GOLDER
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REPORT

HYDROGEOLOGICAL INVESTIGATION

Proposed Residential Development
683 to 685 Warden Avenue, Toronto, Ontario

Submitted to:

Choice Properties Limited Partnership

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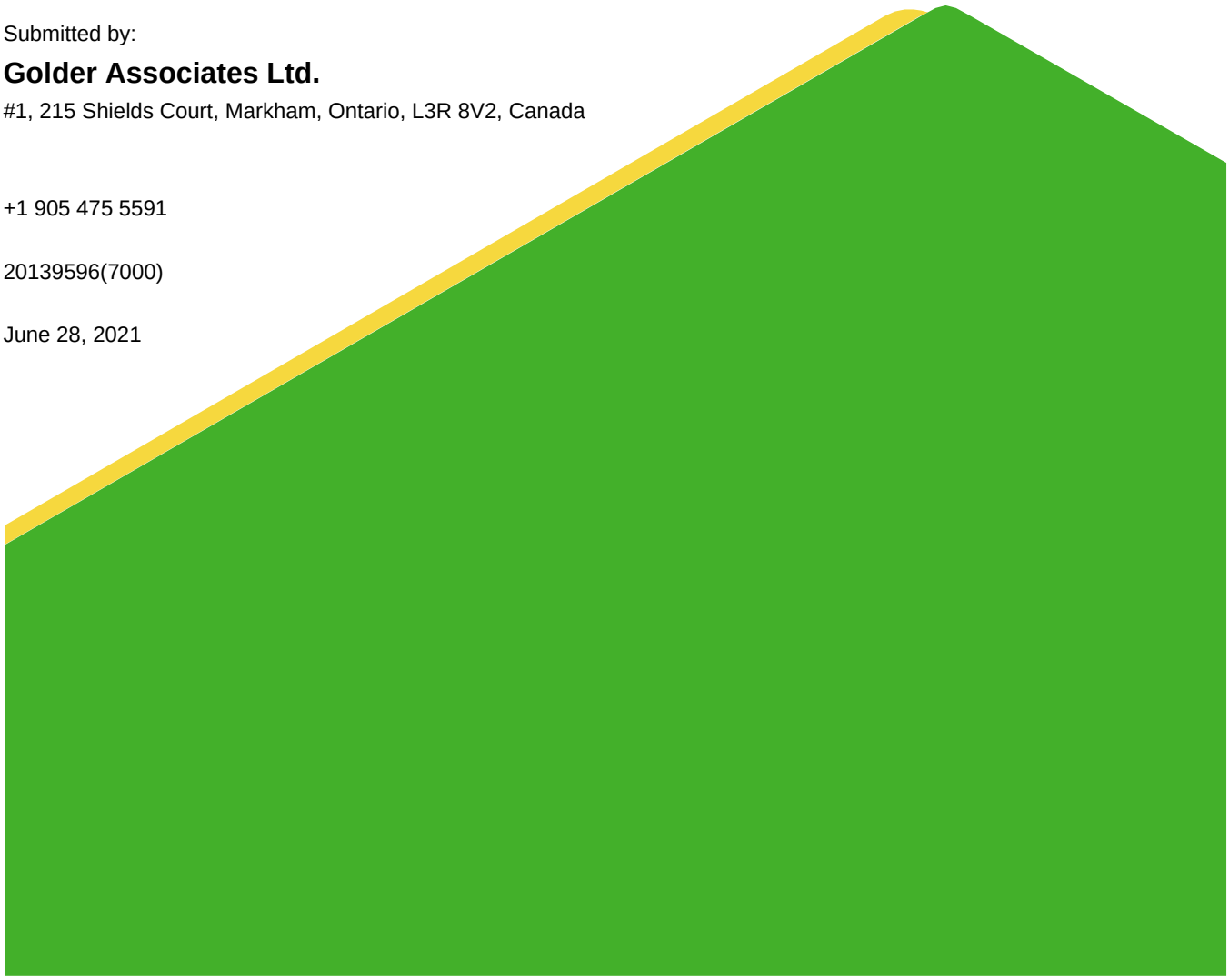

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by Choice Properties Limited Partnership ("Choice" or "Client") to carry out a hydrogeological assessment of temporary (construction dewatering) and long-term (building drainage system) groundwater control requirements for the proposed residential development at 683 to 685 Warden Avenue, Toronto, Ontario, M1R 2R3 (the Site). Water takings in excess of 50 cubic metres per day (m^3/day) are regulated by the Ontario Ministry of the Environment, Conservation and Parks (MECP). A Permit or Agreement is required from the City of Toronto (City) for temporary and long-term discharges to the municipal sewer system.

The purposes of the assessment are: i) to assess temporary and long-term groundwater taking rates based on current design details and existing subsurface investigation data, and ii) to sample and assess existing groundwater quality to evaluate potential groundwater discharge options to the sewer system. An assessment of potential impacts to groundwater receptors and existing structures as a result of dewatering is provided. A recommended monitoring program is also included. It is understood that this report will be used in support of development applications to the City. This report was prepared in consideration of the Hydrological Review terms of reference outlined by the City (revised August 2018), as well as the Ontario Water Resources Act, Ontario Regulation 387/04 and Toronto Municipal Code Chapter 681-Sewers.

This report should be read in conjunction with the *"Important Information and Limitations of This Report"* in Appendix A, which forms an integral part of this document. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report. The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, Golder should be given an opportunity to confirm that the recommendations in this report are still valid. It should be noted that this report addresses only the hydrogeological (physical) aspects of the subsurface conditions at the Site. The geotechnical (physical) aspects of the project are addressed by Golder under separate cover.

2.0 PROJECT DESCRIPTION AND AVAILABLE INFORMATION

The Site is approximately 26,300 m^2 in size and is located approximately 500 m south of St. Clair Avenue East on Warden Avenue in Toronto, Ontario. The site is bordered on the north and south by industrial buildings, on the east by a residential complex and to the west by Warden Avenue. The Site is currently vacant. The location of the Site is shown on Figure 1, attached. Aerial photographs indicate that the site was previously occupied by a single-storey commercial building which covered the majority of the site with parking along the east, south and west perimeters of the site. The former commercial building was reportedly demolished in 2009.

At the time of preparing this report, the preliminary drawings provided by Choice, dated April 14 and May 3, 2021 (Appendix B), indicate that the proposed residential development will consist of the following:

- Towers A and B, located in the east section of the site, which will each be 13-storey buildings connected by a 7-storey podium;
- Towers E and C, located in the northwestern section of the site, which will be 22 storeys and 36 storeys, respectively, connected by an 8-storey podium;
- Towers F and D, located in the southwestern section of the site, which will be 19 storeys and 33 storeys, respectively, connected by an 8-storey podium;

- It is anticipated that there will be a common underground parking structure extending to two levels below finished grade. The finished floor elevation (FFE) of the P2 parking level will range from approximately 139.5 m to 136.7 m, which will be approximately 7 m to 10 m below finished grade Elevation of 146.8 m. Footing bases and elevator shafts are anticipated to be about 1 m to 2 m below the finished basement floor..

Golder previously carried out a preliminary geotechnical investigation at the site in addition to Phase One and Two Environmental Site Assessments

3.0 INVESTIGATION OVERVIEW

3.1 Existing Reports

Following environmental subsurface investigation has been carried out at the Site:

- *"DRAFT – Geotechnical Exploration, Proposed High-Rise Development: 683-685 Warden Avenue, Toronto, ON",* project number 20139596, prepared by Golder Associates Limited, dated May 2021 (Golder, 2021);
- Geotechnical report prepared by Golder titled, "Preliminary *Geotechnical Investigation, Proposed Residential Development, 683 to 685 Warden Avenue, Scarborough, Ontario*," dated May 15, 2020, Report No. 20139596 (Golder, 2020a);
- Draft Phase One ESA titled, "*Phase One Environmental Site Assessment, 683 and 685 Warden Avenue, Toronto, Ontario*," dated April 2020, Report No. 20139596 (Golder, 2020b); and
- Phase Two ESA titled, "*Phase Two Environmental Site Assessment, 683 and 685 Warden Avenue, Toronto, Ontario*," dated April 20, 2020, Report No. 20139596 (Golder, 2020c).

3.2 Borehole & Monitoring Well Summary

The factual information in the above-referenced existing reports was reviewed and pertinent data was used in preparation of this report. The previous geotechnical field investigation for this site was carried out between March 9 and March 12, 2020, during which time seven boreholes (designated as BH20-1 to BH20-7) were advanced at the site. The boreholes for the investigation were drilled using a track-mounted CME 75 Auger and Mud Rotary drill rig supplied and operated by Landshark Drilling of Brantford, Ontario, subcontracted to Golder. An outline of the previous drilling program is presented below in Table 1. The boreholes were distributed within and adjacent to the proposed building footprints, and their approximate locations referenced to existing site features are shown on the Borehole Location Plan – Figure 2. Six boreholes (BH20-1 to BH20-6) were equipped with 50-mm diameter monitoring wells to allow for further monitoring of groundwater levels.

The combined hydrogeological and geotechnical field investigation for this current assignment was carried out from April 28 to May 4, 2021, during which time four boreholes (designated as BH21-1 to BH21-4) were advanced to depths ranging from about 20.3 to 24.8 m below ground surface. 50-mm diameter monitoring wells were installed in two boreholes in the current investigation (see Table 1, below) following the completion of drilling to allow for subsequent groundwater measurements and hydrogeological testing. The boreholes for the investigation were drilled using a standard track-mounted CME75 drill rig supplied and operated by 3D Drilling Inc. of Whitchurch-Stouffville, Ontario, subcontracted to Golder. The well installation details and groundwater level readings are presented on the Record of Borehole sheets in Appendix C.

The geodetic ground surface elevations at the borehole locations were taken from a survey plan (Plan of Survey with Topography of Part of Lot 32 Concession B, City of Toronto) prepared by Speight, Van Nostrand & Gibson

Ltd., Ontario Land Surveyors, dated December 19, 2005. A member of Golder's technical staff was also present on site on March 23, 2020 and May 18, 2021 to measure the elevations at the borehole locations using a laser level based on temporary benchmarks obtained from the topographic plan provided and, as such, the ground surface elevations at the borehole locations should be considered to be approximate. The borehole locations were referenced to existing prominent site features and plotted on the plan provided in the preparation of Figure 2, Borehole Location Plan. As such, the borehole locations shown on Figure 2 should also be considered to be approximate.

The field work for this investigation was monitored by a member of our field staff, who arranged for the clearance of underground services, observed the drilling and logged the boreholes. The soil samples obtained during this investigation were identified in the field, placed in appropriate containers, labelled and transported to our Whitby laboratory for further examination and selective classification testing (natural water content and grain size distribution).

In general, the subsurface conditions encountered in the boreholes consisted of fill overlying compact to very dense non-cohesive till and stiff to hard cohesive till. These glacial tills were underlain by strata of dense to very dense silty sand and silt to sandy silt.

A table summarizing the stratigraphy at the Site is presented in Section 5.4. The monitoring well construction details are summarized below in Table 1.

Table 1: Monitoring Well Construction Details

Monitoring Well ID	Study	Ground Surface Elevation (masl)	Screen Elevation (masl)	Unit Screened	Date Installed
BH20-1	(Golder, 2020)	147.02	131.78 – 134.83	(ML) sandy SILT	March 10, 2020
BH20-2	(Golder, 2020)	146.36	138.74 – 141.79	(CL) SILTY CLAY TILL/(ML) sandy SILT TILL	March 11, 2020
BH20-3	(Golder, 2020)	146.79	139.17 – 142.22	(SM/ML) SILTY SAND to sandy SILT TILL/(CL-ML) SILTY CLAY to CLAYEY SILT TILL	March 11, 2020
BH20-4	(Golder, 2020)	146.00	130.20 – 133.80	(ML) SILT to sandy SILT	March 9, 2020
BH20-5	(Golder, 2020)	145.80	129.95 – 133.61	(SM/ML) SILTY SAND to sandy SILT	March 12, 2020
BH20-6	(Golder, 2020)	146.70	139.08 – 142.13	(CL-ML) sandy SILTY CLAY to CLAYEY SILT TILL	March 9, 2020
BH21-1	(Golder, 2021)	146.77	125.47 – 122.37	(ML) SILT	April 30/ May 3, 2021
BH21-4	(Golder, 2021)	146.19	132.49 – 135.49	(SM/ML) SILTY SAND to sandy SILT	May 3/ May 4, 2021

Notes:
masl = metres above sea level

4.0 DESKTOP ASSESSMENT

The following description of the hydrogeological setting of the Site is based on published information sources and a review of Site-specific data collected as part of the above-referenced subsurface investigations.

4.1 Topography and Drainage

Based on available topographic mapping (Plan of Survey with Topography of Part of Lot 32 Concession B, City of Toronto, dated December 19, 2005) the Site area is relatively flat with a gentle slope downwards from the northwestern corner to the southeastern corner with approximate change in elevations of 1.2 metres (m). The Site grades range from 146.7 metres above sea level (masl) in the northwestern portion of the Site to 145.4 masl in the southeastern portion of the Site. Taylor-Massey Creek is located approximately 190 m west of the Site. Lake Ontario is located approximately 2.6 km south of the site. It is anticipated that Site runoff is directed to the City storm sewer system. The inferred direction of groundwater flow is to the southwest, towards Massey Creek and downgradient towards Lake Ontario.

4.2 Geological Mapping

The surficial geology aspects of the general site area were reviewed from the following publications:

- Chapman, L.J., and Putnam, D.F., 2007, *"The Physiography of Southern Ontario"*; 4th Edition, Ontario Geological Survey; and
- Sharpe, D.R., 1980. Quaternary Geology of Toronto and Surrounding Area; Ontario Geological Survey Preliminary Map P. 2204, Geological Series. Scale 1:100,000.

Physiographic mapping in the area according to the above-noted reference indicates that the Site lies within the physiographic region of southern Ontario known as the South Slope. The South Slope region slopes gradually downward towards Lake Ontario. The overburden immediately below ground surface within the South Slope generally consists of clayey silt till and silty clay till and at depth consists of alternating deposits of dense lacustrine sands and silts and consolidated lacustrine clays and clay tills overlying the bedrock.

The surficial geology mapping indicates that the Site lies within a region consisting of stone poor, sandy silt to silty sand and clay-textured till deposits of Paleozoic terrain.

The subsurface conditions encountered during the investigation are generally consistent with the physiographic and surficial geological mapping.

4.3 Groundwater Use

Municipally supplied potable water is expected in this portion of the urban core of Toronto. Nevertheless, water well records in the vicinity of the Site were obtained from the MECP to assess potential groundwater use. Approximately 24 water well records were reported within 500 m of the Site, and their locations are shown on Figure 4. Little or no information was provided on six of the records, which are not discussed further. The remaining 18 wells were constructed between 2004 and 2017, and consisted of the following:

- records of well abandonment and not used (6); and
- test holes, observation wells or wells used for monitoring purposes (12).

No water supply wells were identified within 500 m of the Site. A table summarizing the water well records is provided in Appendix D.

4.4 Potential Contaminant Sources

The Phase One Environmental Site Assessment (ESA) completed at 683-685 Warden Avenue (Golder, 2021) identified 16 Areas of Potential Environmental Concern (APECs). The Phase One ESA recommended that a Phase Two ESA be conducted at the property to address the APECs. A summary of the APECs reported in the concurrent Phase Two ESA (Golder, 2021) is provided below:

APEC A1 – Fill Material

Fill was reported to be present at the Site up to a maximum depth of 5.5 m below grade. In addition, stockpiles of material are noted at ground surface. The constituents of concern (COCs) associated with this APEC were identified to include petroleum hydrocarbons (PHCs), polycyclic aromatic hydrocarbons (PAHs), metals, hydride metals and oxidation reduction potential (ORP) with the potential for soil and groundwater impacts. The investigation of this APEC included the collection and analysis of soil and groundwater samples (BH20-1 to BH20-7) for the identified COCs. The reported concentrations were below the applicable Site condition standards.

APEC A2 and A3– Previously identified soil exceedance of anthracene and benzo(a)pyrene

According to a previous Phase One ESA executed by others, anthracene and benzo(a)pyrene exceedances were identified in soil samples collected at the Site, although the location of this exceedance was not provided by the historical reports. The COCs associated with these APECs were identified to include PAHs with the potential for soil and groundwater impacts. The investigation of these APECs included the collection and analysis of soil and groundwater samples (BH20-1 to BH20-7) for the identified COCs. The reported concentrations were below the applicable Site condition standards.

APEC B1 to B7 – Historical Industrial Operations

Based on the Phase One ESA, the following are known about these APECs:

- The Site was historically operated as an industrial facility for the manufacturing of metal sash windows between 1955 and the early 1970s. The former industrial activities included painting activities and storage. This included spray painting and powder-coat paint applications. The Site was also historically operated as a glass manufacturing facility between the late 1970s and the 1980s, then operated as a transformer manufacturing facility during the 1970s and operated as a mattress manufacturing facility between the 1990s and 2009. An oil-water interceptor was historically located within the former industrial building and a concrete box filled with impacted soil was previously identified within the former building.

The COCs associated with these APECs were identified to include VOCs, PHCs F1-F4, BTEX, PAHs, PCBs, metals hydride metals and ORP with the potential for soil and groundwater impacts. The investigation of these APECs included the collection and analysis of soil (BH20-3, BH20-6 and BH20-7) and groundwater samples (BH20-3 and BH20-6) for the identified COCs. The reported concentrations for the tested COCs were below the applicable Site condition standards.

APEC C - Former Pad-Mounted Transformer

Based on the Phase One ESA, the following is known about the former pad-mounted transformer APEC:

- A former pad-mounted transformer had been located at the northwest portion of the former Site building; the transformer had been removed at the time the building was demolished. No reports were indicated to be available regarding the disposal of the transformer nor the dielectric oil.

The COC associated with this APEC was identified to include PCBs with the potential for soil impacts. The investigation of this APEC included the collection and analysis of soil a sample (BH20-6) for the identified COC. The reported concentrations were below the applicable Site condition standards.

APEC D - Former Fuel Oil Underground Storage Tank (UST)

Based on the Phase One ESA, the following is known about the former fuel oil UST:

- According to previous Phase One report executed by others and an OPTA Enviroscan report, a fuel oil UST had been located at the northwest portion of the facade of the former Site building at two different positions and had been removed at the time the building was demolished. No reports were indicated to be available regarding the removal of the UST. The UST was not identified or investigated as part of any of the previous Site investigations and no further information was available.

The COCs associated with this APEC were identified to include PAHs, PHCs F1-F4 and BTEX with the potential for soil and groundwater impacts. The investigation of this APEC included the collection and analysis of soil and groundwater samples (BH20-1) for the identified COCs. The reported concentrations were below the applicable Site condition standards.

APEC D - Former Rail Spur

Based on the Phase One ESA, the following are known about this APEC:

- According to previous Phase One report executed by others and an ERIS report, a railway spur was previously located north of the building, entering from the east. The spur was removed at some point between 1975 and 1985.

The COCs associated with this APEC were identified to include PHCs, PAHs, metals, hydride metals and ORP with the potential for soil and groundwater impacts. The investigation of this APEC included the collection and analysis of soil and groundwater (BH20-4) for the identified COCs. The concentrations of the tested COCs were below the applicable Site condition standards.

APEC F1 to F3 – Off-Site Potentially Contaminating Activities

The footprint of APEC F occupies the northern portion of the Phase Two Property, due to potential groundwater migration from PCAs located currently or historically to the north of the Phase Two Property. Two boreholes and one monitoring well were installed to investigate this APEC including BH20-6 and BH20-7.

The COCs associated with these APECs were identified to include one or all of the following PHCs, PAHs, BTEX, VOCs, metals, hydride metals and ORP with the potential for soil and groundwater impacts. The investigation of these APECs included the collection and analysis of soil and groundwater (BH20-6 and BH20-7) for the identified COCs. The concentrations of the tested COCs were below the applicable Site condition standards.

5.0 INVESTIGATION PROCEDURES AND RESULTS

5.1 Groundwater Level Measurements

The available groundwater depth and elevation data measured on two events in the existing and accessible monitoring well locations by Golder on May 12 and May 28, 2021, are provided in Table E-1 (Appendix E). The groundwater elevations in Table E-1 and discussed below represent the conditions on the dates they were measured, and seasonal and annual fluctuations should be anticipated.

The bases of the eight existing groundwater monitoring well screens were installed at elevations ranging from approximately 122.37 to 132.49 m (depths of 7.62 to 24.40 m bgs). Groundwater levels measured in the monitoring wells at two events on May 12 and May 28, 2021 ranged in depth from about 1.09 to 7.67 m bgs (approximate Elevations ranging from 139.08 m asl to 145.61 m asl). The groundwater elevation data on May 28, 2020 are shown on Figure 3, Cross Section A - A'. Groundwater was inferred to flow in a predominantly southerly direction towards Lake Ontario.

Seasonal fluctuation in water levels on the Site should be expected. Given the limited number of monitoring events, seasonal trends could not be identified; however, shallow groundwater levels are typically highest following the spring recharge and decline throughout the summer and fall months into the winter.

5.2 Hydraulic Testing

To estimate the hydraulic conductivity of the soils adjacent to the screened intervals in monitoring wells BH20-1, BH20-4, BH20-5, BH21-1 and BH21-4, single-well response tests were carried out by Golder on May 12, 2021. The tests were carried out by rapidly purging a known volume of water with a dedicated Waterra tube and footvalve and monitoring the subsequent water level recovery.

The Hvorslev (1951) method was applied to rising head test data using the unconfined solution. The data were analyzed using the AQTESOLV for Windows version 4.50 Professional software. The estimated hydraulic conductivity values obtained from the rising head tests are summarized in Table 2 below. A summary of the single-well response test data and the AQTESOLV printouts are provided in Appendix E.

Table 2: Single-Well Response Test Summary

Monitoring Well ID	Screened Interval (masl)	Groundwater Condition	Screened Unit	Est. Hydraulic Conductivity (m/s)
BH20-1	131.78 – 134.83	Unconfined	(ML) sandy SILT	3×10^{-7}
BH20-4	130.20 – 133.80	Unconfined	(ML) SILT to sandy SILT	2×10^{-7}
BH20-5	129.95 – 133.61	Unconfined	(SM/ML) SILTY SAND to sandy SILT	3×10^{-7}
BH21-1	122.37 – 125.47	Unconfined	(ML) SILT	1×10^{-7}
BH21-4	132.49 – 135.49	Unconfined	(SM/ML) SILTY SAND to sandy SILT	3×10^{-7}

Notes:
masl = metres above sea level
m/s = metres per second

The estimated hydraulic conductivity values were considered to be reasonable for the units tested based on grain size characteristics.

5.3 Groundwater Quality

Groundwater samples were collected from monitoring well BH20-6 on May 28, 2021, which is screened within clayey silt deposit. The samples were collected using a peristaltic pump, low flow sampling techniques, and generally accepted environmental engineering protocols, and stored on ice in coolers until delivered, under chain-of-custody documentation, to AGAT Laboratories of Mississauga, Ontario for analysis.

The samples were analyzed for the list of parameters included in the Toronto Municipal Code Chapter 681, Sewers, Table 1 – *Limits for Sanitary and Combined Sewers Discharge,* and Table 2 – *Limits for Storm Sewer Discharge* ("City Sewer Use By-Law"), which include various metals, inorganic and general chemistry parameters, oil and grease, nutrients, biochemical oxygen demand (BOD), Escherichia coli (E. coli.), volatile organic compounds (VOCs), pesticides, total polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and nonylphenols and nonylphenols ethoxylates.

Groundwater sampled from a monitoring well can be higher in suspended sediment than would be present in the discharge from a developed dewatering array, especially if pre-treatment of the pumped groundwater for sediment removal is also implemented. Additional field-filtered groundwater samples using a 0.45-µm filter were collected from BH20-6 on May 28, 2021 and analyzed for metals, total phosphorus and total suspended solids (TSS) to determine if any exceedances were associated with the dissolved or suspended fraction of the sampled water, and to evaluate discharge options. As such, the samples collected are expected to reflect the water quality range of the dewatering discharge from the unconfined aquifer.

Comparison of the analytical data to the City Sewer Use By-Law is provided in Tables F-1 and F-2. The laboratory analytical reports are included in Appendix F.

Both filtered and unfiltered groundwater samples collected from monitoring well BH20-6 on May 28, 2021 met the Table 1 – *Limits for Sanitary and Combined Sewers Discharge* for all parameters tested.

As shown in Table F-1, elevated TSS in the groundwater samples collected from BH20-6 on May 28, 2021, resulted in interference and exceedances of the Table 2 – *Limits for Storm Sewer Discharge* for manganese and TSS. This is interpreted to be the result of the dissolution of suspended sediment during unfiltered sample

acidification, and does not represent the actual dissolved concentrations of manganese in groundwater. The following table summarizes the exceedances of the Table 2 – *Limits for Storm Sewer Discharge*.

