Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

HYDROGEOLOGICAL INVESTIGATION
535 TO 551 BRANT STREET
BURLINGTON, ONTARIO

Prepared for: **Renimmob Properties Limited**
2069 Lakeshore Road
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Attention: Mr. Mark Bales

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EXECUTIVE SUMMARY

Terraprobe Inc. (Terraprobe) was retained by Renimmob Properties Limited to conduct a hydrogeological investigation for the proposed residential development at 535 to 551 Brant Street in Burlington, Ontario (the "Property"). The Property has a frontage along the east side of Brant Street of approximately 54 metres and extends to the east for about 51 metres. A site location plan is provided in Figure 1.

The Property is rectangular in shape, with a total area of approximately 0.28 ha. The Site is currently occupied with a multi-tenant commercial building, with one basement level and one upper level located at the central portion of the building.

It is understood that it is intended to redevelop the Property with a 25-storey mixed use commercial/ residential building with main floor commercial space and residential units above. The building will rest on a 4-level underground parking structure. The hydrogeological investigation has been developed based on the current design plan as indicated on the architectural engineering drawings entitled "*535 – 551 Brant Street, Burlington,* drawing A2.01, dated March 23, 2018, prepared by Turner Fleischer Architects Inc. (Job No. Reference 18.069)" and is intended to provide an assessment of the potential groundwater conditions and dewatering requirements to construct and maintain a P4 level underground parking structure.

According to the above noted plan the underground parking structure will occupy an area of approximately 2,390 m^2. The lowest finished floor elevation (FFE) for P4 was not provided, however, it is expected to be about 13 m below grade (Elev. 74.8± mASL) and will be set within the bedrock. It is expected that foundations will extend nominally 0.5 m deeper than the lowest FFE indicated above.

The purpose of the investigation is to assess the groundwater conditions and dewatering requirements for the proposed construction activities at the Property.

The conclusions of Terraprobe's investigation are as follows:

Proposed Development Conditions				
Development	**Above Grade Levels**	**Below Grade Levels**		
		Level #	**Lowest Finished Floor**	
			Depth (m)	**Elevation (mASL)**
25 Storey High Rise Building at 535 - 551 Brant Street	25	4 levels	13.0	74.8

In general, three main stratigraphic units were encountered at the Property which consisted of:

Site Stratigraphy			
Stratum/Formation	**Depth Range (mbgs)**	**Elevation Range (mASL)**	**Hydraulic Conductivity (m/s)**
Earth Fill	1.5 to 2.3	85.1 to 86.3	1×10^{-6}*
Silt Glacial Till	2.6 to 3.0	84.4 to 85.0	1×10^{-7}*
Shale bedrock	3.0 to 18.5	85.0 to 69.7	1.78×10^{-7}**

*Indicates conductivity was estimated using typical published values from Freeze and Cherry (1979)
**Indicates conductivity was estimated from a rising head test

The groundwater conditions at the Property are as follows:

Groundwater Conditions		
Groundwater Elevation (mASL)	85.1	
Zone of Influence (m)	15 m	
Groundwater Quality		
Sample ID	**Region of Halton Sanitary and Combined Sewer By-Law**	**Region of Halton Storm Sewer By-Law**
Untreated Groundwater (SW-UF-MW107)	Meets	Meets
Groundwater Treatment Required	No	No

Groundwater Control

The water taking requirements for groundwater control at the Property are:

Groundwater Quantity: Short Term (Construction) – Safety Factor of 1.5 Used (Groundwater only)						
Location	**Groundwater Seepage**		**2-Year Rainfall Event**		**Total Volume**	
	L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
25 Storey High-Rise Building at 535 - 551 Brant Street	11,500	8.0	60,000	41.7	**71,500**	**49.7**

The water taking requirements for groundwater control for long term (post-construction) at the Property are:

Groundwater Quantity: Long Term (Post-Construction) – Safety Factor of 1.5 Used (Groundwater only)						
Location	**Groundwater Seepage**		**Infiltration (2-Year Rainfall Event)**		**Total Volume**	
	L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
25 Storey High-Rise Building at 535 - 551 Brant Street	13,000	9.0	3,000	2.1	**16,000**	**11.1**

Regulation Requirements	
Environmental Activity and Sector Registry (EASR) Posting	Required
Short Term Permit to Take Water (PTTW)	Not Required
Long Term Permit to Take Water (PTTW)	Not Required

- It is anticipated that design changes will be made to the current proposed development plan which will affect the results of the hydrogeological investigation. Upon the finalization of a redevelopment design plan it is recommended that Terraprobe update the preliminary hydrogeological investigation to reflect the final design concept.

- If water (storm water, groundwater or a combination of both) is discharged into the City and/or Region sewer system during construction activities, a Short Term Discharge Agreement for construction will have to be obtained from the City and/or Region. Updated ground water analyses are required as the current results are dated February 2019.

- If the redevelopment has a subfloor drainage system (weeper system) that is connected to the City or Region sewers, a Long Term Discharge Agreement will have to be obtained from the City and/or Region.

- Localized dewatering will be required of any protrusions extending below the highest noted groundwater elevation at the Property during construction activities. Waterproofing of these protrusions will be required in the long term.

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1.0 INTRODUCTION

Terraprobe Inc. (Terraprobe) was retained by Renimmob Properties Limited to conduct a hydrogeological investigation for the proposed residential development at 535 to 551 Brant Street in Burlington, Ontario (the "Property"). The Property has a frontage along the east side of Brant Street of approximately 54 metres and extends to the east for about 51 metres. A site location plan is provided in Figure 1.

The Property is located within a relatively flat area. It is rectangular in shape, with a total area of approximately 0.28 ha. Existing development on the Property consists of a multi-tenant commercial building, with one basement level and one upper level located at the central portion of the building. The existing development and locations of monitoring wells installed as part of the subsurface investigation are provided on Figure 2.

It is understood that it is intended to redevelop the Property with a 25-storey mixed use commercial/ residential building with main floor commercial space and residential units above. The building will rest on a 4-level underground parking structure. The underground parking structure will occupy an area of approximately 2,390 m^2. The lowest finished floor elevation (FFE) for P4 is expected to be about 13 m below grade (Elev. 74.8± mASL) and will be set within the bedrock. It is expected that foundations will extend nominally 0.5 m deeper than the lowest FFE indicated above. The proposed building is indicated on Figure 3.

The following reports were reviewed by Terraprobe in preparation of this report:

- "*Geotechnical Engineering Report*", 535 – 551 Brant Street, Burlington, Ontario, dated April 22, 2019 prepared by Terraprobe Inc. (Reference 1-18-0718-02)

The following drawings were provided to Terraprobe for review in preparation of this report:

- Architectural Drawings: "*535 – 551 Brant Street, Burlington",* drawing A2.01, dated March 23, 2018, prepared by Turner Fleischer Architects Inc. (Job No. Reference 18.069)

The hydrogeological investigation has been developed based on the current design plan as indicated on the above noted architectural drawing dated March 23, 2018, and is intended to provide an assessment of the potential groundwater conditions and dewatering requirements to construct a P4 level underground parking structure.

The Terraprobe field investigation involved advancing five (5) boreholes (BH104 to BH108) as part of the concurrent Geotechnical Investigation and Phase Two Environmental Site Assessment at the Property from January 22, 2019 to January 25, 2019 to depths of ranging from approximately 2.6 to 18.5 ±m below grade (Elev. 85.0 to 69.7 ± mASL). The locations of the monitoring wells are provided on Figure 2. The results of the Terraprobe boreholes are recorded on the Borehole Logs in Appendix A.

All boreholes were outfitted with 50 mm diameter monitoring wells. Stabilized groundwater levels as they pertain to the proposed excavation were observed in the monitoring wells. In situ hydraulic conductivity (rising head) testing was conducted at three (3) well locations. Based on the information obtained, interpretation, analysis, and advice with respect to the hydrogeological engineering aspects of the proposed development concepts are provided.

2.0 SCOPE OF WORK

The scope of work for the hydrogeologic investigation consisted of the following:

- Completion of rising head hydraulic conductivity analyses. A rising head test was completed at each of monitoring wells BH104, BH106 and BH107. The results of the test were used to assess the groundwater control requirements for the project.

- Assessment of groundwater control requirements. An assessment of the groundwater inflow rates and volumes for the currently proposed design was completed. The information obtained from the rising head tests and soil grain size information was utilized in order to provide an assessment of the potential groundwater control requirements during construction and for the completed structures following construction.

- Completion of groundwater sampling and analysis. Groundwater sampling for the purpose of determining the groundwater quality at the Property was completed. The results of the analysis were used in order to determine the presence of groundwater contamination and to assess options for disposal of the pumped groundwater.

- Report preparation. A hydrogeological report has been prepared for the project. A summary of the local groundwater conditions in the area has been completed. An evaluation of the proposed construction methods and an assessment of the possible requirements for dewatering or depressurization were completed. Recommendations regarding the estimates of the groundwater control volumes and rates were provided. Regulatory requirements for the groundwater takings were discussed.

3.0 REGIONAL SITE SETTING

1.1 Regional Geology

The current understanding of the surface geological setting of the Property is based on scientific work conducted by the Ontario Geological Survey (OGS, 2003). The Property and surrounding properties are located within in area mapped within glaciolacustrine deposits comprising sand, gravelly sand and gravel, nearshore and beach deposits. Bedrock at the location of the Property consists of red shale of the Queenston Formation (OGS, 2007).

1.2 Regional Physiography

The Property is located within a regional physiography of Southern Ontario known as Iroquois Plain. The Iroquois Plain within the vicinity of the Property consists of a sand plain. The Iroquois Plain occupies the lowlands around the western part of Lake Ontario, where it covers about a distance of 300 km, from the Niagara River to the Trent River. It has a width varying from about 100 m to over 10 km. When the last glacier (Wisconsin) was receding from Southern Ontario, the area was inundated by a body of water known as Lake Iroquois, which emptied eastward at Rome, New York State (Chapman and Putnam, 1984).

1.3 Regional Topography and Drainage

A review of a surface topography map for the Property and surrounding area indicates that the topography of the Property is relatively flat. The ground surface elevation within the vicinity of the Property ranges from 89 mASL to 87 mASL . Considering the topography map and the ground surface elevation for the Property, ground surface slopes in a southeasterly direction. As such, it is anticipated that generated runoff (if it is not managed) will flow in a southerly direction.

1.4 Watershed Setting

The Property is located within the Halton Conservation Watershed area, the majority of the Property lies within the and lies within the Lower Hager Creek Watershed, the northeast portion of the Property lies within the Lower Rambo Creek Watershed (Halton Region Conservation Authority, 2015).

1.5 Local Surface Water and Natural Heritage Features

Ministry of Natural Resources and Forestry interactive mapping, and the City of Burlington and Region of Halton Official Plans were reviewed on April 14, 2020 for any natural heritage features including, watercourses, bodies of water, wetland features, Area of Natural and Scientific Interest (ANSI) and wooded areas located within or in close proximity to the Property. Rambo Creek is located approximately 75 m northeast of the Property.

Record review indicates that there are no records for any wooded area, wetland features or natural heritage features within or in close proximity to the Property.

Source Protection Information Atlas provided by Ministry of the Environment, Conservation and Parks was reviewed on April 14, 2020. Record review indicates that the Property is located within a highly vulnerable aquifer, with a score of 6.

4.0 DESCRIPTION OF SITE CONDITIONS

4.1 Site Location and Description

The Property has a frontage along the east side of Brant Street of approximately 54 metres and extends to the east for about 51 metres. The Property is located within a relatively flat area. It is rectangular in shape, with a total area of approximately 0.28 ha. Existing development on the Property consists of a multi-tenant commercial building, with one basement level and one upper level located at the central portion of the building. A site location plan is provided on Figure 1.

4.2 Site Topography and Drainage

The Property and surrounding lands consist of a mixed commercial/residential area of Burlington. The Property is generally flat lying with a slight slope to the southeast, where an approximate ground surface elevation ranges between 87.9 ± and 87.5 ± mASL .

There are no surface water bodies or features located on the Property or adjacent to the Property. The closest water body is Rambo Creek located approximately 75 m northeast of the Property. The approximate depth to stabilized groundwater table based on water levels recorded within the monitoring wells located on the Property is approximately Elev. 85.1± mASL (2.7 ± metres below existing grade). Locally groundwater is expected to flow to the southeast towards Rambo Creek and Lake Ontario, regionally groundwater is expected to flow south/southeast towards Lake Ontario. Storm water is expected to drain towards the catch basins located on the municipal roads adjacent to the Property and towards the catch basins located on the parking lot at the Property.

4.3 Site Geology and Hydrogeology

The following stratigraphy is based on the borehole findings, as well as the geotechnical laboratory testing conducted on selected representative soil samples.

In general, three (3) main stratigraphic units were encountered in the boreholes during the investigation. The geological thicknesses and geological elevations as provided on the borehole logs are presented below in Table 4-1 and Table 4-2, respectively.

Table 4-1- Geological Unit Thicknesses

Borehole	BH104	BH105	BH106	BH107	BH108
	Thickness (m)	Thickness (m)	Thickness (m)	Thickness (m)	Thickness (m)
Fill	2.1	1.5	1.3	1.3	1.3
Native Soil	0.7	1.1	1.5	1.5	1.5
Bedrock	15.5*	-	15*	15.1*	0.3*

* Bedrock extended beyond the vertical depth of the investigation.

Table 4-2- Geological Unit Elevations

Elevation (m)					
Borehole	**BH104**	**BH105**	**BH106**	**BH107**	**BH108**
Fill	87.2-85.1	87.6-86.1	87.5-86.2	87.6-86.3	87.5-86.2
Native	85.1-84.4	86.1-85.0	86.2-84.7	86.3-84.8	86.2-84.7
Bedrock	84.4-68.9*	-	84.7-69.7*	84.8-69.7*	84.7-84.4*

* Bedrock extended beyond the vertical depth of the investigation.

Groundwater was found to be between elevations of about 82.8 and 85.1 mASL . Groundwater contours are shown on Figure 4.

4.4 Subsurface Investigation

The Terraprobe field investigation involved advancing five (5) boreholes (BH104 to BH108) as part of the concurrent Geotechnical Investigation and Phase Two Environmental Site Assessment at the Property from January 22, 2019 to January 25, 2019 to depths of ranging from approximately 2.6 to 18.5 ±m below grade (Elev. 85.0 to 69.7 ± mASL). The borehole and rock coring results are recorded on the borehole and rock core logs provided in Appendix A, and a summary of the geotechnical laboratory tests results, which include the grain size analysis, are provided in Appendix B. The borehole locations were surveyed by Terraprobe for horizontal coordinates and geodetic elevations with a Trimble R10 Receiver connected to the Global Navigation Satellite System and the Can-Net Virtual Reference Station Network and via a level survey relative to geodetic datum (NAD 83). These elevations are provided for the purpose of relating borehole stratigraphy and should not be used or relied on for other purposes. Borehole locations are shown on Figure 2.

All boreholes were outfitted with 50 mm diameter monitoring wells. Stabilized groundwater levels as they pertain to the proposed excavation were observed in the monitoring wells. In situ permeability (rising head) testing was conducted at three locations in monitoring wells BH104, BH106 and BH107.

4.4.1 Soil

The following stratigraphy is based on the Terraprobe's borehole findings, as well as the geotechnical laboratory testing conducted on selected representative soil samples. It should be noted that the subsurface conditions are confirmed at the borehole locations only, and may vary at other locations. The boundaries between the various strata represent an inferred transition rather than a precise plane of geological change. This summary is intended to correlate the data to assist in the interpretation of the subsurface conditions at the Property. For more specific subsurface details, refer to the enclosed Terraprobe Borehole Logs in Appendix A and a summary of the geotechnical laboratory test results in Appendix B.

Borehole elevations and coordinates are provided relative to geodetic datum (NAD 83). The horizontal coordinates are reported relative to the Universal Transverse Mercator geographic coordinate system (UTM Zone 17T). The elevation of the boreholes on the Property was surveyed using a level survey.

The following discussion has been simplified in terms of the major soil strata for the purposes of geotechnical design. In general, the boreholes encountered asphalt pavement and fill, overlying glacial till and weathered shale bedrock.

Surficial and Earth Fill Materials

At surface, Boreholes 104 to 107 encountered a pavement structure consisting of 50 to 120 mm of asphalt overlying 50 to 260 mm of aggregate. Borehole 108 encountered 150 mm of concrete slab.

Underlying the pavement structure and surficial material, earth fill was encountered in all the boreholes extending to a depth of 1.5 to 2.3 m below grade (Elev. 85.1 to 86.3 mASL). The earth fill consists of clayey silt to sandy silt with trace to some gravel. Trace rock fragments, trace asphalt, trace wood fragments and trace brick fragments were also observed. The fill typically brown to dark brown, and moist. Standard Penetration Test (SPT) results (N-Values) measured in the earth fill range from 2 to 34 blows per 300 mm of penetration, suggesting a soft/very loose to hard/compact state. The earth fill is, on average, stiff/compact.

Glacial Till (Halton Till)

Underlying the earth fill, a glacial till was encountered in all the boreholes at a depth of 1.5 to 2.3 m below grade (Elev. 85.1 to 86.3 mASL). The glacial till stratum extends to a depth of 2.0 to 3.0 m below grade (Elev. 84.4 to 85.5 mASL). The glacial till is composed of silt, some clay, trace sand, and trace gravel. It is typically reddish brown and moist. Standard Penetration Test (SPT) results (N-Values) measured in the sand range from 6 to over 50 blows per 300 mm of penetration, indicating a firm to hard consistency, on average hard.

Bedrock

Underlying the glacial till, bedrock was inferred in Borehole 108 by split spoon samples and auger resistance observation at a depth of about 3.0 m below grade (Elev. 84.7 ± mASL). This borehole was terminated within the inferred bedrock.

Bedrock was confirmed by rock coring in Boreholes 104, 106, and 107, at 3.1 to 3.3 m below grade (Elev. 84.1 to 84.7 ±mASL), and extended to the depth of the investigation at 18.0 to 18.5 m below grade (Elev. 68.9 to 69.7 ±mASL). Rock Core Logs are provided in Appendix A. Borehole 105 did not encounter bedrock as it was only for Phase Two ESA purposes and was terminated at 2.6 m below grade.

