PRELIMINARY HYDROGEOLOGICAL INVESTIGATION

217 and 227 Cross Avenue and 571, 581 and 587 - 595 Argus Road, Oakville, Ontario

Client

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Project Number

BIGC-ENV-349B

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1 Introduction

1.1 Project Description

B.I.G. Consulting Inc. (BIG) was retained by DW Argus Cross LP. (the Client) to update the previous Hydrogeological Investigation, conducted by BIG to support the proposed development of the site located at 217 and 227 Cross Avenue and 571, 581 and 587 – 595 Argus Road, Oakville, Ontario (Site). A previous report titled, "Hydrogeological Investigation, 217 and 227 Cross Avenue and 571 Argus Road, Oakville, Ontario" was prepared by BIG on March 9, 2021. The earlier field investigations remain valid following design updates.

The Site is located south of the Queen Elizabeth Way, north of Cross Avenue and east of Argus Road Oakville, Ontario, as shown on Figure 1. The Site measures approximately 12,600 m² in size and is currently occupied by four (4) commercial buildings (Site buildings). The areas surrounding the Site buildings are covered with asphalt and landscaped areas.

It is BIG's understanding that the proposed re-development at the Site will consist of three (3) condominium towers with seven (7) levels of undergrounding parking structure.

It should be noted that the proposed underground levels were increased from five (5) levels to seven (7) levels; however, further investigation hasn't been conducted at the time of this report preparation. Due to lack of information, the dewatering estimates for seven (7) levels of underground parking are estimated based on the investigation conducted for five (5) levels of underground parking previously. Once the design is finalized, BIG needs to review and re-evaluate the dewatering estimates with conducting additional investigation. Additional boreholes and monitoring wells for proper Site coverage will be required.

The following investigations previously completed for the subject Site were reviewed by BIG:

- Phase I and Phase II Environmental Site Assessment, 217 Cross Avenue and 571 Argus Road, Oakville, Ontario, dated October 11, 2019, prepared by Terrapex Environmental Ltd. (Terrapex); and,
- Preliminary Geotechnical Investigation, 217 Cross Avenue and 571 Argus Road, Oakville, Ontario, dated December 3, 2019, prepared by BIG.

This report addresses the hydrogeological aspects of the proposed project. Reports for the Preliminary Geotechnical Investigation, Phase One and Phase Two Environmental Site Assessments will be issued under separate covers. The field investigation for the geotechnical, environmental and hydrogeological investigations was carried out concurrently.

1.2 Project Objectives

The main objectives of the Hydrogeological Investigation were to:

a) Establish the local hydrogeological settings of the Site;
b) Provide assessment of anticipated construction dewatering flow rates for a generic construction scenario;
c) Estimate foundation sub-drain discharge volumes, if applicable;
d) Assess groundwater quality and compare the results to Region of Halton and Town of Oakville Combined/Sanitary and Storm Sewer Use By-Law parameters;
e) Qualitatively assess the potential impact to the nearby water body and comment on future regulatory agency involvement; and,

f) Prepare a Preliminary Hydrogeological Investigation Report.

1.3 Scope of Work

As part of the report titled "Hydrogeological Investigation, 217 and 227 Cross Avenue and 571 Argus Road, Oakville, Ontario" was prepared by BIG on March 9, 2021, BIG advanced fifteen (15) boreholes (BH101 to BH115) to a maximum depth of 23.4 m bgs and installation of monitoring wells (MW101 to MW115), conducted single well response tests (SWRTs) and collected a groundwater sample for laboratory testing.

To achieve the investigation objectives, BIG proposed and initiated the following scope of work:

a) Background desktop review of pertinent geological and hydrogeological resources;
b) Review of the Ministry of Environment, Conservation and Parks (MECP) Water Well Records;
c) Advancement of five (5) boreholes (BH1A to BH5A) to a maximum depth of 27.6 m bgs and installation of monitoring wells (MW1A to MW5A);
d) Utilizing previously installed monitoring wells at the Site by BIG in 2019;
e) Perform single well response tests (SWRT) at selected monitoring wells to assess the hydraulic characteristics of the bedrock at the Site;
f) Complete groundwater level measurements at monitoring wells;
g) Evaluate the information of groundwater level measurements and groundwater quality;
h) Collection of one (1) groundwater sample for laboratory testing and compare it against the Region of Halton and Town of Oakville Combined/Sanitary and Storm Sewer Use By-Law parameters;
i) Assess groundwater discharges during construction phases;
j) Assess foundation sub-drain discharge volumes, if applicable; and,
k) Prepare a Preliminary Hydrogeological Investigation Report.

1.4 Previous Reports

1.4.1 Terrapex Phase I and II Environmental Site Assessment Report

Terrapex completed a Phase I and II Environmental Site Assessment at the Site, dated October 11, 2019 that consisted of advancement of five (5) boreholes (MW101, MW102, BH103, MW104 and MW105) to a maximum depth of 3.05 m, installation of four (4) monitoring wells (MW101, MW102, MW104, and MW105), collection of soil samples from the boreholes and groundwater samples from the monitoring wells.

1.4.2 BIG Preliminary Geotechnical Investigation Report

BIG completed a Preliminary Geotechnical Investigation at the Site, dated December 3, 2019 that consisted of the advancement of six (6) boreholes (BH1 to BH6) to a maximum depth of 17.7 m bgs and installation of three (3) piezometers (MW3, MW4 and MW6).

2 Regional Setting

2.1 Regional Physiography

The Ontario Geological Survey Map P. 2204, indicates the Site lies in the Iroquois Plain physiographic region of Southern Ontario known as the shale plains. Figure 2 shows the physiographic regions of Southern Ontario around the Site.

During the last retreat of the Laurentide Ice Sheet (12,000 years B.P.) lake levels in what was to become Lake Ontario where much higher due to ice blockage in the St. Lawrence waterway. This created the glacial Lake Iroquois which was up to 60 m higher in elevation in the Toronto area than the current Lake Ontario water levels. The Iroquois Shoreline that coincided with this elevated lake, terminated just above St. Clair Avenue West.

2.2 Regional Geology

The surficial geology of the immediate area around the Site is described as Paleozoic bedrock. The surficial geology for the Site and surrounding areas is shown on Figure 3.

Bedrock of the region corresponds to the Georgian Bay Formation, Blue Mountain Formation, Billings Formation, Collingwood Member and Eastview Member consisting of shale, limestone, dolostone and siltstone. The contact between the bedrock and the overlying overburden is expected to be at approximately 3 m bgs.

2.3 Regional Hydrogeology

Groundwater movement through the subsurface is controlled by hydraulic gradients, the physical characteristics of the sediments, and the interconnectedness of lithological formations. Fine grained sediments restrict lateral movement of groundwater and induce vertical infiltration, while coarse grained sediments allow vertical flow with increased transmissivity.

The regional shallow groundwater flow is expected to follow the local topography and discharge to local area creeks and streams. Local deviation from the regional groundwater flow directions may occur in response to changes in topography and/or soil stratigraphy, as well as the presence of surface water features and/or existing subsurface infrastructure.

No local aquifers were identified that could negatively impact the subject Site.

3 Site Setting

3.1 Site Topography and Drainage

The Site is irregular in shape and has an area of approximately 12,600 m². The Site is currently occupied by four (4) commercial buildings (Site buildings). The areas surrounding the Site buildings are covered with asphalt and landscaped areas. The topography of the Site generally slopes to the south/southeast and based on the borehole logs, the ground elevation ranges between 104.53 m and 100.96 m above sea level (asl). Precipitation that falls on the Site is inferred to predominantly be directed to the catch basins located in the parking lot of the Site and nearby Town of Oakville catch basins.

3.2 Local Surface Water Features

The Site does not feature any surface water bodies on the Site. The closest surface water body to the Site is a tributary to Morrison Creek, located approximately 335 m east of the Site. The Site is situated within the Lower Morrison Creek watershed and is not part of Conservation Halton regulated area.

3.3 Ministry of Environment, Conservation and Parks Water Well Review

Well Records from the Ministry of Environment, Conservation and Parks (MECP) Water Well Record Database (WWR) were reviewed to determine the number of water wells and locations present within a 500 m radius of the Site boundaries.

The MECP WWR database indicated 83 well records within 500 m radius of the Site. All identified wells are shown on Figure 4. A summary of the Water Well Records is included in Appendix B, Table B-1. A review of the records indicated that the majority of the wells were classified for observation well, monitoring well and test hole purposes within 500 m radius of the Site. One (1) supply water well was identified at the Queen Elizabeth Way, located approximate 200 m northwest of the Site. The well was installed in 1948, and the well is located in a developed area, the supply well is likely not present. Given the area is serviced by municipal system, no private well water user is expected.

3.4 Permit to Take Water and Environmental Activity and Sector Registry Search

The MECP also maintains a database of all active and expired Permit to Take Water (PTTW) and Environmental Activity and Sector Registry (EASR) items related to construction dewatering and pumping test. There are nine (9) expired PTTW and three (3) EASR registrations within 1 km of the Site and are summarized in Table B-2, Appendix B. The location for each registration is shown on Figure 5.

4 Field Program

4.1 Borehole and Monitoring Well Details

BIG advanced five (5) borehole (BH1A to BH5A) to a maximum depth of 27.3 m bgs between October 6 and 8, 2021 and instrumented all boreholes with monitoring wells (MW1A to MW5A). The boreholes were advanced by using a truck mounted solid stem continuous flight auger equipment. All boreholes were also cored using HQ size wire line diamond coring method, to confirm the presence and quality of bedrock. The BIG's drilling supervisor examined and logged the overburden soil and rock samples as they were obtained from the boreholes. Soil samples were retrieved at regular intervals with a 50 mm outside diameter split barrel sampler drive and accordance with the Standard Penetration Test Procedure (ASTM D1586). The samples were logged in the field and with returned to BIG's laboratory for further examination and laboratory testing.

The following monitoring wells were previously installed at the Site:

a) Fifteen (15) monitoring wells (MW101 to MW115) installed by BIG to maximum depth of 21.9 m bgs in 2021.
b) Three (3) monitoring wells (BH/MW3, BH/MW4 and BH/MW6) installed by BIG to maximum depth of 10.5 m bgs in 2019.
c) Four (4) monitoring wells (MW101, MW102, MW104 and MW105) installed by Terrapex to a maximum depth of 3.05 m bgs in 2019.

It should be noted that, BIG could not locate MW101, MW102, MW104 and MW105 installed by Terrapex.

Figure 6 is a detailed Borehole/Monitoring Well Location Map of the Site. The borehole logs are attached in Appendix A.

4.2 Site Specific Overburden Geology

The borehole locations are shown on Figure 6 and detailed subsurface conditions are presented on the borehole logs in Appendix A. The following table is provided in addition to the borehole descriptions to provide a general summary of the soil conditions. The soil descriptions are predominately based on BIG's investigation, however, where applicable soil conditions encountered during previous investigation by others are included. The soil boundaries indicated on the borehole logs and discussed herein are inferred from the visual observations and auger resistance and should not be regarded as exact planes of geological change.

The soil conditions encountered at the borehole locations are summarized below. A stratigraphic cross-section across the property as aligned on Figure 6 is included as Figure 7.

Table 4-1: Soil description

Layer	Description
Ground Cover	All boreholes, with the exception of BH/MW112 to BH/MW114, were advanced through the existing asphalt pavement, consisting of approximately 50 to 150 mm thick asphalt concrete over 100 to 300 mm thick granular bases. BH/MW113 was advanced through an approximately 50 mm thick gravel. BH/MW112 and BH/MW114 were advanced through an existing ground surface cover consisting of approximately 150 mm thick topsoil.
Fill	Below the ground surface cover, existing fills, predominantly consisting of clayey silt/silty clay and silty sand/sandy silt, were encountered at all borehole locations that extended to depths varying between 0.5 and 1.7 m bgs. Fills also contained trace sand, trace gravel, trace rootlets and trace organics.

Layer	Description
Clayey Silt Till	Below the fills, a native deposit of glacial clayey silt till was encountered in all boreholes that extended to depths varying between 1.7 and 2.8 m bgs. Clayey silt till deposit also contained trace sand, trace gravel and occasional fragments of Shale.
Shale Bedrock	Below clayey silt till, a highly weathered to excellent quality of Georgian Bay Formation grey Shale bedrock was encountered in all boreholes. All boreholes were drilled into the Shale bedrock and sampled up to the borehole termination depths of 4.9 to 7.8 m bgs. First water strike was also recorded in majority of boreholes between 3.7 and 7.1 m bgs.

4.3 Water Level Monitoring

Water levels at all monitoring well locations were recorded after installation. A summary of all available water level observations is included in Table 4-2. Groundwater was observed in all available monitoring wells on February 13, 2023 and depths to the groundwater ranged from 2.04 m to 20.47 m bgs. The shallow wells, BH/MW102 to BH/MW104, BH/MW108 to BH/MW113, BH/MW1A and BH/MW3A were observed with groundwater elevations of 100.23 m to 98.23 m asl. The intermediate well BH/MW2A was observed with groundwater elevation of 95.92 m asl. The deep wells, BH/MW105, BH/MW114, BH/MW115 and BH/MW5A were observed with groundwater elevations of 87.48 and 81.91 m asl.

An interpreted shallow groundwater contour map for the water level measurements recorded on February 13, 2023 are included as Figure 8. Based on the water level measurements obtained, the inferred direction of shallow groundwater flow across the Site is interpreted to be to the southeast and southwest directions.

Seasonal variability can produce significant changes to the static water level. It has been observed that groundwater can rise and lower in response to changing weather and climate.

