Hydrogeological Assessment

1840-1850 Bloor Street

Mississauga, Ontario

Ranee Management
Hydrogeological Report

August 14, 2024
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ENGLOBE

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Summary

Englobe was retained by Ranee Management to conduct a Hydrogeological Assessment at the property located at 1840-1850 Bloor Street, Mississauga, Ontario (the Site). This report was prepared to estimate the potential short-term construction dewatering and long-term (post construction) foundation drainage requirements associated with the proposed redevelopment. Furthermore, groundwater quality was assessed in comparison to the Region of Peel Sanitary and Storm Sewer Use By-Law limits to provide comments on discharge options.

Englobe (formerly Terraprobe) issued a hydrogeological review report for the Site on May 21, 2020 (file no. 1-19-0720-46). The current report is an update to reflect changes made on the proposed design drawings on the hydrogeological assessment.

The Site is located on the south side of Bloor Street, at the south of the intersection of Bloor Street and Bridgewood Drive in the City of Mississauga, Ontario. The Site is an active apartment complex that currently comprises of two (2) 14-storey residential towers with municipal addresses of 1840 and 1850 Bloor Street, Mississauga. It includes an outdoor swimming pool, a basketball court, asphalt-paved parking lots, and landscaped area. Both towers have one (1) level of underground parking that extends beyond the above-ground footprint of the respective towers (i.e., surface parking). The current conditions of the Site are presented in **Table I**.

Table I: Existing Buildings

Municipal Address	Above Grade Levels	Below Grade Levels
1840 Bloor Street (Building A)	14	1
1850 Bloor Street (Building B)	14	1

The proposed construction will consist of demolition the outdoor swimming pool and basketball court to facilitate the construction of two (2) new 18-storey residential towers on top of a 4-storey L-shaped podium in the southern half of the Site. One (1) level of U-shaped underground parking garage will be constructed beneath the podium. New circular at-grade driveway, outdoor amenity, and new landscaped area will be constructed within the central area surrounded by four (4) towers, including two (2) new towers and two (2) existing towers. The elevation of the top of finished underground parking floor was approximately at 124.55 masl (3.95 mbgs), and an approximate elevation of elevator pit level at 123.05 masl (5.45 mbgs). A summary of the proposed redevelopment is presented in **Table II**.

Table II: Proposed Redevelopment

Proposed Redevelopment Conditions						
Redevelopment Phase	Above Grade Levels	Below Grade Levels				
		Level #	Lowest Finished Floor		Approximate Base of Proposed Elevator Pit (masl)	Approximate Base of Excavation (masl)
			Depth (m)	Elevation (masl)		
Building C and Building D	18	P1	3.95	124.55	123.05	123.05

The subsoil profile and groundwater conditions for the Site are summarized in **Table III and Table IV**:

Table III: Summary of Subsoil Profile

Stratum/Formation	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Fill	0.6-3.0	125.6-127.6	1.00×10^{-6} *
Clayey to Sandy Silt (Glacial Till)	4.6-6.1	121.8-125.0	1.72×10^{-7}**
Sandy Silt/Sand and Gravel	5.6-6.1	122.3-123.5	2.67×10^{-6}**
Inferred Bedrock	5.7-6.3	121.7-123.3	1.16×10^{-7}**

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

**Indicates conductivity was estimated using in-situ hydraulic conductivity test

Table IV: Summary of Groundwater Conditions

Groundwater Conditions	
The Stabilized Shallow Groundwater Elevation for the dewatering flow rate estimation	127.55 masl (0.39 mbgs)
Zone of Influence	27.0 m (underground parking), 12.5 m (underground service)

Short-term construction dewatering flow rates are summarized in **Table V**. Short-term (construction) dewatering included underground parking excavation for the proposed buildings, and proposed underground services (sanitary and storm sewers alignments) as follow.

Table V: Summary of Shot-Term Dewatering Calculations

Ground Water Quantity: Short-Term (Construction)						
Location	**Ground Water Seepage (Safety Factor - 1.5)**		**2-Year Rainfall Event (25 mm Design Storm Event)**		**Total Discharge Volume (Seepage + Rainfall)**	
	L/day	**L/sec**	**L/day**	**L/sec**	**L/day**	**L/sec**
Proposed Underground Parking	150,500	1.74	290,500	3.36	**441,000**	**5.10**
Proposed Underground Services	24,000	0.28	14,500	0.17	**38,500**	**0.45**

Long-term (post construction) dewatering flow rates are summarized in **Table VI**.

Table VI: Summary of Long-Term Dewatering Calculations

Ground Water Quantity: Long-Term (Post Construction)						
Location	**Ground Water Seepage (Safety Factor – 1.5)**		**Infiltration (25 mm Design Storm Event)**		**Total Discharge Volume (Seepage + Infiltration)**	
	L/day	**L/sec**	**L/day**	**L/sec**	**L/day**	**L/sec**
Proposed Underground Parking	89,500	1.04	8,000	0.09	**97,500**	**1.13**

Groundwater quality was assessed in comparison with the Region of Peel Sewer Use By-Law limits with the results summarized in **Table VII**.

Table VII: Summary of Groundwater Quality Assessment

	Region of Peel Storm Sewer Limits	Region of Peel Sanitary and Combined Sewer Limits
Untreated Groundwater (Sample ID: SU-BH4)	Exceeds	Meets
Treatment Required Prior to Discharge	Yes	No

Permits potentially required to be obtained for short-term and long-term dewatering are summarized in **Table VIII**.

Table VIII: Summary of Permits Required for Dewatering

MECP Regulation Requirements	
Environmental Activity and Sector Registry (EASR) Posting	Not Required
Short-Term Permit to Take Water (PTTW)	Required
Long-Term Permit to Take Water (PTTW)	Required
Municipality Requirements, if connected to municipal sewer	
Short-Term Discharge Agreement	Required
Long-Term Discharge Agreement	Required

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1 Introduction

1.1 Site Location and Project Description

Englobe Corp. (Englobe) was retained by Ranee Management to conduct a Hydrogeological Assessment at the property located at 1840-1850 Bloor Street, Mississauga, Ontario (the Site). The Site is located on the south side of Bloor Street, at the south of the intersection of Bloor Street and Bridgewood Drive in the City of Mississauga, Ontario. The location of the Site is shown on **Figure 1**.

The Site is a trapezoidal parcel of land with a total area of approximately 39,300 m^2 (9.7 acres). The Site is an active apartment complex that currently comprises of two (2) 14-storey residential towers with municipal addresses of 1840 and 1850 Bloor Street, Mississauga. It includes an outdoor swimming pool, a basketball court, asphalt-paved parking lots, and landscaped area. Both towers have one (1) level of underground parking that extends beyond the above-ground footprint of the respective towers (i.e., surface parking). The two (2) existing towers and their underground parking structures occupy approximately the northern half of the Site. The outdoor swimming pool, basketball court, and landscaped area occupy approximately the southern half of the Site.

Based on the architectural series of drawings for OPA and ZBA resubmission, for a project entitled “Bloor, 1840-1850 Bloor St., City of Mississauga, ON, Lot 1, Registered Plan 775”, prepared by Arcadis Architects (Canada) Inc. (Arcadis) and dated June 26, 2024, the proposed construction will consist of demolition the outdoor swimming pool and basketball court to facilitate the construction of two (2) new 18-storey residential towers on top of a 4-storey L-shaped podium in the southern half of the Site. One (1) level of U-shaped underground parking garage will be constructed beneath the podium. New circular at-grade driveway, outdoor amenity, and new landscaped area will be constructed within the central area surrounded by four (4) towers, including two (2) new towers and two (2) existing towers.

Currently, municipal water and sewer services are provided to the Site. It is understood that future residential redevelopment will be municipally serviced.

The study was undertaken to assess hydrogeological conditions of the Site and to provide general information regarding the hydrogeologic impact of the proposed redevelopment on the local groundwater function. The report addresses the following areas:

- Identifying the geological and hydrogeological setting of the Site;
- Confirming groundwater level and groundwater flow direction beneath the Site;
- Assessing groundwater quality in comparison with Region of Peel Sanitary and Storm Sewer By-Law;
- Evaluate potential short-term construction dewatering needs for the proposed redevelopment;
- Estimating the long-term foundation drainage rate;
- Identifying potential impacts to the nearby groundwater receptors including water supply wells and natural heritage features pertaining the proposed redevelopment;
- Providing mitigation plan on the potential impacts to the groundwater receptors associated to the proposed redevelopment; and,
- Providing recommendation on any needs for applying for a Permit to Take Water (PTTW), or posting on Environmental Activity and Sector Registry (EASR) with Ministry of the Environment, Conservation and Parks (MECP).

1.2 Scope of Work

The scope of work for the hydrogeological assessment is summarized below:

- Review of available background information: A review of available background geological and Hydrogeological information for the site was completed using Ontario Geological Survey (OGS) maps, Ministry of Environment Conservation and Parks (MECP), Oak Ridges Moraine Group (ORMGP), and Ministry of Natural Resources and Forestry (MNRF) databases.
- Review of the City of Mississauga Official Plans and Credit Valley Conservation (CVC) Authority Policy Areas: The City of Mississauga official plans and CVC maps were reviewed to understand the location of the Site and the proposed redevelopment within the policy areas.
- Site Inspection: A visual inspection of the Site and surrounding areas was conducted to determine local topography and drainage, and an assessment of significant features.
- Groundwater Monitoring and Hydraulic Conductivity Testing: Groundwater levels within the installed monitoring wells were monitored over five (5) monitoring events. In-situ hydraulic conductivity testing was completed within the installed monitoring wells to estimate the hydraulic conductivity of the strata within the well screen interval.
- Groundwater Quality Assessment: Groundwater quality was assessed in comparison with the Region of Peel Sanitary and Storm Sewer By-Law limits to assess available options to discharge the potential short-term dewatering effluent.
- Review of Proposed Site Redevelopment Concept: The proposed site redevelopment plans were reviewed to confirm the proposed invert elevation for developing underground structures.
- Construction and Post Construction Dewatering Flow Rate Estimates: Considering the proposed redevelopment plans, construction dewatering flow rate (short-term dewatering) and long-term

foundation drainage rate were estimated using the stable groundwater table and estimated hydraulic conductivity measured in the Site.

- Mitigation Plans for Dewatering: A mitigation plan was recommended to mitigate potential short-term dewatering impacts to the nearby groundwater receptors (including natural heritage features and water supply wells), and structures, if applicable.
- Potential Dewatering Permits: Considering the estimated short-term construction and long-term post construction dewatering flow rates, recommendations were provided on any need for applying for a PTTW or posting on the EASR with the MECP, if required.

The above scope of work was undertaken in accordance with all of the following: Ontario Water Resources Act, Ontario Regulation 387/04.

2 Applicable Regulations and Agencies

The environmental regulations and policies relevant to this hydrogeological study are briefly discussed below.

2.1 Credit Valley Conservation (CVC) Authority Policies and Regulation (O.Reg. 160/06)

Under Section 28 of the Conservation Authorities Act, local conservation authorities are mandated to protect the health and integrity of the regional greenspace system, and to maintain or improve the hydrological and ecological functions performed by valley and stream corridors. The CVC, through its regulatory mandate, is responsible for issuing permits under Ontario Regulation (O.Reg.) 160/06, Development, Interference with Wetlands and Alterations to Shorelines and Watercourses for development proposal or Site alteration work to shorelines and watercourses within the regulated areas.

2.2 City of Mississauga Official Plan

The City of Mississauga's Official Plan sets up policies that deal with legislative and administrative concerns, guides physical growth, and address social, economic, and environmental concerns. The Official Plan provides land use planning designations and identifies areas of environmental significance where more stringent policies may apply for development applications.

City of Mississauga's Official Plans were reviewed for the current study with the results summarized as below:

- Schedule 1b (Urban System – City Structure) - A review of the map, dated November 22, 2019, indicates that the Site is located within an area designated as Neighbourhood.
- Schedule 3 (Natural System) - A review of the map, dated November 22, 2019, indicates that the Site is not located within the areas designated as Natural Heritage or Natural Hazards.
- Schedule 10 (Land Use Designation) - A review of the map, dated November 22, 2019, shows that the site is located within the Residential High-Density Area.

2.3 Permit to Take Water (PTTW)

According to Part III of O.Reg. 63/16, for construction dewatering, water takings of more than 50,000 L/day but less than 400,000 L/day may be registered on the Environmental Activity and Sector Registry (EASR), while water takings of more than 400,000 L/day require a PTTW issued by MECP. If it is identified that an EASR or PTTW is required for the Site, a hydrogeological report will need to be submitted in support of the application. Construction dewatering estimation will be completed as a part of scope of work for the current assessment.

2.4 Clean Water Act

The MECP mandates the protection of existing and future sources of drinking water under the Clean Water Act, 2006 (CWA). Initiatives under the CWA include the delineation of Wellhead Protection Areas (WHPAs), significant groundwater recharge areas (SGRAs) and Highly Vulnerable Aquifers (HVAs) as well as the assessment of drinking water quality and quantity threats within Source Protection Regions. Source Protection Plans are developed under the CWA and include the restriction and prohibition of certain types of activities and land uses within WHPAs.

Based on a regional-scale source water protection mapping (Source Water Protection Information Atlas) provided by the MECP, the Site is not located within a WHPA, SGRA, and HVA.

3 Methodology

3.1 Borehole Advancement and Monitoring Well Installation

Drilling boreholes and installation of monitoring wells were conducted in conjunction with geotechnical investigation between November 27 and November 29, 2019. The program consisted of the drilling of a total of eight (8) boreholes, denoted as BH1 through BH8, extending to about 5.7 to 6.3 mbgs. Three (3) monitoring wells were advanced beneath the Site. The locations of the boreholes and monitoring wells are shown on **Figure 2**.

Borehole drilling and monitoring well installation were completed by a licensed water well contractor, Profile Drilling Inc., under the full-time supervision of a geotechnical technician from Englobe (formerly Terraprobe), who also logged the soil strata encountered during borehole advancement and collected representative soil samples for textural classification. The boreholes were drilled using track-mounted drill rig with rubber tires and were advanced using continuous flight, hollow stem augers. Detailed descriptions of the encountered subsoil and groundwater conditions are presented on the borehole and monitoring well logs, on the enclosed **Appendix A**, inclusive.

The monitoring wells were constructed using 50-mm diameter PVC riser pipes and screens, which were installed in each of the selected geotechnical boreholes (BH1, BH4, and BH8) in accordance with Ontario Regulation (O. Reg.) 903. All of the monitoring wells were equipped with monument protective casings at the ground surface.

The Universal Transverse Mercator (UTM) coordinates (Zone 17T) and ground surface elevations at the monitoring wells locations, as well as the monitoring well construction details, are presented in **Table 3-1**.

The ground surface elevations and coordinates at the monitoring wells locations were surveyed by Englobe using a Trimble R10® GNSS System. The Trimble R10® system uses the Global Navigation Satellite System and the Can-Net® reference system to determine target location and elevation. The Trimble R10® system is reported to have an accuracy of up to 10 mm horizontally and up to 30 mm vertically.

Table 3-1- Monitoring Well Installation Details

Monitoring Well ID	Installation Date	UTM Coordinates (m)		Ground El. (masl)	Monitoring Well Depth (mbgs)	Screen Interval (mbgs)	Casing Dia. (mm)	Protective Casing Type
		Easting	Northing					
BH1	November 29, 2019	614303	4831204	128.8	5.9	4.4 - 5.9	50	Monument
BH4	November 28, 2019	614357	4831221	127.9	5.6	2.6 - 5.6	50	Monument
BH8	November 27, 2019	614331	4831302	128.6	6.1	3.1 - 6.1	50	Monument

mbgs metres below ground surface
masl metres above sea level

3.2 Groundwater Monitoring

All three (3) installed monitoring wells were utilized to measure and monitor groundwater levels. Monitoring wells were developed, and the groundwater monitoring program confirmed the stabilized groundwater level beneath the Site. The stabilized groundwater levels were monitored over five (5) monitoring events. The findings are presented in **Section 6.1**.

3.3 MECP Water Well Records Review

MECP Water Well Records (WWRs) were reviewed for the registered wells located at the Site and within 500 m radius of the Site boundaries (study area). The findings of the MECP well records are presented in the **Section 4.6** of the current report.

3.4 In-Situ Hydraulic Conductivity Test

Three (3) installed monitoring wells for hydrogeological assessment including BH1, BH4 and BH8 were utilized to conduct hydraulic conductivity testing. The in-situ test provides estimated hydraulic conductivity (K) for subsoil strata at the depths of the well screens. The monitoring wells were developed in advance of the tests. Well development involves the purging and removal of groundwater from each monitoring well to remove remnants of clay, silt and other debris introduced into the monitoring well during construction, and to induce the flow of formation groundwater through the well screens, thereby improving the transmissivity of the subsoil strata formation at the well screen depths.

The in-situ falling head hydraulic conductivity test involves the placement of a slug of known volume into the monitoring well, below the water table, to displace the groundwater level upward. The rate at which the water level recovers to static conditions (falling head) is tracked using a data logger/pressure transducer, and/or manually, using a water level tape. The rate at which the water table recovers to static conditions is used to estimate the K value for the water-bearing strata formation at the well screen depth. The findings for the hydraulic conductivity testing are presented in **Section 6.3.1** of the current report.

3.5 Hydraulic Conductivity based on Grain Size Distribution Graphs

The Hazen equation estimation method was also used to estimate the hydraulic conductivity (K) for saturated subsoils at selected depths beneath the water table below the subject site. The method provides alternative hydraulic conductivity (K) estimates which are derived from the grain size diameter, whereby 10% by weight of the soil particles are finer and 90% are coarser (Freeze and Cherry, 1979). The soils chosen for Hazen estimation were selected primarily within the well screen depths. Findings are presented in **Section 6.3.2**.

3.6 Groundwater Quality Assessment

One (1) set of groundwater samples was collected from one (1) selected monitoring well (BH4) to characterize its quality for evaluation against the Region of Peel Storm and Sanitary Sewer Use By-Law (53-2010) parameters. This is performed to assess whether any anticipated dewatering effluent can be disposed of into the City of Mississauga sewer system during construction or following site redevelopment for any long-term foundation drainage. Based on the results, recommendations for any pre-treatment for any dewatering/drainage effluent can be developed, if required.

One (1) selected monitoring well was developed and purged of three (3) well casings volumes of groundwater prior to sample collection. One (1) complete set of groundwater samples was not filtered during collection, prior to placement in the laboratory sample bottles. Upon sampling, all of the bottles will be placed in ice and packed in a cooler at about 4 ± ºC for shipment to the analytical laboratory. Sample analysis was performed by SGS Canada Inc., a laboratory accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). The results of the analysis are discussed in **Section 6.4** of the current report.

3.7 Review of Regional Data and Available Reports for the Site

The maps, data, and documents provided by the MECP, Ontario Geological Survey (OGS), Ministry of Natural Resource and Forestry (MNRF), and CVC were reviewed. Additionally, available previously issued and concurrent geotechnical reports were reviewed at the time of preparation of the current hydrogeological report, with the findings summarized in **Section 4.**

4 Regional and Local Site Setting

4.1 Regional Geology

The current understanding of the surface geological setting of the Site is based on scientific work conducted by the OGS (OGS, 2003). The Site is located within an area mapped as glaciolacustrine-deposits consisting of clay to slit till (5d). **Figure 3** illustrates the mapped surficial geology for the Site and the surrounding area.

Oak Ridges Moraine Group (ORMGP) produced a cross-sectional geological map to aid in the characterization of the general area. Considering the regional cross-section, it is understood that the overburden unit prevalent in this area consists of Halton Till (equivalent).

Halton Till (Upper Till): The Halton Till is mainly comprised of sandy silt to clayey silt till interbedded with silt, clay, and a number of discontinuous sand and gravel lenses. It was deposited approximately 12,500 years ago. Based on cross-sectional geology, the Halton Till or equivalent is present approximately in ground surface, with an approximate thickness of up to 4.3 m.

Bedrock: The underlying bedrock at the Site is the Georgian Bay Formation, which consists of shale, limestone, dolostone, and siltstone (OGS, 2007). A review of the ORMGP cross-section indicates that the bedrock could be contacted in approximate depth of 4.6 mbgs (El. 124.2 masl) beneath the Site. Inferred bedrock was contacted at depths ranging between 4.6 and 6.1 meters below the prevailing ground surface (mbgs) over the current subsurface investigation.

4.2 Regional Physiography

The Site is located within a regional physiography of Southern Ontario known as South Slope. The South Slop plain within the vicinity of the Site comprises drumlinized till plain. The South Slope is the southern slope of the Oak Ridges Moraine, which includes a land strip south of the Peel Plain. It rises to the line of contact with the moraine at elevations ranging from 244.0 to 305.0 masl. In other words, it rises 91.0 to 122.0 m in elevation and has an average width of 9.66, or 11.27 km. The south slope extends from the Niagara Escarpment to the Trent River where it covers an area of approximately 2,435.0 km^2. (Chapman and Putnam, 1984) **Figure 4** shows the location of the Site within the regional physiography map.

4.3 Regional Topography and Drainage

A review of a survey plan prepared by Speight, Van Nostrand & Gibson Limited, dated May 22, 2019 indicates that the ground surface elevation approximately ranges between 127 masl and 130 masl. The plan review shows that topography of the Site slopes gently towards south/southeast limits, in general.

Figure 5 shows regional topography of the Site and surrounding area. Considering the topography map ground surface elevation for the Site and the surrounding area slopes south/southeast direction. As such, it is anticipated that generated runoff (if it is not managed) will flow east-southeast direction.

4.4 Watershed Setting

The Credit Valley Conservation (CVC) watershed map was reviewed on March 31, 2020. The Site is located within the Lake Ontario Shoreline East Tributaries sub watershed, which has an approximate area of 44.25 km^2. The main type of wetland along the Lake Ontario shoreline is the drowned river mouth wetland. These wetlands provide specialized habitat for rare species, and are a key stopover for migrating birds (CVC, 2009).

