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A REPORT TO
THE ELIA CORPORATION

HYDROGEOLOGICAL ASSESSMENT

PROPOSED MIXED-USE DEVELOPMENT
WITH 2- TO 5-LEVEL UNDERGROUND PARKING STRUCTURE

BLOCKS 1, 2, 3, 4 AND 5
SORRENTO DRIVE AND ELIA AVENUE
SOUTHEAST OF HURONTARIO STREET AND EGLINTON AVENUE EAST

CITY OF MISSISSAUGA

REFERENCE NO. 2010-W021

ISSUED FOR REZONING
MAY 2021

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1.0 EXECUTIVE SUMMARY

Soil Engineers Ltd. has conducted a hydrogeological assessment for a proposed mixed-use development with 2- to 5-level underground parking structures, located at Elia Avenue and Sorrento Drive in the City of Mississauga. The subject site is located within an existing, developed area, consisting of residential properties to the north, east and south and commercial properties to the west. The subject site itself is currently vacant and is covered by grass, weeds and shrubs.

The subject site lies within the Physiographic Region of Southern Ontario known as the South Slope, on the mapped Till Plains (Drumlinized) physiographic feature, where the native shallow surface mineral soils are mapped as Halton Till unit deposits, consisting predominantly of silt to silty clay matrix.

The subject site is located within the Lake Ontario Shoreline East Sub-watershed of the Credit River Watershed. Records review shows that the closest wooded area is located approximately 350 m southeast of the subject site, and that a small water body can be found about 550 m northeast of the subject site. In addition, Cooksville Creek, which flows in a northwest to southeast direction, is located, approximately 200 m west of the site.

A review of the topographic map for the subject site and surrounding area shows that there is a decline in elevation relief towards the west, towards Cooksville Creek. Based on the ground surface elevations, as recorded at boreholes and monitoring wells locations and from review of the existing topographic map and survey plan, the elevation relief across the subject site is approximately 7 m.

The study has disclosed that beneath the topsoil or earth fill soil horizons, the native subsoils underlying the subject site consists of silty clay till, silty clay, silt, sandy silt, sandy silt till and shale bedrock.

The findings of this study confirm that the measured groundwater levels within the wells ranged from being dry to -0.01 m below the prevailing ground surface, or at elevations, ranging from 157.95 to 168.41 m above sea level.

The single well response test estimates for the hydraulic conductivity (K) for the underlying shale bedrock ranges from 1.0×10^{-6} to 2.3×10^{-6} to m/s and the K estimates for the silt, silty clay and/or silty clay till units ranges from 5.1×10^{-7} to 5.6×10^{-6} m/s. The results suggest that the hydraulic conductivity estimates for the groundwater-bearing overburden soil unit is low while the hydraulic conductivity for the groundwater-bearing shale bedrock is moderate,

with correspondingly low to moderate anticipated groundwater seepage rates being into open excavations, below the water table.

The anticipated dewatering flow rate could reach estimated daily rates of 177,453.5 L/day, 68,803.0 L/day, 14,366.2 L/day, 268,771.3 L/day and 2132,943.0 L/day for Blocks 1, 2, 3, 4 and 5 respectively; by applying a safety factor of three (3), it could reach maximums of 532,360.6 L/day, 206,408.9 L/day, 43,098.7 L/day, 806,314.0 L/day and 641,829.0 L/day. The dewatering rates for excavation range from below the groundwater taking approval threshold for Block 3, to between the EASR threshold of 50,000 L/day and 400,000 L/day for Block 2 to above the 400,000 L/day threshold limits for Blocks 1, 4 and 5. As such the approval for the proposed groundwater takings would be through an Environmental Activity and Sector Registry (EASR) filing with the MECP for Block 2 and through a Permit-To-Take Water (PTTW) filing with the MECP for Blocks 1, 4 and 5.

The zone of influence for any temporary construction dewatering could reach a maximum of 35.7 m away from the conceptual dewatering area around the excavation footprints. There are no wetlands, bodies of water, or any natural features present within the conceptual zones of influence for the conceptual dewatering alignment area. Any water supply wells which may be within the conception zone of influence for dewatering are no longer expected to be used as active water supply wells, as the surrounding areas are supplied by municipal water. As such there are no long-term interference impacts to any water supply wells anticipated from any temporary construction dewatering for the proposed development.

The long-term foundation drainage rates to proposed Mira perimeter foundation drainage networks for conventionally shored excavation are 5,461.5 L/day, 1,187.1 L/day, 1,694.1 L/day, 7,119.6 L/day and 3,159.1 L/day for Blocks 1, 2, 3, 4 and 5, respectively. The long-term drainage rates for the under-slab basement floor drainage networks are 577.6 L/day, 67.4 L/day, 159.9 L/day, 541.5 L/day, and 263.6 L/day. The combined long-term drainage rates from both the Mira Drain perimeter foundation drainage network and from the under-slab basement floor drainage networks are estimated at 6,039.1 L/day, 1,254.5 L/day, 1,854.0 L/day, 7,661.2 L/day, and 3,422.7 L/day. After applying a safety factor of three (3), the combined drainage rates are estimated at 18,117.2 L/day, 3,763.4 L/day, 5,562.0 L/day, 22,983.4 L/day, and 10,268.2 L/day for the proposed underground parking structures for Blocks 1, 2, 3, 4 and 5, respectively.

2.0 INTRODUCTION

2.1 Project Description

In accordance with the authorization from Mr. Vince Burns of the Elia Corporation, Soil Engineers Ltd. (SEL) has completed a hydrogeological assessment for a proposed mixed-use development with 2- to 5-levels of underground parking for a subject site at Sorrento Drive and Elia Avenue in the City of Mississauga. The location of the site is shown on Drawing No. 1.

The subject site is located within an existing developed area, where the surrounding land use includes; residential properties to the north, east and south and commercial properties to the west. The subject site itself is currently vacant and is covered by grass, weeds and shrubs.

This report summarizes the findings of the field study and the associated groundwater monitoring and testing programs, and provides a description and characterization of the interpreted hydro-geostratigraphy for the subject site and surrounding area. The current study provides preliminary recommendations for any construction- related, or long-term foundation dewatering and drainage needs prior to detailed design. The report also provides a recommendation for any need to acquire an Environmental Activity and Sector Registry (EASR), or a Permit-To-Take Water (PTTW) as groundwater taking approvals to facilitate a construction dewatering program or for any anticipated long-term foundation drainage needs after development.

2.2 Project Objectives

The major objectives of this Hydrogeological Study Report are as follows:

1. Establish the hydrogeological setting for the subject site and surrounding local areas;
2. Interpretation of shallow groundwater flow patterns;
3. Identify zones of higher groundwater yield as potential sources for ongoing shallow groundwater seepage;
4. Characterizing the hydraulic conductivity (K) for the groundwater-bearing sub soil strata;
5. Prepare an interpreted hydrogeostratigraphic cross-section for the subject site;
6. Estimate the anticipated temporary dewatering flows that may be required to lower the shallow groundwater table to facilitate earthworks for construction, or for any required permanent foundation drainage needs following construction;

7. Evaluate potential impacts to nearby groundwater receptors within the anticipated zone of influence for dewatering;
8. Provide comments regarding any need to file for an Environmental Activity and Sector Registry (EASR) or to acquire a Permit-To-Take Water (PTTW) as groundwater taking approvals to facilitate a construction dewatering program.

2.3 **Scope of Work**

The scope of work for the Hydrogeological Study is summarized below:

1. Installation of fifteen (5) monitoring wells within the site's development footprint;
2. Monitoring well development and groundwater level measurements at the fifteen (15) installed monitoring wells;
3. Performance of Single Well Response Tests (SWRTs) at the installed monitoring wells to estimate the hydraulic conductivity (K) for the groundwater-bearing subsoil/bedrock strata at the depths of the monitoring well screens;
4. Reviewing and plotting of Ministry of the Environment, Conservation and Parks (MECP) water well records within 500 m of the proposed development site;
5. Describing the geological and hydrogeological setting for the site and surrounding local area;
6. Review of the findings of the concurrent geotechnical investigation; review of available engineering development plans and profiles for proposed underground services and for the proposed 2- to 5-level underground structures; assessing the preliminary temporary dewatering needs and estimation of any anticipated dewatering flows to lower the groundwater level to facilitate construction, or for any anticipated long-term foundation drainage, following construction.
7. Provide comments regarding any need to file for an Environmental Activity Sector Registry (EASR), or to acquire a Permit-To-Take Water (PTTW) as approvals to facilitate a construction dewatering program.

3.0 METHODOLOGY

3.1 Borehole Advancement and Monitoring Well Installation

Borehole drilling and monitoring well construction were conducted between October 19 and November 5, 2020. The program consisted of the drilling of thirty-one (31) boreholes (BH) and the installation of fifteen (15) monitoring wells (MW), one within each of fifteen (15) selected boreholes at the time of borehole drilling. The locations of the boreholes/monitoring wells are shown on Drawing No. 2.

The drilling and monitoring well construction were completed by a licensed water well contractor, DBW Drilling Ltd., under the full-time supervision of a geotechnical technician from SEL, who also logged the subsoil strata encountered during borehole advancement and collected representative subsoil samples for textural classification. It should be noted that twenty-six (26) of the boreholes were drilled using continuous flight power augers until contacting the refusal depth. Five (5) of the boreholes were cored into the shale bedrock. Two (2) monitoring wells were installed within the cored boreholes while the remaining monitoring wells were installed within the overburden subsoil material. Detailed descriptions of the encountered subsurface soil and groundwater conditions and monitoring well construction details are presented on the borehole and monitoring well logs, on the enclosed Figures 1 to 31, inclusive.

The monitoring wells were constructed, using 50-mm diameter PVC riser pipes and screen sections, which were installed in each of the boreholes in accordance with Ontario Regulation (O. Reg.) 903. All of the monitoring wells were provided with monument-type protective steel casings, and/or steel flush mount protective casings at the ground surface. The details for monitoring well construction are provided on the enclosed Borehole Logs (Figures 1 to 3, inclusive).

The UTM coordinates and ground surface elevations at the borehole/monitoring well locations, together with the monitoring well construction details, are provided on Table 3-1.

Table 3-1 - Monitoring Well Installation Details

Well ID	Installation Date	UTM Coordinates		Ground El. (masl)	Borehole Depth (mbgs)	Monitoring Well Depth (mbgs)	Screen Interval (mbgs)	Casing Dia. (mm)
		East (m)	North (m)					
BH/MW 1	October 23, 2020	608998.2	4829363.7	170.73	4.1	3.7	2.2-3.7	50
BH/MW 4	October 23, 2020	609055.8	4829307.8	171.07	4.4	4.0	2.5-4.0	50
BH/MW 5	October 23, 2020	609044.6	4829261.4	171.50	6.4	5.8	2.8-5.8	50
BH/MW 7	October 20, 2020	609081.5	4829187.7	170.89	5.0	5.0	3.5-5.0	50
BH/MW 10	October 21, 2020	609185.9	4829164.6	169.66	7.9	7.9	4.9-7.9	50
BH/MW 11	October 20, 2020	609125.5	4829094.8	168.12	6.1	6.1	3.1-6.1	50
BH/MW 16	October 19, 2020	609098.8	4828962.5	165.96	4.9	4.3	2.8-4.3	50
BH/MW 19	October 19, 2020	609028.8	4828883.9	164.97	3.7	3.7	2.2-3.7	50
BH/MW 20	October 19, 2020	609028.4	4828844.7	165.53	4.3	3.7	2.2-3.7	50
BH/MW 22	October 27, 2020	609114.4	4828779.4	163.90	1.9	1.8	0.4-1.8	50
BH/MW 23	November 4-5, 2020	609124.1	4828855.8	164.52	13.9	13.9	10.9-13.9	50
BH/MW 26	October 27, 2020	609212.5	4828906.9	165.21	2.1	2.1	0.6-2.1	50
BH/MW 28	October 29-November 3, 2020	609230.0	4828984.6	165.98	16.8	16.8	13.8-16.8	50
BH/MW 29	October 26, 2020	609292.8	4829002.1	165.24	3.7	3.7	2.2-3.7	50
BH/MW 31	October 26, 2020	609314.9	4829060.5	166.02	4.1	3.7	2.2-3.7	50

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

3.2 Groundwater Monitoring

The groundwater levels in the monitoring wells were measured, manually on November 17, December 1, and December 10, 2020 using an electronic water level tape.

3.3 Mapping of Ontario Water Well Records

SEL received the Ministry of Environment Conservation and Parks (MECP) Water Well Records (WWRs) for the registered wells located on the subject site and within 500 m of the

site boundaries (study area). The records indicate that forty-seven (47) registered wells are located within the study area. The well record locations are shown on Drawing No. 3, and the WWRs reviewed for this study are listed in Appendix 'A'.

3.4 **Monitoring Well Development and Single Well Response Tests**

BH/MWs 5, 10, 11, 16, 23, 26 and 28 underwent development in preparation for single well response testing (SWRT) to estimate the hydraulic conductivity (K) for saturated subsoil and bedrock strata at the depths of the monitoring well screens. Well development involved the purging and removal of several casing volumes of groundwater from each monitoring well to remove remnants of clay, silt and other debris introduced into the wells during construction, and to induce the flow of formation groundwater through the well screens, thereby improving the transmissivity of the strata formation at the well screen depths.

The K values derived from the SWRT's provide an indication of the yield capacity for the ground water-bearing subsoil and bedrock strata and can be used to estimate the flow of groundwater through the water-bearing strata units.

The SWRT involves the placement of a slug of known volume into the well, below the groundwater 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 groundwater table recovers to static conditions is used to estimate the K value for the groundwater-bearing formation at the well screen depths.

It should be noted that SWRTs could not be successfully completed at the other BH/MW locations due to insufficient groundwater volume within the monitoring wells. The K test estimates are provided in Appendix 'B', with a summary of the results provided in Table 6-2.

3.5 **Review Summary of Concurrent Report**

The following concurrent report, prepared by SEL was reviewed in preparation for this hydrogeological study:

"A Report to the Elia Corporation, A Geotechnical Investigation for Proposed Mixed-Use Development with 2- to 4-Level Underground Parking, Blocks 1, 2, 3, 4 and 5, Sorrento Drive and Elia Avenue, Southeast of Hurontario Street and Eglinton Avenue East, City of Mississauga", Reference No. 2010-S021, dated December 2020.

4.0 REGIONAL AND LOCAL SETTING

4.1 Regional Geology

The subject site lies within the Physiographic Region of Southern Ontario known as the South Slope, on the mapped Till Plains (Drumlinized) physiographic feature. The South Slope which is the southern slope of the Oak Ridges Moraine, includes a land strip south of the Peel Plain. It rises 90 to 120 m in elevation to the line of contact with the moraine at the elevations, ranging from 240 to 300 masl. The south slope exhibits an average width of 9.6 to 11.3 km, extending from the Niagara Escarpment to the Trent River in the east. It covers approximately 2,400 square kilometers. The south slope is smoothed, faintly drumlinized, and scarred at intervals by incised valleys which have been cut by water courses through the overburden soil profile that were created by tributaries for the Rouge, Don, and Humber River systems (Chapman and Putnam, 1984).

The surface geological map of Ontario shows that the subject site is located on Halton Till deposits, consisting, predominantly of silt to silty clay matrix that is high in calcium carbonate content and is considered as clast poor. Drawing No. 4, as reproduced from Ontario Geological Survey mapping, illustrates the Quaternary surface soil geology for the subject site and surrounding areas.

The bedrock is comprised mainly of Upper Ordovician aged shale, limestone, dolostone and siltstone of the Georgian Bay Formation, the Blue Mountain Formation, the Billings Formation, the Collingwood Member and the Eastview Member (Ontario Ministry of Northern Department and Mines, 1993). Shale bedrock was contacted at depths, ranging from 2.4 to 7.6 mbgs at the drilled boreholes locations on the subject site.

4.2 Physical Topography

A review of the topographic map for the subject site and surrounding area shows that there is a decline in elevation relief, towards the west, towards Cooksville Creek. Based on review of the ground surface elevation, as recorded at the boreholes and monitoring well locations, and from review of the existing topographic map and survey plan for the area, the elevation relief across the subject site is approximately 7 m. Drawing No. 5 shows the mapped topographical contours for the subject site and surrounding area.

4.3 **Watershed Setting**

The subject site is located within the Lake Ontario Shoreline East Subwatershed of the Credit River Watershed, as shown, mapped on Drawing No. 6. The Credit River watershed is comprised of twenty-three (23) sub-watersheds and covers an area of 1,000 km^2. The Credit River is approximately 90 km long and meanders through nine (9) municipalities. Its headwaters, or upper reaches, are located in Orangeville, Erin and in the Town of Mono. It flows south and empties into Lake Ontario at Port Credit, Mississauga (Credit Valley Conservation Authority, 2009).

4.4 **Local Surface Water and Natural Features**

Records review shows that the closest wooded area is located, approximately 350 m southeast of the subject site, and that a small water body can be found about 550 m northeast of the site. In addition, Cooksville Creek, which flows in a northwest to southeast direction, is located, approximately 200 m west of the site.

The locations of the subject site and the noted natural features are shown on Drawing No. 7.

5.0 SOIL LITHOLOGY

This study has disclosed that beneath the topsoil or earth fill soil horizons, the native soils underlying the subject site consists of silty clay till, silty clay, silt, sandy silt, sandy silt till and shale bedrock. A Key Plan and the interpreted geological cross-section along the delineated southwest to northeast and northwest to southeast transects are presented on Drawing Nos. 8-1, 8-2 and 8-3.

5.1 Topsoil (All BH and BH/MW locations)

Topsoil, 13 to 33 cm thick, was observed at the ground surface at all of the BH and BH/MW locations.

5.2 Earth Fill (All BH and BH/MW locations, except BHs 3, 9, 12, 14, 18 and 24 and BH/MWs 11, 22 and 23)

Earth fill, approximately 0.9 to 2.1 m thick, was observed beneath the topsoil horizon at all of the BH and BH/MW locations, except BHs 3, 9, 12, 14, 18 and 24 and BH/MWs 11, 22 and 23. The fill unit consists of sandy silt or silty clay with varying amounts of gravel, and contains organic inclusions, bedrock fragments and/or asphalt debris in places.

5.3 Silty Clay Till (All BH and BH/MWs locations, except BHs 12 and 13 and BH/MW 11)

Silty clay till was generally encountered beneath the topsoil and/or earth fill layers where it extends to the maximum investigated depth at most of the BH and BH/MW locations. It is stiff to hard in consistency, having varying amounts of sand and gravel, and occasional sand and silt seams and layer, cobbles and boulders. The moisture content for the retrieved subsoil samples ranged from 6% to 27%, indicating damp to saturated conditions. The estimated permeability for the silty clay till is about 10^{-7} cm/sec. Grain size analyses were performed on five (5) subsoil samples, and the gradations are plotted on Figure 32.

5.4 Silty Clay (BH 3 and BH/MWs 10, 22 and 23)

A layer of silty clay, 0.4 to 1.5 m thick was observed at various depths at BH 3 and BH/MWs 10, 22 and 23. It is very stiff to hard in consistency, and contains a trace of sand. The moisture content for the retrieved subsoil samples ranged from 6% to 26%, indicating damp to saturated conditions. The estimated permeability for the silty clay till is about

10^{-7} cm/sec. Grain size analyses were performed on five (5) subsoil samples, and the gradations are plotted on Figure 33.

5.5 **Silt** (BHs 3, 8, 9, 12 and 13 and BH/MW 7, 10 and 11)

A deposit of silt, 1.5 to 6.5 m thick was observed at various depths at BHs 3, 8, 9, 12 and 13 and BH/MWs 7, 10 and 11. It is compact to very dense in consistency and contains traces to some clay along with sand and occasional gravel. The moisture content for the retrieved subsoil samples ranged from 13% to 24%, indicating moist to saturated conditions. The estimated permeability for the silt ranges from about 10^{-7} to 10^{-6} cm/sec. Grain size analyses were performed on five (5) subsoil samples, and the gradations are plotted on Figure 34.

5.6 **Sandy Silt** (BH 9 and BH/MW 11)

A layer of sandy silt was observed between the silty clay till layers at BH 9, and beneath the topsoil horizon at BH /MW 11. It is grey in colour, compact to very dense in consistency and contains traces to some clay, with occasional gravel in places. The moisture content for the retrieved subsoil samples ranged from 14% to 27%, indicating moist to very moist conditions. The estimated permeability for the sandy silt is about 10^{-4} cm/sec. A grain size analysis was performed on one (1) sample, and the gradation is plotted on Figure 35.

5.7 **Sandy Silt Till** (BHs 6, 12 and 13 and BH/MWs 5 and 7)

A layer of sandy silt till was generally encountered beneath the earth fill or topsoil horizons at BHs 6, 12 and 13 and BH/MWs 5 and 7. It is dense to very dense in consistency and contains traces to some clay, a trace of gravel and occasional sand and silt seams and layers, cobbles and boulders. The moisture content for the retrieved subsoil samples ranged from 6 % to 22 %, indicating damp to saturated conditions.

5.8 **Shale Bedrock** (BHs 3, 6, 9, 17, 27, and 30 and BH/MWs 11, 20, 23, 28, 29 and 31)

Shale bedrock was encountered at depths, ranging from 2.4 to 7.6 m below the prevailing ground surface at BHs 3, 6, 9, 17, 27 and 30 and at BH/MWs 11, 20, 23, 28, 29 and 31. It is brown and grey in colour, weathered within its upper sections, becoming more-sound, and hard with depth. The shale extends to the maximum depth of the investigation at 16.8 m below grade. The permeability for the upper portion of the shale unit is anticipated to vary depending on the extent of fracturing and weathering near its contact with the overburden soil.

6.0 GROUNDWATER STUDY

6.1 Review Summary of Current Report

A review of the findings from the concurrent geotechnical soil investigation report (SEL, Reference No. 1710-W179) indicates that beneath the topsoil and earth fill layers, the underlying soil strata consists predominantly of silty clay till with deposits of silty clay, silt, sandy silt and/or silty sand till at various depths and locations. Cave-in occurred at depths of 1.5 to 4.8± m upon completion of 9 of the boreholes. Groundwater yield from the tills and clay will be slow in rate and limited in quantity, while the yield from the silts may be moderate to appreciable. Groundwater under subterranean artesian pressure may also occur in places within the shale bedrock, which is generally considered to be a poor aquifer. Therefore, the yield of groundwater from the bedrock, if encountered, will be appreciable initially; however, upon release through excavation, if allowed to drain freely, it will often dissipate or be depleted with time.

6.2 Review of Ontario Water Well Records

The Ministry of the Environment, Conservation and Parks (MECP) water well records for the subject site and for the properties within a 500 m radius of the boundaries of the subject site (study area) were reviewed.

The records indicate that forty-seven (47) water wells are located within the study area relative to the subject site. The locations of these wells, based on the UTM coordinates provided by the records, are shown on Drawing No 3. Details of the MECP water well records that were reviewed are provided in Appendix ‘A’.

A review of the final status of the well records shows that thirteen (13) wells are registered as observation wells, fifteen (15) are monitoring and test hole wells, five (5) are abandoned – other wells, two (2) are water supply wells, two (2) are test hole wells, one (1) is an abandoned-quality well and nine (9) wells have an unidentified status.

A review of the first status of the well records within the study area reveals that fourteen (14) are registered as monitoring wells, twenty-one (21) are monitoring and test hole wells, two (2) wells are not used, one (1) is a domestic well, one (1) is a commercial well, three (3) are test hole wells, and five (5) wells have an unidentified status.

6.3 **Groundwater Monitoring**

The groundwater levels in the monitoring wells were measured on three occasions over the study period, on the following dates, on November 24, December 1 and on December 12, 2020 to record the fluctuation of the groundwater table beneath the site. The groundwater levels and corresponding elevations are given in Table 6-1.