Table 4-2: **Monitoring Well Details and Water Levels Elevations**

Well ID	Ground Elevation (m asl)	Well Depth (m bgs)	February 1, 2021		February 8, 2021		October 18, 2021		June 3, 2022		February 13, 2023	
			Water Level (m bgs)	Elevation (m asl)	Water Level (m bgs)	Elevation (m asl)	Water Level (m bgs)	Elevation (m asl)	Water Level (m bgs)	Elevation (m asl)	Water Level (m bgs)	Elevation (m asl)
BH/MW101	103.04	6.1	3.10	99.94	3.38	99.66	-	-	-	-	-	-
BH/MW102	102.55	6.1	3.61	98.94	3.67	98.88	-	-	3.33	99.22	3.16	99.39
BH/MW103	101.78	5.5	2.72	99.06	2.79	98.99	-	-	2.51	99.27	2.29	99.49
BH/MW104	100.96	6.1	2.45	98.51	2.45	98.51	-	-	2.18	98.78	2.04	98.92
BH/MW105	102.38	21.9	20.99	81.39	21.09	81.29	-	-	20.47	81.91	20.47	81.91
BH/MW106	102.83	6.1	3.32	99.51	3.32	99.51	-	-	-	-	-	-
BH/MW107	102.40	6.1	3.38	99.02	3.61	98.79	-	-	3.31	99.09	-	-
BH/MW108	102.55	6.1	3.58	98.97	3.90	98.65	-	-	3.58	98.97	3.47	99.08
BH/MW109	102.89	6.1	4.17	98.72	4.20	98.69	-	-	3.83	99.06	2.75	100.14
BH/MW110	101.82	6.1	2.88	98.94	3.08	98.74	-	-	2.74	99.08	2.61	99.21
BH/MW111	101.94	6.1	3.29	98.65	3.37	98.57	-	-	3.07	98.87	3.00	98.94
BH/MW112	102.78	6.1	4.20	98.58	4.23	98.55	-	-	4.69	98.09	4.55	98.23
BH/MW113	103.45	6.1	4.74	98.71	4.77	98.68	-	-	5.27	98.18	4.33	99.12
BH/MW114	103.31	21.6	N/A	N/A	18.88	84.43	-	-	16.01	87.30	15.91	87.39
BH/MW115	101.72	21.6	5.99	95.73	17.91	83.81	-	-	16.58	85.14	15.66	86.06
BH/MW3	102.87	2.3	1.85	101.02	1.72	101.15	-	-	-	-	-	-
BH/MW4	102.32	10.5	3.77	98.55	3.80	98.52	-	-	-	-	-	-
BH/MW6	102.74	3.7	Dry	Dry	Dry	Dry	-	-	DRY	DRY	DRY	DRY
BH/MW1A	104.53	7.0	-	-	-	-	4.38	100.15	4.40	100.13	4.37	100.16
BH/MW2A	104.24	15.2	-	-	-	-	9.05	95.19	8.68	95.56	8.32	95.92
BH/MW3A	104.37	4.7	-	-	-	-	4.24	100.13	4.29	100.08	4.14	100.23
BH/MW4A	103.61	7.3	-	-	-	-	4.71	98.90	-	-	-	-
BH/MW5A	103.75	22.9	-	-	-	-	19.04	84.71	16.66	87.09	16.27	87.48

4.4 Hydraulic Conductivity Testing

The hydraulic conductivity test was completed to estimate the saturated hydraulic conductivity (K) of the soil at the well screen depth at selected monitoring well locations.

Given that slug tests provided adequate aquifer properties, a pump test was not required.

In advance of performing SWRT, the monitoring well was developed to remove the potential presence of fine sediments. The development process involved purging of the monitoring wells to induce the flow of fresh formation water through the screen. The monitoring well water level was permitted to fully recover prior to performing SWRTs.

During the SWRT, a slug of water was instantaneously removed from the well and the response to the water level is recorded. The Hydraulic Conductivity values for each of the tested wells were calculated from the SWRT data using Aqtesolv Software and the Hvorslev solution for unconfined conditions. The semi-log plots for normalized drawdown versus time are included in Appendix C.

The summary of the hydraulic conductivity (K) values estimated from the SWRTs are provided below in Table 4-3:

Table 4-3: Summary of Hydraulic Conductivity (K) Testing Results

Monitoring Well	Well Depth (m bgs)	Hydraulic Conductivity (m/s)
BH/MW104	6.1	3.31×10^{-7}
BH/MW106	6.1	5.86×10^{-7}
BH/MW110	6.1	1.20×10^{-6}
BH/MW113	6.1	5.34×10^{-5}
BH/MW114	21.6	1.93×10^{-8}
BH/MW115	21.6	1.58×10^{-8}
BH/MW1A	7.0	1.06×10^{-7}
BH/MW2A	15.2	1.49×10^{-8}
BH/MW3A	4.7	1.23×10^{-5}
BH/MW4A	7.3	7.69×10^{-6}
BH/MW5A	22.9	6.12×10^{-9}
	Geometric mean K value (m/s)	**3.19×10^{-7}**

The SWRT provides an estimate of K for the geological formation in the immediate media zone surrounding the well screen and may not be representative of bulk formation hydraulic conductivities.

4.5 Groundwater Sampling

To assess the suitability for discharge of pumped groundwater to the Region of Halton sanitary and combined sewer or the Town of Oakville storm sewer during dewatering activities, two groundwater samples were collected from BH/MW113 on February 3, 2021, and from BH/MW4A on October 13, 2021.

Prior to collection of the samples, approximately three (3) standing well volumes of groundwater were purged from the well. The sample was collected and placed into pre-cleaned laboratory-supplied vials and/or bottles provided with analytical test group specific preservatives, as required.

The sample was not field filtered. Dedicated nitrile gloves were used during sample handling. The groundwater sample was submitted to an independent laboratory, Bureau Veritas Laboratories, of Mississauga, Ontario, for analysis.

For the assessment purposes, the analytical results were compared to Table 1 – Limits for Sanitary and Combined Sewer Discharge (By-Law No. 2-03) of the Regional Municipality of Halton; and Table 2 – Limits for Storm Sewer Discharge (By-Law No 2009-031) of the Corporation of the Town of Oakville.

The laboratory Certificate of Analysis (CofAs) and chain of custody are enclosed in Appendix E.

When compared against the Table 1 – Limits for Sanitary and Combined Sewer Discharge, the sample indicated an exceedance for total iron (Fe).

When compared against the more stringent Table 2 – Limits for Storm Sewer Discharge, the sample indicated exceedances for total suspended solids (TSS), total arsenic (As), total copper (Cu), total manganese (Mn), total phosphorus (P), and total zinc (Zn). A summary of the exceedance is provided in Table 4-4.

Table 4-4: Summary of Analytical Results

Parameter	Limits for Sanitary and Combined Sewer Discharge (mg/L) (Table 1)	Limits for Storm Sewer Discharge (mg/L) (Table 2)	Concentration for BH/MW113 (mg/L) (February 3, 2021)	Concentration for BH/MW4A (mg/L) (October 13, 2021)
Total Iron (Fe)	50	-	-	**68**
Total Arsenic (As)	1	0.02	0.0057	**0.021**
Total Copper (Cu)	3	0.04	**0.061**	**0.15**
Total Manganese (Mn)	5	0.05	**0.61**	**2.30**
Total Phosphorus (P)	10	0.4	0.37	**1.6**
Total Suspended Solids (TSS)	350	15	**19**	**88**
Total Zinc (Zn)	3	0.04	0.033	**0.15**

Notes:
***Bold** indicates concentration exceeds the Storm Sewer Discharge Limit.*
***Bold** and underline indicate concentration exceeds the Sanitary Discharge Limit.*

A treatment will be required if the groundwater is discharged to the Halton sanitary and combined sewer or the Town of Oakville storm sewer.

The Region typically does not typically allow groundwater discharge to the Regional sewer system. Alternative discharge method or negotiation with the Town of Oakville will be required.

5 Temporary Construction Dewatering

5.1 Construction Dewatering Requirements

It is BIG's understanding that the proposed re-development at the Site will consist of three (3) condominium towers with seven (7) levels of undergrounding parking structure. Based on Drawing A451.S Building A and B Sections, prepared by BDP. Quadrangle Architects Limited (BDP), dated September 20, 2024, the finish floor elevation (FFE) of seven (7) levels of underground parking is 77.1 m asl. The footing elevation is assumed approximately 2 m below the P7 FFE.

It should be noted that the proposed underground levels were increased from five (5) levels to seven (7) levels; however, further investigation hasn't been conducted at the time of this report preparation. Due to lack of information, the dewatering estimates for seven (7) levels of underground parking are estimated based on the investigation conducted for five (5) levels of underground parking previously. Once the design is finalized, BIG needs to review and re-evaluate the dewatering estimates with conducting additional investigation. Additional boreholes and monitoring wells for proper Site coverage will be required.

The stabilized groundwater level measurements, both in shallow and deep monitoring wells, observed on February 8, 2021 were found to be varying between elevations of 101.15 m and 81.29 m asl. For conservative purposes, the construction dewatering calculation is based on an open cut excavation at the present time. To excavate under dry conditions, the water level is anticipated to be lowered at least to a minimum of approximately 1.0 m below the footing elevation.

Additional dewatering capacity may be required to maintain dry conditions within the excavation during and following significant precipitation events. It should be noted that the dewatering estimates provided in this report are based on the conceptual building information available at this time. If design details are changed (including any changes to excavation depth), the dewatering estimates must be revised to include the final layout of the development.

5.2 Construction Dewatering Flow Rate Assumptions

The assumptions used for the calculation of the dewatering rate for the proposed development are presented in Table 5-1.

Table 5-1 Dewatering Estimate Assumptions

Input Parameter	Values	Notes
Established Grade Elevation (m asl)	102.59	Based on Drawing A451.S Building A and B Sections, prepared by BDP, dated September 20, 2024
P7 FFE (m asl)	77.10	Based on Drawing A451.S Building A and B Sections, prepared by BDP, dated September 20, 2024
Footing Elevation (m asl)	75.10	Assumed 2 m below P7 FFE
Dewatered Elevation Target (m asl)	74.10	Approximate 1 m below footing elevation
Groundwater Elevation (m asl)	101.15	Highest groundwater elevation from shallow wells on February 8, 2021
Estimated Excavation Area	88 m x 110 m	Based on Drawing A151.S P7 and P3-P6 Underground Plans, prepared by BDP, dated September 20, 2024
Hydraulic Conductivity (m/s)	3.19×10^{-7}	Geometric mean K

5.3 Dewatering Flow Rate Equation

The Dupuit equation for steady flow from a circular source of an excavation at distance of radius of influence (R_0) through an unconfined aquifer resting on a horizontal impervious surface was used to obtain a flow rate estimate, and is expressed as follows:

$$Q_w = \frac{\pi K(H^2 - h^2)}{\ln [\frac{R_0}{R_e}]}$$

Where:

Q_w	= Rate of pumping (m³/s)
R_0	= Radius of influence (m)
R_e	= Equivalent radius of well (m)
K	= Hydraulic conductivity (m/s)
H	= Head beyond the influence of pumping (static groundwater elevation) (m)
h	= Head above base of aquifer at the excavation (m)

It is expected that the initial dewatering rate will be higher in order to remove groundwater from within the overburden formation. The dewatering rates are expected to decrease once the target water level is achieved in the excavation footprint as groundwater will have been removed locally from storage resulting in lower seepage rates into the excavation. Additionally, the use of a continuous caisson shoring system will further reduce groundwater migration into the excavation reducing the ongoing seepage rate.

5.4 Radius of Influence

The Radius of Influence (ROI) for the construction dewatering is based on the empirical Sichardt Equation. This equation is used to predict the distance at which the drawdown resulting from pumping is negligible. This equation is empirical and was developed to provide representative flow rates using the steady state flow dewatering equations, as discussed below.

It is noted that in steady state conditions, the radius of influence of pumping will extend until boundary flow conditions are reached and provide sufficient water inputs to the aquifer, such as recharge and surface water bodies. As a result, the distance of influence calculated using Sichardt equation is used to provide a representative flow rate calculation, but it is not precise in determining the actual radius influenced by pumping.

The ROI of pumping (dewatering) for radial flow is calculated based on the Sichardt equation, which is described as follows:

$$R_0 = R_e + 3000\ (H - h)\sqrt{K}$$

Where:

K	= Hydraulic conductivity (m/s)
H	= Static Saturated Head (m)
h	= Dynamic Saturated Head (m)
R_0	= Radius of influence (m)
R_e	= Equivalent radius of well (m)

Based on the Sichardt equation and the geometric mean K value, the ROI is approximately 108.8 m from the centre of the excavation for radial flow. The ROI calculation is provided in Appendix E.

The ROI calculation is a conservative methodology and is calculated based on the assumption of active pumping during the construction dewatering. It should be noted that most of the water will be pumped during the first stage of the construction period or when a rain event occurs. Although the ROI was conservatively predicted as 108.8 m from the centre of the excavation, over a period of time, the drawdown curve will be very close to the bottom of the excavation and thus resulting in negligible ROI. The likelihood for impacts to the nearby structures are negligible. Additionally, the use of a shoring system will further reduce radius of influence.

5.5 Results of Construction Dewatering Flow Rate Estimates

Based on the assumptions provided in this report, the results of the dewatering rate estimate are as follows:

Table 5-2 Summary of Construction Dewatering Flow Rate Estimate

Location	Construction Dewatering Flow Rate Without Safety Factor (L/day)	Peak Construction Dewatering Flow Rate Including Safety Factor of 3 (L/day)
Excavation area	142,000	426,000

Construction dewatering flow rate estimates are provided in Table E-1, in Appendix E.

The peak construction dewatering flow rate includes a factor of safety of three (3) to account for accumulation of rainfall, seasonal fluctuations in the groundwater table, flow from beddings of existing sewers, and variation in hydrogeological properties beyond those encountered during the course of this study. This total dewatering flow rate also provides additional capacity for the dewatering contractors. Given that the predicted dewatering volume exceeds the 400,000 L/day limit, a PTTW for construction dewatering will be required.

It should be noted that if caisson wall shoring system is considered for the subject Site, reduction in groundwater quantities can be anticipated.

Please note that it is the responsibility of the contractor to ensure dry conditions are maintained within the excavation at all times. The dewatering contractor should ensure that silt removal or replacement from subsoil be eliminated and monitored during remediation dewatering at all times.

Additional pumping capacity may be required to maintain dry conditions within the excavation during and following significant precipitation events. Additionally, the presence of near-surface fill material could hold significant groundwater.

The maximum flow calculation is intended to provide a conservative estimate to account for unforeseeable conditions that may arise during construction. It should be noted that the dewatering estimate provided in this report are based on the proposed development information available at this time. If changes to the design are implemented (e.g., increase to planned excavation depths, widening of excavations, etc.), the dewatering estimates must be revised to include and reflect future changes.

6 Long Term Discharge Estimate

6.1 Long-Term Dewatering Assumptions

Given that the groundwater level is above foundation depths for the development, a permanent foundation sub-drain is recommended. It is assumed that the below grade structure will feature a perimeter drain and sub-drain system installed at approximately 0.5 m below the basement elevation. Table 6-1 presents the assumptions used to calculate the long-term drainage rate estimates.

Table 6-1 Dewatering Estimate Assumptions

Input Parameter	Values	Notes
Established Grade Elevation (m asl)	102.59	Based on Drawing A451.S Building A and B Sections, prepared by BDP, dated September 20, 2024
P7 FFE (m asl)	77.10	Based on Drawing A451.S Building A and B Sections, prepared by BDP, dated September 20, 2024
Groundwater Elevation (m asl)	87.48	Highest deep groundwater elevation on February 13, 2023
Foundation Elevation/ Sub-drain Elevation Target (m asl)	76.60	Assumed 0.5 m below the P7 slab elevation
Drainage Dimensions	88 m x 110 m	Based on Drawing A151.S P7 and P3-P6 Underground Plans, prepared by BDP, dated September 20, 2024
Hydraulic Conductivity (m/s)	3.19×10^{-7}	Geometric mean K

6.2 Radius of Influence

The ROI calculation is a conservative methodology and is calculated based on the assumption of active pumping during long-term dewatering. It should be noted that there will be no active pumping during long-term dewatering. The foundation drains will be constructed below the floor slab and/or near the foundation and the groundwater would passively drain into these sub drains and discharged directly to sumps. Due to the nature of overburden material, the groundwater will flow through the natural gradient that exists on the Site and passively flow into the foundation sub-drains and will not be actively pumped. Although, the ROI which was conservatively predicted was at 103.7 m from the centre of the sub-drain, over a period of time, the drawdown curve will be very close to the foundation walls and thus resulting in negligible ROI.

