%	93%	50%	140%
Benzo(g,h,i)perylene	1734675		<0.05	<0.05	NA	< 0.05	85%	50%	140%	98%	50%	140%	96%	50%	140%
Total PCBs (soil)															
Polychlorinated Biphenyls	1717861		< 0.1	< 0.1	NA	< 0.1	105%	60%	140%	100%	60%	140%	102%	60%	140%

Certified By: N Popnikolof

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SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER
Arsenic Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Barium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Boron Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Cadmium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Chromium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS

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Method Summary

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T661605

PROJECT: 1-17-0069-02

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Lead Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Mercury Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Selenium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Silver Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Uranium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Fluoride Leachate	INOR-93-6018	EPA 1311 & modified from SM4500-F-C	ION SELECTIVE ELECTRODE
Cyanide Leachate	INOR-93-6052	EPA 1311 modified from MOE 3015 SM 4500 CN-I,G387	TECHNICON AUTO ANALYZER
(Nitrate + Nitrite) as N Leachate	INOR-93-6053	EPA 1311 & modified from SM 4500-NO3-I	LACHAT FIA

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PROJECT: 1-17-0069-02

ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluorene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benz(a)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
1 and 2 Methlynaphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Moisture Content	ORG-91-5106	Tier 1 Method	BALANCE
Naphthalene-d8	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene-d10	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene-d12	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
F1 (C6 to C10)	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34) minus PAHs	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Vinyl Chloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
m & p-Xylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromoform	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5002	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Moisture Content		Tier 1 method	BALANCE
Polychlorinated Biphenyls	ORG-91-5112	Regulation 558, EPA SW846 3510C/8082	GC/ECD
Decachlorobiphenyl	ORG-91-5112	EPA SW846 3510C/8082	GC/ECD
Pyridine	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Cresols	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Ortho-Cresol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Meta & Para-Cresol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Hexachloroethane	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Nitrobenzene	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Hexachlorobutadiene	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2,4,6-Trichlorophenol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2,4,5-Trichlorophenol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2,4-Dinitrotoluene	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2,3,4,6-Tetrachlorophenol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Hexachlorobenzene	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Dinoseb	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS

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ATTENTION TO: Madan Talukdar

SAMPLING SITE:Berta Point, Bronte Harbour Oakville

SAMPLED BY:Satya

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Benzo(a)pyrene	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2-Fluorophenol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Phenol-d6	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2,4,6-Tribromophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Chrysene-d12	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
BNA Extr	ORG-91-5114	modified from EPA SW846 3510C & 8270E	N/A
Vinyl Chloride	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,1 Dichloroethene	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Dichloromethane	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Trichloroethene	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Tetrachloroethene	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Polychlorinated Biphenyls	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD

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CLIENT NAME: TERRAPROBE INC.
11 INDELL LANE
BRAMPTON, ON L6T3Y3
(905) 796-2650

ATTENTION TO: Abdus Sobahan

PROJECT: 1-17-0069-02

AGAT WORK ORDER: 20T675473

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Nov 13, 2020

PAGES (INCLUDING COVER): 17

VERSION*: 1

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

*Notes

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Certificate of Analysis

AGAT WORK ORDER: 20T675473
PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.
SAMPLING SITE:

ATTENTION TO: Abdus Sobahan
SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2020-11-09