Table 6-1 - Ground Water Level Measurements

Well ID		November 17, 2020	December 1, 2020	December 10, 2020	Fluctuation (m)
BH/MW 1	mbgs	DRY	DRY	DRY	DRY
	masl				
BH/MW 4	mbgs	DRY	DRY	3.89	> 0.11
	masl			167.19	
BH/MW 5	mbgs	3.27	3.27	3.09	0.18
	masl	168.23	168.23	168.41	
BH/MW 7	mbgs	4.49	4.30	3.90	0.59
	masl	166.40	166.59	166.99	
BH/MW 10	mbgs	4.96	4.94	4.84	0.12
	masl	164.70	164.72	164.82	
BH/MW 11	mbgs	3.18	2.82	1.55	1.63
	masl	164.94	165.3	166.57	
BH/MW 16	mbgs	2.74	2.87	2.80	0.13
	masl	163.22	163.09	163.16	
BH/MW 19	mbgs	2.93	2.83	2.73	0.20
	masl	162.04	162.14	162.24	
BH/MW 20	mbgs	DRY	DRY	DRY	DRY
	masl				
BH/MW 22	mbgs	DRY	1.61	1.09	> 0.71
	masl		162.29	162.81	
BH/MW 23	mbgs	5.27	6.37	6.57	1.30
	masl	159.25	158.15	157.95	
BH/MW 26	mbgs	DRY	-0.01	0.41	> 2.11
	masl		165.22	164.80	

Table 6-1 - Ground Water Level Measurements (Cont'd)

Well ID		November 17, 2020	December 1, 2020	December 10, 2020	Fluctuation (m)
BH/MW 28	mbgs	5.49	6.20	6.32	0.83
	masl	160.49	159.78	159.66	
BH/MW 29	mbgs	DRY	DRY	DRY	DRY
	masl				
BH/MW 31	mbgs	3.20	3.11	3.10	0.10
	masl	162.82	162.91	162.92	

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

As shown above, the groundwater levels at the BH/MW locations generally increased over them monitoring period, with the exception of BH/MW 16, which exhibited a decline in groundwater level between November 17 and December 1, and an increase in groundwater level between December 1 and 10, 2020. At BH/MW 26, the level exhibited an increase in groundwater level between November 17 and December 1 and a decrease in groundwater level between December 1 and 10, 2020, and at BH/MWs 23 and 28, they exhibited a consistent decline in groundwater level over the monitoring period. BH/MWs 1, 20 and 29 remained dry throughout the monitoring period. The greatest fluctuation was observed at BH/MW 26, where a groundwater level difference of greater than 2.11 m was recorded over the study period.

6.4 **Shallow Groundwater Flow Pattern**

Due to BH/MW 4 being dry over the first two monitoring events, the shallow groundwater flow pattern for the site was interpreted based on the groundwater levels measured on the third monitoring event, which took place on December 10, 2020. The interpreted groundwater flow pattern suggests that groundwater flows in a southerly direction beneath the eastern portion of the site and in a westerly direction beneath the western portion of the site. It should be noted that groundwater data from BH/MWs 1, 20 and 29 were not included in the interpretation as they were dry throughout the monitoring period, and groundwater data at BH/MWs 23 and 28 were not included in the interpretation as these wells were screened within the shale bedrock and not the overburden subsoil. The interpreted shallow groundwater flow pattern for the subject site is illustrated on Drawing No. 9.

6.5 **Single Well Response Test Analysis**

BH/MWs 5, 10, 11, 16, 23, 26 and 28 underwent single well response tests (SWRTs) to assess the hydraulic conductivity (K) for saturated subsoils and bedrock at the depths of the well screens. The results of the SWRTs are presented in Appendix 'B', with a summary of the findings shown in Table 6-2. Single well response test could not be successfully completed at the other BH/MW locations, due to insufficient groundwater volume within the monitoring wells.

Table 6-2 - Summary of SWRT Results

Well ID	Ground El. (masl)	Monitoring Well Depth (mbgs)	Borehole Depth (mbgs)	Screen Interval (mbgs)	Screened Soil Strata	Hydraulic Conductivity (K) (m/sec)
BH/MW 5	171.50	5.8	5.8	2.8-5.8	Silty clay till	5.1×10^{-7}
BH/MW 10	169.66	7.9	7.9	4.9-7.9	Silty clay, Silty clay till	3.3×10^{-7}
BH/MW 11	168.12	6.1	6.1	3.1-6.1	Silt	1.4×10^{-7}
BH/MW 16	165.96	4.3	4.9	2.8-4.3	Silty clay till	2.1×10^{-7}
BH/MW 23	164.52	13.9	13.9	10.9-13.9	Shale bedrock	2.3×10^{-6}
BH/MW 26	165.21	2.1	2.1	0.6-2.1	Earth fill, Silty clay till	5.6×10^{-6}
BH/MW 28	165.98	16.8	16.8	13.8-16.8	Shale bedrock	1.0×10^{-6}

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

As shown above, the K estimates for the shale bedrock ranges from 1.0×10^{-6} to 2.3×10^{-6} m/s, and the K estimates for the silt, silty clay and/or silty clay till units ranges from 5.6×10^{-6} to 5.1×10^{-7} to m/s. The results of the SWRT provide an indication of the yield capacity for the groundwater-bearing strata units at the depths of the monitoring well screens. The above results suggest that the hydraulic conductivity for the groundwater-bearing overburden unit is low while the hydraulic conductivity for the underlying groundwater-bearing bedrock is moderate at the depths of the monitoring well screens, with correspondingly low to moderate anticipated groundwater seepage rates into open excavations, below the water table. The hydraulic conductivity of the underlying shale bedrock unit may vary depending on the extent of bedding planes and fracturing within the shale.

7.0 GROUNDWATER CONTROL DURING CONSTRUCTION

The estimated hydraulic conductivity (K) values for the overburden and shale bedrock, suggests that groundwater seepage rates into excavations below the groundwater table will range from low to moderate. To provide safe, dry and stable conditions for earthworks excavations for construction of the proposed 2 to 5-levels underground parking structures, the groundwater table should be lowered in advance of, or during construction. The preliminary estimates for construction dewatering flows required to locally lower the groundwater table, based on the K test results, are discussed in the following sections.

7.1 Groundwater Construction Dewatering Rates

An overall site plan, prepared by Quadrangle Architects Limited, dated October 15, 2020, was reviewed for the preparation of this assessment. Based on review of the plans, the proposed development will involve the construction of five blocks, each with multiple storey-high-rise buildings, having 2- to 5-levels of underground parking structure. Based on the measured shallow groundwater level elevations, dewatering is anticipated to facilitate construction for the proposed underground parking structures. The construction dewatering flow rate estimates are discussed below:

Dewatering Flow Rate Estimates for Underground Parking Structure (Block 1)

The Buildings A and B structure sections, prepared by Quadrangle Architects Limited, Drawing Nos. A451.S and A452.S, were reviewed for this assessment. Based on review of the plans, the development for Block 1 will include the construction of 45- and 36-storey buildings with a shared 5-level underground parking structure. Review of the proposed building sections indicate that the base for the 5-level underground parking structure will be at a depth of 15.2 m below the finished grade level, or at an elevation of 149.62. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the groundwater table be lowered to an elevation of 148.62 masl, which is about 1.0 m below the lowest proposed excavation depth. The subsoil profile consists of earth fill, silty clay till, and shale bedrock extending to the maximum anticipated excavation depth. As such, the dewatering flow rates are anticipated to a reach daily rate of 177,453.5 L/day for the proposed 5-level, underground parking structure; by considering a 3x safety factor, this rate could reach an approximate daily maximum of 532,360.6 L/day. It should be noted that a rectangular construction footprint shape was considered for the dewatering needs assessment having a length of 200 m and a width of 70 m with a perimeter of 540 m for the proposed underground parking structure.

In accordance with the current policy of the Ministry of the Environment, Conservation and Parks (MECP), where the dewatering flow rate is above 400,000 L/day, the registering for proposed groundwater-taking for construction is by means of the filing of a Permit-To-Take Water (PTTW) with the MECP. Since the estimated dewatering flow rate exceeds 400,000 L/day, where it is expected to reach a maximum daily rate of 532,360.6 L/day, the registering for any proposed groundwater-taking for construction would be through a PTTW, and its filing with the MECP. However, since the high range of the estimate is only marginally over the PTTW threshold limit, the approval could be obtained by means of the filing of an Environmental Activity and Sector Registry (EARS) with the MECP which allows for groundwater taking up to 400,000 Litres per day. The EASR could be obtained with the understanding that a few more days of dewatering at a lower rate may be required to lower the groundwater table to facilitate earthworks and construction.

It should be noted that shallow groundwater levels were monitored over the late fall/early winter season and it is anticipated that they will increase over the high precipitation, spring season. As such, it is recommended that shallow groundwater levels be monitored again, over the spring season, and that the dewatering estimates be updated if the excavation and construction are planned for this season. It is also recommended that the construction dewatering needs assessment be revised and updated, once finalized development plans, showing the proposed finished floor and underground structure elevations and dimensions become available for review, and/or if there are any significant differences between the above assumptions and the final structure elevations for the proposed development.

Dewatering Flow Rate Estimates for Underground Parking Structure (Block 2)

The Buildings A and B structure sections, prepared by Quadrangle Architects Limited, Drawing Nos. A451.S and A452.S, were reviewed for this assessment. Based on review of the plans, the development of Block 2 will include the construction of 42- and 36-storey buildings and two 3-storey townhouse blocks, having a shared 4-level underground parking structure. Review of the building sections indicate that the base for the 4-level underground parking structure will be at a depth of 12.4 m below the finished grade level, or at an elevation of 159.32. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the groundwater table be lowered to an elevation of 158.32 masl, which is about 1.0 m below the lowest proposed excavation depth. The subsoil profile consists of earth fill, silt, sandy silt till, silty clay, silty clay till and shale bedrock, extending to the maximum anticipated excavation depth. As such, the dewatering flow rates are anticipated to a reach daily rate of 68,803.0 L/day for the proposed underground parking structure; by considering a 3x safety factor, this rate could reach an approximate daily maximum of 206,408.9 L/day. It should be noted that a rectangular construction footprint

shape was considered for the dewatering needs assessment having a length of 157 m and a width of 95 m for the proposed underground parking structure.

In accordance with the current policy of the Ministry of the Environment, Conservation and Parks (MECP), where the dewatering flow rate is above 400,000 L/day, the registering for proposed groundwater-taking for construction is by means of the filing a Permit-To-Take Water (PTTW) with the MECP. However, since the high range of the estimate is below the 400,000 L/day, threshold limit where it is expected to reach a maximum daily rate of 206,408.9 L/day, the registering for any proposed groundwater-taking for construction would be through as EASR with the EASR filed through the MECP.

It should be noted that shallow groundwater levels were monitored over the late fall season and it is anticipated that they will increase over the high precipitation, spring season. As such, it is recommended that shallow groundwater levels be monitored again, over the spring season, and that the dewatering estimates be updated if the excavation and construction are planned for this season. It is also recommended that the construction dewatering needs assessment be revised and updated, once finalized development plans, showing the proposed finished floor and underground structure elevations and dimensions become available for review, and/or if there are any significant differences between the above assumptions and the final structure elevations for the proposed development.

Dewatering Flow Rate Estimates for Underground Parking Structure (Block 3)

The Buildings A and B Building sections, prepared by Quadrangle Architects Limited, Drawing Nos. A451.S, A452.S, and A453.S were reviewed for this assessment. Based on review of the plans, the development of Block 3 will include the construction two 36-storey buildings and four 3-storey townhouse blocks with a shared 2-level underground parking structure. Review of the building sections indicate that the base of the 2-level underground parking structure will be at a depth of 6.8 m below the finished grade or at an elevation of 161.95. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the groundwater table be lowered to an elevation of 160.95 masl, which is about 1.0 m below the lowest proposed excavation depth. The subsoil profile consists of earth fill, silt, sandy silt, sandy silt till, silty clay, and silty clay till extending to the maximum anticipated excavation depth. As such, the estimated dewatering flow rates are anticipated to a reach daily rate of 14,366.2 L/day for the proposed underground parking structure; by considering a 3x safety factor, this rate could reach an approximate daily maximum of 43,098.71 L/day. For this estimate the proposed base of the excavation is above the underlying shale unit. It should be noted that a rectangular construction footprint shape was considered for the dewatering needs assessment having a length of 175 m and a

width of 145 m having a perimeter of 640 m for the proposed underground parking structure.

In accordance with the current policy of the Ministry of the Environment, Conservation and Parks (MECP), where the dewatering flow rate is between 50,000 L/day and 400,000 L/day, the registering for proposed groundwater-taking for construction is by means of the filing an Environmental Activity and Sector Registry (EASR) with the MECP. Since the high range of the estimated dewatering flow rate is below 50,000 L/day, where it is expected to reach a maximum daily rate of 43,098.71 L/day there is no required approval for groundwater taking through the MECP. However, an EASR is recommended to also account for the management and removal of any accumulated runoff volumes within the construction excavations following high rainfall events.

It should be noted that shallow groundwater levels were monitored over the late fall season and it is anticipated that they will increase over the high precipitation, spring season. As such, it is recommended that shallow groundwater levels be monitored again, over the spring season, and that the dewatering estimates be updated if the excavation and construction are planned for this season. It is also recommended that the construction dewatering needs assessment be revised and updated, once finalized development plans, showing the proposed finished floor and underground structure elevations and dimensions become available for review, and/or if there are any significant differences between the above assumptions and the final structure elevations for the proposed development.

Dewatering Flow Rate Estimates for Underground Parking Structure (Block 4)

The Building A and Building sections, prepared by Quadrangle Architects Limited, Drawing Nos. A451.S and A452.S, were reviewed for this assessment. Based on review of the plans, the development of Block 4 will include the construction of 36-storey and 30-storey buildings with a shared 3-level underground parking structure. Review of the building sections indicate that the base for the 3-level underground parking structure will be at a depth of 9.6 m below the finished grade or at an elevation of 155.0. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the groundwater table be lowered to an elevation of 154.0 masl, which is about 1.0 m below the lowest proposed excavation depth. The subsoil profile consists of earth fill, silty clay, silty clay till and shale bedrock extending to the maximum anticipated excavation depth. As such, the dewatering flow rates are anticipated to a reach daily rate of 268,771.3 L/day for the proposed underground parking structure; by considering a 3x safety factor, this rate could reach an approximate daily maximum of 806,313.9 L/day. It should be noted that a rectangular construction footprint shape was considered for the dewatering needs assessment

having a length of 213 m and a width of 68 m, having a perimeter of 562 m for the proposed underground parking structure.

In accordance with the current policy of the Ministry of the Environment, Conservation and Parks (MECP), where the dewatering flow rate is above 400,000 L/day, the registering for proposed groundwater-taking for construction is by means of the filing a Permit-To-Take Water (PTTW) with the MECP. Since the estimated dewatering flow rate exceeds 400,000 L/day, where it is expected to reach a maximum daily rate of 806,313.9 L/day, the registering for any proposed groundwater-taking for construction would be through a PTTW, and its filing with the MECP.

It should be noted that shallow groundwater levels were monitored over the late fall season and it is anticipated that they will increase over the high precipitation, spring season. As such, it is recommended that shallow groundwater levels be monitored again, over the spring season, and that the dewatering estimates be updated if the excavation and construction are planned for this season. It is also recommended that the construction dewatering needs assessment be revised and updated, once finalized development plans, showing the proposed finished floor and underground structure elevations and dimensions become available for review, and/or if there are any significant differences between the above assumptions and the final structure elevations for the proposed development.

Dewatering Flow Rate Estimates for Underground Parking Structure (Block 5)

The Building sections, prepared by Quadrangle Architects Limited, Drawing Nos. A451.S and A452.S, were reviewed for this assessment. Based on review of the plans, the development of Block 5 will include the construction of a 28-storey building and two 3-storey townhouse blocks with a shared 3-level underground parking structure. Review of the building sections indicates that the base for the proposed 3-level underground parking structure will be at a depth of 9.6 m below the finished grade, or at an elevation of 156.2. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the groundwater table be lowered to an elevation of 155.2 masl, which is about 1.0 m below the lowest proposed excavation depth. The subsoil profile consists of earth fill, silty clay till and shale bedrock, extending to the maximum anticipated excavation depth. As such, the dewatering flow rates are anticipated to a reach daily rate of 213,943.0 L/day for the proposed underground parking structure; by considering a 3x safety factor, this rate could reach an approximate daily maximum of 641,829.0 L/day. It should be noted that a rectangular construction footprint shape was considered for the dewatering needs assessment, having a length of 157 m and a width of 62 m, with an estimated perimeter of 438 m for the proposed underground parking structure.

In accordance with the current policy of the Ministry of the Environment, Conservation and Parks (MECP), where the dewatering flow rate is above 400,000 L/day, the registering for proposed groundwater-taking for construction is by means of the filing of a Permit-To-Take Water (PTTW) with the MECP. Since the estimated dewatering flow rate exceeds 400,000 L/day, where it is expected to reach a maximum daily rate of 641,829.0 L/day, the registering for any proposed groundwater-taking for construction would be through a PTTW, and its filing with the MECP.

It should be noted that shallow groundwater levels were monitored over the late fall season and it is anticipated that they will increase over the high precipitation, spring season. As such, it is recommended that shallow groundwater levels be monitored again, over the spring season, and that the dewatering estimates be updated if the excavation and construction are planned for this season. It is also recommended that the construction dewatering needs assessment be revised and updated, once finalized development plans, showing the proposed finished floor and underground structure elevations and dimensions become available for review, and/or if there are any significant differences between the above assumptions and the final structure elevations for the proposed development.

7.2 Groundwater Control Methodology

Given that low to moderate groundwater seepage is anticipated into open excavations below the water table, any construction dewatering can likely be controlled by pumping from sumps when and where required during construction. The final design for the dewatering system will be the responsibility of the construction contractors.

7.3 Mitigation of Potential Impacts Associated with Dewatering

The zone of influence for any construction dewatering could reach a maximum of 35.6 m any from the conceptual dewatering area. There are no wetlands, bodies of water, or any natural features present within the conceptual zone of influence for the dewatering alignment around the considered excavation footprints. Review of the MECP well records indicates that there is one domestic water supply well (MECP ID 4902235) which may be within the conception zone of influence for construction dewatering. However, the surrounding areas are now supplied by municipal water and this well is no longer expected to be used as an active water supply well, should it still exist. As such there are no long-term interference impacts to any water supply wells anticipated from any temporary construction dewatering for the proposed development.

7.4 Long-Term Foundation Drainage Estimation

The proposed development plans indicate that multiple high-rise buildings with 2- to 5-levels of underground parking will be constructed at the site. Excavation depths of 6.8 to 15.2 m below the assumed finished floor elevation were considered to accommodate the proposed underground parking structures. As such, the shallow groundwater level will be above the considered bases for the proposed underground parking structures.

Given the low to moderate groundwater seepage rate estimates for any long-term foundation drainage, a conventionally shored excavation, using pile and lagging methods can be designed and completed for construction of the proposed 2- to 5-level underground parking structures. A Mira drainage network can be included with the design of a conventionally shored excavation, along with a simple basement under-slab drainage network to address any long-term seepage to the excavation and the completed underground structure. These systems can be drained to separate sump pits. The drainage network should be designed by a qualified mechanical engineer, having experience with the designs for under-slab and Mira drainage networks.

The foundation drainage networks should have separate connections to proposed sump pits, with one pit connected to the footing drainage network and a second pit connected to the basement under-slab floor drainage network.

In order to estimate the long-term foundation drainage needs for the shored excavations, the associated mira foundation drainage networks, and for the under-slab floor basement drainage networks at the subject site, Darcy's expression and equation was used. The estimates are provided for Blocks 1 to 5, inclusive, separately as follows:

Block 1 Construction

The base elevation for the 5-level underground parking structure in Block 1 is assumed to be at elevation of approximately 149.62 masl, which were considered for the long- term foundation drainage needs estimation. Review of the measured groundwater levels indicates that the shallow groundwater levels are above the base for the underground parking structure. As such, it is anticipated that that some long-term foundation drainage will be required for the proposed underground parking structure. Darcy's Expression below, was used to assess the long-term foundation seepage flow estimates:

$$Q = KiA$$

Where:

- Q = Estimated seepage drainage rate (m^3/day)
- K = 1.0×10^{-6} m/sec (hydraulic conductivity (K) assessed for the shale bedrock aquifer encountered during the study)
- A = 5,869.8 m^2 for the Mira drain foundation walls and 87.92 m^2 for the under-slab floor drainage network which is the approximate area of the seepage at the ground surface (cross-sectional area of flow)
- iv = 0.076 [unitless], Vertical Hydraulic Gradient for groundwater considered for the under-slab basement floor drainage system
- ih = 0.011 [unitless], Horizontal Hydraulic Gradient for groundwater considered for the perimeter, footing drainage system.

Based on the plans for the proposed 5-level underground parking structure, the estimated long-term seepage drainage rate for the Mira drainage network for is 5,461.5 L/day. The long-term drainage seepage drainage rate for the under-slab basement floor drainage networks is 577.6 L/day. The combined long-term seepage rate from both the Mira drain foundation and the under-slab basement floor drainage networks are estimated at 6,039.1 L/day. Applying a safety factor of three (3), the combined drainage flow rate is estimated at 18,117.2 L/day for the 5-level underground parking structure.

Block 2 Construction

The base elevation for the proposed 4-level underground parking structure in Block 2 is assumed at elevation of approximately 159.32 masl, which was considered for the long-term foundation drainage needs estimation. Review of the measured groundwater levels indicates that the shallow groundwater level is above the base of the parking structure. As such, it is anticipated that that some long-term foundation drainage needs will be required for the proposed underground parking structure. Darcy's Expression below, was used to assess the long-term foundation seepage flow estimates:

$$Q = KiA$$

Where:

- Q = Estimated seepage drainage rate (m^3/day)
- K = 1.0×10^{-6} m/sec (hydraulic conductivity (K) assessed for the shale bedrock encountered during the study)

A = 589.68 m^2 for the Mira drain foundation walls and 95.46 m^2 for the under-slab floor drainage network which is the approximate area of the seepage at the ground surface (cross-sectional area of flow)
iv = 0.008 [unitless], Vertical Hydraulic Gradient for groundwater considered for the under-slab basement floor drainage system
ih = 0.023 [unitless], Horizontal Hydraulic Gradient for groundwater considered for the perimeter, footing drainage system.

Based on the plans for the proposed 4-level underground parking structure, the estimated long-term seepage drainage rate from the Mira drainage network for is 1,187.1 L/day. The long-term drainage seepage drainage rate for the under-slab basement floor drainage networks is 67.4 L/day. The combined long-term seepage rate from both the Mira drain foundation and the under-slab basement floor drainage networks are estimated at 1,254.5 L/day. Applying a safety factor of three (3), the combined drainage flow rate is estimated at 3,763.4 L/day for the 4-level underground parking structure.

Block 3 Construction

The base elevation for the proposed 2-level underground parking structure in Block 3 was considered at elevation of approximately 161.95 masl, for the long- term foundation drainage needs assessment. Review of the measured groundwater levels indicates that the shallow groundwater level is above the base for the underground parking structure. As such, it is anticipated that that some long-term foundation drainage will be required for the proposed underground parking structure. Darcy's Expression below, was used to assess the long-term foundation seepage flow estimates:

$$Q = KiA$$

Where:

Q = Estimated seepage drainage rate (m^3/day)
K = 3.3×10^{-7} m/sec (highest hydraulic conductivity (K) assessed for the silt/silty clay/silty clay till unit encountered during the study)
A = 2,937.60 m^2 for the Mira drain foundation walls and 159.36 m^2 for the under-slab floor drainage network which is the approximate area of the seepage at the ground surface (cross-sectional area of flow)
iv = 0.035 [unitless], Vertical Hydraulic Gradient for groundwater considered for the under-slab basement floor drainage system
ih = 0.018 [unitless], Horizontal Hydraulic Gradient for groundwater considered for the perimeter, footing drainage system.

Based on the plans for the proposed 2-level underground parking structure, the long-term seepage drainage rate for the Mira drainage network for is 1,694.1 L/day. The long-term drainage seepage drainage rate for the under-slab basement floor drainage networks is 159.9 L/day. The combined long-term seepage rate from both the Mira drain foundation and the under-slab basement floor drainage networks are estimated at 1,854.0 L/day. Applying a safety factor of three (3), the combined drainage flow rate is estimated at 5,562.0 L/day for the 2-level underground parking structure. For this estimate the base of the underground structure was considered to be established in the till subsoil unit.