6.3 Long-Term Perimeter Drain Flow Rate Estimate

Based on the assumptions provided in this report (outlined in Section 6.1), the results of the long-term discharge volume estimate are summarized below:

Table 6-2 Summary of Long-Term Discharge Flow Rate

Location	Long-Term Peak Flow Rate (L/day)	Notes
Flow into sub-drain after initial dewatering stages	90,000	Long term sub-drain flow value rounded based on Dupuit's equation including flow from all sides. Safety factor of 3 was used.

The results for the estimate are available in Appendix F, Table F-1. The maximum flow rate estimates represent short term events and are not indicative of long-term continuous contributions to the drainage system. Intermittent cycling of sump pumps and seasonal fluctuation in groundwater regimes should be considered for pump specifications. Given that the predicted dewatering volume exceeds the 50,000 L/day limit, a PTTW is required.

It should be noted that the dewatering estimates provided in this report are based on the proposed building information available at this time.

A treatment will be required if the groundwater encountered during long-term dewatering is discharged to the Halton sanitary and combined sewer or the Town of Oakville storm sewer.

In the event that the long-term foundation drainage is not allowed to discharge into the City's sewer system, the proposed building may be designed and supported by "tanked" water-proofed continuous raft foundation without permanent dewatering (i.e., avoiding permanent perimeter and under-floor drainage system).

7 Potential Groundwater Impacts

7.1 Impacts to Nearby Groundwater Users

The Site lies within an urban area of Oakville, based on the MECP WWR database, one (1) supply water well was identified at the Queen Elizabeth Way, located approximate 200 m northwest of the Site. The well was installed in 1948, and the well is located in a developed area, the supply well is likely not present. Given the area is serviced by municipal system, no private well water user is expected. There are no potential impacts to nearby groundwater users due to construction dewatering is expected.

7.2 Impacts to Nearby Structures

As discussed in Section 5, given the groundwater table is above the excavation, construction dewatering is required. The ROI calculation is a conservative methodology and is calculated based on the assumption of active pumping during the construction dewatering. It should be noted that most of the water will be pumped during the first stage of the construction period or when a rain event occurs. Although the ROI was conservatively predicted as 108.8 m from the centre of the excavation, over a period of time, the drawdown curve will be very close to the bottom of the excavation and thus resulting in negligible ROI. The likelihood for impacts to the nearby structures are negligible. Additionally, the use of a shoring system will further reduce radius of influence.

As discussed in Section 6, given that the groundwater level is above foundation depths for the development, a permanent foundation sub-drain is recommended. It is assumed that the below grade structure will feature a perimeter drain and sub-drain system installed at approximately 0.5 m below the footing elevation. If the foundation drains operate on a long-term basis, the radius of influence was conservatively estimated at 103.7 m from the centre of the excavation. However, unlike the construction dewatering activities where active dewatering takes places, the long-term dewatering operates passively where water would flow through fractured bedrock primarily via vertical drains. Therefore, the actual radius of influence will be less than the predicted distance and no impacts to the surrounding feature is expected.

8 Water Taking and Discharge Permits

8.1 EASR and PTTW

During the active construction dewatering phase, the volume of water expected to be pumped exceeds the daily limit on groundwater taking under the Ontario Water Resources Act (50,000 L/day). Therefore, it is necessary to register the construction dewatering under the EASR or PTTW guidelines. If the excavation is to be undertaken all at once, the cumulative discharge rate for the construction is 426,000 L/day. The limit for water taking under an EASR is 400,000 L/day. Given that the predicted total dewatering volume exceed the 400,000 L/day, a PTTW as per O.Reg.387/04 would be required.

Given that the predicted long-term dewatering volume exceeds the 50,000 L/day limit, a PTTW for long-term discharge is required.

9 Conclusions

Based on the findings of the Hydrogeological Investigation, the following summary of conclusions are provided:

a) It is BIG's understanding that the proposed re-development at the Site will consist of three (3) condominium towers with seven (7) levels of undergrounding parking structure;
b) It should be noted that the proposed underground levels were increased from five (5) levels to seven (7) levels; however, further investigation hasn't been conducted at the time of this report preparation. Due to lack of information, the dewatering estimates for seven (7) levels of underground parking are estimated based on the investigation conducted for five (5) levels of underground parking previously. Once the design is finalized, BIG needs to review and re-evaluate the dewatering estimates with conducting additional investigation. Additional boreholes and monitoring wells for proper Site coverage will be required;
c) The Site is located within a physiographic region within the Iroquois Plain known as the shale plains;
d) The surficial geology of the immediate area around the Site is described as Paleozoic bedrock;
e) The MECP WWR database indicate that there are 83 well records registered with the database within 500 m of the Site. One (1) supply water well was identified at the Queen Elizabeth Way, located approximate 200 m northwest of the Site. The well was installed in 1948 and the well is located in a developed area, the supply well is likely not present. Given the area is serviced by municipal system, no private well water user is expected;
f) Groundwater was observed in all available monitoring wells on February 13, 2023 and depths to the groundwater ranged from 2.04 m to 20.47 m bgs. The shallow wells, BH/MW102 to BH/MW104, BH/MW108 to BH/MW113, BH/MW1A and BH/MW3A were observed with groundwater elevations of 100.23 m to 98.23 m asl. The intermediate well BH/MW2A was observed with groundwater elevation of 95.92 m asl. The deep wells, BH/MW105, BH/MW114, BH/MW115 and BH/MW5A were observed with groundwater elevations of 87.48 and 81.91 m asl;
g) Based on the water level measurements obtained, the inferred direction of shallow groundwater flow across the Site is interpreted to be to the southwest and southeast directions;
h) The estimated hydraulic conductivity of the soil ranges from 5.34×10^{-5} m/s to 6.12×10^{-9} m/s with a geometric mean of 3.19×10^{-7} m/s;
i) Based on the assumptions outlined in this report, the estimated peak construction dewatering flow rate including rainfall for the proposed construction activity is 426,000 L/day;
j) Based on the assumptions outlined in this report, the cumulative contribution to the foundation drains is 90,000 L/day;
k) The limit for water taking under an EASR is 400,000 L/day. Given that the predicted total construction dewatering volume exceed the 400,000 L/day, a PTTW as per O.Reg.387/04 would be required;
l) Given that the predicted long-term dewatering volume exceeds the 50,000 L/day limit, a PTTW for long-term discharge is required;
m) When compared against the Table 1 – Limits for Sanitary and Combined Sewer Discharge, the sample indicated an exceedance for total iron (Fe);
n) When compared against the more stringent Table 2 – Limits for Storm Sewer Discharge, the sample indicated exceedances for total suspended solids (TSS), total arsenic (As), total copper (Cu), total manganese (Mn), total phosphorus (P), and total zinc (Zn);

o) A treatment will be required if the groundwater is discharged to the Halton sanitary and combined sewer or the Town of Oakville storm sewer; and,

p) The Region typically does not typically allow groundwater discharge to the Regional sewer system. Alternative discharge method or negotiation with the Town of Oakville will be required.

It should be noted that the comments and recommendations in this report are based on the assumption that the present design concept described throughout the report will proceed to construction. Any changes to the design concept may result in a modification to the recommendations provided in this report. It is noted that these conclusions and recommendations should be read in conjunction with the entirety of the report.

10 Limitations

This report is based on a limited investigation designed to provide information to support an assessment of the current hydrogeological conditions within the study area. The conclusion and recommendations presented within this report reflect Site conditions existing at the time of the assessment. BIG must be contacted immediately if any unforeseen Site conditions are experienced during the dewatering activities. This will allow BIG to review the new findings and provide appropriate recommendations to allow the construction to proceed in a timely and cost-effective manner.

Our undertaking at BIG, therefore, is to perform our work within limits prescribed by our clients, with the usual thoroughness and competence of the geoscience profession. No other warranty or presentation, either expressed or implied, is included or intended in this report.

We trust that this information is satisfactory for your purposes. Should you have any questions or comments, please do not hesitate to contact our office.

Yours truly,

B.I.G. Consulting Inc.

Travis Van Holst, M.Env.Sc., GIT
Environmental Scientist

Wei (Will) Guo, M.Sc., P.Geo.
Senior Hydrogeologist

11 References

B.I.G. Consulting Inc. (2019). Preliminary Geotechnical Investigation, 217 Cross Avenue and 571 Argus Road, Oakville, Ontario, dated December 3, 2019.

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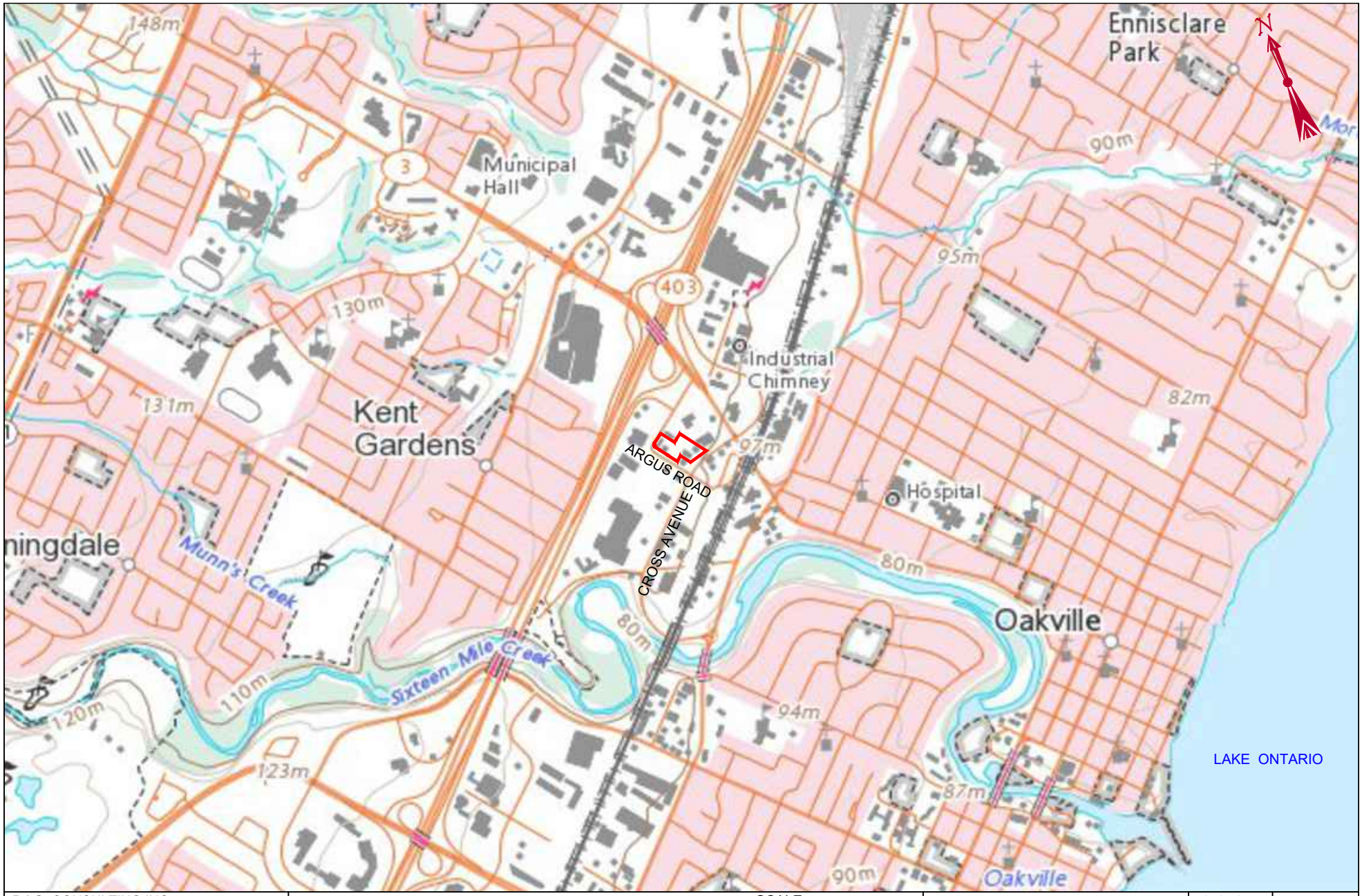
FIGURES