Borehole	Surface Elevation (m)	Top of Weathered (Zone II) Bedrock		Unweathered/Sound (Zone I) Bedrock		Method of Observation/Notes
		Depth (m)	Elevation (mASL)	Depth (m)	Elevation (mASL)	
104	87.4	3.0	84.4	3.5	83.9	Rock Coring
106	87.7	3.0	84.7	3.2	84.5	Rock Coring
107	87.8	3.0	84.8	3.6	84.2	Rock Coring
108	87.7	3.0	84.7	n/a*		Drilling observations, SPT samples

**rock coring not conducted*

A more detailed description of the bedrock is presented in Terraprobe's geotechnical report under separate cover (File No. 1-18-0718-02).

4.4.2 Groundwater Elevations

Groundwater level observations were made in the open boreholes during and after drilling, as noted on the borehole logs. A 50 mm diameter monitoring well was installed in each monitoring well to facilitate long-term groundwater monitoring. Figures 2 and 3 show the location of the monitoring wells included in the monitoring program.

Monitoring well installation details and groundwater measurements as shown on the Terraprobe Borehole Logs and are summarized in Table 4-3 as follows:

Table 4-3- Monitoring Well Installation and Ground Water Level Details

Well ID	BH104		BH105		BH106		BH107		BH108	
Well Depth (mbgs)	18.5		2.3		18.0		18.1		3.0	
Ground Elev. (mASL)	87.4		87.6		87.7		87.8		87.7	
Top of Screen (mASL)	72.0		86.9		72.8		72.8		86.2	
Bottom of Screen (mASL)	68.9		85.3		69.7		69.7		84.7	
Date	WL (mbgs)	Elev. (mASL)	WL (mbgs)	Elev. (mASL)	WL (mbgs)	Elev. (mASL)	WL (mbgs)	Elev. (mASL)	WL (mbgs)	Elev. (mASL)
February 8, 2019	3.4	84.0	Dry	N/A	11.4	76.3	4.3	83.5	Dry	N/A
February 21, 2019	3.6	83.8	Dry	N/A	4.9	82.8	-	-	-	-
March 15, 2019	3.3	84.1	Dry	N/A	4.5	83.2	4.3	83.5	Dry	N/A
March 22, 2019	3.2	84.2	Dry	N/A	4.5	83.2	4.1	83.7	2.6	85.1
April 14, 2019	3.2	84.2	Dry	N/A	4.4	83.3	4.2	83.6	2.6	85.1

A review of groundwater fluctuation within the monitoring wells indicates that groundwater level in deep monitoring wells, installed at depths between 18.0 and 18.5 mbgs within the bedrock, ranges from 3.2 mbgs (84.2 mASL) at BH104 to 4.9 mbgs (82.8 mASL) at BH106 over the monitoring period. Considering the ground water flow pattern in the deep wells it is anticipated that ground water flows in a north to northwesterly direction.

The groundwater levels within the shallow monitoring well installed within the silt till is 2.6 mbgs (85.1 mASL) at BH108. BH105 did not produce water over the monitoring period.

The till found beneath the earth fill/reworked native material contains a relatively high percentage of fine materials and, as such, is considered to be of low permeability and will allow minimal volumes of water to flow into the hydrogeological strata. The Queenston Formation (shale bedrock) is generally considered to be of low permeability due to the general lack of voids within sound bedrock. However, it should be noted that weathered portion of the Queenston Formation may be highly fractured, increasing the permeability of the unit.

Construction dewatering at adjacent sites, existing building drains and/or dewatering systems may cause significant changes to the depth of the groundwater table over time. Groundwater levels may also fluctuate over time and seasonally depending on the amount of precipitation and surface runoff.

4.4.3 Groundwater Quality

One (1) set of groundwater samples was collected by Terraprobe and analysed for the City of Burlington and Region of Halton sewer use by-law parameters. The sample was collected directly from the monitoring well MW107 (from borehole BH107). The sample was compared to the following:

- Regional Municipality of Halton By-Law No. 2-03 Section 4 Table 1 - Limits for Sanitary and Combined Storm Sewer Discharge
- Regional Municipality of Halton By-Law No. 2-03 Section 5 - Storm Sewer Requirements
- The City of Burlington By-Law No. 086-2002 - Limits for Storm Sewer Discharge

The sample (SW-UF-MW107) collected from monitoring well MW107 **met** the Limits for the **Halton Sanitary and Combined Sewer Discharge By-Law** for the parameters analyzed.

The sample (SW-UF-MW107) collected from monitoring well MW107 **met** the Limits for the **Halton Storm Sewer Discharge By-Law** for the parameters analyzed.

The sample (SW-UF-MW107) collected from monitoring well MW107 **exceeded** the Limits for the **Burlington Storm Sewer** for Chloroform, Total Suspended Solids, Copper, Manganese, Phosphorus, and Zinc.

Updated ground water analyses are required as the current results are dated February 2019. The full Certificate of Analysis is presented in Appendix C.

4.4.4 Aquifer Performance Tests

The hydraulic conductivities from Terraprobe's monitoring wells were determined based on the rising water level recovery of the monitoring well (rising head test). This test involves the rapid removal of water from a single well and monitoring the water level recovery. The results of the rising head tests were analysed using the Bouwer and Rice method (1976). The results of the analysis are presented in Appendix D. The hydraulic conductivities of the strata applicable to the Property are as follows (Table 4-4):

Table 4-4- A Summary of Hydraulic Conductivity Test Results

Monitoring Well	Well Screen Elevation (mASL)	Strata Screened Within	Hydraulic Conductivity (rising head test, m/s)
BH104	68.9 -72.0	Queenston Formation bedrock	1.78×10^{-7}
BH106	69.7-72.8	Queenston Formation bedrock	2.28×10^{-8}
BH107	69.7-72.8	Queenston Formation bedrock	1.56×10^{-8}

The horizontal hydraulic conductivities of the wells from the rising head tests were used for the water taking calculations. The values used at the Property for the calculations with regards to the shale bedrock are:

- Shale bedrock: 1.78×10^{-7} m/s

The hydraulic conductivity field results are relatively consistent with the published values associated with the geological materials which were tested.

5.0 DISCUSSION AND ANALYSIS

5.1 Summary of Hydrogeological Conditions

The results of the investigation completed by Terraprobe indicate the following hydrogeologic features for the Property:

- The highest groundwater elevation for the Property is approximately Elev. 85.1 ±mASL and is located in the silt glacial till (Halton Till).
- Based on a review of the data collected from the rising head tests performed at the Property, the hydraulic conductivity of the bedrock applicable to the Property is approximately 1.78 x 10^{-7} m/s.

5.2 Summary of Shoring Design Recommendations

A review of the geotechnical investigation report, prepared by Terraprobe, File No. 1-18-0718-02, dated April 22, 2019 indicates the excavations will be supported using conventional soldier pile and lagging walls. The east wall of the excavation must be constructed as a rigid shoring system to preserve the integrity and support of the soil beneath existing foundations of the adjacent buildings, in a state approximating the at-rest condition. This is to be achieved using continuous interlocking caisson wall shoring.

5.3 Proposed Development Plan

It is understood that it is intended to redevelop the Property with a 25-storey mixed use commercial/residential building with main floor commercial space and residential units above. The building will rest on a 4-level underground parking structure. The underground parking structure will occupy an area of approximately 2,390 m^2. The lowest finished floor elevation (FFE) for P4 is expected to be about 13 m below grade (Elev. 74.8± mASL) and will be set within the bedrock. It is expected that foundations will extend nominally 0.5 m deeper than the lowest FFE indicated above.

It is the understanding of Terraprobe that the relevant construction elevations for the proposed development options are approximately:

P4-Level Assumed Bulk Excavation Elevation ..... 74.3± mASL

It is understood that a shoring system has not been determined at this time. For the purposes of this assessment it is assumed that a permeable (i.e. lagging wall) shoring system will be used along the north, south and west walls of the underground structure during construction. It is assumed that the east wall of the excavation will consist of a continuous interlocking caisson wall to preserve the integrity and support of the soil beneath existing foundations of the adjacent buildings.

The estimated area requiring drainage is:

P4 Option Excavation Area ..... Approximately 47.3 x 50.6 m

5.4 Short-Term Groundwater Control Requirements (Construction Dewatering)

Excavations for footings will be approximately 10.8 m below the groundwater table within the P4 excavation. Dewatering the foundation excavations for the P4-level will penetrate the groundwater table, which will yield free-flowing water.

A numerical analysis was conducted utilizing computer software (Slide 7.014, released March 30, 2016, developed by Rocscience Inc.), utilizing the finite element modelling method. The finite element model (FEM) for groundwater seepage indicates the short term (construction) dewatering requirements as provided below. The finite element model results are presented in Appendix E.

Should the excavation ever be exposed to the elements, storm water will have to be managed. The short term control of groundwater should take into account storm water management from rainfall events. A dewatering system should be designed to take into account removal of rainfall from the excavation. According to O. Reg. 63/16, a plan for discharge must consider the conveyance of storm water from a 100-year storm event. The collection system should also account for a typical 2-year design storm event. Significant rainfall events have the ability to generate:

- An additional 60,000 L/day on the Property during a 2-year storm event (see tables below)
- An additional 224,978 L/day on the Property during a 100-year storm event

The complete short term (construction) dewatering estimates for the Property are as follows (Table 5-1):

Table 5-1- A Summary of Estimated Short-Term Dewatering Flow Rates

Groundwater Quantity: Short Term (Construction) – Safety Factor of 1.5 Used (Groundwater only)						
Location	**Groundwater Seepage**		**2-Year Rainfall Event**		**Total Volume**	
	L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
25 Storey High-Rise Building at 535 - 551 Brant Street	11,500	8.0	60,000	41.7	**71,500**	**49.7**

*A safety factor of 1.5 has been applied to groundwater seepage estimates

An EASR Posting **will** be required for the construction activities for the Site as the total water takings, including both storm water events and groundwater seepage, are greater than 50,000 L/day but less than 400,000 L/day.

If water (storm water, groundwater or a combination of both) is discharged into the City and/or Region sewer system during construction activities, a Discharge Agreement for construction **will** have to be obtained from the City and/or Region.

Localized dewatering will be required of any protrusions extending below the highest noted groundwater elevation at the Property during construction activities.

5.5 Long-Term Groundwater Control Requirements (Post-Construction)

The subfloor drainage layer of the proposed excavation options will extend to approximate elevation of 74.3± mASL, which is approximately 10.8± m below the highest stabilized groundwater table at the Property (Elev. 85.1± mASL) for the P4 level underground parking garage.

A permanent drainage system (weepers) may be laid below the underside of the lowest parking level to account for seasonal increases in the groundwater elevation. The FEM for groundwater seepage indicates the long-term (post-construction) drainage requirements as provided below. The finite element model results are presented in Appendix E.

Any surficial asphalt degradation in areas above and adjacent to the perimeter of the parking structure may be susceptible to infiltration from storm events in the long term. As a result, the Property may incur additional seepage into the perimeter drainage board.

The complete long-term (post-construction) drainage estimates for the Property are as follows (Table 5-2):

Table 5-2- Summary of Estimated Long-Term Foundation Drainage

Groundwater Quantity: Long Term (Post-Construction) – Safety Factor of 1.5 Used (Groundwater only)						
Location	**Groundwater Seepage**		**Infiltration (2-Year Rainfall Event)**		**Total Volume**	
	L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
25 Storey High-Rise Building at 535 - 551 Brant Street	13,000	9.0	3,000	2.1	**16,000**	**11.1**

*A safety factor of 1.5 has been applied to all seepage estimates

A long term PTTW **will not** be required at this Site.

If the redevelopment has a subfloor drainage system (weeper system) that is connected to the City and/or Region sewers, a Discharge Agreement **will** have to be obtained from the City and/or Region.

5.6 Assessment of Potential Impacts

5.6.1 Short Term Discharge of Pumped Groundwater (Construction Dewatering)

The flow from the groundwater control system could be directed towards the local sewer. The dewatering system must be appropriately filtered in order to prevent the pumping of fines and loss of ground during the drainage activities. The groundwater quality sample collected as part of this investigation met the Halton Sanitary and Combined sewer discharge limits and the Halton Storm requirements. Updated ground water analyses are required as the current results are dated February 2019. The water quality of the discharged water must comply with the City of Burlington's and Region of Halton Sewer Use By-law.

Sampling of the discharge water from the dewatering system is required during initial discharge and on and on-going basis, as required, during active dewatering activities. Visual monitoring of the dewatering discharge should be conducted daily. Adjustments to the dewatering system should be made if an increase in turbidity or sediment is noted. The dewatering system must be designed by a dewatering contractor and dewatering must occur prior to excavation.

If water (storm water, groundwater or a combination of both) is discharged into the Region and/or City sewer system during construction activities, a Discharge Agreement for construction **will** have to be obtained from the Region and/or City.

5.6.2 Long Term Discharge of Pumped Groundwater (Post-Construction)

If the building is to be a drained structure, a permanent dewatering system would be required. Taking into account seepage from rainfall events, the following groundwater taking rate is possible:

- P4-Level Underground Parking Garage – 11.1 L/min

This estimate takes into account both groundwater seepage and storm water collected into the perimeter drainage system as a result of long-term degradation.

To reduce potential flows into the local sewer system, consideration should be given to reuse of the groundwater on the property or waterproofing the structure. Any discharge to the sewer system must comply with the City of Burlington`s Storm Sewer Use By-law and Region of Halton Sanitary and Combined Sewer Use By-Law. If the local sewers do not have the required capacity then the buildings must be waterproofed structures.

If the redevelopment has a subfloor drainage system (weeper system) that is connected to the City sewers, a Discharge Agreement **will** have to be obtained from the City.

5.6.3 Zone of Influence (ZOI)

The Zone of Influence (ZOI) was calculated based on the estimated groundwater taking rate and the average hydraulic conductivity recorded at the Property.

The native stratigraphy with water at the Property consists of Queenston Formation bedrock. The ZOI (also known as Radius of Influence or R_0 Calculation) was calculated for the Property. (See calculations below).

Zone of Influence (also known as Radius of Influence or R_0) Calculation:

Equation: $R_0 = 3000*dH*K^{0.5}$

Where:

dH is the dewatering thickness (m) considering 1 ±mASL for dry and safe excavation

K is the hydraulic conductivity (m/s)

The ZOI for the Property during construction (short term) is:

$R_0 = 3000*11.8\ m*1.78 \times 10^{-7}\ m/s^{0.5}$

$R_0 = 15\ m$

5.6.4 Geotechnical Considerations

Geotechnical considerations with respect to the proposed development are discussed in Terraprobe's geotechnical reports:

- "*Geotechnical Engineering Report*", 535 – 551 Brant Street, Burlington, Ontario, dated April 22, 2019 prepared by Terraprobe Inc. (Reference 1-18-0718-02)

Estimated ZOI could extend to approximately 15 m away from the proposed excavated area for proposed P4-level underground parking garage. Based on the investigated soil and rock conditions observed at the borehole locations, there is no technical impediment to the use of a drained foundation design approach at this site. There is no soil or rock strata on this site that will change volume significantly in response to drainage. Negligible ground settlement within the ZOI is anticipated.

5.6.5 Surface Water, Wetlands and Areas of Natural Significance

There are no surface water bodies or features located on the Property or adjacent to the Property. The closest water body is Rambo Creek located approximately 75 m northeast of the Property. Estimated ZOI could extend to approximately 15 m away from the proposed excavated area for proposed P4. There are no records for any natural features or surface water within the conceptual zone of influence.

5.6.6 Local Wells and Zone of Influence

The Property is located in a serviced area of the City of Burlington. The Property and surrounding area are provided with municipal water and sewer services. The MECP well records database was searched through the MECP online Water Well Database for records located on the Property and in the Study Area (within 500 m). No domestic water supply wells were located on the Property or on properties immediately adjacent to the Property. No domestic water supply wells are located within a 500 m radius of the Property. There is no use of the groundwater for water supply in this area of Burlington. All wells located on the Property or within the 500 m study area were identified in the well records as monitoring

wells. All MECP wells within the 500 m study area are shown on Figure 5. The MECP well record data is provided in Appendix F.

5.6.7 Contamination Sources

The Property and immediately surrounding area currently consists of mixed residential and commercial areas. Adjacent commercial uses included a commercial plaza and a restaurant. No Records of Site Conditions (RSCs) have been filed for the Property. It is noted that a Phase One Environmental Site Assessment and a Draft Phase Two Environmental Site Assessment has been completed for this Site. The Phase One ESA entitled, "Draft Phase One Environmental Site Assessment *535-551 Brant Street, Burlington, Ontario*" and dated April 12, 2019, File No. 1-18-0718-41" and the Phase Two ESA entitled "Phase Two Environmental Site Assessment *535-551 Brant Street, Burlington, Ontario*" and dated April 2020, File No. 1-18-0718-42, have been provided under a separate cover. Based on the conclusions of the Phase Two ESA, soil and groundwater exceedances of the applicable MECP site condition standards were noted for the parameters analyzed.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions of Terraprobe's investigation are as follows:

Proposed Development Conditions				
Development	**Above Grade Levels**	**Below Grade Levels**		
		Level #	**Lowest Finished Floor**	
			Depth (m)	**Elevation (mASL)**
25 Storey High Rise Building at 535 - 551 Brant Street	25	4 levels	13.0	74.8

In general, three main stratigraphic units were encountered at the Property which consisted of:

Site Stratigraphy			
Stratum/Formation	**Depth Range (mbgs)**	**Elevation Range (mASL)**	**Hydraulic Conductivity (m/s)**
Earth Fill	1.5 to 2.3	85.1 to 86.3	1×10^{-6}*
Silt Glacial Till	2.6 to 3.0	84.4 to 85.0	1×10^{-7}*
Shale bedrock	3.0 to 18.5	68.9 to 69.7	1.78×10^{-7}**

*Indicates conductivity was estimated using typical published values from Freeze and Cherry (1979)
**Indicates conductivity was estimated from a rising head test

The groundwater conditions at the Property are as follows:

Groundwater Conditions		
Groundwater Elevation (mASL)	85.1	
Zone of Influence (m)	15 m	
Groundwater Quality		
Sample ID	**Region of Halton Sanitary and Combined Sewer By-Law**	**Region of Halton Storm Sewer By-Law**
Untreated Groundwater (SW-UF-MW107)	Meets	Meets
Groundwater Treatment Required	No	No

Groundwater Control

The water taking requirements for groundwater control at the Property are:

Groundwater Quantity: Short Term (Construction) – Safety Factor of 1.5 Used (Groundwater only)						
Location	**Groundwater Seepage**		**2-Year Rainfall Event**		**Total Volume**	
	L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
25 Storey High Rise Building at 535 - 551 Brant Street	11,500	8.0	60,000	41.7	**71,500**	**49.7**

The water taking requirements for groundwater control for long term (post-construction) at the Property are:

Groundwater Quantity: Long Term (Post-Construction) – Safety Factor of 1.5 Used (Groundwater only)						
Location	**Groundwater Seepage**		**Infiltration (2-Year Rainfall Event)**		**Total Volume**	
	L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
25 Storey High Rise Building at 535 - 551 Brant Street	13,000	9.0	3,000	2.1	**16,000**	**11.1**

Regulation Requirements	
Environmental Activity and Sector Registry (EASR) Posting	Required
Short Term Permit to Take Water (PTTW)	Not Required
Long Term Permit to Take Water (PTTW)	Not Required

- It is anticipated that design changes will be made to the current proposed development plan which will affect the results of the hydrogeological investigation. Upon the finalization of a redevelopment design plan it is recommended that Terraprobe update the preliminary hydrogeological investigation to reflect the final design concept.