Block 4 Construction

The base elevation for the proposed 3-level underground parking structure in Block 4 was considered at elevation of approximately 155.0 masl, for the long- term foundation drainage needs estimation. Review of the measured groundwater levels indicates that the shallow groundwater level is above the base of the parking structure. As such, it is anticipated that that some long-term foundation drainage will be required for the proposed underground parking structure. Darcy's Expression below, was used to assess the long-term foundation seepage flow estimates:

$$Q = KiA$$

Where:

- Q = Estimated seepage drainage rate (m^3/day)
- K = 2.3×10^{-6} m/sec (hydraulic conductivity (K) assessed for the shale bedrock encountered during the study)
- A = 2,388.50 m^2 for the Mira drain foundation walls and 91.81 m^2 for the under-slab floor drainage network which is the approximate area of the seepage at the ground surface (cross-sectional area of flow)
- iv = 0.030 [unitless], Vertical Hydraulic Gradient for groundwater considered for the under-slab basement floor drainage system
- ih = 0.015 [unitless], Horizontal Hydraulic Gradient for groundwater considered for the perimeter, footing drainage system.

Based on the plans for the proposed 3-level underground parking structure, the long-term seepage drainage rate for the Mira drainage network for is 7,119.6 L/day. The long-term drainage seepage drainage rate for the under-slab basement floor drainage networks is 541.5 L/day. The combined long-term seepage drainage rate from both the Mira drain foundation and from the under-slab basement floor drainage networks are estimated at

7,661.1 L/day. Applying a safety factor of three (3), the combined drainage flow rate is estimated at 22,983.4 L/day for the 3-level underground parking structure.

Block 5 Construction

The base elevation for the proposed 3-level underground parking structure in Block 5 is assumed at elevation of approximately 156.20 masl, which was considered for the long-term foundation drainage needs estimation. Review of the measured groundwater levels indicates that the shallow groundwater level is above the base for the proposed underground parking structure. As such, it is anticipated that that some long-term foundation drainage will be required for the proposed underground parking structure. Darcy's Expression below, was used to assess the long-term foundation drainage needs assessment:

$$Q = KiA$$

Where:

- Q = Estimated seepage drainage rate (m^3/day)
- K = 2.3×10^{-6} m/sec (hydraulic conductivity (K) assessed for the shale bedrock encountered during the study)
- A = 1,335.90 m^2 for the Mira drain foundation walls and 62.30 m^2 for the under-slab floor drainage network which is the approximate area of the seepage at the ground surface (cross-sectional area of flow)
- iv = 0.021 [unitless], Vertical Hydraulic Gradient for groundwater considered for the under-slab basement floor drainage system
- ih = 0.012 [unitless], Horizontal Hydraulic Gradient for groundwater considered for the perimeter, footing drainage system.

Based on the plans for the proposed 3-level underground parking structure, the long-term seepage drainage rate for the Mira drainage network for is 3,159.1 L/day. The long-term drainage seepage drainage rate for the under-slab basement floor drainage networks is 263.6 L/day. The combined long-term seepage rate from both the Mira drain foundation network and from an under-slab basement floor drainage networks are estimated at 3,422.7 L/day. Applying a safety factor of three (3), the combined seepage drainage flow rate is estimated at 10,268.2 L/day for the proposed 3-level underground parking structure.

The pumping facility and sump systems should be designed for the maximum expected drainage rates. The drainage piping should be properly constructed using weeper tiles surrounded by filter cloth, in turn, surrounded by bedding stone or concrete sand to minimize loss of fines and to prevent silt from clogging the weeper tiles. Over time, the

foundation drainage flow for the underground parking structures may diminish to a lower or possibly negligible steady state rate, but more likely to a steady state rate that will remain relatively constant over time.

It is recommended that the long-term seepage drainage estimations be reviewed again based on the receipt of the finalized development and grading plans, when they become available. Furthermore, the groundwater monitoring program was completed during the late fall/early winter season when the shallow groundwater levels are typically lower. As such, the shallow groundwater levels may be higher during the spring seasons.

Given that permanent foundation drainage for the proposed development is anticipated, a discharge approval may be required from the City of Mississauga and/or Region of Peel to convey and dispose of any drainage effluent to the local sewer systems. Alternatively, the proposed underground parking structures could be water-proofed if entering into a discharge agreement is not feasible.

7.5 Ground Settlement

The subject site is located within an existing developed urbanized area, supplied by municipal water. The area is surrounded by existing commercial buildings, residential buildings and roads which could potentially be affected by ground settlement associated with the conceptual zone of influence for any construction dewatering. A geotechnical engineer should be consulted to review potential ground settlement concerns to nearby structures prior to construction.

7.6 Groundwater Function of the Subject Site

The subject site is located in an existing developed area. The proposed underground structure will be constructed below the groundwater table. As such, groundwater flow pattern may be locally impacted on a temporary basis during construction for the proposed development. However, the records for nearby groundwater receptors, such as water supply wells are assumed to no longer be active as the surrounding area is now supplied by municipal water. In addition, the nearby watercourse for Cooksville Creek is anticipated to be outside the potential zone of influence for temporary construction dewatering in which no interference impacts are anticipated to this watercourse during construction.

8.0 CONCLUSIONS

1. The subject site lies within the physiographic region of Southern Ontario known as the South Slope, on the mapped Till Plains (Drumlinized) physiographic feature, where the native shallow surface mineral soils are mapped as Halton Till deposits, consisting predominantly of silt to silty clay matrix.
2. The subject site is located within the Lake Ontario Shoreline East Sub-watershed of the Credit River Watershed. Records review shows that the closest wooded area is located, approximately 350 m southeast of the subject site and that a small water body can be found about 550 m northeast of the site. In addition, Cooksville Creek, which flows in a northwest to southeast direction, is located approximately 200 m west of the site.
3. A review of the topographic map for the subject site and surrounding area shows that there is a decline in elevation relief towards the west, towards Cooksville Creek. Based on the ground surface elevations, as measured at boreholes and monitoring wells locations and from review of the existing topographic map and survey plan, the total elevation relief across the subject site is approximately 7 m.
4. The study has disclosed that beneath the topsoil or earth fill soil horizons, the native subsoils underlying the site consists of silty clay till, silty clay, silt, sandy silt, sandy silt till overlying shale bedrock.
5. The findings of this study confirm that the measured groundwater levels within the monitoring wells ranged from being dry to -0.01 m below the prevailing ground surface or at elevations ranging from 157.95 to 168.41 m above sea level.
6. The single well response test estimates for the hydraulic conductivity (K) for the shale bedrock ranges from 2.3×10^{-6} to 1.0×10^{-6} m/s and the K estimates for the silt, silty clay and/or silty clay till units ranges from 5.1×10^{-7} to 5.6×10^{-6} m/s. The results suggest that the hydraulic conductivity for the groundwater-bearing overburden soil unit is low while the hydraulic conductivity for the groundwater-bearing bedrock is moderate, with correspondingly low to moderate anticipated groundwater seepage rates into open excavations, below the water table.
7. The anticipated dewatering flow rate could reach estimated daily rates of 177,453.5 L/day, 68,803.0 L/day, 14,366.2 L/day, 268,771.3 L/day and 213,943.0 L/day for Blocks 1, 2, 3, 4 and 5 respectively; by applying a safety factor of three (3), it could reach maximums of 532,360.6 L/day, 206,409.0 L/day, 43,098.7 L/day, 806,314.0 L/day and 641,823.0 L/day. The dewatering rates for excavation range from below the groundwater taking approval threshold for Block 3, to between the EASR threshold of 50,000 L/day and 400,000 L/day for Block 2 to above the 400,000 L/day threshold limits for Blocks 1, 4 and 5. As such the approval for the proposed groundwater takings would be through an Environmental Activity

and Sector Registry (EASR) filing with the MECP for Block 2 and through a Permit-To-Take Water (PTTW) filing with the MECP for Blocks 1, 4 and 5.

8. The zone of influence for any construction dewatering could reach a maximum of 35.7 m any from the conceptual dewatering area. There are no wetlands, bodies of water, or any natural features present within the zone of influence for the conceptual dewatering alignment area. Any water supply wells which may be within the conception zone of influence for dewatering are no longer expected to be used as active water supply wells as the surrounding areas are now supplied by municipal water. As such there are no long-term interference impacts to any water supply wells anticipated from any temporary construction dewatering for the proposed development.
9. The long-term foundation drainage rates to proposed Mira perimeter foundation drainage networks for conventionally shored excavation are 5,461.5 L/day, 1,187.1 L/day, 1,694.1 L/day, 7,119.6 L/day and 3,159.1 L/day for Blocks 1, 2, 3, 4 and 5, respectively. The long-term drainage rates for the under-slab basement floor drainage networks are 577.6 L/day, 67.37 L/day, 159.9 L/day, 541.5 L/day, and 263.6 L/day. The combined long-term drainage rates from both the Mira Drain perimeter foundation and the under-slab basement floor drainage networks are estimated at 6,039.1 L/day, 1,254.5 L/day, 1,854.0 L/day, 7,661.1 L/day, and 3,422.7 L/day. After applying a safety factor of three (3), the combined drainage rates are estimated at 18,117.2 L/day, 3,763.4 L/day, 5,561.0 L/day, 22,983.4 L/day, and 10,268.2 L/day for the proposed underground parking structures at Blocks 1, 2, 3, 4 and 5, respectively.

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2. Bedrock Geology of Ontario, 1993, Data set 6, Ministry of Northern Development.

3. Rising to the Challenge: A Handbook for Understanding and Protecting the Credit River Watershed, 2009, Credit Valley Conservation Authority.

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FIGURES 1 TO 35

BOREHOLE LOGS AND GRAIN SIZE DISTRIBUTION GRAPHS

REFERENCE NO. 2010-W021

LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

The abbreviations and terms commonly employed on the borehole logs and figures, and in the text of the report, are as follows:

SAMPLE TYPES

AS Auger sample
CS Chunk sample
DO Drive open (split spoon)
DS Denison type sample
FS Foil sample
RC Rock core (with size and percentage recovery)
ST Slotted tube
TO Thin-walled, open
TP Thin-walled, piston
WS Wash sample

PENETRATION RESISTANCE

Dynamic Cone Penetration Resistance:

A continuous profile showing the number of blows for each foot of penetration of a 2-inch diameter, 90° point cone driven by a 140-pound hammer falling 30 inches.

Plotted as '—●—'

Standard Penetration Resistance or 'N' Value:

The number of blows of a 140-pound hammer falling 30 inches required to advance a 2-inch O.D. drive open sampler one foot into undisturbed soil.

Plotted as '○'

WH Sampler advanced by static weight
PH Sampler advanced by hydraulic pressure
PM Sampler advanced by manual pressure
NP No penetration

SOIL DESCRIPTION

Cohesionless Soils:

'N' (blows/ft)	Relative Density
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
over 50	very dense

Cohesive Soils:

Undrained Shear Strength (ksf)	'N' (blows/ft)	Consistency
less than 0.25	0 to 2	very soft
0.25 to 0.50	2 to 4	soft
0.50 to 1.0	4 to 8	firm
1.0 to 2.0	8 to 16	stiff
2.0 to 4.0	16 to 32	very stiff
over 4.0	over 32	hard

Method of Determination of Undrained Shear Strength of Cohesive Soils:

x 0.0 Field vane test in borehole; the number denotes the sensitivity to remoulding

△ Laboratory vane test

□ Compression test in laboratory

For a saturated cohesive soil, the undrained shear strength is taken as one half of the undrained compressive strength

METRIC CONVERSION FACTORS

1 ft = 0.3048 metres
1lb = 0.454 kg
1 inch = 25.4 mm
1ksf = 47.88 kPa

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH/MW 1

FIGURE NO.: 1

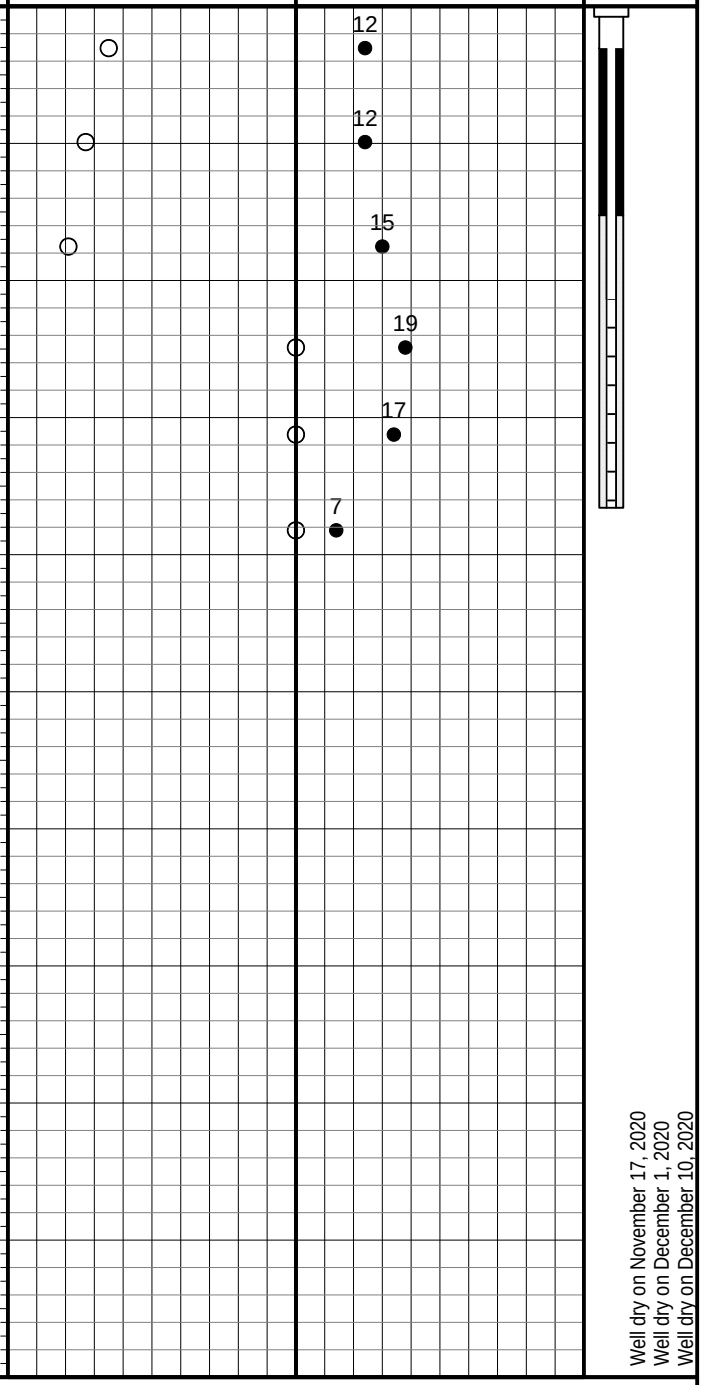
PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 23, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
170.7 / 0.0	Ground Surface				
0.0	**20 cm TOPSOIL**				0
0.2	Brown	1	DO	35	
	EARTH FILL **(Silty Clay)**				
	some sand to sandy a trace of gravel with organic inclusions	2	DO	27	1
		3	DO	21	
168.4					2
2.3	Hard	4	DO	58/25	
	SILTY CLAY TILL				
	a trace to some sand a trace of gravel occ. sand and silt seams and layers, cobbles, boulders and shale fragments	5	DO	50/15	3
	— — brown / grey	6	DO	50/3	
166.6					4
4.1	**END OF BOREHOLE** **(Refusal to Auger)**				
	Installed 50 mm Ø PVC monitoring well to 3.7 m 1.5 m screen from 2.2 m to 3.7 m Sand backfill from 1.5 m to 3.7 m Bentonite holeplug from 0.3 m to 1.5 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				5
					6
					7
					8
					9
					10



WATER LEVEL

Well dry on November 17, 2020
Well dry on December 1, 2020
Well dry on December 10, 2020

Soil Engineers Ltd.

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH 2

FIGURE NO.: 2

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 23, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
171.9	Ground Surface							
0.0	**20 cm TOPSOIL**				0			
0.2	Brown	1	DO	19			14	
	EARTH FILL (Silty Clay)							
	some sand to sandy a trace of gravel	2	DO	27	1		9	
170.4								
1.5	Brown, hard	3	DO	41			11	
	SILTY CLAY TILL				2			
	a trace of sand to sandy a trace of gravel occ. sand and silt seams and layers, cobbles and boulders	4	DO	50/15			11	
168.9		5	AS	-	3		8	
3.0	**END OF BOREHOLE (Refusal to Auger)**							
					4			
					5			
					6			
					7			
					8			
					9			
					10			

Dry and open upon completion of the field work

Soil Engineers Ltd.

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH 3

FIGURE NO.: 3

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers and Rock Coring

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 26 to 28, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
171.8	Ground Surface							
0.0	**28 cm TOPSOIL**	1A	DO	14	0		19	
0.3	Brown, stiff to very stiff, weathered **SILTY CLAY TILL** a trace to some sand a trace of gravel occ. sand and silt seams and layers, cobbles, boulders and rock fragments	1B						
		2	DO	32	1		15	
170.7 1.1	Compact to very dense — weathered							
	SILT a trace of clay a trace to some sand	3	DO	42	2		16	
		4	DO	23			14	
		5	DO	38	3		21	
	— — brown grey	6	AS	50/NP	4		17	
166.6					5			
5.2	Grey **SILTY CLAY** a trace of sand	7	AS	-			16	
166.0								
5.8	Grey **SHALE BEDROCK** with limestone layers	8	RC RQD	50% 18%	6			
		9	RC RQD	67% 0%	7			
		10	RC RQD	83% 0%				
		11	RC RQD	93% 7%	8			
		12	RC RQD	64% 0%	9			
161.8	*(Continued on next page)*				10			W.L. not measured due to use of water for rock coring

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH 3 **FIGURE NO.:** 3

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers and Rock Coring

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 26 to 28, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
10.0	*(Continued)* Grey **SHALE BEDROCK** with limestone layers	13	RC RQD	98% 67%	10			
		14	RC RQD	100% 80%	11 12			
		15	RC RQD	100% 74%	13			
		16	RC RQD	100% 77%	14 15			
		17	RC RQD	100% 60%	16			
154.8 17.0	**END OF BOREHOLE**				17 18 19 20			

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH/MW 4

FIGURE NO.: 4

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 23, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
171.1	Ground Surface							
0.0	**18 cm TOPSOIL**				0			
0.2	Brown **EARTH FILL** **(Silty Clay)** sandy, a trace of gravel with organic inclusions	1	DO	26			11	
		2	DO	14	1		15	
169.3		3	DO	43			13	
1.8	Hard **SILTY CLAY TILL** some sand to sandy a trace of gravel occ. sand and silt seams and layers, cobbles, boulders and shale fragments	4	DO	33	2		10	
		5	DO	65/20	3		11	
166.7	brown / grey	6	AS	-	4		8	
4.4	**END OF BOREHOLE** **(Refusal to Auger)** Installed 50 mm Ø PVC monitoring well to 4.0 m 1.5 m screen from 2.5 m to 4.0 m Sand backfill from 1.8 m to 4.0 m Bentonite holeplug from 0.3 m to 1.8 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				5 6 7 8 9 10			

Well dry on November 17, 2020
Well dry on December 1, 2020
W.L. @ 167.19 m on December 10, 2020

Soil Engineers Ltd.

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH/MW 5

FIGURE NO.: 5

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 23, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
171.5	Ground Surface							
0.0	**18 cm TOPSOIL**				0			
0.2	Brown **EARTH FILL** **(Silty Clay)** some sand, a trace of gravel with organic inclusions	1	DO	23			8	
170.4		2	DO	39	1		13	
1.1	Brown, dense to very dense **SANDY SILT TILL** a trace to some clay a trace of gravel occ. sand and silt seams and layers, cobbles, boulders and rock fragments	3	DO	53			12	
169.2					2			
2.3	Grey, hard **SILTY CLAY TILL** a trace of sand to sandy a trace to some gravel occ. sand and silt seams and layers, cobbles, boulders and rock fragments	4	DO	59			6	
		5	DO	37	3		8	
		6	DO	61	4		9	
					5			
165.1		7	DO	50/15	6		9	
6.4	**END OF BOREHOLE** **(Refusal to Auger)** Installed 50 mm Ø PVC monitoring well to 5.8 m 3.0 m screen from 2.8 m to 5.8 m Sand backfill from 2.1 m to 5.8 m Bentonite holeplug from 0.3 m to 2.1 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				7			
					8			
					9			
					10			

W.L. @ 168.23 m on November 17, 2020
W.L. @ 168.23 m on December 1, 2020
W.L. @ 168.41 m on December 10, 2020

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH 6 ***FIGURE NO.:*** 6

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 20, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
171.0	Ground Surface							
0.0	**25 cm TOPSOIL**	1	DO	50/15	0			
0.3	Brown **EARTH FILL** **(Sandy Silt)** traces to some clay and gravel	2	DO	48	1		11	
169.2		3	DO	36			11	
1.8	Brown, dense to very dense **SANDY SILT TILL** trace of clay and gravel occ. sand and silt seams and layers, cobbles and boulders	4	DO	50/13	2		7	
		5	DO	50/10	3		6	
166.4					4			
4.6	Grey, hard	6	DO	50/8			6	
166.1	**SILTY CLAY TILL**	7	DO	50/5	5		7	
4.9	sandy, a trace of gravel occ. sand and silt seams and layers, cobbles, boulders and shale fragments Grey **SHALE BEDROCK**							
	END OF BOREHOLE **(Refusal to Auger)**				6 7 8 9 10			Dry and open upon completion of the field work

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH/MW 7 **FIGURE NO.:** 7

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

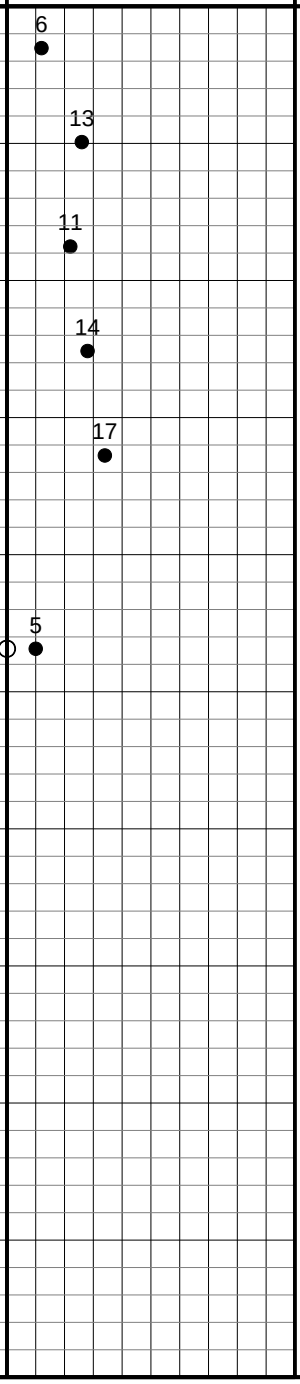
DRILLING DATE: October 20, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
170.9	Ground Surface				
0.0	**18 cm TOPSOIL**				0
0.2	Brown **EARTH FILL** **(Sandy Silt)** traces to some clay and gravel occ. rock fragments	1	DO	52	
170.1 0.8	Brown, very dense **SANDY SILT TILL** traces of clay and gravel occ. sand and silt seams and layers, cobbles and boulders	2	DO	62	1
169.4 1.5	Grey, dense	3	DO	44	2
	SILT a trace to some clay traces of sand and gravel	4	DO	31	3
167.6 3.3	Grey, very stiff to hard **SILTY CLAY TILL** some sand to sandy a trace to some gravel occ. sand and silt seams and layers, cobbles, boulders and rock fragments	5	DO	31	4
		6	DO	50/8	
165.9	rock fragments	7	AS	-	5
5.0	**END OF BOREHOLE** **(Refusal to Auger)** Installed 50 mm Ø PVC monitoring well to 5.0 m 1.5 m screen from 3.5 m to 5.0 m Sand backfill from 2.9 m to 5.0 m Bentonite holeplug from 0.3 m to 2.9 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				6 7 8 9 10

Dynamic Cone (blows/30 cm) 10 30 50 70 90
Shear Strength (kN/m²) 50 100 150 200
Penetration Resistance (blows/30 cm) 10 30 50 70 90

Atterberg Limits PL LL
Moisture Content (%) 10 20 30 40

WATER LEVEL



W.L. @ 166.40 m on November 17, 2020
W.L. @ 166.59 m on December 1, 2020
W.L. @ 166.99 m on December 10, 2020

Soil Engineers Ltd.