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LEGEND

SITE BOUNDARY

SCALE

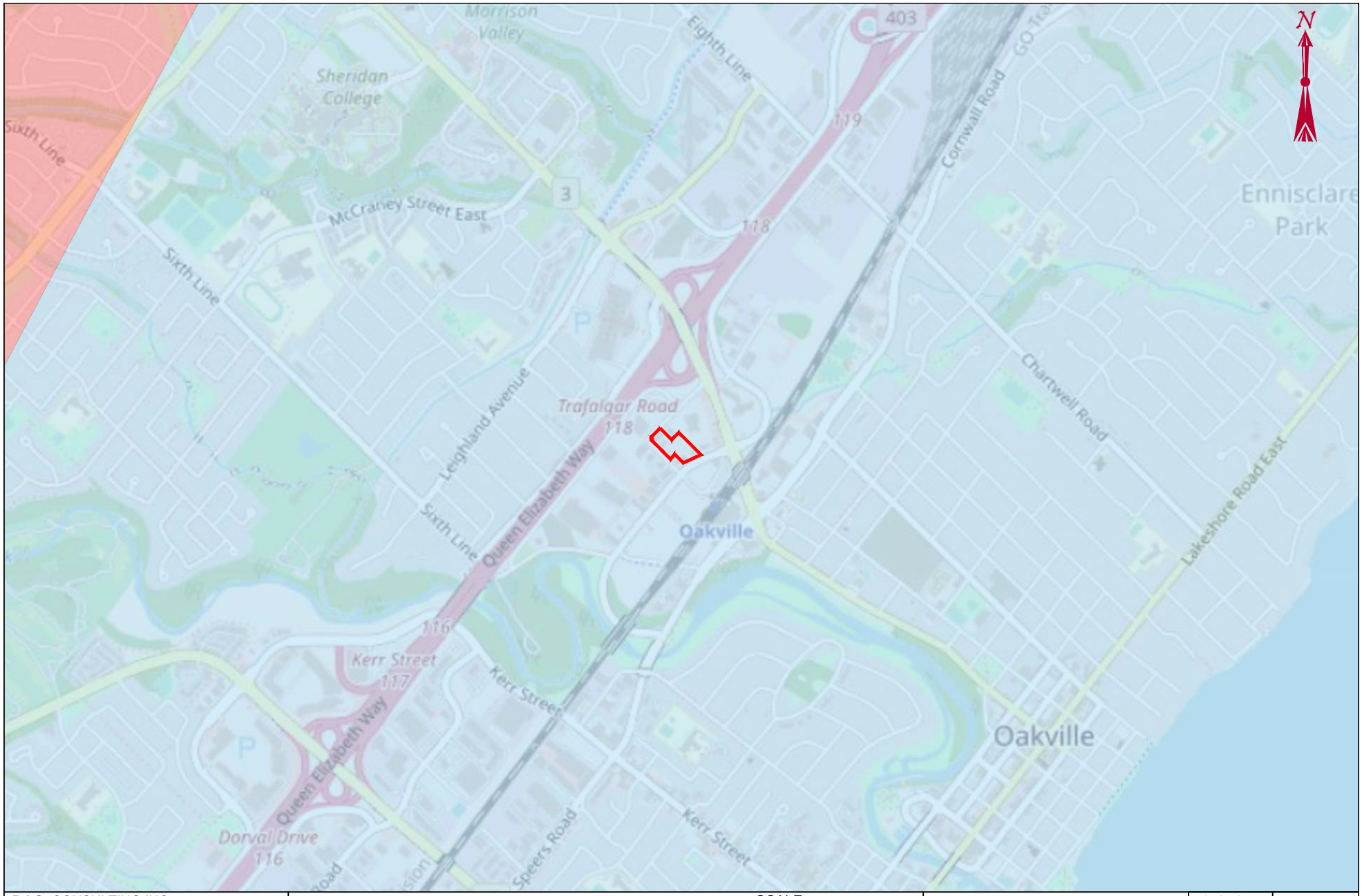
250m 0m 750m

IMAGERY OBTAINED FROM TOPORAMA, NATURAL RESOURCES CANADA, 2017

TITLE AND LOCATION

SITE LOCATION PLAN
HYDROGEOLOGICAL INVESTIGATION
217 AND 227 CROSS AVENUE
AND 571, 581 AND 587-595
ARGUS ROAD, OAKVILLE,
ONTARIO

PROJECT NO.	DWN.
BIGC-GEO-349J	T.S.
SCALE	CK.
AS NOTED	W.G.
DATE	FIG NO.
SEPTEMBER 2024	1



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LEGEND

- SITE BOUNDARY
- SOUTH SLOPE
- IROQUOIS PLAIN

SCALE

250m 0m 750m

NOTES:

1. PHYISIOGRAPHIC REGIONS PRODUCED BY MINISTRY OF ENERGY, NORTHERN DEVELOPMENT AND MINES, 2012
2. IMAGERY OBTAINED FROM OPENSTREETMAP, 2016

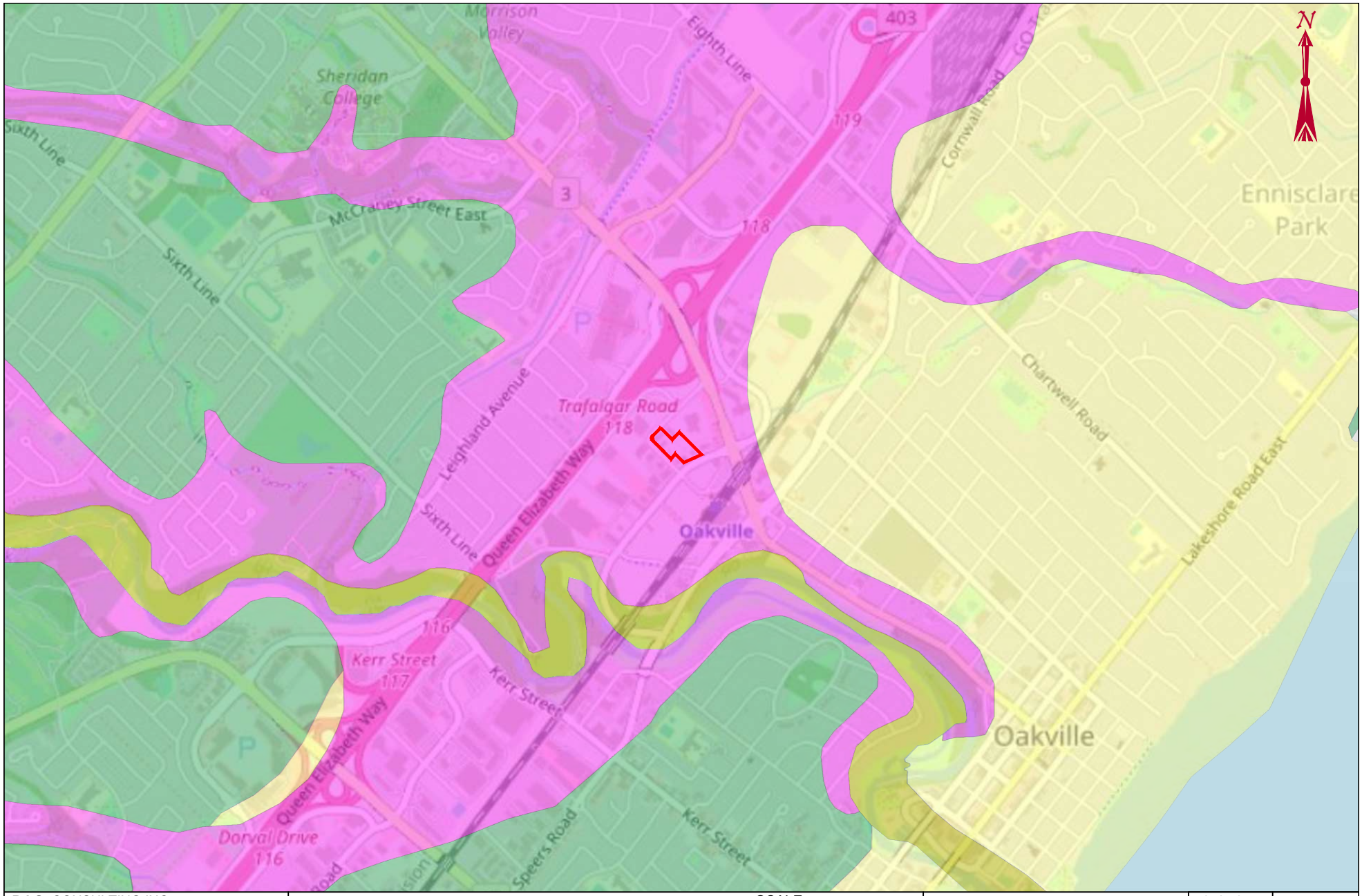
TITLE AND LOCATION

PHYSIOGRAPHIC REGIONS OF SOUTHERN ONTARIO

HYDROGEOLOGICAL INVESTIGATION

217 AND 227 CROSS AVENUE AND 571, 581 AND 587-595 ARGUS ROAD, OAKVILLE, ONTARIO

PROJECT NO.	DWN.
BIGC-GEO-349J	T.S.
SCALE	CK.
AS NOTED	W.G.
DATE	FIG NO.
SEPTEMBER 2024	2



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LEGEND

- SITE BOUNDARY
- COARSE-TEXTURED GLACIOLACUSTRINE DEPOSITS
- TILL
- MODERN ALLUVIAL DEPOSITS
- PALEOZOIC BEDROCK

SCALE

250m 0m 750m

NOTES:

1. SURFICIAL GEOLOGY PRODUCED BY MINISTRY OF ENERGY, NORTHERN DEVELOPMENT AND MINES, 2012
2. IMAGERY OBTAINED FROM OPENSTREETMAP, 2016

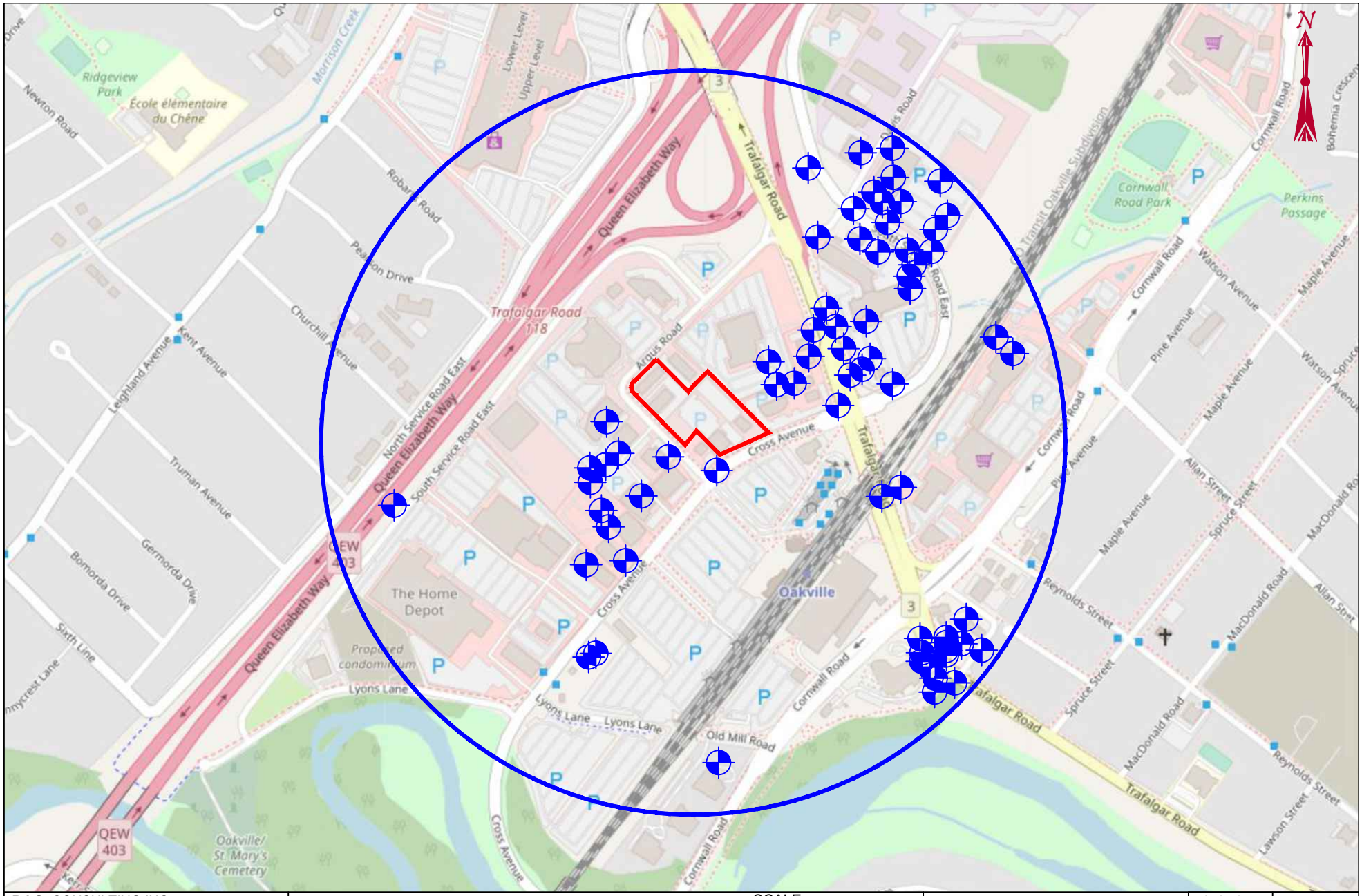
TITLE AND LOCATION

SURFICIAL GEOLOGY OF SOUTHERN ONTARIO

HYDROGEOLOGICAL INVESTIGATION

217 AND 227 CROSS AVENUE AND 571, 581 AND 587-595 ARGUS ROAD, OAKVILLE, ONTARIO

PROJECT NO.	DWN.
BIGC-GEO-349J	T.S.
SCALE	CK.
AS NOTED	W.G.
DATE	FIG NO.
SEPTEMBER 2024	3



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LEGEND

- SITE BOUNDARY
- WELL RECORD STUDY AREA BOUNDARY
- WELL RECORD LOCATION (2021)

SCALE

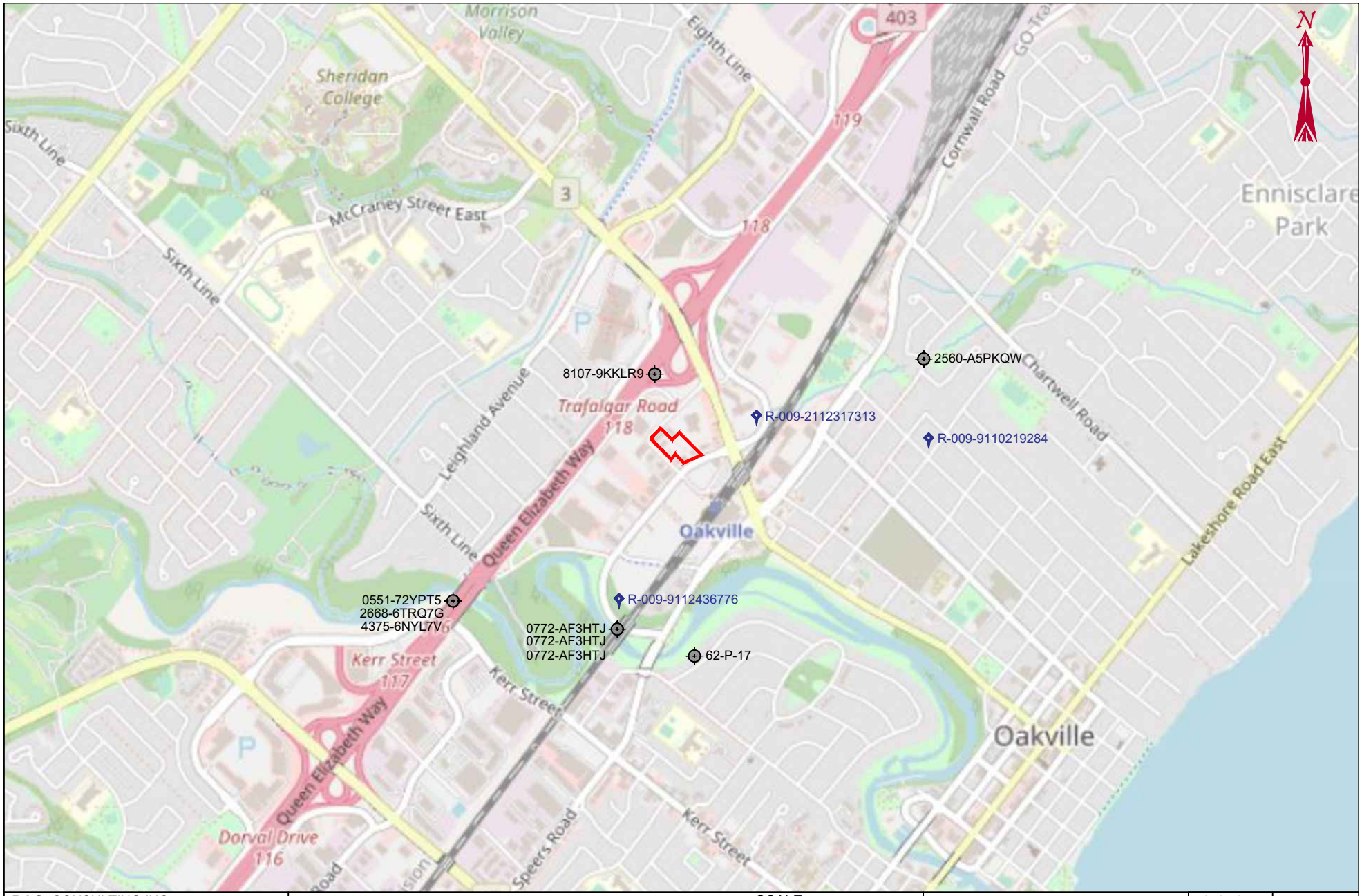
60 30 0 60 120 180 240 300

IMAGERY OBTAINED FROM OPENSTREETMAP, 2016

TITLE AND LOCATION

MECP WATER WELL RECORD LOCATIONS
HYDROGEOLOGICAL INVESTIGATION
217 AND 227 CROSS AVENUE
AND 571, 581 AND 587-595 ARGUS
ROAD, OAKVILLE, ONTARIO