Table 3: Summary of Groundwater Quality Exceedances

Parameter	Units	Discharge Limits Table 1	Discharge Limits Table 2	BH20-6 (Unfiltered)	BH20-6 (Filtered)
Total Manganese	mg/L	5	0.05	**0.15**	**0.17**
Total Suspended Solids	mg/L	350	15	**21**	<10
Field Turbidity	NTU	-	-	26.8	-

Notes:
Bold font values exceed the City of Toronto, Table 2: Limits for Storm Sewer Discharge.
Table 1: Sanitary and Combined Sewers
Table 2: Storm Sewer
"-" = Not Applicable

As summarized in Table 3, the concentration of manganese and TSS exceeded the Table 2 – *Limits for Storm Sewer Discharge* in filtered groundwater quality samples taken from BH20-6. It is noted that manganese concentration in the BH20-6 sample is not affected by filtration. The results are interpreted to indicate that when the TSS in the discharge is less than 10 mg/L or less, the water quality should meet the Table 2 – *Limits for Storm Sewer Discharge* with the potential exception of manganese.

5.4 Hydrogeological Summary and Conceptual Site Model

For the purpose of estimating dewatering rates, the subsurface information obtained during the various investigations by Golder and others was reviewed to develop a conceptual model of the stratigraphic units that are present. The reported elevations of the contact between the units is summarized in the following Table 4 and were used to approximate the thickness of the units.

Table 4: Conceptual Model Summary

Average Elevation (masl)	Thickness (m)	Hydraulic Conductivity (m/sec)	Description	
143.6 – 146.8	3.2	Not Assessed	"Fill"	Underlying the topsoil, the Site is underlain by sandy silt to sandy silty clay and gravel fill materials. In BH20-6, the Fill extended to a depth of about 4.1 m bgs.
132.1 – 145.0	12.9	Not Assessed	"Silty Sand to Sandy Silt TILL Unit"	The fill is underlain by non-cohesive silty sand to sandy silt deposits. The units are grouped together for the purpose of the conceptual model. The unit is considered to be partially saturated and under unconfined condition.

Average Elevation (masl)	Thickness (m)	Hydraulic Conductivity (m/sec)	Description	
137.0 – 146.1	9.1	Not Assessed	"Silty Clay to Clayey Silt TILL Unit"	The cohesive silty clay soil Glacial Till deposits were encountered in between the non-cohesive Silt Unit. The unit is considered to be partially saturated and under unconfined condition.
121.9 – 139.1	>17.2 *(thickness not fully assessed)	1×10^{-7} to 3×10^{-7}	"Silt to Sandy Silt Unit"	Underlying the Glacial Till deposits, the Site is underlain by silt to sandy silt deposits. The silt to sandy silt unit extended to the depth of exploration in all boreholes advanced by Golder. The unit is considered to be saturated and under unconfined condition. *The full thickness of the silt to sandy silt unit was not encountered within the depth of the investigation. For the purpose of this assessment, a thickness of 17 m was assigned.

The highest groundwater elevation measured in the Silty Clay Glacial Till Unit (i.e., perched water table condition) was at monitoring well BH 20-6 on May 12, 2021 at approximately 145.6 m asl. For the purpose of this assessment, the seasonal high groundwater elevation was assumed to be 0.5 m higher, or 146.1 m asl. The highest groundwater elevation measured in the Silty Unit (i.e., the inferred water table condition) was at monitoring well BH 21-4 on May 12, 2021 at approximately 142.2 m asl. For the purpose of this assessment, the seasonal high groundwater elevation in the Silty Unit was assumed to be 0.5 m higher, or 142.7 m asl. Refer to Table E-1 for a summary of all groundwater level measurements.

Based on the results of the single well response testing, the hydraulic conductivity of the Silt Unit is estimated to be in the range of 1×10^{-7} to 3×10^{-7} m/s.

Given the above hydraulic conductivity for the Silt Unit and a saturated thickness of 11.1 m, the Silt Unit was assigned a transmissivity (T = K b) of 0.39 m^2/day.

6.0 PROPOSED WATER TAKING PROGRAM

It is recommended that a licensed, specialist dewatering subcontractor supervise the installation, operation and decommissioning of all dewatering systems for this project, in accordance with applicable legislation. At this time, it is understood that no dewatering plan is available. For the purpose of evaluating dewatering rates and the zone of influence (ZOI), Golder has assumed that dewatering will be carried out as follows:

- The method of construction dewatering is to be solely determined by the Contractor based on their own independent assessment of the Site-specific conditions, and likely by their specialist dewatering contractor;
- The groundwater level will be controlled at no more than 2 m below the invert elevation of the excavation (i.e., 137.0 masl - 2 m = 135.0 masl);

- Surface water runoff will be directed away from any open excavation;
- Groundwater should be pumped in a manner to prevent loss of ground; and
- The dewatering system must be operated temporarily during construction until such time as the building underslab drainage system has been installed, approved and is functional.

6.1 Required Groundwater Level Lowering

To estimate the steady state dewatering rate for construction dewatering activities, the total required groundwater level lowering is summarized in Table 5, below. During construction, dewatering of the Silt Unit will be required.

Table 5: Summary of Required Groundwater Level Lowering

Dewatering	Representative Groundwater Elevation (masl)	Foundation / Underslab Drain Invert* (masl)	Min. Lowered Groundwater Elevation (masl)	Representative Drawdown (m)
Silt Unit (Construction Dewatering)	146.1	136.0	135.0	11.1
Silt Unit (Long-Term)	146.1	136.7	136.7	9.4

Note: * = base of excavation (foundation/underslab drain invert) assumed to be 2 m below the assumed finished floor elevation of 137.0 masl.

In the long-term, the invert of the building underslab drainage system is expected to be approximately 0.3 m below the finished floor elevation of 137.0 masl for the underground parking level. Groundwater levels in the long-term for the Silt Unit are expected to be controlled at that elevation (i.e., approximately 136.7 masl).

6.2 Dewatering Zone of Influence

The dewatering zone of influence (ZOI) represents the lateral extent of groundwater drawdown in response to dewatering. The dewatering ZOI is governed by the transmissivity of the hydrostratigraphic units and the depth of dewatering required. Applying the Theis analytical solution, the lateral extent of groundwater level drawdown can be estimated as follows:

$$s(r,t) = \frac{Q}{4\pi T} W\left(\frac{r^2 S}{4Tt}\right)$$

where $s(r,t)$ = drawdown at distance (r) and time (t) after the start of pumping
Q = pumping rate required to achieve desired drawdown at the source
T = aquifer transmissivity
S = aquifer storativity, and
W = Theis well function.

For the purpose of assessing the potential impacts of dewatering activities to the nearby natural environment and to local structures or services, it is conservatively estimated that seasonal fluctuations in groundwater levels are at least 0.5 m. Therefore, natural systems are expected to be able to tolerate at least a 0.5 m lowering in groundwater levels without an adverse effect. Therefore, the ZOI to a drawdown of 0.5 m is referred to herein as the “effective” ZOI.

Based on Theis analytical approach, the ZOI was estimated for the Silt Unit during construction dewatering (i.e., drawdown of 11.1 m), assuming a transmissivity of 0.39 m^2/day; aquifer storativity of 0.1; and 14 days for the dewatering system to reach steady-state. Accordingly, it is estimated that a drawdown of 0 m will occur at up to approximately 32 m from the dewatering source area. The effective ZOI was estimated to be approximately 15 m.

6.3 Water Taking Needs

To assess potential temporary dewatering rates for building construction, the steady state dewatering rate was estimated for an excavation 210 m long by 115 m wide, with a drawdown of 11.1 m in the Silt Unit. The modified Jacob's equation was applied using the aquifer parameters and conditions given above.

The steady-state dewatering rate from the Silt Unit was estimated by summing the line source flow along the excavation walls and the radial flow at the four corners of the excavation (each corner was estimated to be one quarter of radial flow from a well). The dewatering rate (Q) was estimated by the following equation for unconfined aquifer conditions:

$$Q = \left[\frac{\pi\, K\, \left(H^2 - {h_w}^2\right)}{\ln \frac{R_0}{r_w}}\right] + 1\, \left[\frac{x\, K\, \left(H^2 - {h_w}^2\right)}{2L}\right]$$

where:

Q = Dewatering rate (m^3/s)
K = hydraulic conductivity for Silt Unit (3 x 10^{-7} m/s)
H = initial groundwater level, from base of unit (16.11 m)
h_w = final groundwater level, from base of unit (5.0 m)
R_o = 2 L = ZOI + r_w = (32 m + 87.7 m = 119.7 m);
r_w = equivalent radius for underground parking footprint, (87.7 m)
x = perimeter of excavation (650 m)

Accordingly, the steady-state dewatering rate, with a factor of safety of 2.0 applied to account for the variability of subsurface conditions, is estimated to be 576 m^3/day, or less.

6.3.1 Dewatering Rates for Removal from Storage and Precipitation Events

For short periods of time, higher dewatering rates will be required to remove groundwater from storage, and to remove direct precipitation into the excavation. The volume of groundwater storage within the excavation that could be freely released from storage was estimated to be approximately 33,305 m^3, requiring an additional pumping rate of up to 2,379 m^3/day (based on removal over 14 days).

In addition, any incidental precipitation into the excavation will need to be handled with the groundwater. Assuming a 30-mm rain event occurred over the excavation area during the high dewatering rate period, an additional pumping rate of 725 m^3/day would be required.

6.3.2 Total Construction Dewatering Rate

The following table summarizes the above estimated temporary (short-term) construction dewatering rate. It is recommended that a factor of safety of 2.0 be applied to the steady-state dewatering rates used for permitting and design, to account for potential variability in the hydraulic conductivity of the subsurface units being dewatered.

Table 6: Summary of Total Construction Dewatering Capacity

Dewatering Source	Steady State Groundwater Inflow (Factor of Safety = 2.0) (m^3/day)	Removal of Storage (m^3/day)	Removal of 30 mm Precipitation Event (m^3/day)	Total Construction Dewatering Capacity (m^3/day)
Construction Dewatering	576	2,379	725	3,680

The sum of the factored steady state groundwater inflow rate, the initial removal of groundwater from storage and the management of incidental precipitation is estimated to result in a total construction dewatering rate of 3,679 m^3/day, which is greater than the 400 m^3/day threshold for which a short-term PTTW is required by the MECP. This finding should be reviewed upon the completion of detailed design and the development of construction methods and plans.

6.3.3 Total Long-Term Dewatering Rate

Applying the modified Jacob's equation and assuming a long-term lowering of 9.4 m in the Silt Unit, the long-term steady state dewatering rate from these units is estimated to be 527 m^3/day.

It is recommended that a factor of safety of 2.0 be applied to the total long-term dewatering rates used for permitting and design, to account for potential variability in the hydraulic conductivity of the subsurface units being dewatered. Based on the above, the following table summarizes the above estimated foundation/underslab drainage system (long-term) dewatering rate:

Table 7: Summary of Long-Term Dewatering Capacity

Dewatering Source	Steady State Groundwater Inflow (Factor of Safety = 2.0) (m^3/day)	Total Long-Term Dewatering Capacity (m^3/day)
Foundation / Underslab Drainage System	527	527

In the long-term, steady state groundwater inflow rates to the foundation/underslab drainage system are estimated to be in the order of 527 m^3/day. Therefore, a long-term PTTW for groundwater flow from the drainage system is anticipated to be required, however, long-term flow rates should be re-evaluated on the basis of construction dewatering data.

7.0 ASSESSMENT OF POTENTIAL EFFECTS OF WATER TAKING

The following section assesses the potential impacts of the proposed water taking program on local groundwater resources, natural heritage features, surface water resources and with respect to existing structures.

7.1 Mobilization of Contaminants

As discussed in Section 4.4, the Phase Two ESA at 683 and 685 Warden Avenue by Golder analyzed seven soil samples and six groundwater samples for Metals and ORP, PAHs, PHCs, VOCs and PCBs. The Phase Two ESA had not identified impacts in excess of the applicable Site condition standards (the Table 3 Standards). Therefore, no potential contaminant sources were identified in the vicinity of the Work Area. As summarized in Section 5.3; Table 3, the groundwater water quality results indicate that, excluding total manganese, no other contaminant exceedances were identified in groundwater samples above the applicable criteria. As such, no potential impacts from mobilization of contaminants are expected at the Site during dewatering. The quality of the groundwater pumped during construction dewatering should be monitored for indications of increasing parameter concentrations that could suggest the mobilization of contaminants. Given the above-stated potential contaminant sources, monitoring of the parameters included in the City Sewer Use By-Law should be adequate to screen for potential issues.

7.2 Groundwater Resources

The MECP Water Well Record database indicates that no active water supply wells were identified within 500 m of the Site. This is consistent with the expectation that this urban core area of Toronto is supplied with municipally-sourced potable water. As such, no potential impacts to private water supply wells are expected as a result of the proposed water taking activities.

7.3 Surface Water Resources / Natural Heritage Features

Based on available mapping, Taylor-Massey Creek is located approximately 190 m west of the Site and Lake Ontario is located approximately 2.6 km south of the site and are therefore outside of the maximum effective ZOI (i.e., 32 m in the Silt Unit). Given the effective ZOI (See Section 6.2), the water taking activities are not expected to impact local surface water resources.

7.4 Geotechnical Assessment

Section 6.0 discusses the lateral extent of the anticipated groundwater drawdown for the proposed excavation. It is anticipated that the dewatering will generally extend to about 1 m below the proposed foundation depths. As the construction methods and sequencing are not finalized, only preliminary and generalized comments on the potential dewatering impacts on structures can be made at this time. The conceptual stratigraphic model of the site consists of fill overlying both cohesive and non-cohesive glacial till deposits overlying silty sand to sandy silt deposits.

For the purpose of this assessment, the predicted zone of influence due to groundwater dewatering will depend on the depth of excavations, lateral extent (width) of the excavations, the nature of the excavation support (shoring) system used by the contractor and, most importantly, the depths and locations of the dewatering well points in relation to the relevant existing structures.

The settlements at various distances from the source of the dewatering are summarized below:

Table 8: Summary of Anticipated Settlement Due to Dewatering

Distance from Pumping Source (m)	Anticipated Drawdown (m)	Increase in Effective Stress (kPa)	Approximate Total Settlement (mm)
1	11	108	39
3	6	60	13
5	4	40	5
10	1.4	14	<1

The Site is bordered on the north and south by single storey commercial buildings, on the east by residential houses and on the west by Warden Avenue. The development drawings indicate that the proposed footprint of the development will be surrounded on the north, east and south sides by an 18.5-metre wide right-of-way (ROW).

Buildings and Structures

The proposed ROW will likely create a buffer of greater than 5 m between the pumping sources and the existing structures on the north, east and south sides of the Site.

Settlements induced by dewatering at a distance of 5 m from the pumping source is estimated to be at approximately 5 mm. As the structures will be more than 5 m beyond the pumping sources, the dewatering is not expected to have any adverse impacts on the structures. The zone of influence and dewatering impacts beyond the site boundaries can be further reduced by installing a shoring system that effectively cuts off the site from the groundwater regime so that dewatering is only required to remove aquifer storage within the building footprint. Once the locations of the pumping sources are determined and the shoring means and methods established, the impact of the dewatering should be re-evaluated.

Overall, for any structure that falls within 5 m from the pumping sources and/or is particularly sensitive to settlement due to age and/or condition, we recommend that condition surveys be carried out prior to, during, and following the construction activities. Monitoring of groundwater levels should be carried out throughout construction to evaluate the effectiveness of the dewatering/cut-off systems and to identify potential deficiencies.

Existing Subsurface Utilities, Utility Poles, Signs and Bus Stops

The existing subsurface utilities under Warden Avenue are anticipated to be about 5 m or more from the dewatering points. At a distance of about 5 m from the pumping source, the groundwater table will be lowered by about 4 m resulting in an increase in effective stress of about 40 kPa.

This temporary increase in effective stress is estimated to result in a settlement of approximately 5 mm which would not result in leaning of the utility poles and noticeable settlement / cracking of the sidewalks.

As mentioned above, the shoring system may be designed to reduce the effect of the dewatering on the utilities, if necessary, if the limits of the excavation are closer than 5 m from these structures.

The dewatering system must be designed in such a way as to avoid loss of soil particles, as a loss of soil particles could lead to settlements with magnitudes greater than the estimated settlements due to decreases in piezometric levels and the associated increase in the effective stresses.

8.0 DISCHARGE PLAN

If the pumped water from the construction dewatering system is discharged to the municipal sewer, a temporary sewer discharge permit from the City will be required. If the groundwater inflow to the foundation/underslab drainage system is discharged to the municipal sewer, a long-term sewer discharge permit from the City will be required. The proposed layout of the construction dewatering and discharge method should be determined by the Contractor, and likely by their specialist dewatering contractor. The following guidance is provided:

8.1 Discharge Criteria for Total Suspended Solids and Turbidity

The monitoring program (Section 9.0) describes the recommended procedures for monitoring the pre-treated dewatering discharge in terms of field turbidity measurements, as well as the collection of total suspended solids (TSS) samples for laboratory analysis. The City Sewer Use By-Law stipulates a TSS limit of 350 mg/L for discharged water to the sanitary sewer and a TSS limit of 15 mg/L for the storm sewer. It is expected that pre-treatment of the water pumped during construction dewatering to remove suspended sediment will be required prior to sewer discharge.

Based on the analytical results for TSS in the groundwater samples collected using a low-flow sampling technique (see Section 5.3), pre-treatment (e.g., filtration) to remove suspended sediment is not expected in the long-term for groundwater discharged to the sanitary sewer, but will likely be needed for groundwater discharged to the storm sewer.

8.2 Discharge Criterion for Temperature

The City Sewer Use By-Law states that the temperature of the discharge to the sanitary sewer can be no greater than 60 degrees Celsius and that the temperature of the discharge to the storm sewer can be no greater than 40 degrees Celsius. These temperatures are not considered a concern as the construction dewatering discharge is not expected to experience any significant heating other than that provided by the ambient air temperature and solar radiation and is not considered to be a concern in the long-term.

9.0 PROPOSED MONITORING, MITIGATION AND CONTINGENCY PLAN

The following section provides a recommended monitoring program for implementation during the operation of the temporary dewatering system. It is recommended that the data from the monitoring program be reviewed by the project hydrogeologist or engineer, and the program modified as appropriate.

9.1 Discharge Water Monitoring

The following temporary construction dewatering monitoring program should be undertaken:

i) to monitor the discharge rate;

ii) to confirm that the groundwater discharged from the dewatering system meets the City Sewer Use By-Law*;* and

iii) to respond to any changing conditions, such as discharge water quality non-compliance and spills.

The monitoring program, as outlined below, is not intended to supersede any monitoring requirements that the City may impose.

- The contractor shall provide measurement controls suitable to measure and record the daily volume of water discharged (e.g., totalizer) and flow rate (e.g., flow meter) to confirm that discharge rates remain below the maximum permitted discharge rate;
- Prior to release of the water from the settling/holding tank to the sanitary or storm sewer, a sample should be collected and compared to the City Sewer Use By-Law. If the sample meets the applicable discharge limits, the water may be discharged to the sewer; if the sample does not meet the applicable discharge limits, the water should be hauled off-Site for disposal;
- Prior to initiating the main dewatering activities at the Site, at least one water quality sample shall be collected of the untreated water quality and at least one water quality sample shall be collected immediately after the Contractor's selected pre-treatment system, and submitted for laboratory analysis to confirm compliance with the parameters in the City Sewer Use By-Law. Corresponding measurements for field turbidity, temperature and pH will be manually collected at the same locations at the time of sampling. A Qualified Professional (QP) must review the results of the water quality analyses immediately to decide whether further treatment is required. If no water quality concerns are identified, the monitoring program will include frequent visual assessments, turbidity, temperature and pH measurements and TSS sampling, with periodic more comprehensive sampling, to confirm compliance with the City Sewer Use By-Law discharge limits as detailed below;
- Storage tanks, or an equivalent measure, should be mobilized to the Site to temporarily contain the effluent generated at the commissioning of the system, pending the results of the initial effluent sampling event to determine whether additional treatment is in fact required;
- The settling tank and, as necessary any additional water treatment measures, should be implemented to control the concentration of TSS in the discharge water such that it remains below the maximum discharge concentration at all times. This will be confirmed with the following monitoring:

    1) Dewatering effluent shall be sampled on Day 1, Day 3 and then on a weekly basis and analyzed for TSS. If the water is sequestered and discharged intermittently (such as following rain events), the pre-treated effluent will be sampled at least twice during the discharge event, and analyzed for TSS; and,

    2) The turbidity of the dewatering effluent shall be monitored daily (or during intermittent discharge events) with a calibrated field unit, and a written log kept. Turbidity monitoring results are to be correlated with the TSS results from the laboratory and used as a daily indicator that TSS remains below 350 mg/L for water discharged to the sanitary sewer and below 15 mg/L for water discharged to the storm sewer. If the monitoring results indicate TSS is above the applicable discharge limit, additional treatment will be undertaken immediately to reduce TSS concentrations under the applicable discharge limit. The additional treatment measures could include deployment of a second settling tank allowing longer residency periods for the dewatering effluent;

- Where additional treatment is required, the Contractor shall conduct daily sampling (or during intermittent discharge events) until the efficacy of the treatment is demonstrated. Water will not be permitted to be discharged to the sewer until the quality meets the City Sewer Use By-Law;

- Visual inspection of the discharge water shall be conducted at least once daily (or during intermittent discharge events) to ensure there is no visible oil or sheen, and a written log kept. Measurements of field turbidity and pH will be recorded at all discharge location(s) at least once daily (or during intermittent discharge events) to confirm that discharge quality maintains a turbidity level corresponding to ensuring that the concentration is below the required TSS limit and that pH remains within a range between 6.0 and 11.5 for discharge to the sanitary sewer and between 6.0 and 9.5 for discharge to the storm sewer;
- Additional monitoring of the pre-treated effluent should occur on Day 1, Day 3, then on a weekly basis for six weeks, and then on a monthly basis thereafter. If the discharge events are intermittent, monitoring of the first eight events should occur, followed by a reduced frequency as recommended by the project professional engineer or hydrogeologist. The samples should be analyzed for parameters contained in the City Sewer Use By-Law, or as recommended by the project professional engineer or hydrogeologist based on conditions at that time. Additional sampling events should also be considered whenever significant alterations (if any) are made to the dewatering system over the course of the project; and
- Based on the water quality monitoring program, the need to maintain the pre-treatment and mobilize any other necessary treatment measures should be evaluated on an on-going basis.

The long-term monitoring program should be established by the project professional engineer or hydrogeologist on the basis of the results from the construction dewatering program, and prior to the commencement of the long-term discharge agreement, and in accordance with any City requirements. At this time, it is expected that monitoring to confirm compliance with the City Sewer Use By-Law will be required on a more frequent basis (e.g., monthly, then quarterly) until consistent results are achieved, followed by monitoring on a less frequent basis (e.g., annually).

9.2 Groundwater Level Monitoring

If feasible within the Site boundaries, it is recommended that at least three monitoring wells be installed outside of the excavation walls to monitor groundwater elevations. If a dewatering array is to be installed around the excavation perimeter by the specialist dewatering contractor, these monitoring wells should be installed at the same time.

It is recommended that groundwater elevations be monitored in the existing monitoring well network (if accessible) at the Site during construction dewatering as long as possible until decommissioned during building construction activities.

Water levels should be monitored once in the available monitoring wells prior to the commencement of dewatering activities, followed by the selection of representative monitoring wells in which an automatic datalogger can be installed. Starting with the commencement of dewatering activities, groundwater levels are recommended to be monitored weekly for one month, including datalogger downloads. Subsequently, it is recommended that the groundwater levels be monitored and the dataloggers downloaded on a monthly basis, or as recommended by the project professional engineer or hydrogeologist.

10.0 MONITORING WELL DECOMMISSIONING

When no longer required, the monitoring wells installed at the Site should be decommissioned by a MECP-licensed Water Well Contractor in accordance with applicable legislation.

11.0 LIMITATIONS

This report was prepared for Choice to accompany development applications to the City of Toronto related to the proposed commercial and residential development at the Site. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the sole responsibility of such third parties. This report is subject to the *Important Information and Limitations of this Report*, as attached in Appendix A, and to any other limitations as stated in the Golder reports prepared for this Site on which this report relies.

Golder has relied in good faith on the data and information provided by Choice and others, and on other materials as noted in this report. Golder has assumed that the information provided was factual and accurate. Golder accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Signature Page

Golder Associates Ltd.