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH 8

FIGURE NO.: 8

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 21, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
170.4	Ground Surface							
0.0	**20 cm TOPSOIL**				0			
0.2	Brown **EARTH FILL** **(Silty Clay)** traces of sand and gravel	1	DO	18			10	
169.3		2	DO	19	1		16	
1.1	Dense to very dense **SILT** a trace to some clay a trace of sand occ. gravel	3	DO	55			13	
		4	DO	69/25	2		16	
	brown / grey	5	DO	55	3		24	
		6	DO	39	4		14	
		7	DO	50/8	5		14	
162.8					6			
7.6	Grey, hard **SILTY CLAY TILL** traces of sand and gravel occ. sand and silt seams and layers, cobbles, boulders and shale fragments	8	DO	50/8	7		8	
162.5 7.9	**END OF BOREHOLE** **(Refusal to Auger)**				8			Dry and open upon completion of the field work
					9			
					10			

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH 9 **FIGURE NO.:** 9

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers and Rock Coring

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 28 and 29, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
169.4	Ground Surface							
0.0	**25 cm TOPSOIL**	1A	DO	13	0		10	
0.3	Brown, compact, weathered **SILTY CLAY TILL** some sand, a trace of gravel occ. sand and silt seams and layers, cobbles and boulders	1B						
168.6								
0.8	Dense	2	DO	31	1		14	
	SANDY SILT — — brown / grey	3	DO	37			16	
	a trace of clay occ. sand layers				2			
167.1								
2.3	Grey, very stiff to hard **SILTY CLAY TILL** sandy, a trace of gravel occ. sand and silt seams and layers, cobbles and boulders	4	DO	24			11	
		5	DO	32	3		13	
		6	DO	45	4		11	
163.3					5			
6.1	Grey, very dense **SILT** some clay, a trace of sand	7	DO	50/15	6		16	
161.8		8	DO	100/3	7		8	
7.6	Grey **SHALE BEDROCK** with limestone layers	9	RC RQD	96% 50%	8			
					9			
159.4	*(Continued on next page)*				10			W.L. not measured due to use of water for rock coring

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH 9 **FIGURE NO.:** 9

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers and Rock Coring

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 28 and 29, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
10.0	*(Continued)* Grey **SHALE BEDROCK** with limestone layers	10	RC RQD	100% 78%	10			
		11	RC RQD	100% 91%	11			
		12	RC RQD	100% 89%	12			
155.7 13.7	**END OF BOREHOLE**				13 14 15 16 17 18 19 20			

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH/MW 10 **FIGURE NO.:** 10

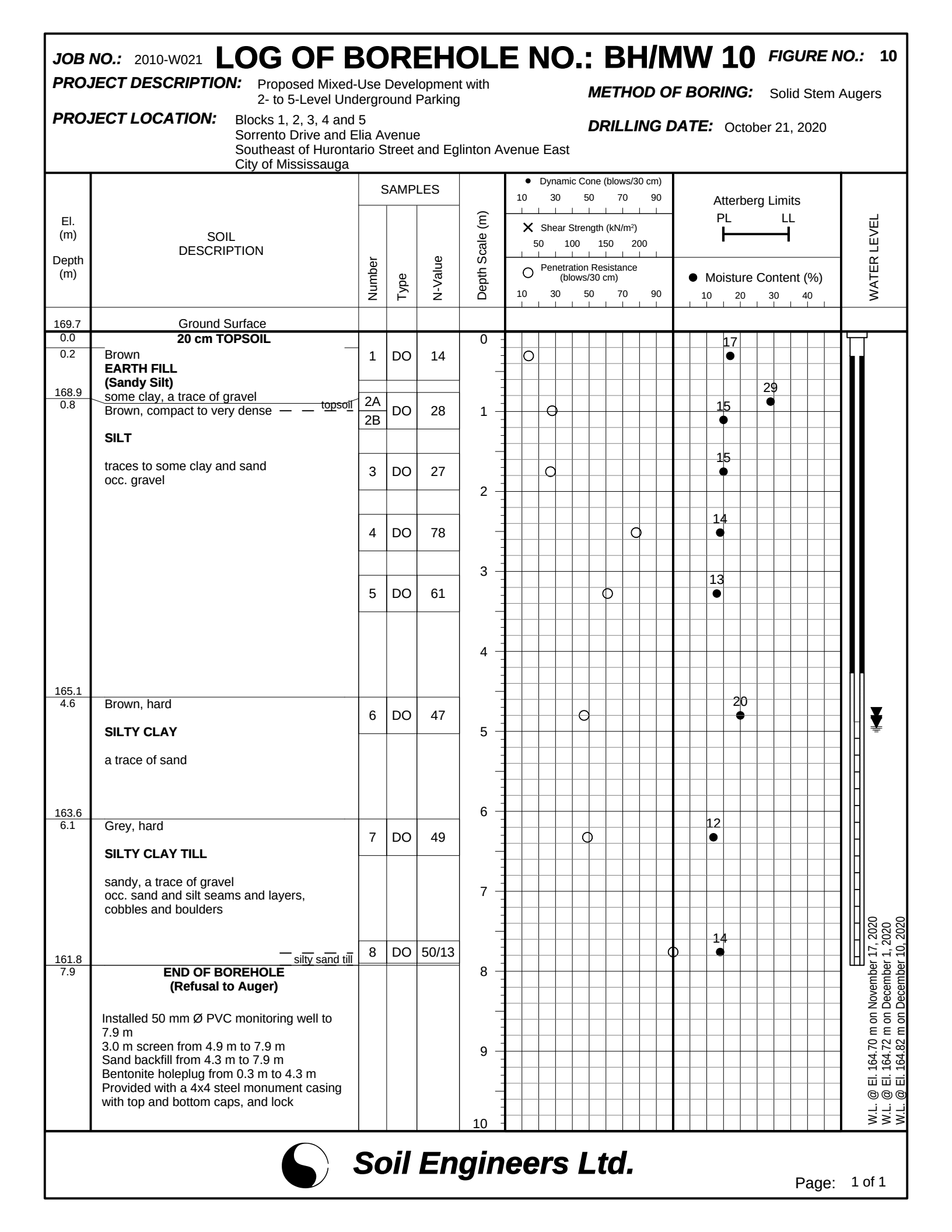
PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 21, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
169.7	Ground Surface							
0.0	**20 cm TOPSOIL**				0			
0.2	Brown **EARTH FILL** **(Sandy Silt)** some clay, a trace of gravel	1	DO	14				
168.9	topsoil							
0.8	Brown, compact to very dense **SILT** traces to some clay and sand occ. gravel	2A 2B	DO	28	1			
		3	DO	27	2			
		4	DO	78				
		5	DO	61	3			
165.1					4			
4.6	Brown, hard **SILTY CLAY** a trace of sand	6	DO	47	5			
163.6					6			
6.1	Grey, hard **SILTY CLAY TILL** sandy, a trace of gravel occ. sand and silt seams and layers, cobbles and boulders	7	DO	49	7			
161.8	silty sand till	8	DO	50/13				
7.9	**END OF BOREHOLE** **(Refusal to Auger)** Installed 50 mm Ø PVC monitoring well to 7.9 m 3.0 m screen from 4.9 m to 7.9 m Sand backfill from 4.3 m to 7.9 m Bentonite holeplug from 0.3 m to 4.3 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				8 9 10			



W.L. @ El. 164.70 m on November 17, 2020
W.L. @ El. 164.72 m on December 1, 2020
W.L. @ El. 164.82 m on December 10, 2020

Soil Engineers Ltd.

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH/MW 11

FIGURE NO.: 11

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 20, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
168.1	Ground Surface							
0.0	**20 cm TOPSOIL**				0			
0.2	Brown, compact to dense	1	DO	17			12	
	SANDY SILT							
	a trace of clay occ. sand layers	2	DO	27	1		16	
		3	DO	32			17	
165.8					2			
2.3	Grey, compact to dense	4	DO	42			12	
	SILT							
	traces to some clay and sand occ. gravel	5	DO	16	3		12	
		6	DO	31	4		15	
162.0					5			
6.1	Grey **SHALE BEDROCK**	7	DO	50/3	6		4	
	END OF BOREHOLE (Refusal to Auger)				7			
	Installed 50 mm Ø PVC monitoring well to 6.1 m 3.0 m screen from 3.1 m to 6.1 m Sand backfill from 2.4 m to 6.1 m Bentonite holeplug from 0.3 m to 2.4 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				8			
					9			
					10			

W.L. @ El. 164.94 m on November 17, 2020
W.L. @ El. 165.30 m on December 1, 2020
W.L. @ El. 166.57 m on December 10, 2020

Soil Engineers Ltd.

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH 12

FIGURE NO.: 12

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 20, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
168.4	Ground Surface							
0.0	**25 cm TOPSOIL**				0			
0.3	Compact to dense	1	DO	30			9	
	SANDY SILT TILL							
	a trace to some clay a trace of gravel occ. sand and silt seams and layers, brown grey cobbles and boulders	2	DO	44	1		13	
		3	DO	24			22	
		4	DO	32	2		13	
165.4								
3.0	Grey, compact to dense	5	DO	40	3		14	
	SILT							
	a trace to some clay a trace of sand occ. gravel	6	DO	30	4		18	
		7	DO	74/28	5			
					6		16	
161.1		8	AS	-	7		15	
7.3	**END OF BOREHOLE** **(Refusal to Auger)**				8			
					9			
					10			Dry and open upon completion of the field work

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH 13 **FIGURE NO.:** 13

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 20, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
168.1	Ground Surface							
0.0	**25 cm TOPSOIL**				0			
0.3	Brown/dark grey asphalt debris	1	DO	17			14	
	EARTH FILL (Sandy Silt and Silty Clay)							
		2	DO	21	1		21	
	a trace of gravel with topsoil/organic inclusions							
166.4		3A	DO	78/23			20	
1.7	Dense to very dense	3B					11	
	SILT				2			
	traces to some clay and sand	4	DO	40			15	
					3			
	brown grey	5	DO	31			14	
163.5					4			
4.6	Grey, dense **SANDY SILT TILL** traces of clay and gravel occ. sand and silt seams and layers, cobbles and boulders	6	DO	44			13	
163.1					5			
5.0	**END OF BOREHOLE**							
					6			
					7			
					8			
					9			
					10			

Dry and open upon completion of the field work

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH 14 **FIGURE NO.:** 14

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 20, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
166.5	Ground Surface							
0.0	**20 cm TOPSOIL**				0			
0.2	Very stiff to hard — brown grey	1	DO	32			10	
	SILTY CLAY TILL							
	sandy, a trace of gravel occ. sand and silt seams and layers, cobbles, boulders and rock fragments — weathered	2	DO	50	1		11	
		3	DO	50/13			11	
		4	AS	-			8	
164.4		5	AS	-	2			
2.1	**END OF BOREHOLE** **(Refusal to Auger)**							
					3			
					4			
					5			
					6			
					7			
					8			
					9			
					10			

Dry and open upon completion of the field work

Soil Engineers Ltd.

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH 15

FIGURE NO.: 15

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 19, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
165.4	Ground Surface							
0.0	**18 cm TOPSOIL**				0			
0.2	Brown **EARTH FILL** **(Silty Clay)** some sand, a trace of gravel	1	DO	34			9	
		2	DO	50/3			15	
164.2 1.2	Very stiff to hard **SILTY CLAY TILL** sandy, a trace of gravel occ. sand and silt seams and layers, cobbles, boulders and rock fragments	3	DO	28	1		6	
		4	DO	66/25	2		12	
		5	DO	50/13	3		10	
	brown / grey				4			
161.1 4.3	**END OF BOREHOLE** **(Refusal to Auger)**	6	DO	50/3				
					5			
					6			
					7			
					8			
					9			
					10			

Cave-in @ El. 161.4 m on completion

Soil Engineers Ltd.

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH/MW 16 **FIGURE NO.:** 16

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 19, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
166.0	Ground Surface							
0.0	**13 cm TOPSOIL**				0			
0.1	Brown **EARTH FILL** **(Silty Clay)** some sand to sandy a trace of gravel	1	DO	28			9	
		2	DO	26	1		13	
164.5								
1.5	Brown, hard **SILTY CLAY TILL** some sand to sandy a trace to some gravel occ. sand and silt seams and layers, cobbles, boulders and rock fragments	3	DO	42	2		13	
		4	DO	40			10	
		5	DO	55	3		10	
		6	DO	59/18	4		9	
161.1								
4.9	**END OF BOREHOLE** **(Refusal to Auger)** Installed 50 mm Ø PVC monitoring well to 4.3 m 1.5 m screen from 2.8 m to 4.3 m Sand backfill from 2.1 m to 4.3 m Bentonite holeplug from 0.3 m to 2.1 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				5 6 7 8 9 10			

W.L. @ El. 163.22 m on November 17, 2020
W.L. @ El. 163.09 m on December 1, 2020
W.L. @ El. 163.16 m on December 10, 2020

Soil Engineers Ltd.

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH 17 **FIGURE NO.:** 17

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers and Rock Coring

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 20 to 26, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
165.5	Ground Surface							
0.0	**20 cm TOPSOIL**	1A			0			
0.2	Brown **EARTH FILL (Silty Clay)** some sand to sandy a trace of gravel	1B	DO	21			10	
164.4		2	DO	14	1		9	
1.1	Brown, very stiff to hard **SILTY CLAY TILL** some sand to sandy a trace to some gravel occ. sand and silt seams and layers, cobbles, boulders and rock fragments	3	DO	30	2		12	
	rock fragments	4	DO	50/13			6	
		5	DO	50	3		11	
161.1					4			
4.4	Grey **SHALE BEDROCK** with limestone layers	6	RC RQD	94% 71%	5			
		7	RC RQD	81% 13%				
		8	RC RQD	95% 39%	6			
		9	RC RQD	100% 16%	7			
		10	RC RQD	98% 35%	8			
					9			
155.5	*(Continued on next page)*		RC		10			W.L. not measured due to use of water for rock coring

JOB NO.: 2010-W021 **LOG OF BOREHOLE NO.: BH 17** **FIGURE NO.:** 17

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers and Rock Coring

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 20 to 26, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
10.0	*(Continued)* Grey **SHALE BEDROCK** with limestone layers	11	RC RQD	92% 43%	10			
		12	RC RQD	98% 38%	11 12			
		13	RC RQD	100% 67%	13			
		14	RC RQD	98% 66%	14 15			
		15	RC RQD	97% 57%	16			
148.6 16.9	**END OF BOREHOLE**				17 18 19 20			

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH 18

FIGURE NO.: 18

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 19, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
163.7	Ground Surface							
0.0	**23 cm TOPSOIL**				0			
0.2	Stiff to hard	1	DO	11			15	
	SILTY CLAY TILL							
	traces of sand and gravel occ. sand and silt seams and layers, cobbles, boulders and shale fragments	2	DO	19	1		22	
	brown / grey	3	DO	50/3			15	
161.5		4	DO	50/3	2			
2.2	**END OF BOREHOLE** **(Refusal to Auger)**				3			
					4			
					5			
					6			
					7			
					8			
					9			
					10			

Dry and open upon completion of the field work

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH/MW 19 **FIGURE NO.:** 19

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 19, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
165.0	Ground Surface							
0.0	**20 cm TOPSOIL**				0			
0.2	Brown	1	DO	19			14	
	EARTH FILL (Silty Clay)							
	sandy, a trace of gravel occ. sand layers	2	DO	20	1		12	
163.5								
1.5	Brown, very stiff to hard	3	DO	19			14	
	SILTY CLAY TILL				2			
	traces to some sand and gravel occ. sand and silt seams and layers, cobbles and boulders	4	DO	58			13	
		5	DO	42	3		8	
161.3		6	DO	50/5			6	
3.7	**END OF BOREHOLE (Refusal to Auger)**				4			
	Installed 50 mm Ø PVC monitoring well to 3.7 m 1.5 m screen from 2.2 m to 3.7 m Sand backfill from 1.5 m to 3.7 m Bentonite holeplug from 0.3 m to 1.5 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				5			
					6			
					7			
					8			
					9			
					10			

W.L. @ El. 162.04 m on November 17, 2020
W.L. @ El. 162.14 m on December 1, 2020
W.L. @ El. 162.24 m on December 10, 2020

Soil Engineers Ltd.

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH/MW 20 **FIGURE NO.:** 20

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 19, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
165.5	Ground Surface							
0.0	**25 cm TOPSOIL**				0			
0.3		1	DO	42			11	
	EARTH FILL — — brown grey **(Silty Clay)**							
	a trace to some sand a trace of gravel	2	DO	26	1		9	
		3	DO	24			11	
163.2					2			
2.3	Brown, very stiff	4	DO	20			14	
	SILTY CLAY TILL							
	some sand to sandy a trace of gravel occ. sand and silt seams and layers, cobbles and boulders	5	DO	22	3		19	
161.4					4			
161.2	Grey	6	AS	-			10	
4.3	**SHALE BEDROCK**							
	END OF BOREHOLE **(Refusal to Auger)**				5			
	Installed 50 mm Ø PVC monitoring well to 3.7 m 1.5 m screen from 2.2 m to 3.7 m Sand backfill from 1.5 m to 3.7 m Bentonite holeplug from 0.3 m to 1.5 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				6			
					7			
					8			
					9			
					10			

Well dry on November 17, 2020
Well dry on December 1, 2020
Well dry on December 10, 2020

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH 21

FIGURE NO.: 21

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 27, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
164.2	Ground Surface							
0.0	**25 cm TOPSOIL**				0			
0.3		1	DO	14			10	
	EARTH FILL							
	(Silty Clay) — — brown grey	2	DO	52	1		15	
	a trace of sand to sandy a trace of gravel							
162.4		3	DO	65			16	
1.8	Hard — — brown				2		8	
162.1	**SILTY CLAY TILL** grey	4	AS	-				
2.1	sandy, a trace of gravel occ. sand and silt seams and layers, cobbles, boulders and shale fragments							
	END OF BOREHOLE **(Refusal to Auger)**				3			
					4			
					5			
					6			
					7			
					8			
					9			
					10			Dry and open upon completion of the field work

Soil Engineers Ltd.

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH/MW 22 **FIGURE NO.:** 22

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 27, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
163.9	Ground Surface							
0.0	**33 cm TOPSOIL**	1	DO	12	0		12	
0.3	Brown, stiff **SILTY CLAY TILL** traces to some sand and gravel occ. sand and silt seams and layers, cobbles and boulders	2	DO	16	1		26	
162.4								
1.5	Hard — — brown / grey	3	DO	65/18			19	
162.0	**SILTY CLAY**	4	AS	-	2		6	
1.9	a trace of sand							
	END OF BOREHOLE **(Refusal to Auger)**				3			
	Installed 50 mm Ø PVC monitoring well to 1.8 m 1.4 m screen from 0.4 m to 1.8 m Sand backfill from 0.3 m to 1.8 m Bentonite holeplug from 0 m to 0.3 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				4			
					5			
					6			
					7			
					8			
					9			
					10			

Well dry on November 17, 2020
W.L. @ El. 162.29 m on December 1, 2020
W.L. @ El. 162.81 m on December 10, 2020

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH/MW 23

FIGURE NO.: 23

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers and Rock Coring

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: November 4 and 5, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
164.5	Ground Surface							
0.0	**15 cm TOPSOIL**				0			
0.2	Stiff to very	1	DO	9			13	
	SILTY CLAY TILL							
	traces to some sand and gravel, occ. sand and silt seams and layers, cobbles and boulders — brown / grey	2	DO	17	1		17	
163.0								
1.5	Grey, very stiff	3	DO	17			26	
	SILTY CLAY				2			
	a trace of sand							
162.1		4	DO	50/15			17	
2.4	Grey							
	SHALE BEDROCK				3			
	with limestone layers	5	RC RQD	100% 0%				
		6	RC RQD	88% 29%	4			
		7	RC RQD	100% 35%	5			
		8	RC RQD	95% 32%	6			
		9	RC RQD	100% 50%	7			
		10	RC RQD	90% 41%	8			
					9			
154.5	*(Continued on next page)*	11	RC	100%	10			

W.L. @ El. 129.25 m on November 17, 2020
W.L. @ El. 158.15 m on December 1, 2020
W.L. @ El. 157.95 m on December 10, 2020

JOB NO.: 2010-W021 **LOG OF BOREHOLE NO.: BH/MW 23** **FIGURE NO.:** 23

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers and Rock Coring

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: November 4 and 5, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
10.0	*(Continued)* Grey **SHALE BEDROCK** with limestone layers	11	RQD	68%	10			
		12	RC RQD	100% 77%	11			
		13	RC RQD	84% 62%	12			
		14	RC RQD	83% 74%	13			
150.6 13.9	**END OF BOREHOLE** Installed 50 mm Ø PVC monitoring well to 13.9 m 3.0 m screen from 10.9 m to 13.9 m Sand backfill from 10.2 m to 13.9 m Bentonite holeplug from 0.3 m to 10.2 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				14 15 16 17 18 19 20			

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH 24

FIGURE NO.: 24

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 27, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
164.5	Ground Surface							
0.0	**25 cm TOPSOIL**				0		8	
0.3	Stiff to hard	1	DO	15				
	SILTY CLAY TILL							
	a trace of sand to sandy	2	DO	35	1		15	
	a trace of gravel							
	occ. sand and silt seams and layers, cobbles and boulders — brown grey	3	DO	50/13			13 7	
162.7		4	AS	-				
1.8	**END OF BOREHOLE (Refusal to Auger)**				2			
					3			
					4			
					5			
					6			
					7			
					8			
					9			
					10			

Cave-in @ El. 162.8 m on completion

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH 25

FIGURE NO.: 25

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 26, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
165.0	Ground Surface							
0.0	**20 cm TOPSOIL**				0			
0.2	Brown **EARTH FILL** **(Silty Clay)** a trace of sand to sandy a trace of gravel	1	DO	13			20	
163.9 1.1	with organic inclusions Stiff to hard	2	DO	12	1		16	
	SILTY CLAY TILL a trace of sand to sandy a trace of gravel	3	DO	21			16	
	occ. sand and silt seams and layers, ~~brown~~ grey cobbles and boulders	4	DO	50/15	2		13	
162.3		5	AS	-			8	
2.7	**END OF BOREHOLE** **(Refusal to Auger)**				3			
					4			
					5			
					6			
					7			
					8			
					9			
					10			

Dry and open upon completion of the field work

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH/MW 26 **FIGURE NO.:** 26

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 27, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
165.2	Ground Surface							
0.0	**15 cm TOPSOIL**				0			
0.2	Brown **EARTH FILL** **(Silty Clay)** some sand and gravel	1	DO	15				
164.1		2	DO	14	1			
1.1	Grey, stiff to very stiff **SILTY CLAY TILL** traces to some sand and gravel occ. sand and silt seams and layers, cobbles and boulders	3	DO	29				
163.1		4	AS	-	2			
2.1	**END OF BOREHOLE** **(Refusal to Auger)** Installed 50 mm Ø PVC monitoring well to 2.1 m 1.5 m screen from 0.6 m to 2.1 m Sand backfill from 0.3 m to 2.1 m Bentonite holeplug from 0 m to 0.3 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				3 4 5 6 7 8 9 10			

Moisture Content (%): 10 (0.2 m), 13 (1.1 m), 16 (2.1 m), 7 (2.1 m)