DATE REPORTED: 2020-11-13

		SAMPLE DESCRIPTION:		BH3-20/SS7	BH3-20/SS1
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2020-11-04	2020-11-04
Parameter	Unit	G / S	RDL	1662195	1662196
Antimony	µg/g	1.3	0.8	<0.8	<0.8
Arsenic	µg/g	18	1	5	4
Barium	µg/g	220	2	126	131
Beryllium	µg/g	2.5	0.5	0.6	0.6
Boron	µg/g	36	5	15	10
Boron (Hot Water Soluble)	µg/g	NA	0.10	2.95	0.23
Cadmium	µg/g	1.2	0.5	<0.5	<0.5
Chromium	µg/g	70	5	26	25
Cobalt	µg/g	21	0.5	13.2	10.4
Copper	µg/g	92	1	28	8
Lead	µg/g	120	1	13	11
Molybdenum	µg/g	2	0.5	0.9	0.8
Nickel	µg/g	82	1	29	23
Selenium	µg/g	1.5	0.4	0.8	0.5
Silver	µg/g	0.5	0.2	<0.2	<0.2
Thallium	µg/g	1	0.4	<0.4	<0.4
Uranium	µg/g	2.5	0.5	1.0	0.7
Vanadium	µg/g	86	1	33	36
Zinc	µg/g	290	5	382	61
Chromium, Hexavalent	µg/g	0.66	0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	0.57	0.005	0.498	0.189
Sodium Adsorption Ratio	NA	2.4	NA	1.42	0.280
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.23	7.41

Certified By:

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AGAT WORK ORDER: 20T675473
PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.
ATTENTION TO: Abdus Sobahan
SAMPLING SITE:
SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2020-11-09
DATE REPORTED: 2020-11-13

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1662195-1662196 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.
SAMPLING SITE:

ATTENTION TO: Abdus Sobahan
SAMPLED BY:

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2020-11-09

DATE REPORTED: 2020-11-13

		SAMPLE DESCRIPTION:		BH3-20/SS2	BH3-20/SS6
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2020-11-04	2020-11-04
Parameter	Unit	G / S	RDL	1662197	1662198
Naphthalene	µg/g	0.09	0.05	<0.05	<0.05
Acenaphthylene	µg/g	0.093	0.05	<0.05	<0.05
Acenaphthene	µg/g	0.072	0.05	<0.05	<0.05
Fluorene	µg/g	0.12	0.05	<0.05	<0.05
Phenanthrene	µg/g	0.69	0.05	<0.05	<0.05
Anthracene	µg/g	0.16	0.05	<0.05	<0.05
Fluoranthene	µg/g	0.56	0.05	<0.05	<0.05
Pyrene	µg/g	1	0.05	<0.05	<0.05
Benz(a)anthracene	µg/g	0.36	0.05	<0.05	<0.05
Chrysene	µg/g	2.8	0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g	0.47	0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/g	0.48	0.05	<0.05	<0.05
Benzo(a)pyrene	µg/g	0.3	0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	µg/g	0.23	0.05	<0.05	<0.05
Dibenz(a,h)anthracene	µg/g	0.1	0.05	<0.05	<0.05
Benzo(g,h,i)perylene	µg/g	0.68	0.05	<0.05	<0.05
1 and 2 Methlynaphthalene	µg/g	0.59	0.05	<0.05	<0.05
Moisture Content	%		0.1	12.8	26.3
Surrogate	Unit	Acceptable Limits			
Naphthalene-d8	%	50-140		75	65
Acenaphthene-d10	%	50-140		108	94
Chrysene-d12	%	50-140		101	97

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1662197-1662198 Results are based on the dry weight of the soil.
Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

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CLIENT NAME: TERRAPROBE INC.
SAMPLING SITE:

ATTENTION TO: Abdus Sobahan
SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)

DATE RECEIVED: 2020-11-09

DATE REPORTED: 2020-11-13

		SAMPLE DESCRIPTION:		BH3-20/SS4	BH3-20/SS8
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2020-11-04	2020-11-04
Parameter	Unit	G / S	RDL	1662199	1662259
F1 (C6 to C10)	µg/g	25	5	<5	<5
F1 (C6 to C10) minus BTEX	µg/g	25	5	<5	<5
F2 (C10 to C16)	µg/g	10	10	<10	<10
F3 (C16 to C34)	µg/g	240	50	63	<50
F4 (C34 to C50)	µg/g	120	50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g	120	50	NA	NA
Moisture Content	%		0.1	25.0	18.6
Surrogate	Unit	Acceptable Limits			
Terphenyl	%	60-140		120	86