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SAA/MAS/lh

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Figures

LEGEND

SITE BOUNDARY

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1:25,000 METRES

REFERENCE(S)

BASE MAP SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CHOICE PROPERTIES REIT

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2020-04-21
DESIGNED	JT
PREPARED	JT
REVIEWED	SA
APPROVED	MAS

PROJECT
HYDROGEOLOGICAL INVESTIGATION
PROPOSED HIGH-RISE DEVELOPMENT
683-685 WARDEN AVENUE, TORONTO, ON

TITLE
KEY PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
20139596	0006	A	1

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LEGEND

- BOREHOLE LOCATION (2020)
- BOREHOLE LOCATION (2021)
- CROSS SECTION LINE
- SITE BOUNDARY

0 40 80

1:1,000 METRES

REFERENCE(S)

1. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
2. BASE PLAN PROVIDED BY TURNER FLEISCHER, ENTITLED "SITE PLAN/ROOF PLAN". DRAWING NO. RZ00, DATED 2021-05-03.
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

CHOICE PROPERTIES REIT

PROJECT

HYDROGEOLOGICAL INVESTIGATION
PROPOSED HIGH-RISE DEVELOPMENT
683-685 WARDEN AVENUE, TORONTO, ON

TITLE

BOREHOLE LOCATION PLAN

CONSULTANT

GOLDER MEMBER OF WSP

YYYY-MM-DD	2020-03-25
DESIGNED	RA
PREPARED	MK/JT
REVIEWED	SA
APPROVED	MAS

PROJECT NO.	CONTROL	REV.	FIGURE
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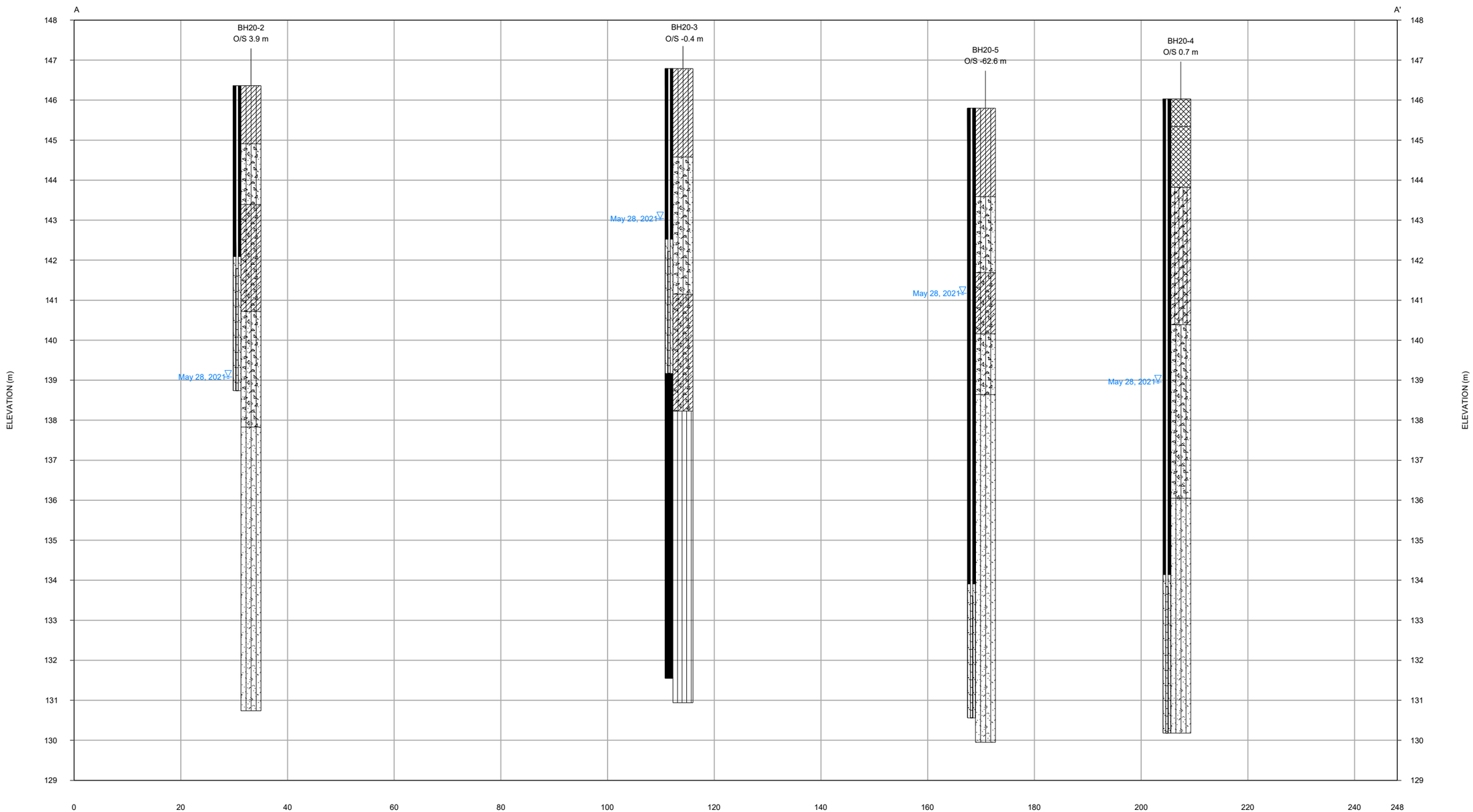

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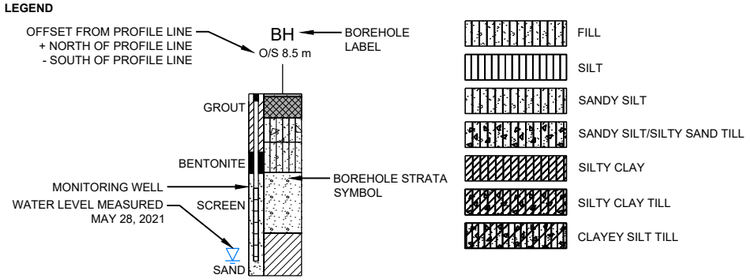

NOT FOR CONSTRUCTION

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0 2.5 5
1:150 VERTICAL SCALE METRES

CLIENT
CHOICE PROPERTIES REIT

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-06-09
DESIGNED	
PREPARED	JL
REVIEWED	SA
APPROVED	MAS

PROJECT
HYDROGEOLOGICAL INVESTIGATION
PROPOSED HIGH-RISE DEVELOPMENT
683-685 WARDEN AVENUE, TORONTO, ONTARIO

TITLE
CROSS SECTION A-A'

PROJECT NO.	CONTROL	REV.	FIGURE
20139596	0006	A	3

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LEGEND

- WELL RECORD
- UTILITY LINE
- WATERCOURSE
- SITE BOUNDARY
- STUDY AREA (500 METRE RADIUS)

0 200 400

1:5,000 METRES

REFERENCE(S)
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2. BASE IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
3. PROJECTION: TRANSVERSE MERCATOR NAD 1983 UTM ZONE 17

CLIENT
CHOICE PROPERTIES REIT

PROJECT
HYDROGEOLOGICAL INVESTIGATION
PROPOSED HIGH-RISE DEVELOPMENT
683-685 WARDEN AVENUE, TORONTO, ON

TITLE
MINISTRY RECORDED WELLS

CONSULTANT
GOLDER MEMBER OF WSP

YYYY-MM-DD	2020-03-25
DESIGNED	RA
PREPARED	MK/JT
REVIEWED	SA
APPROVED	MAS

PROJECT NO.	CONTROL	REV.	FIGURE
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APPENDIX A

Important Information and Limitations of this Report

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder cannot be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client can not rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Ground Water Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

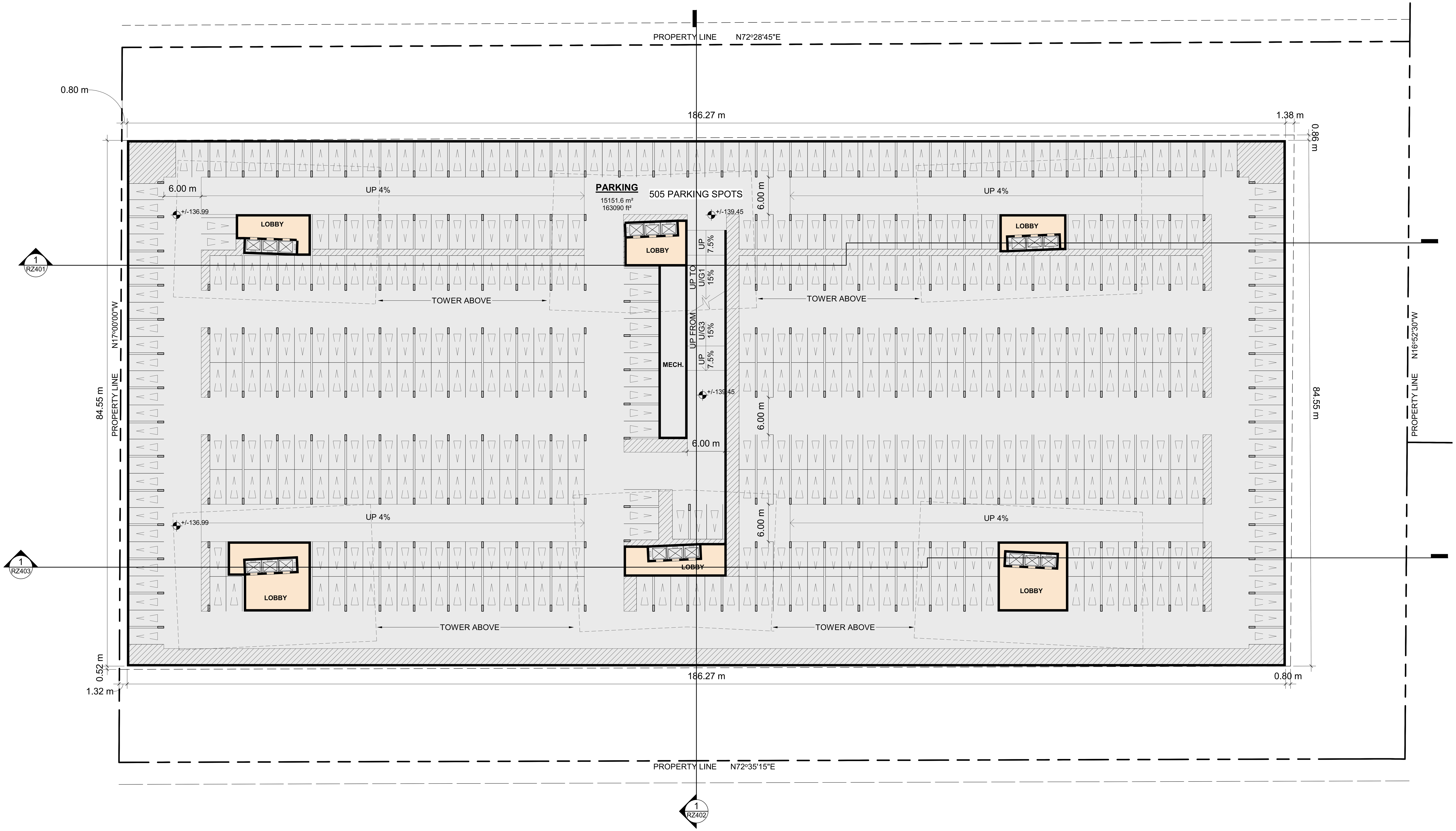
During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

APPENDIX B

Provided Site Condition and Design Information



1 U/G 02
RZ101 1 : 300

2021-05-21 10:45:43 AM

TURNER FLEISCHER

Turner Fleischer Architects Inc.

67 Lesmill Road
Toronto, ON, M3B 2T8
T 416 425 2222
turnerfleischer.com

NOTE: U/G PARKING EXITS TO BE REVIEWED AND RESOLVED

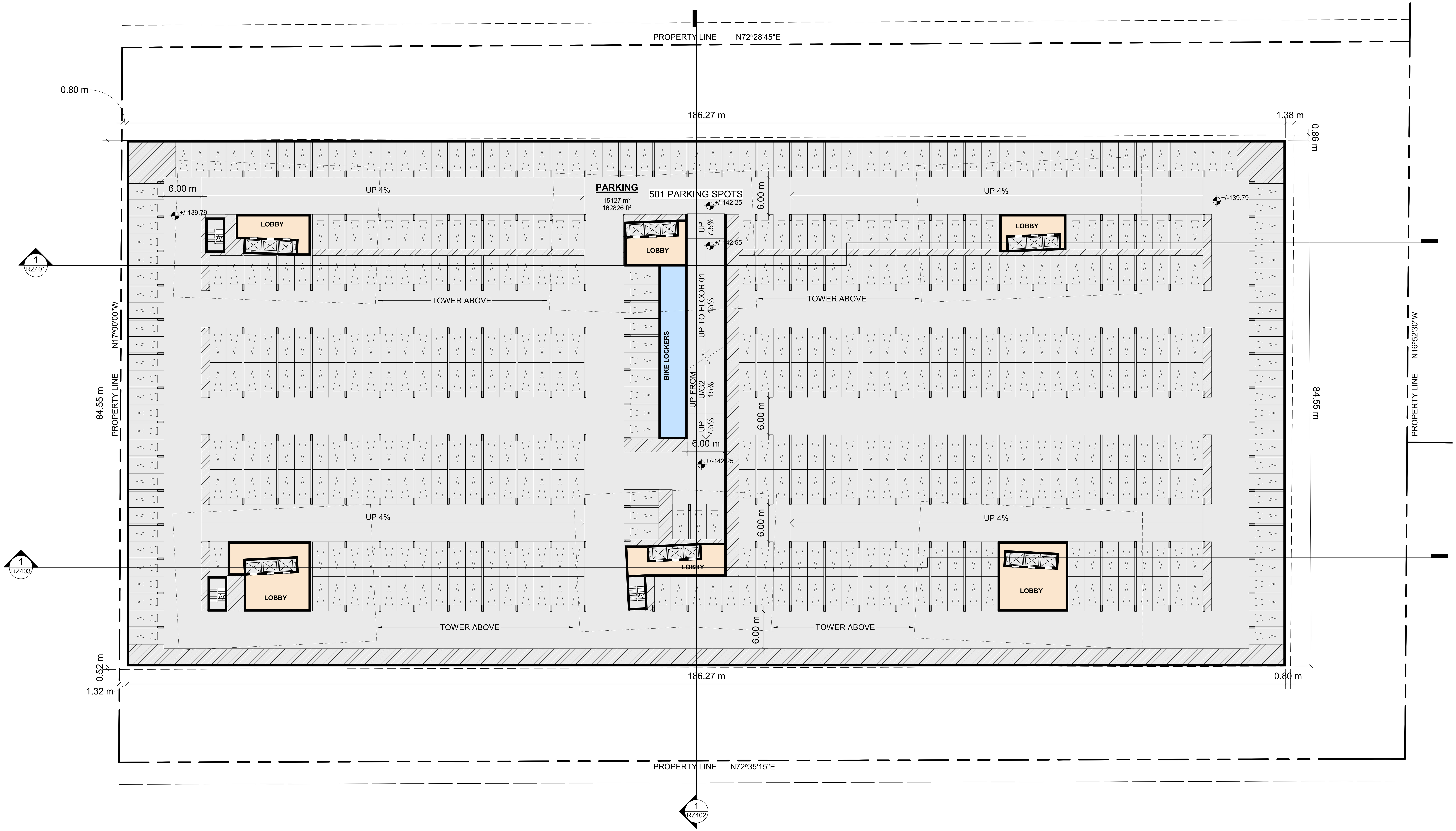
#	DATE	DESCRIPTION	BY

PROJECT
685 Warden Avenue
685 Warden Avenue, Scarborough, ON

DRAWING
TYPICAL UNDERGROUND LEVEL 02

PROJECT NO. 06.077RZ
PROJECT DATE 2021-05-03
DRAWN BY CCU / ALG
CHECKED BY CCU / RMM
SCALE 1 : 300

DRAWING NO. RZ101
REV.



1 RZ102 U/G 01
1 : 300

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67 Lesmill Road
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T 416 425 2222
turnerfleischer.com

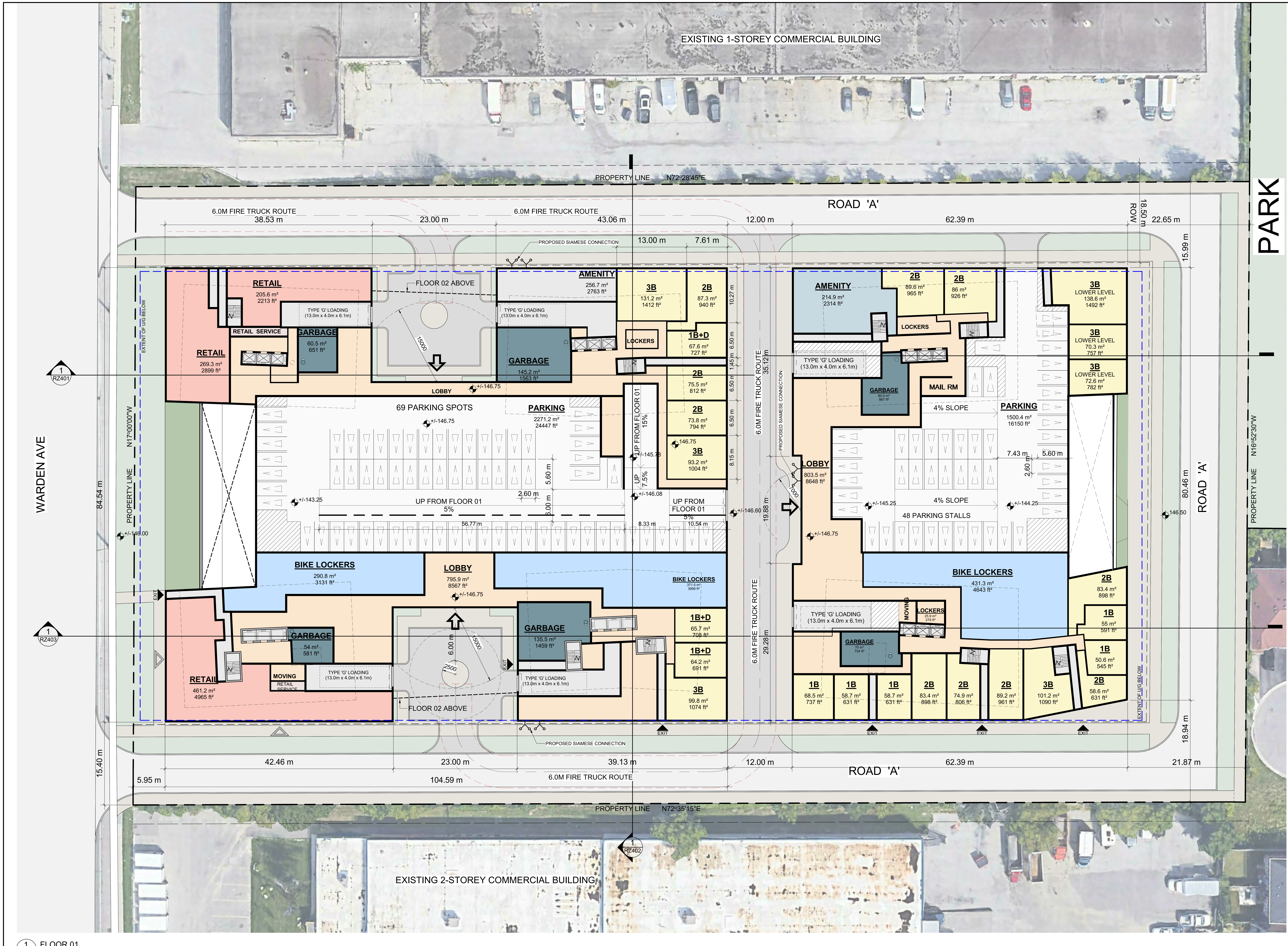
NOTE: U/G PARKING EXITS TO BE REVIEWED AND RESOLVED

#	DATE	DESCRIPTION	BY

PROJECT
685 Warden Avenue
685 Warden Avenue, Scarborough, ON

DRAWING
UNDERGROUND LEVEL 01

PROJECT NO.	06.077RZ
PROJECT DATE	2021-05-03
DRAWN BY	CCU / ALG
CHECKED BY	CCU / RMM
SCALE	1 : 300
DRAWING NO.	RZ102
REV.	



EXISTING 1-STOREY COMMERCIAL BUILDING
PROPERTY LINE N72°28'45"E
ROAD 'A'
6.0M FIRE TRUCK ROUTE
PARK
WARDEN AVE
PROPERTY LINE N17°00'00"W
PROPERTY LINE N16°52'30"W
EXTENT OF U/G BELOW
RETAIL
205.6 m²
2213 ft²
RETAIL
269.3 m²
2899 ft²
RETAIL SERVICE
GARBAGE
60.5 m²
651 ft²
FLOOR 02 ABOVE
TYPE 'G' LOADING (13.0m x 4.0m x 6.1m)
AMENITY
256.7 m²
2763 ft²
GARBAGE
145.2 m²
1563 ft²
LOBBY
3B
131.2 m²
1412 ft²
2B
87.3 m²
940 ft²
LOCKERS
1B+D
67.6 m²
727 ft²
2B
75.5 m²
812 ft²
2B
73.8 m²
794 ft²
3B
93.2 m²
1004 ft²
69 PARKING SPOTS
PARKING
2271.2 m²
24447 ft²
UP FROM FLOOR 01 5%
UP FROM FLOOR 01 15%
UP 7.5%
BIKE LOCKERS
290.8 m²
3131 ft²
LOBBY
795.9 m²
8567 ft²
BIKE LOCKERS
371.5 m²
3999 ft²
GARBAGE
54 m²
581 ft²
GARBAGE
135.5 m²
1459 ft²
RETAIL
461.2 m²
4965 ft²
MOVING
RETAIL SERVICE
1B+D
65.7 m²
708 ft²
1B+D
64.2 m²
691 ft²
3B
99.8 m²
1074 ft²
PROPOSED SIAMESE CONNECTION
AMENITY
214.9 m²
2314 ft²
2B
89.6 m²
965 ft²
2B
86 m²
926 ft²
3B LOWER LEVEL
138.6 m²
1492 ft²
3B LOWER LEVEL
70.3 m²
757 ft²
3B LOWER LEVEL
72.6 m²
782 ft²
LOCKERS
GARBAGE
MAIL RM
4% SLOPE
PARKING
1500.4 m²
16150 ft²
LOBBY
803.5 m²
8648 ft²
48 PARKING STALLS
BIKE LOCKERS
431.3 m²
4643 ft²
2B
83.4 m²
898 ft²
1B
55 m²
591 ft²
1B
50.6 m²
545 ft²
LOCKERS
GARBAGE
1B
68.5 m²
737 ft²
1B
58.7 m²
631 ft²
1B
58.7 m²
631 ft²
2B
83.4 m²
898 ft²
2B
74.9 m²
806 ft²
2B
89.2 m²
961 ft²
3B
101.2 m²
1090 ft²
2B
58.6 m²
631 ft²
EXIT
PROPERTY LINE N72°35'15"E
EXISTING 2-STOREY COMMERCIAL BUILDING
38.53 m
23.00 m
43.06 m
12.00 m
62.39 m
22.65 m
18.50 m ROW
13.00 m
7.61 m
15.99 m
84.54 m
80.46 m
42.46 m
23.00 m
39.13 m
12.00 m
62.39 m
21.87 m
18.94 m
15.40 m
5.95 m
104.59 m
35.12 m
19.88 m
29.28 m
RZ401
RZ402
RZ403

FLOOR 01
RZ151 1 : 300

2021-05-21 10:45:44 AM

TURNER FLEISCHER

Turner Fleischer Architects Inc.
67 Lesmill Road
Toronto, ON, M3B 2T8
T 416 425 2222
turnerfleischer.com

LEGEND

- PRIMARY RESIDENTIAL ENTRANCE
- SECONDARY RESIDENTIAL ENTRANCE
- RETAIL ENTRANCE
- EXIT
- FIRE HYDRANT
- SIAMESE CONNECTION
- CONVEX MIRROR
- TRANSFORMER WITH CLEARANCES
- FIRE ROUTE SIGN
- 000.00 SPOT ELEVATION
- GAS/HYDRO METER

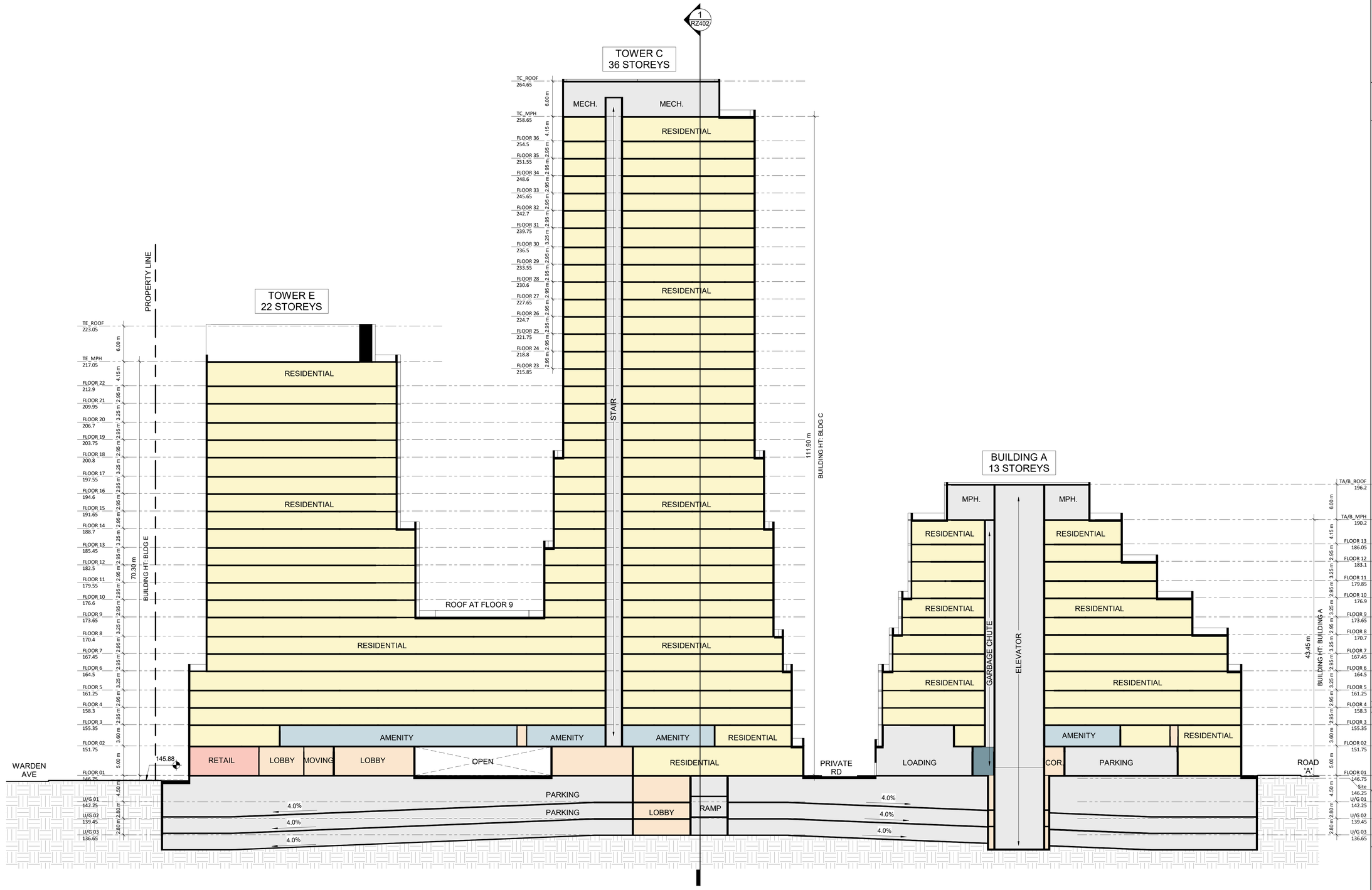
#	DATE	DESCRIPTION	BY

PROJECT
685 Warden Avenue
685 Warden Avenue, Scarborough, ON

DRAWING
FLOOR 01

PROJECT NO.	06.077RZ
PROJECT DATE	2021-05-03
DRAWN BY	CCU / ALG
CHECKED BY	CCU / RMM
SCALE	As indicated

DRAWING NO. RZ151
REV.