Well dry on November 17, 2020
W.L. @ El. 165.22 m on December 1, 2020
W.L. @ El. 164.80 m on December 10, 2020

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH 27

FIGURE NO.: 27

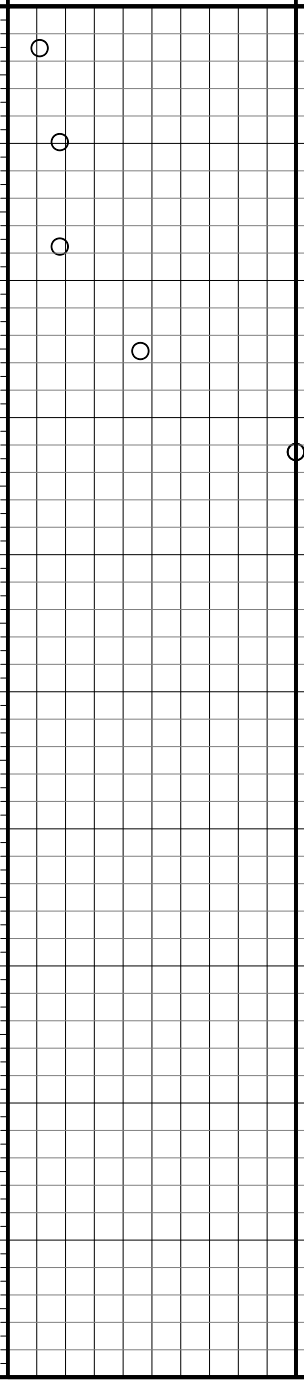
PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

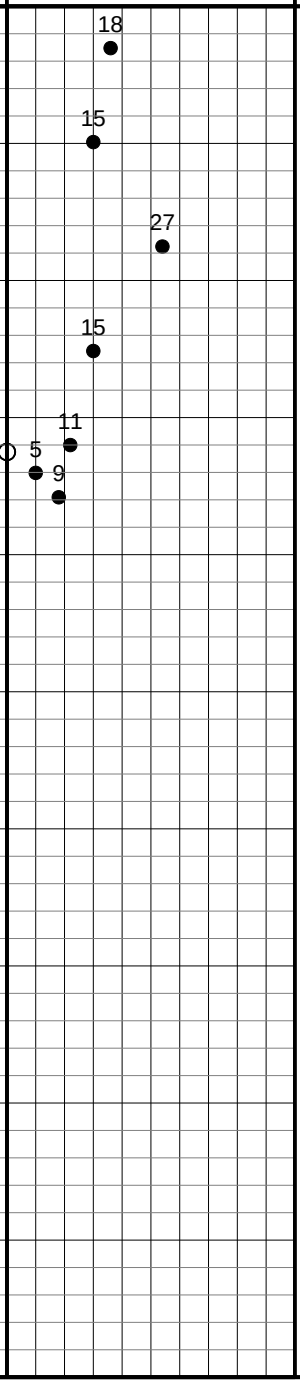
METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 26, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
165.2	Ground Surface				
0.0	**18 cm TOPSOIL**				0
0.2	Brown/dark grey **EARTH FILL** **(Silty Clay)** a trace to some sand a trace of gravel	1	DO	11	
		2	DO	18	1
163.5		3	DO	18	
1.7	Grey, very stiff to hard **SILTY CLAY TILL** traces to some sand and gravel occ. sand and silt seams and layers, cobbles, boulders and shale fragments	4	DO	46	2
161.8		5A	DO	71/25	3
3.4	Grey	5B			
161.5	**SHALE BEDROCK**	6	AS	-	
3.7	with limestone layers **END OF BOREHOLE** **(Refusal to Auger)**				4
					5
					6
					7
					8
					9
					10





WATER LEVEL

Cave-in @ El. 162.2 m on completion

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JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH/MW 28

FIGURE NO.: 28

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers and Rock Coring

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 29 to November 3, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
166.0	Ground Surface							
0.0	**28 cm TOPSOIL**	1A	DO	10	0			
0.3		1B						
	EARTH FILL (Silty Clay)	2	DO	20	1			
	sandy, a trace of gravel							
	brown / grey	3	DO	20	2			
163.7								
2.3	Grey, hard	4	DO	42				
	SILTY CLAY TILL							
	traces to some sand and gravel occ. sand and silt seams and layers, cobbles, boulders and shale fragments	5	DO	38/23 50/NP	3			
161.6					4			
4.4	Grey	6	RC RQD	89% 0%	5			
	SHALE BEDROCK							
	with limestone layers	7	RC RQD	100% 35%	6			
		8	RC RQD	95% 30%	7			
		9	RC RQD	98% 65%	8 9			
156.0	*(Continued on next page)*				10			

W.L. @ El. 160.49 m on November 17, 2020
W.L. @ El. 159.78 m on December 1, 2020
W.L. @ El. 159.66 m on December 10, 2020

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH/MW 28 **FIGURE NO.:** 28

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers and Rock Coring

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 29 to November 3, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
10.0	*(Continued)* Grey **SHALE BEDROCK** with limestone layers	10	RC RQD	90% 55%	10			
		11	RC RQD	97% 88%	11			
		12	RC RQD	100% 86%	12			
		13	RC RQD	95% 76%	13			
		14	RC RQD	88% 68%	14			
149.2 16.8	**END OF BOREHOLE** Installed 50 mm Ø PVC monitoring well to 16.5 m 3.0 m screen from 13.5 m to 16.5 m Sand backfill from 12.8 m to 16.5 m Bentonite holeplug from 0.3 m to 12.8 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				15 16 17 18 19 20			

JOB NO.: 2010-W021 # LOG OF BOREHOLE NO.: BH/MW 29 **FIGURE NO.:** 29

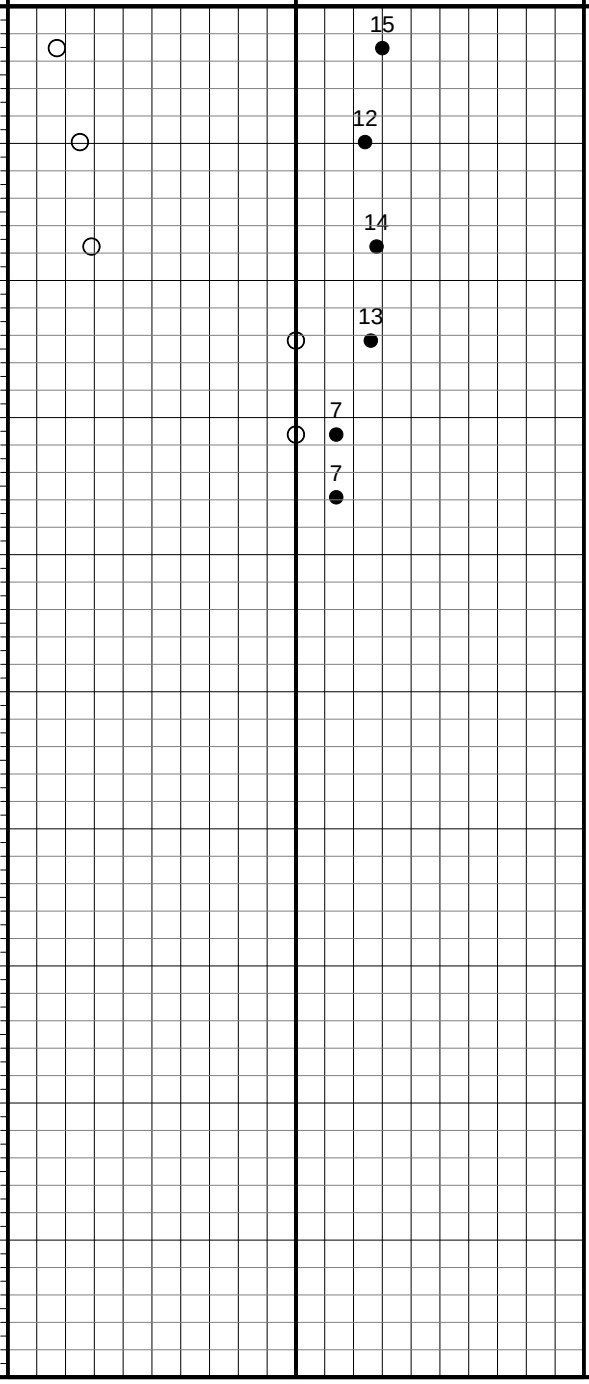
PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 26, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
165.2	Ground Surface				
0.0	**23 cm TOPSOIL**				0
0.2	Brown	1	DO	17	
	EARTH FILL **(Silty Clay)** a trace to some sand a trace of gravel	2	DO	25	1
163.7					
1.5	Grey, very stiff to hard **SILTY CLAY TILL** traces to some sand and gravel occ. sand and silt seams and layers, cobbles, boulders and shale fragments	3	DO	29	2
162.7		4	DO	50/15	
2.5	Grey **SHALE BEDROCK** with limestone layers	5	DO	50/15	3
161.5		6	AS	-	
3.7	**END OF BOREHOLE** **(Refusal to Auger)**				4
	Installed 50 mm Ø PVC monitoring well to 3.7 m 1.5 m screen from 2.2 m to 3.7 m Sand backfill from 1.5 m to 3.7 m Bentonite holeplug from 0.3 m to 1.5 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				5
					6
					7
					8
					9
					10



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JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH 30

FIGURE NO.: 30

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 26, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
166.1	Ground Surface							
0.0	**25 cm TOPSOIL**				0			
0.3	Brown	1	DO	14			11	
	EARTH FILL (Silty Clay)							
	some sand to sandy a trace of gravel with organic inclusions	2	DO	63/28	1		12	
164.4								
1.7	Very stiff to hard — — brown / grey	3	DO	23			21	
	SILTY CLAY TILL				2			
	traces to some sand and gravel occ. sand and silt seams and layers, cobbles, boulders and shale fragments	4	DO	42				
		5	DO	77/23	3		10	
162.7								
3.4	Grey							
	SHALE BEDROCK				4			
	with limestone layers							
161.5		6	AS	-			7	
4.6	**END OF BOREHOLE (Refusal to Auger)**				5			
					6			
					7			
					8			
					9			
					10			

Cave-in @ El. 162.1 m on completion

Soil Engineers Ltd.

JOB NO.: 2010-W021

LOG OF BOREHOLE NO.: BH/MW 31

FIGURE NO.: 31

PROJECT DESCRIPTION: Proposed Mixed-Use Development with 2- to 5-Level Underground Parking

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Blocks 1, 2, 3, 4 and 5
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East
City of Mississauga

DRILLING DATE: October 26, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
166.0 / 0.0	Ground Surface				0
0.0	**25 cm TOPSOIL**	1	DO	14	
0.3	Brown **EARTH FILL** **(Silty Clay)** traces of sand and gravel with topsoil inclusions				
165.1 / 0.9	Brown, very stiff	2	DO	19	1
	SILTY CLAY TILL	3	DO	29	2
	some sand to sandy a trace of gravel occ. sand and silt seams and layers, cobbles, boulders and shale fragments	4	DO	25	
163.3 / 2.7	Grey				3
	SHALE BEDROCK with limestone layers	5	DO	50/10	
161.9 / 4.1	**END OF BOREHOLE** **(Refusal to Auger)**	6	AS	-	4
	Installed 50 mm Ø PVC monitoring well to 3.7 m 1.5 m screen from 2.2 m to 3.7 m Sand backfill from 1.5 m to 3.7 m Bentonite holeplug from 0.3 m to 1.5 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				5 6 7 8 9 10

Dynamic Cone (blows/30 cm) 10 30 50 70 90
Shear Strength (kN/m²) 50 100 150 200
Penetration Resistance (blows/30 cm) 10 30 50 70 90

Atterberg Limits PL LL
Moisture Content (%) 10 20 30 40

Moisture Content values: 21, 11, 18, 14, 5, 8

WATER LEVEL

W.L. @ El. 162.82 m on November 17, 2020
W.L. @ El. 162.91 m on December 1, 2020
W.L. @ El. 162.92 m on December 10, 2020

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

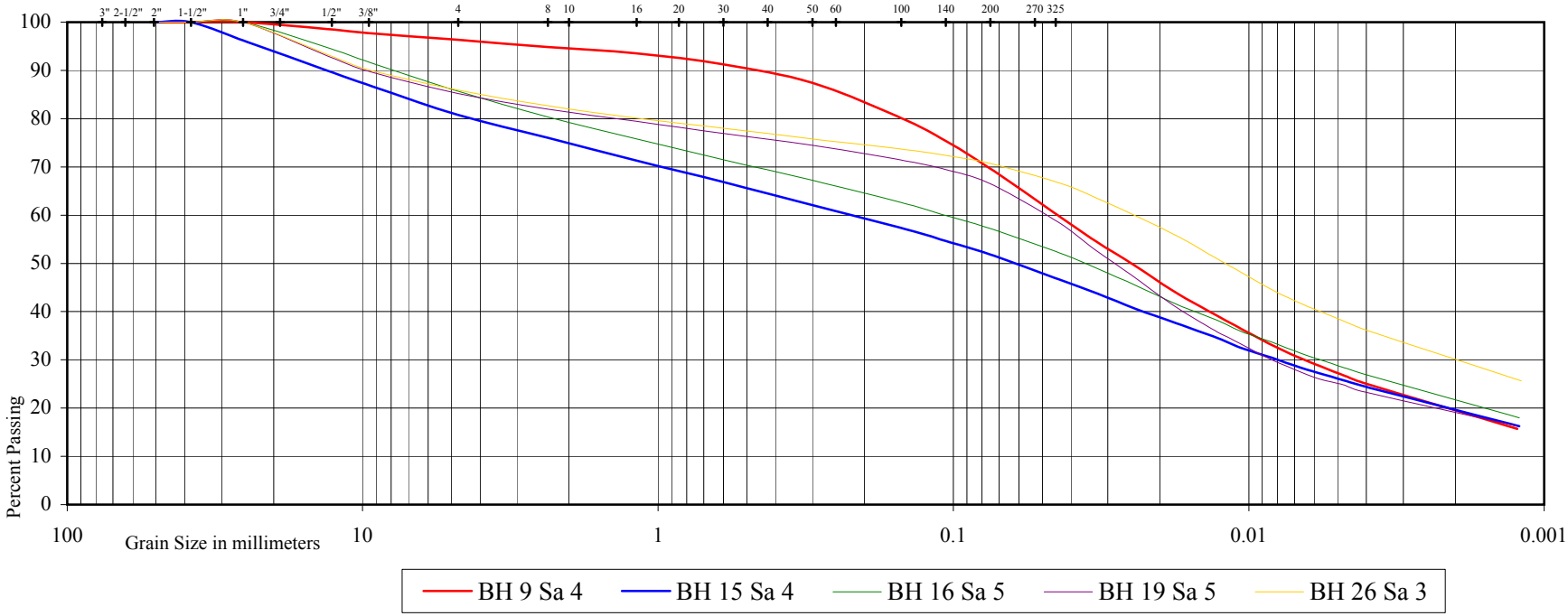
Reference No: 2010-W021

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Propsed Mixed-Use Development

Location: Sorrento Drive and Elia Avenue, Southeast of Hurontario Street and Eglinton Avenue East, City of Mississauga

Borehole No:	9	15	16	19	26
Sample No:	4	4	5	5	3
Depth (m):	2.5	2.5	3.3	3.3	1.8
Elevation (m):	166.9	162.9	162.7	161.7	163.4

BH 9 Sa. 4 Estimated Permeability (cm./sec.) = 10^{-7}

BH 15 Sa 4 Estimated Permeability (cm./sec.) = 10^{-7}

BH 16 Sa. 5 Estimated Permeability (cm./sec.) = 10^{-7}

BH 19 Sa 5 Estimated Permeability (cm./sec.) = 10^{-7}

BH 26 Sa 3 Estimated Permeability (cm./sec.) = 10^{-7}

Classification of Sample [& Group Symbol]: SILTY CLAY, TILL

some sand to sandy, a trace to some of gravel

Figure: 32

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

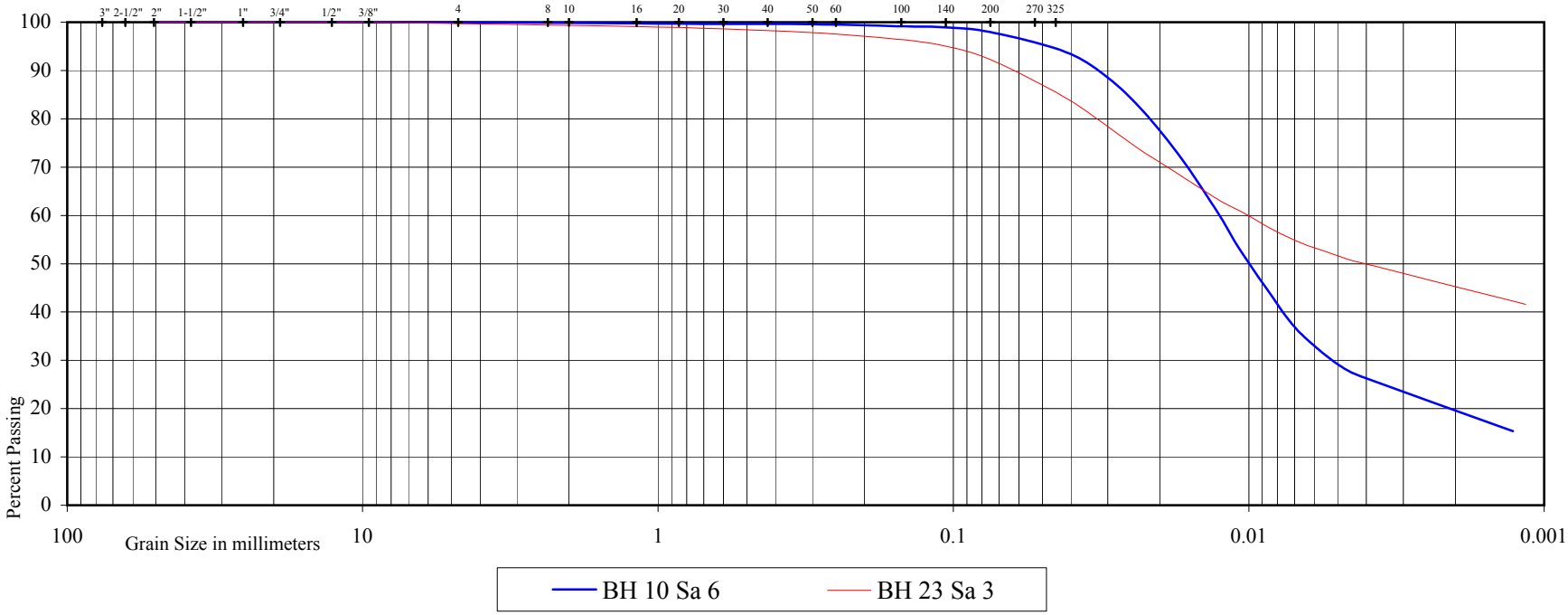
Reference No: 2010-W021

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Propsed Mixed-Use Development

Location: Sorrento Drive and Elia Avenue, Southeast of Hurontario Street and Eglinton Avenue East, City of Mississauga

Borehole No:	10	23
Sample No:	6	3
Depth (m):	4.8	1.8
Elevation (m):	164.9	162.7

BH 10 Sa 6 Estimated Permeability (cm./sec.) = 10^{-7}

BH 23 Sa 3 Estimated Permeability (cm./sec.) = 10^{-7}

Classification of Sample [& Group Symbol]: SILTY CLAY
a trace of sand

Figure: 33

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

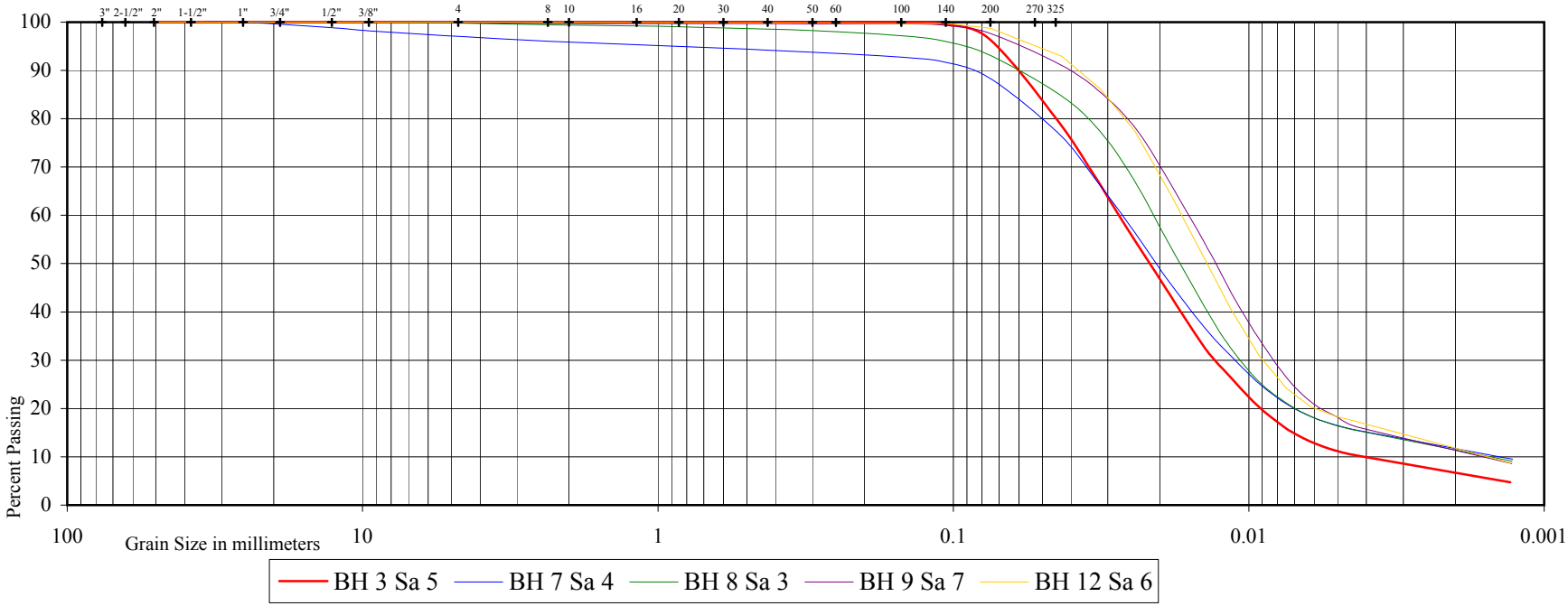
Reference No: 2010-W021

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Propsed Mixed-Use Development

Location: Sorrento Drive and Elia Avenue, Southeast of Hurontario Street and Eglinton Avenue East, City of Mississauga

Borehole No:	3	7	8	9	12
Sample No:	5	4	3	7	6
Depth (m):	3.3	2.5	1.8	6.3	4.8
Elevation (m):	168.5	168.4	168.6	163.1	163.6