PROJECT NO.	DWN.
BIGC-GEO-349J	T.S.
SCALE	CK.
AS NOTED	W.G.
DATE	FIG NO.
SEPTEMBER 2024	4



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LEGEND

- SITE BOUNDARY
- LOCATION OF PTTW RECORD
- LOCATION OF EASR RECORD

SCALE

250m 0m 750m

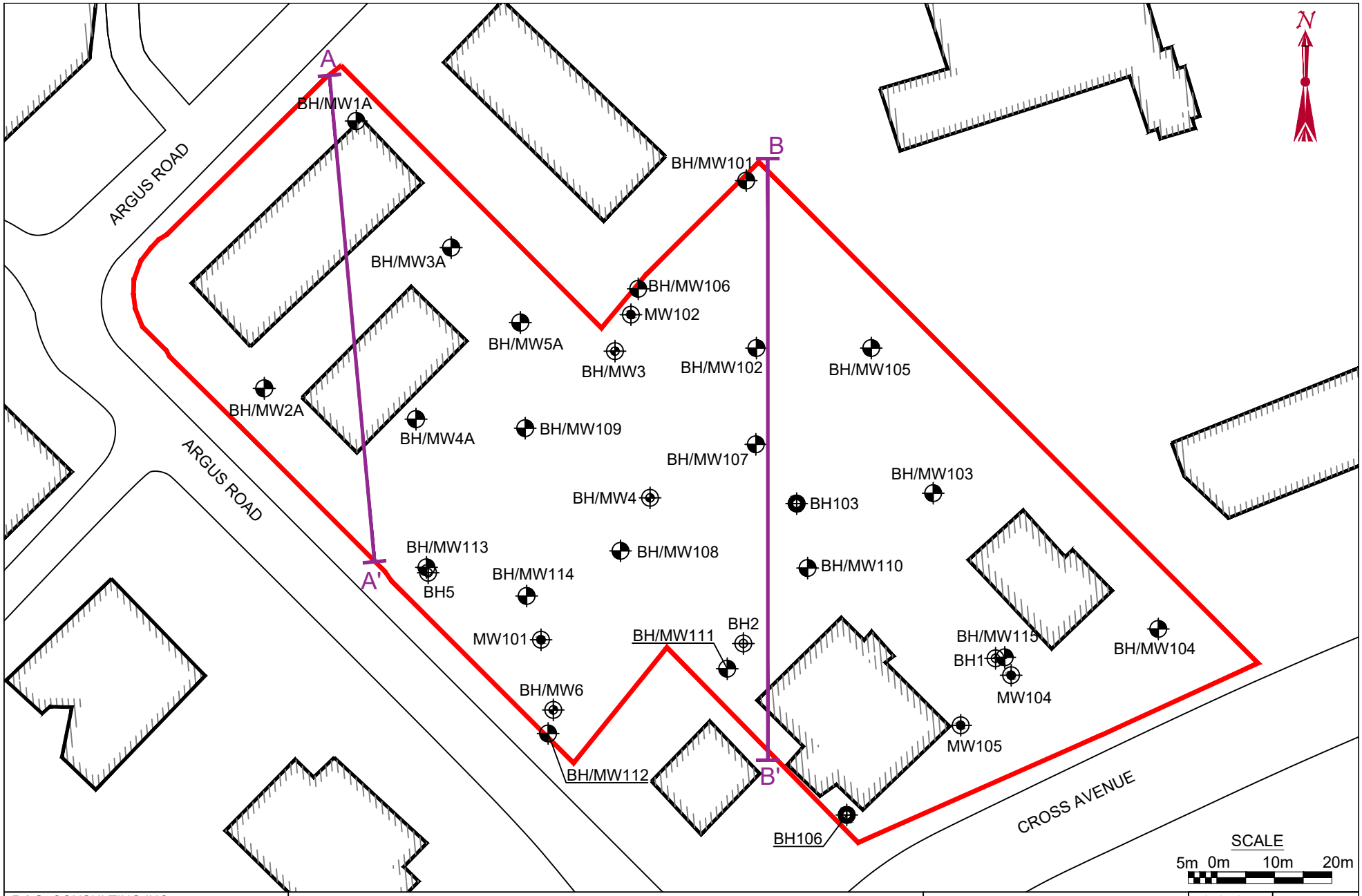
IMAGERY OBTAINED FROM OPENSTREETMAP, 2016

TITLE AND LOCATION

PTTW AND EASR RECORD LOCATIONS HYDROGEOLOGICAL INVESTIGATION

217 AND 227 CROSS AVENUE AND 571, 581 AND 587-595 ARGUS ROAD, OAKVILLE, ONTARIO

PROJECT NO.	DWN.
BIGC-GEO-349J	T.S.
SCALE	CK.
AS NOTED	W.G.
DATE	FIG NO.
SEPTEMBER 2024	5



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LEGEND

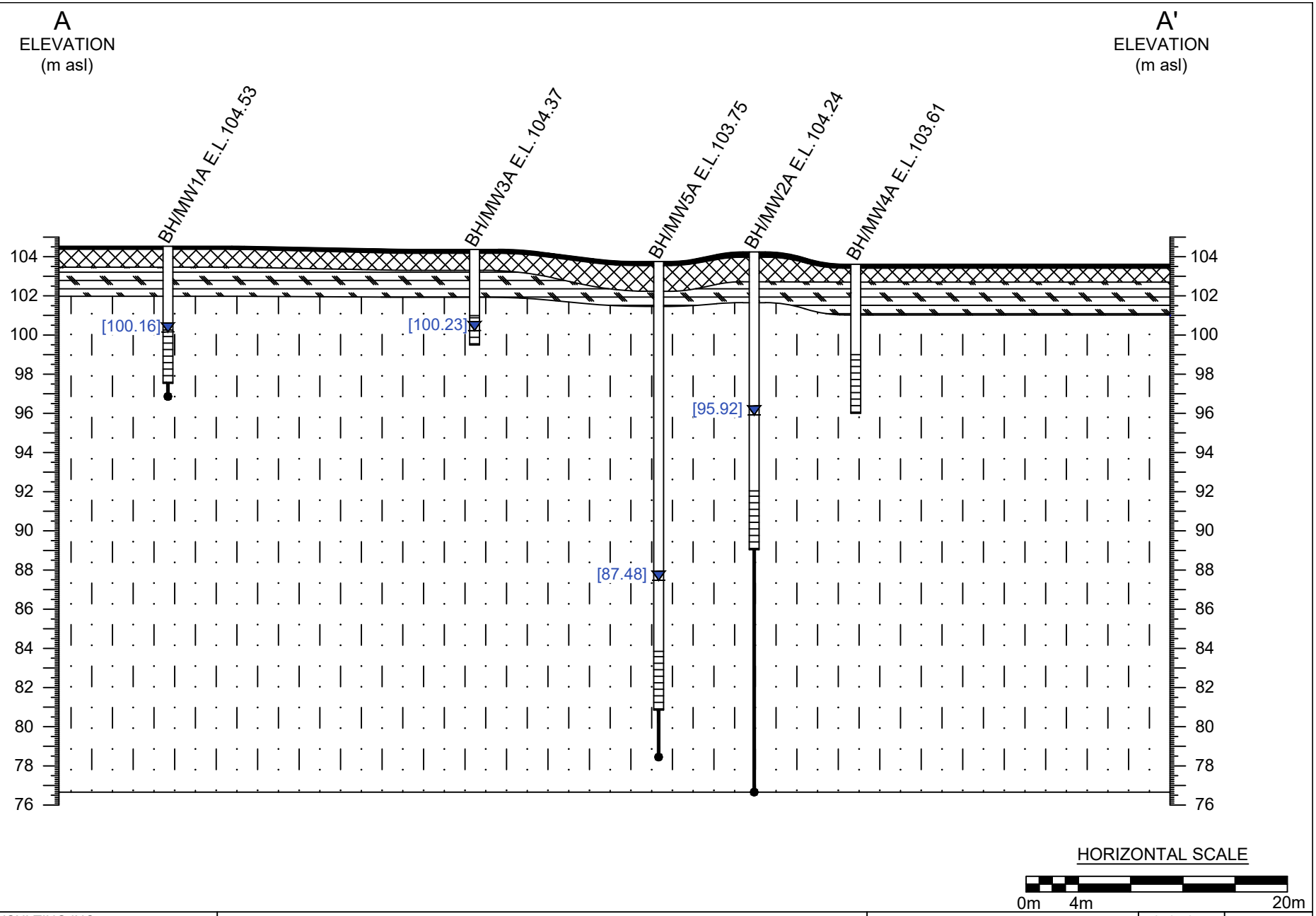
- SITE BOUNDARY
- BUILDING FOOTPRINT
- BOREHOLE/MONITORING WELL LOCATION (BIG 2021)
- BOREHOLE/PIEZOMETER LOCATION (BIG 2019)
- BOREHOLE LOCATION (BIG 2019)
- BOREHOLE/MONITORING LOCATION (TERRAPEX)
- BOREHOLE LOCATION (TERRAPEX)
- A–A' GEOLOGICAL CROSS SECTION (SEE FIGURE 7A)
- B–B' GEOLOGICAL CROSS SECTION (SEE FIGURE 7B)

TITLE AND LOCATION

BOREHOLE/MONITORING WELL LOCATION PLAN HYDROGEOLOGICAL INVESTIGATION

217 AND 227 CROSS AVENUE AND 571, 581 AND 587-595 ARGUS ROAD, OAKVILLE, ONTARIO

PROJECT NO.	DWN.
BIGC-GEO-349J	T.S.
SCALE	CK.
AS NOTED	W.G.
DATE	FIG NO.
SEPTEMBER 2024	6



HORIZONTAL SCALE

0m 4m 20m

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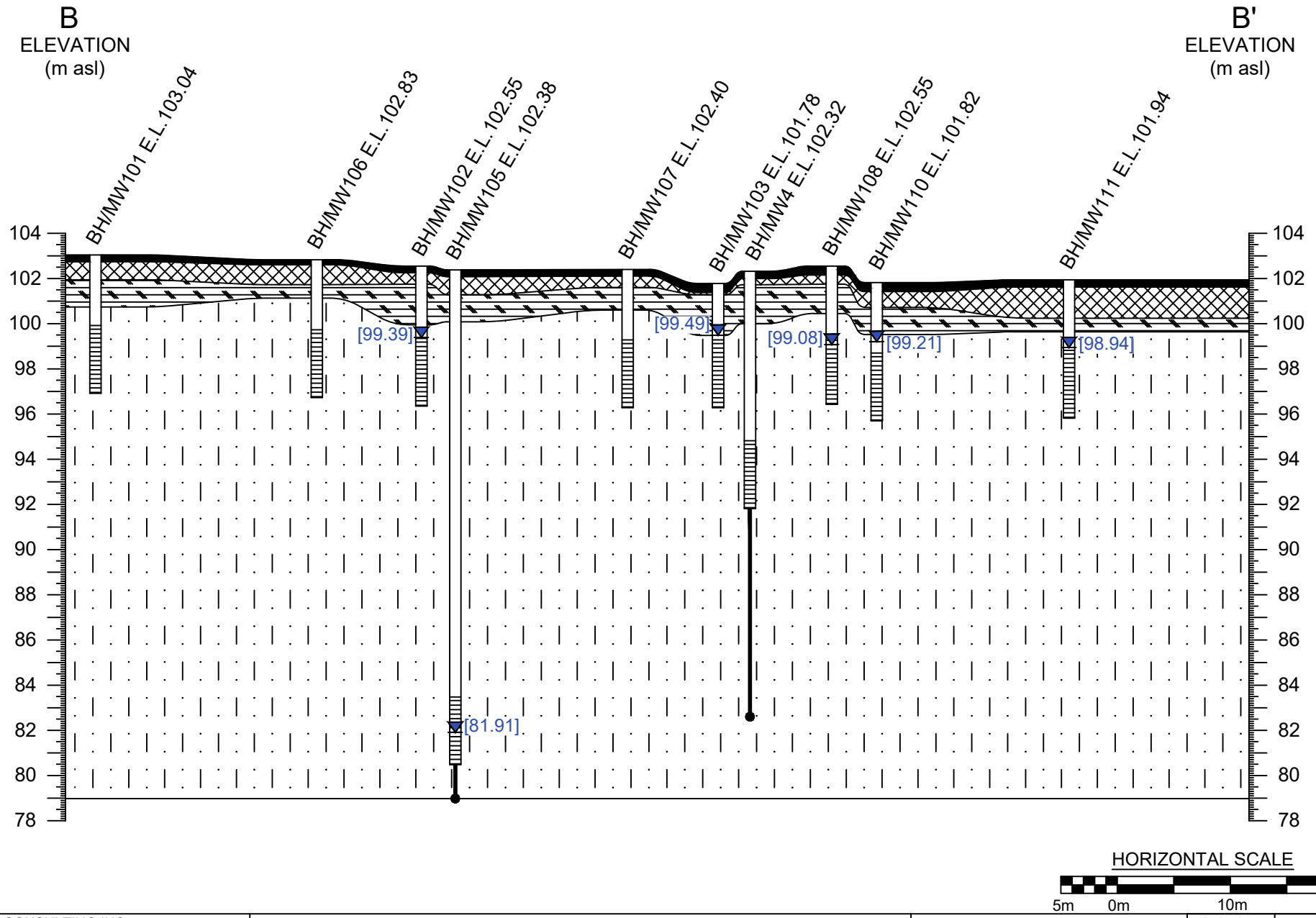
LEGEND