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1662199-1662259 Results are based on sample dry weight.
The C6-C10 fraction is calculated using toluene response factor.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified without the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

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AGAT WORK ORDER: 20T675473
PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.
SAMPLING SITE:

ATTENTION TO: Abdus Sobahan
SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2020-11-09

DATE REPORTED: 2020-11-13

		SAMPLE DESCRIPTION:		BH3-20/SS4	BH3-20/SS8
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2020-11-04	2020-11-04
Parameter	Unit	G / S	RDL	1662199	1662259
Dichlorodifluoromethane	µg/g	0.05	0.05	<0.05	<0.05
Vinyl Chloride	ug/g	0.02	0.02	<0.02	<0.02
Bromomethane	ug/g	0.05	0.05	<0.05	<0.05
Trichlorofluoromethane	ug/g	0.25	0.05	<0.05	<0.05
Acetone	ug/g	0.5	0.50	<0.50	<0.50
1,1-Dichloroethylene	ug/g	0.05	0.05	<0.05	<0.05
Methylene Chloride	ug/g	0.05	0.05	<0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g	0.05	0.05	<0.05	<0.05
Methyl tert-butyl Ether	ug/g	0.05	0.05	<0.05	<0.05
1,1-Dichloroethane	ug/g	0.05	0.02	<0.02	<0.02
Methyl Ethyl Ketone	ug/g	0.5	0.50	<0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g	0.05	0.02	<0.02	<0.02
Chloroform	ug/g	0.05	0.04	<0.04	<0.04
1,2-Dichloroethane	ug/g	0.05	0.03	<0.03	<0.03
1,1,1-Trichloroethane	ug/g	0.05	0.05	<0.05	<0.05
Carbon Tetrachloride	ug/g	0.05	0.05	<0.05	<0.05
Benzene	ug/g	0.02	0.02	<0.02	<0.02
1,2-Dichloropropane	ug/g	0.05	0.03	<0.03	<0.03
Trichloroethylene	ug/g	0.05	0.03	<0.03	<0.03
Bromodichloromethane	ug/g	0.05	0.05	<0.05	<0.05
Methyl Isobutyl Ketone	ug/g	0.5	0.50	<0.50	<0.50
1,1,2-Trichloroethane	ug/g	0.05	0.04	<0.04	<0.04
Toluene	ug/g	0.2	0.05	<0.05	<0.05
Dibromochloromethane	ug/g	0.05	0.05	<0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04	<0.04	<0.04
Tetrachloroethylene	ug/g	0.05	0.05	<0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g	0.05	0.04	<0.04	<0.04
Chlorobenzene	ug/g	0.05	0.05	<0.05	<0.05
Ethylbenzene	ug/g	0.05	0.05	<0.05	<0.05
m & p-Xylene	ug/g		0.05	<0.05	<0.05

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AGAT WORK ORDER: 20T675473
PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.
SAMPLING SITE:

ATTENTION TO: Abdus Sobahan
SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2020-11-09

DATE REPORTED: 2020-11-13

		SAMPLE DESCRIPTION:		BH3-20/SS4	BH3-20/SS8
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2020-11-04	2020-11-04
Parameter	Unit	G / S	RDL	1662199	1662259
Bromoform	ug/g	0.05	0.05	<0.05	<0.05
Styrene	ug/g	0.05	0.05	<0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.05	<0.05
o-Xylene	ug/g		0.05	<0.05	<0.05
1,3-Dichlorobenzene	ug/g	0.05	0.05	<0.05	<0.05
1,4-Dichlorobenzene	ug/g	0.05	0.05	<0.05	<0.05
1,2-Dichlorobenzene	ug/g	0.05	0.05	<0.05	<0.05
Xylenes (Total)	ug/g	0.05	0.05	<0.05	<0.05
1,3-Dichloropropene (Cis + Trans)	µg/g	0.05	0.04	<0.04	<0.04
n-Hexane	µg/g	0.05	0.05	<0.05	<0.05
Moisture Content	%		0.1	25.0	18.6
Surrogate	Unit	Acceptable Limits			
Toluene-d8	% Recovery	50-140		109	112
4-Bromofluorobenzene	% Recovery	50-140		101	102