BH 3 Sa 5 Estimated Permeability (cm./sec.) = 10^{-5}

BH 7 Sa 4 Estimated Permeability (cm./sec.) = 10^{-6}

BH 8 Sa 3 Estimated Permeability (cm./sec.) = 10^{-6}

BH 9 Sa 7 Estimated Permeability (cm./sec.) = 10^{-6}

BH 12 Sa 6 Estimated Permeability (cm./sec.) = 10^{-6}

Classification of Sample [& Group Symbol]: SILT

a trace to some clay, traces of sand and gravel

Figure: 34

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

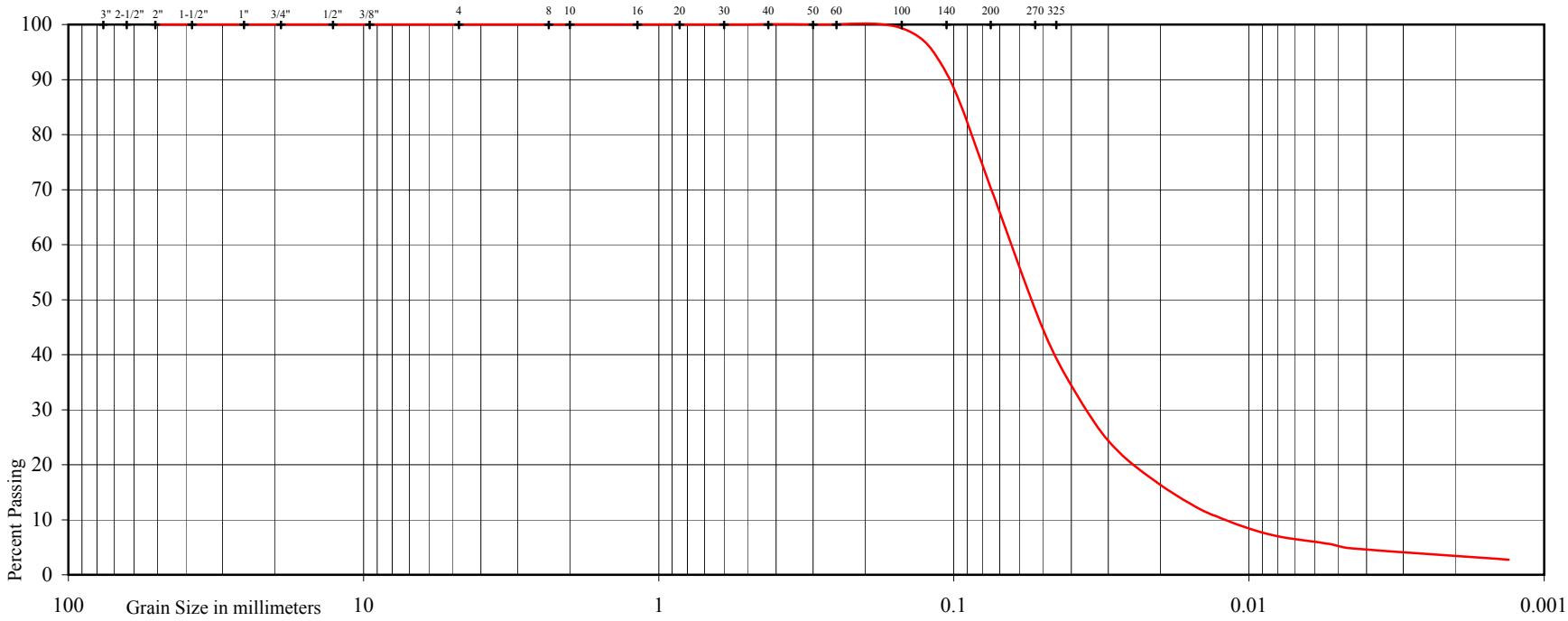
Reference No: 2010-W021

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Propsed Mixed-Use Development

Location: Sorrento Drive and Elia Avenue, Southeast of Hurontario Street and Eglinton Avenue East, City of Mississauga

Borehole No: 11

Sample No: 2

Depth (m): 1.0

Elevation (m): 167.1

Estimated Permeability (cm./sec.) = 10^{-4}

Classification of Sample [& Group Symbol]: SANDY SILT
a trace of clay

Figure: 35

Soil Engineers Ltd.
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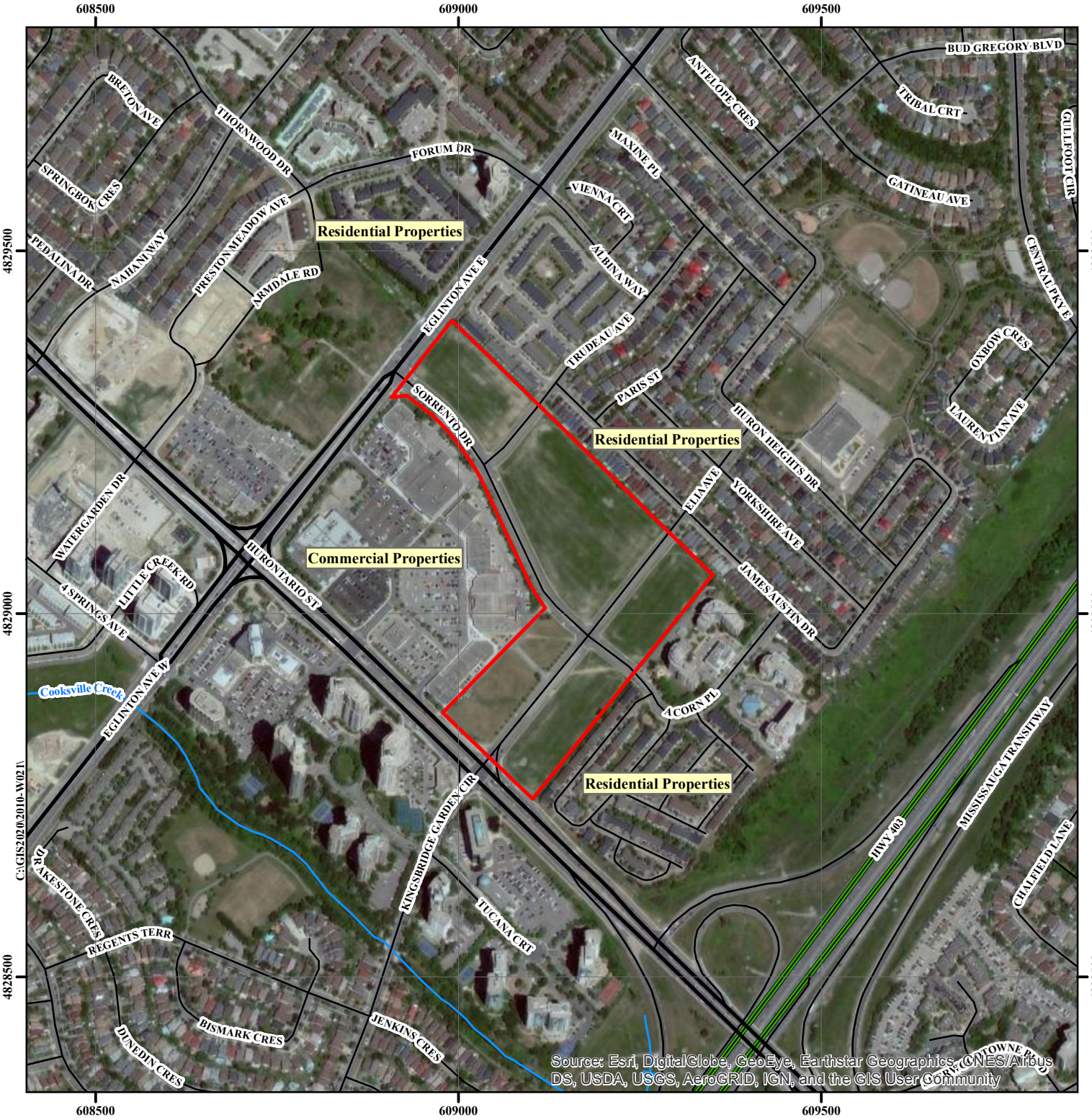
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

DRAWINGS 1 TO 9

REFERENCE NO. 2010-W021



N

Approximate Boundary of Subject Site

Watercourse

Expressway/Freeway

Major Road

Local Road

Soil Engineers Ltd.

Title: Site Location Plan

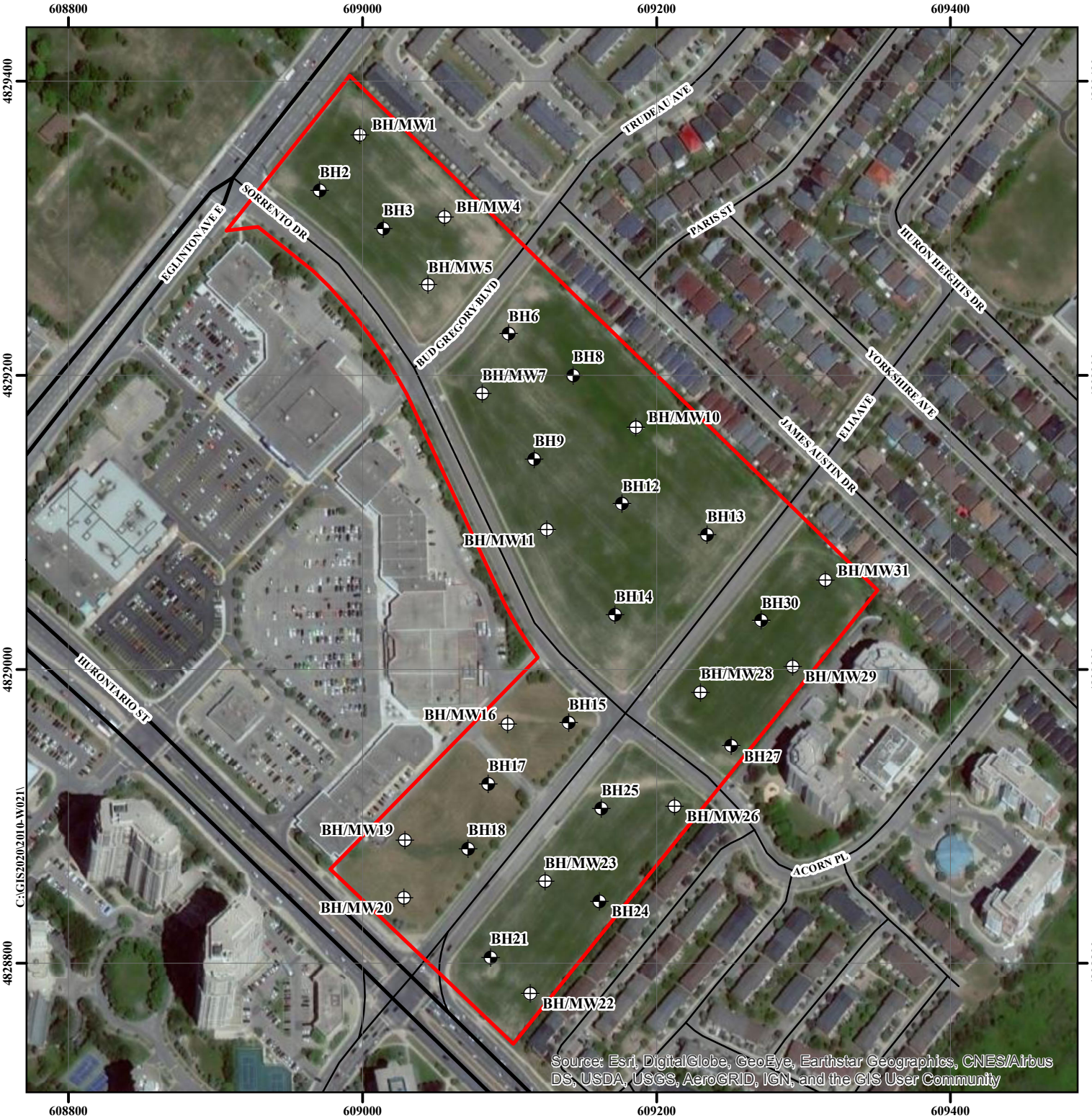
Project:
Hydrogeological Assessment
Proposed Mixed-Use Development
with 2 to 5 Level Underground Parking
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and
Eglinton Avenue East, City of Mississauga

Reference No. 2010-W021

Date: November 26, 2020

Scale:
0 25 50 100 150 200 250
Metres

Drawing No. 1



N

Approximate Boundary of Subject Site

Borehole

Borehole with Monitoring Well

Major Road

Local Road

Soil Engineers Ltd.

Title: Borehole and Monitoring Well Location Plan

Project:

Hydrogeological Assessment
Proposed Mixed-Use Development
with 2 to 5 Level Underground Parking
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and
Eglinton Avenue East, City of Mississauga

Reference No. 2010-W021

Date: November 26, 2020

Scale:

0 25 50 100 150 200

Metres

Drawing No. 2

N

Approximate Boundary of Subject Site

500 metres from Subject Site Boundary

Well Location from MECP Well Records (see Appendix 'A')

Waterbody

Watercourse

Expressway/Freeway

Major Road

Local Road

Soil Engineers Ltd.

Title: MECP Well Location Plan

Project:

Hydrogeological Assessment
Proposed Mixed-Use Development
with 2 to 5 Level Underground Parking
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and
Eglinton Avenue East, City of Mississauga

Reference No. 2010-W021

Date: November 26, 2020

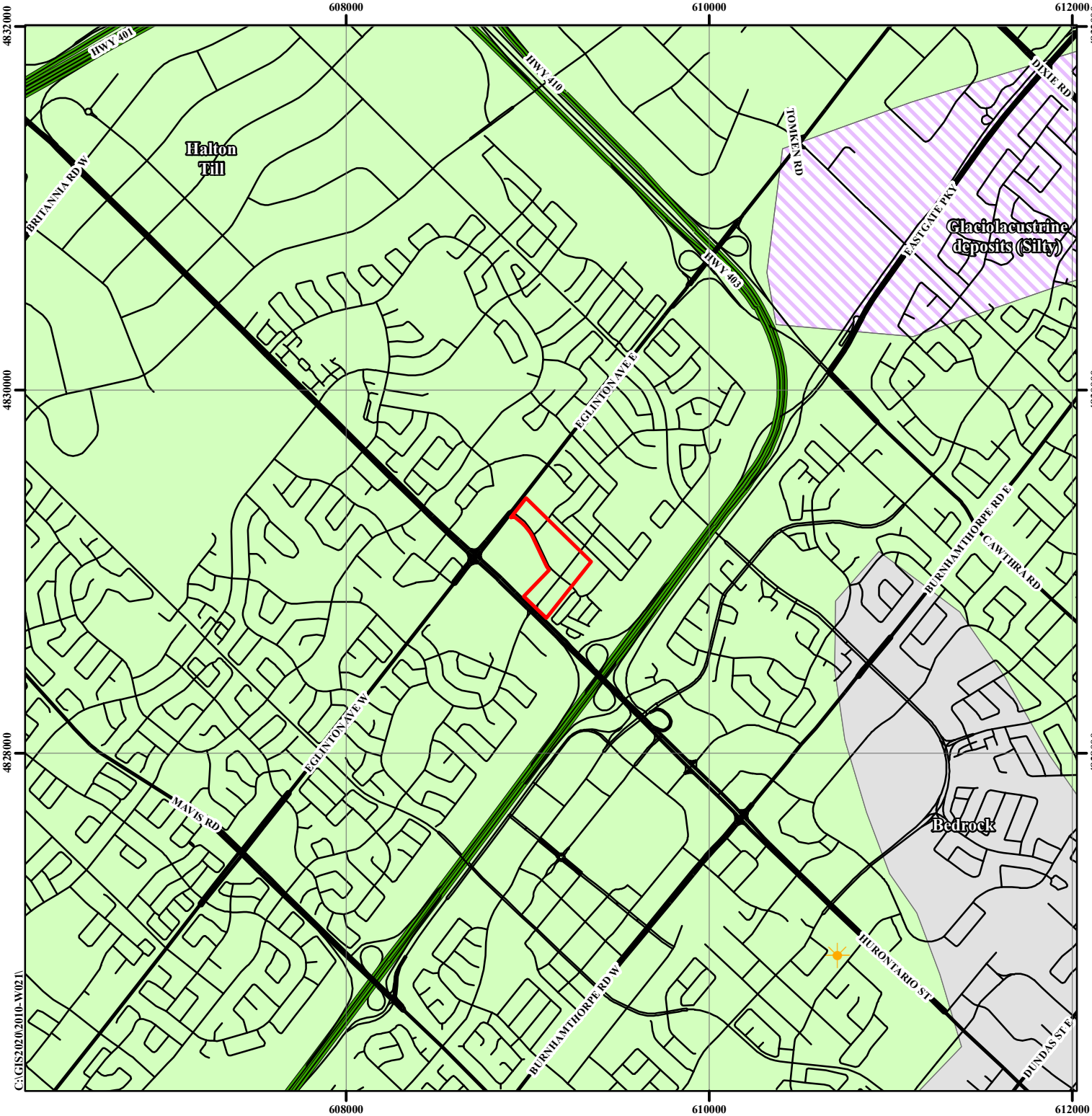
Scale:

0 50 100 200 300 400 500

Metres

Drawing No. 3

Source: Ministry of Natural Resources and Forestry



N

Approximate Boundary of Subject Site

Bedrock, undifferentiated igneous and metamorphic rock, or carbonate and clastic sedimentary rock, exposed at surface or covered by a discontinuous, thin layer of drift

Glaciolacustrine deposits (Silty)
Material: silt and clay, minor sand, basin and quiet water deposits

Halton Till
Material: predominantly silt to silty clay matrix, high in matrix carbonate content and clast poor

Oil and Gas Wells

Expressway/Freeway

Major Road

Local Road

Soil Engineers Ltd.

Title: Quarternary and Surface Geology Map

Project:

Hydrogeological Assessment
Proposed Mixed-Use Development
with 2 to 5 Level Underground Parking
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and
Eglinton Avenue East, City of Mississauga

Reference No. 2010-W021

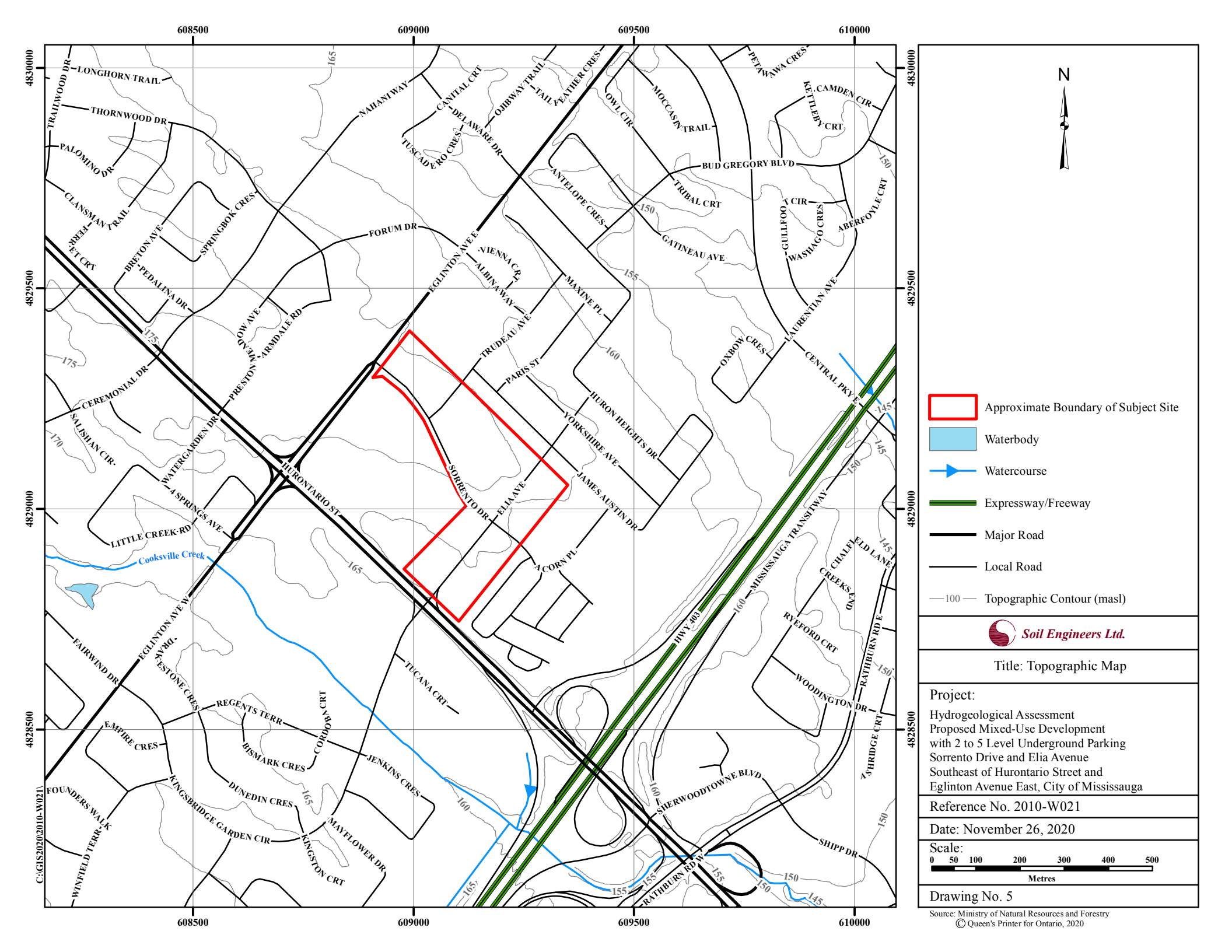
Date: November 26, 2020

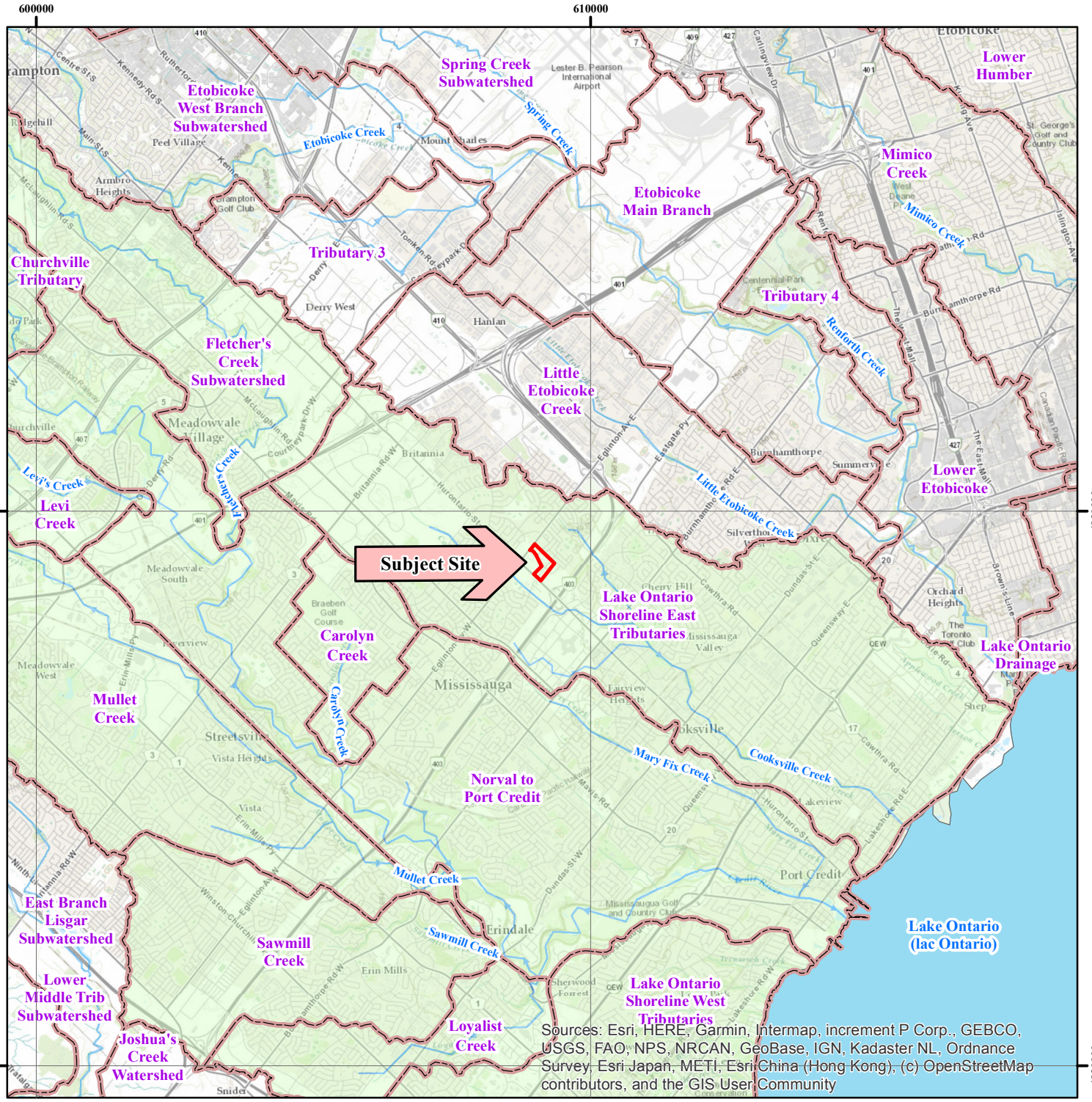
Scale:

0 100 200 400 600 800 1,000
Metres

Drawing No. 4

Source: Ontario Geological Survey, 1997,
Surface Geology of Ontario; Ontario Geological Survey,
Miscellaneous Released-Data 0014


608500
609000
609500
610000
4830000
4829500
4829000
4828500
N
LONGHORN TRAIL
TRAILWOOD DR
THORNWOOD DR
PALOMINO DR
CLANSMAN TRAIL
FERRET CRT
BRETON AVE
SPRINGBOK CRES
PEDALINA DR
FORUM DR
NAHANIWAY
CANITAL CRT
DELAWARE DR
OJIBWAY TRAIL
TAILFEATHER CRES
TUSCADERO CRES
EGLINTON AVE E
VIENNA CRT
ALBINA WAY
MAXINE PL
TRUDEAU AVE
PARIS ST
HURON HEIGHTS DR
YORKSHIRE AVE
JAMES AUSTIN DR
SORRENTO DR
ELIA AVE
ACORN PL
OWL CIR
MOCCASIN TRAIL
PETTAWAWA CRES
KETTLEBY CRT
CAMDEN CIR
BUD GREGORY BLVD
TRIBAL CRT
ANTELOPE CRES
GATINEAU AVE
GULLFOOT CIR
WASHAGO CRES
ABERFOYLE CRT
LAURENTIAN AVE
OXBOW CRES
CENTRAL PKWY E
MISSISSAUGA TRANSITWAY
HWY 403
CHALFIELD LANE
CREEKS END
RYEFORD CRT
RATHBURN RD E
WOODINGTON DR
ASHRIDGE CRT
SHERWOODTOWNE BLVD
SHIPP DR
RATHBURN RD W
FAIRWIND DR
EGLINTON AVE W
DRAKESTONE CRES
REGENTS TERR
CORDOBA CRT
EMPIRE CRES
BISMARK CRES
JENKINS CRES
TUCANA CRT
DUNEDIN CRES
KINGSBRIDGE GARDEN CIR
KINGSTON CRT
MAYFLOWER DR
FOUNDERS WALK
WINFIELD TERR
CEREMONIAL DR
SALISHAN CIR
WATERGARDEN DR
4 SPRINGS AVE
LITTLE CREEK RD
HURONTARIO ST
PRESTON MEADOW
ARMDALE RD
Cooksville Creek
C:\GIS2020\2010-W021\
Approximate Boundary of Subject Site
Waterbody
Watercourse
Expressway/Freeway
Major Road
Local Road
100 Topographic Contour (masl)
Soil Engineers Ltd.
Title: Topographic Map
Project:
Hydrogeological Assessment
Proposed Mixed-Use Development
with 2 to 5 Level Underground Parking
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and
Eglinton Avenue East, City of Mississauga
Reference No. 2010-W021
Date: November 26, 2020
Scale:
0 50 100 200 300 400 500
Metres
Drawing No. 5
Source: Ministry of Natural Resources and Forestry
© Queen's Printer for Ontario, 2020



C:\GIS2020\2010-W021\

N

Watershed:

Approximate Boundary of the Subject Site

Watershed Boundaries

Waterbody

Watercourse

Expressway/Major Road

Soil Engineers Ltd.