- ASPHALT / GRANULAR
- FILL
- CLAYEY SILT / SILTY CLAY TILL
- SHALE BEDROCK
- WATER LEVEL
- [xx.xx] WATER LEVEL MEASUREMENT (FEBRUARY 13, 2023)

TITLE AND LOCATION

GEOLOGICAL CROSS SECTION A-A'
HYDROGEOLOGICAL INVESTIGATION
217 AND 227 CROSS AVENUE
AND 571, 581 AND 587-595 ARGUS
ROAD, OAKVILLE, ONTARIO

PROJECT NO.	DWN.
BIGC-GEO-349J	T.S.
SCALE	CK.
AS NOTED	W.G.
DATE	FIG NO.
SEPTEMBER 2024	7A



HORIZONTAL SCALE

5m 0m 10m 20m

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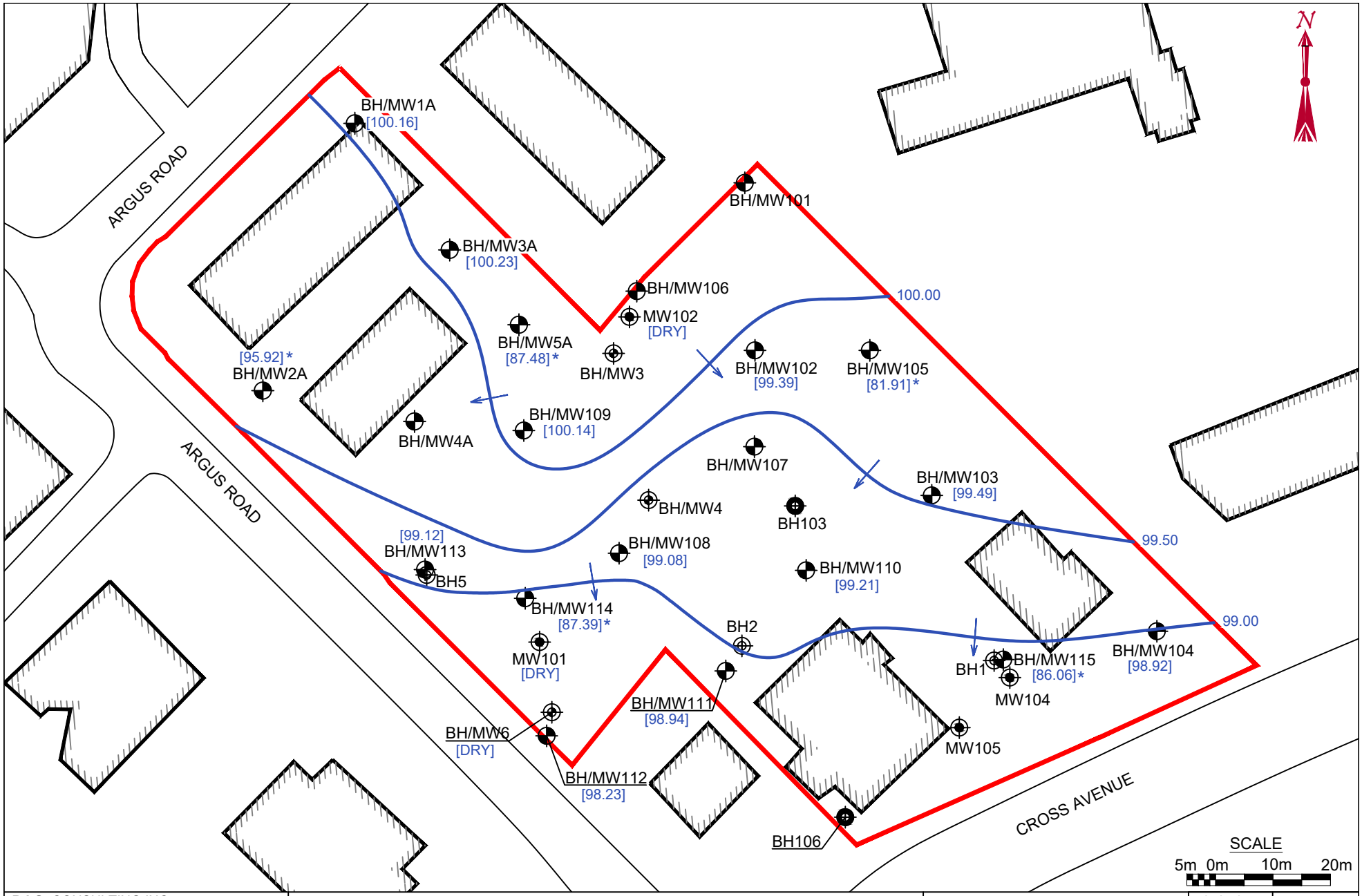
LEGEND

- ASPHALT / GRANULAR
- FILL
- CLAYEY SILT TILL
- SHALE BEDROCK
- WATER LEVEL
- [xx.xx] WATER LEVEL MEASUREMENT (FEBRUARY 13, 2023)

TITLE AND LOCATION

GEOLOGICAL CROSS SECTION B-B'
HYDROGEOLOGICAL INVESTIGATION
217 AND 227 CROSS AVENUE AND 571, 581 AND 587-595 ARGUS ROAD, OAKVILLE, ONTARIO

PROJECT NO.	DWN.
BIGC-GEO-349J	T.S.
SCALE	CK.
AS NOTED	W.G.
DATE	FIG NO.
SEPTEMBER 2024	7B



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LEGEND

- SITE BOUNDARY
- BUILDING FOOTPRINT
- BOREHOLE/MONITORING WELL LOCATION (BIG 2021)
- BOREHOLE/PIEZOMETER LOCATION (BIG 2019)
- BOREHOLE LOCATION (BIG 2019)
- BOREHOLE/MONITORING LOCATION (TERRAPEX)
- BOREHOLE LOCATION (TERRAPEX)
- [XX.XX] WATER LEVEL MEASUREMENT (FEBRUARY 13, 2023)
- GROUNDWATER CONTOUR
- INTERPRETED DIRECTION OF GROUNDWATER FLOW

TITLE AND LOCATION

GROUNDWATER CONTOUR MAP HYDROGEOLOGICAL INVESTIGATION

217 AND 227 CROSS AVENUE AND 571, 581 AND 587-595 ARGUS ROAD, OAKVILLE, ONTARIO

PROJECT NO.	DWN.
BIGC-GEO-349J	T.S.
SCALE	CK.
AS NOTED	W.G.
DATE	FIG NO.
SEPTEMBER 2024	8

APPENDIX A: BOREHOLE LOGS

RECORD OF BOREHOLE No. BH/MW1A

Project Number:	BIGC-GEO-490A	Drilling Location:	See Borehole Location Plan	Logged by:	MV
Project Client:	Oakville Argus Cross LP	Drilling Method:	150 mm Mud Rotary/ HQ Core	Compiled by:	MV
Project Name:	Preliminary Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill	Reviewed by:	SS
Project Location:	581-587 Argus Road, Oakville	Date Started:	8 Oct 21	Date Completed: 8 Oct 21	Revision No.: 0, 25/10/21

Geodetic Ground Surface Elevation: 104.53 m

Depth (m)	Description	Elevation (m)	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%
0	**ASPHALT PAVEMENT:** 50mm Asphalt over 100mm granular base	104.38 / 0.2	SS	1	62	5
	FILL: silty clay to clayey silt, possibly reworked, mottled brown, moist, firm					
	silty sand with clay, trace gravel, compact, possibly reworked below 0.76 m	103.46 / 1.1	SS	2	59	22
	SILTY CLAY TILL: trace sand, trace gravel, occasional Shale fragments, reddish brown, moist, very stiff to hard		SS	3	100	43
	pale grey, hard below 1.83 m	101.98	SS	4	100	50/15
	BEDROCK: Shale, highly weathered, occasional limetone layers throughout, grey, moist to damp	2.6	SS	5	100	50/8
	- first water strike		SS	6	100	50/5
			SS	7	100	50/5
		96.86	SS	8	100	50/5
	End of Borehole	7.7				

Notes:
1. Borehole open and dry upon completion of drilling.
2. Groundwater level reading at 4.38 m bgs on October 18, 2021.

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Groundwater depth on completion of drilling: Dry m.

Groundwater depth observed on 18/10/2021 at a depth of: 4.38 m.

RECORD OF BOREHOLE No. BM/MW2A

Project Number:	BIGC-GEO-490A	Drilling Location:	See Borehole Location Plan	Logged by:	MV
Project Client:	Oakville Argus Cross LP	Drilling Method:	96 mm Mud Rotary/ HQ Core	Compiled by:	MV
Project Name:	Preliminary Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill	Reviewed by:	SS
Project Location:	581-587 Argus Road, Oakville	Date Started:	7 Oct 21	Date Completed: 7 Oct 21	Revision No.: 0, 25/10/21

Geodetic Ground Surface Elevation: 104.24 m

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING: Penetration Testing (SPT ○ / DCPT ●); MTO Vane* (Intact △ / Remould ▲); Nilcon Vane* (Intact ◇ / Remould ◆); * Undrained Shear Strength (kPa) 20 40 60 80	LAB TESTING: ★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L; Plastic 20 40 60 80 Liquid	INSTRUMENTATION INSTALLATION	COMMENTS
	ASPHALT PAVEMENT: 70mm Asphalt over 200mm granular base 103.97					0	104				
	0.3	SS	1	70	16			○			
	FILL: silty clay to clayey silt, trace gravel, dark greenish black, damp, very stiff										
	----------										
	mottled greenish brown, stiff below 0.76 m	SS	2	75	12	1	103	○			
	102.72										
	CLAYEY SILT TILL: trace sand, trace gravel, grey to reddish brown, damp, hard 1.5	SS	3	79	34	2	102	○			
	101.65	SS	4	100	50/23			50/23			
	BEDROCK: Shale, highly weathered to excellent quality, occasional limetone layers throughout, grey, moist to damp 2.6	SS	5	100	50/5	3	101	50/5			
						4	100				
		SS	6	100	50/8			50/8			
						5	99				
	- first water strike	SS	7	100	50/5	6	98	50/5			
						7	97				
	---------- ROCK CORE BEGINS at 7.32 m ----------	RC	1	83	0			○			
	- Very Poor Quality					8	96				
	- Fair Quality	RC	2	100	70			○			
						9 ▼	95				
	- Fair Quality	RC	3	99	72	10	94	○			
	- Good Quality soft zone from 12.06 to 12.2 m					11	93				
		RC	4	97	78			○			
						12	92				
	- Good Quality	RC	5	100	77	13	91	○			
						14					

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▽ Groundwater depth on completion of drilling: Not measured m.

▼ Groundwater depth observed on 18/10/2021 at a depth of: 9.05 m.

Scale: 1 : 74

Continued on Next Page

RECORD OF BOREHOLE No. BM/MW2A

Project Number: **BIGC-GEO-490A** Drilling Location: **See Borehole Location Plan** Logged by: **MV**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	BEDROCK: Shale, highly weathered to excellent quality, occasional limetone layers throughout, grey, moist to damp	RC	6	100	79	15	90				
	- Good Quality some oxidised laminae at 13.87 m soft zone from 14.38 to 14.54 m						89				
	- Excellent Quality	RC	7	100	90	16	88				
	- Excellent Quality some oxidised laminae at 16.92 m	RC	8	97	95	17 18	87 86				
	- Good Quality	RC	9	97	89	19	85				
	- Excellent Quality	RC	10	100	100	20 21	84 83				
	- Excellent Quality	RC	11	100	99	22	82				
	- Good Quality fracture zone with slickenside from 24.01 to 24.29 m	RC	12	97	79	23 24	81 80				
	- Good Quality	RC	13	97	88	25	79				
	- Good Quality soft zones at 26.25 m and 27.02 to 27.07 m 76.66	RC	14	100	84	26 27	78 77				
	End of Borehole 27.6										

FIELD TESTING: Penetration Testing — ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: ★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L Plastic Liquid 20 40 60 80

Notes:
1. Borehole open completion of drilling.
2. Groundwater level reading not measured upon completion of drilling due to introduced drilling water.
3. Groundwater level reading at 9.05 m bgs on October 18, 2021.

Scale: 1 : 74

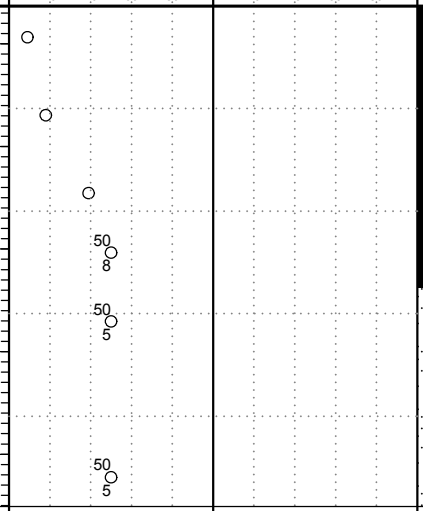
RECORD OF BOREHOLE No. BM/MW3A

Project Number:	**BIGC-GEO-490A**	Drilling Location:	**See Borehole Location Plan**	Logged by:	**MV**
Project Client:	**Oakville Argus Cross LP**	Drilling Method:	**150 mm Solid Stem Augering**	Compiled by:	**MV**
Project Name:	**Preliminary Geotechnical Investigation**	Drilling Machine:	**Truck Mounted Drill**	Reviewed by:	**SS**
Project Location:	**581-587 Argus Road, Oakville**	Date Started:	**8 Oct 21** Date Completed: **8 Oct 21**	Revision No.:	**0, 25/10/21**

Geodetic Ground Surface Elevation: 104.37 m

DESCRIPTION	Elevation	Depth	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%
ASPHALT PAVEMENT: 50mm Asphalt over 150mm granular base	104.17	0.2	SS	1	38	9
FILL: silty clay to clayey silt, possibly reworked, trace sand, trace gravel, mottled brown, moist, stiff to very stiff						
----------	103.30		SS	2	70	18
silty sand with clay, trace gravel, mottled pale grey, possibly reworked, compact below 0.76 m		1.1				
CLAYEY SILT TILL: trace sand, trace gravel, occasional Shale fragments, reddish brown to grey, moist, very stiff to hard			SS	3	100	39
	101.93		SS	4	100	50/8
BEDROCK: Shale, highly weathered, occasional limetone layers throughout, grey, moist to damp		2.4	SS	5	100	50/5
			SS	6	100	50/5
- first water strike	99.49					
End of Borehole on Auger Refusal		4.9				

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 4.72 m bgs upon completion of drilling.
3. Groundwater level reading at 4.24 m bgs on October 18, 2021.