- If water (storm water, groundwater or a combination of both) is discharged into the City and/or Region sewer system during construction activities, a Short Term Discharge Agreement for construction will have to be obtained from the City and/or Region. Updated ground water analyses are required as the current results are dated February 2019.

- If the redevelopment has a subfloor drainage system (weeper system) that is connected to the City or Region sewers, a Long Term Discharge Agreement will have to be obtained from the City and/or Region.

- Localized dewatering will be required of any protrusions extending below the highest noted groundwater elevation at the Property during construction activities. Waterproofing of these protrusions will be required in the long term.

7.0 SIGNATURES

We trust this report meets with your requirements. Should you have any questions regarding the information presented, please do not hesitate to contact our office.

Yours truly,

Terraprobe Inc.

PROFESSIONAL GEOSCIENTIST
April 28, 2020
STEPHEN J. HODGSON
PRACTISING MEMBER
0325
ONTARIO

Teresa Weatherhead, LEL
Project Manager

Stephen Hodgson, P.Geo., QP$_{ESA}$
Senior Hydrogeologist

8.0 REFERENCES

1- Grinstone Creek, Sixteen Mile Creek and Supplemental Monitoring, 2015, Halton Region Conservation Authority.

2- The Physiography of Southern Ontario (Third Edition), L. J. Chapman and D. F. Putnam, 1984.

3- Geological Survey. Ontario Geological Survey (OGS), 2003. Surficial Geology of Southern Ontario. Miscellaneous Release – Data 128 – revised.

4- Geological Survey. Ontario Geological Survey (OGS), 2007. Bedrock Geology of Ontario. Miscellaneous Release – MRD 219.

5- Terraprobe Inc., April 22, 2019. *Geotechnical Engineering Report, 535-551 Brant Street, Burlington, Ontario.* Project 1-18-0718-02.

6- Terraprobe Inc., October 23, 2019. *Phase Two Environmental Site Assessment, 535-551 Brant Street, Burlington, Ontario.* Project 1-18-0718-42.

9.0 LIMITATIONS OF LIABILITY

This report was prepared at the request of, and for the exclusive use of Renimmob Properties Limited and its affiliates ("the Intended User") is intended to provide an assessment of the hydrogeological conditions of the Property located at 535-551 Brant Street, City of Burlington, Ontario ("the Property"). No one other than the Intended User has the right to use and rely on the work without first obtaining the written authorization of Terraprobe Inc. and Renimmob Properties Limited.

Terraprobe Inc. expressly excludes liability to any party except the Intended User for any use of, and/or reliance upon, the work. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Terraprobe Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report, including consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The assessment should not be considered a comprehensive audit that eliminates all risks of encountering hydrogeological problems. The information presented in this report is based on information collected during the completion of the hydrogeological study by Terraprobe Inc. It was based on the conditions on the Property at the time of the hydrogeological study by a review of historical information and field investigation to assess the hydrogeological conditions of the Property, as reported herein.

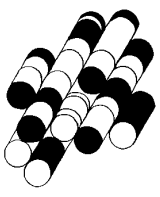
There is no warranty expressed or implied by this report regarding the hydrogeological conditions for the Property. Professional judgement was exercised in gathering and analysing information collected by reviewing previous reports, data provided by government and are open to public and field work investigation. The conclusions presented are the product of professional care and competence, and cannot be construed as an absolute guarantee.

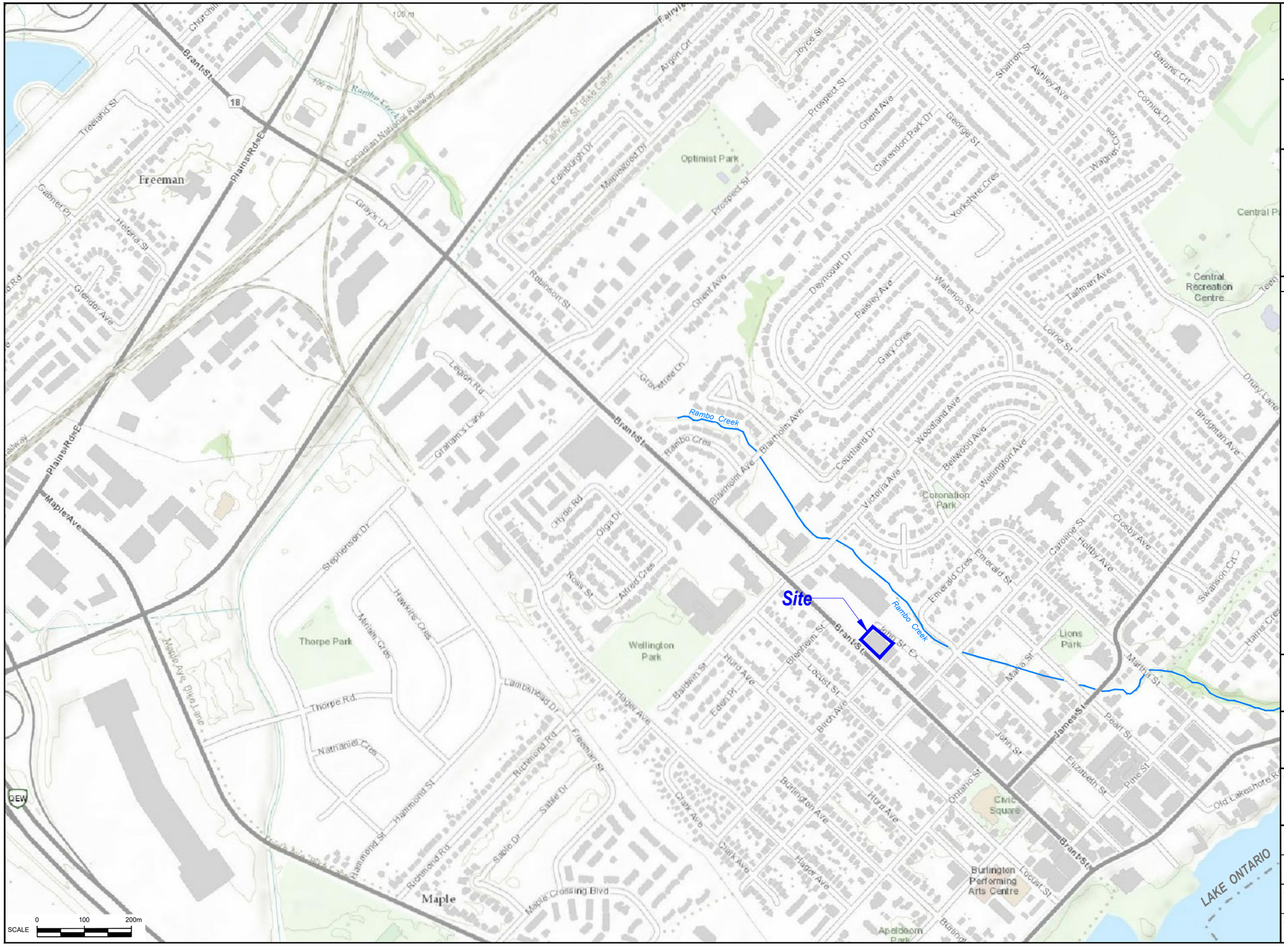
In the event that during future work new information regarding the hydrogeological conditions of the Property is encountered, or in the event that the outstanding responses from the regulatory agencies indicate outstanding issues on file with respect to the Property, Terraprobe Inc. should be notified in order that we may re-evaluate the findings of this assessment and provide amendments, as required.

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FIGURES

TERRAPROBE INC.





Terraprobe Inc.
Consulting Geotechnical & Environmental Engineering
Construction Materials, Inspection & Testing
11 Indell Lane - Brampton Ontario L6T 3Y3 (905) 796-2650

Reference:
Explore Burlington 2018

Notes:

Legend:

Site Boundary

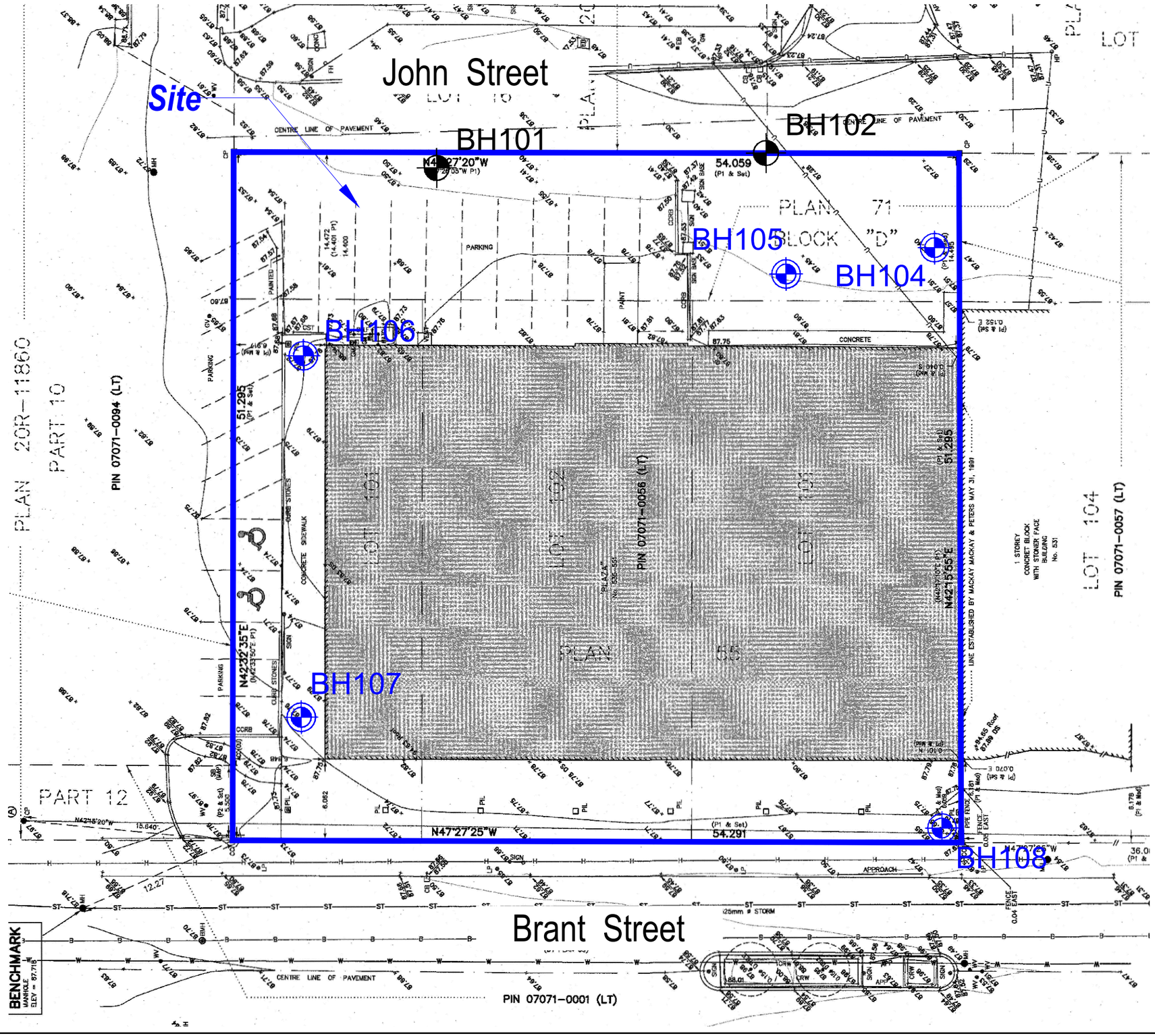
Project Title:
Hydrogeological Assessment

Site Location:
535 to 551 Brant Street, Burlington, Ontario

Figure Title:
SITE LOCATION PLAN

Designed By: TW	***File No.:*** 1-18-0718-46
Drawn By: AA	***Scale:*** As Shown
Reviewed By: SH	***Figure No.:*** 1
Date: April 2020	

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Terraprobe Inc.
Consulting Geotechnical & Environmental Engineering
Construction Materials, Inspection & Testing
11 Indell Lane - Brampton Ontario L6T 3Y3 (905) 796-2650

Reference:
Google Earth Pro 2018

Notes:

Legend:

- Site Boundary
- Approximate Borehole with Monitoring Well Location
- Approximate Geotechnical Pavement Investigation Borehole Location
- Approximate Cross Section Location

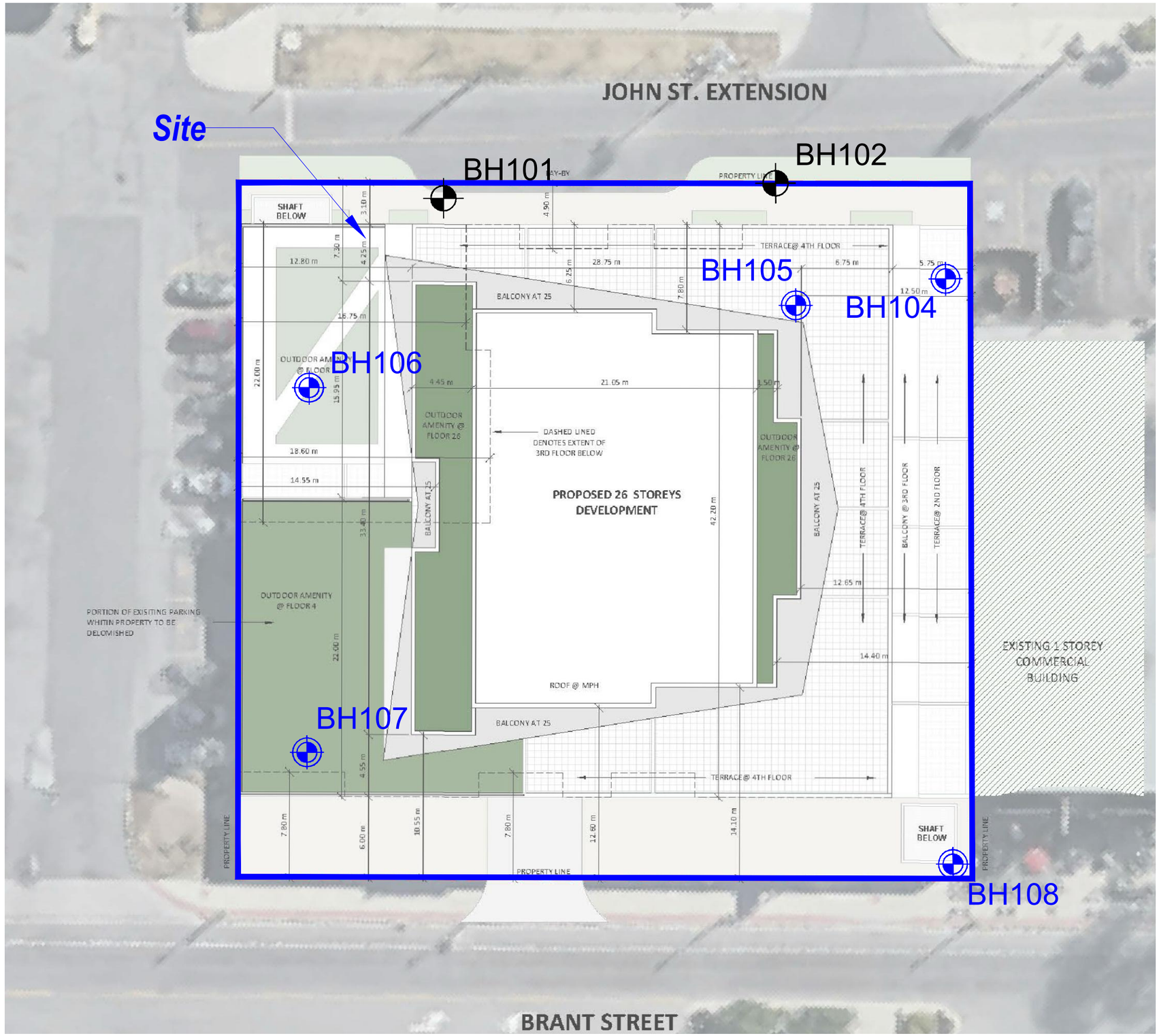
Project Title:
Hydrogeological Assessment

Site Location:
535 to 551 Brant Street, Burlington, Ontario

Figure Title:
MONITORING WELL LOCATION
PLAN- EXISTING CONDITION

Designed By: TW	*File No.:* 1-18-0718-46
Drawn By: AA	*Scale:* As Shown
Reviewed By: SH	*Figure No.:* 2
Date: April 2020	