1 RZ401 SECTION A
1 : 300

TURNER FLEISCHER

Turner Fleischer Architects Inc.

67 Lesmill Road
Toronto, ON, M3B 2T8
T 416 425 2222
turnerfleischer.com

#	DATE	DESCRIPTION	BY
1	Date 1	Revision 1	

PROJECT
685 Warden Avenue
685 Warden Avenue, Scarborough, ON

DRAWING
BUILDING SECTIONS

PROJECT NO.	06.077RZ
PROJECT DATE	2021-05-03
DRAWN BY	Author
CHECKED BY	Checker
SCALE	1 : 300

DRAWING NO. RZ401 REV. 1

2021-05-21 10:46:03 AM

PLAN OF SURVEY WITH TOPOGRAPHY OF

PART OF LOT 32
CONCESSION B
CITY OF TORONTO
(FORMERLY CITY OF SCARBOROUGH)

SCALE 1 : 500

10 5 0 10 20 30 40 50 metres

SPEIGHT, VAN NOSTRAND & GIBSON LIMITED
ONTARIO LAND SURVEYORS
2021

ELEVATION NOTE

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE CITY OF TORONTO BENCH MARK No. MT 71

LOCATION: WARDEN AVENUE, SOUTH OF ST. CLAIR AVENUE EAST SIDE. IN WEST FACE OF EAST BRIDGE ABUTMENT OF RAILWAY OVERPASS ON WARDEN AVENUE SOUTH OF ST. CLAIR AVENUE, 0.18 METRES NORTH OF SOUTH WEST CORNER AND 0.27 METRES ABOVE SIDEWALK.

PUBLISHED ELEVATION = 147.557 metres.

BEARING NOTE

BEARINGS HEREON ARE ASTRONOMIC AND ARE REFERRED TO THE EASTERLY LIMIT OF WARDEN AVENUE AS SHOWN ON PLAN 66R-24263 HAVING A BEARING OF N17°00'00"W

LEGEND

■	DENOTES	SURVEY MONUMENT FOUND
□	"	SURVEY MONUMENT PLANTED
WIT	"	WITNESS MONUMENT
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
IB	"	IRON BAR
CC	"	CUT CROSS
N,S,E,W	"	NORTH, SOUTH, EAST, WEST
OU	"	ORIGIN UNKNOWN
875	"	GEORGE CLENDAY
MTR	"	METRO TRAFFIC AND ROADS
1683	"	PURCELL T. MURRAY
MMM	"	MARSHALL MACKLIN MONAGHAN ONTARIO LTD
RP	"	REFERENCE PLAN 66R-5133
P1	"	PLAN 66R-21253
MH	"	MANHOLE
SMH	"	SEWER MANHOLE
WMH	"	WATER MANHOLE
HMH	"	HYDRO MANHOLE
BMH	"	BELL MANHOLE
CB	"	CATCH BASIN
FH	"	FIRE HYDRANT
WV	"	WATER VALVE
GV	"	GAS VALVE
HW	"	HAND WELL
CHP	"	CONCRETE HYDRO POLE
WHP	"	WOODEN HYDRO POLE
CLS	"	CONCRETE LIGHT STANDARD
MLS	"	METAL LIGHT STANDARD
FF	"	FLOOR FINISH
A/C	"	AIR CONDITIONER
B	"	BOLLARD
SC	"	SIAMESE CONNECTION
ATS	"	AUTOMATIC TRAFFIC SIGNAL
ICR	"	IRRIGATION CONTROL VALVE
GM	"	GAS METER
WELL	"	MONITORING WELL
HP	"	HYDRO POLE
	"	DECIDUOUS TREE
	"	CONIFEROUS TREE
123.456	"	ELEVATION ON THE TOP OF WALL
	"	CONCRETE
	"	GRAVEL
	"	BRICK
	"	BRICK WALL
	"	CONCRETE WALL

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON

DATE: _____

D. A. WILTON
ONTARIO LAND SURVEYOR

SPEIGHT, VAN NOSTRAND & GIBSON LIMITED
ONTARIO LAND SURVEYORS
750 OAKDALE ROAD, Unit 65 & 66
TORONTO, ONTARIO M3N 2Z4
TEL. 416 749-SVNG(7864) FAX 416 749-7866
E-Mail : toronto@svng.on.ca

DRAWN :	F.P.B./M.M./D.G.	FILE NAME :	A2010075
CHECKED :	D. A. W.	PLOT SCALE :	MET. 1=0.50
JOB No. :	201-0075	PLOTTED :	
REF. No. :		UPDATED :	

METRIC

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO METRES BY DIVIDING BY 0.3048

A1 (594x840)

PE8396

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT

DATE : FEBRUARY 23rd, 2009

D. A. WILTON
ONTARIO LAND SURVEYOR

PLAN 66R-24263

RECEIVED AND DEPOSITED

DATE : APR/01/09

TERRY BULLERWELL
DEPUTY LAND REGISTRAR FOR THE LAND TITLES DIVISION OF THE TORONTO REGISTRY OFFICE (No. 66)

SCHEDULE

PART	PART OF LOT	CONCESSION	PART OF PIN	AREA m^2
1	32	B	06449-0174 (LT)	15,554.5
2			06449-0173 (LT)	5,622.5
3				960.9
4				328.1
5				320.5
6			06449-0174 (LT)	99.7
7				889.5
8			06449-0270 (LT)	598.1
9				1761.5
10				100.9
11				25.5
12			06449-0174 (LT)	34.7
13			06449-0173 (LT)	1.5
14				1.5
15				1.5
16				1.5
17				1.5
18				1.5
19				1.5
20				1.5
21				1.5
22				1.5
23				1.5
24				1.5
25				1.5

PART 5&6: SUBJECT TO EASEMENT AS IN INST. No. LT616425
PARTS 1,6,7 & 12 COMPRISES ALL OF PIN 06449-0174 (LT)
PARTS 2,3,4,5,13 TO 25 BOTH INCLUSIVE COMPRISES ALL OF PIN 06449-0173 (LT)
PARTS 8,9,10&11 COMPRISES ALL OF PIN 06449-0270 (LT)

PLAN OF SURVEY OF
PART OF LOT 32
CONCESSION B
CITY OF TORONTO

SCALE 1 : 500

10 5 0 10 20 30 40 50 metres

SPEIGHT, VAN NOSTRAND & GIBSON LIMITED
ONTARIO LAND SURVEYORS

GEODETIC REFERENCE NOTE

BEARINGS HEREON ARE GRID BEARINGS AND ARE DERIVED FROM HORIZONTAL CONTROL MONUMENTS NO.
020660724 E 323373.19 N 4840333.22
020720704 E 323404.47 N 4840453.38
AND ARE REFERRED TO THE CENTRAL MERIDIAN 79°30' WEST LONGITUDE, ZONE 10.

DISTANCES SHOWN ARE ADJUSTED GROUND DISTANCES AND CAN BE USED TO COMPUTE GRID DISTANCES BY MULTIPLYING THE DISTANCES BY THE COMBINED SCALE FACTOR OF 0.999881.

COORDINATES SHOWN HEREON ARE BASED ON THE 3° MODIFIED TRANSVERSE MERCATOR PROJECTION, ZONE 10, NAD27

LEGEND

■	DENOTES	SURVEY MONUMENT FOUND
□	-	SURVEY MONUMENT PLANTED
WIT	-	WITNESS MONUMENT
SIB	-	STANDARD IRON BAR
SSIB	-	SHORT STANDARD IRON BAR
IB	-	IRON BAR
#IB	-	ROUND IRON BAR
CC	-	CUT CROSS
N,S,E,W	-	NORTH, SOUTH, EAST, WEST
OU	-	ORIGIN UNKNOWN
B75	-	WINTERS MAUGHAN & GLENDAY
MTR	-	METRO TRAFFIC AND ROADS
1683	-	YATES AND PURCELL LTD.
MMM	-	MARSHALL MACKLIN MONAGHAN ONTARIO LTD
P1	-	PLAN 66R-21253
P2	-	PLAN 66R-17963
P3	-	PLAN 66R-5133
*	-	UNABLE TO SET MONUMENT

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS UNDER THEM.
2. THE SURVEY WAS COMPLETED ON FEBRUARY 20th, 2009

DATE : FEBRUARY 23rd, 2009

D. A. WILTON
ONTARIO LAND SURVEYOR

METRIC
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

A1 (594x840)

SPEIGHT, VAN NOSTRAND & GIBSON LIMITED
ONTARIO LAND SURVEYORS
750 OAKDALE ROAD, Unit 66, TORONTO, ONTARIO M3N 2Z4
TEL. 416 749-SVNG(7864) FAX 416 749-7866
E-Mail : toronto@svng.on.ca

DRAWN :	F.P.B.	JOB No. :	051-0409
CHECKED :	D. A. W.	REF. No. :	64-Con. B Scar.
FILE NAME :	R0510409.DWG	PLOTTED :	NOV. 9, 2007

64-Con. B Scar.

APPENDIX C

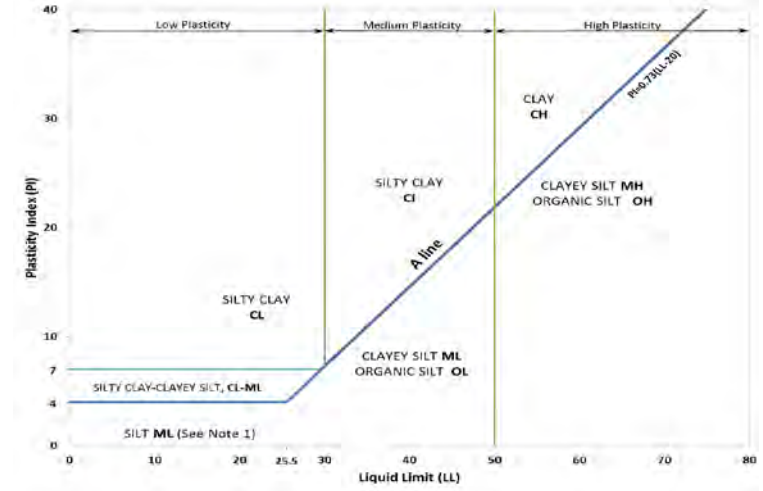
Record of Borehole Sheets

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
				Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
				Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
				Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
			Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
				None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% **(see Note 2)**	CL	SILTY CLAY
			Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
			Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures							30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat							75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.). Values reported are as recorded in the field and are uncorrected.

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DD	Diamond Drilling
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
GS	Grab Sample
MC	Modified California Samples
MS	Modified Shelby (for frozen soil)
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size (Shelby tube)
TP	Thin-walled, piston – note size (Shelby tube)
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for the effects of overburden pressure.
2. Definition of compactness terms are based on SPT 'N' ranges as provided in Terzaghi, Peck and Mesri (1996). Many factors affect the recorded SPT 'N' value, including hammer efficiency (which may be greater than 60% in automatic trip hammers), overburden pressure, groundwater conditions, and grainsize. As such, the recorded SPT 'N' value(s) should be considered only an approximate guide to the soil compactness. These factors need to be considered when evaluating the results, and the stated compactness terms should not be relied upon for design or construction.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1,2] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
NP	non-plastic
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c′	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

PROJECT: 20139596

LOCATION: See Figure 4

RECORD OF BOREHOLE: BH20-1

SHEET 1 OF 2

BORING DATE: March 10, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		147.02						
0	CME 75 TRACK MOUNTED 90 mm Mud Rotary Drilling	FILL - (ML) sandy SILT, trace to some gravel; brown, trace rootlets; non-cohesive, moist, very loose to compact		0.00	1	SS	4			METALS, ORP	50 mm Diameter Monitoring Well
1					2	SS	9				
					3	SS	14				
2				144.81							
		(ML) sandy SILT, trace gravel; brown (TILL), oxidization staining; non-cohesive, moist, compact to dense		2.21	4	SS	33	ND			
3											
					5	SS	24	ND			
4				142.91							
		(CL) SILTY CLAY, some sand, trace gravel; grey (TILL); cohesive w~PL, stiff to very stiff		4.11							
					6	SS	14	ND		PHC, VOC, PAH	Bentonite Seal
5											
6											
					7	SS	21	ND			
7				139.86							
		(CL-ML) SILTY CLAY to CLAYEY SILT, some sand, trace gravel; grey (TILL); cohesive, w~PL, hard		7.16	8	SS	50/0.08	ND			▽ March 23, 2020
8											
9					9	SS	50/0.13	ND			
				137.04							
10		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

PROJECT: 20139596

RECORD OF BOREHOLE: BH20-1

SHEET 2 OF 2

LOCATION: See Figure 4

BORING DATE: March 10, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---								
10	CME 75 TRACK MOUNTED 90 mm Mud Rotary Drilling	(ML) sandy SILT; grey; non-cohesive, slight plasticity, moist to wet, very dense		9.98	10	SS	50/0.13	ND		Bentonite Seal
11										
12					11	SS	50/0.10	ND		
13										
14					12	SS	50/0.25	ND		Silica Sand Filter
15				131.65	13	SS	50/0.13	ND	MH	
		END OF BOREHOLE		15.37						
16		NOTES:								
		1. Borehole open upon completion of drilling.								
		2. Groundwater level measured in monitoring well as follows:								
17		Date / Depth(m) / Elev. (m) 23/03/2020 / 7.79 / 139.2 26/03/2020 / 7.71 / 139.3 12/05/2021 / 7.63 / 139.4								
18										
19										
20										

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

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PROJECT: 20139596

RECORD OF BOREHOLE: BH20-2

SHEET 1 OF 2

LOCATION: See Figure 4

BORING DATE: March 11, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ *ND = Not Detected* (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ *ND = Not Detected* (100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		146.36						
0	CME 75 TRACK MOUNTED 90 mm Mud Rotary Drilling	FILL - (CL) sandy SILTY CLAY, trace gravel; brown, trace rootlets and organic material; cohesive, w~PL, firm		0.00	1	SS	7	ND		METALS ORP; 50 mm Diameter Monitoring Well
1					2	SS	8	ND		
				144.91						
		(ML) sandy SILT, trave gravel; brown (TILL), oxidation staining; non-cohesive, moist, compact		1.45	3	SS	22	ND		
2										Bentonite Seal
					4	SS	27	ND		PHC, VOC, PAH
				143.39						
3		(CL) SILTY CLAY, some sand, trace gravel; brown (TILL), oxidation staining; cohesive, w~PL, very stiff		2.97	5	SS	21	ND		
4										
					6	SS	21	ND		
5										
				140.72						
		(ML) sandy SILT, trace gravel; brown (TILL); non-cohesive, moist to wet, dense to very dense		5.64						
6										Silica Sand Filter
					7	SS	35	ND		
7										▽ May 12, 2021
					8	SS	52/ 0.13	ND		
8				137.83						
		(ML) SILT to sandy SILT; brown to grey; non-cohesive, moist to wet, very dense		8.53						
9					9	SS	50/ 0.08	ND		
10		*CONTINUED NEXT PAGE*								

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

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PROJECT: 20139596

RECORD OF BOREHOLE: BH20-2

SHEET 2 OF 2

LOCATION: See Figure 4

BORING DATE: March 11, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---								
10	CME 75 TRACK MOUNTED 90 mm Mud Rotary Drilling	- Becomes grey at a depth of about 10.0 m (ML) SILT to sandy SILT; brown to grey; non-cohesive, moist to wet, very dense			10	SS	50/ 0.08	ND		MH	
11											
12					11	SS	50/ 0.13	ND			
13											
14					12	SS	80	ND			
15											
				130.74	13	SS	93/ 0.23	ND			
		END OF BOREHOLE		15.62							
16		NOTES: 1. Borehole open upon completion of drilling. 2. Groundwater level measured in monitoring well as follows: Date / Depth(m) / Elev. (m) 23/03/2020 / 7.06 / 139.3 26/03/2020 / 7.10 / 139.3 12/05/2021 / 7.24 / 139.1									
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

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PROJECT: 20139596

RECORD OF BOREHOLE: BH20-3

SHEET 1 OF 2

LOCATION: See Figure 4

BORING DATE: March 11, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		146.79						
0	CME 75 TRACK MOUNTED 90 mm Mud Rotary Drilling	FILL - (CL) sandy SILTY CLAY, trave gravel; brown, trace rootlets and organic matter; cohesive, w~PL, soft to firm		0.00	1	SS	5	ND		50 mm Diameter Monitoring Well
1					2	SS	5	ND		METALS, ORP
					3	SS	4	ND		
2				144.58						Bentonite Seal
		(SM/ML) SILTY SAND to sandy SILT, trace to some gravel; brown (TILL), oxidation staining; non-cohesive, moist, compact to very dense		2.21	4	SS	25	ND		MH
3					5	SS	41	ND		▽ May 12, 2021
4										
5					6	SS	67	ND		
				141.15						
		(CL-ML) SILTY CLAY to CLAYEY SILT, travel gravel; grey (TILL); cohesive, w~pL to w<pL, hard		5.64						Silica Sand Filter
6					7	SS	47	ND		PHC, VOC, PAH
7										
					8	SS	73/0.23	ND		
8				138.23						
		(ML) SILT, trace sand; grey; non-cohesive, slight plasticity, moist to wet, very dense to dense		8.56						Bentonite Seal
9					9	SS	50/0.1	ND		
10		*CONTINUED NEXT PAGE*								

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

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PROJECT: 20139596

RECORD OF BOREHOLE: BH20-3

SHEET 2 OF 2

LOCATION: See Figure 4

BORING DATE: March 11, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	CME 75 TRACK MOUNTED 90 mm Mud Rotary Drilling	(ML) SILT, trace sand; grey; non-cohesive, slight plasticity, moist to wet, very dense to dense			10	SS	50/0.08	ND	W		
11					11	SS	50/0.05	ND	W		Bentonite Seal
12											
13					12	SS	50/0.13	ND	W		
14											
15					13	SS	47	ND	W		
				130.94							
16		END OF BOREHOLE		15.85							
17		NOTES: 1. Borehole open upon completion of drilling. 2. Groundwater level measured in monitoring well as follows: Date / Depth(m) / Elev. (m) 23/03/2020 / 1.84 / 145.0 26/03/2020 / 2.29 / 144.5 12/05/2021 / 3.42 / 143.4									
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

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PROJECT: 20139596

RECORD OF BOREHOLE: BH20-4

SHEET 1 OF 2

LOCATION: See Figure 4

BORING DATE: Mar 09, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		146.03						
0	CME 75 TRACK MOUNTED 90 mm Mud Rotary Drilling	FILL - (SP/GP) SAND and GRAVEL, some fines; brown; non-cohesive, moist, loose		0.00	1	SS	5	ND		METALS, ORP — 50 mm Diameter Monitoring Well
				145.34						
1		FILL - (CL) sandy SILTY CLAY, trace gravel; brown and grey, trace organic matter; cohesive, w~pL, firm		0.69	2	SS	7	ND		
					3	SS	6	ND		
2				143.82						
		(ML) sandy CLAYEY SILT, trace gravel; brown to grey (TILL); cohesive, w~pL to w<pL, very stiff		2.21	4	SS	20	ND		
3					5	SS	28	ND		
4		- Becomes grey at a depth of about 4.1 m								March 23, 2020
					6	SS	22	ND		PHC, VOC, PAH — Bentonite Seal
5				140.39						
		(SM/ML) SILTY SAND to sandy SILT, trace to some gravel; grey (TILL); non-cohesive, moist, dense to very dense		5.64						
6					7	SS	33	ND		
7										
8					8	SS	43	ND		
9					9	SS	50/0.13	ND		
10				136.05						
		CONTINUED NEXT PAGE								

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

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PROJECT: 20139596

RECORD OF BOREHOLE: BH20-4

SHEET 2 OF 2

LOCATION: See Figure 4

BORING DATE: Mar 09, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---								
10	CME 75 TRACK MOUNTED 90 mm Mud Rotary Drilling	(ML) SILT to sandy SILT, trace gravel; grey; non-cohesive, slight plasticity, wet, very dense		9.98						
					10	SS	50/0.05	ND		Bentonite Seal
11										
12					11	SS	50/0.05	ND		
13										
					12	SS	50/0.10			Silica Sand Filter
14										
15										
					13	SS	53	ND		
				130.18						
16		END OF BOREHOLE		15.85						
		NOTES:								
		1. Borehole open upon completion of drilling.								
		2. Groundwater level measured in monitoring well as follows:								
		Date / Depth(m) / Elev. (m): 23/03/2020 / 4.44 / 141.6; 26/03/2020 / 4.40 / 141.6; 12/05/2021 / 3.95 / 142.1								
17										
18										
19										
20										

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DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

PROJECT: 20139596

RECORD OF BOREHOLE: BH20-5

SHEET 1 OF 2

LOCATION: See Figure 4

BORING DATE: Mar 12, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected) 100 200 300 400	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected) 100 200 300 400	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3}	WATER CONTENT PERCENT Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		145.80									
0	CME 75 TRACK MOUNTED 90 mm Mud Rotary Drilling	FILL - (CL) sandy SILTY CLAY, trace to some gravel; brown and grey, trace organic matter; cohesive, w>pL, soft to firm		0.00	1	SS	4	ND				50 mm Diameter Monitoring Well
1					2	SS	6	ND			METALS, ORP	
2					3	SS	5	ND			PHC, VOC, PAH	
				143.59								
		(ML) sandy SILT, trace gravel; brown (TILL), oxidation staining; non-cohesive, moist, compact		2.21	4	SS	15	ND				
3					5	SS	25	ND				
4				141.69								
		(CL-ML) SILTY CLAY TO CLAYEY SILT, some sand, trace gravel; grey (TILL); cohesive, w<pL, hard		4.11	6	SS	32	ND				
5												Bentonite
				140.16								
		(ML) sandy SILT, trace gravel; grey (TILL); non-cohesive, moist, dense		5.64								▽ March 26, 2020
6					7	SS	31	ND				
7				138.64								
		(SM/ML) SILTY SAND to sandy SILT; trace gravel; grey; non-cohesive, slight plasticity, wet, very dense		7.16	8	SS	80/0.28	ND				
8												
9					9	SS	83/0.2	ND			MH	
10		*CONTINUED NEXT PAGE*										

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DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