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1662199-1662259 The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

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AGAT WORK ORDER: 20T675473

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Abdus Sobahan

SAMPLING SITE:

SAMPLED BY:

Total PCBs (soil)

DATE RECEIVED: 2020-11-09

DATE REPORTED: 2020-11-13

		SAMPLE DESCRIPTION:		BH3-20/SS7	BH3-20/SS1
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2020-11-04	2020-11-04
Parameter	Unit	G / S	RDL	1662195	1662196
Polychlorinated Biphenyls	µg/g	0.3	0.1	<0.1	<0.1
Moisture Content	%		0.1	25.3	17.0
Surrogate	Unit	Acceptable Limits			
Decachlorobiphenyl	%	60-130		96	84

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1662195-1662196 Results are based on the dry weight of soil extracted.

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Certified By: N Popnikolof

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Exceedance Summary

AGAT WORK ORDER: 20T675473

PROJECT: 1-17-0069-02

CLIENT NAME: TERRAPROBE INC.

ATTENTION TO: Abdus Sobahan

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
1662195	BH3-20/SS7	ON T1 S RPI/ICC	O. Reg. 153(511) - Metals & Inorganics (Soil)	Zinc	µg/g	290	382

Results relate only to the items tested. Results apply to samples as received.

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Quality Assurance

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T675473

PROJECT: 1-17-0069-02

ATTENTION TO: Abdus Sobahan

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Nov 13, 2020			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
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	1610071		<0.8	<0.8	NA	< 0.8	126%	70%	130%	103%	80%	120%	103%	70%	130%
Arsenic	1610071		5	5	0.0%	< 1	116%	70%	130%	97%	80%	120%	90%	70%	130%
Barium	1610071		63	62	1.6%	< 2	111%	70%	130%	99%	80%	120%	89%	70%	130%
Beryllium	1610071		0.7	0.7	NA	< 0.5	87%	70%	130%	97%	80%	120%	97%	70%	130%
Boron	1610071		19	20	NA	< 5	123%	70%	130%	98%	80%	120%	91%	70%	130%
Boron (Hot Water Soluble)	1610071		0.27	0.26	NA	< 0.10	103%	60%	140%	109%	70%	130%	98%	60%	140%
Cadmium	1610071		<0.5	<0.5	NA	< 0.5	114%	70%	130%	98%	80%	120%	90%	70%	130%
Chromium	1610071		25	25	0.0%	< 5	100%	70%	130%	101%	80%	120%	92%	70%	130%
Cobalt	1610071		16.9	16.5	2.4%	< 0.5	104%	70%	130%	96%	80%	120%	88%	70%	130%
Copper	1610071		7	7	0.0%	< 1	94%	70%	130%	102%	80%	120%	89%	70%	130%
Lead	1610071		8	9	11.8%	< 1	108%	70%	130%	101%	80%	120%	90%	70%	130%
Molybdenum	1610071		0.6	0.6	NA	< 0.5	101%	70%	130%	95%	80%	120%	81%	70%	130%
Nickel	1610071		35	34	2.9%	< 1	106%	70%	130%	97%	80%	120%	88%	70%	130%
Selenium	1610071		<0.4	<0.4	NA	< 0.4	127%	70%	130%	94%	80%	120%	87%	70%	130%
Silver	1610071		<0.2	<0.2	NA	< 0.2	98%	70%	130%	94%	80%	120%	84%	70%	130%
Thallium	1610071		<0.4	<0.4	NA	< 0.4	122%	70%	130%	98%	80%	120%	88%	70%	130%
Uranium	1610071		1.1	1.1	NA	< 0.5	123%	70%	130%	100%	80%	120%	92%	70%	130%
Vanadium	1610071		39	38	2.6%	< 1	106%	70%	130%	92%	80%	120%	83%	70%	130%
Zinc	1610071		70	69	1.4%	< 5	101%	70%	130%	101%	80%	120%	98%	70%	130%
Chromium, Hexavalent	1660524		<0.2	<0.2	NA	< 0.2	92%	70%	130%	92%	80%	120%	82%	70%	130%
Cyanide, Free	1664344		<0.040	<0.040	NA	< 0.040	108%	70%	130%	90%	80%	120%	100%	70%	130%
Mercury	1610071		<0.10	<0.10	NA	< 0.10	109%	70%	130%	100%	80%	120%	94%	70%	130%
Electrical Conductivity (2:1)	1662195	1662195	0.498	0.499	0.2%	< 0.005	101%	80%	120%						
Sodium Adsorption Ratio	1662195	1662195	1.42	1.52	6.8%	NA									
pH, 2:1 CaCl2 Extraction	1664958		7.88	7.89	0.1%	NA	100%	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.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:

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Quality Assurance

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T675473

PROJECT: 1-17-0069-02

ATTENTION TO: Abdus Sobahan

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Nov 13, 2020

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total PCBs (soil)															
Polychlorinated Biphenyls	1664832		< 0.1	< 0.1	NA	< 0.1	107%	60%	140%	102%	60%	140%	90%	60%	140%
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	1656827		< 0.05	< 0.05	NA	< 0.05	62%	50%	140%	73%	50%	140%	74%	50%	140%
Acenaphthylene	1656827		< 0.05	< 0.05	NA	< 0.05	113%	50%	140%	85%	50%	140%	105%	50%	140%
Acenaphthene	1656827		< 0.05	< 0.05	NA	< 0.05	118%	50%	140%	92%	50%	140%	108%	50%	140%
Fluorene	1656827		< 0.05	< 0.05	NA	< 0.05	116%	50%	140%	109%	50%	140%	113%	50%	140%
Phenanthrene	1656827		< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	111%	50%	140%	107%	50%	140%
Anthracene	1656827		< 0.05	< 0.05	NA	< 0.05	118%	50%	140%	107%	50%	140%	114%	50%	140%
Fluoranthene	1656827		< 0.05	< 0.05	NA	< 0.05	119%	50%	140%	98%	50%	140%	108%	50%	140%
Pyrene	1656827		< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	98%	50%	140%	108%	50%	140%
Benz(a)anthracene	1656827		< 0.05	< 0.05	NA	< 0.05	111%	50%	140%	97%	50%	140%	104%	50%	140%
Chrysene	1656827		< 0.05	< 0.05	NA	< 0.05	117%	50%	140%	112%	50%	140%	104%	50%	140%
Benzo(b)fluoranthene	1656827		< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	106%	50%	140%	81%	50%	140%
Benzo(k)fluoranthene	1656827		< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	103%	50%	140%	90%	50%	140%
Benzo(a)pyrene	1656827		< 0.05	< 0.05	NA	< 0.05	114%	50%	140%	100%	50%	140%	110%	50%	140%
Indeno(1,2,3-cd)pyrene	1656827		< 0.05	< 0.05	NA	< 0.05	83%	50%	140%	70%	50%	140%	91%	50%	140%
Dibenz(a,h)anthracene	1656827		< 0.05	< 0.05	NA	< 0.05	79%	50%	140%	75%	50%	140%	80%	50%	140%