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11 Indell Lane - Brampton Ontario L6T 3Y3 (905) 796-2650

Reference:
Site Plan
535-551 Brant Street, Burlington, ON
Dwg No: A1.02
Project No: 18.069
By: Turner Fleischer

Notes:

Legend:

- Site Boundary
- Approximate Borehole with Monitoring Well Location
- Approximate Geotechnical Pavement Investigation Borehole Location
- Approximate Cross Section Location

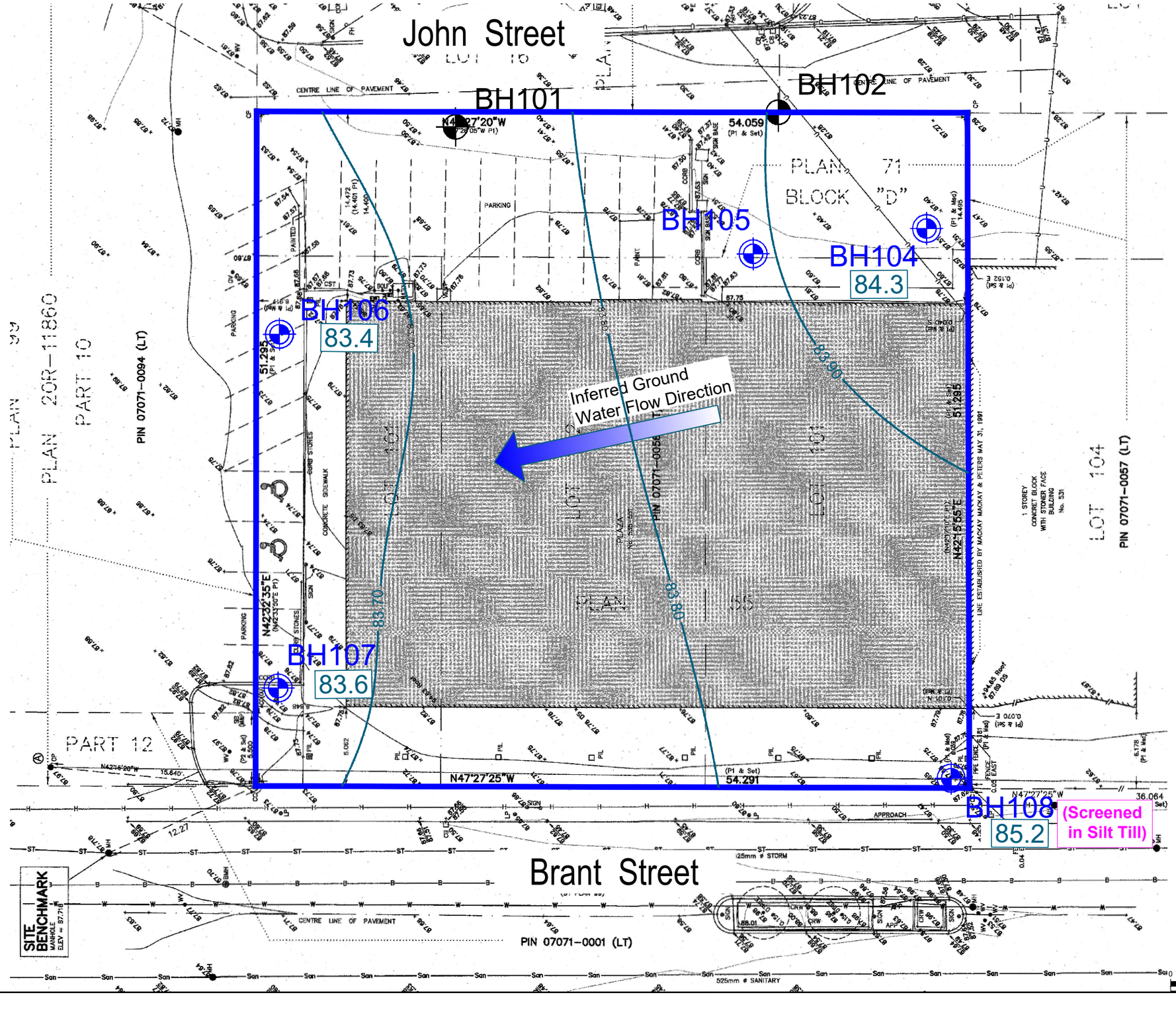
Project Title:
Hydrogeological Assessment

Site Location:
535 to 551 Brant Street, Burlington, Ontario

Figure Title:
MONITORING WELL LOCATION PLAN- PROPOSED CONDITION

Designed By: TW	***File No.:*** 1-18-0718-46
Drawn By: AA	***Scale:*** As Shown
Reviewed By: SH	***Figure No.:*** 3
Date: April 2020	

\\192.168.1.4\tas\1-Project Files\2018\1-18-0718 - 535 - 551 Brant Street, Burlington\46- Hydro-GA\ Dwgs, Logs\AutoCAD\1-18-0718-42 Phase Two April 2020.dwg, sanghania



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Construction Materials, Inspection & Testing
11 Indell Lane - Brampton Ontario L6T 3Y3 (905) 796-2650

Reference:
Google Earth Pro 2018

Notes:

Legend:

- Site Boundary
- Approximate Borehole with Monitoring Well Location
- Approximate Geotechnical Pavement Investigation Borehole Location
- 84.3 — Ground Water Elevation (masl), April 14, 2019
- 83.9 — Ground Water Elevation Contour
- Ground Water Flow Direction

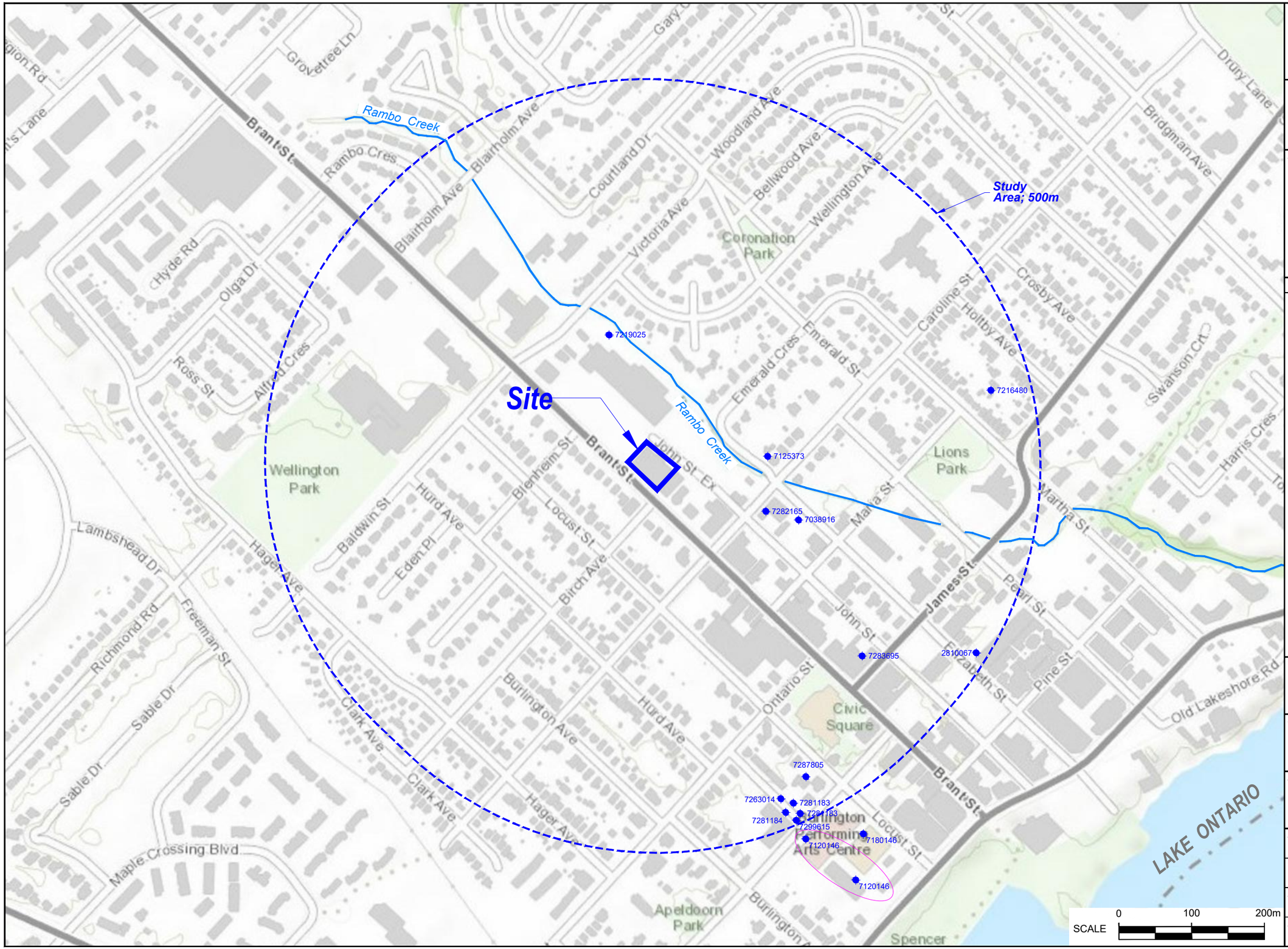
Project Title:
Hydrogeological Assessment

Site Location:
535 to 551 Brant Street, Burlington, Ontario

Figure Title:
GROUND WATER ELEVATIONS
(Bedrock Aquifer)

Designed By: TW	***File No.:*** 1-18-0718-46
Drawn By: AA	***Scale:*** As Shown
Reviewed By: SH	***Figure No.:*** 4
Date: April 2020	

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Consulting Geotechnical & Environmental Engineering
Construction Materials, Inspection & Testing
11 Indell Lane - Brampton Ontario L6T 3Y3 (905) 796-2650

Reference:
Explore Burlington 2018

Notes:

Legend:

- Site Boundary
- Study Area; 500m
- Approximate MECP Well Location

Project Title:
Hydrogeological Assessment

Site Location:
535 to 551 Brant Street, Burlington, Ontario

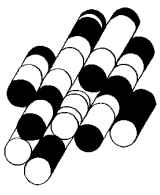
Figure Title:
MECP WELL LOCATION PLAN

Designed By: TW	***File No.:*** 1-18-0718-46
Drawn By: AA	***Scale:*** As Shown
Reviewed By: SH	***Figure No.:*** 5
Date: April 2020	

\\192.168.1.4\tas1\Project Files\2018\1-18-0718 - 535 - 551 Brant Street, Burlington\4B- Hydro-GA, Dwgs, Logs\AutoCAD\1-18-0718-42 Phase Two April 2020.dwg, asinghania

APPENDIX A

TERRAPROBE INC.



LOG OF BOREHOLE 104

Terraprobe

Project No. : 1-18-0718	Client : Carriage Gate Homes	Originated by : TG
Date started : January 22, 2019	Project : 535-551 Brant Street	Compiled by : JK
Sheet No. : 1 of 2	Location : Burlington, ON	Checked by : MD

Position : E: 597190, N: 4798010 (UTM 17T) | Elevation Datum : Geodetic | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Hollow stem augers, HQ rock coring

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	87.4	**GROUND SURFACE**				
	87.2	80mm **ASPHALTIC CONCRETE**				
	0.2	80mm **AGGREGATE**				
		FILL, clayey silt, trace to some gravel, trace sand, trace asphalt, hard, red with grey and black pockets, moist		1	SS	34
1		...at 0.8 m, some sand, trace concrete, dark brown to black, firm		2	SS	5
		...at 1.5 m, brown with red staining		3	SS	6
2	85.1					
	2.3	**SILT**, some clay, trace sand, trace gravel, firm, reddish brown, moist (HALTON TILL)		4A	SS	6
		...at 2.6 m, silty clay, trace shale fragments		4B		
3	84.4					
	3.0	**INFERRED BEDROCK**, shale, red		5	SS	50 / 125mm
	84.1					
	3.3	**QUEENSTON FORMATION** (See rock core log for details)		1	RUN	
		...at 3.5 m, transition to sound bedrock		2	RUN	
4				3	RUN	
5				4	RUN	
6				5	RUN	
7				6	RUN	
8				7	RUN	
9						
10						
11						

Elevation Scale (m): 87, 86, 85, 84, 83, 82, 81, 80, 79, 78, 77, 76

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

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane — 40 80 120 160

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

Headspace Vapour (ppm):
- PID: <5
- PID: 5
- PID: 10
- PID: <5
- PID: <5
- PID: <5

Instrument Details: Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)

GR SA SI CL

SS1 Analysis:
M&I, DUP 1

SS2 Analysis:
PAH

SS3 Analysis:
VOC, PHC

17 11 47 25

4B Analysis:
M&I, PAH, VOC, PHC

(continued next page)

LOG OF BOREHOLE 104

Terraprobe

Project No. : 1-18-0718	Client : Carriage Gate Homes	Originated by : TG
Date started : January 22, 2019	Project : 535-551 Brant Street	Compiled by : JK
Sheet No. : 2 of 2	Location : Burlington, ON	Checked by : MD

Position : E: 597190, N: 4798010 (UTM 17T) | Elevation Datum : Geodetic | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Hollow stem augers, HQ rock coring

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
		(continued)				
12		**QUEENSTON FORMATION** (See rock core log for details) *(continued)*		7	RUN	
13				8	RUN	
14						
15				9	RUN	
16						
17				10	RUN	
18				11	RUN	
	68.9					
	18.5	**END OF BOREHOLE**				

Elevation Scale (m): 75, 74, 73, 72, 71, 70, 69

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

Undrained Shear Strength (kPa): 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

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

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Feb 8, 2019	3.4	84.1
Feb 21, 2019	3.6	83.9
Mar 15, 2019	3.3	84.2
Mar 22, 2019	3.2	84.2
Apr 14, 2019	3.2	84.3

file: 1-18-0718 bh logs.gpj

LOG OF BOREHOLE 105

Terraprobe

Project No.	: 1-18-0718	Client	: Carriage Gate Homes	Originated by	: TG
Date started	: January 25, 2019	Project	: 535-551 Brant Street	Compiled by	: JK
Sheet No.	: 1 of 1	Location	: Burlington, ON	Checked by	: MD

Position : E: 597175, N: 4798018 (UTM 17T) Elevation Datum : Geodetic

Rig type : Big Beaver 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	**87.6**	**GROUND SURFACE**					87	Dynamic Cone 10 20 30 40; Unconfined / Pocket Penetrometer / Field Vane / Lab Vane 40 80 120 160	Plastic Limit / Natural Water Content / Liquid Limit PL MC LL 10 20 30				GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
		50mm **ASPHALTIC CONCRETE**											
		50mm **AGGREGATE**											
1		**FILL**, clayey silt, trace to some sand, trace to some gravel, trace asphalt, trace wood fragments, trace rock fragments, stiff, reddish brown, moist		1	SS	9				PID: <5			14 22 46 18 SS1 Analysis: M&I
				2	SS	13	86			PID: <5			SS2 Analysis: PAH, VOC, PHC
	86.1 1.5	**SILT**, some clay, trace sand, trace gravel, very stiff, reddish brown, moist (HALTON TILL)		3	SS	28				PID: <5			SS3 Analysis: M&I, PAH, VOC, PHC
2		...at 2.3 m, trace shale fragments, hard, grey with red		4	SS	81 / 200mm	85			PID: <5			21 18 41 20
	85.0 2.6	**END OF BOREHOLE**											

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Feb 8, 2019	dry	n/a
Feb 21, 2019	dry	n/a
Mar 15, 2019	dry	n/a
Mar 22, 2019	dry	n/a
Apr 14, 2019	dry	n/a

file: 1-18-0718 bh logs.gpj

LOG OF BOREHOLE 106

Terraprobe

Project No. : 1-18-0718	Client : Carriage Gate Homes	Originated by : TG
Date started : January 23, 2019	Project : 535-551 Brant Street	Compiled by : JK
Sheet No. : 1 of 2	Location : Burlington, ON	Checked by : MD

Position : E: 597147, N: 4798038 (UTM 17T) | Elevation Datum : Geodetic | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Hollow stem augers, HQ rock coring

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
0	87.7	**GROUND SURFACE**				
	87.5 / 0.2	80mm **ASPHALTIC CONCRETE**				
		80mm **AGGREGATE**		1	SS	7
		FILL, sandy silt, trace gravel, trace asphalt, loose, brown to dark brown, moist		2	SS	7
1	86.2					
	1.5	**SILT**, some clay, trace sand, trace gravel, very stiff to hard, reddish brown, moist (HALTON TILL)		3	SS	24
2				4	SS	54
	84.7					
3	3.0			5	SS	50 / 125mm
	84.5 / 3.2	**INFERRED BEDROCK**, shale, red ...at 3.2 m, transition to sound bedrock				
		QUEENSTON FORMATION (See rock core log for details)		1	RUN	
4						
				2	RUN	
5						
6				3	RUN	
7						
				4	RUN	
8						
9				5	RUN	
10						
				6	RUN	
11						
				7	RUN	

Elevation Scale (m): 87, 86, 85, 84, 83, 82, 81, 80, 79, 78, 77, 76

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

Undrained Shear Strength (kPa) — 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): PID: <5 | PID: <5 | PID: <5 | PID: <5 | PID: <5

Instrument Details — Unstabilized Water Level

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

SS1 Analysis: PAH, DUP 2

SS2 Analysis: M&I, VOC, PHC

SS3 Analysis: M&I, PAH

0 10 74 16

SS4 Analysis: VOC, PHC

(continued next page)

LOG OF BOREHOLE 106

Terraprobe

Project No. : 1-18-0718	Client : Carriage Gate Homes	Originated by : TG
Date started : January 23, 2019	Project : 535-551 Brant Street	Compiled by : JK
Sheet No. : 2 of 2	Location : Burlington, ON	Checked by : MD

Position : E: 597147, N: 4798038 (UTM 17T) | Elevation Datum : Geodetic | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Hollow stem augers, HQ rock coring

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)
		SOIL PROFILE		SAMPLES			
12		*(continued)*					75
		QUEENSTON FORMATION (See rock core log for details) *(continued)*		7	RUN		
13							74
				8	RUN		
14							73
15				9	RUN		
							72
16							
							71
17				10	RUN		
	69.7						70
	18.0	**END OF BOREHOLE**					