Title: Watershed and Subwatershed Map

Project:

Hydrogeological Assessment
Proposed Mixed-Use Development
with 2 to 5 Level Underground Parking
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and
Eglinton Avenue East, City of Mississauga

Reference No. 2010-W021

Date: November 26, 2020

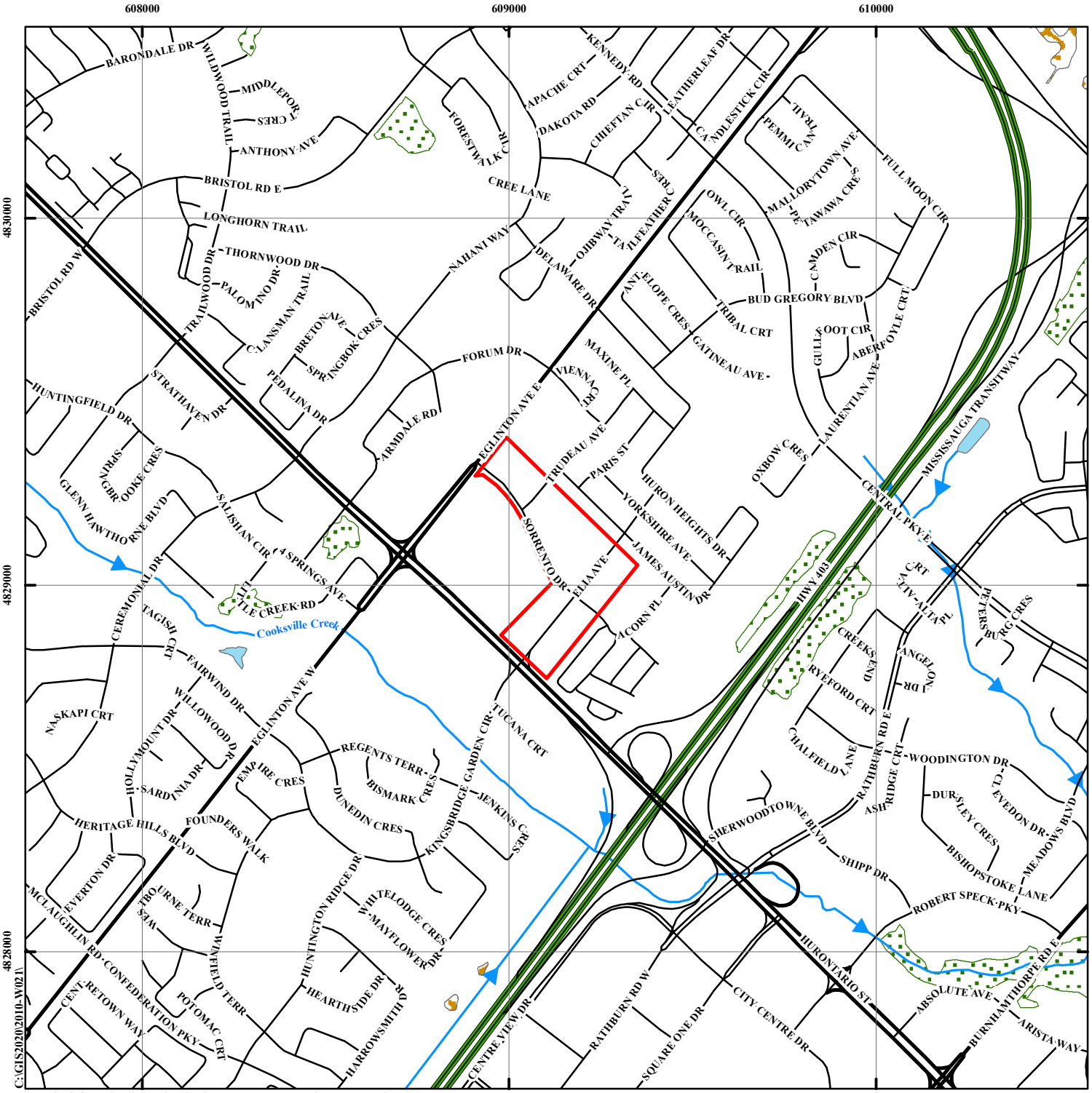
Scale:

0 500 1,000 2,000 3,000 4,000 5,000

Metres

Drawing No. 6

This mapping was produced by SEL and should be used for information purposes only.
Data sources used in its production are of varying quality and accuracy and all boundaries should be considered approximate.



Approximate Boundary of Subject Site

Wetland (Not evaluated per OWES)

Wooded Area

Waterbody

Watercourse

Expressway/Freeway

Major Road

Local Road

Soil Engineers Ltd.

Title: Natural Features and Protection Area Plan

Project:

Hydrogeological Assessment
Proposed Mixed-Use Development
with 2 to 5 Level Underground Parking
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and
Eglinton Avenue East, City of Mississauga

Reference No. 2010-W021

Date: November 26, 2020

Scale:

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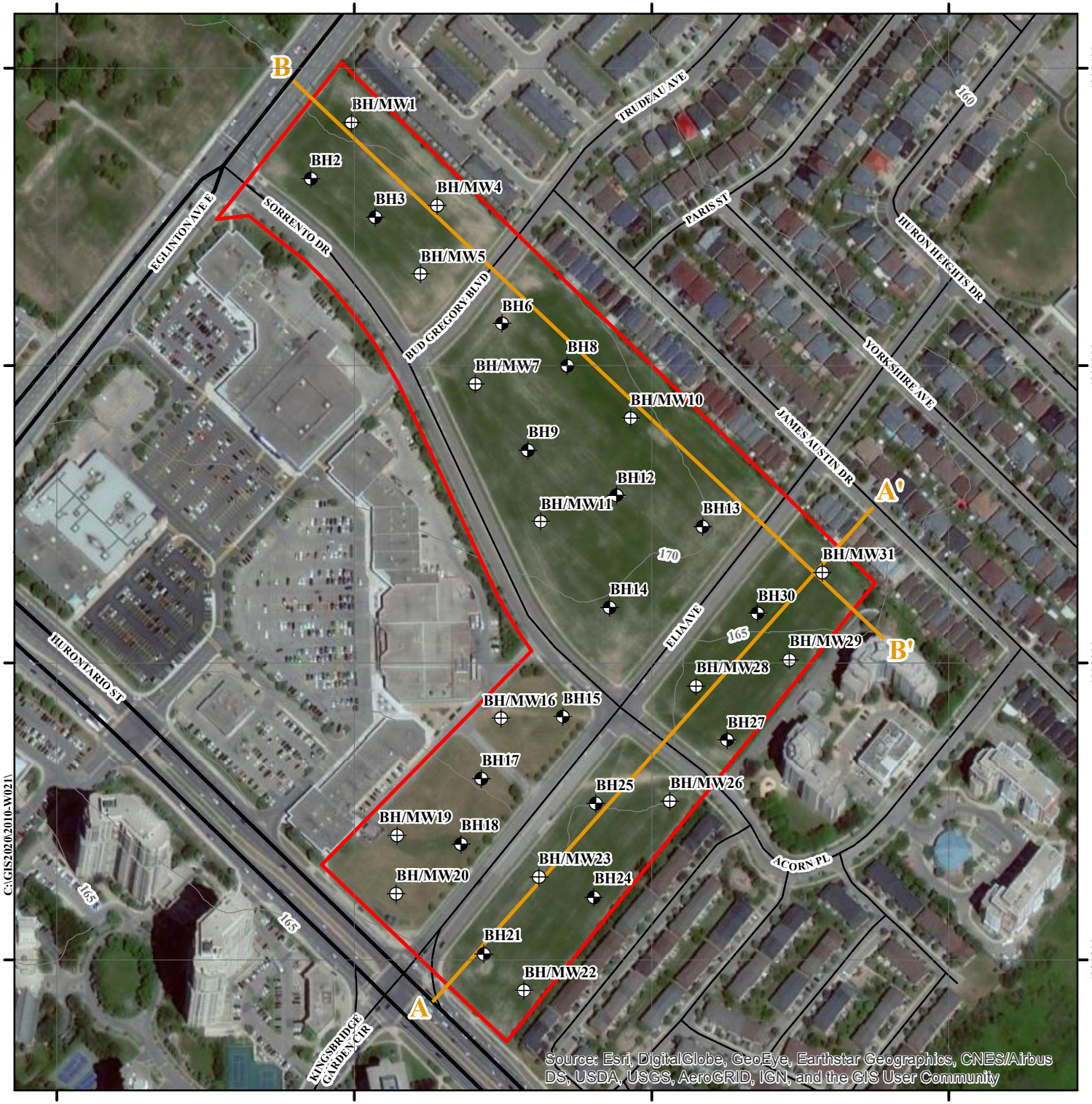
Metres

Drawing No. 7



N

Approximate Boundary of Subject Site

Borehole

Borehole with Monitoring Well

Major Road

Local Road

A A' Cross-Section Direction

100 Topographic Contour (masl)

Soil Engineers Ltd.

Title: Cross-Section Key Plan

Project:

Hydrogeological Assessment
Proposed Mixed-Use Development
with 2 to 5 Level Underground Parking
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and
Eglinton Avenue East, City of Mississauga

Reference No. 2010-W021

Date: November 26, 2020

Scale:

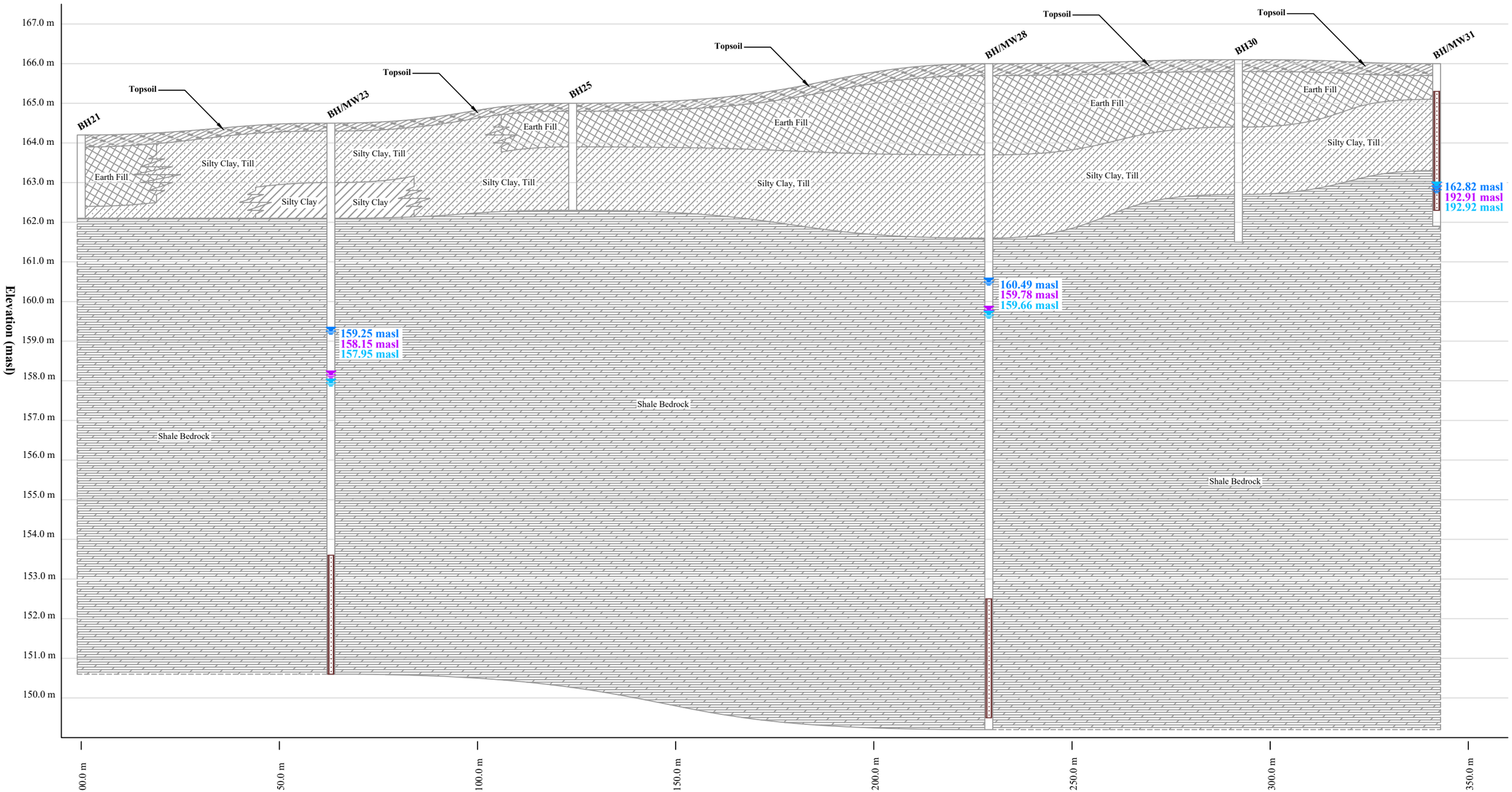
0 25 50 100 150 200

Metres

Drawing No. 8-1

Southwest
A

Northeast
A'



Section A-A'

Topsoil
Earth Fill
Shale Bedrock
Silty Clay
Silty Clay, Till
3.0 m Screen

Water Table on November 17, 2020
Water Table on December 1, 2020
Water Table on December 10, 2020

C:Projects/2019 Jobs/1903--W079

Soil Engineers Ltd.
CONSULTING SOIL, FOUNDATION & ENVIRONMENTAL ENGINEERS

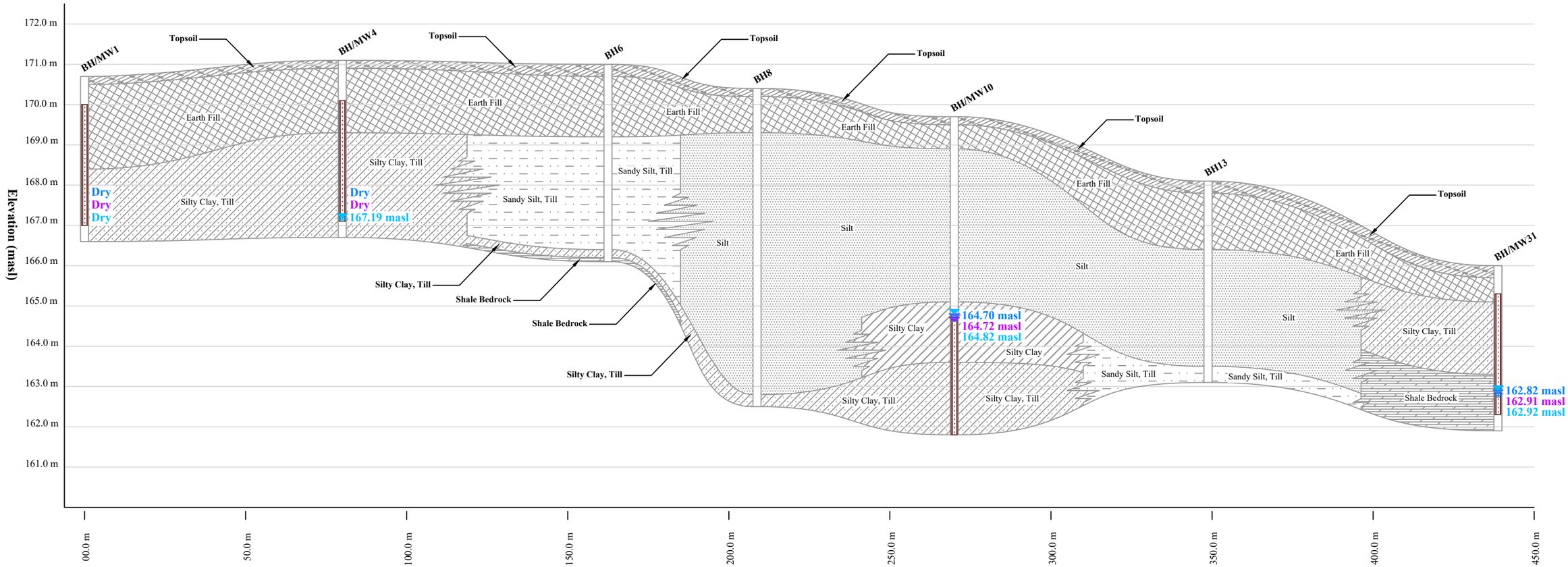
Title: Geological Cross-Section (A-A')

Project: Hydrogeological Assessment
Proposed Mixed-Use Development with 2 to 5 Level Underground Parking
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East, City of Mississauga

Reference No:	Date:	Scale: V	Scale: H	Drawing No.
2010-W021	December, 2020	1:100	1:3750	8-2

Northwest
B

Southeast
B'



Section A-A'

Topsoil
Earth Fill
Silt
Shale Bedrock
Silty Clay
Silty Clay, Till
Sandy Silt, Till
3.0 m Screen
Water Table on November 17, 2020
Water Table on December 1, 2020
Water Table on December 10, 2020

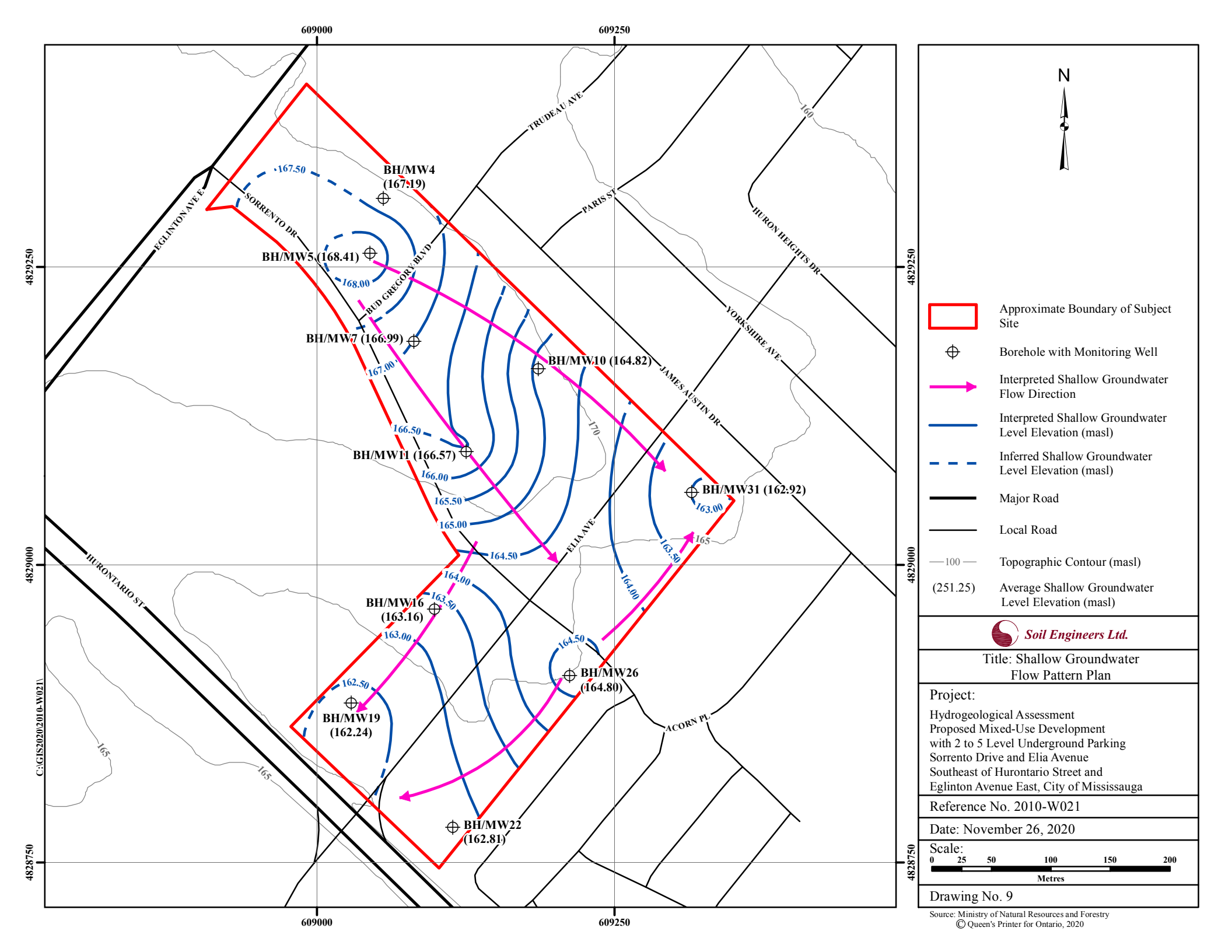
C:Projects/2019 Jobs/1903--W079

Soil Engineers Ltd.
CONSULTING SOIL, FOUNDATION & ENVIRONMENTAL ENGINEERS

Title: Geological Cross-Section (B-B')