Benzo(g,h,i)perylene	1656827		< 0.05	< 0.05	NA	< 0.05	70%	50%	140%	63%	50%	140%	72%	50%	140%
O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)															
F1 (C6 to C10)	1664972		< 5	< 5	NA	< 5	104%	60%	140%	97%	60%	140%	96%	60%	140%
F2 (C10 to C16)	1664972		< 10	< 10	NA	< 10	91%	60%	140%	90%	60%	140%	89%	60%	140%
F3 (C16 to C34)	1664972		< 50	< 50	NA	< 50	90%	60%	140%	93%	60%	140%	91%	60%	140%
F4 (C34 to C50)	1664972		< 50	< 50	NA	< 50	90%	60%	140%	109%	60%	140%	96%	60%	140%
O. Reg. 153(511) - VOCs (Soil)															
Dichlorodifluoromethane	1664826		<0.05	<0.05	NA	< 0.05	72%	50%	140%	89%	50%	140%	102%	50%	140%
Vinyl Chloride	1664826		<0.02	<0.02	NA	< 0.02	98%	50%	140%	93%	50%	140%	90%	50%	140%
Bromomethane	1664826		<0.05	<0.05	NA	< 0.05	101%	50%	140%	81%	50%	140%	83%	50%	140%
Trichlorofluoromethane	1664826		<0.05	<0.05	NA	< 0.05	104%	50%	140%	105%	50%	140%	90%	50%	140%
Acetone	1664826		<0.50	<0.50	NA	< 0.50	91%	50%	140%	96%	50%	140%	85%	50%	140%
1,1-Dichloroethylene	1664826		<0.05	<0.05	NA	< 0.05	102%	50%	140%	107%	60%	130%	90%	50%	140%
Methylene Chloride	1664826		<0.05	<0.05	NA	< 0.05	95%	50%	140%	86%	60%	130%	96%	50%	140%
Trans- 1,2-Dichloroethylene	1664826		<0.05	<0.05	NA	< 0.05	80%	50%	140%	97%	60%	130%	81%	50%	140%
Methyl tert-butyl Ether	1664826		<0.05	<0.05	NA	< 0.05	102%	50%	140%	99%	60%	130%	80%	50%	140%
1,1-Dichloroethane	1664826		<0.02	<0.02	NA	< 0.02	80%	50%	140%	114%	60%	130%	80%	50%	140%
Methyl Ethyl Ketone	1664826		<0.50	<0.50	NA	< 0.50	75%	50%	140%	89%	50%	140%	89%	50%	140%
Cis- 1,2-Dichloroethylene	1664826		<0.02	<0.02	NA	< 0.02	77%	50%	140%	101%	60%	130%	98%	50%	140%
Chloroform	1664826		<0.04	<0.04	NA	< 0.04	93%	50%	140%	109%	60%	130%	97%	50%	140%
1,2-Dichloroethane	1664826		<0.03	<0.03	NA	< 0.03	88%	50%	140%	90%	60%	130%	100%	50%	140%