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

Undrained Shear Strength (kPa) — 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

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

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Feb 8, 2019	11.4	76.4
Feb 21, 2019	4.9	82.8
Mar 15, 2019	4.5	83.2
Mar 22, 2019	4.5	83.3
Apr 14, 2019	4.4	83.3

LOG OF BOREHOLE 107

Terraprobe

Project No.	: 1-18-0718	Client	: Carriage Gate Homes	Originated by	: TG
Date started	: January 24, 2019	Project	: 535-551 Brant Street	Compiled by	: JK
Sheet No.	: 1 of 2	Location	: Burlington, ON	Checked by	: MD

Position : E: 597128, N: 4798019 (UTM 17T) | Elevation Datum : Geodetic | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Hollow stem augers, HQ rock coring

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	87.8	**GROUND SURFACE**				
	87.6	75mm **ASPHALTIC CONCRETE**				
	0.2	75mm **AGGREGATE**		1	SS	11
		FILL, clayey silt, sandy, trace to some gravel, trace asphalt, trace concrete fragments, trace brick, very loose/very soft to stiff/compact, black to dark brown, moist		2	SS	2
1	86.3					
	1.5	**SILT**, some clay, trace sand, trace gravel, very stiff to hard, reddish brown, moist (HALTON TILL)		3	SS	16
				4	SS	50 / 125mm
2	84.8					
	3.0	**INFERRED BEDROCK**, shale, red		5	SS	50 / 25mm
	84.7	**QUEENSTON FORMATION**		1	RUN	
	3.1	(See rock core log for details)				
3		...at 3.6 m, transition to sound bedrock				
				2	RUN	
4						
				3	RUN	
5						
				4	RUN	
6						
				5	RUN	
7						
				6	RUN	
8						
				7	RUN	
9						
10						
11						

Elevation Scale (m): 87, 86, 85, 84, 83, 82, 81, 80, 79, 78, 77, 76

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

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, 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

SS1 Analysis: M&I, PAH

SS2 Analysis: VOC, PHC

SS3 Analysis: M&I, PAH

SS4 Analysis: VOC, PHC

(continued next page)

LOG OF BOREHOLE 107

Terraprobe

Project No. : 1-18-0718	Client : Carriage Gate Homes	Originated by : TG
Date started : January 24, 2019	Project : 535-551 Brant Street	Compiled by : JK
Sheet No. : 2 of 2	Location : Burlington, ON	Checked by : MD

Position : E: 597128, N: 4798019 (UTM 17T) | Elevation Datum : Geodetic | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Hollow stem augers, HQ rock coring

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
12		*(continued)*				
		QUEENSTON FORMATION (See rock core log for details) *(continued)*		7	RUN	
13				8	RUN	
14						
15				9	RUN	
16				10	RUN	
17						
18	69.7			11	RUN	
	18.1	**END OF BOREHOLE**				

Elevation Scale (m): 75, 74, 73, 72, 71, 70

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

Undrained Shear Strength (kPa): 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

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

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Feb 8, 2019	4.3	83.5
Feb 21, 2019	dry	n/a
Mar 15, 2019	4.3	83.5
Mar 22, 2019	4.1	83.7
Apr 14, 2019	4.1	83.6

file: 1-18-0718 bh logs.gpj

LOG OF BOREHOLE 108

Terraprobe

Project No.	: 1-18-0718	Client	: Carriage Gate Homes	Originated by	: TG
Date started	: January 25, 2019	Project	: 535-551 Brant Street	Compiled by	: JK
Sheet No.	: 1 of 1	Location	: Burlington, ON	Checked by	: MD

Position : E: 597160, N: 4797980 (UTM 17T) Elevation Datum : Geodetic

Rig type : Big Beaver Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
	87.7	**GROUND SURFACE**				
0	87.5	150mm **PC CONCRETE**				
	0.2	**FILL**, sandy silt, trace gravel, trace rock fragments, loose to compact, dark brown, moist		1	SS	8
1				2	SS	10
	86.2					
	1.5	**SILT**, some clay, trace sand, trace gravel, hard, reddish brown, moist (HALTON TILL)		3	SS	39
2				4	SS	78 / 275mm
	84.7					
3	3.0	**INFERRED BEDROCK**, shale, red		5	SS	50 / 125mm
	84.4					
	3.3	**END OF BOREHOLE**				

Elevation Scale (m): 87, 86, 85

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

Undrained Shear Strength (kPa): 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

SS1 Analysis: M&I

SS2 Analysis: PAH, VOC, PHC

SS3 Analysis: M&I

0 14 73 13

SS4 Analysis: PAH

SS5 Analysis: VOC, PHC, DUP 3

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

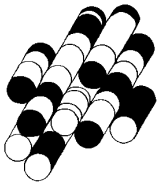
WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Feb 8, 2019	dry	n/a
Feb 21, 2019	2.8	85.0
Mar 15, 2019	dry	n/a
Mar 22, 2019	2.6	85.2
Apr 14, 2019	2.6	85.2

file: 1-18-0718 bh logs.gpj

APPENDIX B

TERRAPROBE INC.



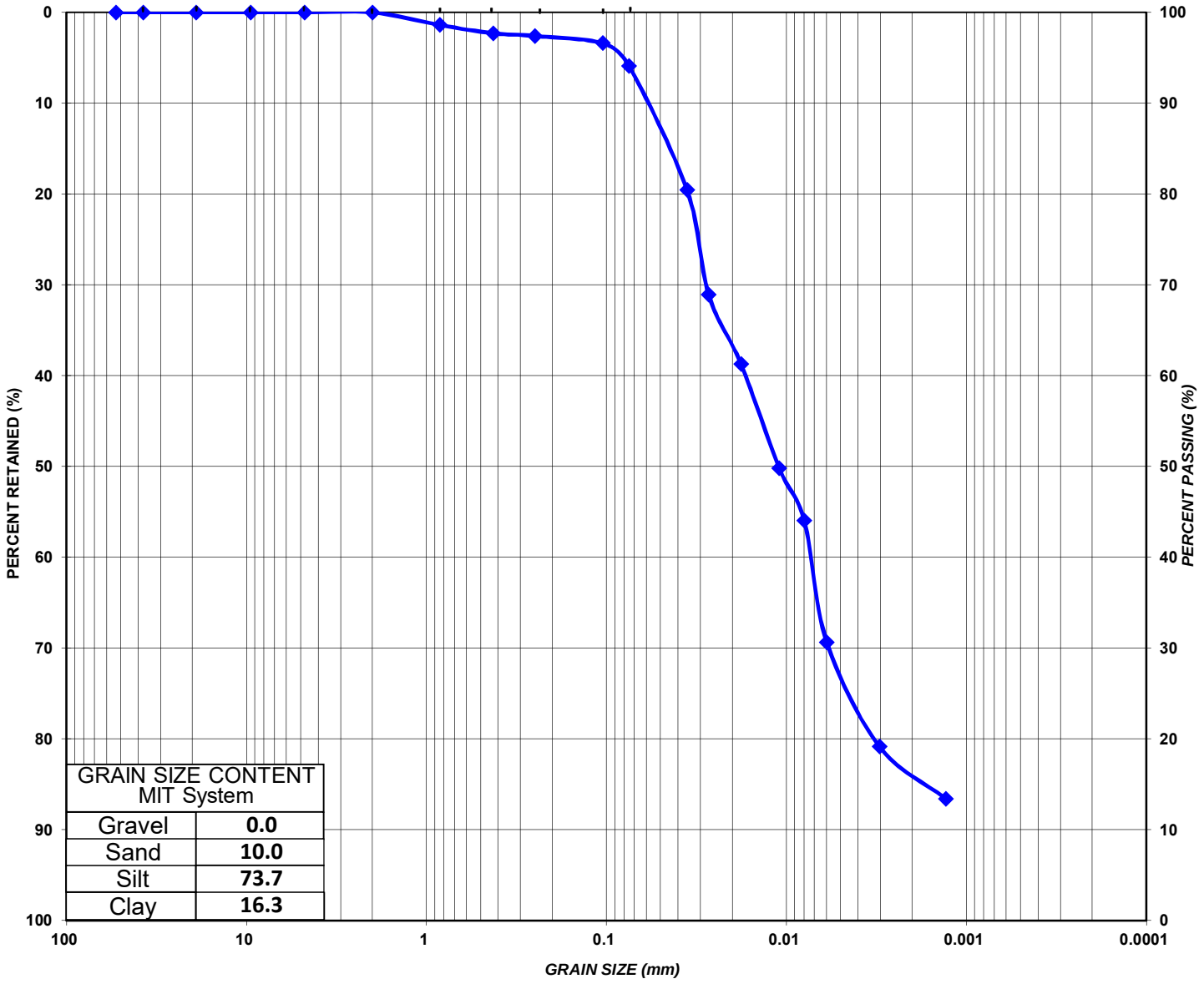
Terraprobe

SIEVE AND HYDROMETER ANALYSIS TEST REPORT

PROJECT: **535 - 551 Brant Street, Burlington, Ontario**
LOCATION: **Burlington, On.**
CLIENT: **Carriage Gate Homes**
BOREHOLE: **106**
SAMPLE NUMBER: **4**
SAMPLE DEPTH: **7'**
SAMPLE DESCRIPTION: **SILT, some clay, trace sand**

FILE NO.: **1-18-0718**
LAB NO.: **1057**
SAMPLE DATE: **Jan 27, 2019**
SAMPLED BY: **TG**

GRAIN SIZE DISTRIBUTION



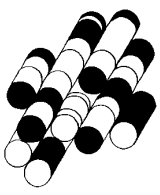
GRAIN SIZE CONTENT MIT System	
Gravel	**0.0**
Sand	**10.0**
Silt	**73.7**
Clay	**16.3**

MIT SYSTEM	GRAVEL	COARSE	MEDIUM	FINE	SILT	CLAY
		SAND				

UNIFIED SYSTEM ASTM D2487	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
	GRAVEL		SAND			

APPENDIX C

TERRAPROBE INC.





FINAL REPORT

CA14203-FEB19 R1

1-18-0718-42 535 to551 Brant Street Burlington, Ontario

Prepared for

Terraprobe Inc

FINAL REPORT

CA14203-FEB19 R1

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	Terraprobe Inc	Project Specialist	Brad Moore Hon. B.Sc
		Laboratory	SGS Canada Inc.
Address	11 Indell Lane Brampton, ON L6T 3Y3. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Prakash Patel	Telephone	705-652-2000
Telephone	(905) 796-2650	Facsimile	705-652-6365
Facsimile	(905) 796-2250	Email	
Email	ppatel@terraprobe.ca	SGS Reference	CA14203-FEB19
Project	1-18-0718-42 535 to551 Brant Street Burlington, Ontario	Received	02/08/2019
Order Number		Approved	02/15/2019
Samples	Ground Water (1)	Report Number	CA14203-FEB19 R1
		Date Reported	02/15/2019

COMMENTS

RL - SGS Reporting Limit

Temperature of Sample upon Receipt: 5 degrees C
Cooling Agent Present: yes
Custody Seal Present: yes

Chain of Custody Number: N/A

SIGNATORIES

Brad Moore Hon. B.Sc

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Client: Terraprobe Inc

Project: 1-18-0718-42 535 to551 Brant Street Burlington, Ontar

Project Manager: Prakash Patel

Samplers: Tarak A

PACKAGE: **SANSEW - General Chemistry** (WATER)

Sample Number 8

Sample Name SW-UF-MW107

Sample Matrix Ground Water

Sample Date 08/02/2019

L1 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Storm Sewer Discharge - BL_2_03

General Chemistry

Parameter	Units	RL	L1	L2	Result
Biochemical Oxygen Demand (BOD5)	mg/L	2	300		9
Total Suspended Solids	mg/L	2	350		32
Total Kjeldahl Nitrogen	as N mg/L	0.5	100		1.5

PACKAGE: **SANSEW - Metals and Inorganics** (WATER)

Sample Number 8

Sample Name SW-UF-MW107

Sample Matrix Ground Water

Sample Date 08/02/2019

L1 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Storm Sewer Discharge - BL_2_03

Metals and Inorganics

Parameter	Units	RL	L1	L2	Result
Cyanide (total)	mg/L	0.01	2		< 0.01
Fluoride	mg/L	0.06	10		0.46
Sulphate	mg/L	0.2	1500		170
Aluminum (total)	mg/L	0.001	50		22.3
Antimony (total)	mg/L	0.0002	5		0.0004
Arsenic (total)	mg/L	0.0002	1		0.0075
Beryllium (total)	mg/L	0.000007	5		0.000919
Cadmium (total)	mg/L	0.000003	1		0.000110
Chromium (total)	mg/L	0.00003	3		0.0511

Client: Terraprobe Inc

Project: 1-18-0718-42 535 to551 Brant Street Burlington, Ontar

Project Manager: Prakash Patel

Samplers: Tarak A

PACKAGE: **SANSEW - Metals and Inorganics**

(WATER)

L1 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Storm Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
Metals and Inorganics (continued)					
Cobalt (total)	mg/L	0.000004	5		0.0127
Copper (total)	mg/L	0.00002	3		0.0419
Iron (total)	mg/L	0.007	50		25.0
Lead (total)	mg/L	0.00001	3		0.0107
Manganese (total)	mg/L	0.00001	5		0.847
Molybdenum (total)	mg/L	0.00001	5		0.0249
Nickel (total)	mg/L	0.0001	3		0.0320
Phosphorus (total)	mg/L	0.003	10		0.621
Selenium (total)	mg/L	0.00004	5		0.00037
Silver (total)	mg/L	0.00005	5		0.00009
Tin (total)	mg/L	0.00001	5		0.00184
Titanium (total)	mg/L	0.00005	5		0.191
Zinc (total)	mg/L	0.002	3		0.081

Client: Terraprobe Inc

Project: 1-18-0718-42 535 to551 Brant Street Burlington, Ontar

Project Manager: Prakash Patel

Samplers: Tarak A

PACKAGE: **SANSEW - Microbiology** (WATER)

L1 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Storm Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
Microbiology					
E. Coli	cfu/100mL	-		200	< 2↑

PACKAGE: **SANSEW - Oil and Grease** (WATER)

L1 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Storm Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
Oil and Grease					
Oil & Grease (total)	mg/L	2			< 2
Oil & Grease (animal/vegetable)	mg/L	4	150		< 4
Oil & Grease (mineral/synthetic)	mg/L	4	15		< 4

PACKAGE: **SANSEW - Other (ORP)** (WATER)

L1 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Storm Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
Other (ORP)					
pH	no unit	0.05	10	8.5	8.12
Mercury (total)	mg/L	0.00001	0.05		0.00001

Client: Terraprobe Inc

Project: 1-18-0718-42 535 to551 Brant Street Burlington, Ontar

Project Manager: Prakash Patel

Samplers: Tarak A

PACKAGE: **SANSEW - Phenols** (WATER)

L1 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Storm Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
Phenols					
4AAP-Phenolics	mg/L	0.002	1		0.007

PACKAGE: **SANSEW - SVOCs - PAHs** (WATER)

L1 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Storm Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
SVOCs - PAHs					
Naphthalene	mg/L	0.0005	0.14		< 0.0005

PACKAGE: **SANSEW - VOCs** (WATER)

L1 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Storm Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
VOCs					
Chloroform	mg/L	0.0005	0.04		0.0031
1,4-Dichlorobenzene	mg/L	0.0005	0.08		< 0.0005
Methylene Chloride	mg/L	0.0005	2		< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	1		0.0007
Trichloroethylene	mg/L	0.0005	0.4		< 0.0005

Client: Terraprobe Inc

Project: 1-18-0718-42 535 to551 Brant Street Burlington, Ontar

Project Manager: Prakash Patel

Samplers: Tarak A

PACKAGE: **SANSEW - VOCs - BTEX** (WATER)

L1 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Storm Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
VOCs - BTEX					
Benzene	mg/L	0.0005	0.01		< 0.0005
Ethylbenzene	mg/L	0.0005	0.16		< 0.0005
Toluene	mg/L	0.0005	0.016		< 0.0005

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated

QC SUMMARY

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENVIIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphate	DIO0115-FEB19	mg/L	0.2	<0.2	1	20	96	80	120	96	75	125

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0013-FEB19	mg/L	2	< 2	3	30	88	70	130	NV	70	130

Cyanide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENVISFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0076-FEB19	mg/L	0.01	<0.01	ND	10	101	90	110	100	75	125

QC SUMMARY

Fluoride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-[ENVIEWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0135-FEB19	mg/L	0.06	<0.06	1	10	95	90	110	76	75	125

Mercury by CVAAS

Method: EPA 7471A/SM 3112B I Internal ref.: ME-CA-[ENVISPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0013-FEB19	mg/L	0.00001	< 0.00001	ND	20	90	80	120	98	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0059-FEB19	mg/L	0.00005	<0.00005	ND	20	96	90	110	76	70	130
Aluminum (total)	EMS0059-FEB19	mg/L	0.001	<0.001	ND	20	96	90	110	NV	70	130
Arsenic (total)	EMS0059-FEB19	mg/L	0.0002	<0.0002	1	20	98	90	110	91	70	130
Beryllium (total)	EMS0059-FEB19	mg/L	0.000007	<0.000007	ND	20	102	90	110	95	70	130
Cadmium (total)	EMS0059-FEB19	mg/L	0.000003	<0.000003	17	20	94	90	110	86	70	130
Cobalt (total)	EMS0059-FEB19	mg/L	0.000004	<0.000004	9	20	97	90	110	87	70	130
Chromium (total)	EMS0059-FEB19	mg/L	0.00003	<0.00003	ND	20	97	90	110	NV	70	130
Copper (total)	EMS0059-FEB19	mg/L	0.00002	<0.00002	0	20	97	90	110	99	70	130
Iron (total)	EMS0059-FEB19	mg/L	0.007	<0.007	19	20	96	90	110	NV	70	130
Manganese (total)	EMS0059-FEB19	mg/L	0.00001	<0.00001	0	20	100	90	110	NV	70	130
Molybdenum (total)	EMS0059-FEB19	mg/L	0.00001	<0.00001	16	20	92	90	110	90	70	130
Nickel (total)	EMS0059-FEB19	mg/L	0.0001	<0.0001	5	20	98	90	110	93	70	130
Lead (total)	EMS0059-FEB19	mg/L	0.00001	<0.00001	11	20	97	90	110	98	70	130
Antimony (total)	EMS0059-FEB19	mg/L	0.0002	<0.0002	ND	20	102	90	110	102	70	130
Selenium (total)	EMS0059-FEB19	mg/L	0.00004	<0.00004	14	20	98	90	110	96	70	130
Tin (total)	EMS0059-FEB19	mg/L	0.00001	<0.00001	5	20	96	90	110	NV	70	130
Titanium (total)	EMS0059-FEB19	mg/L	0.00005	<0.00005	ND	20	91	90	110	NV	70	130
Zinc (total)	EMS0059-FEB19	mg/L	0.002	<0.002	2	20	98	90	110	108	70	130
Aluminum (total)	EMS0063-FEB19	mg/L	0.001	<0.001	2	20	102	90	110	NV	70	130