4.5 Local Surface Water and Natural Heritage Features

MNRF database was reviewed on April 06, 2020 for any natural heritage features including, watercourses, bodies of water, wetland features, Area of Natural and Scientific Interest (ANSI) and wooded areas. **Figure 6** shows the location of the Site within the surrounding Natural Heritage Features. Etobicoke Creek is located approximately 200 m to the east of the Site, and Lake Ontario is located approximately 5.5 km to the south of the Site. Wooded areas are scattered at the north and east sides of the Site. Parts of the south portion of the Site is located within the wooded area. The wooded area also extends to the east outside of the Site boundary.

Record review indicates that there are no other records for natural heritage features including wetland, water bodies, watercourses and ANSI within or in close proximity to the Site.

4.6 Ground Water Resources (MECP Well Records)

MECP well record database was reviewed on March 26, 2020 for records located within a radius of 500 m from the approximate Site boundary (Study Area). The location of the well records is presented on **Figure 7** with the details for each well is summarized in **Appendix B.** A total of 37 wells were located within the study area. A summary of data obtained from record review is presented in **Table 4-1.**

The summary indicates that most local wells registered as observation wells. Approximately 43% of the registered wells are completed less than 6.0 mbgs; and approximately 35% of the registered wells are completed deeper than 6.0 mbgs. Static groundwater level was unknown for majority of the wells (i.e., 78%). Static groundwater level was recorded shallower than 4.5 mbgs within approximately 22% of the wells. Record review indicates that no water supply wells are registered.

The site is situated in a serviced area within the City of Mississauga. Additionally, there are no records for water supply wells within or in close proximity to the Site. As such, a door to door well survey is not required in advance of, during and after construction.

Table 4-1- MECP Well Records Summary

Number of the Well Records	**37**
Well Type	
Drilled Well	26 (70%)
Dug Well	0 (0 %)
Unknown	7 (19%)
Other	4 (11%)

Depth Ranges	
Less or 3.0 m (10 ft)	0 (0%)
3.0 m to 6.0 m (10 ft to 20 ft	16 (43%)
Greater than 6.0 m (20 ft)	13 (35%)
Unknown	8 (22%)
Water Use (Final Status)	
Observation Well	18 (48%)
abandoned/Other	1 (3%)
Test Hole	4 (11%)
Monitoring/test hole	6 (16%)
Water Supply	0 (0%)
Unknown	8 (22%)
Reported Static Level	
0 to 4.5 m (0 to 15 ft)	8 (22%)
Unknown	29 (78%)

Active Permit to Take Water Application Records Review

MECP website was reviewed for any active PTTW application records within 1.0 km radius of the Site on July 29, 2024. Record review indicates one (1) active PTTW within the Study Area. Detail is summarized in **Table 4-2**:

Table 4-2- Active PTTW Application Records

Permit NO.	Permit Holder Name	Purpose	Specific Purpose	Max Litres per Day	Source Type	Approx. Distance (km)
4837-A7XR4S	Markland Wood Golf Club	Commercial	Golf Course Irrigation	1,703,250	Surface Water	0.3

5 Local Geology and Subsurface Investigation

Englobe (formerly Terraprobe) completed a geotechnical investigation on February 25, 2019. The fieldwork consisted of drilling of a total of eight (8) boreholes extending to maximum depths depth of 6.3 mbgs. Information regarding borehole logs and grain size distribution graphs is presented in **Appendix A**. The approximate locations of boreholes are shown on **Figure 2**. A review of the geotechnical investigation report indicates that the stratigraphy beneath the investigated areas of the Site generally consists of the followings:

5.1 Fill

Brown to dark brown miscellaneous fill material consisting of clayey to sandy silt with trace amounts of gravel and organic matters were encountered beneath 140 mm to 160 mm topsoil in all eight (8) boreholes. The fill layer extended to depths ranging from approximately 0.6 mbgs at BH3 and BH4 to 3.0 mbgs at BH2.

Standard Penetration Test results (N-values) obtained from the earth fill zone ranged from 5 to 18 blows per 300 mm of penetration (blows per foot, bpf), indicating firm to very stiff consistency (cohesive soils) or loose to compact relative density (cohesionless soils). The moisture contents of the fill samples ranged from 8 to 20%, indicating a moist condition.

5.2 Native Soil (Undisturbed Soils)

5.2.1 Silty Sand

A brown silty sand unit with trace amount of gravel was encountered beneath the fill material in BH1. The silty sand layer extended to an approximate depth of 3.0 mbgs at BH1.

N-value obtained from the undisturbed silty sand deposit was 17 bpf, indicating that the unit is compact in consistency. The moisture content of the native soil sample was 14%, indicating a wet condition.

5.2.2 Glacial Till

Undisturbed native glacial till material consisting of clayey to sandy silt with various amount of sand and gravel (some sand and trace gravel) was encountered underneath the fill material and extended to approximate depths of 4.6 mbgs in BH1 to BH4, and 6.0 mbgs in BH5 to BH8.

N-values obtained from the till layer ranged from 12 bpf to 50 blows per 75 mm of penetration, indicating soft to hard consistency. The moisture contents of the till samples ranged from 4 to 18%, indicating damp to wet conditions.

5.3 Inferred Bedrock

Grey weathered shale bedrock fragments were encountered beneath the sand and gravel layer in BH2, underneath the sandy silt layer in BH4, and beneath the glacial till in BH1, BH3, and BH5 through BH8, extending to the termination depths of investigation at all boreholes.

The inferred bedrock beneath the site is expected to be of the Georgian Bay Formation, which is a deposit predominantly comprised of thin- to medium-bedded grey shale of Ordovician age. The shale contains interbedded grey calcareous shale, limestone/dolostone and calcareous sandstone (conventionally grouped together as “limestone”) which are discontinuous and nominally 25 to 125 mm thick.

The augered borehole method used at this site is conventionally accepted investigative practice. However, the interval sampling method does not define the bedrock surface with precision, particularly where the surface of the rock is weathered, weaker and easily penetrated by auger. The auger refusal is generally indicative of a presence of a relatively less weathered/sound shale and/or limestone/dolostone layers. It should be noted that confirmation and characterization of the bedrock through rock coring was not included in our scope of work. Therefore, the bedrock surface elevations at the borehole locations, as noted on the borehole logs, could not be confirmed, and were inferred from the borehole augering, auger grinding, split barrel sampler refusal and bouncing. Auger grinding or sampler refusal in this case could either be inferred as bedrock or could be due to the presence of boulders/obstruction/limestone slabs which may be present within the overburden, therefore actual bedrock surface elevations may vary from the inferred elevations noted on the borehole logs. It must be noted that inference of bedrock level based on auger grinding and/or sampler refusal does not provide bedrock level accurately.

6 Local Hydrogeological study

6.1 Monitoring well development and Ground Water Level Monitoring

A groundwater monitoring program was completed between December 10, 2019 and January 9, 2020, and on June 3, 2024 as a part of the hydrogeological assessment. Three (3) monitoring wells installed for the hydrogeological assessment (BH1, BH4, and BH8) were considered for groundwater monitoring program.

Groundwater levels were monitored over five (5) monitoring events. The measured groundwater levels, along with other monitoring wells details and findings, are presented in **Appendix C**. A summary of the groundwater observations is provided in **Table 6-1**:

Table 6-1- A Summary of Groundwater Monitoring

Monitoring Well ID	Unit	Ground El. (masl)	Screen Interval	Groundwater Level					Fluctuation
				Dec. 10, 2019*	Dec. 16, 2019	Dec. 23, 2019	Jan. 09, 2020	June 3, 2024	
BH1	masl	128.79	124.4 - 122.9	127.37	127.17	127.52	127.11	N/A	0.41
	mbgs	-	4.4 - 5.9	1.42	1.62	1.27	1.68	N/A	
BH4	masl	127.94	125.3 - 122.3	127.43	127.55	127.39	127.33	N/A	0.22
	mbgs	-	2.6 - 5.6	0.51	0.39	0.55	0.61	N/A	
BH8	masl	128.61	125.5 - 122.5	125.32	126.70	126.98	126.62	126.68	0.36
	mbgs	-	3.1 - 6.1	3.29	1.91	1.63	1.99	1.93	

Notes:
*Unstabilized groundwater level reading
mbgs metres below ground surface
masl metres above sea level
N/A damaged/blocked monitoring well

As shown in **Table 6-1**, the highest and lowest shallow groundwater levels were measured at El. 127.55 masl and 126.62 masl at BH4 and BH8, respectively. The average groundwater levels ranged from 126.75 masl to 127.42 masl.

In addition, the highest groundwater fluctuation of 0.41 m was measured at monitoring well BH1. The lowest fluctuation of 0.22 m was recorded at monitoring well BH4 location over the monitoring period.

6.2 Shallow Groundwater Flow Pattern

Groundwater level elevations measured on December 23, 2019 were considered to interpret the shallow groundwater flow pattern beneath the Site. **Figure 8** presents the interpreted shallow groundwater elevation contours. A review of the plan indicates that the shallow groundwater is interpreted flowing the northeasterly direction, in general, towards the Etobicoke Creek.

6.3 Hydraulic Conductivity Testing

6.3.1 In-Situ Hydraulic Conductivity Testing

Monitoring wells BH1, BH4, and BH8 underwent single well response tests (SWRTs) to assess the hydraulic conductivity (K) for saturated shallow aquifer subsoils at the depths of the well screens. Each monitoring well was equipped with a digital transducer to record the fluctuation made to complete the SWRT. The results of the SWRT tests are presented in **Appendix D**, with a summary of the findings provided in **Table 6-2**.

Table 6-2- A Summary of Falling Head Hydraulic Conductivity Testing

Well ID	Ground El. (masl)	Monitoring Well Depth (mbgs)	Screen Interval (mbgs)	Screened Soil Strata	Hydraulic Conductivity (K) (m/sec)	Test Method
BH1	128.8	5.9	4.4 - 5.9	Inferred Bedrock/Clayey silt (glacial till)	1.16×10^{-7}	Falling Head Test
BH4	127.9	5.6	2.6 - 5.6	Sandy silt/Clayey to sandy silt (glacial till)	2.67×10^{-6}	Falling Head Test
BH8	128.6	6.1	3.1 - 6.1	Clayey to sandy silt (glacial till)	1.72×10^{-7}	Falling Head Test

Notes:
mbgs metres below ground surface
masl metres above sea level

A review of the findings indicates a moderate hydraulic conductivity for the subsoil profile and featured bedrock contacted within the screen interval.

6.3.2 Hydraulic Conductivity Test Using Grain Size Distribution Graphs

The Hazen Equation method was adopted to estimate the hydraulic conductivity (K) for different soil layers which may contain groundwater during the seasonal high water table (spring) period, or if they are not encountered within the screen intervals.

The Hazen Equation method relies on the interrelationship between hydraulic conductivity and effective grain size, d10, in the soil media. This empirical relation predicts a power-law relation with K, as follow:

$$K = Ad_{10}^2$$

where;

d_{10}: Value of the soil grain size gradation curve as determined by sieve analysis, whereby 10% by weight of the soil particles are finer and 90% by weight of the soil particles are coarser.

A: Coefficient; it is equal to 1 when K in cm/sec and d_{10} is in mm

The Hazen Equation estimation provides an indication of the groundwater yield capacity for saturated soil strata at the depths where soils samples were selected for grain size analysis. The grain size distribution graphs prepared for the geotechnical investigation were used to the estimate the hydraulic conductivity, with the details are presented in **Appendix A**. The results of the Hazen equation are provided in **Table 6-3**, below.

Table 6-3 - A Summary of Hydraulic Conductivity Using Hazen Equation

Borehole/Monitoring Well ID	Soil Sample Depth (mbgs)	Soil Sample Elevation (masl)	Soil Strata	Hydraulic Conductivity (m/sec.)
BH2	3.3 (SS5)	126.3	Silt and sand (glacial till)	2.07×10^{-8}
BH3	4.8 (SS6)	123.4	Silty sand (glacial till)	4.48×10^{-9}
BH8	4.8 (SS6)	123.8	Clayey to sandy silt (glacial till)	3.25×10^{-9}

Notes:
mbgs metres below ground surface
masl metres above sea level

The K estimates determined using the Hazen method suggests very low hydraulic conductivity for silt and sand (glacial till), silty sand (glacial till), and clayey to sandy silt (glacial till) units.

6.4 Groundwater Quality

One (1) representative groundwater sample was collected for analysis from monitoring well BH4 on December 23, 2019. The sample was submitted for analysis and evaluation against the Region of Peel Sewer Use By-Law (53-2010) limits.

The submitted samples consisted of unfiltered groundwater, with results presented as totals for various parameters analyzed. Upon sampling, all bottles were placed in ice and packed in a cooler at about 4°C for shipment to the analytical laboratory. Sample analysis was performed by SGS Canada Inc., which is accredited by CALA. The results of the analysis are provided in **Appendix E**, with a discussion of the findings provided below.

The analytical results for the unfiltered groundwater samples obtained from monitoring well BH4 indicates that the concentrations for all the analyzed parameters meet the Region of Peel's sanitary sewer discharge; and exceeded storm sewer discharge with the exceedances for Total Suspended Solids (TSS) and Total Manganese. The exceedances, together with the storm sewer use criteria, are presented in **Table 6-4.**

Table 6-4- Groundwater Quality Analysis Results Exceeded

Exceeded Parameter	Groundwater Quality Results (mg/L)	Region of Peel Storm Limits (mg/L)
TSS	**79**	15
Total Manganese	**0.758**	0.05

The results suggest that any construction dewatering or foundation drainage effluents should be acceptable for discharge to the City of Mississauga sanitary sewer. The anticipated effluent would not be acceptable for discharge to the City of Mississauga storm sewer system. However, implementing pre-treatment to lower TSS and total manganese to meet Region of Peel storm sewer by-law limits could potentially permit its discharge to the City's storm sewer system.

7 Construction dewatering

7.1 Proposed Redevelopment Plan Review

The proposed Site redevelopment plan prepared by Arcadis Architects (Canada) Inc. (Arcadis), was reviewed for the current study. The reviewed plans include the architectural series of drawings, and prepared for OPA and ZBA resubmission, for a project entitled "Bloor, 1840-1850 Bloor St., City of Mississauga, ON, Lot 1, Registered Plan 775," dated June 26, 2024. The proposed construction will consist of demolition the existing outdoor swimming pool and basketball court to facilitate the construction of two (2) new 18-storey residential towers on top of a 4-storey L-shaped podium in the southern half of the Site. One (1) level of U-shaped underground parking garage will be constructed beneath the podium. The approximate locations of the two (2) existing residential towers, the proposed two (2) new residential towers and the limit of the new (one level) underground parking are shown in the attached **Figure 9-1**. Additionally, it is understood that the Finished Floor Elevation (FFE) for the proposed underground parking is proposed at El. 124.55 masl.

A review of Preliminary Site Servicing Plan, Drawing No. C102, issued for coordination dated August 08, 2024, prepared by C.F. Crozier & Associates Consulting Engineers indicates that sanitary and storm sewer alignments are proposed as a part of future development. **Figure 9-2** presents the proposed underground services and the existing manholes. The proposed alignments should be connected to the existing manholes.

7.2 A Review of Geotechnical Investigation Report

Englobe's geotechnical investigation report entitled "*Geotechnical Investigation, Proposed Residential Development, 1840-1850 Bloor Street, Mississauga, Ontario*" dated July 18, 2024, was reviewed as below:

- Based on a total of eight (8) boreholes, denoted as BH1 through BH8, subsurface conditions of the Site included the topsoil layer at the ground surface underlain by a layer of fill materials (clayey silt and sandy silt fill), which extended to depths ranging from approximately 0.6 mbgs at BH3 and BH4 to 3.0 mbgs at BH2. Silty sand was encountered below the fill material in BH1, extended to an approximate depth of 3.0 mbgs at BH1. Glacial till material consisting of clayey to sandy silt was encountered underneath the fill materials and extended to approximate depths of 4.6 mbgs in BH1 to BH4, and 6.0 mbgs in BH5 to BH8. Grey weathered shale bedrock fragments were encountered beneath the sand and gravel layer in BH2, underneath the sandy silt layer in BH4, and beneath the glacial till in BH1, BH3, and BH5 through BH8, extending to the termination depths of investigation at all boreholes. The inferred bedrock beneath the site is expected to be of the Georgian Bay Formation.
- The design drawing implied the P1 FFE would be set at Elev. 124.55 m. The underside of the spread footings may be at Elev. 123.3 m± (1.2 m allowance for the footing depth and frost protection).
- Based on the findings from the subsurface investigation, glacial till material was encountered at about El. 125.0 m in all boreholes and undisturbed glacial till is considered suitable material to support the proposed structure foundations. It is recommended the proposed structure should bear on the glacial till material at about El. 125.0 m and lower.
- A maximum net geotechnical reaction at Serviceability Limit States (SLS) of 400 kPa and a maximum factored geotechnical bearing resistance at Ultimate Limit States (ULS) of 600 kPa are

recommended for design of conventional spread footing foundations (for vertical and concentric loads) supported on the underlying competent undisturbed glacial till material.

- The P1 FFE is set at Elev. 124.55 mm, which is only up to 2.8 m above the top of the partially weathered shale (about 1.5 m below the footing underside). In addition, the high-rise towers will impose significant structural loads on the foundations. Therefore, the consideration may be given to extend the footings to deeper depths to bear on partially weathered (Zone II) shale bedrock to provide uniform and high bearing capacity foundations for the proposed towers.
- The underside of footing elevations must be designed to provide a minimum of 1.2 m of soil cover or equivalent insulation to the foundation subgrade for frost protection considerations for all exterior foundations and foundations in unheated areas. All footings must be designed to bear at least 0.3 m into the undisturbed native soil stratum.
- Decisions regarding shoring methods and sequencing are the responsibility of the Contractor. Temporary shoring should be carried out by a licensed Professional Engineer experienced in shoring design. The detailed design of the proposed building was not available at the time of preparation of this report. The shoring requirements for the site will have to be examined in detail with respect to the site boundary constraints, once the redevelopment details and the building footprint are finalized. Depending upon the boundary conditions and structures located in the vicinity, groundwater condition and dewatering details, the shoring system may consist of a rigid (interlocking drilled caissons) or a steel soldier piles and timber lagging shoring system, or a combination of both. Based on the subsurface soil conditions (predominantly low permeability cohesive soils) a soldier piles and timber lagging shoring system should suffice for the site except in the area where existing structures are located in the close proximity/zone of influence of the excavation where a caisson wall shoring system will be required to provide support to existing foundations at an at-rest condition.
- The fill material as well as undisturbed native soil deposit encountered in the boreholes are classified as Type 3 Soil above and Type 4 Soil below the prevailing groundwater level, while glacial till deposit would be classified as Type 2 above and Type 3 below the prevailing groundwater level. Where workmen must enter excavations advanced deeper than 1.2 m, the trench walls should be suitably sloped and/or braced in accordance with the Ontario Occupational Health and Safety Act (OHSA) and Regulations for Construction Projects. The steepest slope inclination of excavation for Type 2 and Type 3 Soil should be 1 horizontal to 1 vertical, and for Type 4 Soil should be 3 horizontal to 1 vertical.

7.3 Summary of Hydrogeological Conditions of Site Redevelopment

The results of the investigation completed by Englobe indicate the following hydrogeologic features for the Site:

- Underlying the fill, native deposits mainly comprises of glacial till (clayey to sandy silt) and partially sandy silt/sand and gravel, underlain by inferred bedrock were encountered.
- It should be noted that a sand and gravel unit was encountered only in BH2, which was not encountered in any other boreholes. Therefore, it is recommended that further investigations should be conducted to determine the extent of this sand and gravel unit.
- The shallow groundwater table for design purposes was to be at El. 127.55 ± masl (0.39 mbgs) measured at BH4 located within the proposed underground parking area.

- Based on a review of the estimated hydraulic conductivity for clayey to sandy silt (glacial till), the hydraulic conductivity of 1.72 x 10^{-7} m/sec was considered for dewatering calculations. Additionally, an estimated hydraulic conductivity of 2.67 x 10^{-6} m/sec for sandy silt/sand and gravel, and 1.16 x 10^{-7} m/sec for inferred bedrock were considered. Value of 1.0 x 10^{-6} m/sec was considered for hydraulic conductivity of fill material based on typical published values from Freeze and Cherry (1979).
- Based on the recommendations provided in Englobe's geotechnical investigation report dated July 18, 2024, conventional spread footing foundations was considered. Soldier piles and timber lagging shoring system should suffice for the site except in the area where existing structures are located in the close proximity/zone of influence of the excavation where a caisson wall shoring system will be required to provide support to existing foundations at an at-rest condition. However, shoring design may need to be examined in detail later once the detailed design of the proposed building is finalized, which was not available at the time of preparation of this report. Therefore, soldier piles and timber lagging shoring system as a conservative scenario was considered for dewatering flow rate estimations.

7.4 Short-Term Groundwater Control Requirements (Construction Dewatering)

7.4.1 Proposed Building

Dewatering Flow Rate Estimate

- Based on the latest architectural drawings dated June 26, 2024 and the elevations provided by the Arcadis architect involved in the project, in an email dated July 5, 2024, the following elevations were considered for the current dewatering flow rate estimations:
    - Grading elevation is proposed at El.128.33 masl.
    - Top of the finished underground parking floor is proposed at El. 124.55 masl.
    - Elevator pit was assumed at approximately 123.05 masl.
- Based on the proposed one (1) level of U-shaped underground parking garage, dewatering calculations were completed considering one (1) bulk excavation area.

Short-term dewatering flow rate was estimated reviewing the proposed redevelopment plans, considering subsoil profile, groundwater conditions and estimated hydraulic conductivity for the geological units in which the excavation and construction of the underground parking will be completed. A permeable shoring system (soldier piles and timber lagging) was considered for the current short-term dewatering flow rate estimate. The assumptions considered for the dewatering flow rate calculations are summarized in **Table 7-1**.