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Quality Assurance

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T675473

PROJECT: 1-17-0069-02

ATTENTION TO: Abdus Sobahan

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Nov 13, 2020

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,1,1-Trichloroethane	1664826		<0.05	<0.05	NA	< 0.05	88%	50%	140%	100%	60%	130%	85%	50%	140%
Carbon Tetrachloride	1664826		<0.05	<0.05	NA	< 0.05	80%	50%	140%	101%	60%	130%	87%	50%	140%
Benzene	1664826		<0.02	<0.02	NA	< 0.02	76%	50%	140%	111%	60%	130%	89%	50%	140%
1,2-Dichloropropane	1664826		<0.03	<0.03	NA	< 0.03	94%	50%	140%	89%	60%	130%	92%	50%	140%
Trichloroethylene	1664826		<0.03	<0.03	NA	< 0.03	96%	50%	140%	87%	60%	130%	109%	50%	140%
Bromodichloromethane	1664826		<0.05	<0.05	NA	< 0.05	114%	50%	140%	116%	60%	130%	90%	50%	140%
Methyl Isobutyl Ketone	1664826		<0.50	<0.50	NA	< 0.50	96%	50%	140%	94%	50%	140%	75%	50%	140%
1,1,2-Trichloroethane	1664826		<0.04	<0.04	NA	< 0.04	93%	50%	140%	104%	60%	130%	102%	50%	140%
Toluene	1664826		<0.05	<0.05	NA	< 0.05	93%	50%	140%	97%	60%	130%	89%	50%	140%
Dibromochloromethane	1664826		<0.05	<0.05	NA	< 0.05	109%	50%	140%	101%	60%	130%	81%	50%	140%
Ethylene Dibromide	1664826		<0.04	<0.04	NA	< 0.04	106%	50%	140%	102%	60%	130%	83%	50%	140%
Tetrachloroethylene	1664826		<0.05	<0.05	NA	< 0.05	113%	50%	140%	113%	60%	130%	94%	50%	140%
1,1,1,2-Tetrachloroethane	1664826		<0.04	<0.04	NA	< 0.04	93%	50%	140%	104%	60%	130%	78%	50%	140%
Chlorobenzene	1664826		<0.05	<0.05	NA	< 0.05	90%	50%	140%	101%	60%	130%	93%	50%	140%
Ethylbenzene	1664826		<0.05	<0.05	NA	< 0.05	72%	50%	140%	103%	60%	130%	89%	50%	140%
m & p-Xylene	1664826		<0.05	<0.05	NA	< 0.05	94%	50%	140%	99%	60%	130%	90%	50%	140%
Bromoform	1664826		<0.05	<0.05	NA	< 0.05	87%	50%	140%	113%	60%	130%	72%	50%	140%
Styrene	1664826		<0.05	<0.05	NA	< 0.05	98%	50%	140%	96%	60%	130%	100%	50%	140%
1,1,2,2-Tetrachloroethane	1664826		<0.05	<0.05	NA	< 0.05	84%	50%	140%	92%	60%	130%	83%	50%	140%
o-Xylene	1664826		<0.05	<0.05	NA	< 0.05	96%	50%	140%	106%	60%	130%	95%	50%	140%
1,3-Dichlorobenzene	1664826		<0.05	<0.05	NA	< 0.05	90%	50%	140%	94%	60%	130%	93%	50%	140%
1,4-Dichlorobenzene	1664826		<0.05	<0.05	NA	< 0.05	104%	50%	140%	100%	60%	130%	79%	50%	140%
1,2-Dichlorobenzene	1664826		<0.05	<0.05	NA	< 0.05	72%	50%	140%	91%	60%	130%	89%	50%	140%
n-Hexane	1664826		<0.05	<0.05	NA	< 0.05	99%	50%	140%	99%	60%	130%	108%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: N Popnikolof

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Method Summary

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T675473

PROJECT: 1-17-0069-02

ATTENTION TO: Abdus Sobahan

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

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Method Summary

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T675473

PROJECT: 1-17-0069-02

ATTENTION TO: Abdus Sobahan

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluorene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benz(a)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
1 and 2 Methlynaphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Moisture Content	ORG-91-5106	Tier 1 Method	BALANCE
Naphthalene-d8	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene-d10	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene-d12	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
F1 (C6 to C10)	VOL-91-5009	modified from CCME Tier 1 Method, SW846 5035	P&T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method, SW846 5035	P&T GC/FID
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS

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Method Summary

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PROJECT: 1-17-0069-02

ATTENTION TO: Abdus Sobahan

SAMPLING SITE:

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Vinyl Chloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS

Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories

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Method Summary

CLIENT NAME: TERRAPROBE INC.

AGAT WORK ORDER: 20T675473

PROJECT: 1-17-0069-02

ATTENTION TO: Abdus Sobahan

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
m & p-Xylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromoform	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5002	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Moisture Content		Tier 1 method	BALANCE
Polychlorinated Biphenyls	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD

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