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Groundwater depth on completion of drilling: 4.72 m.

Groundwater depth observed on 18/10/2021 at a depth of: 4.24 m.

Scale: 1 : 74

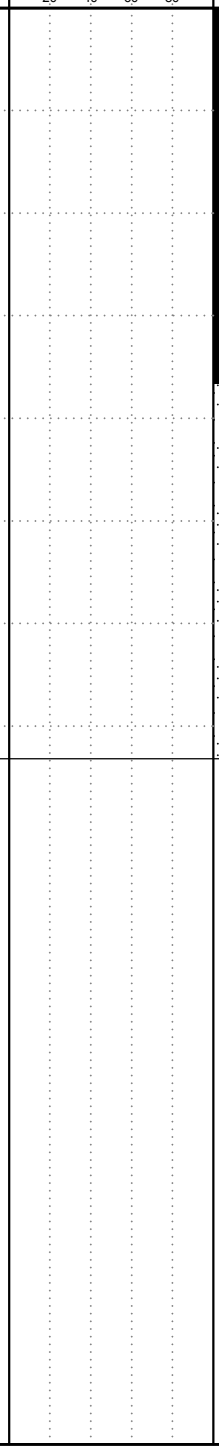
RECORD OF BOREHOLE No. BM/MW4A

Project Number:	**BIGC-GEO-490A**	Drilling Location:	**See Borehole Location Plan**	Logged by:	**MV**
Project Client:	**Oakville Argus Cross LP**	Drilling Method:	**150 mm Solid Stem Augering**	Compiled by:	**MV**
Project Name:	**Preliminary Geotechnical Investigation**	Drilling Machine:	**Truck Mounted Drill**	Reviewed by:	**SS**
Project Location:	**581-587 Argus Road, Oakville**	Date Started:	**8 Oct 21** Date Completed: **8 Oct 21**	Revision No.:	**0, 25/10/21**

Geodetic Ground Surface Elevation: 103.61 m

Depth (m)	Description	Elevation (m)	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%
	ASPHALT PAVEMENT: 50mm Asphalt over 150mm granular base	103.41				
0.2	**FILL:** silty clay to clayey silt, thale fragments, brown to grey, moist, stiff	102.70	SS	1	75	14
0.9	**CLAYEY SILT TILL:** trace sand, trace gravel, pale slightly mottled brown to grey, moist to damp, stiff to hard		SS	2	51	31
			SS	3	82	14
		101.02	SS	4	47	75/23
2.6	**BEDROCK:** Shale, highly weathered, occasional limetone layers throughout, grey, moist to damp		SS	5	100	50/8
	- first water strike		SS	6	100	50/8
		96.29	SS	7	100	50/8
7.3	**End of Borehole on Auger Refusal**					

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 7.01 m bgs upon completion of drilling.
3. Groundwater level reading at 4.71 m bgs on October 18, 2021.



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Groundwater depth on completion of drilling: 7.01 m.

Groundwater depth observed on 18/10/2021 at a depth of: 4.71 m.

RECORD OF BOREHOLE No. BM/MW5A

Project Number:	BIGC-GEO-490A	Drilling Location:	See Borehole Location Plan	Logged by:	MV
Project Client:	Oakville Argus Cross LP	Drilling Method:	96 mm Solid Stem Augers	Compiled by:	MV
Project Name:	Preliminary Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill	Reviewed by:	SS
Project Location:	581-587 Argus Road, Oakville	Date Started:	6 Oct 21	Date Completed: 6 Oct 21	Revision No.: 0, 25/10/21

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	COMMENTS
	Geodetic Ground Surface Elevation: 103.75 m							
	ASPHALT PAVEMENT: 70mm Asphalt over 130mm granular base 103.55 / 0.2	SS	1	70	9			
	FILL: silty clay to clayey silt, trace sand, trace gravel, mottled pale grey, damp, stiff to hard							
	occasional cobble, mottled greenish brown, hard below 0.76 m	SS	2	48	50/15	1	103	
	102.23							
	SILTY CLAY TO CLAYEY SILT TILL: trace gravel and pebbles, pale grey, damp, hard 1.5	SS	3	62	32	2	102	
	101.46							
	BEDROCK: Shale, highly weathered to excellent quality, occasional limetone layers throughout, grey, moist to damp 2.3	SS	4	100	50/8			
		SS	5	100	50/8	3	101	
		SS	6	100	50/10	4	100	
		SS	7	100	50/8	5	99	
	- first water strike					6	98	
	ROCK CORE BEGINS at 7.32 m	RC	1	87	0	7	97	
	- Very Poor Quality					8	96	
	- Fair Quality fracture zone from 8.16 to 8.72 m some conglomeratic layers throughout run	RC	2	100	61	9	95	
	- Fair Quality	RC	3	95	70	10	94	
	- Good Quality	RC	4	100	87	11	93	
	- Fair Quality some oxidised laminae from 12.34 to 15.39 m	RC	5	98	72	12	92	
						13	91	
						14	90	

FIELD TESTING

Penetration Testing: ○ SPT ● DCPT

MTO Vane*: △ Intact ▲ Remould

Nilcon Vane*: ◇ Intact ◆ Remould

* Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING

★ Rinse pH Values 2 4 6 8 10 12

Soil Vapour Reading △ parts per million (ppm) 100 200 300 400

▲ Lower Explosive Limit (LEL) W_P W W_L

Plastic Liquid 20 40 60 80

INSTRUMENTATION INSTALLATION

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Groundwater depth on completion of drilling: Not measured m.

Groundwater depth observed on 18/10/2021 at a depth of: 19.04 m.

Scale: 1 : 74

RECORD OF BOREHOLE No. BM/MW5A

Project Number: **BIGC-GEO-490A** Drilling Location: **See Borehole Location Plan** Logged by: **MV**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	BEDROCK: Shale, highly weathered to excellent quality, occasional limetone layers throughout, grey, moist to damp							Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L Plastic Liquid 20 40 60 80		
	- Excellent Quality	RC	6	100	93	15	89	○			
	- Fair Quality sub vertical fracture from from 15.84 to 15.92 m	RC	7	100	74	16	88	○			
	- Excellent Quality	RC	8	95	93	17	87	○			
	- Excellent Quality	RC	9	100	92	18 19 ▼	86	○			
	- Excellent Quality	RC	10	98	90	20	85	○			
	- Fair Quality	RC	11	95	70	21	84	○			
	- Excellent Quality fracture zone from 23.81 to 23.91 m	RC	12	100	99	22 23	83	○			
	- Good Quality 78.45	RC	13	100	88	24 25	82 81 80 79	○			
	End of Borehole 25.3										

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level reading not measured upon completion of drilling due to introduced drilling water.
3. Groundwater level reading at 19.04 m bgs on October 18, 2021.

Scale: 1 : 74

RECORD OF BOREHOLE No. BH/MW101

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Solid Stem Augering	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	13 Jan 21	Date Completed: 13 Jan 21	Revision No.: 1, 9/2/21

Lithology Plot	DESCRIPTION (Geodetic Ground Surface Elevation: 103.04 m)		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	ASPHALT: 100 mm asphalt concrete over 200 mm granular base	102.74										
	FILL: clayey silt, trace sand, trace gravel, mottled, grey, moist, very stiff to hard	0.3	SS	1	41	22						SS1 sampled for Metals and Inorganics and PAHs on January 13, 2021
		101.97	SS	2	100	60	1	102				SS2 sampled for VOCs and PHCs on January 13, 2021
	CLAYEY SILT TILL: trace sand, trace gravel, fragments of Shale, grey, moist, hard	1.1	SS	3	93	71	2	101				
	BEDROCK: Shale, highly weathered, occasional limestone seams, grey, damp, hard	100.75 2.3	SS	4	53	50/15			50/15	18		
	-first water strike		SS	5	63	50/8	3	100	50/8	6		Groundwater sampled for PHCs, VOCs, Metals and Inorganics on February 3, 2021
			SS	6	100	50/3	4	99	50/3	4		
		96.92	SS	7	100	50/3	5	98				
	End of Borehole	6.1					6	97	50/3	4		

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 5.18 m bgs measured upon completion of drilling.
3. Groundwater level reading at 3.38 m bgs on February 8, 2021.

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Groundwater depth on completion of drilling: 5.18 m.

Groundwater depth observed on 08/02/2021 at a depth of: 3.38 m.

RECORD OF BOREHOLE No. BH/MW102

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Solid Stem Augering	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	13 Jan 21	Date Completed: 13 Jan 21	Revision No.: 1, 9/2/21

Lithology Plot	DESCRIPTION (Geodetic Ground Surface Elevation: 102.55 m)	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING: Penetration Testing (SPT / DCPT), MTO Vane* (Intact / Remould), Nilcon Vane* (Intact / Remould), * Undrained Shear Strength (kPa)	LAB TESTING: Rinse pH Values, Soil Vapour Reading (parts per million (ppm)), Lower Explosive Limit (LEL), Plastic / Liquid	INSTRUMENTATION INSTALLATION	COMMENTS
	ASPHALT: 100 mm asphalt concrete over 200 mm granular base (102.25)	SS	1	90	50/15	0	102	50 / 15	19		SS1 sampled for Metals and Inorganics and PAHs on January 13, 2021
	FILL: sandy silt, some clay, mottled, brown/grey, very moist, compact (101.79)					0.3					
	CLAYEY SILT TILL: trace sand, trace sand, trace gravel, fragments of Shale, grey, moist, very stiff to hard - sand seam, 100 mm thick (99.96)	SS	2	46	24	0.8			16		SS2 sampled for VOCs and PHCs on January 13, 2021
		SS	3	90	50/15	1	101	50 / 15	13		
		SS	4	100	50/13	2	100	50 / 13	7		
	BEDROCK: Shale, highly weathered, occasional limestone fragments, grey, damp, hard	SS	5	100	50/3	3	99	50 / 3	6		
	-first water strike	SS	6	63	50/8	4	98	50 / 8	6		
	(96.40)	SS	7	60	50/5	5	97	50 / 5	6		
	End of Borehole (6.2)					6					

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 5.18 m bgs measured upon completion of drilling.
3. Groundwater level reading at 3.67 m bgs on February 8, 2021.

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Groundwater depth on completion of drilling: 5.18 m.

Groundwater depth observed on 08/02/2021 at a depth of: 3.67 m.

Scale: 1 : 47

RECORD OF BOREHOLE No. BH/MW103

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Solid Stem Augering	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	13 Jan 21	Date Completed: 13 Jan 21	Revision No.: 1, 9/2/21

Lithology Plot	DESCRIPTION	Elev.	Depth	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	Geodetic Ground Surface Elevation: 101.78 m							Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L Plastic Liquid 20 40 60 80		
	ASPHALT: 100 mm asphalt concrete over 300 mm granular bases	101.38		SS	1	51	13	○ 13			SS1 sampled for Metals and Inorganics and PAHs on January 13, 2021
	FILL: sand and gravel, brown, moist, compact	101.32	0.5								
	CLAYEY SILT TILL: some sand, trace gravel, fragments of Shale, reddish brown, moist, very stiff to hard			SS	2	84	26	○	○ 15		
			1								
		100		SS	3	93	70	○	○ 11		
			2								
		99.49									
	BEDROCK: Shale, highly weathered, occasional limestone fragments, grey, damp, hard	2.3		SS	4	87	50/15	50 ○ 15	○ 6		
		99		SS	5	100	50/5	50 ○ 5	○ 2		
			3								
		98									Groundwater sampled for Na/Cl on February 3, 2021
			4								
				SS	6	60	50/5	50 ○ 5	○ 4		
		97									
			5								
		96.29									
	Borehole terminated at 5.49 m due to auger refussal on inferred Limestone bedrock	5.5									

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 4.57 m bgs measured upon completion of drilling.
3. Groundwater level reading at 2.79 m bgs on February 8, 2021.

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▽ Groundwater depth on completion of drilling: 4.57 m.

▼ Groundwater depth observed on 08/02/2021 at a depth of: 2.79 m.

RECORD OF BOREHOLE No. BH/MW104

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Solid Stem Augering	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	13 Jan 21	Date Completed: 13 Jan 21	Revision No.: 1, 9/2/21

Lithology Plot	DESCRIPTION (Geodetic Ground Surface Elevation: 100.96 m)	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING: SPT 'N' Value	LAB TESTING: Soil Vapour Reading (ppm)	INSTRUMENTATION INSTALLATION	COMMENTS
	ASPHALT: 100 mm asphalt concrete over 200 mm granular bases 100.66										
	FILL: sand and gravel, brown, moist, compact 0.3	SS	1	62	23			4			SS1 sampled for Metals and Inorganics and PAHs on January 13, 2021
	------- sandy silt, some clay, trace gravel 99.59	SS	2	62	13	1	100	12			
	CLAYEY SILT TILL: some sand, trace gravel, fragments of Shale, brown, moist, hard 1.4	SS	3	95	42	2	99	13			
	98.67										
	BEDROCK: Shale, highly weathered, occasional Limestone fragments, grey, moist, hard 2.3	SS	4	63	50/8			50/8	7		
		SS	5	100	50/3	3	98	50/3	6		
		SS	6	100	50/5	4	97	50/5	7		Groundwater sampled for PHCs, VOCs and PAHs on February 3, 2021
						5	96				
		SS	7	100	50/3	6	95	50/3	8		
	94.84 **End of Borehole** 6.1										

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 4.88 m bgs measured upon completion of drilling.
3. Groundwater level reading at 2.45 m bgs on February 8, 2021.

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▽ Groundwater depth on completion of drilling: 4.88 m.

▼ Groundwater depth observed on 08/02/2021 at a depth of: 2.45 m.

RECORD OF BOREHOLE No. BH/MW105

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Hollow Stem Augering + Rock Coring	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	14 Jan 21	Date Completed: 15 Jan 21	Revision No.: 1, 9/2/21

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		
Lithology Plot	DESCRIPTION Geodetic Ground Surface Elevation: 102.38 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	Penetration Testing: SPT, DCPT; MTO Vane* Intact/Remould; Nilcon Vane* Intact/Remould; * Undrained Shear Strength (kPa) 20 40 60 80	Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading parts per million (ppm) 100 200 300 400; Lower Explosive Limit (LEL); W_P W W_L; Plastic Liquid 20 40 60 80	INSTRUMENTATION INSTALLATION	COMMENTS
	ASPHALT: 100 mm asphalt concrete over 200 mm granular base 102.08	SS	1	62	37	0	102	50	6		SS1 sampled for Metals and Inorganics and PAHs on January 14, 2021
	FILL: clayey silt, trace to some sand and gravel, brown/grey, moist, hard to very stiff 0.3 101.31	SS	2	70	23	1	101		14		
	CLAYEY SILT TILL: trace sand, trace gravel, fragments of Shale, grey, moist, very stiff to hard 1.1 100.09	SS	3	84	55	2			9		SS3 sampled for VOCs and PHCs on January 14, 2021
	BEDROCK: Shale, highly weathered to excellent qaulity, occasional Limestone layers, grey, moist 2.3	SS	4	100	50/8		100	50/8	7		
		SS	5	100	50/5	3	99	50/5	7		
	-first water strike	SS	6	100	50/5	4	98	50/5	18		
		SS	7	100	50/5	5	97	50/5	16		
		SS	8	100	50/5	6	96	50/5	16		
	ROCK CORE BEGINS - Poor Quality	RC	1	78	27	7	95				
						8	94				
						9					

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Groundwater depth on completion of drilling: NOT MEASURED DUE TO DRILLING WATER m.