Table 7-1- Summary of Proposed Excavation Dimensions

Proposed Redevelopment	Approximate Proposed Width (m)	Approximate Proposed Length (m)	Assumed Elevator Pit El. (masl)	Shallow Groundwater Level (masl)	Proposed Shoring
Underground Parking of Buildings C and D	87.6	132.5	123.05	127.55	Permeable Shoring

Notes:
mbgs metres below ground surface
masl metres above sea level

As the approximate elevation of elevator pit was assumed to be at 123.05± masl, a dewatering target of 122.05± masl was used to maintain a dry base of excavations for short-term (during construction).

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

The estimated construction dewatering rates for the proposed redevelopment are summarized below:

- The construction dewatering flow rate for groundwater seepage is calculated at 100,127 L/day, and it could extend up to 150,500 L/day, considering a safety factor of 1.5 the upward dewatering limit.
- The above estimate does not take into account storm water management from rainfall events. The collection system should also account for a typical 2-year design storm event which will generate approximately 290,500 L/day.
- The 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, which translates to approximately 1,091,000 L/day.
- A total volume of 441,000 L/day is anticipated for short-term construction dewatering. Total anticipated short-term dewatering flow rate is summarized in **Table 7-2**.

Table 7-2- Summary of Short-Term Dewatering Calculations

Location	Ground Water Seepage (Safety Factor - 1.5)		2-Year Rainfall Event (25 mm Design Storm Event)		Total Discharge Volume (Seepage + Rainfall)	
	L/day	L/sec	L/day	L/sec	L/day	L/sec
Underground Parking of Buildings C and D	150,500	1.74	290,500	3.36	441,000	5.10

Zone of Influence

The conceptual Zone of Influence (ZOI) for dewatering, also known as Radius of Influence (R_0), was calculated based on the anticipated maximum drawdown required and the average hydraulic conductivity recorded at the Site using Sichardt's Relationship. The native stratigraphy at the Site generally consists of clayey to sandy silt (glacial till) and partially sandy silt/sand and gravel. The ZOI was calculated for short-term (construction) for the Site.

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

Where dH is the drawdown (m)

K is the hydraulic conductivity (m/s)

It is assumed that the current grading elevation will be at El. 128.65 masl. Base of the footing will be developed to a depth of 5.03 m below the proposed grade of 128.33 masl, at El. 123.3 masl. The elevator pit is proposed to be constructed at a 1.5 m depth below the lowest FFE at approximately 123.05 masl. To provide safe, dry and stable conditions for excavations, the water table will need to be lowered in advance of or during excavation for approximately 1.0 m below the proposed base of the proposed elevator pit at El. 122.05 masl. The highest shallow groundwater level is measured at 127.55 masl.

Zone of Influence Calculations – Glacial Till:

$$R_0 = 3000 * 5.5\ m * 1.72 \times 10^{-7}\ m/s^{0.5}$$

$$R_0 = 6.8\pm\ m$$

Zone of Influence Calculations – Sandy silt/sand and gravel:

$$R_0 = 3000 * 5.5\ m * 2.67 \times 10^{-6}\ m/s^{0.5}$$

$$R_0 = 27.0\pm\ m$$

The maximum estimated ZOI could reach 27.0 m from the proposed excavation area.

7.4.2 Proposed Underground Services

Proposed buildings will be connected to the existing sanitary and storm manholes. The location and the invert elevations are presented on **Figure 9-2**, with a summary presented in **Table 7-3**.

Table 7-3- Summary of Proposed Underground Services

Proposed Alignment	Approximate Width (m)	Approximate Proposed Length (m)	Existing MH El. (masl)	Shallow Groundwater Level (masl)
Proposed Storm Sewer Alignment	2	163.7	123.53	127.55
Proposed Sanitary Sewer Alignment	2	111.5	125.37	127.55

Dewatering Flow Rate Estimate

Pumping rate calculations for the proposed underground services performed based on the assumption that the proposed manholes and catch basins excavation footprint will act as a single large radius dewatering well. The calculations were based on equations of radial flow provided in Powers et al. (2007). For the purposes of this analysis, steady state flow into an open excavation is assumed. Moreover, the analysis is considered based on the entire length of sanitary sewer alignment (111.5 m) and the entire length of the storm sewer alignment (163.7 m) kept open for construction purposes. Additionally, the equations of radial flow have the following assumptions:

- Ideal aquifer conditions (homogeneous, isotropic, uniform thickness and has infinite areal extent);
- Fully penetrating pumping well;
- Only uniform lateral flow to the pumping well; and
- Constant pumping rate with the flow to the pumping well reaching steady state.

The following equation was used to compute the dewatering rates required for the proposed underground services alignment and is based on unconfined aquifer conditions:

$$Q = \frac{\pi K(H^2 - h^2)}{\ln(R_0 / r_s)} + 2\left[\frac{xK(H^2 - h^2)}{2L}\right]$$

Where,

Q	=	Anticipated pumping rate (m^3/day)
K	=	Hydraulic conductivity (m/day)
H	=	Distance from initial static water level to bottom of the saturated aquifer (m)
h	=	Depth of water in the well while pumping (m)
R_0	=	Distance from a point of greatest drawdown to a point where there is no drawdown (radius of influence) (m)
r_s	=	Distance to the wellpoints from the centre of the trench, assumed to be half of the trench width (m)
x	=	Trench length (m)
L	=	Distance from a line source to the trench, assumed to be equivalent to R_0 (m)

Zone of Influence

An estimate of the Zone of Influence (ZOI) for dewatering excavations in unconfined aquifers can be calculated using the following equation (Bear, 1979):

$$R_0 = 2.45\sqrt{\frac{HK}{S_y}}t$$

where,

R_0	=	Zone of Influence (m), beyond which there is negligible drawdown
H	=	Distance from initial static water level to bottom of saturated aquifer (m)
S_y	=	Specific yield of the aquifer formation (based on Johnson (1967))
t	=	Time, in seconds, required to draw the static groundwater level to the desired level (assumed to be equivalent to 14 days)
K	=	Hydraulic Conductivity (m/s)

A summary of the dewatering rate calculations and conceptual ZOI are presented in **Table 7-4** below and **Appendix F**.

Table 7-4- Dewatering Flow Rate Summary

Proposed Alignment	H (m)	h (m)	K (m/s)	Drawdown (m)	ZOI (R0) (m)	Pumping Rate (L/day)	Pumping Rate (L/day) (S.F. -1.5)*	25 mm Storm Event (L/day)	Total Anticipated Volume (L/day)
Proposed Storm Sewer Alignment	7.5	1.6	1.72×10^{-7}	5.9	12.5	11,400	17,500	8,500	26,000
Proposed Sanitary Sewer Alignment	4.7	0.7	1.72×10^{-7}	4.0	9.9	4,100	6,500	6,000	12,500
Total Dewatering Flow Rate									**38,500**

*S.F: Safety Factor

A review of the **Table 7-4** indicates that the anticipated dewatering flow rate for proposed underground services alignments could reach to 38,500 L/day considering a safety factor of 1.5, and 25 mm storm event.

7.5 Long-Term Groundwater Control Requirements (Post Construction)

The approximate elevation of elevator pit was assumed to be at 123.05± masl, and a drainage layer at 124.0± masl was used for long-term (post construction).

A numerical analysis was conducted utilizing computer software (Slide 7.014, released March 30, 2016, developed by Rocscience Inc.), utilizing the Finite Element Modelling (FEM) method. FEM for groundwater seepage indicates the long-term (post construction) dewatering requirements as provided below. The finite element model results and dewatering rate calculations are presented in **Appendix F.**

The estimated post construction dewatering rates for the proposed redevelopment are summarized below:

- The post construction dewatering rate is 59,468 L/day, and it could reach to 89,500 L/day of groundwater seepage into the excavation considering a safety factor of 1.5.
- Since surficial asphalt degradation could happen in area above and adjacent to the perimeter of the parking garage, stormwater infiltration should be taken into consideration over the post construction. Therefore, a 2-year rainfall event seeping into the surface around a 0.5 m wide perimeter around the proposed underground parking level was considered. This will generate approximately an additional 8,000 L/day of stormwater infiltration.
- A total volume of 97,500 L/day is anticipated for long-term foundation drainage flow rate. A total anticipated long-term dewatering flow rate is summarized in **Table 7-5**.

Table 7-5- Summary of Long-Term Dewatering Calculations

Location	Ground Water Seepage (Safety Factor - 1.5)		Infiltration (25 mm Design Storm Event)		Total Discharge Volume (Seepage + Infiltration)	
	L/day	L/sec	L/day	L/sec	L/day	L/sec
Underground Parking of Towers C and D	89,500	1.04	8,000	0.09	97,500	1.13

7.6 Permit Requirements

The anticipated short-term dewatering flow rates above exceeds the MECP Environmental Activity and Sector Registry's (EASR) upper limit of the of 400,000 L/day. As such, applying for a short-term Permit to Take Water (PTTW) with the MECP is required. Additionally, discharge permit is required to be obtained from the City of Mississauga for discharging the short-term dewatering effluent, if it is proposed to be discharged to the City's sewer system.

The estimated long-term foundation drainage flow rate exceeds MECP limits of 50,000 L/day and can reach 97,500 L/day. As such, applying for PTTW with MECP is required for the long-term (post construction) dewatering.

7.7 Potential Dewatering Impacts and Mitigation Plan

7.7.1 Ground Settlement

The estimated ZOI could reach 27.0 m and 12.5 m away from the excavation area for developing the proposed underground parking and installation of proposed underground services, respectively. Existing buildings and existing underground parking structures within the Site, and the structures located at the east, south and southeast of the Site are located within the conceptual ZOI. Additionally, Bloor Street is partially located within the conceptual ZOI for installation of the proposed underground sewer alignment. It is recommended a professional geotechnical engineer is consulted to assess the potential ground settlement with respect to short-term dewatering program.

7.7.2 Surface Water, Wetlands and Areas of Natural Significance

Etobicoke Creek is located approximately 200 m to the east of the Site, and Lake Ontario is located approximately 5.5 km to the south of the Site. Wooded areas are scattered at the north and east sides of the Site. A partial southern portion of the Site is located within the wooded area. This record is also extended to the east outside of the Site boundary. Record review indicates that no other records for natural heritage features including wetland, water bodies, watercourses and ANSI within or in close proximity to the Site. As such, no impacts to natural heritage features are anticipated pertaining the proposed redevelopment.

7.7.3 Water Supply Wells and Zone of Influence

The Site is situated in a serviced area within the City of Mississauga. A review of the MECP well records confirmed that there are no records for water supply wells at or within 500 m of the Site. As such, no concerns are anticipated regarding local groundwater users.

7.7.4 Contamination Sources

Based on the Phase One Environmental Site Assessment (ESA) completed for the Site by Try Environmental Services Inc. dated November 8, 2010, the Phase One ESA did not reveal any significant environmental concerns that would restrict the current use or redevelopment of the Site.

8 Conclusions and Recommendations

- The Site is located within a regional physiography of Southern Ontario known as South Slope.
- The Site is located within an area mapped as glaciolacustrine-deposits consisting of clay to slit till (5d).
- The Site is located within the Lake Ontario Shoreline East Tributaries sub watershed. Etobicoke Creek is located approximately 200 m to the east of the Site, and Lake Ontario is located approximately 5.5 km to the south of the Site. Wooded areas are scattered at the north and east sides of the Site. A partial southern portion of the Site is located within the wooded area. This record is also extended to the east outside of the Site boundary. Record review indicates that there are no other records for natural heritage features including wetland, water bodies, watercourses and ANSI within or in close proximity to the Site.
- The subsoil profile beneath the topsoil layer consisted mainly of earth fill, underlain by clayey to sandy silt (glacial till) and partially sandy silt/sand and gravel, and followed by inferred bedrock.
- The highest and lowest shallow groundwater levels were measured at El. 127.55 masl and 126.62 masl at BH4 and BH8, respectively. The average groundwater levels ranged from 126.75 masl to 127.42 masl.
- Estimated hydraulic conductivity using single well response test (SWRT) were 1.72×10^{-7} m/s for clayey to sandy silt (glacial till), 2.67×10^{-6} m/s for sandy silt/sand and gravel, and 1.16×10^{-7} m/s for inferred bedrock unit.
- Groundwater quality for one (1) sample collected from monitoring well BH4 meets the Region of Peel's sanitary sewer use by-law limits, and exceeds the Region of Peel's storm sewer use by-law limits with the exceedances for Total Suspended Solid (TSS) and Total Manganese.
- Short-term construction dewatering flow rate for the proposed underground parking considering a safety factor of 1.5 and a 2-year rainfall event (25 mm design storm event) could reach 441,000 L/day.
- Short-term construction dewatering flow rate for the proposed underground services considering a safety factor of 1.5 and a 2-year rainfall event (25 mm design storm event) could reach 38,500 L/day.
- Long-term post construction dewatering flow rate for the proposed underground parking considering a safety factor of 1.5 and an infiltration (25 mm design storm event) could reach 97,500 L/day.
- The estimated ZOI could extend up to 27.0 m and 12.5 m away from the proposed excavated area for developing the proposed underground parking and installation of proposed underground services, respectively. It is recommended a professional geotechnical engineer is consulted to assess the potential ground settlement with respect to short-term dewatering program.

9 References

- Chapman, L.J. and D.F. Putnam, 1984. The Physiography of Southern Ontario. Ontario.
- Credit Valley Conservation (CVC) Authority, Watershed map, 2009.
- Freeze, A. and Cherry, J., 1979. Groundwater, Prentice-Hall Inc., New Jersey.
- Geological Survey. Ontario Geological Survey (OGS), 2003. Surficial Geology of Southern Ontario. Miscellaneous Release – Data 128 – revised.
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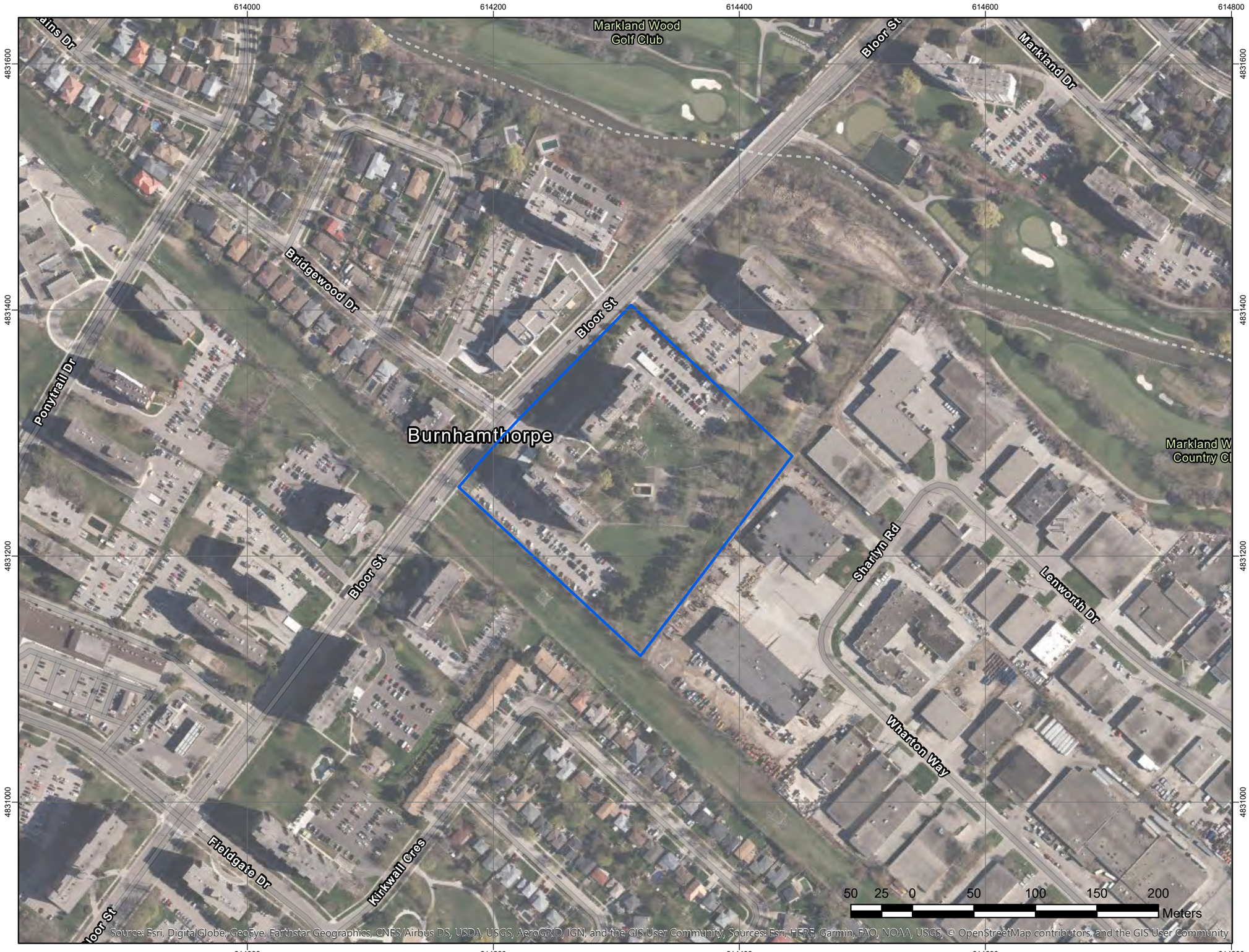
- Ministry of the Environment, Conservation and Parks, 2019, Source Protection Information Atlas Interactive Map.
- Ministry of Natural Recourses and Forestry, 2020. Natural Heritage Interactive Map.
- Architectural Series of Drawings for OPA & ZBA Resubmission, 1840-1850 Bloor St., City of Mississauga, ON, Lot 1, Registered Plan 775, Arcadis Architects (Canada) Inc.
- Plan of Survey with Topography of Lot 1, Registered Plan 775, City of Mississauga, Regional Municipality of Peel, May 22, 2019, Speight, Van Nostrand & Gibson Limited
- Englobe Corp. “Geotechnical Investigation Report, Proposed Residential Redevelopment, 1840-1850 Bloor Street, Mississauga, Ontario”, dated July 18, 2024. File No. 02405214.001.

ENGLOBE

Figures

ENGLOBE



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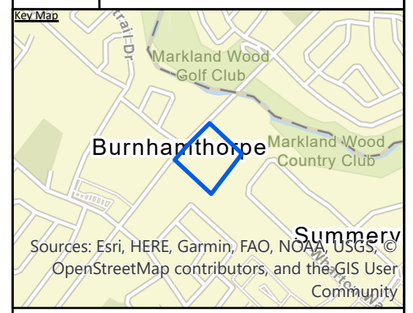
References:

ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/ Airbus Ds, USDA, USGS, AeroGRID, IGN, and the GIS User Community.Basemaps

Key Map



Notes:

Legend:

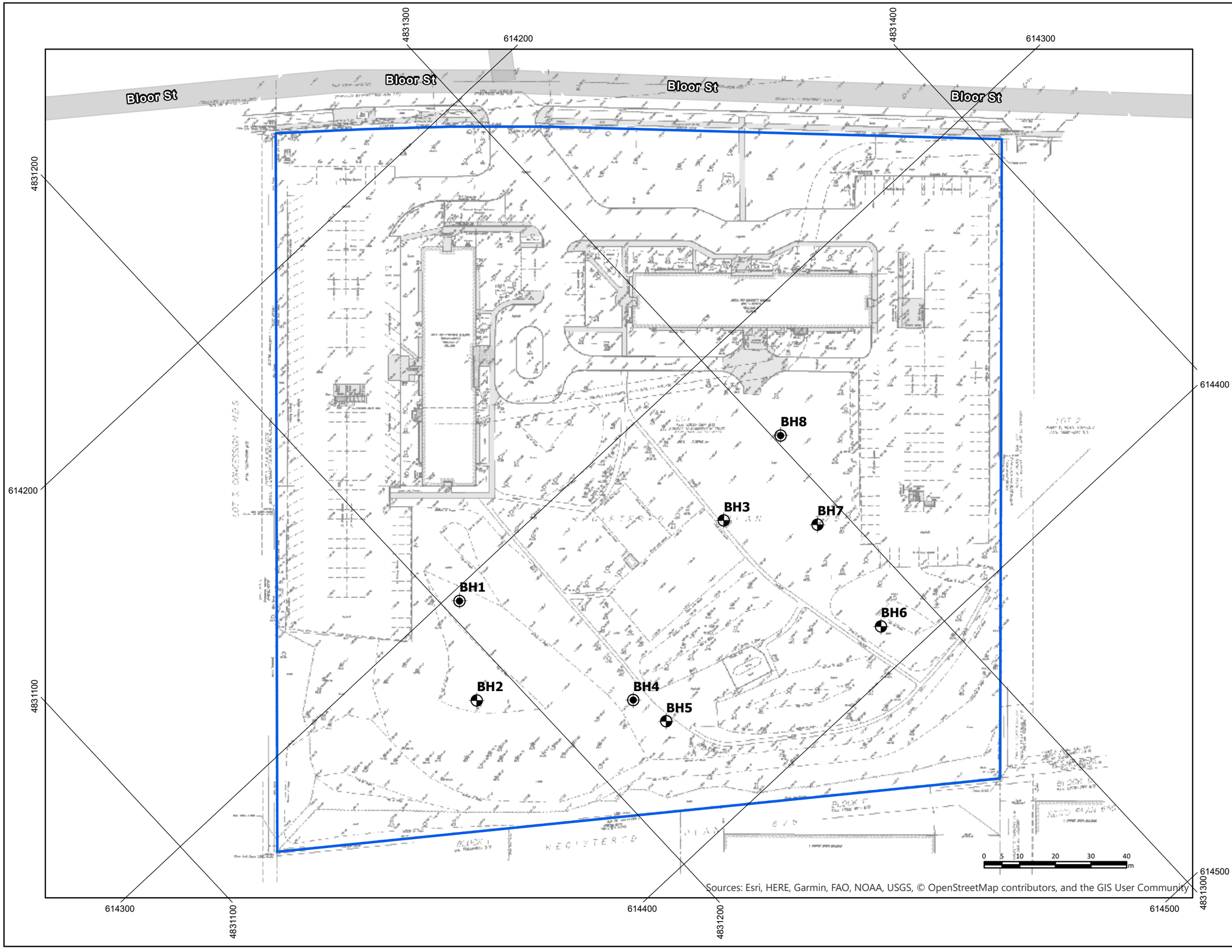
Approximate Site Boundary

Project Title:
Hydrogeological Assessment

Site Location:
1840-1850 Bloor Street, Mississauga, Ontario

Figure Title:
Site Location Plan

Designed By: MM	*File No.:* 1-19-0720-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 1
Date: February 2020	