PROJECT: 20139596

RECORD OF BOREHOLE: BH20-5

SHEET 2 OF 2

LOCATION: See Figure 4

BORING DATE: Mar 12, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---								
10	CME 75 TRACK MOUNTED 90 mm Mud Rotary Drilling	(SM/ML) SILTY SAND to sandy SILT; trace gravel; grey; non-cohesive, slight plasticity, wet, very dense			10	SS	50/0.05	ND		Bentonite
11										
12					11	SS	50/0.08	ND		Sand
13										
14					12	SS	73	ND		Screen and Sand
15										
					13	SS	84	ND		
				129.95						
16		END OF BOREHOLE		15.85						
		NOTES:								
		1. Borehole open upon completion of drilling.								
		2. Groundwater level measured in monitoring well as follows:								
17		Date / Depth(m) / Elev. (m): 23/03/2020 / 5.23 / 140.6; 26/03/2020 / 5.93 / 139.9; 12/05/2021 / 4.58 / 141.2								
18										
19										
20										

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

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PROJECT: 20139596

RECORD OF BOREHOLE: BH20-6

SHEET 1 OF 1

LOCATION: See Figure 4

BORING DATE: March 9, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	CME 75 TRACK MOUNTED 140 mm Hollow Stem Augers	GROUND SURFACE		146.76							
		FILL - (CL) SILTY CLAY, some sand, some gravel; brown; cohesive, w>pL, very soft to stiff		0.00	1	SS	2	ND		METALS, ORP, PCB	50 mm Diameter Monitoring Well
1					2	SS	8	ND			
				145.31							
		FILL - (SP/GP) SAND and GRAVEL, some fines; brown; non-cohesive, moist, compact to very dense		1.45	3	SS	22	ND		PHC, VOC, PAH	March 23, 2020
2											Bentonite Seal
					4	SS	50	ND			
3											
					5	SS	26	ND			
4				142.65							
		(CL-ML) sandy SILTY CLAY to CLAYEY SILT, trace gravel; grey (TILL); cohesive, w~pL, very stiff to hard		4.11	6	SS	18	ND			
5											
6											Silica Sand Filter
					7	SS	28	ND			
7											
				138.89	8	SS	50/0.1				
8		END OF BOREHOLE		7.87							
9		NOTES: 1. Borehole open upon completion of drilling. 2. Groundwater level measured in monitoring well as follows: Date / Depth(m) / Elev. (m) 23/03/2020 / 1.71 / 145.0 26/03/2020 / 1.57 / 145.1 12/05/2021 / 1.09 / 145.6									
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

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PROJECT: 20139596

RECORD OF BOREHOLE: BH20-7

SHEET 1 OF 1

LOCATION: See Figure 4

BORING DATE: March 9, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		146.55							
0	CME 75 TRACK MOUNTED 140 mm Hollow Stem Augers	TOPSOIL		0.00							
		FILL - (CL) SILTY CLAY, some sand, trace gravel; brown, trace rootlets; cohesive, w>pL, firm		0.10	1	SS	7			METALS, ORP	
				145.86							
1		FILL - (SP/GP) SAND and GRAVEL, some fines; brown; non-cohesive, moist, compact		0.69	2	SS	14				
				145.10							
		(SM/ML) SILTY SAND to sandy SILT, trace gravel; brown to grey (TILL); non-cohesive, moist, compact to very dense		1.45	3	SS	18	ND		PHC, VOC, PAH	
2					4	SS	39	ND			
3		- Becomes grey at a depth of 3.4 m			5	SS	71/0.28	ND			
4					6A	SS	84				
					6B						
5											
6					7	SS	44			MH	
7				139.39							
		(CL-ML) SILTY CLAY to CLAYEY SILT, some gravel; grey (TILL); cohesive, w<pL, hard		7.16	8	SS	38				
8				138.32							
		END OF BOREHOLE		8.23							
		NOTE:									
		1. Borehole open upon completion of drilling.									
9											
10											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: RP

CHECKED: AD

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PROJECT: 20139596 (6000)

LOCATION: See Figure 2

RECORD OF BOREHOLE: BH21-1

SHEET 1 OF 3

BORING DATE: April 30/May 3, 2021

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		146.77							
0	200 mm O.D. Hollow Stem	TOPSOIL (~80 mm thick)		0.00							
		FILL - (CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, w~PL, firm		0.08	1	SS	5				Concrete; 50 mm Diameter Monitoring Well
				146.08							
1		(CL/CL-ML) SILTY CLAY to CLAYEY SILT, some sand to sandy, trace gravel; brown to grey (TILL); cohesive, w<PL to w~PL, firm to hard		0.69	2	SS	6				
					3	SS	13				
2					4	SS	27				
3					5	SS	50/0.08				
4	CME75 Track Rig										
		- Becomes grey at a depth of about 4.6 m			6	SS	25				
5											Bentonite
6	120 mm Tricone Mud Rotary				7	SS	28				
											▽ May 12, 2021
7		(ML/SM) sandy SILT to SILTY SAND, trace gravel; grey (TILL); non-cohesive, moist to wet, very dense		139.68 7.09							
					8	SS	51				
8											
9					9	SS	50/0.03			MH	
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AD

CHECKED: RA

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PROJECT: 20139596 (6000)

LOCATION: See Figure 2

RECORD OF BOREHOLE: BH21-1

BORING DATE: April 30/May 3, 2021

SHEET 2 OF 3

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	CME75 Track Rig 120 mm Tricone Mud Rotary	(ML/SM) sandy SILT to SILTY SAND, trace gravel; grey (TILL); non-cohesive, moist to wet, very dense			10	SS	50/0.1				
11											
12					11	SS	50/0.13				
13											
14					12	SS	50/0.13				
				132.06							
15		(ML) SILT to sandy SILT, grey; non-cohesive, wet, very dense		14.71	13	SS	50/0.1				Bentonite
16											
17					14	SS	93				
				129.02							
18		(ML) SILT, trace sand, grey; non-cohesive, wet, very dense		17.75							
19					15	SS	92				
20					16	SS	86				
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AD

CHECKED: RA

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PROJECT: 20139596 (6000)

LOCATION: See Figure 2

RECORD OF BOREHOLE: BH21-1

SHEET 3 OF 3

BORING DATE: April 30/May 3, 2021

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20	CME75 Track Rig 120 mm Tricone Mud Rotary	(ML) SILT, trace sand, grey; non-cohesive, wet, very dense			16	SS	86				Bentonite
21					17	SS	86				Sand
22											
23					18	SS	65				Silica Sand Filter and Screen
24											
				121.93	19	SS	74				
25		END OF BOREHOLE NOTE: 1. Groundwater level measured in monitoring well as follows: Date 12/05/2021 Depth(m) 6.76 Elev. (m) 140.01		24.84							
26											
27											
28											
29											
30											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AD

CHECKED: RA

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PROJECT: 20139596 (6000)

LOCATION: See Figure 2

RECORD OF BOREHOLE: BH21-2

BORING DATE: April 28/29, 2021

SHEET 1 OF 3

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		146.38							
0	200 mm O.D. Hollow Stem	TOPSOIL (~50 mm thick)		0.00							
		FILL - (CL) SILTY CLAY, trace sand; trace gravel; brown to dark brown (REWORKED NATIVE); red brick fragments; cohesive, w~PL, stiff to firm		0.05	1	SS	13		○		
1					2	SS	5		○		
		(CL/CL-ML) SILTY CLAY to CLAYEY SILT, trace to some sand; trace gravel; brown (TILL); cohesive, w<PL, stiff to hard		145.01 1.37	3	SS	11		○		
2					4	SS	31		○		
		(ML) sandy SILT, trace gravel; brown (TILL); non-cohesive, moist, dense		143.48 2.90	5	SS	40		○		
3											
		(CL-ML) SILTY CLAY to CLAYEY SILT, some sand, trace to some gravel; grey (TILL); cohesive, w<PL, very stiff to hard		142.34 4.04	6	SS	27		○		
4											
5	CME75 Track Rig										
6	120 mm Tricone Mud Rotary				7	SS	48		○		
7											
		(ML) sandy SILT to SILT, grey; non-cohesive, wet, very dense		138.53 7.85							
8											
9					PMT 1						
					8	SS	50/ 0.13		○	MH	
10		*CONTINUED NEXT PAGE*									

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DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AD

CHECKED: RA

PROJECT: 20139596 (6000)

RECORD OF BOREHOLE: BH21-2

SHEET 2 OF 3

LOCATION: See Figure 2

BORING DATE: April 28/29, 2021

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	CME75 Track Rig 120 mm Tricone Mud Rotary	(ML) sandy SILT to SILT, grey; non-cohesive, wet, very dense									
11											
12					PMT 2						
					9	SS	50/ 0.1		W	MH	
13											
14											
15					PMT 3						
					10	SS	50/ 0.08		W		
16											
17											
18					PMT 4						
					11	SS	83		W		
19											
20					12	SS	60				
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AD

CHECKED: RA

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PROJECT: 20139596 (6000)

RECORD OF BOREHOLE: BH21-2

SHEET 3 OF 3

LOCATION: See Figure 2

BORING DATE: April 28/29, 2021

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20		(ML) sandy SILT to SILT, grey; non-cohesive, wet, very dense		126.11	12	SS	60		W		
		END OF BOREHOLE		20.27							
		NOTE: 1. Borehole grouted on completion of drilling.									
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AD

CHECKED: RA

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PROJECT: 20139596 (6000)

LOCATION: See Figure 2

RECORD OF BOREHOLE: BH21-3

BORING DATE: April 29/30, 2021

SHEET 1 OF 3

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		146.38							
0	200 mm O.D. Hollow Stem	TOPSOIL (~50 mm thick)		0.00							
		FILL - (CL) SILTY CLAY, some sand; trace gravel; trace rootlets; brown (REWORKED NATIVE); cohesive, w>PL, firm		0.05	1	SS	4				
1					2	SS	5				
		(CL) sandy SILTY CLAY, trace gravel; brown, oxidation stains (TILL); cohesive, w<PL, firm		145.01 1.37	3	SS	7				
2		(ML) sandy SILT, trace gravel; brown to grey (TILL); oxidation stains to 4.6 m; non-cohesive, moist, very dense		144.25 2.13	4	SS	54				
3	CME75 Track Rig				5	SS	78/ 0.28				
4											
		- Becomes grey at a depth of about 4.6 m			6	SS	50/ 0.1				
5	120 mm Tricone Mud Rotary										
6					7	SS	52				
7											
					8	SS	33				
8											
				137.54							
9		(ML) SILT to sandy SILT, grey; non-cohesive, wet, very dense		8.84							
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AD

CHECKED: RA

GTA-BHS 001 S:\CLIENTS\CHOICE_PROPERTIES\SCARBOROUGH_WARDEN_AVE_683_685\02_DATA\GINT\20139596.GPJ GAL-MIS.GDT 5/25/21 MLK Mar. 2020

PROJECT: 20139596 (6000)

RECORD OF BOREHOLE: BH21-3

SHEET 2 OF 3

LOCATION: See Figure 2

BORING DATE: April 29/30, 2021

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	CME75 Track Rig 120 mm Tricone Mud Rotary	(ML) SILT to sandy SILT, grey; non-cohesive, wet, very dense			PMT 1						
11					9	SS	50/ 0.1		W	MH	
12											
13					PMT 2						
14					10	SS	50/ 0.13		W		
15											
16					PMT 3						
17					11	SS	94		W		
18											
19											
20					PMT 4						
					12	SS	52				
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AD

CHECKED: RA

PROJECT: 20139596 (6000)

RECORD OF BOREHOLE: BH21-3

SHEET 3 OF 3

LOCATION: See Figure 2

BORING DATE: April 29/30, 2021

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20		*--- CONTINUED FROM PREVIOUS PAGE ---*									
		(ML) SILT to sandy SILT, grey; non-cohesive, wet, very dense		126.01	12	SS	52		○		
		END OF BOREHOLE		20.37							
		NOTE:									
21		1. Borehole grouted on completion of drilling.									
22											
23											
24											
25											
26											
27											
28											
29											
30											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AD

CHECKED: RA

GTA-BHS 001 S:\CLIENTS\CHOICE_PROPERTIES\SCARBOROUGH_WARDEN_AVE_683_685\02_DATA\GINT\20139596.GPJ GAL-MIS.GDT 5/25/21 MLK Mar. 2020

PROJECT: 20139596 (6000)

LOCATION: See Figure 2

RECORD OF BOREHOLE: BH21-4

BORING DATE: May 3/4, 2021

SHEET 1 OF 3

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		146.19							
0	200 mm O.D. Hollow Stem	TOPSOIL (~50 mm thick)		0.00							
		FILL - (CL) SILTY CLAY, some gravel; brown; cohesive, w~PL, stiff		0.05	1	SS	9				Concrete 50 mm Diameter Monitoring Well
				145.50							
1		(CL) SILTY CLAY, some sand, trace gravel; brown, oxidation stains (TILL); cohesive, w<PL, stiff to very stiff		0.69	2	SS	11				
					3	SS	23				
2				144.06							
		(ML) sandy SILT, trace to some gravel; brown, oxidation stains (TILL); non-cohesive, moist, very dense to dense		2.13	4	SS	62				
3					5	SS	47				
4				142.15							May 12, 2021
		(CL) sandy SILTY CLAY, trace gravel; grey (TILL); cohesive, w~PL, very stiff to hard		4.04	6	SS	28				
5	CME75 Track Rig										Bentonite
6	120 mm Tricone Mud Rotary				7	SS	52				
7				139.10							
		(SM/GP) SILTY SAND and GRAVEL; grey; wet, very dense		7.09	8	SS	99/ 0.28				
8											
				137.58							
		(SM/ML) SILTY SAND to sandy SILT, grey; non-cohesive, wet, very dense		8.61							
9					9	SS	50/ 0.1				
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AM

CHECKED: RA

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PROJECT: 20139596 (6000)

LOCATION: See Figure 2

RECORD OF BOREHOLE: BH21-4

SHEET 2 OF 3

BORING DATE: May 3/4, 2021

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	CME75 Track Rig 120 mm Tricone Mud Rotary	(SM/ML) SILTY SAND to sandy SILT, grey; non-cohesive, wet, very dense			10	SS	50/0.03				Sand
11				134.61							
		(ML) sandy SILT, grey; non-cohesive, wet, very dense		11.58							
12					11	SS	50/0.1				Silica Sand Filter and Screen
13											
14					12	SS	82				Sand
				131.48							
15		(ML) SILT, trace to some sand; grey; non-cohesive, wet, very dense to dense		14.71	13	SS	66				
16											
17					14	SS	68				Bentonite
18											
19					15	SS	47				
20					16	SS	54				
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AM

CHECKED: RA

GTA-BHS 001 S:\CLIENTS\CHOICE_PROPERTIES\SCARBOROUGH_WARDEN_AVE_683_685\02_DATA\GINT\20139596.GPJ GAL-MIS.GDT 5/25/21 MLK Mar. 2020

PROJECT: 20139596 (6000)

RECORD OF BOREHOLE: BH21-4

SHEET 3 OF 3

LOCATION: See Figure 2

BORING DATE: May 3/4, 2021

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---											
20	CME75 Track Rig 120 mm Tricone Mud Rotary	(ML) SILT, trace to some sand; grey; non-cohesive, wet, very dense to dense			16	SS	54				○		
21					17	SS	50				○		
				124.40									
22		END OF BOREHOLE		21.79									
		NOTE:											
		1. Groundwater level measured in monitoring well as follows:											
		Date Depth(m) Elev. (m) 12/05/2021 3.96 142.23											
23													
24													
25													
26													
27													
28													
29													
30													

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AM

CHECKED: RA

GTA-BHS 001 S:\CLIENTS\CHOICE_PROPERTIES\SCARBOROUGH_WARDEN_AVE_683_685\02_DATA\GINT\20139596.GPJ GAL-MIS.GDT 5/25/21 MLK Mar. 2020

APPENDIX D

MECP Water Well Record Summary

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR mbgl	FND Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
6928295		Oct-04	638787 4840607	142.0	5.2	Fr	1.5	-6.1	NR				7230 -	TH NU	**MOE# 6928295 TAG#A019967** 0.0 BRWN FILL SOFT 1.5 GREY SILT SAND PEAT 6.1 GREY SILT DNSE 12.8
6928507		Nov-04	639174 4840341	147.8	4.0	Fr	2.1	-3.0	NR				7230 -	TH NU	**MOE# 6928507 TAG#A019968** 0.0 FILL 0.3 BRWN SAND SILT LOOS 4.0 GREY SAND SILT PCKD 7.9
6929884		Jan-06	638828 4840811	146.0	0.9	Fr	3.0	-3.0	NR				7230 -	TH NU	**MOE# 6929884 TAG#A035782** 0.0 BRWN FILL 2.1 BRWN SILT SAND HARD 4.6 GREY SILT SAND HARD 6.7
6930582		Jul-06	639070 4840400	147.8	7.0 Un 0.9	Un	6.1	-1.5	NR				6607 -	OW -	**MOE# 6930582 TAG#A015775** 0.0 BRWN SAND SILT FILL 1.5 BRWN SILT SAND 3.0 GREY SILT DNSE 6.1 GREY SILT SAND 7.6
6930881		Oct-06	639246 4840547	146.9			4.6	-3.0	NR				6032 -	OW NU	**MOE# 6930881 TAG#A005416** 0.0 GREY SAND SLTY 7.6 GREY SILT SAND 7.6 GREY FILL SILT SAND 7.6
7043655		Mar-07	638914 4841342	153.3	2.1	Fr	1.5	-4.6	NR				6607 -	OW NU	**MOE# 7043655 TAG#A054673** 0.0 BRWN SAND SILT CLAY 6.1
7044691		May-07	639030 4840458	145.7			6.1	-1.5	NR				7241 OTH	AB -	**MOE# 7044691 TAG#A015775** 0.0
7048685		Jul-07	638715 4840500	142.0	6.1	Fr	4.9	-3.4	NR				7314 -	OW NU	**MOE# 7048685 TAG#A041449** 0.0 BRWN SAND SLTY GRVL 0.9 BRWN SAND SLTY GRVL 8.2
7120153		Dec-08	638603 4841401	144.2					NR				6607 -	TH MO	**MOE# 7120153 TAG#A081332** 0.0 BRWN SAND SILT HARD 4.6 GREY SAND SILT HARD 6.7
7169835		Sep-11	639274 4840431	147.2			3.7	-1.5	NR				7241 DP	- TH	**MOE# 7169835 TAG#A115759** 0.0 BRWN SAND GRVL LOOS 0.3 BRWN SAND SILT LOOS 3.7 GREY SILT SAND LOOS 4.9
7169836		Sep-11	639277 4840409	147.5			3.7	-1.5	NR				7241 DP	- TH	**MOE# 7169836 TAG#A122481** 0.0 GREY SAND GRVL LOOS 0.0 BRWN SAND SILT LOOS 3.7 GREY SAND SILT LOOS 4.9
7199437		May-12	638839 4840203	145.4					NR				6988 -	- -	**MOE# 7199437 TAG#A118408** 0.0
7201252		Jan-13	639091 4841353	153.9			2.4	-1.5	NR				6902 -	OW MO	**MOE# 7201252 TAG#A130406** 0.0 BLCK 79.9 BRWN SAND GRVL 499.9 BRWN SAND SILT CLAY 899.8 BRWN SAND SILT HARD 3.7
7201258		Mar-13	638558 4840330	141.4			1.5	-1.5	NR				7238 BR	OW MO	**MOE# 7201258 TAG#A143079** 0.0 GREY GRVL GRVL 0.3 GREY SILT SAND GRVL 2.4 SILT STNS DNSE 3.0
7265351		Mar-16	638767 4840577	141.1	6.7	Fr	18.3	-1.5	NR				7230 BR	- -	**MOE# 7265351 TAG#A203325** 0.0 BRWN FILL SAND DNSE 3.7 BRWN SAND SILT DNSE 8.5 GREY CLAY SILT 16.2 GREY SILT CLAY 19.8

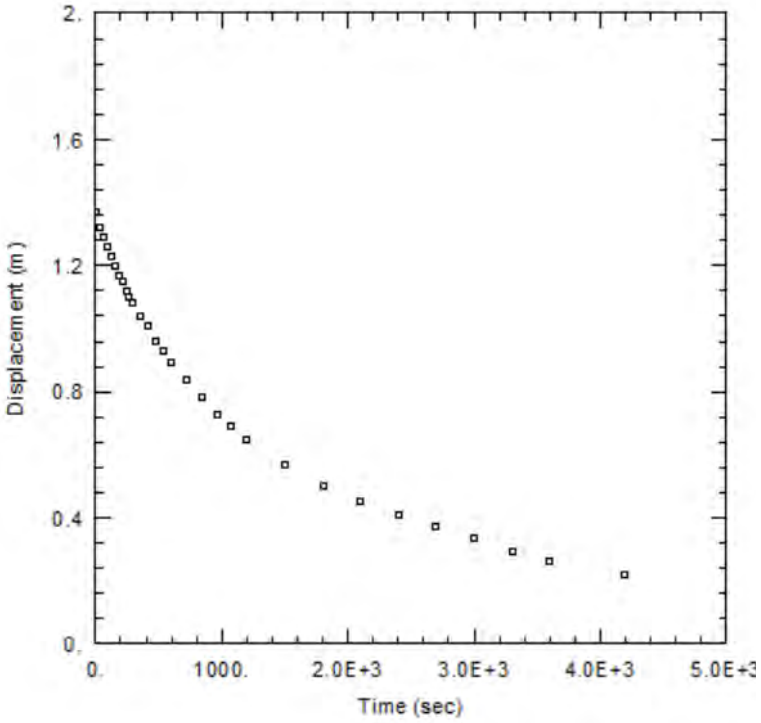
LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR mbgl	FND Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
7291094		May-17	638559 4841116	141.4	5.5	Un	15.2	-3.0	NR				7360 -	OW MO	**MOE# 7291094 TAG#A224679** 0.0 BRWN CLAY SOFT 3.0 GREY CLAY HARD 18.3
7291105		May-17	638557 4841188	139.3	6.1	Un	12.2	-3.0	NR				7360 -	OW MO	**MOE# 7291105 TAG#A224686** 0.0 FILL 1.5 SAND WBRG 6.1 CLAY HARD WBRG 15.2
7300124		Oct-17	639386 4840707	148.4	3.0	Un	1.5	-3.0	NR				6032 BR	OW TH	**MOE# 7300124 TAG#A202512** 0.0 BRWN CLAY 3.0 GREY CLAY 4.3 GREY SAND SILT 4.6
7300132		Apr-17	638667 4840801	146.0			21.3	0.0	NR				6032 BR	OW MO	**MOE# 7300132 TAG#A201456** 0.0 BRWN FILL SAND LOOS 1.5 BRWN SILT CLAY DNSE 9.1 GREY SILT CLAY DNSE 21.3 GREY SILT CLAY HARD 30.5
7300136		May-17	638804 4840316	145.7			21.3	0.0	NR				6032 RC	OW MO	**MOE# 7300136 TAG#A202529** 0.0 GREY STNS HARD 0.3 BRWN SAND GRVL HARD 0.9 BRWN CLAY SILT HARD 9.1 GREY SILT CLAY DNSE 32.0
7300137		May-17	638838 4840210	145.4			18.3	0.0	NR				6032 RR	OW MO	**MOE# 7300137 TAG#A202536** 0.0 GREY STNS HARD 0.3 BRWN SAND GRVL HARD 0.9 BRWN SILT CLAY HARD 3.7 GREY SILT CLAY DNSE 15.2 BRWN SAND DNSE 18.3
7300955		Nov-17	638657 4841077	146.0					NR				7238 -	- -	**MOE# 7300955 TAG#A229869** 0.0
7301787		Nov-17	638646 4840938	146.0					NR				7464 -	- -	**MOE# 7301787 TAG#A235108** 0.0
7322177		Apr-17	638631 4840889	NR			19.8	-3.0	NR				6032 BR	OW MO	**MOE# 7322177 TAG#A244498** 0.0 BLCK FILL LOOS 0.6 BRWN SILT CLAY LOOS 9.1 GREY CLAY SILT LOOS 22.9

QUALITY:		TYPE:		USE:			METHOD :	
Fr	Fresh	WS	Water Supply	CO	Comercial	NU	Not Used	CT	Cable Tool
Mn	Mineral	AQ	Abandoned Quality	DO	Domestic	IR	Irrigation	JT	Jetting
Sa	Salty	AS	Abandoned Supply	MU	Municipal	AL	Alteration	RC	Rotary Conventional
Su	Sulphur	AB	Abandonment Record	PU	Public	MO	Monitoring	RA	Rotary Air
--	Unrecorded	TH	Test Hole or Observation	ST	Stock	-	Not Recorded	BR	Boring

Easting and Northings UTM NAD 83 Zone 17, Translated from Recorded UTM NAD, subject to Field Verified Location or Improved Location Accuracy.