QC SUMMARY

Metals in aqueous samples - ICP-OES

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	EMS0059-FEB19	mg/L	0.003	<0.003	4	20	90	90	110	NV	70	130

Microbiology

Method: SM 9222D | Internal ref.: ME-CA-[ENV]MIC-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
E. Coli	BAC9130-FEB19	cfu/100mL	-	ACCEPTED	ACCEPTED							

Oil & Grease

Method: MOE E3401 | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (total)	GCM0156-FEB19	mg/L	2	<2			101	75	125			

QC SUMMARY

Oil & Grease-AV/MS

Method: MOE E3401/SM 5520F | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (animal/vegetable)	GCM0156-FEB19	mg/L	4	< 4			NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0156-FEB19	mg/L	4	< 4			NA	70	130			

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0140-FEB19	no unit	0.05	NA	0		100			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0070-FEB19	mg/L	0.002	<0.002	5	10	103	90	110	99	75	125

QC SUMMARY

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Naphthalene	GCM0129-FEB19	mg/L	0.0005	< 0.5	NSS	30	72	50	140	NSS	50	140

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0183-FEB19	mg/L	2	< 2	0	10	NV	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0080-FEB19	as N mg/L	0.5	<0.5	NV	10	98	90	110	123	75	125
Total Kjeldahl Nitrogen	SKA0104-FEB19	as N mg/L	0.5	<0.5	3	10	97	90	110	96	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,4-Dichlorobenzene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	96	60	130	NSS	50	140
Benzene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	95	60	130	NSS	50	140
Chloroform	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	96	60	130	NSS	50	140
Ethylbenzene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	96	60	130	NSS	50	140
Methylene Chloride	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	95	60	130	NSS	50	140
Tetrachloroethylene (perchloroethylene)	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	97	60	130	NSS	50	140
Toluene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	94	60	130	NSS	50	140
Trichloroethylene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	94	60	130	NSS	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act” published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

This report must not be reproduced, except in full. This report supersedes all previous versions.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

SGS Environment, Health & Safety - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

No:

Page __1__ of __1__

Laboratory Information Section - Lab use only

Received By: Stephanie Vaithilingam
Received Date (mm/dd/yyyy): 02\08\19 (mm\dd\yy)
Received Time: 15:30
Received By (signature): VStephanie
Custody Seal Present: ☑
Custody Seal Intact: ☐
Cooling Agent Present: ☑ ICE
Temperature Upon Receipt (°C) 5°6°8° 5x3
LAB LIMS #: CA14203-FEB19

REPORT INFORMATION

Company: Terraprobe Inc
Contact: Prakash Patel
Address: 11 Indell Lane
Brampton, ON, L6T 3Y3
Phone:[905) 796-2650
Fax:(905) 796-2250
Email: ppatel@terraprobe.ca

INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email:

PROJECT INFORMATION

Quotation #: 2017-272
P.O. #:
Project #: 1-18-0718-42 535 to 551 Brant Stre Site Location/ID: Burlington, Ontario

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends).
Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date: Rush Confirmation ID:

REGULATIONS

Regulation 153/04:
☐ Table 1 ☐ Res/Park Soil Texture:
☐ Table 2 ☐ Ind/Com ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ Medium
☐ Table _____ ☐ Fine

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA

Sewer By-Law:
☑ Sanitary
☑ Storm
Municipality: Burlington

NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	Metals & Inorganics	PHC F1-F4 ☐ VOC ☐ BTEX ☐ BTEX/F1 ☐ F2-F4 ☐	PAH ☐ ABN ☐ SVOC(all) ☐	PCB Total ☐ Aroclor ☐	Pesticides OC ☐ OP ☐	TCLP M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit. ☐	Water Pkg Gen. ☐ Ext. ☐	Sewer Use: Halton Region Sewer Use By-Law						COMMENTS:
1	SW - UF - MW107	8-Feb-18		14	GW									X						
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

Observations/Comments/Special Instructions

Sampled By (NAME): Tarak A.	**Signature:** Tarak A	Date: _02__ /_08_ /_19_	(mm/dd/yy)		Pink Copy - Client
Relinquished by (NAME): ~~Prakash P.~~ Tarak A	**Signature:** Tarak A	Date: _02__ /_08_ /_19_	(mm/dd/yy)		Yellow & White Copy - SGS

Revision #: 1.1
Date of Issue: 04 April, 2018

SGS

SAMPLE INTEGRITY REPORT

Project Number: 1-18-0718-42

ONTARIO REGULATION 153/04

SGS Sample ID CA14203-Feb19

Date / Time Sampled Feb 8, 2019

Client Sample ID SW-UF-MW107

	ALL
Sample Submission General Sample Integrity Violations	
Temperature >10 C upon receipt if not sampled same day	☐
No evidence of cooling trend initiated if sampled same day	☐
Chain of Custody not submitted	☐
Chain of Custody incomplete	☐
Chain of Custody not signed / dated	☐
Chain of Custody not a current version	☐
Bottles / Samples listed on CoC but not received	☐
Bottles / Samples received but not listed on the CoC	☐
Sample container received empty	☐

Sample Specific Sample Integrity Violations							
Sample received past hold time	☐	☐	☐	☐	☐	☐	☐
Incorrect preservation (including no preservation where required)	☐	☐	☐	☐	☐	☐	☐
Headspace present in VOC vial (aqueous)	☐	☐	☐	☐	☐	☐	☐
Sample(s) received frozen	☐	☐	☐	☐	☐	☐	☐
Bottle(s) broken or damaged in transport	☐	☐	☐	☐	☐	☐	☐
Discrepancy between sample label and chain of custody	☐	☐	☐	☐	☐	☐	☐
Analysis requirements absent / unclear	☐	☐	☐	☐	☐	☐	☐
Missing or incorrect sample label(s)	☐	☐	☐	☐	☐	☐	☐
Inappropriate sample container used	☐	☐	☐	☐	☐	☐	☐
Insufficient number of bottles received	☐	☐	☐	☐	☐	☐	☐
Limited sample volume	☐	☐	☐	☐	☐	☐	☐
Insufficient sample volume	☐	☐	☐	☐	☐	☐	☐
Sample contains multiple phases	☐	☐	☐	☐	☐	☐	☐
Sediment Log							
Groundwater samples contain visible sediment / particulate	☑	☐	☐	☐	☐	☐	☐
Groundwater contains greater than 1cm of sediment / particulate matter in bottle	☐	☐	☐	☐	☐	☐	☐

Additional Comments/Remarks:

No issues upon receipt ☐ Initials: CL



FINAL REPORT

CA14203-FEB19 R1

1-18-0718-42 535 to551 Brant Street Burlington, Ontario

Prepared for

Terraprobe Inc

FINAL REPORT

CA14203-FEB19 R1

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	Terraprobe Inc	Project Specialist	Jill Campbell, B.Sc.,GISAS
		Laboratory	SGS Canada Inc.
Address	11 Indell Lane Brampton, ON L6T 3Y3. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Prakash Patel	Telephone	2165
Telephone	(905) 796-2650	Facsimile	705-652-6365
Facsimile	(905) 796-2250	Email	jill.campbell@sgs.com
Email	ppatel@terraprobe.ca	SGS Reference	CA14203-FEB19
Project	1-18-0718-42 535 to551 Brant Street Burlington, Ontario	Received	02/08/2019
Order Number		Approved	04/27/2020
Samples	Ground Water (1)	Report Number	CA14203-FEB19 R1
		Date Reported	04/27/2020

COMMENTS

RL - SGS Reporting Limit

Temperature of Sample upon Receipt: 5 degrees C
Cooling Agent Present: yes
Custody Seal Present: yes

Chain of Custody Number: N/A

SIGNATORIES

Jill Campbell, B.Sc.,GISAS



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Client: Terraprobe Inc

Project: 1-18-0718-42 535 to551 Brant Street Burlington, Ontar

Project Manager: Prakash Patel

Samplers: Tarak A

PACKAGE: **SANSEW - General Chemistry** (WATER)

Sample Number 8

Sample Name SW-UF-MW107

Sample Matrix Ground Water

Sample Date 08/02/2019

L1 = SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

General Chemistry

Parameter	Units	RL	L1	L2	Result
Biochemical Oxygen Demand (BOD5)	mg/L	2	15	300	9
Total Suspended Solids	mg/L	2	15	350	32
Total Kjeldahl Nitrogen	as N mg/L	0.5		100	1.5

PACKAGE: **SANSEW - Metals and Inorganics** (WATER)

Sample Number 8

Sample Name SW-UF-MW107

Sample Matrix Ground Water

Sample Date 08/02/2019

L1 = SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

Metals and Inorganics

Parameter	Units	RL	L1	L2	Result
Cyanide (total)	mg/L	0.01	0.02	2	< 0.01
Fluoride	mg/L	0.06		10	0.46
Sulphate	mg/L	0.2		1500	170
Aluminum (total)	mg/L	0.001		50	22.3
Antimony (total)	mg/L	0.0002		5	0.0004
Arsenic (total)	mg/L	0.0002	0.02	1	0.0075
Beryllium (total)	mg/L	0.000007		5	0.000919
Cadmium (total)	mg/L	0.000003	0.008	1	0.000110
Chromium (total)	mg/L	0.00003	0.08	3	0.0511

Client: Terraprobe Inc

Project: 1-18-0718-42 535 to551 Brant Street Burlington, Ontar

Project Manager: Prakash Patel

Samplers: Tarak A

PACKAGE: **SANSEW - Metals and Inorganics**

(WATER)

Sample Number 8

Sample Name SW-UF-MW107

Sample Matrix Ground Water

Sample Date 08/02/2019

L1 = SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

Metals and Inorganics (continued)

Parameter	Units	RL	L1	L2	Result
Cobalt (total)	mg/L	0.000004		5	0.0127
Copper (total)	mg/L	0.00002	0.04	3	0.0419
Iron (total)	mg/L	0.007		50	25.0
Lead (total)	mg/L	0.00001	0.12	3	0.0107
Manganese (total)	mg/L	0.00001	0.05	5	0.847
Molybdenum (total)	mg/L	0.00001		5	0.0249
Nickel (total)	mg/L	0.0001	0.08	3	0.0320
Phosphorus (total)	mg/L	0.003	0.4	10	0.621
Selenium (total)	mg/L	0.00004	0.02	5	0.00037
Silver (total)	mg/L	0.00005	0.12	5	0.00009
Tin (total)	mg/L	0.00001		5	0.00184
Titanium (total)	mg/L	0.00005		5	0.191
Zinc (total)	mg/L	0.002	0.04	3	0.081

Client: Terraprobe Inc

Project: 1-18-0718-42 535 to551 Brant Street Burlington, Ontar

Project Manager: Prakash Patel

Samplers: Tarak A

PACKAGE: **SANSEW - Microbiology** (WATER)

L1 = SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
Microbiology					
E. Coli	cfu/100mL	-			< 2↑

PACKAGE: **SANSEW - Oil and Grease** (WATER)

L1 = SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
Oil and Grease					
Oil & Grease (total)	mg/L	2			< 2
Oil & Grease (animal/vegetable)	mg/L	4		150	< 4
Oil & Grease (mineral/synthetic)	mg/L	4		15	< 4

PACKAGE: **SANSEW - Other (ORP)** (WATER)

L1 = SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
Other (ORP)					
pH	no unit	0.05	9.5	10	8.12
Mercury (total)	mg/L	0.00001	0.0004	0.05	0.00001

Client: Terraprobe Inc

Project: 1-18-0718-42 535 to551 Brant Street Burlington, Ontar

Project Manager: Prakash Patel

Samplers: Tarak A

PACKAGE: **SANSEW - Phenols** (WATER)

L1 = SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
Phenols					
4AAP-Phenolics	mg/L	0.002	0.008	1	0.007

PACKAGE: **SANSEW - SVOCs** (WATER)

L1 = SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
SVOCs					
Bis(2-ethylhexyl)phthalate	mg/L	0.002	0.0088		0.003
Pentachlorophenol	mg/L	0.0005	0.002		< 0.0005
di-n-Butyl Phthalate	mg/L	0.002	0.015		< 0.002

PACKAGE: **SANSEW - SVOCs - PAHs** (WATER)

L1 = SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
SVOCs - PAHs					
Naphthalene	mg/L	0.0005		0.14	< 0.0005

Client: Terraprobe Inc

Project: 1-18-0718-42 535 to551 Brant Street Burlington, Ontar

Project Manager: Prakash Patel

Samplers: Tarak A

PACKAGE: **SANSEW - VOCs** (WATER)

L1 = SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

VOCs

Parameter	Units	RL	L1	L2	Result
Chloroform	mg/L	0.0005	0.002	0.04	0.0031
1,4-Dichlorobenzene	mg/L	0.0005	0.0068	0.08	< 0.0005
Methylene Chloride	mg/L	0.0005	0.0052	2	< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	0.0044	1	0.0007
Trichloroethylene	mg/L	0.0005	0.0076	0.4	< 0.0005
1,2-Dichlorobenzene	mg/L	0.0005	0.0056		< 0.0005
cis-1,2-Dichloroethylene	mg/L	0.0005	0.0056		0.0006
trans-1,3-Dichloropropene	mg/L	0.0005	0.0056		< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	0.017		< 0.0005

Client: Terraprobe Inc

Project: 1-18-0718-42 535 to551 Brant Street Burlington, Ontar

Project Manager: Prakash Patel

Samplers: Tarak A

PACKAGE: **SANSEW - VOCs - BTEX** (WATER)

L1 = SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002

L2 = SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03

Sample Number	8
Sample Name	SW-UF-MW107
Sample Matrix	Ground Water
Sample Date	08/02/2019

Parameter	Units	RL	L1	L2	Result
VOCs - BTEX					
Benzene	mg/L	0.0005	0.002	0.01	< 0.0005
Ethylbenzene	mg/L	0.0005	0.002	0.16	< 0.0005
Toluene	mg/L	0.0005	0.002	0.016	< 0.0005
Toluene	mg/L	0.0005	0.002	0.016	< 0.0005
Xylene (total)	mg/L	0.0005	0.0044		< 0.0005
m-p-xylene	mg/L	0.0005			< 0.0005
o-xylene	mg/L	0.0005			< 0.0005

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	SANSEW / WATER / - - City of Burlington - Burlington Storm Sewer Discharge - BL_086_2002 L1	SANSEW / WATER / - - Halton Sewer Discharge By Law - Sanitary and Combined Sewer Discharge - BL_2_03 L2
SW-UF-MW107					
Chloroform	EPA 5030B/8260C	mg/L	0.0031	0.002	
Total Suspended Solids	SM 2540D	mg/L	32	15	
Copper	SM 3030/EPA 200.8	mg/L	0.0419	0.04	
Manganese	SM 3030/EPA 200.8	mg/L	0.847	0.05	
Phosphorus	SM 3030/EPA 200.8	mg/L	0.621	0.4	
Zinc	SM 3030/EPA 200.8	mg/L	0.081	0.04	

QC SUMMARY

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENVIIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphate	DIO0115-FEB19	mg/L	0.2	<0.2	1	20	96	80	120	96	75	125

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0013-FEB19	mg/L	2	< 2	3	30	88	70	130	NV	70	130

Cyanide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENVISFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0076-FEB19	mg/L	0.01	<0.01	ND	10	101	90	110	100	75	125

QC SUMMARY

Fluoride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-[ENVIEWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0135-FEB19	mg/L	0.06	<0.06	1	10	95	90	110	76	75	125

Mercury by CVAAS

Method: EPA 7471A/SM 3112B I Internal ref.: ME-CA-[ENVISPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0013-FEB19	mg/L	0.00001	< 0.00001	ND	20	90	80	120	98	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0059-FEB19	mg/L	0.00005	<0.00005	ND	20	96	90	110	76	70	130
Aluminum (total)	EMS0059-FEB19	mg/L	0.001	<0.001	ND	20	96	90	110	NV	70	130
Arsenic (total)	EMS0059-FEB19	mg/L	0.0002	<0.0002	1	20	98	90	110	91	70	130
Beryllium (total)	EMS0059-FEB19	mg/L	0.000007	<0.000007	ND	20	102	90	110	95	70	130
Cadmium (total)	EMS0059-FEB19	mg/L	0.000003	<0.000003	17	20	94	90	110	86	70	130
Cobalt (total)	EMS0059-FEB19	mg/L	0.000004	<0.000004	9	20	97	90	110	87	70	130
Chromium (total)	EMS0059-FEB19	mg/L	0.00003	<0.00003	ND	20	97	90	110	NV	70	130
Copper (total)	EMS0059-FEB19	mg/L	0.00002	<0.00002	0	20	97	90	110	99	70	130
Iron (total)	EMS0059-FEB19	mg/L	0.007	<0.007	19	20	96	90	110	NV	70	130
Manganese (total)	EMS0059-FEB19	mg/L	0.00001	<0.00001	0	20	100	90	110	NV	70	130
Molybdenum (total)	EMS0059-FEB19	mg/L	0.00001	<0.00001	16	20	92	90	110	90	70	130
Nickel (total)	EMS0059-FEB19	mg/L	0.0001	<0.0001	5	20	98	90	110	93	70	130
Lead (total)	EMS0059-FEB19	mg/L	0.00001	<0.00001	11	20	97	90	110	98	70	130
Phosphorus (total)	EMS0059-FEB19	mg/L	0.003	<0.003	4	20	90	90	110	NV	70	130
Antimony (total)	EMS0059-FEB19	mg/L	0.0002	<0.0002	ND	20	102	90	110	102	70	130
Selenium (total)	EMS0059-FEB19	mg/L	0.00004	<0.00004	14	20	98	90	110	96	70	130
Tin (total)	EMS0059-FEB19	mg/L	0.00001	<0.00001	5	20	96	90	110	NV	70	130
Titanium (total)	EMS0059-FEB19	mg/L	0.00005	<0.00005	ND	20	91	90	110	NV	70	130
Zinc (total)	EMS0059-FEB19	mg/L	0.002	<0.002	2	20	98	90	110	108	70	130
Aluminum (total)	EMS0063-FEB19	mg/L	0.001	<0.001	2	20	102	90	110	NV	70	130