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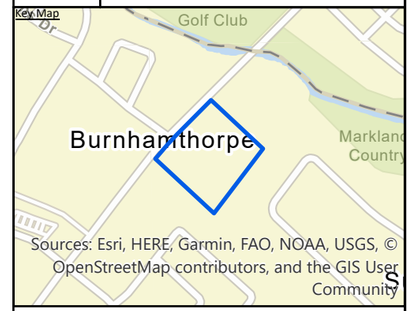
References:

Lot 1, Registered Plan 775, City of Mississauga
Job No: 190-0075
Dated: May22, 2019
By: Speight, Van Nostrand & Gibson Ltd

Key Map



Notes:

Legend:

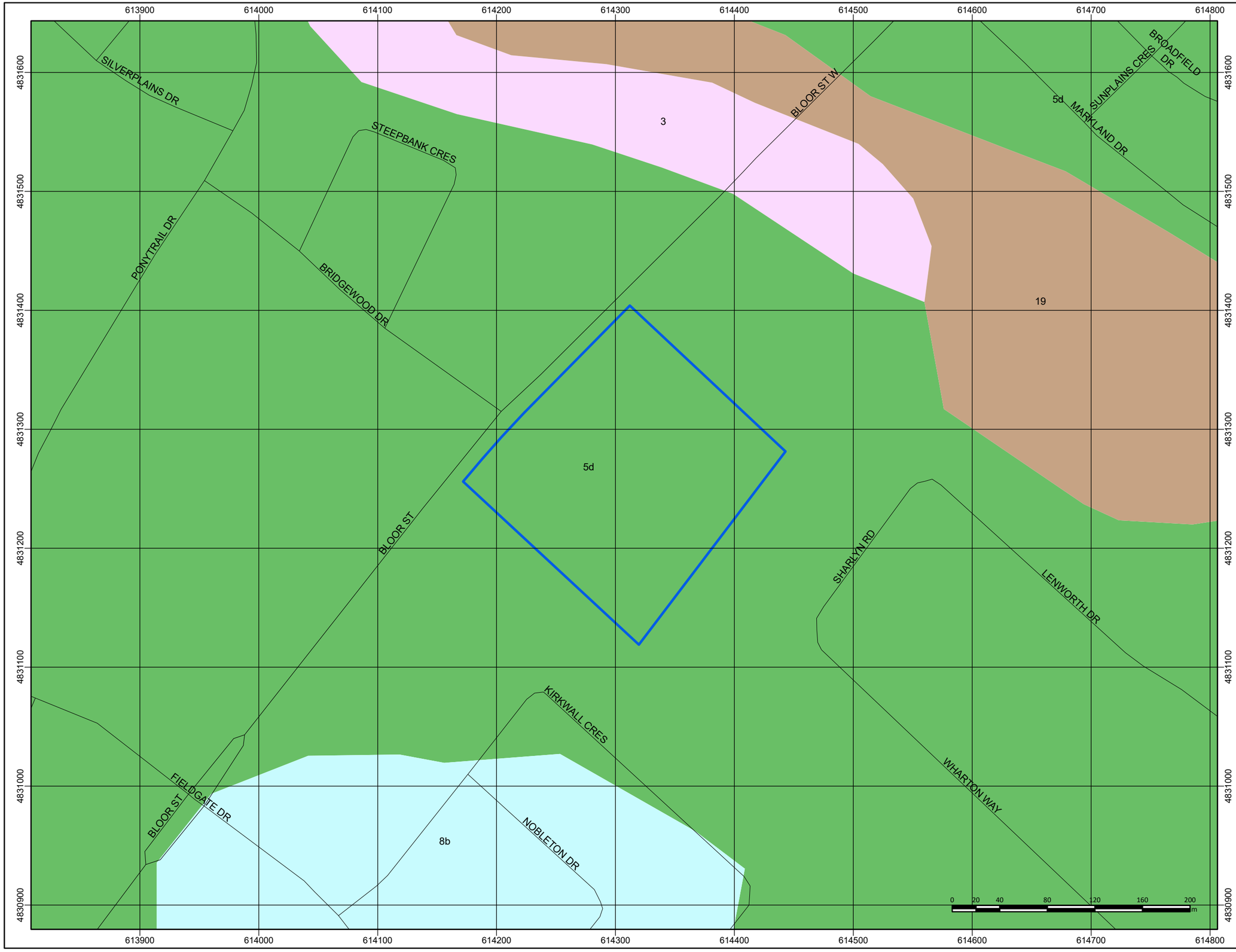
- Approximate Site Boundary
- Approximate Monitoring Well Location
- Approximate Borehole Location

Project Title:
Hydrogeological Assessment

Site Location:
1840-1850 Bloor Street, Mississauga, Ontario

Figure Title:
Borehole and Monitoring Well Location Plan

Designed By: MM	*File No.:* 1-19-0720-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 2
Date: February 2020	



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References:

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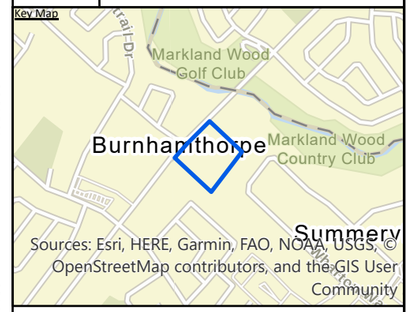
Key Map



Notes:

Legend:

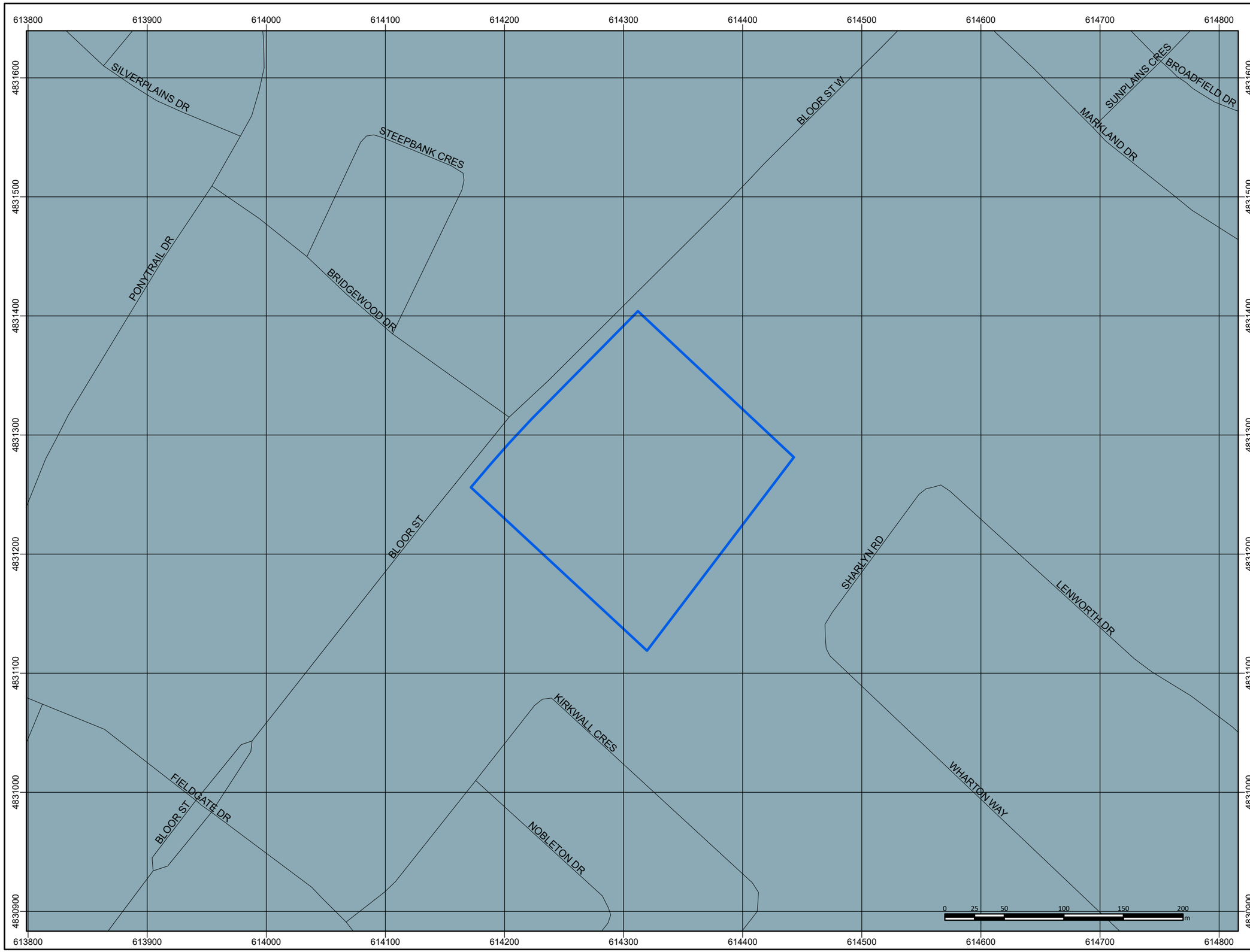
- Approximate Site Boundary
- Collector
- Local / Street
- 3: Paleozoic bedrock
- 5d: Glaciolacustrine-derived silty to clayey till
- 8b: Interbedded flow till, rainout deposits and silt and clay
- 19: Modern alluvial deposits

Project Title:
Hydrogeological Assessment

Site Location:
1840-1850 Bloor Street, Mississauga, Ontario

Figure Title:
Surficial Geology Map

Designed By: MM	*File No.:* 1-19-0720-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 3
Date: February 2020	



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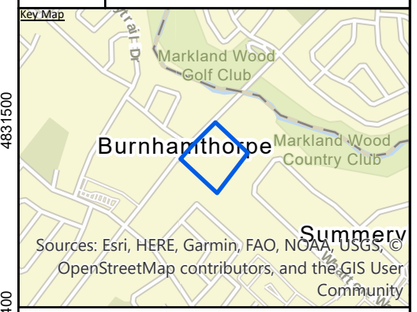
Key Map



Notes:

Legend:

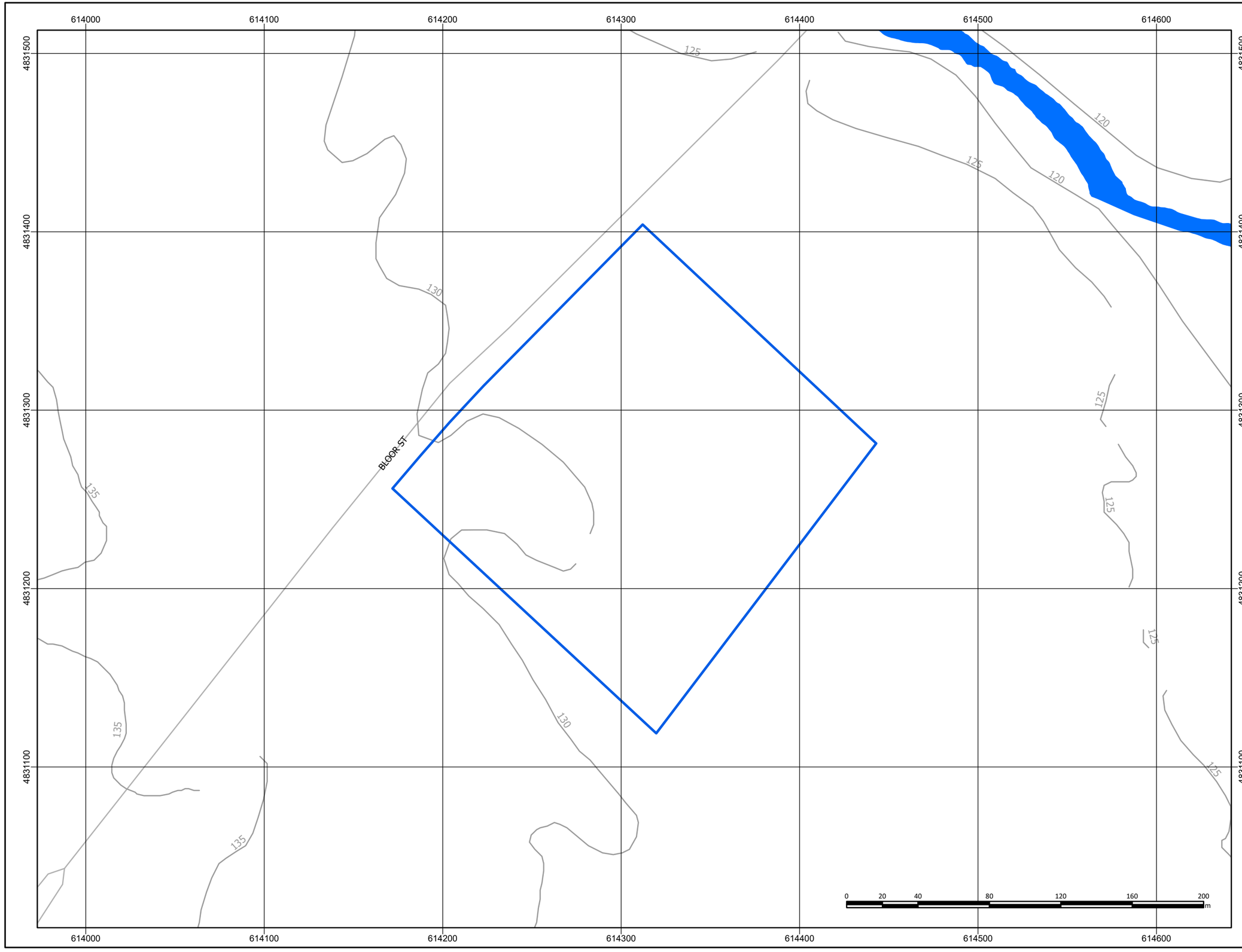
- Approximate Site Boundary
- Collector
- Local / Street
- 32, South Slope

Project Title:
Hydrogeological Assessment

Site Location:
1840-1850 Bloor Street, Mississauga, Ontario

Figure Title:
Regional Physiography Map

Designed By: MM	*File No.:* 1-19-0720-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 4
Date: February 2020	



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References:

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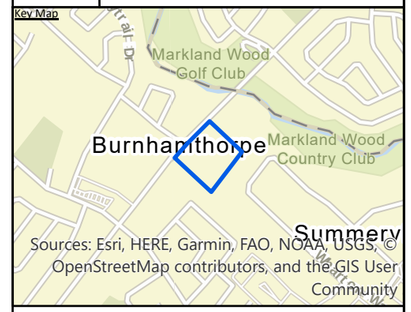
Key Map



Notes:

Legend:

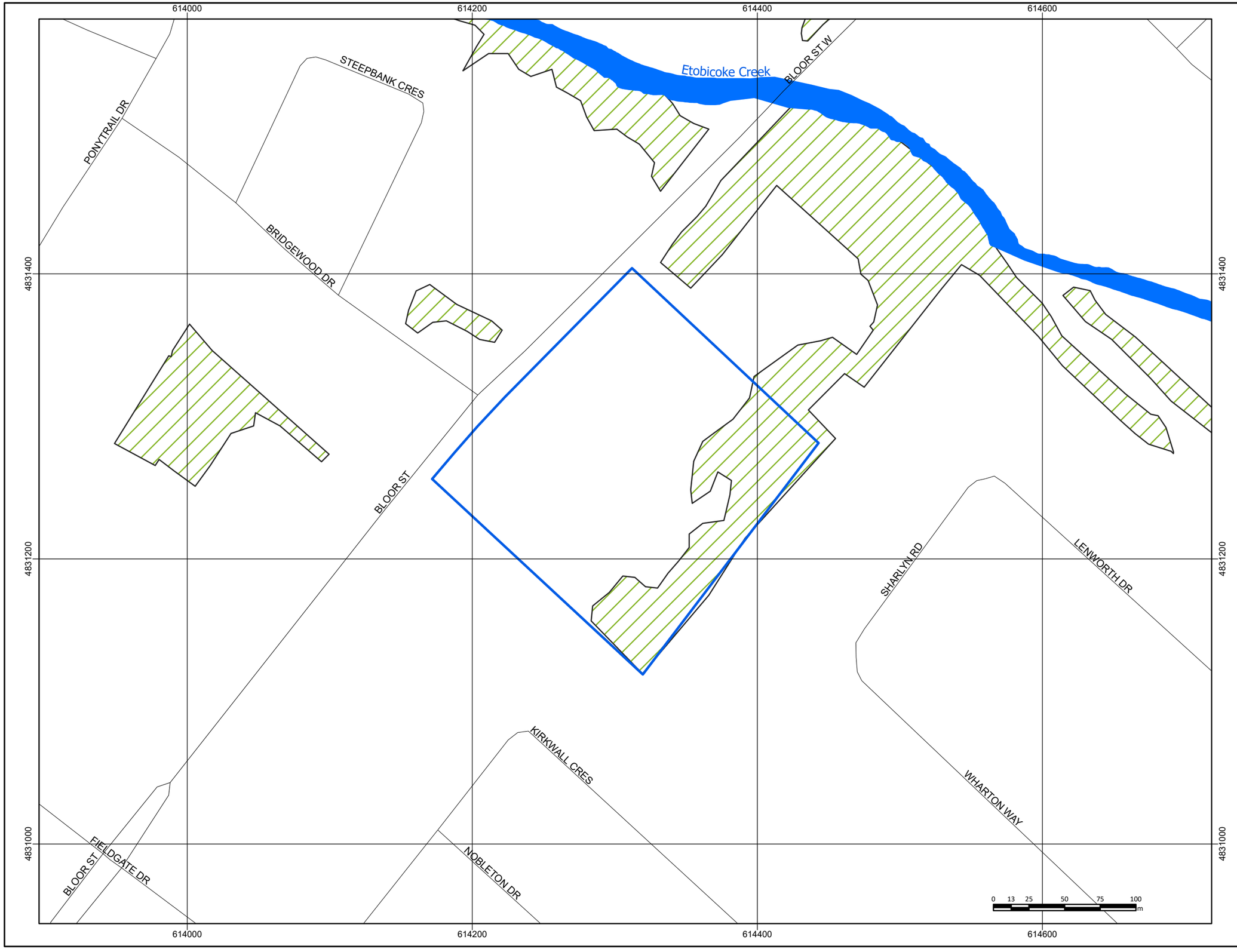
- Approximate Site Boundary
- City of Mississauga Topographic Contours
- Water Body
- Collector

Project Title:
Hydrogeological Assessment

Site Location:
1840-1850 Bloor Street, Mississauga, Ontario

Figure Title:
Topography Maps

Designed By: MM	*File No.:* 1-19-0720-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 5
Date: February 2020	



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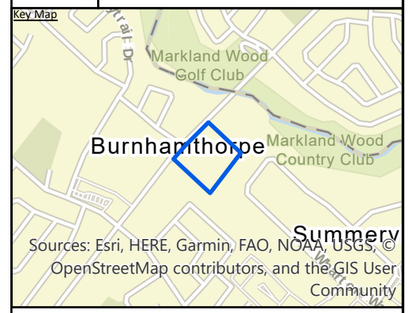
Key Map



Notes:

Legend:

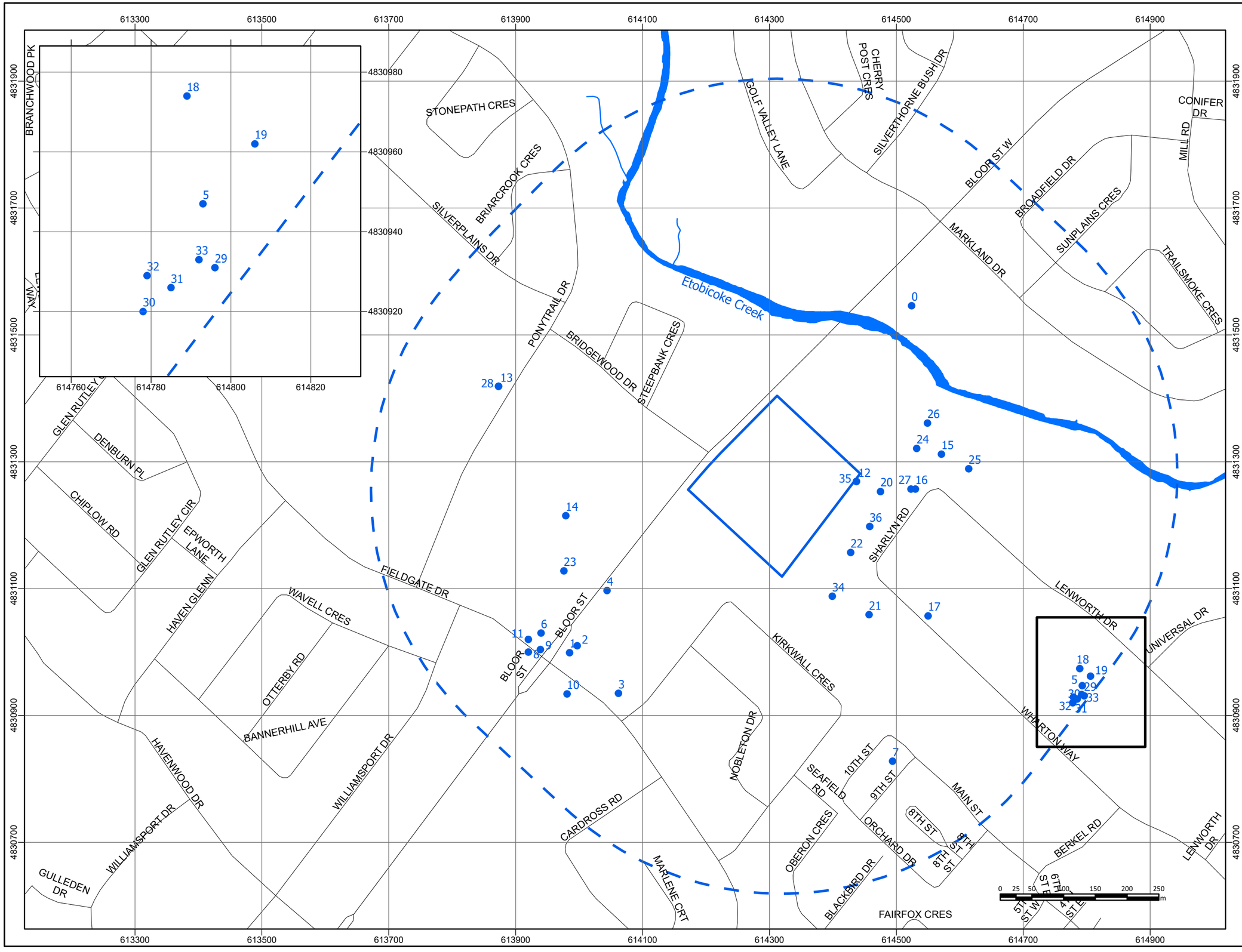
- Approximate Site Boundary
- Collector
- Local / Street
- Water Body
- Wooded Area

Project Title:
Hydrogeological Assessment

Site Location:
1840-1850 Bloor Street, Mississauga, Ontario

Figure Title:
Natural Heritage Feature Map

Designed By: MM	*File No.:* 1-19-0720-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 6
Date: February 2020	



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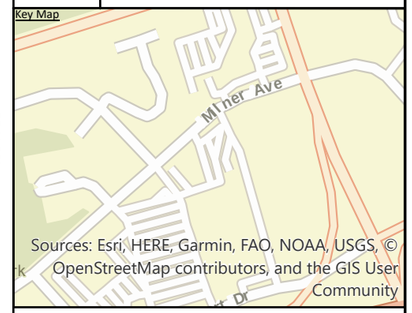
References:

ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus Ds, USDA, USGS, AeroGRID, IGN, and the GIS User Community produced by Terraprobe Inc. Copyright (c) Queen's Printer 2020. Water Well Information System Ministry of the Environment, Conservation and Parks, 2020

Key Map



Notes:

Legend:

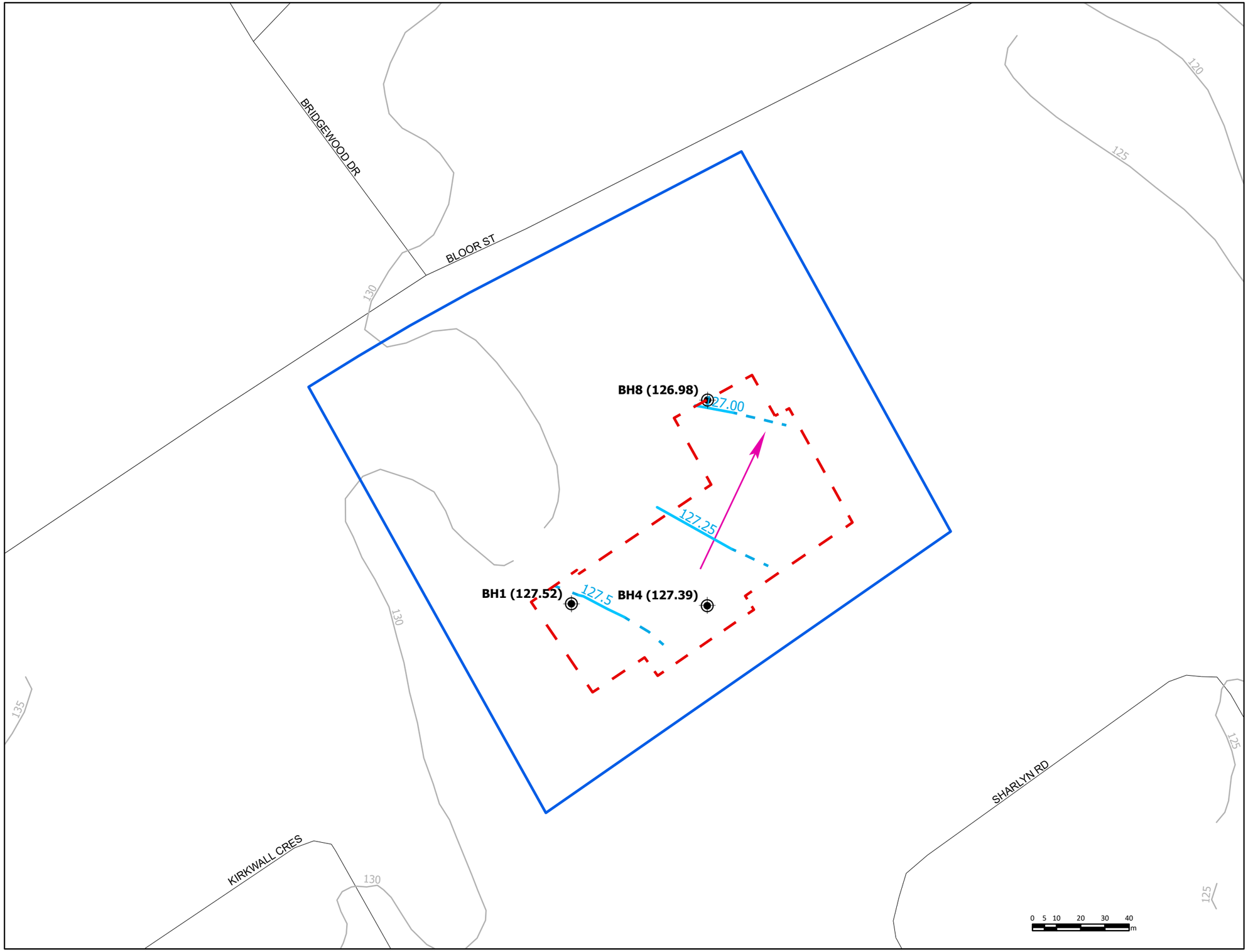
- Approximate Site Boundary
- Approximate Study Area; 500m
- MECP Well Location
- Water Body
- Water Course
- Collector
- Local / Street

Project Title:
Hydrogeological Assessment

Site Location:
1840-1850 Bloor Street, Mississauga, Ontario

Figure Title:
MECP Well Records Plan

Designed By: MM	*File No.:* 1-19-0720-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 7
Date: February 2020	



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References:

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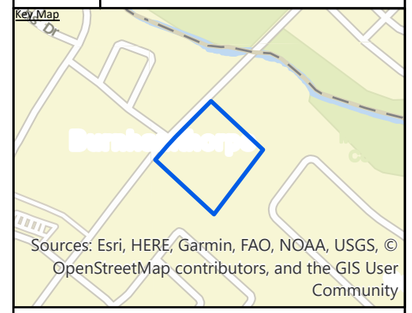
Key Map



Notes:

Legend:

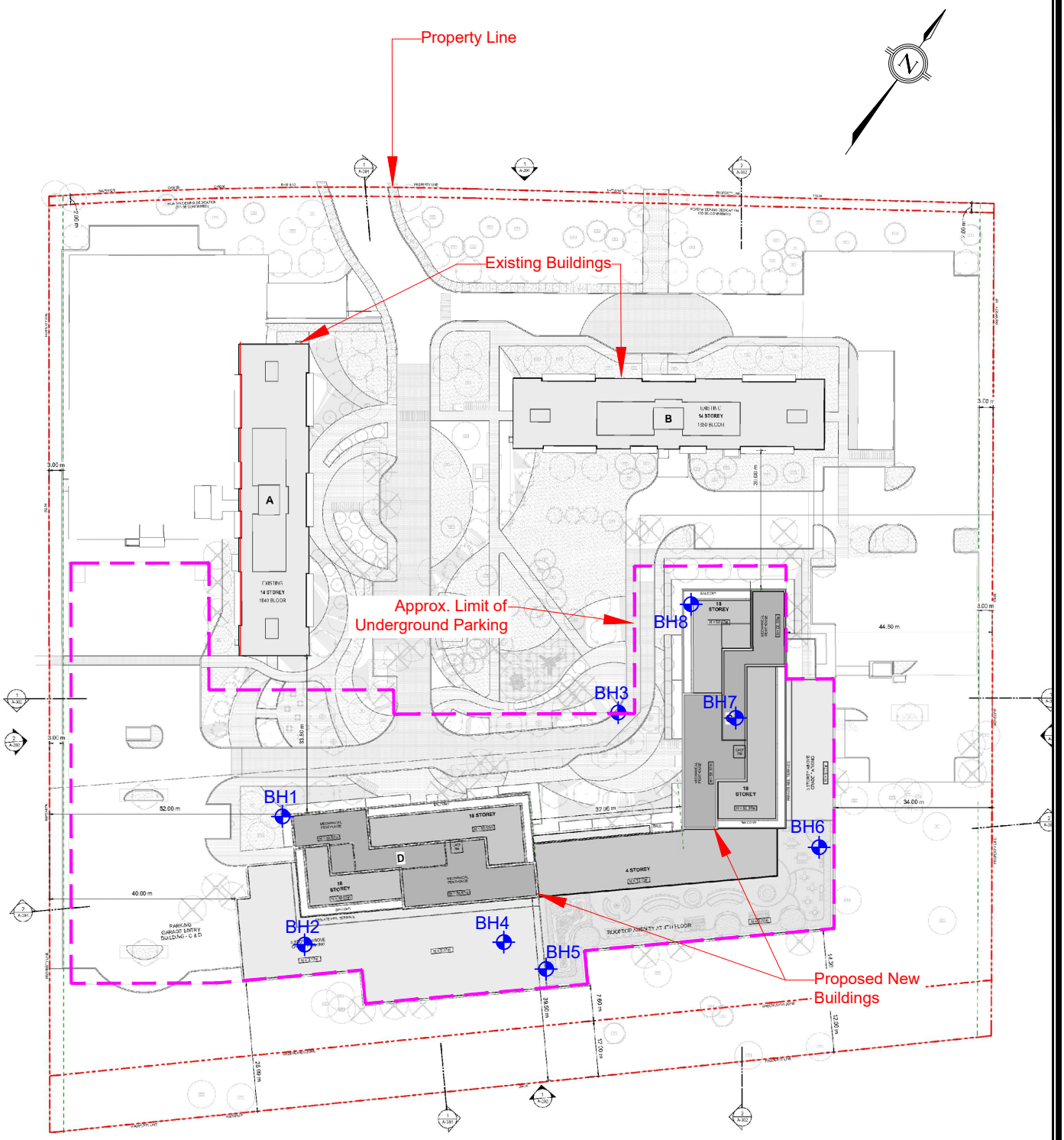
- Approximate Site Boundary
- Proposed Development Area
- City of Mississauga Topographic Contours
- Approximate Monitoring Well Location
- Collector
- Local / Street
- Interpretted Ground Water Contours
- Inferred Ground Water Flow Direction
- Interpretted Ground Water Flow Direction

Project Title:
Hydrogeological Investigation

Site Location:
1840-1850 Bloor Street, Mississauga, Ontario

Figure Title:
Shallow Ground Water Flow Direction

Designed By: MM	*File No.:* 1-19-0720-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 8
Date: February 2020	



REFERENCE
Sheet Title: Roof Plan
Project No.: 120303
Sheet No.: A-109
By: Arcadis Architects

LEGEND
Approximate Borehole Location

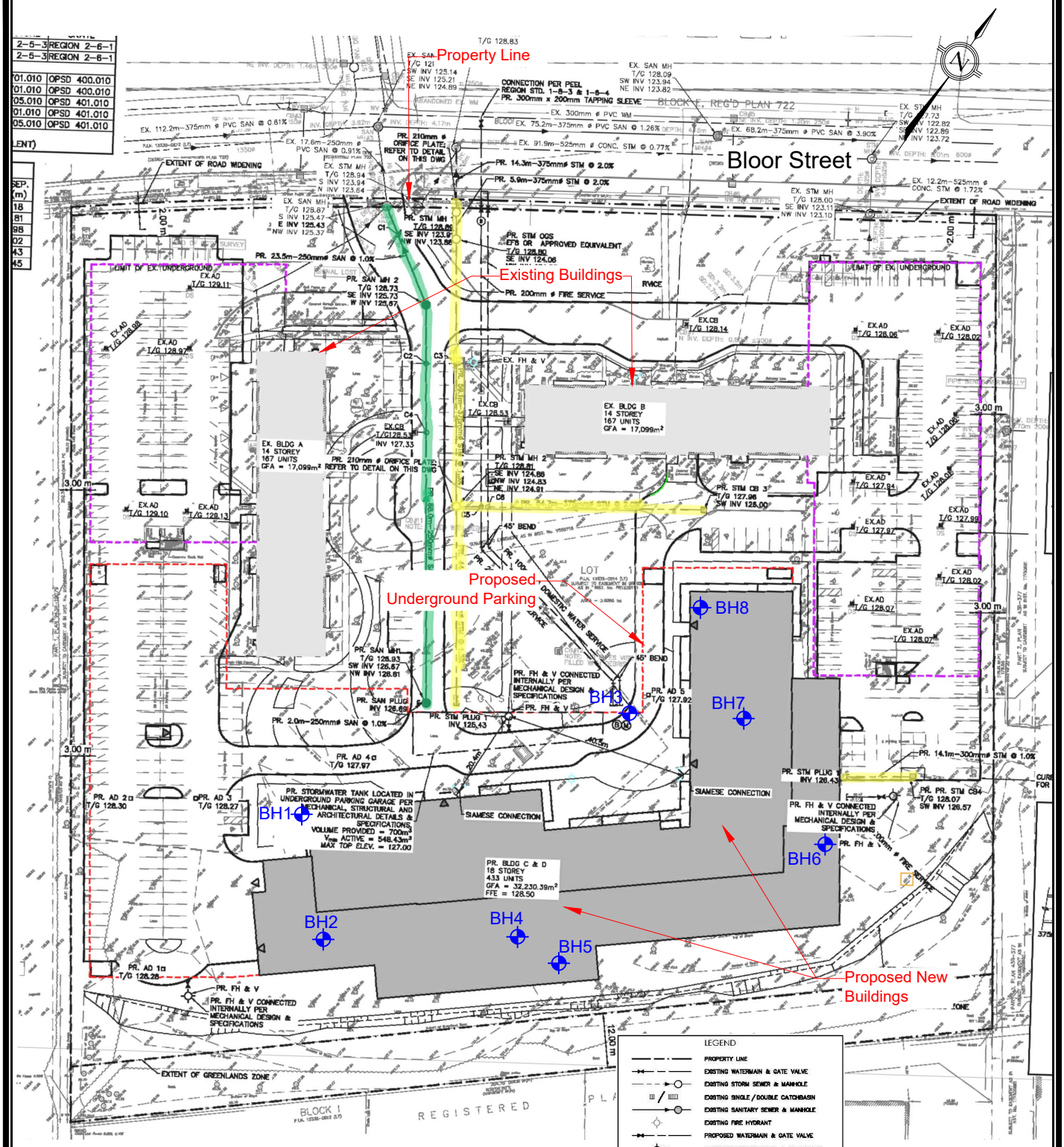
SCALE 8 0 20m

ENGLOBE

Title: **BOREHOLE LOCATION PLAN**

File. No.: 02405214.000

FIGURE 9-1



REFERENCE
Sheet Title: Site Servicing Plan
Project No.: 1788-5378
Drwg. No.: C102
By: Crozier Consulting Engineers

LEGEND

Approximate Borehole Location

ENGLOBE	Title: Proposed Underground Services Plan	FIGURE : 9-2
	File. No.: 024051214.000	

Appendix A
Borehole Logs & Grain Size Distribution Graphs

ENGLOBE

ABBREVIATIONS AND TERMINOLOGY

SAMPLING METHODS

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

PENETRATION RESISTANCE

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

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

COHESIONLESS SOILS

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

COHESIVE SOILS

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

COMPOSITION

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

TESTS AND SYMBOLS

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

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

FIELD MOISTURE DESCRIPTIONS

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

LOG OF BOREHOLE 1

Project No.	: 02405214.001	Client	: Ranee Management	Originated by	: DH
Date started	: November 29, 2019	Project	: 1840 - 1850 Bloor Street	Compiled by	: JKA
Sheet No.	: 1 of 1	Location	: Mississauga, Ontario	Checked by	: BS

Position : E: 614303, N: 4831204 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	**128.8**	**GROUND SURFACE**				
	128.6	160mm **TOPSOIL**				
	0.2	**FILL**, sandy silt, trace to some clay, trace gravel, trace organics, compact, greyish brown, moist		1	SS	10
1				2	SS	13
				3	SS	13
2	126.5					
	2.3	**SILTY SAND**, trace gravel, compact, brown, wet		4	SS	17
3	125.8					
	3.0	**CLAYEY SILT**, some sand, trace gravel, hard, grey, moist (GLACIAL TILL)		5	SS	35
4	124.2					
	4.6	**INFERRED BEDROCK**, weathered to partially unweathered shale with intermittent limestone/dolostone stringers **(Georgian Bay Formation)**		6	SS	50 / 50mm
5	122.9					
	5.9	**END OF BOREHOLE**				

Elevation Scale (m): 128, 127, 126, 125, 124, 123

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 was dry and open upon completion of drilling.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Dec 10, 2019	1.4	127.4
Dec 16, 2019	1.6	127.2
Dec 23, 2019	1.3	127.5
Jan 9, 2020	1.7	127.1

file: 02405214.001 bh logs 2024-07-16.gpj

LOG OF BOREHOLE 2

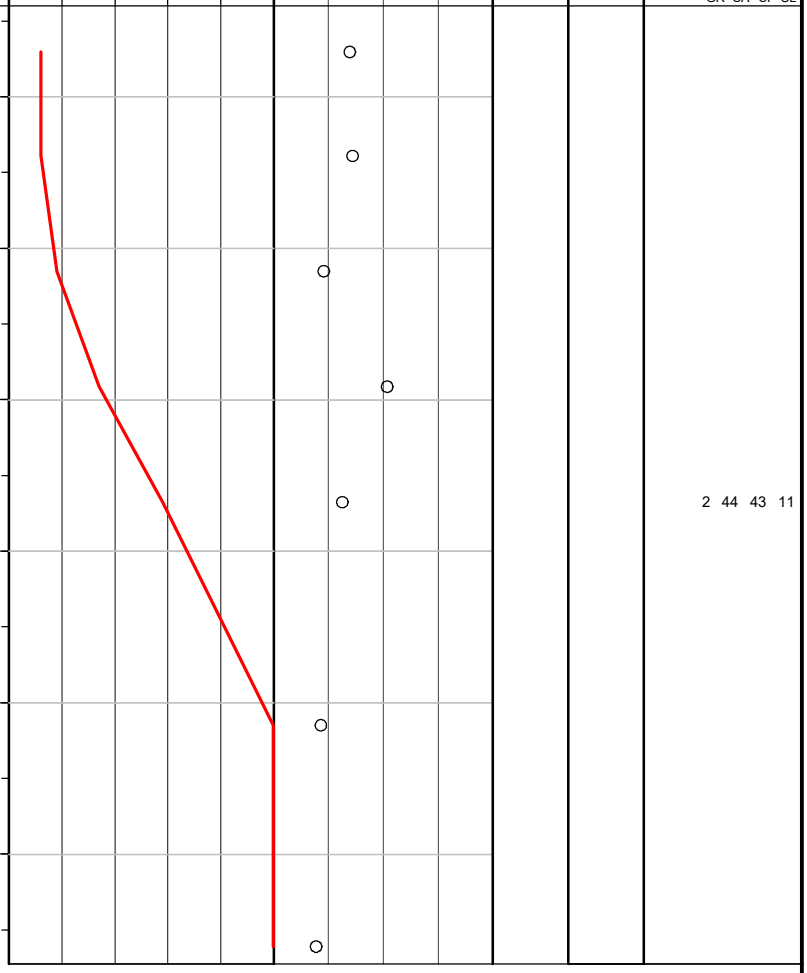
Project No.	: 02405214.001	Client	: Ranee Management	Originated by	: DH
Date started	: November 29, 2019	Project	: 1840 - 1850 Bloor Street	Compiled by	: JKA
Sheet No.	: 1 of 1	Location	: Mississauga, Ontario	Checked by	: BS

Position : E: 614327, N: 4831189 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
	129.6	**GROUND SURFACE**				
0		140mm **TOPSOIL**				
		FILL, clayey silt, some sand to sandy, trace gravel, trace organics, firm, greyish brown, moist		1	SS	6
1				2	SS	6
	128.1					
	1.5	**FILL**, sandy silt, trace to some clay, trace organics, loose to compact, brown to dark brown, moist		3	SS	9
2				4	SS	17
	126.6					
3	3.0	**SILT AND SAND**, some clay, trace gravel, compact, brownish grey, moist (GLACIAL TILL)		5	SS	29
4	125.0					
	4.6	**SAND AND GRAVEL**, trace silt, very dense, grey, wet		6	SS	86 / 200mm
5	123.5					
	6.1			7	SS	50 / 75mm
	123.3	**INFERRED BEDROCK**, weathered to partially unweathered shale with intermittent limestone/dolostone stringers **(Georgian Bay Formation)**				
6	6.3	**END OF BOREHOLE**				

Borehole was dry and open upon completion of drilling.



Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments	GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
				2 44 43 11

file: 02405214.001 bh logs 2024-07-16.gpj

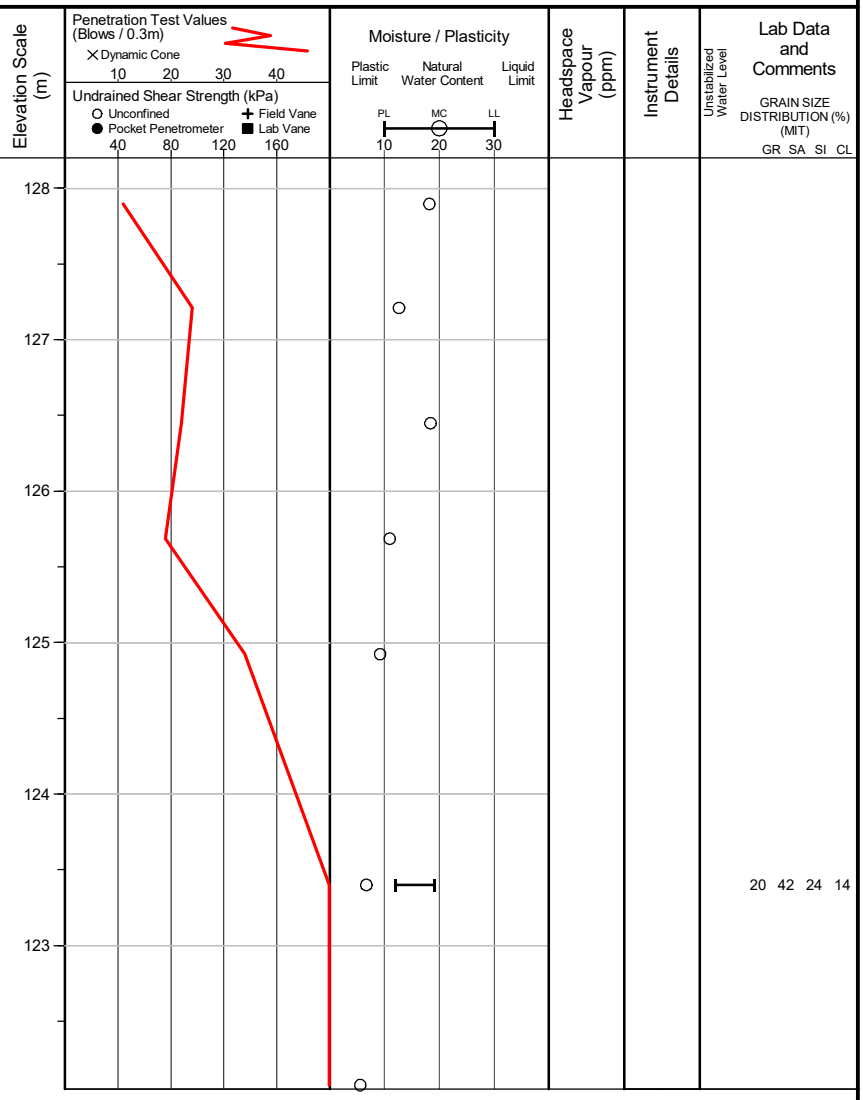
LOG OF BOREHOLE 3

Project No.	: 02405214.001	Client	: Ranee Management	Originated by	: DH
Date started	: November 27, 2019	Project	: 1840 - 1850 Bloor Street	Compiled by	: JKA
Sheet No.	: 1 of 1	Location	: Mississauga, Ontario	Checked by	: BS

Position : E: 614337, N: 4831274 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	128.2	**GROUND SURFACE**				
	128.0 / 0.2	150mm **TOPSOIL**				
		FILL, clayey silt, some sand, trace organics, stiff, brown, moist		1	SS	11
	127.6 / 0.6	**CLAYEY to SANDY SILT**, trace gravel, very stiff to hard, brown / grey, moist (GLACIAL TILL)		2	SS	24
1		...silt lenses		3	SS	22
2		...grey below		4	SS	19
3				5	SS	34
4	123.6 / 4.6	**SILTY SAND**, some clay, some gravel, very dense, grey, damp (GLACIAL TILL)		6	SS	59
5						
6	122.1 / 122.1 / 6.1	**INFERRED BEDROCK**, weathered to partially unweathered shale with intermittent limestone/dolostone stringers **(Georgian Bay Formation)**		7	SS	50 / 50mm
		END OF BOREHOLE				
		Borehole was dry and open upon completion of drilling.				



Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)

GR	SA	SI	CL
20	42	24	14

file: 02405214.001 bh logs 2024-07-16.gpj

LOG OF BOREHOLE 4

Project No.	: 02405214.001	Client	: Ranee Management	Originated by	: DH
Date started	: November 28, 2019	Project	: 1840 - 1850 Bloor Street	Compiled by	: JKA
Sheet No.	: 1 of 1	Location	: Mississauga, Ontario	Checked by	: BS

Position : E: 614357, N: 4831221 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
	127.9	**GROUND SURFACE**				
0	127.7	150mm **TOPSOIL**				
	0.2	**FILL**, clayey silt, some sand, trace organics, stiff, brown, moist		1	SS	13
	127.1					
	0.8	**CLAYEY to SANDY SILT**, some sand, trace gravel, very stiff to hard, brown, moist (GLACIAL TILL)		2	SS	17
1				3	SS	32
2				4	SS	73
3				5	SS	50 / 125mm
	123.3					
4	4.6	**SANDY SILT**, trace clay, dense, grey, wet		6	SS	41
5	122.3					
	122.2	**INFERRED BEDROCK**, weathered to partially unweathered shale with intermittent limestone/dolostone stringers **(Georgian Bay Formation)**		7	SS	50 / 100mm
	5.7	**END OF BOREHOLE**				

Borehole was dry and open upon completion of drilling.

Elevation Scale (m): 127, 126, 125, 124, 123

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

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Dec 10, 2019	0.5	127.4
Dec 16, 2019	0.4	127.5
Dec 23, 2019	0.6	127.3
Jan 9, 2020	0.6	127.3

file: 02405214.001 bh logs 2024-07-16.gpj

LOG OF BOREHOLE 5

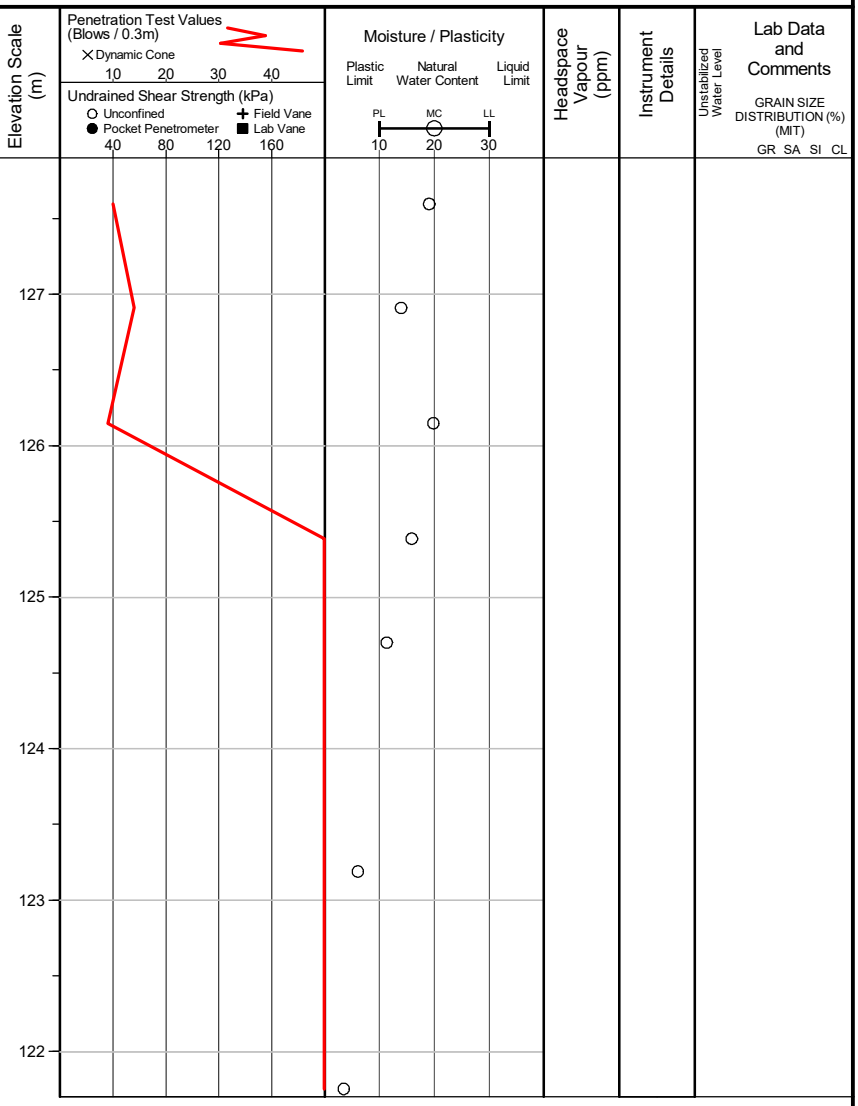
Project No.	: 02405214.001	Client	: Ranee Management	Originated by	: DH
Date started	: November 28, 2019	Project	: 1840 - 1850 Bloor Street	Compiled by	: JKA
Sheet No.	: 1 of 1	Location	: Mississauga, Ontario	Checked by	: BS

Position : E: 614367, N: 4831224 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
	127.9	**GROUND SURFACE**				
0	127.7	150mm **TOPSOIL**				
	0.2	**FILL**, clayey silt, some sand, trace organics, stiff, brown, moist		1	SS	10
1				2	SS	14
				3	SS	9
2	125.6					
	2.3	**CLAYEY to SANDY SILT**, trace gravel, ocassional silt lenses, hard, brown, moist (GLACIAL TILL)		4	SS	62
3				5	SS	50 / 150mm
4		...grey below		6	SS	50 / 125mm
5						
6	121.8					
	121.7	**INFERRED BEDROCK**, weathered to partially unweathered shale with intermittent limestone/dolostone stringers **(Georgian Bay Formation)**		7	SS	50 / 100mm
	6.2	**END OF BOREHOLE**				

Borehole was dry and open upon completion of drilling.



file: 02405214.001 bh logs 2024-07-16.gpj

LOG OF BOREHOLE 6

Project No. : 02405214.001 | Client : Ranee Management | Originated by : DH

Date started : November 28, 2019 | Project : 1840 - 1850 Bloor Street | Compiled by : JKA

Sheet No. : 1 of 1 | Location : Mississauga, Ontario | Checked by : BS

Position : E: 614389, N: 4831286 (UTM 17T) | Elevation Datum : Geodetic

Rig type : Track-mounted | Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
0	128.8	**GROUND SURFACE**				
		140mm **TOPSOIL**				
		FILL, clayey silt, trace to some sand, trace organics, stiff, brown, moist		1	SS	5
1				2	SS	8
				3	SS	13
2	126.5					
	2.3	**CLAYEY to SANDY SILT**, trace to some gravel, hard, brown, moist (GLACIAL TILL)		4	SS	44
3				5	SS	41
4		...sandy, grey below		6	SS	55
5	123.0					
	5.8	**INFERRED BEDROCK**, weathered to partially unweathered shale with intermittent limestone/dolostone stringers **(Georgian Bay Formation)**		7	SS	50 / 125mm
6	122.7					
	6.1	**END OF BOREHOLE**				

Borehole was dry and open upon completion of drilling.

Elevation Scale (m): 128, 127, 126, 125, 124, 123

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
0	7	59	34

file: 02405214.001 bh logs 2024-07-16.gpj

LOG OF BOREHOLE 7

Project No.	: 02405214.001	Client	: Ranee Management	Originated by	: DH
Date started	: November 27, 2019	Project	: 1840 - 1850 Bloor Street	Compiled by	: JKA
Sheet No.	: 1 of 1	Location	: Mississauga, Ontario	Checked by	: BS

Position : E: 614356, N: 4831292 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	128.4	**GROUND SURFACE**				
		140mm **TOPSOIL**				
		FILL, clayey silt, some sand, trace organics, stiff, brown, moist		1	SS	9
1				2	SS	15
	126.9					
	1.5	**CLAYEY to SANDY SILT**, trace gravel, hard, brown, moist (GLACIAL TILL)		3	SS	50 / 75mm
2				4	SS	52
3				5	SS	82
4		...grey below		6	SS	50/ 125mm
5						
6	122.3			7	SS	50 / 75mm
	122.2					
	6.2	**INFERRED BEDROCK**, weathered to partially unweathered shale with intermittent limestone/dolostone stringers **(Georgian Bay Formation)**				
		END OF BOREHOLE				
		Borehole was dry and open upon completion of drilling.				

Elevation Scale (m): 128, 127, 126, 125, 124, 123

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

file: 02405214.001 bh logs 2024-07-16.gpj

LOG OF BOREHOLE 8

Project No.	: 02405214.001	Client	: Ranee Management	Originated by	: DH
Date started	: November 27, 2019	Project	: 1840 - 1850 Bloor Street	Compiled by	: JKA
Sheet No.	: 1 of 1	Location	: Mississauga, Ontario	Checked by	: BS

Position : E: 614331, N: 4831302 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	128.6	**GROUND SURFACE**				
		140mm **TOPSOIL**				
		FILL, clayey silt, some sand, trace organics, stiff, brown to greyish brown, moist		1	SS	11
1				2	SS	18
2				3	SS	10
	126.3					
	2.3	**CLAYEY to SANDY SILT**, trace gravel, stiff to hard, brown, moist (GLACIAL TILL)		4	SS	12
3				5	SS	48
4		...grey below		6	SS	79
5						
6	122.5					
	122.3	**INFERRED BEDROCK**, weathered to partially unweathered shale with intermittent limestone/dolostone stringers **(Georgian Bay Formation)**		7	SS	50 / 25mm
	6.3	**END OF BOREHOLE**				

Borehole was dry and open upon completion of drilling.

Elevation Scale (m): 128, 127, 126, 125, 124, 123

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)

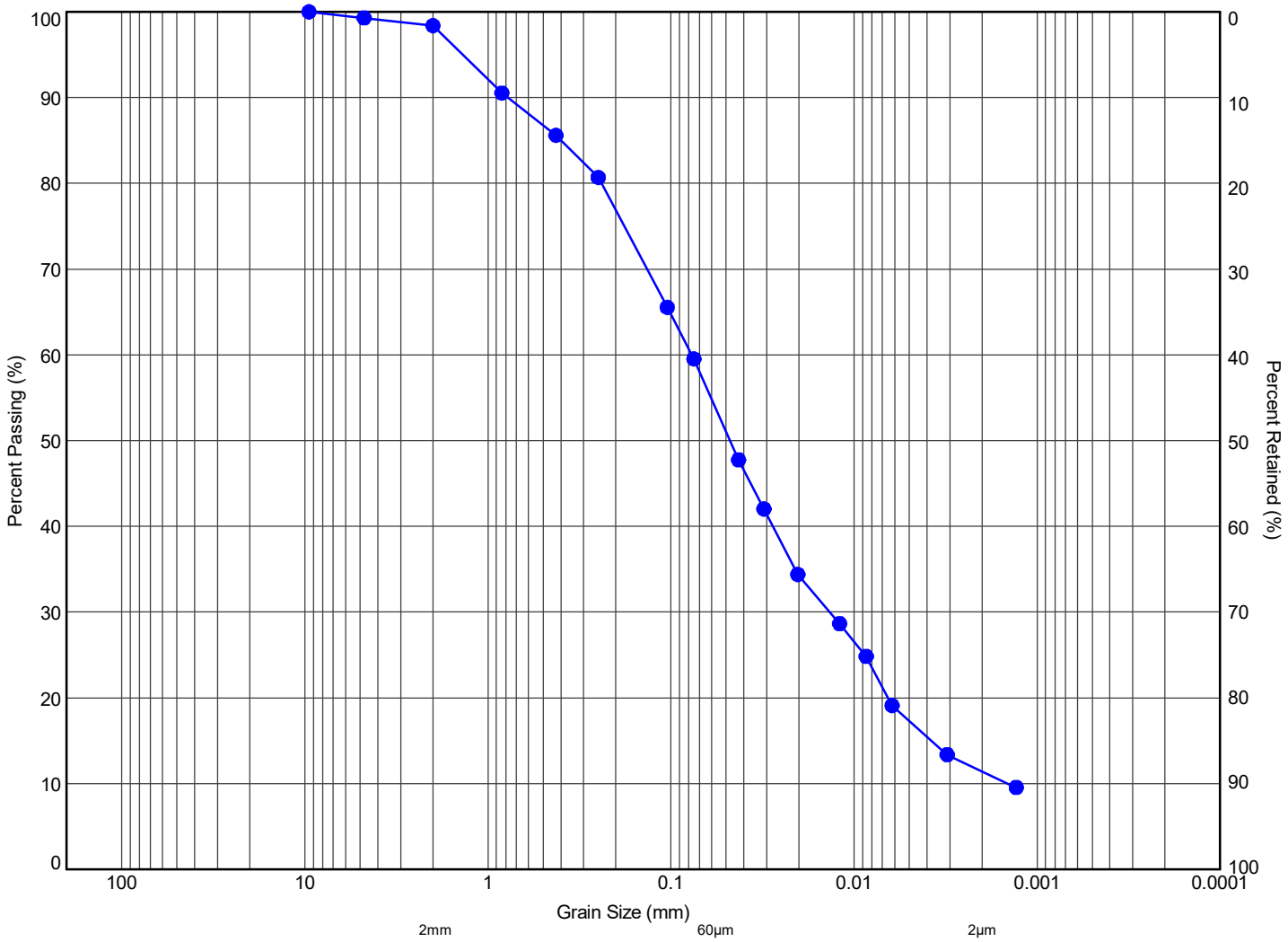
GR SA SI CL

14 30 39 17

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Dec 10, 2019	3.3	125.3
Dec 16, 2019	1.9	126.7
Dec 23, 2019	1.6	127.0
Jan 9, 2020	2.0	126.6

file: 02405214.001 bh logs 2024-07-16.gpj



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

MIT SYSTEM

	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**2**	SS5	3.3	126.3	2	44	43	11	

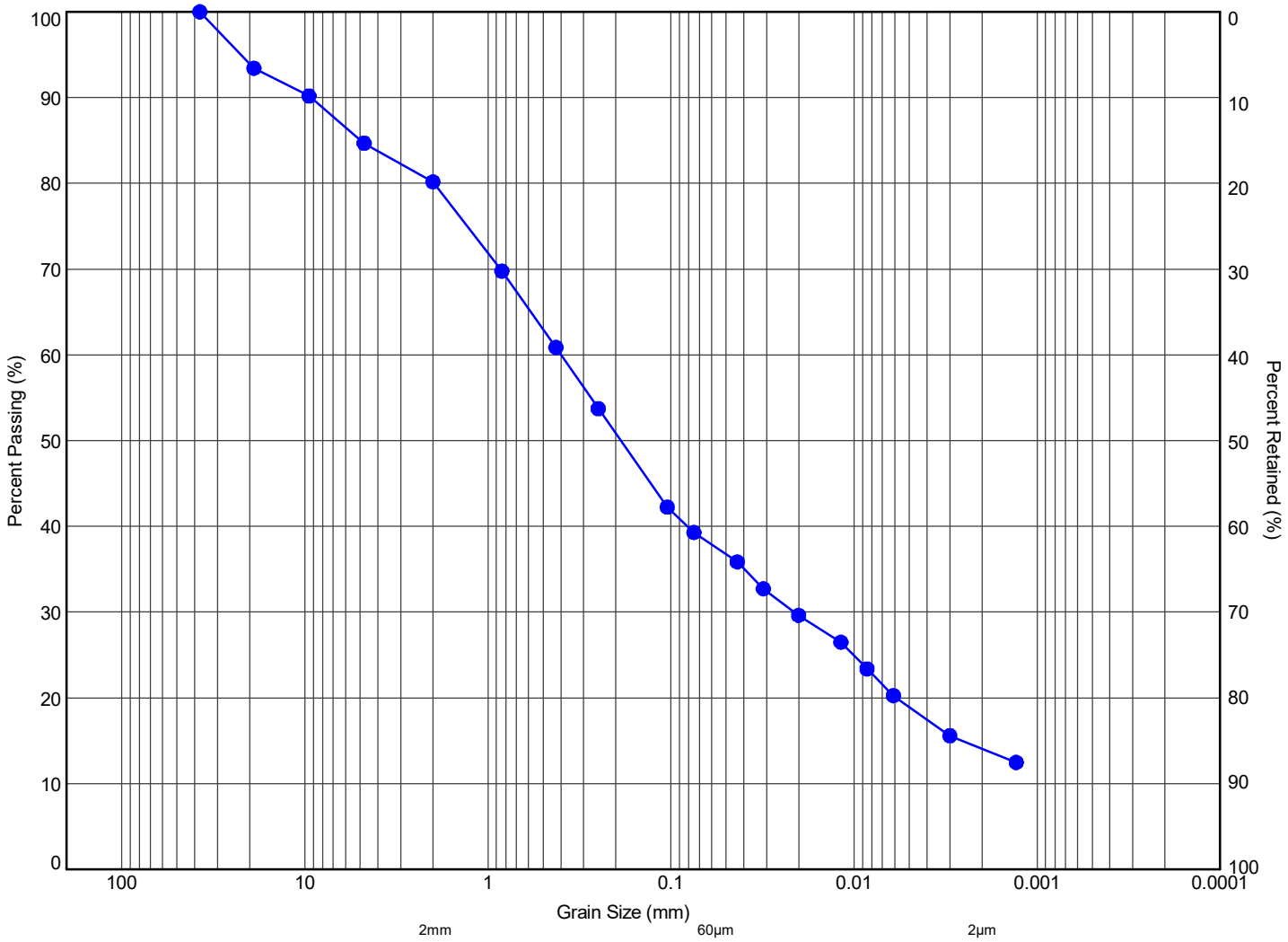
ENGLOBE

Title:

GRAIN SIZE DISTRIBUTION

SILT AND SAND, SOME CLAY, TRACE GRAVEL

File No.: **02405214.001**



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

MIT SYSTEM

	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**3**	SS6	4.8	123.4	20	42	24	14	

ENGLOBE

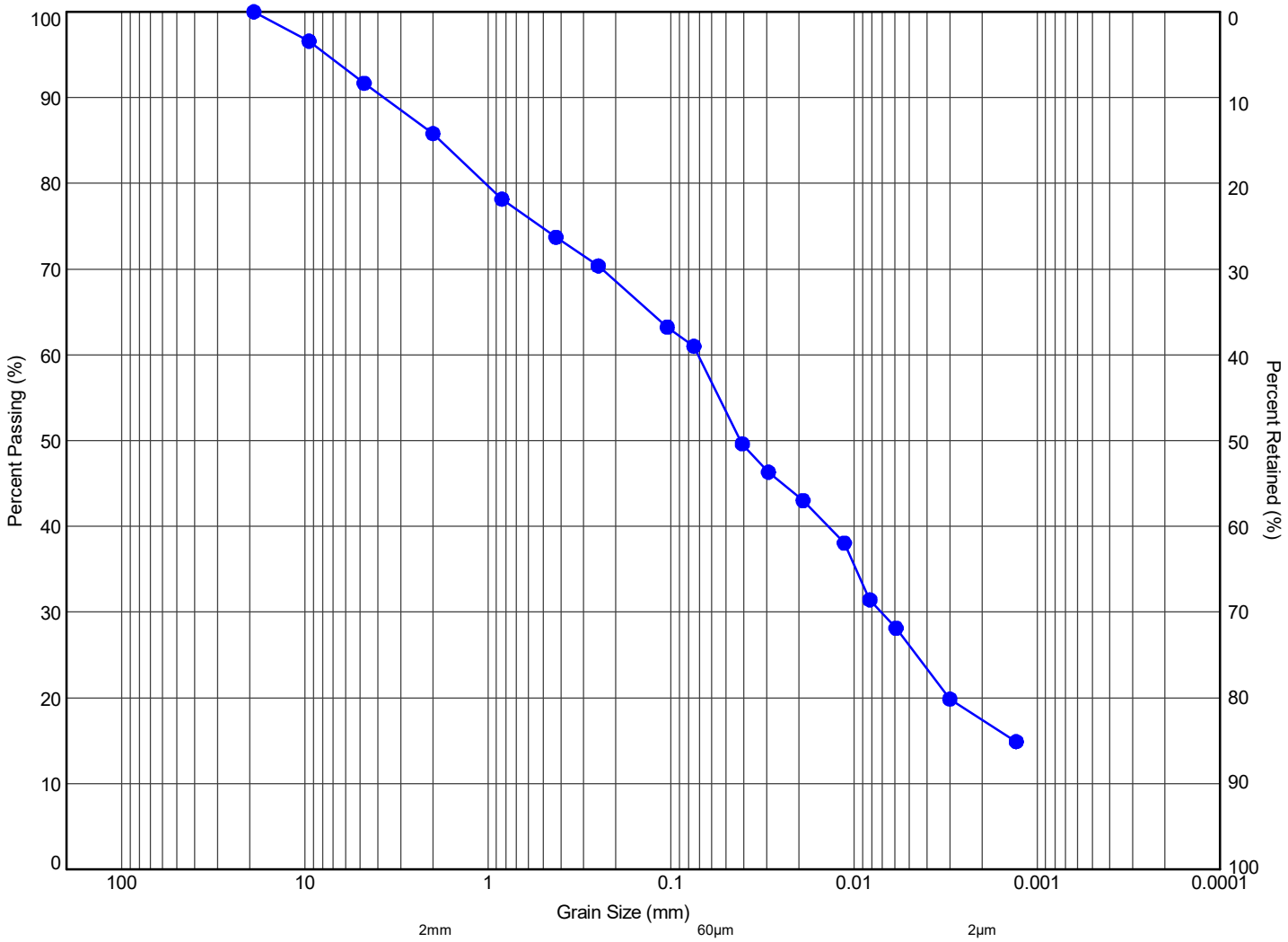
Title:

GRAIN SIZE DISTRIBUTION

SILTY SAND, SOME GRAVEL, SOME CLAY

File No.:

02405214.001



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

MIT SYSTEM

	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**8**	SS6	4.8	123.8	14	30	39	17	

ENGLOBE

Title:

GRAIN SIZE DISTRIBUTION

SANDY SILT, SOME CLAY, SOME GRAVEL

File No.:

02405214.001

Appendix B
MECP Well Records

ENGLOBE

MECP Well Records Summary

WELL ID	MECP WWR ID*	Final Status	First Use	DATE COMPLETED	Water Found (m)**	Well Depth (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**	Construction Method
0	7240563	Observation Wells	Monitoring and Test Hole	04/08/2015	3.66	5.19	2.44	3.97	Auger
1	7112127	Monitoring and Test Hole	Monitoring and Test Hole	09/15/2008		4.88	1.83	4.88	Direct Push
2	7112126	Monitoring and Test Hole	Monitoring and Test Hole	09/15/2008		5.50	2.40	5.50	Direct Push
3	7112120	Monitoring and Test Hole	Monitoring and Test Hole	09/15/2008		5.80	2.74	5.80	Direct Push
4	7112119	Monitoring and Test Hole	Monitoring and Test Hole	09/15/2008		6.71	3.66	6.71	Direct Push
5	7197422	Observation Wells	Monitoring	01/29/2013		6.00	4.60	6.00	Boring
6	7039277	Observation Wells		12/07/2006	4.00	6.00	3.00	6.00	Boring
7	7034856			08/16/2006		3.66	0.61	3.66	Other Method
8	4910290	Abandoned-Other		07/14/2006	4.50	7.60			Boring
9	4910102	Observation Wells	Not Used	01/27/2006		21.00	6.00	21.00	Rotary (Convent.)
10	4910100	Observation Wells		03/08/2006		0.00	1.22	4.27	Other Method
11	4910055	Observation Wells		12/19/2005	3.60	9.00	6.00	9.00	Boring
12	4909740	Observation Wells		04/11/2004		10.80	9.10	10.80	Other Method
13	7223423			10/29/2013					
14	7276722	Observation Wells	Monitoring	10/18/2016		6.10	3.05	6.10	Boring
15	7269521			10/02/2014					
16	7265604			05/05/2016					
17	7261241			03/31/2016					
18	7253457	Monitoring and Test Hole	Monitoring and Test Hole	11/13/2015		6.10	3.05	6.10	Direct Push
19	7253456	Monitoring and Test Hole	Monitoring and Test Hole	11/13/2015		6.10	3.05	6.10	Direct Push
20	7253065			09/03/2015					
21	7225882	Observation Wells	Monitoring and Test Hole	07/11/2014	3.05	3.66	0.92	3.66	Boring
22	7225880	Observation Wells	Monitoring and Test Hole	07/11/2014	3.05	3.97	0.92	3.97	Boring
23	7285463	Observation Wells	Monitoring	03/03/2017	2.14	5.19	2.14	5.19	Boring
24	7209721	Test Hole	Test Hole	09/27/2013		3.97	0.92	3.97	Direct Push
25	7209720	Test Hole	Monitoring and Test Hole	09/27/2013		4.12	1.07	4.12	Direct Push
26	7209719	Test Hole	Monitoring and Test Hole	09/27/2013		3.36	1.83	3.36	Direct Push
27	7209718	Test Hole	Monitoring and Test Hole	09/27/2013		3.81	2.23	3.75	Direct Push
28	7206882			08/13/2013					
29	7202128			04/25/2012					
30	7197426	Observation Wells	Monitoring	01/29/2013		7.30	5.70	7.30	Rotary (Convent.)
31	7197425	Observation Wells		01/29/2013		7.30	5.70	7.30	Rotary (Convent.)
32	7197424	Observation Wells	Monitoring	01/29/2013		7.30	5.70	7.30	Boring
33	7197423	Observation Wells	Monitoring	01/29/2013		6.40	4.80	6.40	Boring
34	7225881	Observation Wells	Monitoring and Test Hole	07/11/2014	3.05	3.97	0.92	3.97	Boring
35	4909462	Observation Wells		06/17/2004			4.27	6.10	Rotary (Convent.)
36	4909509	Observation Wells	Not Used	06/10/2004		5.50			Other Method

*MECP WWR ID: Ministry of the Environment , Conservation and Parks Water Well Records Identification

**metres below ground surface

Appendix C
Groundwater Monitoring Details

ENGLOBE

1840-1850 Bloor Street, Mississauga, Ontario

Groundwater Depths (m below ground surface)

Monitoring Well ID	Ground Surface Elevation (masl)	Well Depth (mbgs)	Top of the Well Screen Depth (mbgs)	1st GW Monitoring Event	2nd GW Monitoring Event	3rd GW Monitoring Event	4th GW Monitoring Event	5th GW Monitoring Event
				Water Depth Dec. 10, 2019 (mbgs)*	Water Depth Dec. 16, 2019 (mbgs)	Water Depth Dec. 23, 2019 (mbgs)	Water Depth Jan 09, 2020 (mbgs)	Water Depth June 3, 2024 (mbgs)
BH1	128.79	5.90	4.40	1.42	1.62	1.27	1.68	N/A
BH4	127.94	5.64	2.64	0.51	0.39	0.55	0.61	N/A
BH8	128.61	6.10	3.10	3.29	1.91	1.63	1.99	1.93

Groundwater Elevations (m above sea level)

Monitoring Well ID	Ground Surface Elevation (masl)	Well Screen Bottom Elevation (masl)	Top of the Well Screen Depth (masl)	1st GW Monitoring Event	2nd GW Monitoring Event	3rd GW Monitoring Event	4th GW Monitoring Event	5th GW Monitoring Event
				Ground Water Elevation Dec. 10, 2019 (masl)*	Ground Water Elevation Dec. 16, 2019 (masl)	Ground Water Elevation Dec. 23, 2019 (masl)	Ground Water Elevation Jan 09, 2020 (masl)	Ground Water Elevation June 3, 2024 (masl)
BH1	128.79	122.89	124.39	127.37	127.17	127.52	127.11	N/A
BH4	127.94	122.30	125.30	127.43	127.55	127.39	127.33	N/A
BH8	128.61	122.51	125.51	125.32	126.70	126.98	126.62	126.68

*Unstabilized groundwater level reading

mbgs - meters below ground surface

masl - meters above sea level

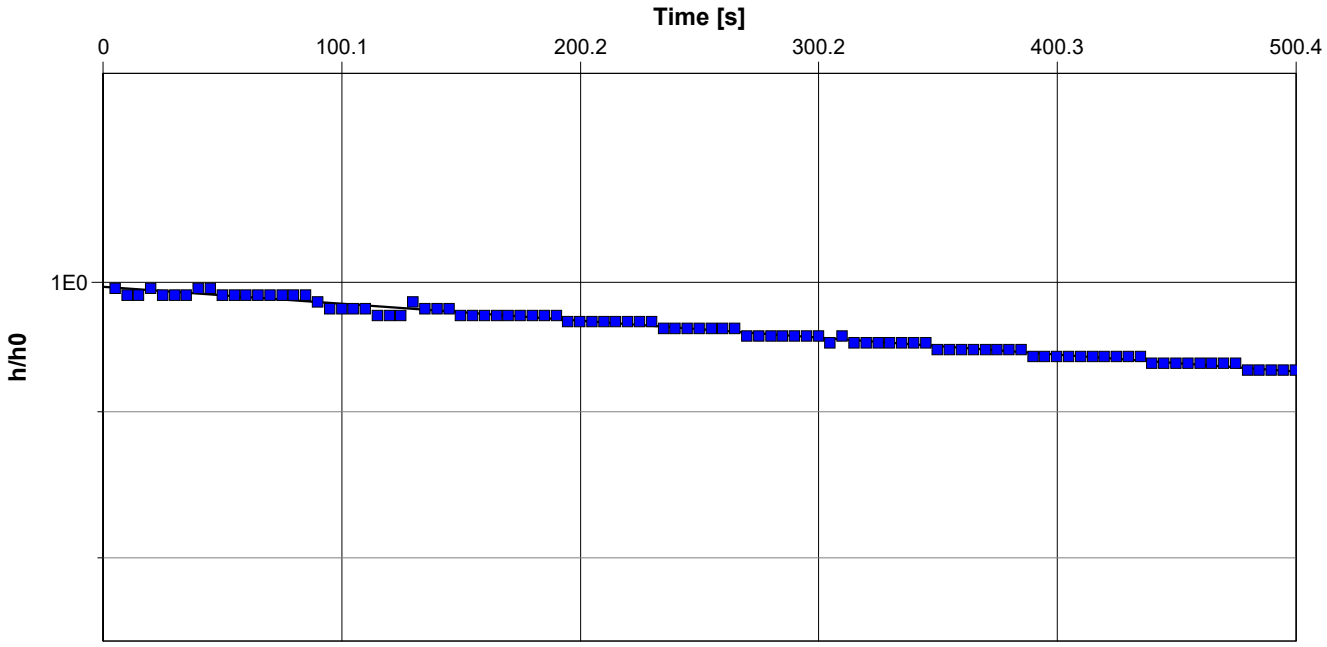
N/A - damaged/blocked well

Appendix D
In-Situ Hydraulic Conductivity Testing Results

ENGLOBE

ENGLOBE	**Slug Test Analysis Report**
	Project: 1840-1850 Bloor Street
	Number: 1-19-0720-46
	Client: Ranee Management

Location: Mississauga, ON	Slug Test: BH1	Test Well: BH1
Test Conducted by: NK		Test Date: 12/16/2019
Analysis Performed by: MM	FHT-BH1	Analysis Date: 3/4/2020
Aquifer Thickness: 5.91 m		

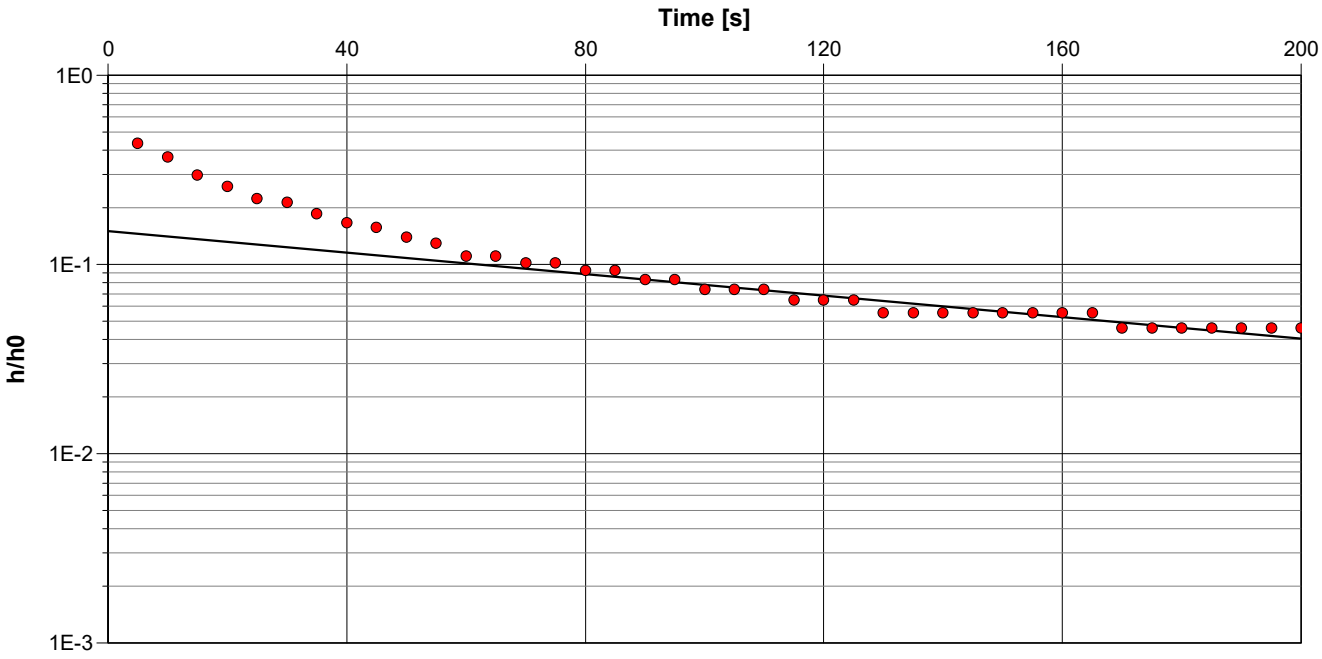


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH1	1.16×10^{-7}	

ENGLOBE	**Slug Test Analysis Report**
	Project: 1840-1850 Bloor Street
	Number: 1-19-0720-46
	Client: Ranee Management

Location: Mississauga, ON	Slug Test: BH4	Test Well: BH4
Test Conducted by: NK		Test Date: 12/16/2019
Analysis Performed by: MM	FHT-BH4	Analysis Date: 3/4/2020
Aquifer Thickness: 5.70 m		

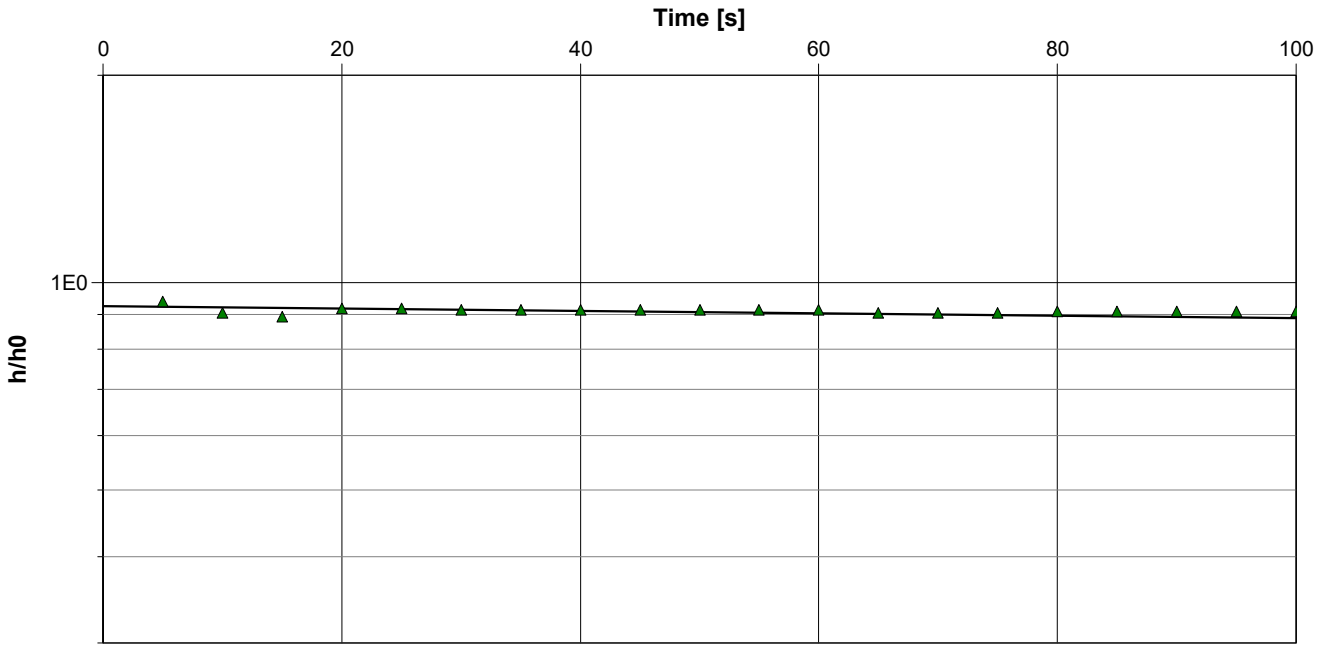


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
BH4	2.67×10^{-6}

	Slug Test Analysis Report
	Project: 1840-1850 Bloor Street
	Number: 1-19-0720-46
	Client: Ranee Management

Location: Mississauga, ON	Slug Test: BH8	Test Well: BH8
Test Conducted by: NK		Test Date: 12/16/2019
Analysis Performed by: MM	FHT-BH8	Analysis Date: 3/4/2020
Aquifer Thickness: 6.30 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH8	1.72×10^{-7}	

Appendix E
Groundwater Quality Analysis Results

ENGLOBE

FINAL REPORT

CA14843-DEC19 R1

1-19-0720-46, 1840-1850 Bloor St Mississauga

Prepared for

Terraprobe

FINAL REPORT

First Page

CLIENT DETAILS

Client	Terraprobe
Address	11 Indell Lane Brampton, Ontario L6T 3Y3. Canada
Contact	Mahmoud Meskar
Telephone	905-796-2650
Facsimile	905-796-2250
Email	mmeskar@terraprobe.ca
Project	1-19-0720-46, 1840-1850 Bloor St Mississauga
Order Number	
Samples	Ground Water (1)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2143
Facsimile	705-652-6365
Email	brad.moore@sgs.com
SGS Reference	CA14843-DEC19
Received	12/24/2019
Approved	01/02/2020
Report Number	CA14843-DEC19 R1
Date Reported	01/02/2020

COMMENTS

RL - SGS Reporting Limit
Temperature of Sample upon Receipt: 4 degrees C
Cooling Agent Present: yes
Custody Seal Present: yes

Chain of Custody Number: 012611

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

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Legend..... 19
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Client: Terraprobe