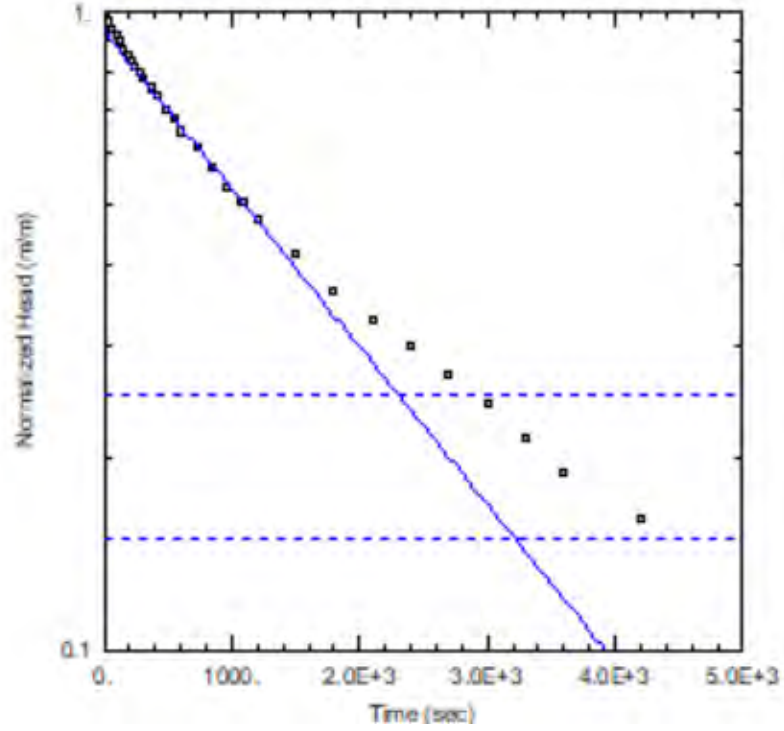
APPENDIX E

Water Level Measurements and Hydraulic Testing



TEST INFORMATION:

Test Well:	BH20-1
Date of Test:	May 12, 2021
Test Type:	Rising Head Test
Test Method:	Physical Slug
Static Water Level:	6.76 m
Initial Displacement:	1.37 m
Casing Radius:	0.025 m
Borehole Radius:	0.057 m
Well Screen Interval:	12.19 m to 15.35 m
Geology:	Sandy Silt



OLUTION:

Solution Method:	Hvorslev
Solution Type:	Zero Storage
Aquifer Model:	Unconfined

Hydraulic Conductivity (K) =

2.7×10^{-7} m/s

Water Level Measurement

Solution Match Line

CLIENT
Choice Properties Limited Partnership

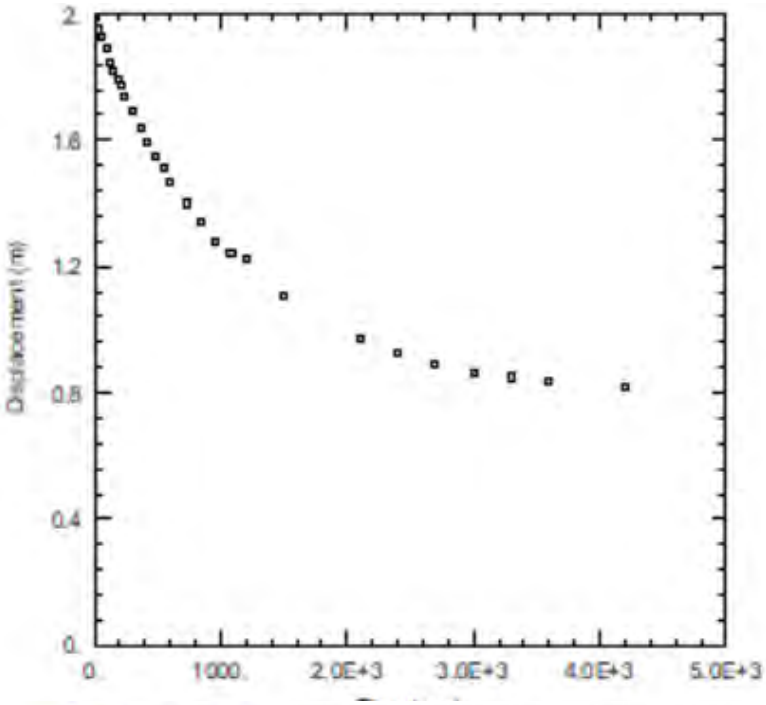
CONSULTANT
GOLDER

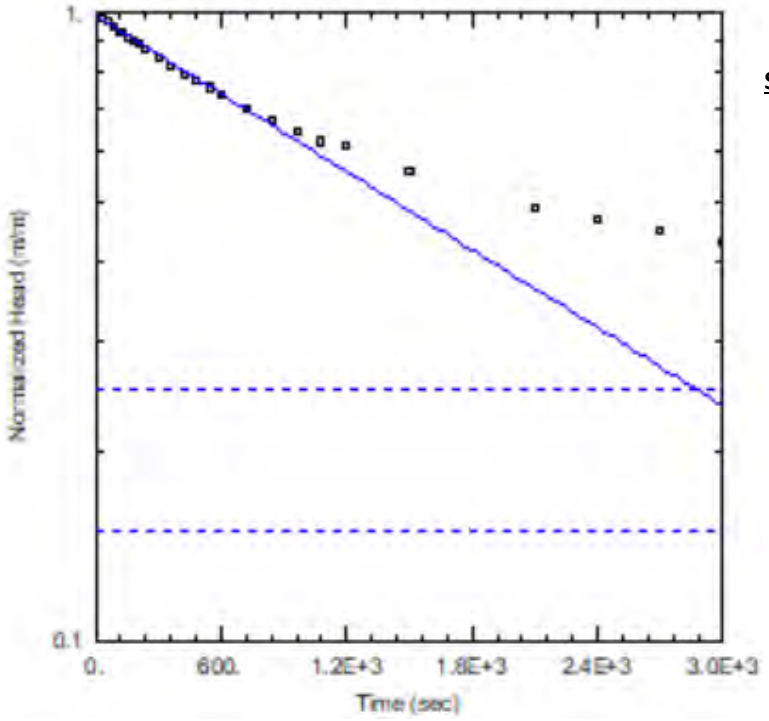
YYYY-MM-DD	2021-06-08
PREPARED	LB
DESIGN	PGM
REVIEW	LB
APPROVED	SA

PROJECT
Environmental Site Assessment, 683 and 685 Warden Avenue, Toronto, Ontario

TITLE
SINGLE WELL RESPONSE TEST ANALYSIS MONITORING WELL BH20-1

PROJECT No.	PHASE	Rev.	FIGURE
20139596	**6000**	**x**	**X**





TEST INFORMATION:

Test Well:	BH20-4
Date of Test:	May 12, 2021
Test Type:	Rising Head Test
Test Method:	Physical Slug
Static Water Level:	3.95 m
Initial Displacement:	1.99 m
Casing Radius:	0.025 m
Borehole Radius:	0.057 m
Well Screen Interval:	12.20 m to 15.80 m
Geology:	Silty Clay/sandy Silt

SOLUTION:

Solution Method:	Hvorslev
Solution Type:	Zero Storage
Aquifer Model:	Unconfined

Hydraulic Conductivity (K) =

2.1×10^{-7} m/s

Water Level Measurement

Solution Match Line

CLIENT
Choice Properties Limited Partnership

PROJECT
Environmental Site Assessment, 683 and 685 Warden Avenue, Toronto, Ontario

CONSULTANT
GOLDER

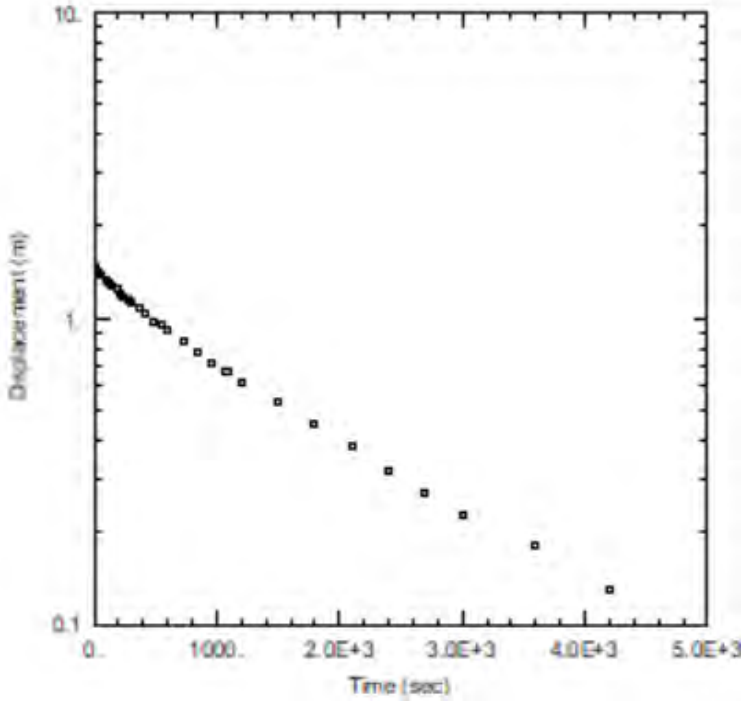
YYYY-MM-DD	2021-06-08
PREPARED	LB
DESIGN	PGM
REVIEW	LB
APPROVED	SA

TITLE
SINGLE WELL RESPONSE TEST ANALYSIS MONITORING WELL BH20-4

PROJECT No.	PHASE	Rev.	FIGURE
20139596	**6000**	**x**	**X**

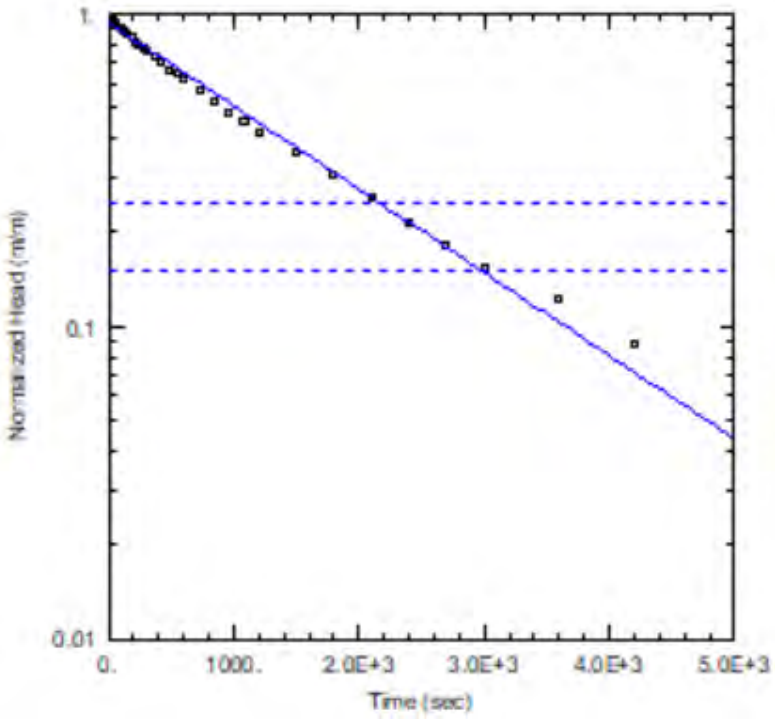
N:\Active\20153 Proj\328098 TTC_Scarborough Subway Extension_TOR\Report - working files\Appendix F - Permeability Tests

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A



TEST INFORMATION:

Test Well:	BH20-5
Date of Test:	May 12, 2021
Test Type:	Rising Head Test
Test Method:	Physical Slug
Static Water Level:	4.58 m
Initial Displacement:	1.48 m
Casing Radius:	0.025 m
Borehole Radius:	0.057 m
Well Screen Interval:	12.20 m to 15.2 m
Geology:	Silt Silty Sand/sandy Silt



SOLUTION:

Solution Method:	Hvorslev
Solution Type:	Zero Storage
Aquifer Model:	Unconfined

Hydraulic Conductivity (K) =

2.6×10^{-7} m/s

Water Level Measurement

Solution Match Line

CLIENT
Choice Properties Limited Partnership

PROJECT
Environmental Site Assessment, 683 and 685 Warden Avenue, Toronto, Ontario

CONSULTANT
GOLDER

YYYY-MM-DD	2021-06-08
PREPARED	LB
DESIGN	PGM
REVIEW	LB
APPROVED	SA

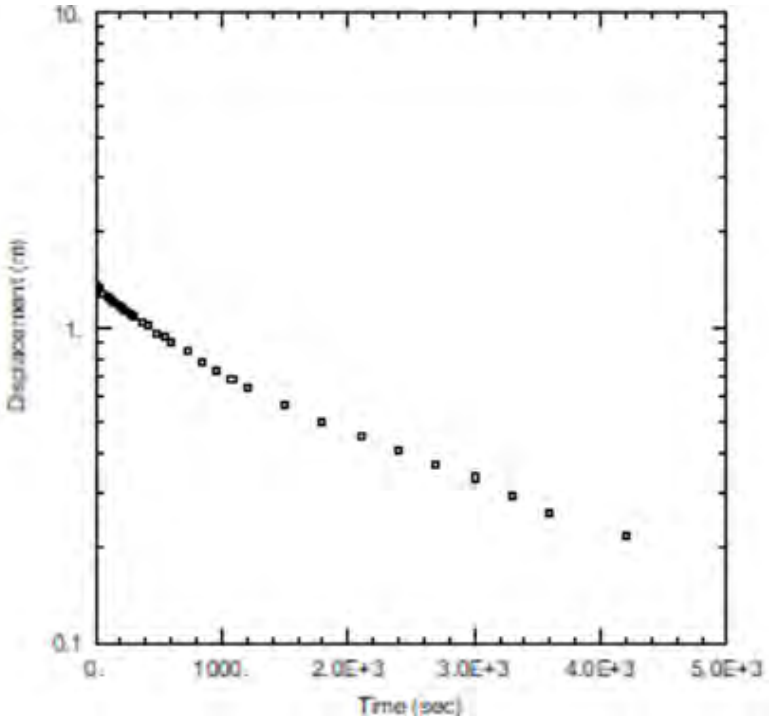
TITLE
SINGLE WELL RESPONSE TEST ANALYSIS
MONITORING WELL BH20-5

PROJECT No.	PHASE	Rev.	FIGURE
20139596	**6000**	**x**	**X**

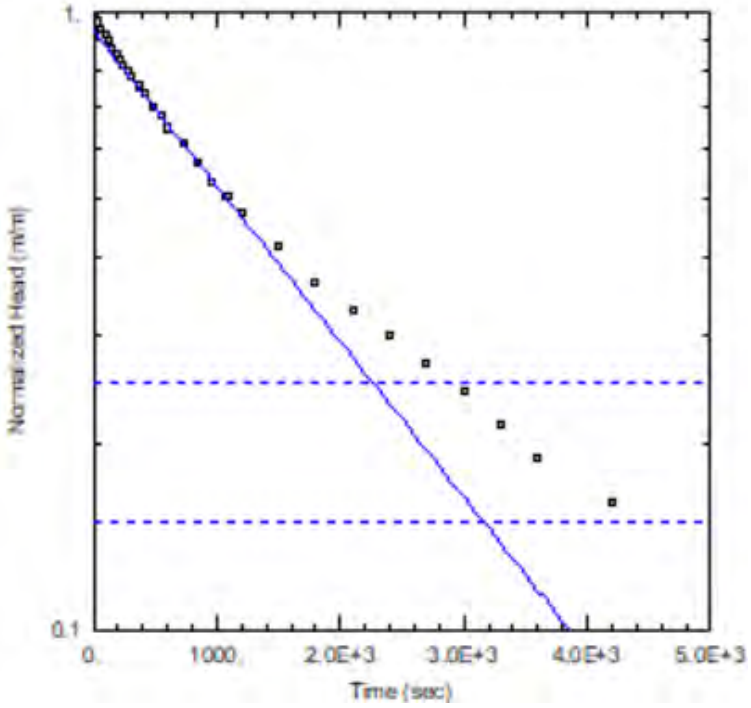
N:\Active\20153 Proj\328098 TTC_Scarborough Subway Extension_TOR\Report - working files\Appendix F - Permeability Tests

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

TEST INFORMATION:



Test Well:	BH21-01
Date of Test:	May 12, 2021
Test Type:	Rising Head Test
Test Method:	Physical Slug
Static Water Level:	6.76 m
Initial Displacement:	1.37 m
Casing Radius:	0.025 m
Borehole Radius:	0.057 m
Well Screen Interval:	21.3 m to 24.4 m
Geology:	Silt Silty Sand/sandy Silt



SOLUTION:

Solution Method:	Hvorslev
Solution Type:	Zero Storage
Aquifer Model:	Unconfined

Hydraulic Conductivity (K) =

2.8×10^{-7} m/s

Water Level Measurement

Solution Match Line

CLIENT
Choice Properties Limited Partnership

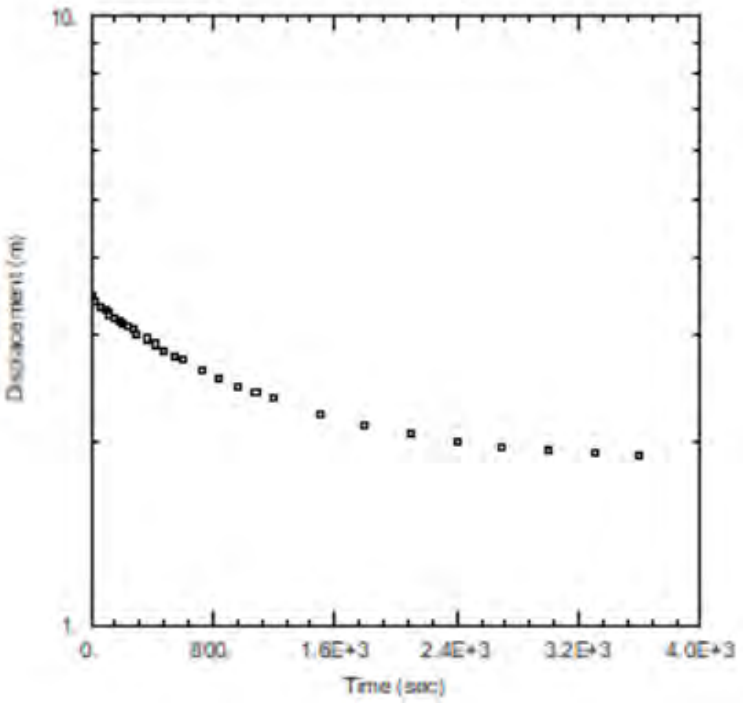
PROJECT
Environmental Site Assessment, 683 and 685 Warden Avenue, Toronto, Ontario

CONSULTANT
GOLDER

YYYY-MM-DD	2021-06-08
PREPARED	LB
DESIGN	PGM
REVIEW	LB
APPROVED	SA

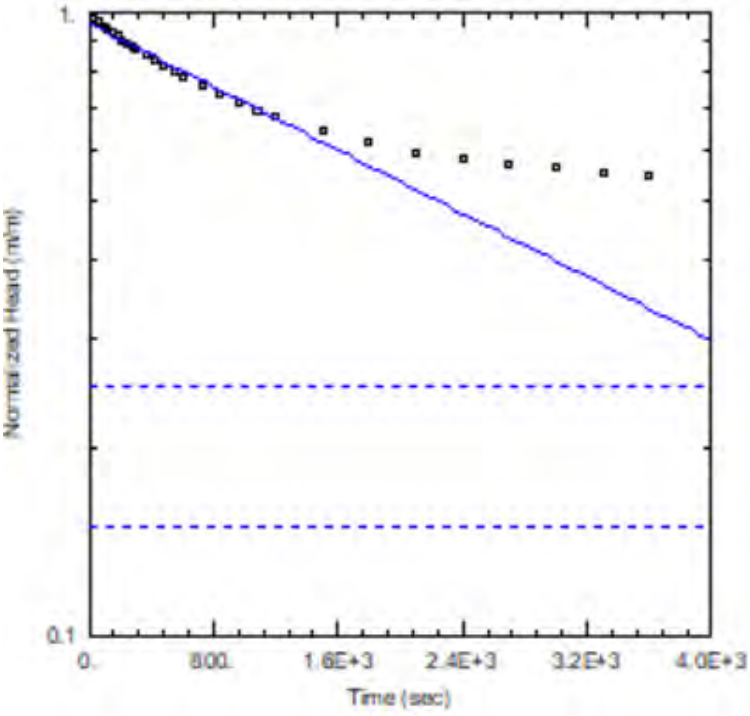
TITLE
SINGLE WELL RESPONSE TEST ANALYSIS
MONITORING WELL BH21-1

PROJECT No.	PHASE	Rev.	FIGURE
20139596	**6000**	**x**	**X**



TEST INFORMATION:

Test Well:	BH21-04
Date of Test:	May 12, 2021
Test Type:	Rising Head Test
Test Method:	Physical Slug
Static Water Level:	3.96 m
Initial Displacement:	3.45 m
Casing Radius:	0.025 m
Borehole Radius:	0.057 m
Well Screen Interval:	10.7 m to 13.7 m
Geology:	Silty Sand/sandy Silt



SOLUTION:

Solution Method:	Hvorslev
Solution Type:	Zero Storage
Aquifer Model:	UnConfined

Hydraulic Conductivity (K) =

1.3×10^{-7} m/s

Water Level Measurement

Solution Match Line

CLIENT
Choice Properties Limited Partnership

PROJECT
Environmental Site Assessment, 683 and 685 Warden Avenue, Toronto, Ontario

CONSULTANT
GOLDER

YYYY-MM-DD	2021-06-08
PREPARED	LB
DESIGN	PGM
REVIEW	LB
APPROVED	SA

TITLE
SINGLE WELL RESPONSE TEST ANALYSIS
MONITORING WELL BH21-4

PROJECT No.	PHASE	Rev.	FIGURE
20139596	**6000**	**x**	**X**

Table 1 - Groundwater Depths and Elevations
683 - 685 Warden Avenue, Toronto, Ontario

Monitoring Well ID	Unit Screened	Screen Interval (mbgs)		Screen Interval (masl)		Elevation (masl)	Stick-up (m)	12-May-21		28-May-21	
								(mbgs)	(masl)	(mbgs)	(masl)
BH20-1	(ML) sandy SILT	12.19	15.24	134.83	131.78	147.02	0.92	6.76	140.26	7.67	139.35
BH20-2	(CL) SILTY CLAY TILL/(ML) sandy SILT TILL	4.57	7.62	141.79	138.74	146.36	0.98	7.24	139.12	7.28	139.08
BH20-3	(SM/ML) SILTY SAND to sandy SILT TILL/(CL-ML) SILTY CLAY to CLAYEY SILT TILL	4.57	7.62	142.22	139.17	146.79	0.84	3.42	143.37	3.75	143.04
BH20-4	(ML) SILT to sandy SILT	12.20	15.80	133.80	130.20	146.00	0.88	3.95	142.05	4.07	141.93
BH20-5	(SM/ML) SILTY SAND to sandy SILT	12.19	15.85	133.61	129.95	145.80	0.97	4.58	141.22	4.63	141.17
BH20-6	(CL-ML) sandy SILTY CLAY to CLAYEY SILT TILL	4.57	7.62	142.13	139.08	146.70	0.96	1.09	145.61	1.46	145.24
BH21-1	(ML) SILT	21.30	24.40	125.47	122.37	146.77	0.92	6.76	140.01	6.8	139.97
BH21-4	(SM/ML) SILTY SAND to sandy SILT	10.70	13.70	135.49	132.49	146.19	0.85	3.96	142.23	5.78	140.41

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

Input by: LB
Checked by: SAA

APPENDIX F

Groundwater Analytical Results

Table F-1: Groundwater Analytical Results (Unfiltered): Toronto Sanitary and Storm Sewer By-Law Parameters
Hydrogeological Investigation

Proposed Residential Development
683 to 685 Warden Avenue, Scarborough, Ontario
Sampling Date: May 28, 2021