QC SUMMARY

Microbiology

Method: SM 9222D | Internal ref.: ME-CA-IENVIMIC-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
E. Coli	BAC9130-FEB19	cfu/100mL	-	ACCEPTED	ACCEPTED							

Oil & Grease

Method: MOE E3401 | Internal ref.: ME-CA-IENVIGC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (total)	GCM0156-FEB19	mg/L	2	<2			101	75	125			

QC SUMMARY

Oil & Grease-AV/MS

Method: MOE E3401/SM 5520F | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (animal/vegetable)	GCM0156-FEB19	mg/L	4	< 4			NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0156-FEB19	mg/L	4	< 4			NA	70	130			

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0140-FEB19	no unit	0.05	NA	0		100			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0070-FEB19	mg/L	0.002	<0.002	5	10	103	80	120	99	75	125

QC SUMMARY

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bis(2-ethylhexyl)phthalate	GCM0129-FEB19	mg/L	0.002	< 0.002	NSS	30	100	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0129-FEB19	mg/L	0.002	< 0.002	NSS	30	106	50	140	NSS	50	140
Naphthalene	GCM0129-FEB19	mg/L	0.0005	< 0.5	NSS	30	72	50	140	NSS	50	140
Pentachlorophenol	GCM0129-FEB19	mg/L	0.0005	< 0.0005	NSS	30	94	50	140	NSS	50	140

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0183-FEB19	mg/L	2	< 2	0	10	NV	90	110	NA		

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0080-FEB19	as N mg/L	0.5	<0.5	NV	10	98	90	110	123	75	125
Total Kjeldahl Nitrogen	SKA0104-FEB19	as N mg/L	0.5	<0.5	3	10	97	90	110	96	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,2,2-Tetrachloroethane	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	98	60	130	NSS	50	140
1,2-Dichlorobenzene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	98	60	130	NSS	50	140
1,4-Dichlorobenzene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	96	60	130	NSS	50	140
Benzene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	95	60	130	NSS	50	140
Chloroform	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	96	60	130	NSS	50	140
cis-1,2-Dichloroethylene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	95	60	130	NSS	50	140
Ethylbenzene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	96	60	130	NSS	50	140
m-p-xylene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	95	60	130	NSS	50	140
Methylene Chloride	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	95	60	130	NSS	50	140
o-xylene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	98	60	130	NSS	50	140
Tetrachloroethylene (perchloroethylene)	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	97	60	130	NSS	50	140
Toluene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	94	60	130	NSS	50	140
trans-1,3-Dichloropropene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	101	60	130	NSS	50	140
Trichloroethylene	GCM0131-FEB19	mg/L	0.0005	<0.0005	NSS	30	94	60	130	NSS	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

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-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

SGS Environment, Health & Safety - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

No:

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Laboratory Information Section - Lab use only

Received By: Stephanie Vaithilingam
Received Date (mm/dd/yyyy): 02\08\19 (mm\dd\yy)
Received Time: 15:30
Received By (signature): VStephanie
Custody Seal Present: ☑
Custody Seal Intact: ☐
Cooling Agent Present: ☑ ICE
Temperature Upon Receipt (°C) 5°6°8° 5x3
LAB LIMS #: CA14203-FEB19

REPORT INFORMATION

Company: Terraprobe Inc
Contact: Prakash Patel
Address: 11 Indell Lane
Brampton, ON, L6T 3Y3
Phone:[905) 796-2650
Fax:(905) 796-2250
Email: ppatel@terraprobe.ca

INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email:

PROJECT INFORMATION

Quotation #: 2017-272
P.O. #:
Project #: 1-18-0718-42 535 to 551 Brant Stre Site Location/ID: Burlington, Ontario

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends).
Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date: Rush Confirmation ID:

REGULATIONS

Regulation 153/04:
☐ Table 1 ☐ Res/Park Soil Texture:
☐ Table 2 ☐ Ind/Com ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ Medium
☐ Table _____ ☐ Fine

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA

Sewer By-Law:
☑ Sanitary
☑ Storm
Municipality: Burlington

NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	Metals & Inorganics	PHC F1-F4 ☐ VOC ☐ BTEX ☐ BTEX/F1 ☐ F2-F4 ☐	PAH ☐ ABN ☐ SVOC(all) ☐	PCB Total ☐ Aroclor ☐	Pesticides OC ☐ OP ☐	TCLP M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit. ☐	Water Pkg Gen. ☐ Ext. ☐	Sewer Use: Halton Region Sewer Use By-Law						COMMENTS:
1	SW - UF - MW107	8-Feb-18		14	GW									X						
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

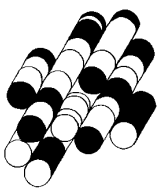
Observations/Comments/Special Instructions

Sampled By (NAME): Tarak A.	**Signature:** Tarak A	Date: _02__ /_08_ /_19_	(mm/dd/yy)		Pink Copy - Client
Relinquished by (NAME): ~~Prakash P.~~ Tarak A	**Signature:** Tarak A	Date: _02__ /_08_ /_19_	(mm/dd/yy)		Yellow & White Copy - SGS

Revision #: 1.1
Date of Issue: 04 April, 2018

APPENDIX D

TERRAPROBE INC.



Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

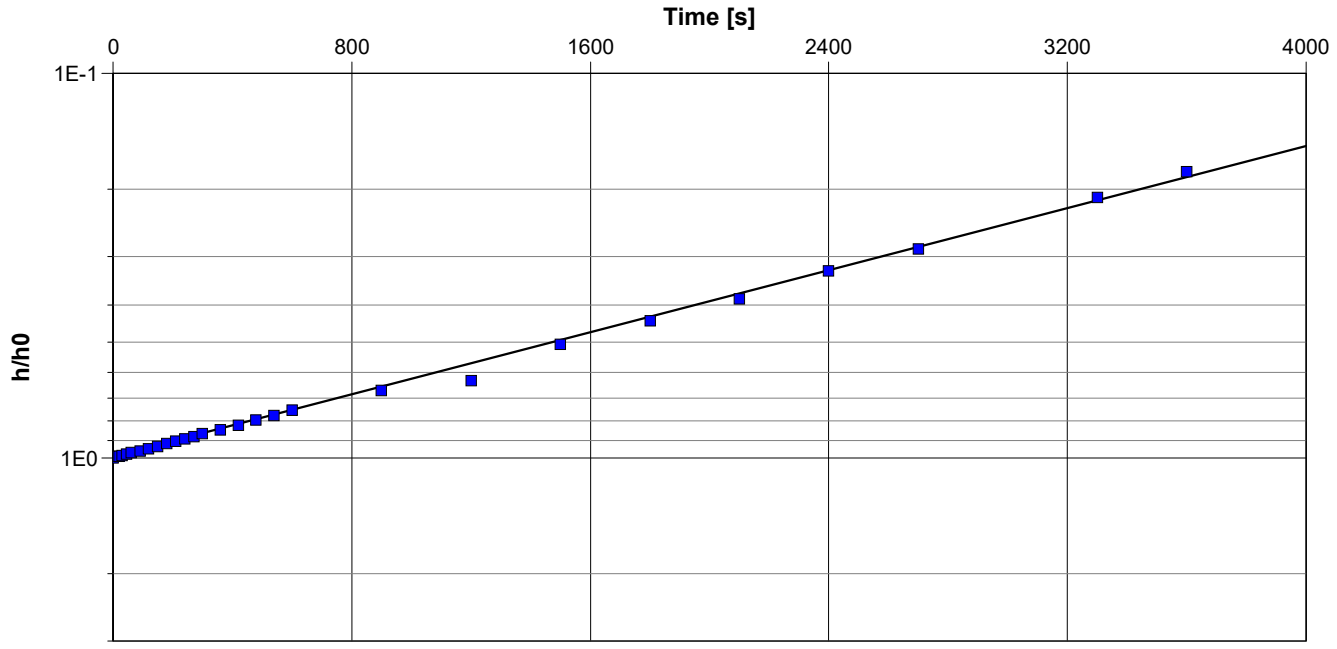
Slug Test Analysis Report

Project: 535 - 551 Brant Street

Number: 1-18-0718-46

Client: Carriage Gate Homes

Location: Burlington	Slug Test: Rising Head Test - BH104	Test Well: BH104
Test Conducted by: TG		Test Date: 2/8/2019
Analysis Performed by: AA	Rising Head Test - BH104	Analysis Date: 4/15/2019
Aquifer Thickness: 18.51 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH104	1.78×10^{-7}	

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Construction Materials Engineering, Inspection & Testing

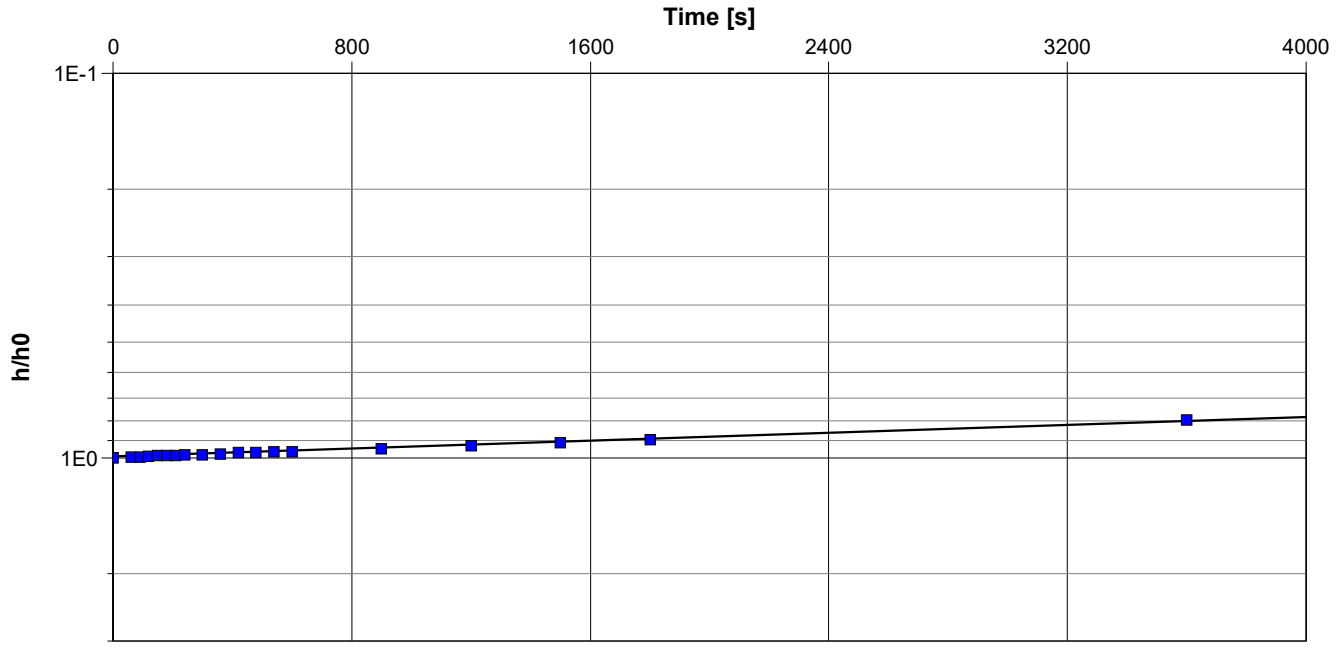
Slug Test Analysis Report

Project: 535 - 551 Brant Street

Number: 1-18-0718-46

Client: Carriage Gate Homes

Location: Burlington	Slug Test: Rising Head Test - BH106	Test Well: BH106
Test Conducted by: TG		Test Date: 2/8/2019
Analysis Performed by: AA	Rising Head Test - BH106	Analysis Date: 4/15/2019
Aquifer Thickness: 18.01 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH106	2.28×10^{-8}	

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Construction Materials Engineering, Inspection & Testing

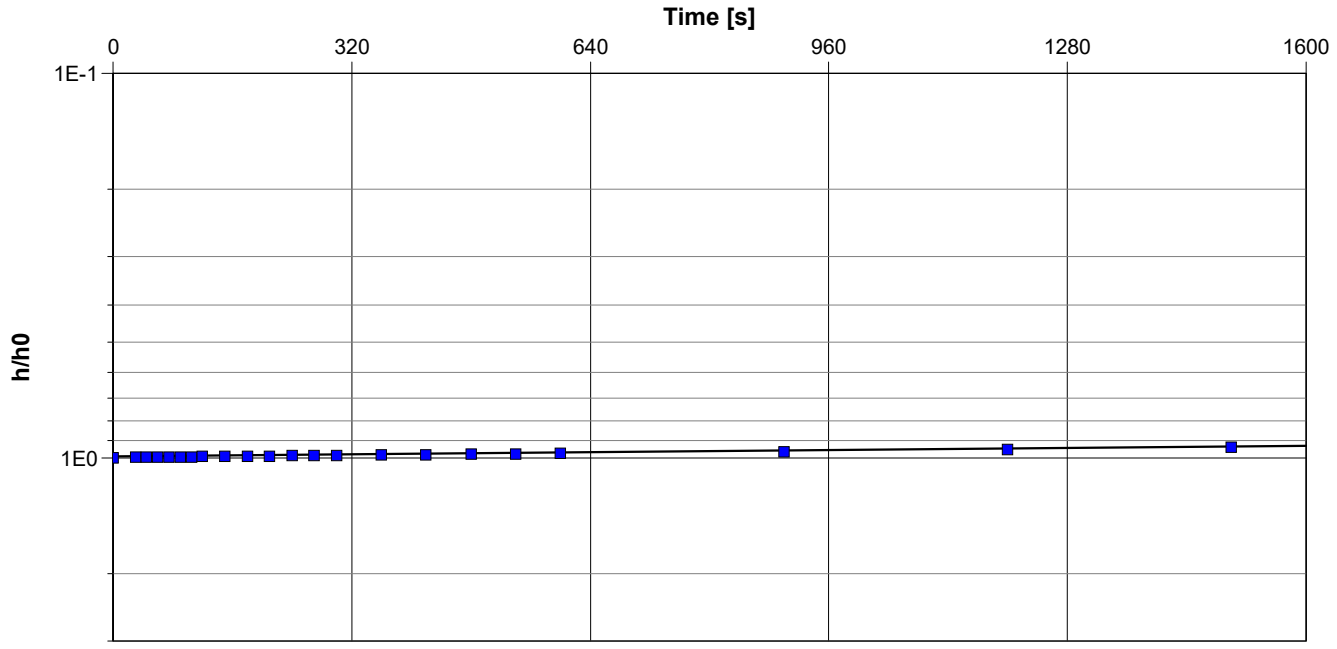
Slug Test Analysis Report

Project: 535 - 551 Brant Street

Number: 1-18-0718-46

Client: Carriage Gate Homes

Location: Burlington	Slug Test: Rising Head Test - BH107	Test Well: BH107
Test Conducted by: TG		Test Date: 2/8/2019
Analysis Performed by: AA	Rising Head Test - BH107	Analysis Date: 4/15/2019
Aquifer Thickness: 18.11 m		

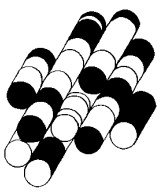


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH107	1.56×10^{-8}	

APPENDIX E

TERRAPROBE INC.