Project: Hydrogeological Assessment
Proposed Mixed-Use Development with 2 to 5 Level Underground Parking
Sorrento Drive and Elia Avenue
Southeast of Hurontario Street and Eglinton Avenue East, City of Mississauga

Reference No:	Date:	Scale: V	Scale: H	Drawing No.
2010-W021	December, 2020	1:100	1:4800	8-3



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FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

APPENDIX 'A'

MECP WATER WELL RECORDS SUMMARY

REFERENCE NO. 2010-W021

Ontario Water Well Records

WELL ID	MECP WWR ID	Construction Method	Well Depth (m)**	Well Usage		Water Found (m)**	Static Water Level (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**
				Final Status	First Use				
1	7309131	-	-	-	-	-	-	-	-
2	7335457	Boring	15.54	Observation Wells	Monitoring	-	-	12.50	15.54
3	7198980	Boring	3.80	Observation Wells	Monitoring	2.00	-	1.80	3.80
4	7109518	Direct Push	3.35	Monitoring and Test Hole	Monitoring and Test Hole	-	-	1.83	3.35
5	7232886	-	4.00	Abandoned-Other	-	0.90	-	-	-
6	4908024	-	3.96	Abandoned-Other	Not Used	-	-	-	-
7	4902235	Cable Tool	29.87	Water Supply	Domestic	29.87	5.49	-	-
8	7282257	Boring	7.00	Observation Wells	Monitoring	3.00	-	1.90	3.40
9	7335455	Boring	6.10	Observation Wells	Monitoring	-	-	3.05	6.10
10	4902480	Cable Tool	19.81	Water Supply	Commercial	6.10	2.44	-	-
11	7281042	Boring	4.60	Observation Wells	Monitoring	-	-	1.60	4.60
12	7231802	Boring	6.10	Observation Wells	Monitoring	-	-	3.05	6.10
13	7337621	Other Method	3.96	Monitoring and Test Hole	Monitoring and Test Hole	-	-	0.91	3.96
14	7232612	-	-	-	-	-	-	-	-
15	7341311	Rotary (Convent.)	4.57	-	Monitoring and Test Hole	-	-	1.52	4.57
16	7341313	Rotary (Convent.)	7.62	-	Monitoring and Test Hole	-	-	4.57	7.62
17	7145448	Rotary (Convent.)	5.18	Abandoned-Other	Monitoring and Test Hole	-	-	-	-
18	7267349	Boring	4.80	Test Hole	Monitoring	-	-	1.10	4.10
19	7142196	Rotary (Convent.)	4.80	Monitoring and Test Hole	Monitoring and Test Hole	-	-	1.80	4.80
20	7296531	Direct Push	4.57	Monitoring and Test Hole	Test Hole	-	-	1.52	4.57
21	4902477	Cable Tool	59.74	Abandoned-Quality	Not Used	15.24	21.34	-	-
22	7222069	Rotary (Convent.)	10.37	Observation Wells	Monitoring	-	-	7.62	10.37
23	7296530	Direct Push	4.42	Monitoring and Test Hole	Test Hole	-	-	1.37	4.42
24	7145446	Rotary (Convent.)	4.57	Abandoned-Other	Monitoring and Test Hole	-	-	-	-
25	7310460	Boring	5.90	Observation Wells	Monitoring	-	-	2.90	5.90
26	7149412	Driving	3.00	Observation Wells	Monitoring	-	-	-	-
27	7281040	Boring	6.10	Observation Wells	Monitoring	-	-	1.50	4.50
28	7337626	Direct Push	3.35	Monitoring and Test Hole	Monitoring and Test Hole	-	-	2.44	3.35
29	7211314	-	-	-	-	-	-	-	-
30	7335456	Boring	18.59	Observation Wells	Monitoring	-	-	15.54	18.59
31	7142197	Rotary (Convent.)	4.50	Monitoring and Test Hole	Monitoring and Test Hole	-	-	1.50	4.50
32	7341310	Rotary (Convent.)	4.57	-	Monitoring and Test Hole	-	-	1.52	4.57
33	7145447	Rotary (Convent.)	5.79	Abandoned-Other	Monitoring and Test Hole	-	-	-	-
34	7317934	-	-	-	-	-	-	-	-
35	7116733	Rotary (Convent.)	3.96	Test Hole	Test Hole	-	-	7.62	3.96
36	7142198	Rotary (Convent.)	5.70	Monitoring and Test Hole	Monitoring and Test Hole	-	-	2.70	5.70

WELL ID	MECP WWR ID	Construction Method	Well Depth (m)**	Well Usage		Water Found (m)**	Static Water Level (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**
				Final Status	First Use				
37	7261922	Rotary (Convent.)	5.79	Monitoring and Test Hole	Monitoring and Test Hole	-	-	2.74	5.79
38	7337622	Direct Push	3.66	Monitoring and Test Hole	Monitoring and Test Hole	-	-	2.13	3.66
39	7198979	Boring	3.00	Observation Wells	Monitoring	1.60	-	1.50	3.00
40	7337624	Other Method	3.35	Monitoring and Test Hole	Monitoring and Test Hole	-	-	0.91	3.35
41	7341312	Rotary (Convent.)	6.10	-	Monitoring and Test Hole	-	-	3.05	6.10
42	7337623	Other Method	3.96	Monitoring and Test Hole	Monitoring and Test Hole	-	-	0.91	3.96
43	7335454	Boring	3.96	Observation Wells	Monitoring	-	-	0.91	3.96
44	7337625	Other Method	3.35	Monitoring and Test Hole	Monitoring and Test Hole	-	-	0.91	3.35
45	7145315	Rotary (Convent.)	3.35	Monitoring and Test Hole	Monitoring and Test Hole	-	-	1.37	3.35
46	7197447	Rotary (Convent.)	3.66	Monitoring and Test Hole	Monitoring and Test Hole	-	-	2.13	3.66
47	7341309	Rotary (Convent.)	7.01	-	Monitoring and Test Hole	-	-	5.49	7.01

*MECP WWID: Ministry of Environment, Conservation, and Parks Water Well Records Identification

**metres below ground surface

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FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

APPENDIX 'B'

SINGLE WELL RESPONSE TEST RESULTS

REFERENCE NO. 2010-W021

Falling Head Test (Slug Test)

Test Date:		1-Dec-20	
Piezometer/Well No.:		BH/MW 5	
Ground level:		171.50	m
Screen top level:		168.70	m
Screen bottom level:		165.70	m
Test El. (at midpoint of screen):		167.20	m
Test depth (at midpoint of screen):		4.3	m
Screen length	L=	3.0	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.168	m
Initial water depth		3.27	m
Aquifer material:		**Silty clay till**	

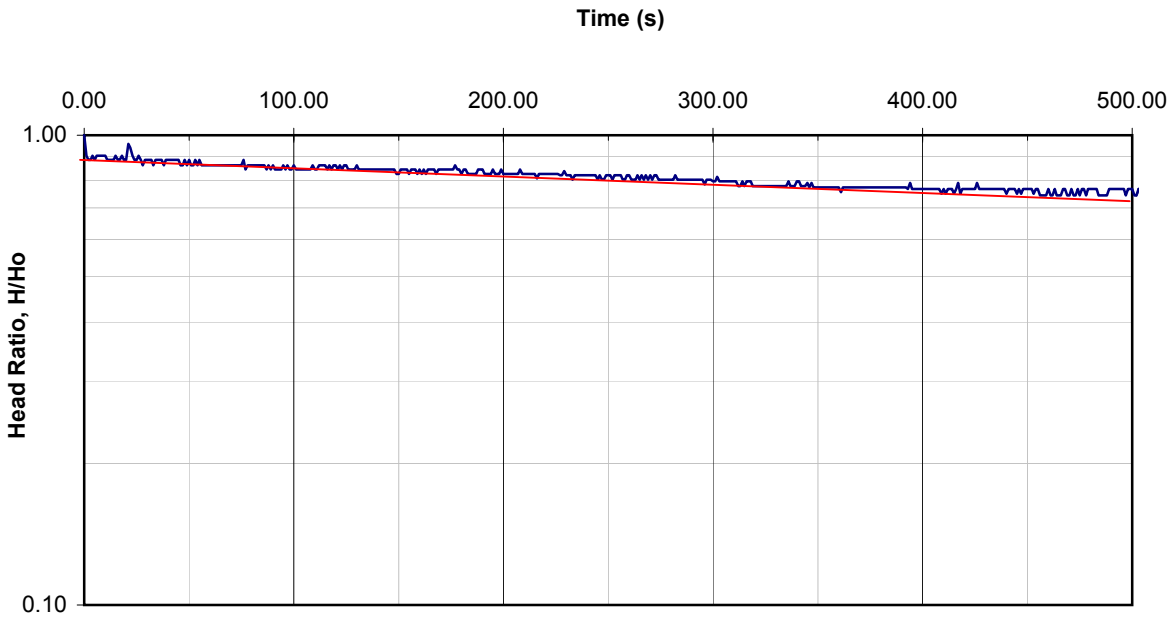
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.701815$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.001472302$

K= **5.1E-05** cm/s

5.1E-07 m/s



Falling Head Test (Slug Test)

Test Date:		1-Dec-20	
Piezometer/Well No.:		BH/MW 10	
Ground level:		169.66	m
Screen top level:		164.76	m
Screen bottom level:		161.76	m
Test El. (at midpoint of screen):		163.26	m
Test depth (at midpoint of screen):		6.4	m
Screen length	L=	3.0	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.20	m
Initial water depth		4.94	m
Aquifer material:		**Silty clay, Silty clay till**	

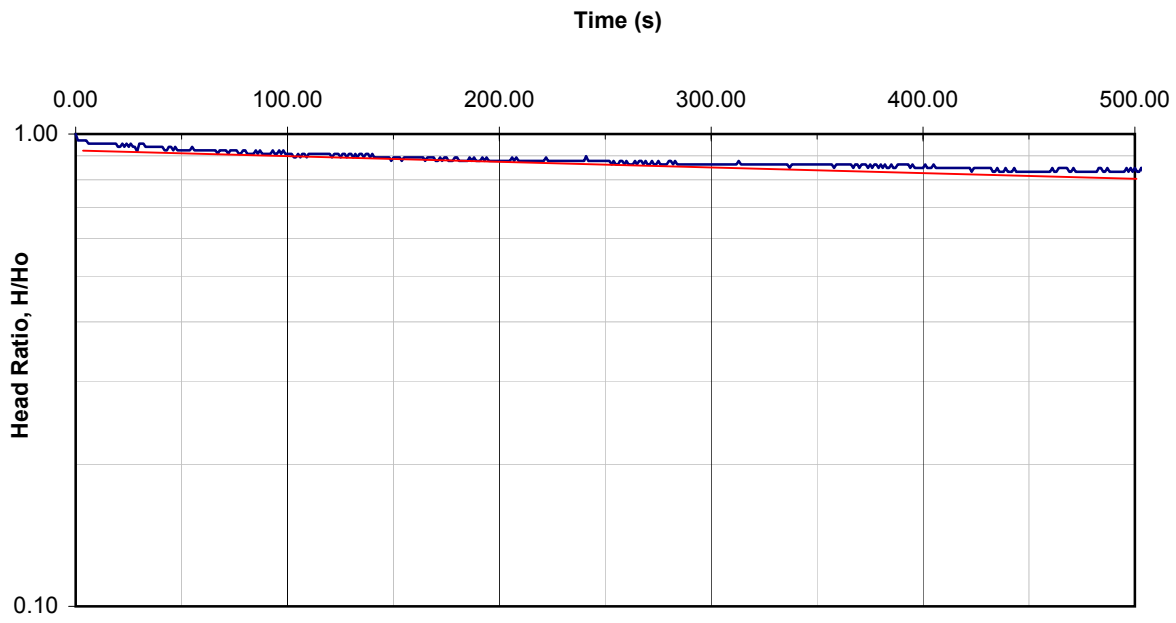
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.701815$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.000963311$

K= **3.3E-05** cm/s

3.3E-07 m/s



Falling Head Test (Slug Test)

Test Date:		1-Dec-20	
Piezometer/Well No.:		BH/MW 11	
Ground level:		168.12	m
Screen top level:		165.02	m
Screen bottom level:		162.02	m
Test El. (at midpoint of screen):		163.52	m
Test depth (at midpoint of screen):		4.6	m
Screen length	L=	3.0	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.174	m
Initial water depth		2.82	m
Aquifer material:		**Silt**	

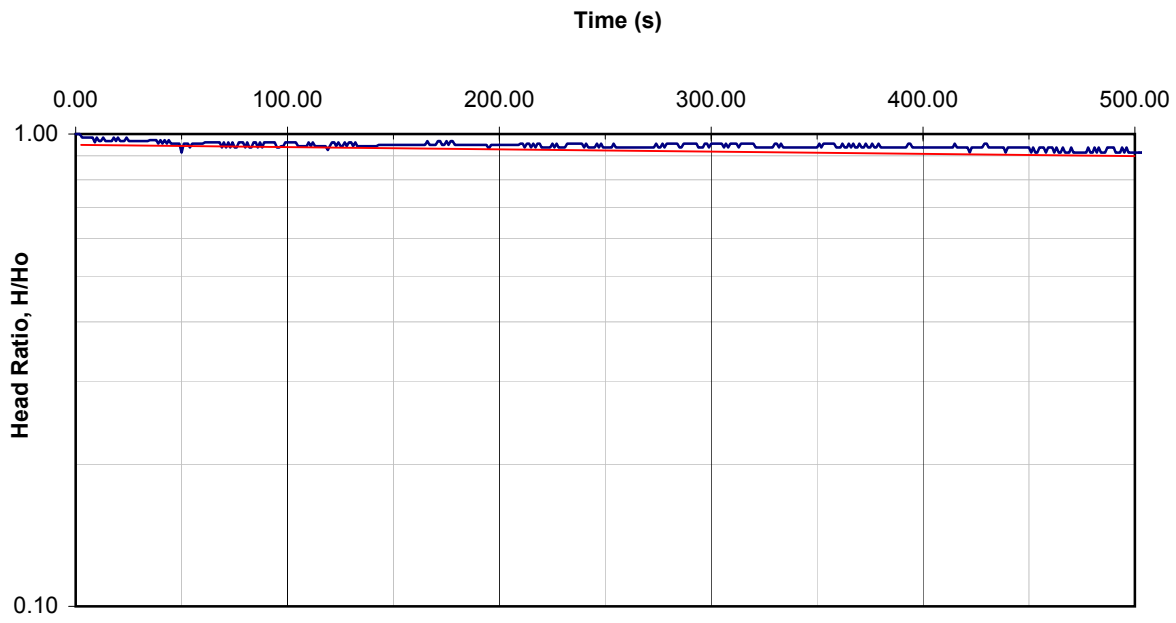
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.701815$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.000410615$

K= **1.4E-05** cm/s

1.4E-07 m/s



Falling Head Test (Slug Test)

Test Date:		1-Dec-20	
Piezometer/Well No.:		BH/MW 16	
Ground level:		165.96	m
Screen top level:		163.16	m
Screen bottom level:		161.66	m
Test El. (at midpoint of screen):		162.41	m
Test depth (at midpoint of screen):		3.55	m
Screen length	L=	1.5	m
Diameter of undisturbed portion (	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.131	m
Initial water depth		2.87	m
Aquifer material:		**Silty clay till**	

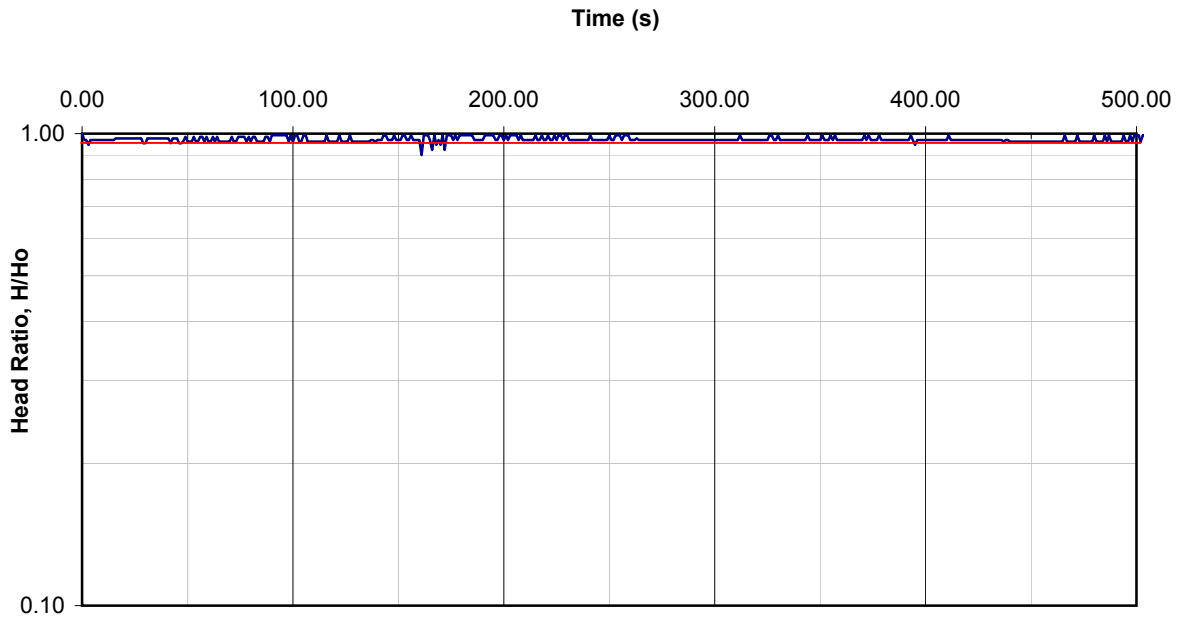
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 3.607239$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.000389154$

K= **2.1E-05** cm/s

2.1E-07 m/s



Falling Head Test (Slug Test)

Test Date:		1-Dec-20	
Piezometer/Well No.:		BH/MW 23	
Ground level:		164.52	m
Screen top level:		153.62	m
Screen bottom level:		150.62	m
Test El. (at midpoint of screen):		152.12	m
Test depth (at midpoint of screen):		12.4	m
Screen length	L=	3.0	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.44	m
Initial water depth		6.37	m
Aquifer material:		**Shale bedrock**	

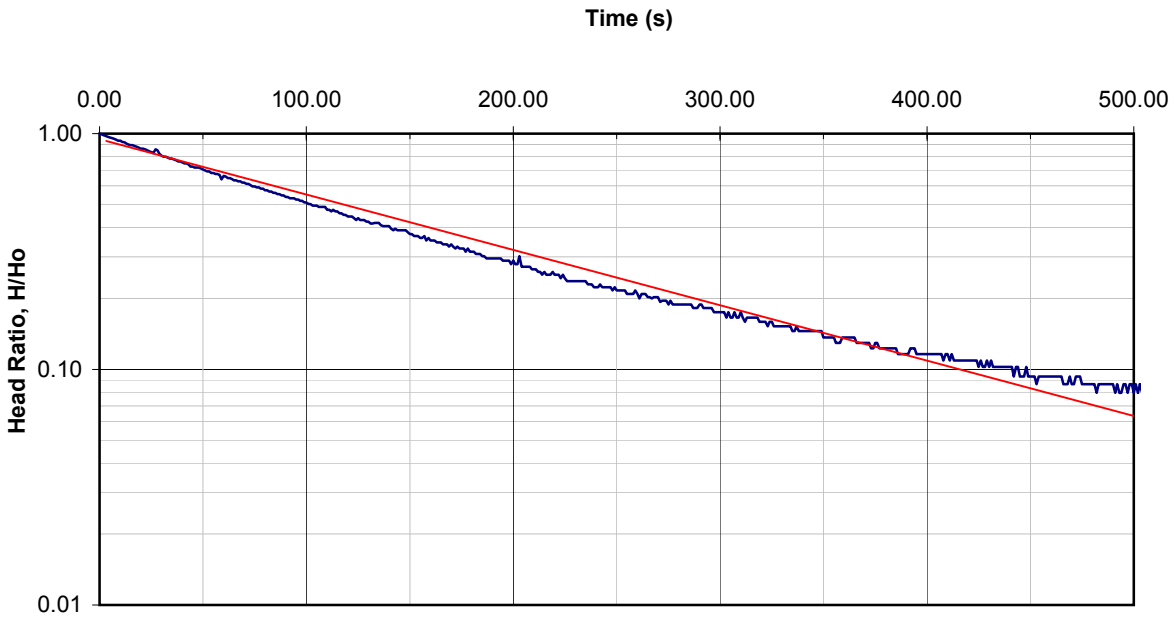
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.701815$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.006706743$

K= **2.3E-04** cm/s

2.3E-06 m/s



Falling Head Test (Slug Test)

Test Date:		1-Dec-20	
Piezometer/Well No.:		BH/MW 26	
Ground level:		165.21	m
Screen top level:		164.61	m
Screen bottom level:		163.11	m
Test El. (at midpoint of screen):		163.86	m
Test depth (at midpoint of screen):		1.35	m
Screen length	L=	1.5	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.039	m
Initial water depth		-0.01	m
Aquifer material:		**Earth fill, Silty clay till**	

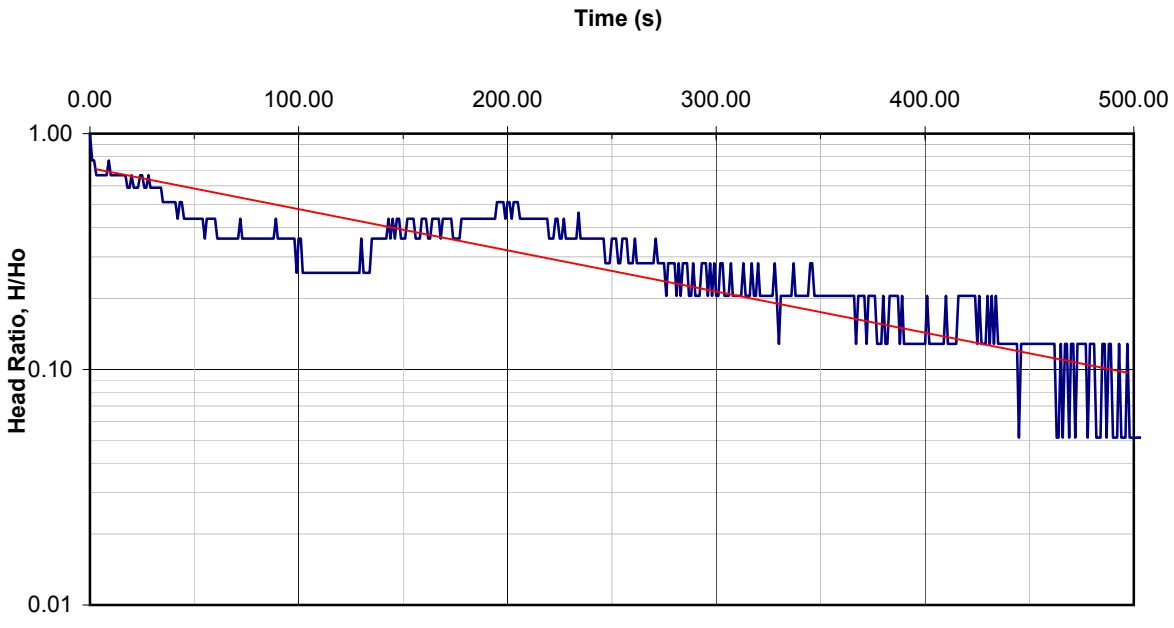
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 3.607239$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.010245043$

K= **5.6E-04** cm/s

5.6E-06 m/s



Falling Head Test (Slug Test)

Test Date:		1-Dec-20	
Piezometer/Well No.:		BH/MW 28	
Ground level:		165.98	m
Screen top level:		152.18	m
Screen bottom level:		149.18	m
Test El. (at midpoint of screen):		150.68	m
Test depth (at midpoint of screen):		15.3	m
Screen length	L=	3.0	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.359	m
Initial water depth		6.2	m
Aquifer material:		**Shale bedrock**	

Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.701815$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.002923354$

K= **1.0E-04** cm/s

1.0E-06 m/s