Parameters	Units	RDL	Discharge Limits		BH20-6
Metals			Sanitary	Storm	**May-28-2021**
Total Aluminum	mg/L	0.0049	50	-	0.15
Total Antimony	mg/L	0.0005	5	-	<0.0005
Total Arsenic	mg/L	0.001	1	0.02	<0.001
Total Cadmium	mg/L	0.00009	0.7	0.008	<0.00009
Chromium (VI)	mg/L	0.0005	2	0.04	<0.0005
Total Chromium	mg/L	0.005	4	0.08	<0.005
Total Cobalt	mg/L	0.0005	5	-	0.0014
Total Copper	mg/L	0.0009	2	0.04	<0.0009
Total Lead	mg/L	0.0005	1	0.12	<0.0005
Total Manganese	mg/L	0.002	5	0.05	**0.15**
Total Mercury	mg/L	0.00010	0.01	0.0004	<0.00010
Total Molybdenum	mg/L	0.0005	5	-	0.0016
Total Nickel	mg/L	0.001	2	0.08	0.0037
Total Selenium	mg/L	0.002	1	0.02	<0.002
Total Silver	mg/L	0.00009	5	0.12	<0.00009
Total Tin	mg/L	0.001	5	-	<0.001
Total Titanium	mg/L	0.005	5	-	0.0083
Total Zinc	mg/L	0.005	2	0.04	<0.005
Inorganics and General Chemistry					
pH	pH Units	-	6.0:11.5	6.0:9.5	7.43
BOD (5)	mg/L	2	300	15	<2
Fluoride	mg/L	0.10	10	-	0.24
Total Cyanide	mg/L	0.0050	2	0.02	<0.0050
Total Kjeldahl Nitrogen	mg/L	0.10	100	-	0.65
Phenols	mg/L	0.0010	1.0	0.008	<0.0010
Total Phosphorus	mg/L	0.1	10	0.4	<0.1
Total Suspended Solids	mg/L	10	350	15	**21**
Oil and Grease (animal/vegetable) in water	mg/L	0.50	150	-	<0.50
Oil and Grease (mineral) in water	mg/L	0.5	15	-	<0.50
Methylene Chloride	mg/L	0.004	2	0.0052	<0.004
cis- 1,2-Dichloroethylene	mg/L	0.001	4	0.0056	<0.001
Chloroform	mg/L	0.0004	0.04	0.002	<0.0004
Benzene	mg/L	0.0004	0.01	0.002	<0.0004
trans-1,3-Dichloropropylene	mg/L	0.0008	0.14	0.0056	<0.0008
Trichloroethylene	mg/L	0.0004	0.4	0.0076	<0.0004
Toluene	mg/L	0.0004	0.016	0.002	<0.0004
Tetrachloroethylene	mg/L	0.0004	1	0.0044	<0.0004
Ethylbenzene	mg/L	0.0004	0.16	0.002	<0.0004
1,1,2,2-Tetrachloroethane	mg/L	0.0008	1.4	0.017	<0.0008
1,2-Dichlorobenzene	mg/L	0.0008	0.05	0.0056	<0.0008
1,4-Dichlorobenzene	mg/L	0.0008	0.08	0.0068	<0.0008
Total Xylenes	mg/L	0.0004	1.4	0.0044	<0.0004
PCBs	mg/L	0.00005	0.001	0.0004	<0.00005
Di-n-butyl phthalate	mg/L	0.002	0.08	0.015	<0.002
Bis(2-Ethylhexyl)phthalate	mg/L	0.002	0.012	0.0088	<0.002
Total Nonylphenol	mg/L	0.001	0.02	0.001	<0.001
Total Nonylphenol Ethoxylates	mg/L	0.005	0.2	0.01	<0.005
Escherichia coli	CFU/100mL	10	-	200	<10

Notes:

Shaded	Concentrations in shaded cells exceed the Regional Municipality of Toronto, By-law No. 100-2016, *Table 1 - Limits for Sanitary Sewer Discharge* .
Bold	Concentrations in cells **with bold font** exceed the Regional Municipality of Toronto, By-law No. 100-2016, *Table 2 - Limits for Storm Sewer Discharge* .
RDL	Reported detection limit
-	Parameter not analyzed
<	Less than the accompanying RDL
NA	Not applicable
BOD	Biochemical Oxygen Demand
PCB	Polychlorinated biphenyls
mg/L	milligrams per litre
CFU	Colony forming unit

Entered by: CME
Checked by: SAA

Table F-2: Groundwater Analytical Results (Filtered): Toronto Sanitary and Storm Sewer By-Law Parameters
Hydrogeological Investigation
Proposed Residential Development
683 to 685 Warden Avenue, Scarborough, Ontario
Sampling Date: May 28, 2021

Parameters	Units	RDL	Discharge Limits		20-1F
Metals			Sanitary	Storm	**May-28-20**
Total Aluminum	mg/L	0.005	50	-	<0.0049
Total Antimony	mg/L	0.0005	5	-	<0.0005
Total Arsenic	ug/L	0.001	1	0.02	<0.001
Total Cadmium	ug/L	0.00009	0.7	0.008	<0.00009
Total Chromium	ug/L	0.005	4	0.08	<0.005
Total Cobalt	ug/L	0.0005	5	-	0.002
Total Copper	ug/L	0.0009	2	0.04	<0.0009
Total Lead	ug/L	0.0005	1	0.12	<0.0005
Total Manganese	ug/L	0.002	5	0.05	**0.170**
Total Mercury	mg/L	0.00010	0.01	0.0004	-
Total Molybdenum	mg/L	0.0005	5	-	0.0018
Total Nickel	mg/L	0.001	2	0.08	0.0047
Total Selenium	mg/L	0.002	1	0.02	<0.002
Total Silver	mg/L	0.00009	5	0.12	<0.00009
Total Tin	mg/L	0.001	5	-	<0.001
Total Titanium	mg/L	0.005	5	-	<0.005
Total Zinc	mg/L	0.005	2	0.04	<0.005
Total Phosphorus	mg/L	0.1	10	0.4	<0.1
Total Suspended Solids	mg/L	10	250	15	<10

Notes:

Shaded	*1 - Limits for Sanitary Sewer Discharge* .
Bold	Concentrations in cells **with bold font** exceed the Regional Municipality of Toronto, By-law No. 100-2016, *Table 2 - Limits for Storm Sewer Discharge* .
RDL	Reported detection limit
-	Parameter not analyzed
<	Less than the accompanying RDL
NA	Not applicable
mg/L	milligrams per litre

Entered by: CME
Checked by:

Your Project #: 20139596 (7000)
Site Location: 685 Warden Avenue
Your C.O.C. #: 827955-01-01

Attention: Syed Ali

Golder Associates Ltd
100 Scotia Crt
Whitby, ON
CANADA L1N 8Y6

Report Date: 2021/06/10
Report #: R6670424
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1E5900
Received: 2021/05/29, 08:25

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sewer Use By-Law Semivolatile Organics	1	2021/06/08	2021/06/10	CAM SOP 00301	EPA 8270 m
Biochemical Oxygen Demand (BOD)	1	2021/05/31	2021/06/05	CAM SOP-00427	SM 23 5210B m
Chromium (VI) in Water	1	N/A	2021/06/03	CAM SOP-00436	EPA 7199 m
Total Cyanide	1	2021/06/02	2021/06/02	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2021/06/01	2021/06/03	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2021/06/02	2021/06/03	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	2	N/A	2021/06/02	CAM SOP-00447	EPA 6020B m
E.coli, (CFU/100mL)	1	N/A	2021/05/29	CAM SOP-00552	MOE LSB E3371
Total Nonylphenol in Liquids by HPLC	1	2021/06/04	2021/06/05	CAM SOP-00313	In-house Method
Nonylphenol Ethoxylates in Liquids: HPLC	1	2021/06/04	2021/06/05	CAM SOP-00313	In-house Method
Animal and Vegetable Oil and Grease	1	N/A	2021/06/03	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2021/06/02	2021/06/03	CAM SOP-00326	EPA1664B m,SM5520B m
Polychlorinated Biphenyl in Water	1	2021/06/02	2021/06/03	CAM SOP-00309	EPA 8082A m
pH	1	2021/06/01	2021/06/03	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2021/06/01	CAM SOP-00444	OMOE E3179 m
Total Kjeldahl Nitrogen in Water	1	2021/06/01	2021/06/02	CAM SOP-00938	OMOE E3516 m
Total PAHs (1)	1	N/A	2021/06/07	CAM SOP - 00301	
Mineral/Synthetic O & G (TPH Heavy Oil) (2)	1	2021/06/02	2021/06/03	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	2	2021/06/02	2021/06/03	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2021/06/02	CAM SOP-00228	EPA 8260C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or

Your Project #: 20139596 (7000)
Site Location: 685 Warden Avenue
Your C.O.C. #: 827955-01-01

Attention: Syed Ali

Golder Associates Ltd
100 Scotia Crt
Whitby, ON
CANADA L1N 8Y6

Report Date: 2021/06/10
Report #: R6670424
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1E5900
Received: 2021/05/29, 08:25

implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Total PAHs include only those PAHs specified in the sewer use by-by-law.
(2) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ema Gitej, Senior Project Manager
Email: emese.gitej@bureauveritas.com
Phone# (905)817-5829
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C1E5900
Report Date: 2021/06/10

Golder Associates Ltd
Client Project #: 20139596 (7000)
Site Location: 685 Warden Avenue
Sampler Initials: AD

TORONTO SANITARY&STORM SEWER (100-2016)

BV Labs ID				PRS053		
Sampling Date				2021/05/28 05:00		
COC Number				827955-01-01		
	UNITS	San	Stm	BH20-6	RDL	QC Batch
Calculated Parameters						
Total Animal/Vegetable Oil and Grease	mg/L	**150**	-	<0.50	0.50	7378694
Inorganics						
Total BOD	mg/L	**300**	15	<2	2	7380125
Fluoride (F-)	mg/L	**10**	-	0.24	0.10	7381983
Total Kjeldahl Nitrogen (TKN)	mg/L	**100**	-	0.65	0.10	7382592
pH	pH	**6.0:11.5**	6.0:9.5	7.43		7382076
Phenols-4AAP	mg/L	**1.0**	0.008	<0.0010	0.0010	7380061
Total Suspended Solids	mg/L	**350**	15	21	10	7379715
Total Cyanide (CN)	mg/L	**2**	0.02	<0.0050	0.0050	7386174
Petroleum Hydrocarbons						
Total Oil & Grease	mg/L	**-**	-	<0.50	0.50	7385725
Total Oil & Grease Mineral/Synthetic	mg/L	**15**	-	<0.50	0.50	7385731
Miscellaneous Parameters						
Nonylphenol Ethoxylate (Total)	mg/L	**0.2**	0.01	<0.005	0.005	7390457
Nonylphenol (Total)	mg/L	**0.02**	0.001	<0.001	0.001	7390455
Metals						
Chromium (VI)	ug/L	**2000**	40	<0.50	0.50	7380787
Mercury (Hg)	mg/L	**0.01**	0.0004	<0.00010	0.00010	7384378
Total Aluminum (Al)	ug/L	**50000**	-	150	4.9	7384055
Total Antimony (Sb)	ug/L	**5000**	-	<0.50	0.50	7384055
Total Arsenic (As)	ug/L	**1000**	20	<1.0	1.0	7384055
Total Cadmium (Cd)	ug/L	**700**	8	<0.090	0.090	7384055
Total Chromium (Cr)	ug/L	**4000**	80	<5.0	5.0	7384055
Total Cobalt (Co)	ug/L	**5000**	-	1.4	0.50	7384055
Total Copper (Cu)	ug/L	**2000**	40	<0.90	0.90	7384055
Total Lead (Pb)	ug/L	**1000**	120	<0.50	0.50	7384055
Total Manganese (Mn)	ug/L	**5000**	50	150	2.0	7384055
Total Molybdenum (Mo)	ug/L	**5000**	-	1.6	0.50	7384055
Total Nickel (Ni)	ug/L	**2000**	80	3.7	1.0	7384055
Total Phosphorus (P)	ug/L	**10000**	400	<100	100	7384055
Total Selenium (Se)	ug/L	**1000**	20	<2.0	2.0	7384055
Total Silver (Ag)	ug/L	**5000**	120	<0.090	0.090	7384055

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

TORONTO SANITARY&STORM SEWER (100-2016)

BV Labs ID				PRS053		
Sampling Date				2021/05/28 05:00		
COC Number				827955-01-01		
	UNITS	San	Stm	BH20-6	RDL	QC Batch
Total Tin (Sn)	ug/L	**5000**	-	<1.0	1.0	7384055
Total Titanium (Ti)	ug/L	**5000**	-	8.3	5.0	7384055
Total Zinc (Zn)	ug/L	**2000**	40	<5.0	5.0	7384055
Semivolatile Organics						
Di-N-butyl phthalate	ug/L	**80**	15	<2	2	7396600
Bis(2-ethylhexyl)phthalate	ug/L	**12**	8.8	<2	2	7396600
3,3'-Dichlorobenzidine	ug/L	**2**	0.8	<0.8	0.8	7396600
Pentachlorophenol	ug/L	**5**	2	<1	1	7396600
Phenanthrene	ug/L	**-**	-	<0.2	0.2	7396600
Anthracene	ug/L	**-**	-	<0.2	0.2	7396600
Fluoranthene	ug/L	**-**	-	<0.2	0.2	7396600
Pyrene	ug/L	**-**	-	<0.2	0.2	7396600
Benzo(a)anthracene	ug/L	**-**	-	<0.2	0.2	7396600
Chrysene	ug/L	**-**	-	<0.2	0.2	7396600
Benzo(b/j)fluoranthene	ug/L	**-**	-	<0.2	0.2	7396600
Benzo(k)fluoranthene	ug/L	**-**	-	<0.2	0.2	7396600
Benzo(a)pyrene	ug/L	**-**	-	<0.2	0.2	7396600
Indeno(1,2,3-cd)pyrene	ug/L	**-**	-	<0.2	0.2	7396600
Dibenzo(a,h)anthracene	ug/L	**-**	-	<0.2	0.2	7396600
Benzo(g,h,i)perylene	ug/L	**-**	-	<0.2	0.2	7396600
Dibenzo(a,i)pyrene	ug/L	**-**	-	<0.2	0.2	7396600
Benzo(e)pyrene	ug/L	**-**	-	<0.2	0.2	7396600
Perylene	ug/L	**-**	-	<0.2	0.2	7396600
Dibenzo(a,j) acridine	ug/L	**-**	-	<0.4	0.4	7396600
7H-Dibenzo(c,g) Carbazole	ug/L	**-**	-	<0.4	0.4	7396600
1,6-Dinitropyrene	ug/L	**-**	-	<0.4	0.4	7396600
1,3-Dinitropyrene	ug/L	**-**	-	<0.4	0.4	7396600
1,8-Dinitropyrene	ug/L	**-**	-	<0.4	0.4	7396600
Calculated Parameters						
Total PAHs (18 PAHs)	ug/L	**5**	2	<1	1	7378695
Volatile Organics						
Benzene	ug/L	**10**	2	<0.40	0.40	7381476
Chloroform	ug/L	**40**	2	<0.40	0.40	7381476

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681

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BV Labs Job #: C1E5900
Report Date: 2021/06/10

Golder Associates Ltd
Client Project #: 20139596 (7000)
Site Location: 685 Warden Avenue
Sampler Initials: AD

TORONTO SANITARY&STORM SEWER (100-2016)

BV Labs ID				PRS053		
Sampling Date				2021/05/28 05:00		
COC Number				827955-01-01		
	UNITS	San	Stm	BH20-6	RDL	QC Batch
1,2-Dichlorobenzene	ug/L	**50**	5.6	<0.80	0.80	7381476
1,4-Dichlorobenzene	ug/L	**80**	6.8	<0.80	0.80	7381476
cis-1,2-Dichloroethylene	ug/L	**4000**	5.6	<1.0	1.0	7381476
trans-1,3-Dichloropropene	ug/L	**140**	5.6	<0.80	0.80	7381476
Ethylbenzene	ug/L	**160**	2	<0.40	0.40	7381476
Methylene Chloride(Dichloromethane)	ug/L	**2000**	5.2	<4.0	4.0	7381476
1,1,2,2-Tetrachloroethane	ug/L	**1400**	17	<0.80	0.80	7381476
Tetrachloroethylene	ug/L	**1000**	4.4	<0.40	0.40	7381476
Toluene	ug/L	**16**	2	<0.40	0.40	7381476
Trichloroethylene	ug/L	**400**	7.6	<0.40	0.40	7381476
p+m-Xylene	ug/L	**1400**	4.4	<0.40	0.40	7381476
o-Xylene	ug/L	**1400**	4.4	<0.40	0.40	7381476
Total Xylenes	ug/L	**1400**	4.4	<0.40	0.40	7381476
PCBs						
Total PCB	ug/L	**1**	0.4	<0.05	0.05	7384490
Microbiological						
Escherichia coli	CFU/100mL	-	200	<10	10	7378925
Surrogate Recovery (%)						
2,4,6-Tribromophenol	%	-	-	71		7396600
2-Fluorobiphenyl	%	-	-	58		7396600
D14-Terphenyl (FS)	%	-	-	87		7396600
D5-Nitrobenzene	%	-	-	77		7396600
D8-Acenaphthylene	%	-	-	74		7396600
Decachlorobiphenyl	%	-	-	119		7384490
4-Bromofluorobenzene	%	-	-	82		7381476
D4-1,2-Dichloroethane	%	-	-	125		7381476
D8-Toluene	%	-	-	91		7381476

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
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BV Labs Job #: C1E5900
Report Date: 2021/06/10

Golder Associates Ltd
Client Project #: 20139596 (7000)
Site Location: 685 Warden Avenue
Sampler Initials: AD

RESULTS OF ANALYSES OF WATER

BV Labs ID				PRS054		
Sampling Date				2021/05/28 05:00		
COC Number				827955-01-01		
	UNITS	San	Stm	BH20-6 F	RDL	QC Batch
Inorganics						
Total Suspended Solids	mg/L	**350**	15	<10	10	7379715

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681

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BV Labs Job #: C1E5900
Report Date: 2021/06/10

Golder Associates Ltd
Client Project #: 20139596 (7000)
Site Location: 685 Warden Avenue
Sampler Initials: AD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID				PRS054		
Sampling Date				2021/05/28 05:00		
COC Number				827955-01-01		
	UNITS	San	Stm	BH20-6 F	RDL	QC Batch
Metals						
Total Aluminum (Al)	ug/L	**50000**	-	<4.9	4.9	7384055
Total Antimony (Sb)	ug/L	**5000**	-	<0.50	0.50	7384055
Total Arsenic (As)	ug/L	**1000**	20	<1.0	1.0	7384055
Total Cadmium (Cd)	ug/L	**700**	8	<0.090	0.090	7384055
Total Chromium (Cr)	ug/L	**4000**	80	<5.0	5.0	7384055
Total Cobalt (Co)	ug/L	**5000**	-	2.0	0.50	7384055
Total Copper (Cu)	ug/L	**2000**	40	<0.90	0.90	7384055
Total Lead (Pb)	ug/L	**1000**	120	<0.50	0.50	7384055
Total Manganese (Mn)	ug/L	**5000**	50	170	2.0	7384055
Total Molybdenum (Mo)	ug/L	**5000**	-	1.8	0.50	7384055
Total Nickel (Ni)	ug/L	**2000**	80	4.7	1.0	7384055
Total Phosphorus (P)	ug/L	**10000**	400	<100	100	7384055
Total Selenium (Se)	ug/L	**1000**	20	<2.0	2.0	7384055
Total Silver (Ag)	ug/L	**5000**	120	<0.090	0.090	7384055
Total Tin (Sn)	ug/L	**5000**	-	<1.0	1.0	7384055
Total Titanium (Ti)	ug/L	**5000**	-	<5.0	5.0	7384055
Total Zinc (Zn)	ug/L	**2000**	40	<5.0	5.0	7384055

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681

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BV Labs Job #: C1E5900
Report Date: 2021/06/10

Golder Associates Ltd
Client Project #: 20139596 (7000)
Site Location: 685 Warden Avenue
Sampler Initials: AD

TEST SUMMARY

BV Labs ID: PRS053
Sample ID: BH20-6
Matrix: Water

Collected: 2021/05/28
Shipped:
Received: 2021/05/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sewer Use By-Law Semivolatile Organics	GC/MS	7396600	2021/06/08	2021/06/10	Kathy Horvat
Biochemical Oxygen Demand (BOD)	DO	7380125	2021/05/31	2021/06/05	Frank Zhang
Chromium (VI) in Water	IC	7380787	N/A	2021/06/03	Lang Le
Total Cyanide	SKAL/CN	7386174	2021/06/02	2021/06/02	Aditiben Patel
Fluoride	ISE	7381983	2021/06/01	2021/06/03	Yogesh Patel
Mercury in Water by CVAA	CV/AA	7384378	2021/06/02	2021/06/03	Meghaben Patel
Total Metals Analysis by ICPMS	ICP/MS	7384055	N/A	2021/06/02	Nan Raykha
E.coli, (CFU/100mL)	PL	7378925	N/A	2021/05/29	Farhana Rahman
Total Nonylphenol in Liquids by HPLC	LC/FLU	7390455	2021/06/04	2021/06/05	Dennis Boodram
Nonylphenol Ethoxylates in Liquids: HPLC	LC/FLU	7390457	2021/06/04	2021/06/05	Dennis Boodram
Animal and Vegetable Oil and Grease	BAL	7378694	N/A	2021/06/03	Automated Statchk
Total Oil and Grease	BAL	7385725	2021/06/02	2021/06/03	Saumya Modh
Polychlorinated Biphenyl in Water	GC/ECD	7384490	2021/06/02	2021/06/03	Svitlana Shaula
pH	AT	7382076	2021/06/01	2021/06/03	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	7380061	N/A	2021/06/01	Deonarine Ramnarine
Total Kjeldahl Nitrogen in Water	SKAL	7382592	2021/06/01	2021/06/02	Rajni Tyagi
Total PAHs	CALC	7378695	N/A	2021/06/07	Automated Statchk
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	7385731	2021/06/02	2021/06/03	Saumya Modh
Total Suspended Solids	BAL	7379715	2021/06/02	2021/06/03	Sandeep Kaur
Volatile Organic Compounds in Water	GC/MS	7381476	N/A	2021/06/02	Rebecca McClean

BV Labs ID: PRS054
Sample ID: BH20-6 F
Matrix: Water

Collected: 2021/05/28
Shipped:
Received: 2021/05/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals Analysis by ICPMS	ICP/MS	7384055	N/A	2021/06/02	Nan Raykha
Total Suspended Solids	BAL	7379715	2021/06/02	2021/06/03	Sandeep Kaur

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BV Labs Job #: C1E5900
Report Date: 2021/06/10

Golder Associates Ltd
Client Project #: 20139596 (7000)
Site Location: 685 Warden Avenue
Sampler Initials: AD