Material Name	Color	KS (m/s)
Fill		1e-006
Silt Till		1e-007
Queenston Bedrock		1.78e-007
Caisson		1e-012

Excavation Dimensions: 47.3 m x 50.6 m
Section Cut: E-W

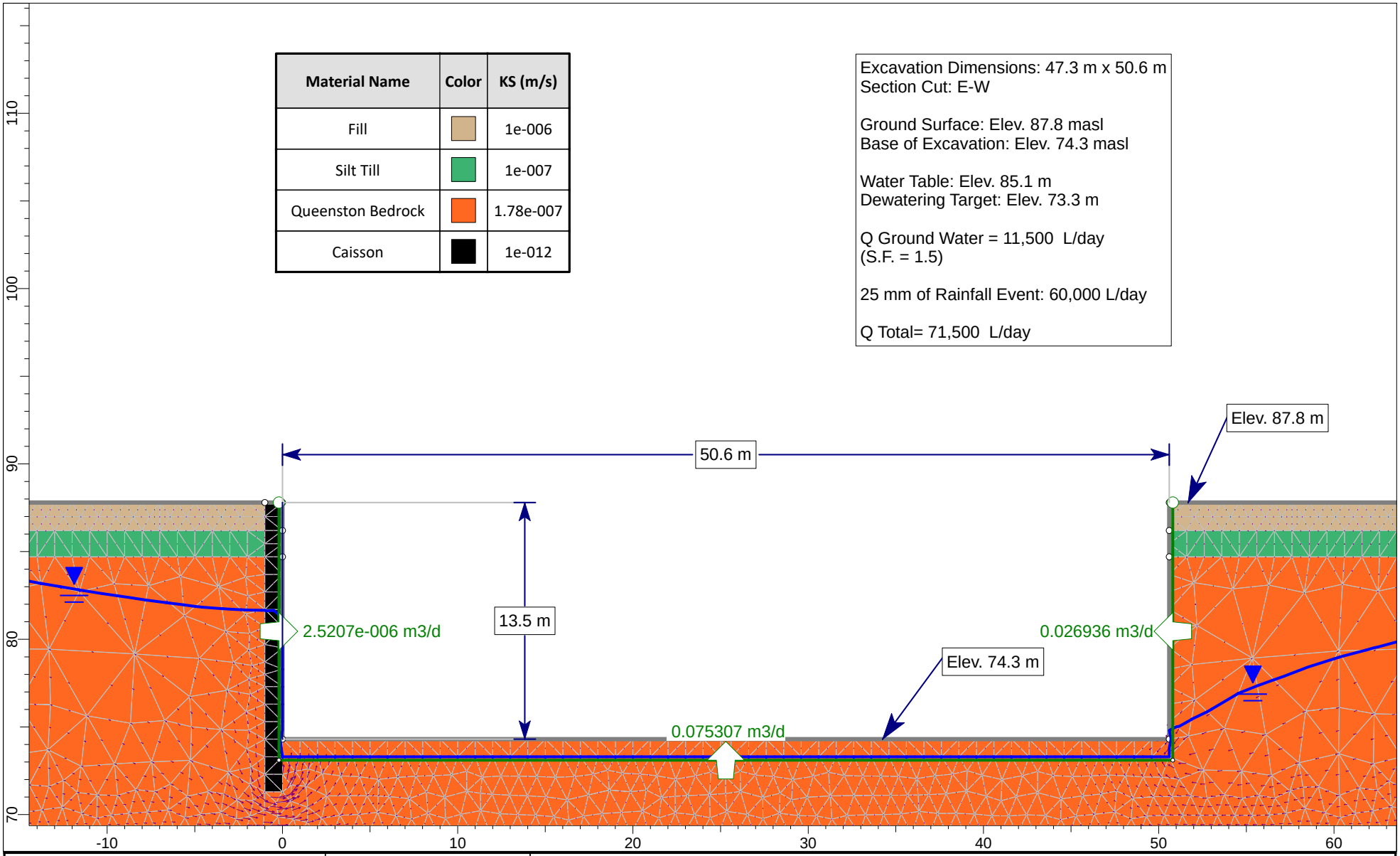
Ground Surface: Elev. 87.8 masl
Base of Excavation: Elev. 74.3 masl

Water Table: Elev. 85.1 m
Dewatering Target: Elev. 73.3 m

Q Ground Water = 11,500 L/day
(S.F. = 1.5)

25 mm of Rainfall Event: 60,000 L/day

Q Total= 71,500 L/day



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Construction Materials Inspection & Testing

SLIDEINTERPRET 7.038

Notes
Refer to Hydrogeological Report for factual information supporting this analysis.

Project: **1-18-0718-46 I 535 - 551 Brant Street, Burlington**

Analysis: Dewatering Analysis , Short Term , Dewatering

Date	Scale	File
2020-04-22	1:307	1-18-0718-46.slmd

By	Ref.
UA	

Material Name	Color	KS (m/s)
Fill		1e-006
Silt Till		1e-007
Queenston Bedrock		1.78e-007
Caisson		1e-007

Excavation Dimensions: 47.3 m x 50.6 m
Section Cut: E-W

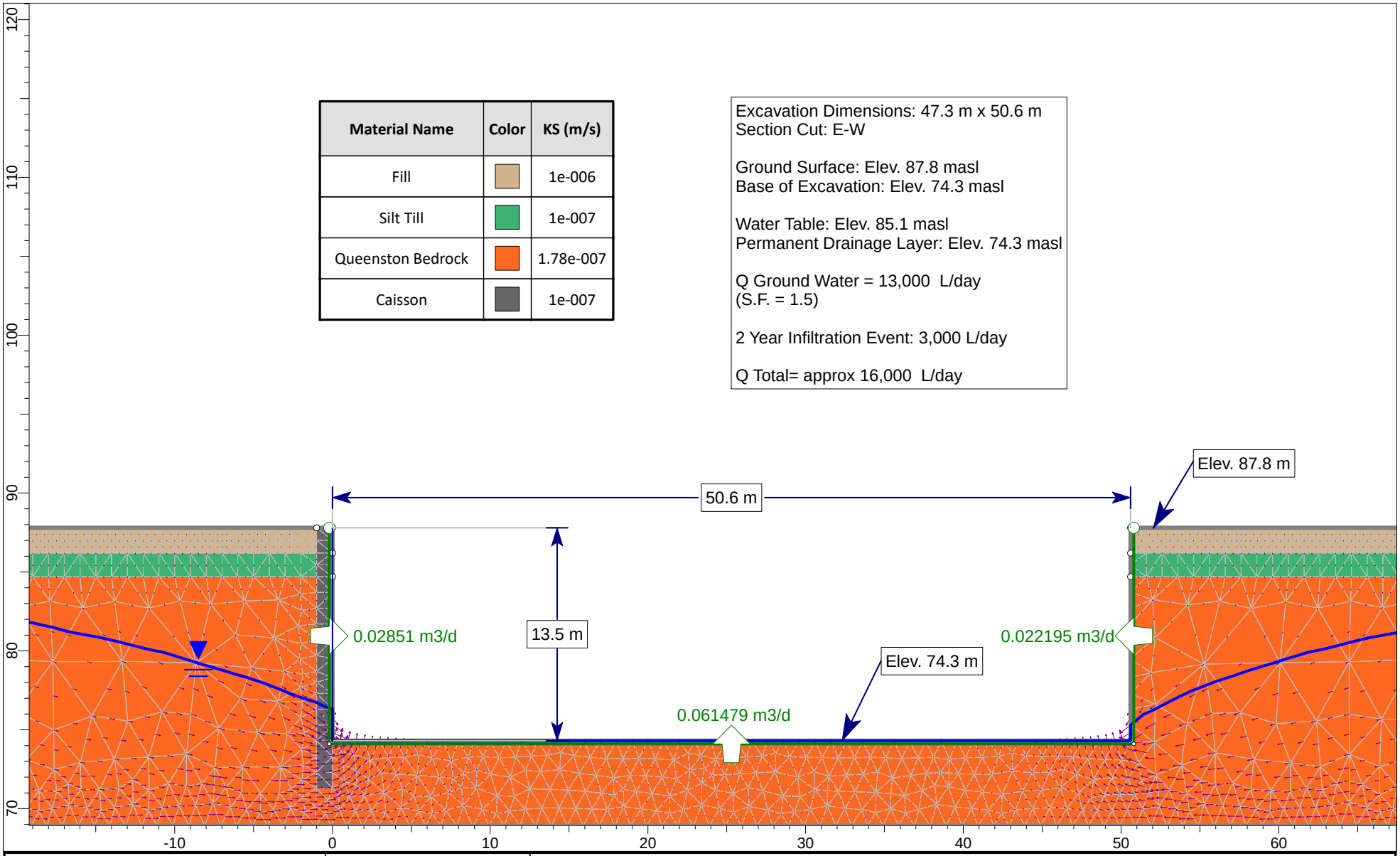
Ground Surface: Elev. 87.8 masl
Base of Excavation: Elev. 74.3 masl

Water Table: Elev. 85.1 masl
Permanent Drainage Layer: Elev. 74.3 masl

Q Ground Water = 13,000 L/day
(S.F. = 1.5)

2 Year Infiltration Event: 3,000 L/day

Q Total= approx 16,000 L/day



Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

SLIDEINTERPRET 7.038

Notes
Refer to Hydrogeological Report for factual information supporting this analysis.

Project: **1-18-0718-46 I 535 - 551 Brant Street, Burlington**

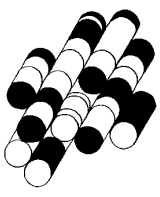
Analysis: Dewatering Analysis , Long Term , Dewatering

Date	Scale	File
2020-04-22	1:341	1-18-0718-46.slmd

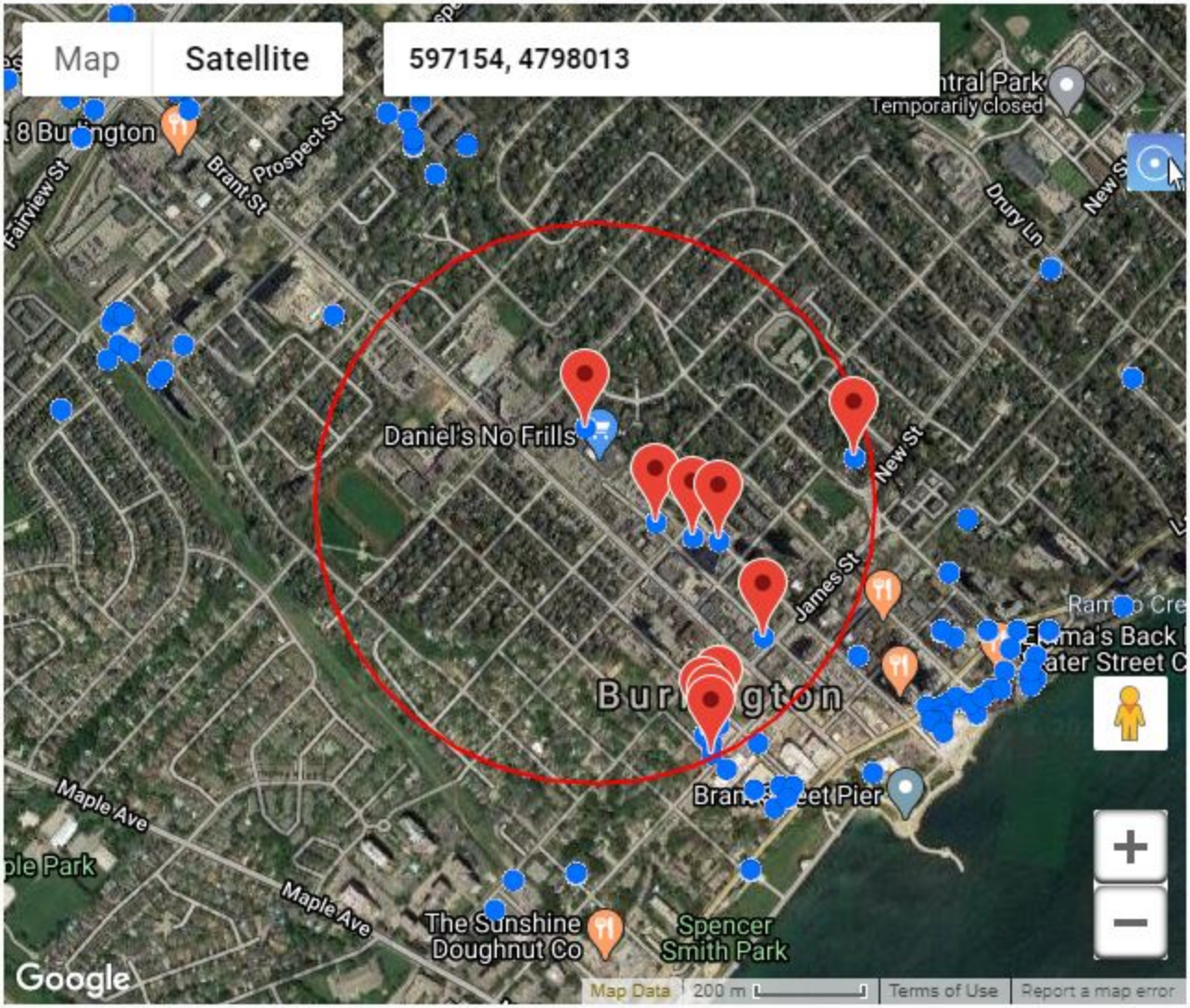
By	Ref.
UA	

APPENDIX F

TERRAPROBE INC.



*Your search returns **10** well records, which are displayed as red pins over blue dots.*



Latitude:43.32984, Longitude:-79.78973 (UTM Zone:17, Easting:598118, Northing:4798155)

Water Well Records

Tuesday, April 14, 2020

1:08:46 PM

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
BURLINGTON CITY	17 597361 4797576 W	2016/05 7464						7281183 (C33001) A197018 P	
BURLINGTON CITY	17 597370 4797950 W	2006/10 6607	0.75	FR 0011			0010 5	7038916 (Z56623) A033993	BRWN CLAY SILT SAND 0002 RED SHLE 0015
BURLINGTON CITY	17 597440 4797489 W	2008/04 6607	2.00			MO		7120146 (M01723) A067333	BRWN SAND SILT LOOS 0004 BRWN SILT SHLE DNSE 0008 RED SHLE LYRD 0020
BURLINGTON CITY	17 597250 4797979 W	2009/03 7295	0.18	FR 0010		MO		7125373 (Z67964) A084867	BRWN FILL LOOS 0003 BRWN CLAY 0010 RED SHLE 0026
BURLINGTON CITY	17 597660 4797518 W	2013/09 7147	1.25	FR 0020		MO	0010 10	7209538 (Z171605) A149632	BRWN CLAY 0010 BRWN CLAY 0020
BURLINGTON CITY	17 597615 4798107 W	7348	2.46					7216480 (Z65677) A056646	
BURLINGTON CITY	17 597344 4797582 W	2016/03 7464						7263014 (C31809) A197018 P	
BURLINGTON CITY	17 597511 4797497 W	2017/06 7383	2	0019		TH MO	0015 10	7293469 (Z264549) A226375	CLAY SLTY 0025 RED SAND
BURLINGTON CITY	17 597362 4797551 W	2016/05 7464						7281184 (C33002) A196994 P	
BURLINGTON CITY	17 597317 4797958 W	2016/10 7230						7282165 (C35922) A217079 P	
BURLINGTON CITY	17 597452 4797775 W	2016/10 7230						7283295 (C36624) A217085 P	
BURLINGTON CITY	17 596640 4798358 W	2016/11 7230	1.97			TH MO	0015 5	7283351 (Z251286) A217096	RED LOAM SLTY LOOS 0007 RED SILT SAND DNSE 0020
BURLINGTON CITY	17 597373 4797612 W	2017/02 7464						7287805 (C36267) A208388 P	

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
BURLINGTON CITY	17 597490 4797495 W	2017/06 7383	2	0016		TH MO	0015 10	7293468 (Z264548) A226376	CLAY SLTY 0025 RED SAND
BURLINGTON CITY	17 597115 4798155 W	2014/03 7147						7219025 (C25021) A161004 P	
BURLINGTON CITY BB	17 597635 4797742 W	2004/10 6607	1.97	0000			0010 10	2810067 (Z19529) A016894	BRWN SAND SILT 0003 GREY CLAY SILT 0013 RED SHLE 0020

Notes:
UTM: UTM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
DATE CNTR: Date Work Completedand Well Contractor Licence Number
CASING DIA: .Casing diameter in inches
WATER: Unit of Depth in Fee. See Table 4 for Meaning of Code

PUMP TEST: Static Water Level in Feet / Water Level After Pumping in Feet / Pump Test Rate in GPM / Pump Test Duration in Hour : Minutes
WELL USE: See Table 3 for Meaning of Code
SCREEN: Screen Depth and Length in feet
WELL: WEL (AUDIT #) Well Tag . A: Abandonment; P: Partial Data Entry Only
FORMATION: See Table 1 and 2 for Meaning of Code

1. Core Material and Descriptive terms

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
BLDR	BOULDERS	FCRD	FRACTURED	IRFM	IRON FORMATION	PORS	POROUS	SOFT	SOFT
BSLT	BASALT	FGRD	FINE-GRAINED	LIMY	LIMY	PRDG	PREVIOUSLY DUG	SPST	SOAPSTONE
CGRD	COARSE-GRAINED	FGVL	FINE GRAVEL	LMSN	LIMESTONE	PRDR	PREV. DRILLED	STKY	STICKY
CGVL	COARSE GRAVEL	FILL	FILL	LOAM	TOPSOIL	QRTZ	QUARTZITE	STNS	STONES
CHRT	CHERT	FLDS	FELDSPAR	LOOS	LOOSE	QSND	QUICKSAND	STNY	STONEY
CLAY	CLAY	FLNT	FLINT	LTCL	LIGHT-COLOURED	QTZ	QUARTZ	THIK	THICK
CLN	CLEAN	FOSS	FOSILIFEROUS	LYRD	LAYERED	ROCK	ROCK	THIN	THIN
CLYY	CLAYEY	FSND	FINE SAND	MARL	MARL	SAND	SAND	TILL	TILL
CMTD	CEMENTED	GNIS	GNEISS	MGRD	MEDIUM-GRAINED	SHLE	SHALE	UNKN	UNKNOWN TYPE
CONG	CONGLOMERATE	GRNT	GRANITE	MGVL	MEDIUM GRAVEL	SHLY	SHALY	VERY	VERY
CRYS	CRYSTALLINE	GRSN	GREENSTONE	MRBL	MARBLE	SHRP	SHARP	WBRG	WATER-BEARING
CSND	COARSE SAND	GRVL	GRAVEL	MSND	MEDIUM SAND	SHST	SCHIST	WDFR	WOOD FRAGMENTS
DKCL	DARK-COLOURED	GRWK	GREYWACKE	MUCK	MUCK	SILT	SILT	WTHD	WEATHERED
DLMT	DOLOMITE	GVLY	GRAVELLY	OBDN	OVERBURDEN	SLTE	SLATE		
DNSE	DENSE	GYPS	GYPSUM	PCKD	PACKED	SLTY	SILTY		
DRTY	DIRTY	HARD	HARD	PEAT	PEAT	SNDS	SANDSTONE		
DRY	DRY	HPAN	HARDPAN	PGVL	PEA GRAVEL	SNDY	SANDYOAPSTONE		

2. Core Color

Code	Description
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GREN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

3. Well Use

Code	Description	Code	Description
DO	Domestic	OT	Other
ST	Livestock	TH	Test Hole
IR	Irrigation	DE	Dewatering
IN	Industrial	MO	Monitoring
CO	Commercial	MT	Monitoring TestHole
MN	Municipal		
PS	Public		
AC	Cooling And A/C		
NU	Not Used		

4. Water Detail

Code	Description	Code	Description
FR	Fresh	GS	Gas
SA	Salty	IR	Iron
SU	Sulphur		
MN	Mineral		
UK	Unknown		