Project: 1-19-0720-46, 1840-1850 Bloor St Mississauga

Project Manager: Mahmoud Meskar

Samplers: Madam Suural

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

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010

L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

Parameter	Units	RL	L1	L2	Result
General Chemistry					
Biochemical Oxygen Demand (BOD5)	mg/L	2	300	15	< 4 ↑
Total Suspended Solids	mg/L	2	350	15	79
Total Kjeldahl Nitrogen	as N mg/L	0.5	100	1	< 0.5

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

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010

L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

Parameter	Units	RL	L1	L2	Result
Metals and Inorganics					
Fluoride	mg/L	0.06	10		0.22
Cyanide (total)	mg/L	0.01	2	0.02	< 0.01
Sulphate	mg/L	0.2	1500		160
Aluminum (total)	mg/L	0.001	50		1.89
Antimony (total)	mg/L	0.0009	5		< 0.0009
Arsenic (total)	mg/L	0.0002	1	0.02	0.0012
Cadmium (total)	mg/L	0.000003	0.7	0.008	< 0.000003
Chromium (total)	mg/L	0.00008	5	0.08	0.00347
Copper (total)	mg/L	0.0002	3	0.05	0.0029
Cobalt (total)	mg/L	0.000004	5		0.00226
Lead (total)	mg/L	0.00001	3	0.12	0.00095

Client: Terraprobe

Project: 1-19-0720-46, 1840-1850 Bloor St Mississauga

Project Manager: Mahmoud Meskar

Samplers: Madam Suural

PACKAGE: **SANSEW - Metals and Inorganics**

(WATER)

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010

L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

Metals and Inorganics (continued)

Parameter	Units	RL	L1	L2	Result
Manganese (total)	mg/L	0.00001	5	0.05	0.758
Molybdenum (total)	mg/L	0.00004	5		0.00225
Nickel (total)	mg/L	0.0001	3	0.08	0.0026
Phosphorus (total)	mg/L	0.003	10	0.4	0.071
Selenium (total)	mg/L	0.00004	1	0.02	< 0.00004
Silver (total)	mg/L	0.00005	5	0.12	< 0.00005
Tin (total)	mg/L	0.00006	5		0.00203
Titanium (total)	mg/L	0.00005	5		0.0834
Zinc (total)	mg/L	0.002	3	0.04	0.009

Client: Terraprobe
Project: 1-19-0720-46, 1840-1850 Bloor St Mississauga
Project Manager: Mahmoud Meskar
Samplers: Madam Suural

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

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010
L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

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

PACKAGE: **SANSEW - Nonylphenol and Ethoxylates** (WATER)

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010
L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

Parameter	Units	RL	L1	L2	Result
Nonylphenol and Ethoxylates					
Nonylphenol	mg/L	0.001	0.02		< 0.001
Nonylphenol Ethoxylates	mg/L	0.01	0.2		< 0.01
Nonylphenol diethoxylate	mg/L	0.01			< 0.01
Nonylphenol monoethoxylate	mg/L	0.01			< 0.01

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

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010
L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

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

Client: Terraprobe
Project: 1-19-0720-46, 1840-1850 Bloor St Mississauga
Project Manager: Mahmoud Meskar
Samplers: Madam Suural

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

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010
L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

Parameter	Units	RL	L1	L2	Result
Other (ORP)					
pH	no unit	0.05	10	9	7.55
Mercury (total)	mg/L	0.00001	0.01	0.0004	< 0.00001

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

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010
L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

Parameter	Units	RL	L1	L2	Result
PCBs					
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001	0.001	0.0004	< 0.0001

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

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010
L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

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

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

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010
L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

Parameter	Units	RL	L1	L2	Result

Client: Terraprobe

Project: 1-19-0720-46, 1840-1850 Bloor St Mississauga

Project Manager: Mahmoud Meskar

Samplers: Madam Suural

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

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010

L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Parameter	Units	RL	L1	L2	Result
SVOCs					
di-n-Butyl Phthalate	mg/L	0.002	0.08	0.015	< 0.002
Bis(2-ethylhexyl)phthalate	mg/L	0.002	0.012	0.0088	< 0.002

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

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010

L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Parameter	Units	RL	L1	L2	Result
VOCs					
Chloroform	mg/L	0.0005	0.04	0.002	< 0.0005
1,2-Dichlorobenzene	mg/L	0.0005	0.05	0.0056	< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005	0.08	0.0068	< 0.0005
cis-1,2-Dichloroethene	mg/L	0.0005	4	0.0056	< 0.0005
trans-1,3-Dichloropropene	mg/L	0.0005	0.14	0.0056	< 0.0005
Methylene Chloride	mg/L	0.0005	2	0.0052	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	1.4	0.017	< 0.0005
Methyl ethyl ketone	mg/L	0.02	8		< 0.02
Styrene	mg/L	0.0005	0.2		< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	1	0.0044	< 0.0005
Trichloroethylene	mg/L	0.0005	0.4	0.008	< 0.0005

Client: Terraprobe

Project: 1-19-0720-46, 1840-1850 Bloor St Mississauga

Project Manager: Mahmoud Meskar

Samplers: Madam Suural

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

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010

L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number	8
Sample Name	SU-BH4
Sample Matrix	Ground Water
Sample Date	23/12/2019

VOCs - BTEX

Parameter	Units	RL	L1	L2	Result
Benzene	mg/L	0.0005	0.01	0.002	< 0.0005
Ethylbenzene	mg/L	0.0005	0.16	0.002	< 0.0005
Toluene	mg/L	0.0005	0.27	0.002	< 0.0005
Xylene (total)	mg/L	0.0005	1.4	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 / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010 L1	SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010 L2
SU-BH4					
Total Suspended Solids	SM 2540D	mg/L	79		15
Manganese	SM 3030/EPA 200.8	mg/L	0.758		0.05

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	DIO0394-DEC19	mg/L	0.2	<0.2	1	20	96	80	120	88	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)	BOD0050-DEC19	mg/L	2	< 2	7	30	98	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)	SKA0209-DEC19	mg/L	0.01	<0.01	ND	10	93	90	110	84	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	EWL0347-DEC19	mg/L	0.06	<0.06	0	10	99	90	110	92	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)	EHG0025-DEC19	mg/L	0.00001	< 0.00001	ND	20	113	80	120	119	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)	EMS0171-DEC19	mg/L	0.00005	<0.00005	ND	20	108	90	110	101	70	130
Aluminum (total)	EMS0171-DEC19	mg/L	0.001	<0.001	2	20	107	90	110	93	70	130
Arsenic (total)	EMS0171-DEC19	mg/L	0.0002	<0.0002	7	20	103	90	110	103	70	130
Cadmium (total)	EMS0171-DEC19	mg/L	0.000003	<0.000003	14	20	102	90	110	84	70	130
Cobalt (total)	EMS0171-DEC19	mg/L	0.000004	<0.000004	2	20	103	90	110	101	70	130
Chromium (total)	EMS0171-DEC19	mg/L	0.00008	<0.00008	ND	20	107	90	110	110	70	130
Copper (total)	EMS0171-DEC19	mg/L	0.0002	<0.0002	9	20	103	90	110	92	70	130
Manganese (total)	EMS0171-DEC19	mg/L	0.00001	<0.00001	2	20	102	90	110	NV	70	130
Molybdenum (total)	EMS0171-DEC19	mg/L	0.00004	<0.00004	2	20	101	90	110	108	70	130
Nickel (total)	EMS0171-DEC19	mg/L	0.0001	<0.0001	6	20	99	90	110	102	70	130
Lead (total)	EMS0171-DEC19	mg/L	0.00001	<0.00001	7	20	105	90	110	97	70	130
Phosphorus (total)	EMS0171-DEC19	mg/L	0.003	<0.003	ND	20	95	90	110	NV	70	130
Antimony (total)	EMS0171-DEC19	mg/L	0.0009	<0.0009	ND	20	100	90	110	110	70	130
Selenium (total)	EMS0171-DEC19	mg/L	0.00004	<0.00004	ND	20	110	90	110	100	70	130
Tin (total)	EMS0171-DEC19	mg/L	0.00006	<0.00006	4	20	98	90	110	NV	70	130
Titanium (total)	EMS0171-DEC19	mg/L	0.00005	<0.00005	11	20	96	90	110	NV	70	130
Zinc (total)	EMS0171-DEC19	mg/L	0.002	<0.002	ND	20	98	90	110	79	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	BAC9414-DEC19	cfu/100mL	-	ACCEPTED	ACCEPTED							

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-IENVIGC-LAK-AN-015

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
Nonylphenol diethoxylate	GCM0356-DEC19	mg/L	0.01	< 0.01			87	55	120			
Nonylphenol Ethoxylates	GCM0356-DEC19	mg/L	0.01	< 0.01								
Nonylphenol monoethoxylate	GCM0356-DEC19	mg/L	0.01	< 0.01			100	55	120			
Nonylphenol	GCM0356-DEC19	mg/L	0.001	< 0.001			100	55	120			

QC SUMMARY

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)	GCM0351-DEC19	mg/L	2	<2	NSS	20	99	75	125			

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)	GCM0351-DEC19	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0351-DEC19	mg/L	4	< 4	NSS	20	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	EWL0339-DEC19	no unit	0.05	NA	0		100			NA		

QC SUMMARY

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	SKA0212-DEC19	mg/L	0.002	<0.002	7	10	105	90	110	88	75	125

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-[ENV]GC-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
Polychlorinated Biphenyls (PCBs) - Total	GCM0349-DEC19	mg/L	0.0001	<0.0001	NSS	30	110	60	140	NSS	60	140

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	GCM0350-DEC19	mg/L	0.002	< 0.002	NSS	30	102	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0350-DEC19	mg/L	0.002	< 0.002	NSS	30	101	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	EWL0353-DEC19	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	SKA0225-DEC19	as N mg/L	0.5	<0.5	ND	10	103	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	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	100	60	130	95	50	140
1,2-Dichlorobenzene	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	99	60	130	96	50	140
1,4-Dichlorobenzene	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	99	60	130	96	50	140
Benzene	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	95	60	130	99	50	140
Chloroform	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	97	60	130	100	50	140
cis-1,2-Dichloroethene	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	96	60	130	99	50	140
Ethylbenzene	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	98	60	130	100	50	140
m-p-xylene	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	99	60	130	100	50	140
Methyl ethyl ketone	GCM0366-DEC19	mg/L	0.02	<0.02	ND	30	105	50	140	80	50	140
Methylene Chloride	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	93	60	130	97	50	140
o-xylene	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	99	60	130	101	50	140
Styrene	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	99	60	130	100	50	140
Tetrachloroethylene (perchloroethylene)	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	96	60	130	95	50	140
Toluene	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	97	60	130	98	50	140
trans-1,3-Dichloropropene	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	96	60	130	92	50	140
Trichloroethylene	GCM0366-DEC19	mg/L	0.0005	<0.0005	ND	30	96	60	130	95	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.

-- 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: 012611 Page 1 of 1

Laboratory Information Section - Lab use only

Received By: Kim Sheard
Received Date: 12,23,19 (mm/dd/yy)
Received Time: 14 50 (hr : min)
Received By (signature):
Custody Seal Present: Yes ☐ No ☑
Custody Seal Intact: Yes ☐ No ☑
Cooling Agent Present: Yes ☑ No ☐ Type: ice
Temperature Upon Receipt (°C) 4 . 4 . 4
LAB LIMS #: CA14843-DEC19

REPORT INFORMATION

Company: Terraprobe Inc
Contact: Mahmoud Meskar
Address: 11 Indell Ln.
Brampton, ON
Phone: 905 796-2650
Fax:
Email: mmeskar@terraprobe.ca

INVOICE INFORMATION

☒ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email: lrossi@terraprobe.ca

Quotation #:
P.O. #:
Project #: 1-19-0720-41
Site Location/ID: 1840-1850 Blur St. Mississauga

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:

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

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: Peel Region

RECORD OF SITE CONDITION (RSC) ☐ YES ☒ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	M&I: Field Filtered (Y/N)	M&I: Metals & Inorganics incl CrVI, CN, Hg pH,(BHWS),EC,SAR-soil) (Cl, Na-water)	M&I: Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI	M&I: ICP Metals only Sb,As,Ba,Be,B,Cd,Cr,Co,Cu,Pb,Mo,Ni, Se,Ag,Ti,U,V,Zn	SVOC: PAHs only	SVOC: SVOCs all incl PAHs, ABNs, CPs	PCB: PCBs Total ☐ Aroclor ☐	PHC: F1-F4 + BTEX	PHC: F1-F4 only no BTEX	VOC: VOCs all incl BTEX	VOC: BTEX only	Pest: Pesticides Organochlorine or specify other	Other: Sewer Use: Region of Peel Specify pkg: X	Other: Water Characterization Pkg General ☐ Extended ☐	TCLP: Specify TCLP tests ☐M&I ☐VOC ☐PCB ☐B(a)P ☐ABN ☐Ignit.	COMMENTS:
1	SU-BH4	Dec 23/19	1:30	15	GW	N												X			
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

Observations/Comments/Special Instructions

Sampled By (NAME): Madan Suvral Signature: Madan Date: 12,23,019 (mm/dd/yy)
Relinquished by (NAME): Madan Suvral Signature: Madan Date: 12,23,019 (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Revision #: 1.2
Date of Issue: 09 Sept, 2019

Appendix F
FEM Modelling and Dewatering Rate Calculations

ENGLOBE

Material Name	Color	KS (m/s)
Earth Fill		1e-06
Clayey to Sandy Silt (Glacial Till)		1.72e-07
Sandy SIlt/Sandy Gravel		2.67e-06
Inferred Bedrock		1.16e-07

Excavation Dimensions: 87.6 m X 132.5 m
Section Cut: E-W

Ground Surface: Elev.128.65 masl

Proposed Finished Floor: Elev. 124.55 masl
Elevator Pit Elevation/Base of Excavation: 123.05 masl

Water Table: Elev. 127.55 masl
Dewatering Target: Elev. 122.05 masl

Q Ground Water = 150,500 L/day
(S.F. = 1.5)
25 mm of Rainfall Event: 290,500 L/day

Q Total= 441,000 L/day

ENGLOBE

1840 - 1850 Bloor Street, Mississauga

Short Term - P1 Dewatering - Permeable

Drawn By	YH	Scale	1:827	Company	Englobe Corp
2024-07				File Name	02405214.000 FEM.slmd

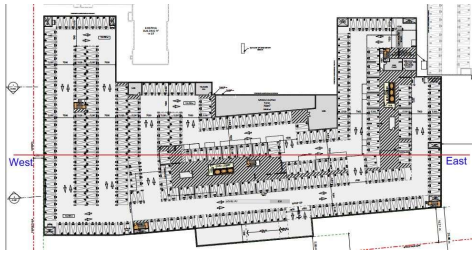
Short-Term Construction Dewatering Flow Rate Estimate Details - Parking Level 1

Dewatering flow rate from Groundwater Source		
Excavation Dimensions		
NS (m)	87.6	
EW (m)	132.5	
Total Area (m^2)	11603	
Perimeter (m)	582.0	
Q BASE		
Flow (m^3/day)	**Length of Base (m)**	**Flow (L/day)**
0.0399540	87.6	3498.764242
Q SIDES		
Flow (m^3/day)	**Length of the Face (m)**	**Flow (L/day)**
0.258150	291.0	75121.6500
0.073907	291.0	21506.9370
Q Total	L/day	100,127.35
Safety Factor		1.5
	L/day	150,191.03
	L/day	**150,500.00**
	L/min	104.51

Dewatering Flow Rate from Rainfall Event		
Rainfall Event		
Year	2	100
Hour	3	12
Depth (mm)	25	94
Depth (m)	0.025	0.094
2 Year Event (L/day)*	**290,075**	290,500
100 Year Event (L/Day)	**1,090,682**	1,091,000

Estimated Total Dewatering Flow Rate	
Short term (L/day)	441,000.00
Short term L/min	306.25

Material Name	Color	KS (m/s)
Earth Fill		1e-06
Clayey to Sandy Silt (Glacial Till)		1.72e-07
Sandy Silt/Sandy Gravel		2.67e-06
Inferred Bedrock		1.16e-07



Excavation Dimensions: 87.6 m X 132.5 m
Section Cut: W-E

Ground Surface: Elev.128.65 masl

Proposed Finished Floor: Elev. 124.55 masl
Drainage Layer: 124.0 masl

Water Table: Elev. 127.55 masl

Q Ground Water = 89,500 L/day
(S.F. = 1.5)
25 mm of Rainfall Event: 8,000 L/day

Q Total= 97,500 L/day

ENGLOBE

1840 - 1850 Bloor Street, Mississauga

Long Term - P1 Drainage - Permeable

Drawn By	YH	Scale	1:670	Company	Englobe Corp
2024-07				File Name	02405214.000 FEM.slmd

Long-Term Foundation Drainage Flow Rate Estimate Details - Parking Level 1

Dewatering flow rate from Groundwater Source		
Excavation Dimensions		
NS (m)	87.6	
EW (m)	132.5	
Total Area (m^2)	11603	
Perimeter (m)	582.0	
Q BASE		
Flow (m^3/day)	**Length of Base (m)**	**Flow (L/day)**
0.1363400	87.6	11939.26808
Q SIDES		
Flow (m^3/day)	**Length of the Face (m)**	**Flow (L/day)**
0.105660	291.0	30747.0600
0.057669	291.0	16781.6790

Q Total	L/day	59,468.01

Safety Factor		1.5
	L/day	89,202.01
	L/day	**89,500.00**
	L/min	62.15

Foundation Drainage Flow Rate from Infiltration		
Infiltration		
Perimeter	Slice	25mm event
582.0	0.5	0.025

2 Year Event (L/day)	7,275
2 Year Event (L/day)	**8,000**
2 Year Event (L/min)	**5.56**

Estimated Total Foundation Drainage Flow Rate	
Long term (L/day)	**97,500.00**
Long term (L/min)	67.71

Dewatering Calculations
1840-1850 Bloor Street, Mississauga
Proposed Underground Services

Dewatering Rate Formula for an Unconfined Aquifer (Powers et al., 2007):

$$Q = \frac{\pi K (H^2 - h^2)}{\ln(R_0 / r_s)} + 2\left[\frac{xK(H^2 - h^2)}{2L}\right]$$

Where:

- Q = Anticipated pumping rate (m^3/day)
- K = Hydraulic Conductivity (m/day)
- H = Distance from initial static water level to bottom of the saturated aquifer (m)
- h = Depth of water in the well while pumping (m)
- R_0 = Distance from a point of greatest drawdown to a point where there is no drawdown (Radius of influence) (m)
- r_s = Distance to the wellpoints from the centre of the trench (m), assumed to be half of the trench width
- x = Trench Length (m)
- L = Distance from a line source to the trench, equivalent to R_o (m)

Parameter	Units	Proposed Storm Sewer Value	Proposed Sanitary Sewer Value
Q	**m^3/day**	11.4	4.1
K	**m/day**	0.01	0.01
H	**m**	7.5	4.7
h	**m**	1.6	0.7
R_0	**m**	12.5	9.9
Trench width (b)	**m**	2	2
r_s	**m**	1.0	1.0
x (a)	**m**	163.7	111.5
L	**m**	12.5	9.9
	a/b	81.9	55.8

Considering a factor of safety of 1.5

Required Dewatering Rate:

Q (Proposed Storm Sewer)= 17.1 m^3/day

Q (Proposed Sanitary Sewer = 6.2 m^3/day

Radius of Influence Formula (Bear, 1979):

$$R_0 = 2.45\sqrt{\frac{HK}{S_y}}\,t$$

a/b>1.5 Trench Dewatering
a/b<1.5 Single Well Dewatering

Where:

- R_0 = Radius of Influence (m), beyond which there is negligible drawdown
- H = Distance from initial static water level to bottom of saturated aquifer (m)
- K = Hydraulic conductivity (m/s)
- S_y = Specific yield of the aquifer formation
- t =Time (s) required to draw the static groundwater level to the desired level (assumed to be equivalent to 14 days)

Parameter	Units	Value	Value
R_0	**m**	12.5	9.9
H	**m**	7.5	4.7
K	**m/s**	1.7E-07	1.7E-07
S_y		0.06	0.06
t	**s**	1209600	1209600

Short-Term Construction Dewatering Flow Rate Estimate Details
Proposed Storm Sewer Alignment

Dewatering flow rate from Groundwater Source	
Excavation Dimensions	
NS (m)	163.7
EW (m)	2
Area (m^2)	327.4
Perimeter (m)	331.4
Total Flow (m^3/day)	**Flow (l/day)**
17.10	17,500.00

Dewatering Flow Rate from Rainfall Event		
Rainfall Event		
Year	2	100
Hour	3	12
Depth (mm)	25	94
Depth (m)	0.025	0.094
2 Year Event (L/day) for Trench Excavation	**8,185**	8,500
100 Year Event (L/Day) for Trench Excavation	**30,776**	31,000

Estimated Short-Term Dewatering Flow Rate

2 Year Event (L/day)	**26,000.00**
100 Year Event (L/day)	**48,500.00**

Short-Term Construction Dewatering Flow Rate Estimate Details
Proposed Sanitary Sewer Alignment

Dewatering flow rate from Groundwater Source	
Excavation Dimensions	
NS (m)	111.5
EW (m)	2
Area (m^2)	223
Perimeter (m)	227
Total Flow (m^3/day)	**Flow (l/day)**
6.20	6,500.00

Dewatering Flow Rate from Rainfall Event		
Rainfall Event		
Year	2	100
Hour	3	12
Depth (mm)	25	94
Depth (m)	0.025	0.094
2 Year Event (L/day) for Trench Excavation	**5,575**	6,000
100 Year Event (L/Day) for Trench Excavation	**20,962**	21,000

Estimated Short-Term Dewatering Flow Rate

2 Year Event (L/day)	**12,500.00**
100 Year Event (L/day)	**27,500.00**