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.0°C

Sample PRS053 [BH20-6] : VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7379715	SEK	QC Standard	Total Suspended Solids	2021/06/03		95	%	85 - 115
7379715	SEK	Method Blank	Total Suspended Solids	2021/06/03	<10		mg/L	
7379715	SEK	RPD	Total Suspended Solids	2021/06/03	NC		%	25
7380061	DRM	Matrix Spike	Phenols-4AAP	2021/05/31		101	%	80 - 120
7380061	DRM	Spiked Blank	Phenols-4AAP	2021/05/31		102	%	80 - 120
7380061	DRM	Method Blank	Phenols-4AAP	2021/05/31	<0.0010		mg/L	
7380061	DRM	RPD	Phenols-4AAP	2021/05/31	NC		%	20
7380125	FZH	QC Standard	Total BOD	2021/06/05		92	%	80 - 120
7380125	FZH	Method Blank	Total BOD	2021/06/05	<2		mg/L	
7380125	FZH	RPD	Total BOD	2021/06/05	NC		%	30
7380787	LLE	Matrix Spike	Chromium (VI)	2021/06/03		100	%	80 - 120
7380787	LLE	Spiked Blank	Chromium (VI)	2021/06/03		103	%	80 - 120
7380787	LLE	Method Blank	Chromium (VI)	2021/06/03	<0.50		ug/L	
7380787	LLE	RPD	Chromium (VI)	2021/06/03	NC		%	20
7381476	RSC	Matrix Spike	4-Bromofluorobenzene	2021/06/02		118	%	70 - 130
			D4-1,2-Dichloroethane	2021/06/02		113	%	70 - 130
			D8-Toluene	2021/06/02		108	%	70 - 130
			Benzene	2021/06/02		95	%	70 - 130
			Chloroform	2021/06/02		105	%	70 - 130
			1,2-Dichlorobenzene	2021/06/02		92	%	70 - 130
			1,4-Dichlorobenzene	2021/06/02		102	%	70 - 130
			cis-1,2-Dichloroethylene	2021/06/02		103	%	70 - 130
			trans-1,3-Dichloropropene	2021/06/02		108	%	70 - 130
			Ethylbenzene	2021/06/02		81	%	70 - 130
			Methylene Chloride(Dichloromethane)	2021/06/02		104	%	70 - 130
			1,1,2,2-Tetrachloroethane	2021/06/02		103	%	70 - 130
			Tetrachloroethylene	2021/06/02		91	%	70 - 130
			Toluene	2021/06/02		93	%	70 - 130
			Trichloroethylene	2021/06/02		101	%	70 - 130
			p+m-Xylene	2021/06/02		86	%	70 - 130
			o-Xylene	2021/06/02		78	%	70 - 130
7381476	RSC	Spiked Blank	4-Bromofluorobenzene	2021/06/02		97	%	70 - 130
			D4-1,2-Dichloroethane	2021/06/02		111	%	70 - 130
			D8-Toluene	2021/06/02		107	%	70 - 130
			Benzene	2021/06/02		92	%	70 - 130
			Chloroform	2021/06/02		102	%	70 - 130
			1,2-Dichlorobenzene	2021/06/02		88	%	70 - 130
			1,4-Dichlorobenzene	2021/06/02		98	%	70 - 130
			cis-1,2-Dichloroethylene	2021/06/02		99	%	70 - 130
			trans-1,3-Dichloropropene	2021/06/02		97	%	70 - 130
			Ethylbenzene	2021/06/02		78	%	70 - 130
			Methylene Chloride(Dichloromethane)	2021/06/02		100	%	70 - 130
			1,1,2,2-Tetrachloroethane	2021/06/02		99	%	70 - 130
			Tetrachloroethylene	2021/06/02		89	%	70 - 130
			Toluene	2021/06/02		89	%	70 - 130
			Trichloroethylene	2021/06/02		99	%	70 - 130
			p+m-Xylene	2021/06/02		82	%	70 - 130
			o-Xylene	2021/06/02		80	%	70 - 130
7381476	RSC	Method Blank	4-Bromofluorobenzene	2021/06/02		86	%	70 - 130
			D4-1,2-Dichloroethane	2021/06/02		122	%	70 - 130
			D8-Toluene	2021/06/02		90	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzene	2021/06/02	<0.20		ug/L	
			Chloroform	2021/06/02	<0.20		ug/L	
			1,2-Dichlorobenzene	2021/06/02	<0.40		ug/L	
			1,4-Dichlorobenzene	2021/06/02	<0.40		ug/L	
			cis-1,2-Dichloroethylene	2021/06/02	<0.50		ug/L	
			trans-1,3-Dichloropropene	2021/06/02	<0.40		ug/L	
			Ethylbenzene	2021/06/02	<0.20		ug/L	
			Methylene Chloride(Dichloromethane)	2021/06/02	<2.0		ug/L	
			1,1,2,2-Tetrachloroethane	2021/06/02	<0.40		ug/L	
			Tetrachloroethylene	2021/06/02	<0.20		ug/L	
			Toluene	2021/06/02	<0.20		ug/L	
			Trichloroethylene	2021/06/02	<0.20		ug/L	
			p+m-Xylene	2021/06/02	<0.20		ug/L	
			o-Xylene	2021/06/02	<0.20		ug/L	
			Total Xylenes	2021/06/02	<0.20		ug/L	
7381476	RSC	RPD	Benzene	2021/06/02	NC		%	30
			Chloroform	2021/06/02	NC		%	30
			1,2-Dichlorobenzene	2021/06/02	NC		%	30
			1,4-Dichlorobenzene	2021/06/02	NC		%	30
			cis-1,2-Dichloroethylene	2021/06/02	NC		%	30
			trans-1,3-Dichloropropene	2021/06/02	NC		%	30
			Ethylbenzene	2021/06/02	NC		%	30
			Methylene Chloride(Dichloromethane)	2021/06/02	NC		%	30
			1,1,2,2-Tetrachloroethane	2021/06/02	NC		%	30
			Tetrachloroethylene	2021/06/02	NC		%	30
			Toluene	2021/06/02	3.4		%	30
			Trichloroethylene	2021/06/02	NC		%	30
			p+m-Xylene	2021/06/02	NC		%	30
			o-Xylene	2021/06/02	NC		%	30
			Total Xylenes	2021/06/02	NC		%	30
7381983	YPA	Matrix Spike	Fluoride (F-)	2021/06/03		95	%	80 - 120
7381983	YPA	Spiked Blank	Fluoride (F-)	2021/06/03		100	%	80 - 120
7381983	YPA	Method Blank	Fluoride (F-)	2021/06/03	<0.10		mg/L	
7381983	YPA	RPD	Fluoride (F-)	2021/06/03	NC		%	20
7382076	YPA	Spiked Blank	pH	2021/06/02		102	%	98 - 103
7382076	YPA	RPD	pH	2021/06/02	0.78		%	N/A
7382592	RTY	Matrix Spike	Total Kjeldahl Nitrogen (TKN)	2021/06/02		114	%	80 - 120
7382592	RTY	QC Standard	Total Kjeldahl Nitrogen (TKN)	2021/06/02		98	%	80 - 120
7382592	RTY	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2021/06/02		98	%	80 - 120
7382592	RTY	Method Blank	Total Kjeldahl Nitrogen (TKN)	2021/06/02	<0.10		mg/L	
7382592	RTY	RPD	Total Kjeldahl Nitrogen (TKN)	2021/06/02	NC		%	20
7384055	N_R	Matrix Spike	Total Aluminum (Al)	2021/06/02		94	%	80 - 120
			Total Antimony (Sb)	2021/06/02		96	%	80 - 120
			Total Arsenic (As)	2021/06/02		97	%	80 - 120
			Total Cadmium (Cd)	2021/06/02		97	%	80 - 120
			Total Chromium (Cr)	2021/06/02		97	%	80 - 120
			Total Cobalt (Co)	2021/06/02		97	%	80 - 120
			Total Copper (Cu)	2021/06/02		94	%	80 - 120
			Total Lead (Pb)	2021/06/02		97	%	80 - 120
			Total Manganese (Mn)	2021/06/02		93	%	80 - 120
			Total Molybdenum (Mo)	2021/06/02		104	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Nickel (Ni)	2021/06/02		94	%	80 - 120
			Total Phosphorus (P)	2021/06/02		95	%	80 - 120
			Total Selenium (Se)	2021/06/02		103	%	80 - 120
			Total Silver (Ag)	2021/06/02		95	%	80 - 120
			Total Tin (Sn)	2021/06/02		97	%	80 - 120
			Total Titanium (Ti)	2021/06/02		92	%	80 - 120
			Total Zinc (Zn)	2021/06/02		98	%	80 - 120
7384055	N_R	Spiked Blank	Total Aluminum (Al)	2021/06/02		89	%	80 - 120
			Total Antimony (Sb)	2021/06/02		94	%	80 - 120
			Total Arsenic (As)	2021/06/02		100	%	80 - 120
			Total Cadmium (Cd)	2021/06/02		95	%	80 - 120
			Total Chromium (Cr)	2021/06/02		97	%	80 - 120
			Total Cobalt (Co)	2021/06/02		100	%	80 - 120
			Total Copper (Cu)	2021/06/02		94	%	80 - 120
			Total Lead (Pb)	2021/06/02		99	%	80 - 120
			Total Manganese (Mn)	2021/06/02		96	%	80 - 120
			Total Molybdenum (Mo)	2021/06/02		100	%	80 - 120
			Total Nickel (Ni)	2021/06/02		98	%	80 - 120
			Total Phosphorus (P)	2021/06/02		98	%	80 - 120
			Total Selenium (Se)	2021/06/02		100	%	80 - 120
			Total Silver (Ag)	2021/06/02		96	%	80 - 120
			Total Tin (Sn)	2021/06/02		95	%	80 - 120
			Total Titanium (Ti)	2021/06/02		89	%	80 - 120
			Total Zinc (Zn)	2021/06/02		102	%	80 - 120
7384055	N_R	Method Blank	Total Aluminum (Al)	2021/06/02	<4.9		ug/L	
			Total Antimony (Sb)	2021/06/02	<0.50		ug/L	
			Total Arsenic (As)	2021/06/02	<1.0		ug/L	
			Total Cadmium (Cd)	2021/06/02	<0.090		ug/L	
			Total Chromium (Cr)	2021/06/02	<5.0		ug/L	
			Total Cobalt (Co)	2021/06/02	<0.50		ug/L	
			Total Copper (Cu)	2021/06/02	<0.90		ug/L	
			Total Lead (Pb)	2021/06/02	<0.50		ug/L	
			Total Manganese (Mn)	2021/06/02	<2.0		ug/L	
			Total Molybdenum (Mo)	2021/06/02	<0.50		ug/L	
			Total Nickel (Ni)	2021/06/02	<1.0		ug/L	
			Total Phosphorus (P)	2021/06/02	<100		ug/L	
			Total Selenium (Se)	2021/06/02	<2.0		ug/L	
			Total Silver (Ag)	2021/06/02	<0.090		ug/L	
			Total Tin (Sn)	2021/06/02	<1.0		ug/L	
			Total Titanium (Ti)	2021/06/02	<5.0		ug/L	
			Total Zinc (Zn)	2021/06/02	<5.0		ug/L	
7384055	N_R	RPD	Total Arsenic (As)	2021/06/02	NC		%	20
			Total Cadmium (Cd)	2021/06/02	NC		%	20
			Total Chromium (Cr)	2021/06/02	NC		%	20
			Total Copper (Cu)	2021/06/02	NC		%	20
			Total Lead (Pb)	2021/06/02	NC		%	20
			Total Manganese (Mn)	2021/06/02	NC		%	20
			Total Nickel (Ni)	2021/06/02	NC		%	20
			Total Phosphorus (P)	2021/06/02	NC		%	20
			Total Selenium (Se)	2021/06/02	NC		%	20
			Total Silver (Ag)	2021/06/02	NC		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Zinc (Zn)	2021/06/02	5.3		%	20
7384378	MPD	Matrix Spike	Mercury (Hg)	2021/06/03		95	%	75 - 125
7384378	MPD	Spiked Blank	Mercury (Hg)	2021/06/03		96	%	80 - 120
7384378	MPD	Method Blank	Mercury (Hg)	2021/06/03	<0.00010		mg/L	
7384378	MPD	RPD	Mercury (Hg)	2021/06/03	NC		%	20
7384490	SVS	Matrix Spike	Decachlorobiphenyl	2021/06/03		103	%	60 - 130
			Total PCB	2021/06/03		95	%	60 - 130
7384490	SVS	Spiked Blank	Decachlorobiphenyl	2021/06/03		98	%	60 - 130
			Total PCB	2021/06/03		103	%	60 - 130
7384490	SVS	Method Blank	Decachlorobiphenyl	2021/06/03		103	%	60 - 130
			Total PCB	2021/06/03	<0.05		ug/L	
7384490	SVS	RPD	Total PCB	2021/06/03	NC		%	40
7385725	SA5	Spiked Blank	Total Oil & Grease	2021/06/03		96	%	85 - 115
7385725	SA5	RPD	Total Oil & Grease	2021/06/03	3.9		%	25
7385725	SA5	Method Blank	Total Oil & Grease	2021/06/03	<0.50		mg/L	
7385731	SA5	Spiked Blank	Total Oil & Grease Mineral/Synthetic	2021/06/03		92	%	85 - 115
7385731	SA5	RPD	Total Oil & Grease Mineral/Synthetic	2021/06/03	3.8		%	25
7385731	SA5	Method Blank	Total Oil & Grease Mineral/Synthetic	2021/06/03	<0.50		mg/L	
7386174	ABP	Matrix Spike	Total Cyanide (CN)	2021/06/02		83	%	80 - 120
7386174	ABP	Spiked Blank	Total Cyanide (CN)	2021/06/02		97	%	80 - 120
7386174	ABP	Method Blank	Total Cyanide (CN)	2021/06/02	<0.0050		mg/L	
7386174	ABP	RPD	Total Cyanide (CN)	2021/06/02	NC		%	20
7390455	DEO	Matrix Spike	Nonylphenol (Total)	2021/06/05		76	%	50 - 130
7390455	DEO	Spiked Blank	Nonylphenol (Total)	2021/06/05		96	%	50 - 130
7390455	DEO	Method Blank	Nonylphenol (Total)	2021/06/05	<0.001		mg/L	
7390455	DEO	RPD	Nonylphenol (Total)	2021/06/05	NC		%	40
7390457	DEO	Matrix Spike	Nonylphenol Ethoxylate (Total)	2021/06/05		86	%	50 - 130
7390457	DEO	Spiked Blank	Nonylphenol Ethoxylate (Total)	2021/06/05		82	%	50 - 130
7390457	DEO	Method Blank	Nonylphenol Ethoxylate (Total)	2021/06/05	<0.005		mg/L	
7390457	DEO	RPD	Nonylphenol Ethoxylate (Total)	2021/06/05	NC		%	40
7396600	KHO	Matrix Spike	2,4,6-Tribromophenol	2021/06/10		73	%	10 - 130
			2-Fluorobiphenyl	2021/06/10		61	%	30 - 130
			D14-Terphenyl (FS)	2021/06/10		85	%	30 - 130
			D5-Nitrobenzene	2021/06/10		90	%	30 - 130
			D8-Acenaphthylene	2021/06/10		81	%	30 - 130
			Di-N-butyl phthalate	2021/06/10		62	%	30 - 130
			Bis(2-ethylhexyl)phthalate	2021/06/10		103	%	30 - 130
			3,3'-Dichlorobenzidine	2021/06/10		50	%	30 - 130
			Pentachlorophenol	2021/06/10		42	%	30 - 130
			Phenanthrene	2021/06/10		87	%	30 - 130
			Anthracene	2021/06/10		84	%	30 - 130
			Fluoranthene	2021/06/10		95	%	30 - 130
			Pyrene	2021/06/10		96	%	30 - 130
			Benzo(a)anthracene	2021/06/10		92	%	30 - 130
			Chrysene	2021/06/10		95	%	30 - 130
			Benzo(b/j)fluoranthene	2021/06/10		90	%	30 - 130
			Benzo(k)fluoranthene	2021/06/10		91	%	30 - 130
			Benzo(a)pyrene	2021/06/10		76	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2021/06/10		89	%	30 - 130
			Dibenzo(a,h)anthracene	2021/06/10		87	%	30 - 130
			Benzo(g,h,i)perylene	2021/06/10		83	%	30 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dibenzo(a,i)pyrene	2021/06/10		44	%	30 - 130
			Benzo(e)pyrene	2021/06/10		92	%	30 - 130
			Perylene	2021/06/10		96	%	30 - 130
			Dibenzo(a,j) acridine	2021/06/10		85	%	30 - 130
			7H-Dibenzo(c,g) Carbazole	2021/06/10		101	%	30 - 130
			1,6-Dinitropyrene	2021/06/10		48	%	30 - 130
			1,3-Dinitropyrene	2021/06/10		64	%	30 - 130
			1,8-Dinitropyrene	2021/06/10		36	%	30 - 130
7396600	KHO	Spiked Blank	2,4,6-Tribromophenol	2021/06/10		79	%	10 - 130
			2-Fluorobiphenyl	2021/06/10		67	%	30 - 130
			D14-Terphenyl (FS)	2021/06/10		86	%	30 - 130
			D5-Nitrobenzene	2021/06/10		97	%	30 - 130
			D8-Acenaphthylene	2021/06/10		81	%	30 - 130
			Di-N-butyl phthalate	2021/06/10		102	%	30 - 130
			Bis(2-ethylhexyl)phthalate	2021/06/10		102	%	30 - 130
			3,3'-Dichlorobenzidine	2021/06/10		106	%	30 - 130
			Pentachlorophenol	2021/06/10		67	%	30 - 130
			Phenanthrene	2021/06/10		89	%	30 - 130
			Anthracene	2021/06/10		86	%	30 - 130
			Fluoranthene	2021/06/10		97	%	30 - 130
			Pyrene	2021/06/10		97	%	30 - 130
			Benzo(a)anthracene	2021/06/10		94	%	30 - 130
			Chrysene	2021/06/10		98	%	30 - 130
			Benzo(b/j)fluoranthene	2021/06/10		93	%	30 - 130
			Benzo(k)fluoranthene	2021/06/10		103	%	30 - 130
			Benzo(a)pyrene	2021/06/10		84	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2021/06/10		106	%	30 - 130
			Dibenzo(a,h)anthracene	2021/06/10		103	%	30 - 130
			Benzo(g,h,i)perylene	2021/06/10		103	%	30 - 130
			Dibenzo(a,i)pyrene	2021/06/10		107	%	30 - 130
			Benzo(e)pyrene	2021/06/10		100	%	30 - 130
			Perylene	2021/06/10		96	%	30 - 130
			Dibenzo(a,j) acridine	2021/06/10		103	%	30 - 130
			7H-Dibenzo(c,g) Carbazole	2021/06/10		95	%	30 - 130
			1,6-Dinitropyrene	2021/06/10		107	%	30 - 130
			1,3-Dinitropyrene	2021/06/10		99	%	30 - 130
			1,8-Dinitropyrene	2021/06/10		81	%	30 - 130
7396600	KHO	Method Blank	2,4,6-Tribromophenol	2021/06/10		74	%	10 - 130
			2-Fluorobiphenyl	2021/06/10		72	%	30 - 130
			D14-Terphenyl (FS)	2021/06/10		85	%	30 - 130
			D5-Nitrobenzene	2021/06/10		91	%	30 - 130
			D8-Acenaphthylene	2021/06/10		83	%	30 - 130
			Di-N-butyl phthalate	2021/06/10	<2		ug/L	
			Bis(2-ethylhexyl)phthalate	2021/06/10	<2		ug/L	
			3,3'-Dichlorobenzidine	2021/06/10	<0.8		ug/L	
			Pentachlorophenol	2021/06/10	<1		ug/L	
			Phenanthrene	2021/06/10	<0.2		ug/L	
			Anthracene	2021/06/10	<0.2		ug/L	
			Fluoranthene	2021/06/10	<0.2		ug/L	
			Pyrene	2021/06/10	<0.2		ug/L	
			Benzo(a)anthracene	2021/06/10	<0.2		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chrysene	2021/06/10	<0.2		ug/L	
			Benzo(b/j)fluoranthene	2021/06/10	<0.2		ug/L	
			Benzo(k)fluoranthene	2021/06/10	<0.2		ug/L	
			Benzo(a)pyrene	2021/06/10	<0.2		ug/L	
			Indeno(1,2,3-cd)pyrene	2021/06/10	<0.2		ug/L	
			Dibenzo(a,h)anthracene	2021/06/10	<0.2		ug/L	
			Benzo(g,h,i)perylene	2021/06/10	<0.2		ug/L	
			Dibenzo(a,i)pyrene	2021/06/10	<0.2		ug/L	
			Benzo(e)pyrene	2021/06/10	<0.2		ug/L	
			Perylene	2021/06/10	<0.2		ug/L	
			Dibenzo(a,j) acridine	2021/06/10	<0.4		ug/L	
			7H-Dibenzo(c,g) Carbazole	2021/06/10	<0.4		ug/L	
			1,6-Dinitropyrene	2021/06/10	<0.4		ug/L	
			1,3-Dinitropyrene	2021/06/10	<0.4		ug/L	
			1,8-Dinitropyrene	2021/06/10	<0.4		ug/L	
7396600	KHO	RPD	Di-N-butyl phthalate	2021/06/10	NC		%	40
			Bis(2-ethylhexyl)phthalate	2021/06/10	0.093		%	40
			3,3'-Dichlorobenzidine	2021/06/10	NC		%	40
			Pentachlorophenol	2021/06/10	NC		%	40
			Phenanthrene	2021/06/10	NC		%	40
			Anthracene	2021/06/10	NC		%	40
			Fluoranthene	2021/06/10	NC		%	40
			Pyrene	2021/06/10	NC		%	40
			Benzo(a)anthracene	2021/06/10	NC		%	40
			Chrysene	2021/06/10	NC		%	40
			Benzo(b/j)fluoranthene	2021/06/10	NC		%	40
			Benzo(k)fluoranthene	2021/06/10	NC		%	40
			Benzo(a)pyrene	2021/06/10	NC		%	40
			Indeno(1,2,3-cd)pyrene	2021/06/10	NC		%	40
			Dibenzo(a,h)anthracene	2021/06/10	NC		%	40
			Benzo(g,h,i)perylene	2021/06/10	NC		%	40
			Dibenzo(a,i)pyrene	2021/06/10	NC		%	40
			Benzo(e)pyrene	2021/06/10	NC		%	40
			Perylene	2021/06/10	NC		%	40
			Dibenzo(a,j) acridine	2021/06/10	NC		%	40
			7H-Dibenzo(c,g) Carbazole	2021/06/10	NC		%	40
			1,6-Dinitropyrene	2021/06/10	NC		%	40
			1,3-Dinitropyrene	2021/06/10	NC		%	40
			1,8-Dinitropyrene	2021/06/10	NC		%	40

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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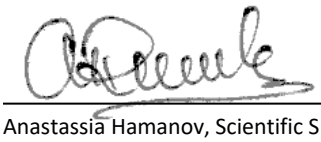
BV Labs Job #: C1E5900
Report Date: 2021/06/10

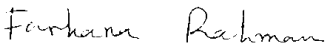
Golder Associates Ltd
Client Project #: 20139596 (7000)
Site Location: 685 Warden Avenue
Sampler Initials: AD

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist



Farhana Rahman, Senior Analyst

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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BV Labs Job #: C1E5900
Report Date: 2021/06/10

Golder Associates Ltd
Client Project #: 20139596 (7000)
Site Location: 685 Warden Avenue
Sampler Initials: AD

Exceedance Summary Table – Toronto San/Stm Sewer

Result Exceedances

Sample ID	BV Labs ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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MICRO

Bureau Veritas Laboratories
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CHAIN OF CUSTODY RECORD

Page of

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#12323 Golder Associates Ltd	Company Name:	GOLDER	Quotation #:	B80683	BV Labs Job #:	Bottle Order #: 827955
Attention:	Accounts Payable	Attention:	~~David Dillon~~ Syed Ali	P.O. #:			
Address:	121 Commerce Park Drive Unit L Barrie ON L4N 8X1	Address:		Project:	20139596(7000)	COC #: C#827955-01-01	Project Manager: Ema Gitej
Tel:	(705) 722-4492 Fax: (705) 722-3786	Tel:	Fax:	Project Name:	685 WARDEN AVENUE		
Email:	CanadaAccountsPayableInvoices@golder.com	Email:	~~David_Dillon@golder.com~~ Syed_Ali@golder.com	Site #:			
				Sampled By:	ALEXANDER DZIEDZIC		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___

Other Regulations: ☐ CCME ☐ Reg 558 ☐ MISA ☐ PWQO ☐ Other ☒ Sanitary Sewer Bylaw ☒ Storm Sewer Bylaw Municipality: Toronto ☐ Reg 406 Table ___

Special Instructions:

Include Criteria on Certificate of Analysis (Y/N)? Y

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Toronto Sanitary&Storm Sewer (100-2016)	Total Metals Analysis by ICPMS	Total Suspended Solids	Total Phosphorus (Colourimetric)	# of Bottles	Comments
1		BH20-6	21/05/28	5:00	GW		✓				19	Unfiltered
2		BH20-6F	21/05/28	5:00	GW			✓	✓	✓	3	Filtered
3												
4												
5												
6												
7												
8												
9												
10												

29-May-21 08:25
Ema Gitej
C1E5900
JA5 ENV-789

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ______ Time Required: ______ ☐
Rush Confirmation Number: ______ (call lab for #)

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only
ADziedzic Alex Dziedzic	21/05/29	8:00	[signature]	2021/05/29	08:25		Time Sensitive; Temperature (°C) on Recei 3/4/2; Custody Seal Present Yes; Intact

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

APPENDIX G

Geotechnical Assessment Memorandum

1.0 ASSESSMENT OF POTENTIAL DEWATERING EFFECTS

1.1 Geotechnical Assessment

Section 6.0 discusses the lateral extent of the anticipated groundwater drawdown for the proposed excavation. It is anticipated that the dewatering will extend to about 1 m below the proposed foundation depths. As the construction methods and sequencing are not finalized, only preliminary and generalized comments on the potential dewatering impacts on structures can be made at this time. The conceptual stratigraphic model of the site consists of fill overlying both cohesive and non-cohesive glacial till deposits overlying silty sand to sandy silt deposits.

For the purpose of this assessment, the predicted zone of influence due to groundwater dewatering will depend on the depth of excavations, lateral extent (width) of the excavations, the nature of the excavation support (shoring) system used by the contractor and, most importantly, the depths and locations of the dewatering well points in relation to the relevant existing structures.

The settlements at various distances from the source of the dewatering are summarized below:

Table 1: Summary of Anticipated Settlement Due to Dewatering

Distance from Pumping Source (m)	Anticipated Drawdown (m)	Increase in Effective Stress (kPa)	Approximate Total Settlement (mm)
1	11	108	39
3	6	60	13
5	4	40	5
10	1.4	14	<1

The Site is bordered on the north and south by single storey commercial buildings, on the east by residential houses and on the west by Warden Avenue. The development drawings indicate that the proposed footprint of the development will be surrounded on the north, east and south sides by an 18.5-metre wide right-of-way (ROW).

Buildings and Structures

The proposed ROW will likely create a buffer of greater than 5 m between the pumping sources and the existing structures on the north, east and south sides of the Site.

Settlements induced by dewatering at a distance of 5 m from the pumping source is estimated to be at approximately 5 mm. As the structures will be more than 5 m beyond the pumping sources, the dewatering is not expected to have any adverse impacts on the structures. The zone of influence and dewatering impacts beyond the site boundaries can be further reduced by installing a shoring system that effectively cuts off the site from the groundwater regime so that dewatering is only required to remove aquifer storage within the building footprint. Once the locations of the pumping sources are determined and the shoring means and methods established, the impact of the dewatering should be re-evaluated.

Overall, for any structure that falls within 5 m from the pumping sources and/or is particularly sensitive to settlement due to age and/or condition, we recommend that condition surveys be carried out prior to, during, and following the construction activities. Monitoring of groundwater levels should be carried out throughout construction to evaluate the effectiveness of the dewatering/cut-off systems and to identify potential deficiencies.

Existing Subsurface Utilities, Utility Poles, Signs and Bus Stops

The existing subsurface utilities under Warden Avenue are anticipated to be about 5 m or more from the dewatering points. At a distance of about 5 m from the pumping source, the groundwater table will be lowered by about 4 m resulting in an increase in effective stress of about 40 kPa.

This temporary increase in effective stress is estimated to result in a settlement of approximately 5 mm which would not result in leaning of the utility poles and noticeable settlement / cracking of the sidewalks.

As mentioned above, the shoring system may be designed to reduce the effect of the dewatering on the utilities, if necessary, if the limits of the excavation are closer than 5 m from these structures.

The dewatering system must be designed in such a way as to avoid loss of soil particles, as a loss of soil particles could lead to settlements with magnitudes greater than the estimated settlements due to decreases in piezometric levels and the associated increase in the effective stresses.

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