Groundwater depth observed on 08/02/2021 at a depth of: 21.09 m.

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RECORD OF BOREHOLE No. BH/MW105

Project Number: **BIGC-ENV-349B** Drilling Location: **See BH Location Plan** Logged by: **TVH**

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L Plastic Liquid 20 40 60 80	INSTRUMENTATION INSTALLATION	COMMENTS
	- Good Quality **BEDROCK:** Shale, highly weathered to excellent qaulity, occasional Limestone layers, grey, moist	RC	2	100	81		93				
	- Good Quality	RC	3	99	82	10	92	○			
	- Excellent Quality	RC	4	99	91	11	91	○			
	- Excellent Quality	RC	5	99	97	12	90	○			
	- Excellent Quality	RC	6	99	96	13	89	○			
	- Excellent Quality	RC	7	99	95	14	88	○			
	- Excellent Quality	RC	8	97	98	15	87	○			
						16	86				
						17	85				
						18	84				
						19					

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commisioned and the accompanying'Notes to Record of Boreholes'.

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RECORD OF BOREHOLE No. BH/MW105

Project Number: **BIGC-ENV-349B** Drilling Location: **See BH Location Plan** Logged by: **TVH**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	BEDROCK: Shale, highly weathered to excellent qaulity, occasional Limestone layers, grey, moist										
	- Good Quality	RC	9	98	83	20	83				
	- Excellent Quality	RC	10	99	93	21	82				
	- Excellent Quality	RC	11	99	92	22	81				
	78.96					23	80				
	Borehole terminated at 23.42 23.4						79				

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level not measured upon completion of drilling due to introduced drilling water.
3. Groundwater level reading at 21.09 m bgs on February 8, 2021.

FIELD TESTING: Penetration Testing — ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: ★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L; Plastic Liquid 20 40 60 80

Scale: 1 : 47

RECORD OF BOREHOLE No. BH/MW106

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Solid Stem Augers	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	20 Jan 21	Date Completed: 20 Jan 21	Revision No.: 1, 9/2/21

Geodetic Ground Surface Elevation: 102.83 m

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING: Penetration Testing (SPT ○, DCPT ●); MTO Vane* (Intact △, Remould ▲); Nilcon Vane* (Intact ◇, Remould ◆); * Undrained Shear Strength (kPa) 20 40 60 80	LAB TESTING: ★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L; Plastic 20 40 60 80 Liquid	INSTRUMENTATION INSTALLATION	COMMENTS
	ASPHALT: 75 mm asphalt concrete over 150 mm granular base (102.61)										
	FILL: clayey silt, trace sand, trace gravel, rootlets, mottled, brown, moist, stiff to hard (0.2)	SS	1	92	12			○ 50	○ 14		SS1 sampled for VOCs and PHCs on January 20, 2021
	(101.77)	SS	2	95	63/23	1	102	○ 63/23	○ 14		SS2 sampled for Metals and Inorganics and PAHs on January 20, 2021
	CLAYEY SILT TILL: trace sand, trace gravel, fragments of Shale, brown, moist, hard (1.1)										
	(101.15)	SS	3	93	50/15			○ 50/15	○ 15		
	BEDROCK: Shale, highly weathered, occasional Limestone fragments, grey, damp, hard (1.7)					2	101				
		SS	4	100	50/5			○ 50/5	○ 6		
		SS	5	100	50/5	3	100	○ 50/5	○ 6		
	-first water strike					4	99				
		SS	6	100	50/3			○ 50/3	○ 3		
						5	98				
	(96.71)	SS	7	100	50/3	6	97	○ 50/3	○ 2		
	End of Borehole (6.1)										

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 4.88 m bgs measured upon completion of drilling.
3. Groundwater level reading at 3.32 m bgs on February 8, 2021.

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▽ Groundwater depth on completion of drilling: 3.96 m.

▼ Groundwater depth observed on 08/02/2021 at a depth of: 3.32 m.

RECORD OF BOREHOLE No. BH/MW107

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Solid Stem Augers	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	20 Jan 21	Date Completed: 20 Jan 21	Revision No.: 1, 9/2/21

Lithology Plot	DESCRIPTION (Geodetic Ground Surface Elevation: 102.40 m)	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING: Penetration Testing (SPT / DCPT), MTO Vane* (Intact / Remould), Nilcon Vane* (Intact / Remould), * Undrained Shear Strength (kPa) 20 40 60 80	LAB TESTING: Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading parts per million (ppm) 100 200 300 400; Lower Explosive Limit (LEL) W_P W W_L; Plastic 20 40 60 80 Liquid	INSTRUMENTATION INSTALLATION	COMMENTS
	ASPHALT: 120 mm asphalt concrete over 170 mm granular base 102.11										
	FILL: clayey silt, trace gravel, rootlets, mottled, brown, moist, stiff 101.64	SS	1	59	12		102		16		SS1 sampled for Metals and Inorganics and PAHs on January 20, 2021
	CLAYEY SILT TILL: trace sand, trace gravel, oxidized fissures, mottled, brownish grey, moist, very stiff to hard 100.57	SS	2	92	28	1	101		12		
	BEDROCK: Shale, highly weathered, occasional Limestone fragments, grey, damp to moist, hard	SS	3	70	51	2			11		
		SS	4	100	50/5		100	50/5	8		
		SS	5	60	50/5	3		50/5	6		
	-first water strike						99				
						4					Groundwater sampled for Na/Cl on February 3, 2021
		SS	6	100	50/5		98	50/5	23		
						5					
							97				
	96.28	SS	7	100	50/3	6		50/3	23		
	End of Borehole 6.1										

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 3.66 m bgs measured upon completion of drilling.
3. Groundwater level reading at 3.61 m bgs on February 8, 2021.

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Groundwater depth on completion of drilling: 3.66 m.

Groundwater depth observed on 08/02/2021 at a depth of: 3.61 m.

RECORD OF BOREHOLE No. BH/MW108

Project Number:	**BIGC-ENV-349B**	Drilling Location:	**See BH Location Plan**	Logged by:	**TVH**
Project Client:	**Distrikt Capital**	Drilling Method:	**150 mm Solid Stem Augers**	Compiled by:	**TVH**
Project Name:	**Geotechnical Investigation**	Drilling Machine:	**Truck Mounted Drill Rig**	Reviewed by:	**SS**
Project Location:	**217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON**	Date Started:	**20 Jan 21** Date Completed: **20 Jan 21**	Revision No.:	**1, 9/2/21**

Lithology Plot	DESCRIPTION (Geodetic Ground Surface Elevation: 102.55 m)	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING: Penetration Testing (SPT ○, DCPT ●); MTO Vane* (Intact △, Remould ▲); Nilcon Vane* (Intact ◇, Remould ◆); * Undrained Shear Strength (kPa) 20 40 60 80	LAB TESTING: ★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL); W_P W W_L; Plastic 20 40 60 80 Liquid	INSTRUMENTATION INSTALLATION	COMMENTS
	ASPHALT: 150 mm asphalt concrete over 200 mm granular base 102.20	SS	1	75	9		102	○	★ 15		SS1 sampled for Metals and Inorganics and PAHs on January 20, 2021
	FILL: clayey silt, trace gravel, rootlets, organic staining, mottled, brown, moist, stiff 0.4 / 101.79										
	CLAYEY SILT TILL: trace sand, trace gravel, oxidized fissures, mottled, brown, moist, very stiff to hard 0.8 / 100.47	SS	2	100	25	1	101	○	○ 12		
		SS	3	100	65	2		○	○ 11		
	BEDROCK: Shale, highly weathered, occasional Limestone fragments, grey, moist 2.1	SS	4	100	50/5		100	50/5	○ 8		
		SS	5	100	50/5	3		50/5	○ 6		
	-first water strike					4	99				Groundwater sampled for Metals and Inorganics on February 3, 2021
		SS	6	100	50/3		98	50/3	○ 5		
						5	97				
	End of Borehole 96.43 / 6.1	SS	7	100	50/3	6		50/3	○ 21		

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 3.96 m bgs measured upon completion of drilling.
3. Groundwater level reading at 3.90 m bgs on February 8, 2021.

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▽ Groundwater depth on completion of drilling: 3.96 m.

▼ Groundwater depth observed on 08/02/2021 at a depth of: 3.90 m.

RECORD OF BOREHOLE No. BH/MW109

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Solid Stem Augers	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	20 Jan 21	Date Completed: 20 Jan 21	Revision No.: 1, 9/2/21

Lithology Plot	DESCRIPTION (Geodetic Ground Surface Elevation: 102.89 m)	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING: Penetration Testing (SPT / DCPT), MTO Vane* (Intact / Remould), Nilcon Vane* (Intact / Remould), * Undrained Shear Strength (kPa)	LAB TESTING: Rinse pH Values, Soil Vapour Reading (parts per million (ppm)), Lower Explosive Limit (LEL), Plastic / Liquid	INSTRUMENTATION INSTALLATION	COMMENTS
	ASPHALT: 140 mm asphalt concrete over 160 mm granular base (102.59)										
	FILL: clayey silt, trace gravel, rootlets, mottled brown, moist, stiff (102.43)	SS	1	92	13						SS1 sampled for Metals and Inorganics and PAHs on January 20, 2021
	0.5										
	CLAYEY SILT TILL: trace sand, trace gravel, fragments of Shale, oxidized fissures, mottled, brownish grey, moist, hard	SS	2	100	33	1	102				
	(101.06)	SS	3	83	76/20						
	1.8										
	BEDROCK: Shale, highly weathered, occasional Limestone fragments, grey, moist to damp, hard	SS	4	100	50/5	2	101				
		SS	5	100	50/3	3	100				
	-first water strike	SS	6	100	50/5	4	99				
	(96.77)	SS	7	100	50/3	5	98				
	6.1					6	97				
	End of Borehole										

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 5.18 m bgs measured upon completion of drilling.
3. Groundwater level reading at 4.20 m bgs on February 8, 2021.

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Groundwater depth on completion of drilling: 5.18 m.

Groundwater depth observed on 08/02/2021 at a depth of: 4.20 m.

RECORD OF BOREHOLE No. BH/MW110

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Solid Stem Augers	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	21 Jan 21	Date Completed: 21 Jan 21	Revision No.: 1, 9/2/21

Geodetic Ground Surface Elevation: 101.82 m

Depth (m)	Description	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	Elevation (m)
0	**ASPHALT:** 120 mm asphalt concrete over 300 mm granular base	SS	1	79	21	101.40
0.4	**FILL:** sandy silt, some gravel, occasional glass fragments, rootlets, brown, moist, compact	SS	2	95	12	100.75
1.1	**CLAYEY SILT TILL:** trace sand, trace gravel, fragments of Shale, oxidized fissures, mottled, brownish grey, moist, stiff to hard	SS	3	100	37	99.53
2.3	**BEDROCK:** Shale, highly weathered, occasional Limestone fragments, grey, damp, hard	SS	4	100	50/5	
		SS	5	100	50/5	
	-first water strike	SS	6	60	50/5	
6.1	**End of Borehole**	SS	7	100	50/3	95.70

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 3.96 m bgs measured upon completion of drilling.
3. Groundwater level reading at 3.08 m bgs on February 8, 2021.

COMMENTS

SS1 sampled for Metals and Inorganics and PAHs on January 21, 2021

SS2 sampled for VOCs and PHCs on January 21, 2021

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▽ Groundwater depth on completion of drilling: 3.96 m.

▼ Groundwater depth observed on 08/02/2021 at a depth of: 3.08 m.

RECORD OF BOREHOLE No. BH/MW111

Project Number:	**BIGC-ENV-349B**	Drilling Location:	**See BH Location Plan**	Logged by:	**TVH**
Project Client:	**Distrikt Capital**	Drilling Method:	**150 mm Solid Stem Augers**	Compiled by:	**TVH**
Project Name:	**Geotechnical Investigation**	Drilling Machine:	**Truck Mounted Drill Rig**	Reviewed by:	**SS**
Project Location:	**217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON**	Date Started:	**21 Jan 21** Date Completed: **21 Jan 21**	Revision No.:	**1, 9/2/21**

Lithology Plot	DESCRIPTION (Geodetic Ground Surface Elevation: 101.94 m)	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING: Penetration Testing (SPT ○ / DCPT ●); MTO Vane* (Intact △ / Remould ▲); Nilcon Vane* (Intact ◇ / Remould ◆); * Undrained Shear Strength (kPa) 20 40 60 80	LAB TESTING: ★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L; Plastic Liquid 20 40 60 80	INSTRUMENTATION INSTALLATION	COMMENTS
	ASPHALT: 75 mm asphalt concrete over 250 mm granular base 101.71										
	FILL: sandy silt, trace gravel, rootlets, organic staining, brown, moist, compact 0.2	SS	1	95	15			○ 13			SS1 sampled for Metals and Inorganics and PAHs on January 21, 2021
	------- clayey silt, firm	SS	2	100	8	1	101	○ 15			
	100.26										
	CLAYEY SILT TILL: trace sand, trace gravel, fragments of Shale, oxidized fissures, mottled, grey, moist, hard 1.7	SS	3	100	34	2	100	○ 13			
	99.65										
	BEDROCK: Shale, highly weathered, occasional Limestone fragments, grey, moist 2.3	SS	4	63	50/8			50 ○ 8	○ 5		
		SS	5	100	50/5	3	99	50 ○ 5	○ 7		
	-first water strike					4	98				Groundwater sampled for PAHs on February 3, 2021
		SS	6	60	50/5			50 ○ 5	○ 8		
						5	97				
	95.82	SS	7	100	50/3	6	96	50 ○ 3	○ 7		
	End of Borehole 6.1										

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 3.96 m bgs measured upon completion of drilling.
3. Groundwater level reading at 3.37 m bgs on February 8, 2021.

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▽ Groundwater depth on completion of drilling: 3.96 m.

▼ Groundwater depth observed on 08/02/2021 at a depth of: 3.37 m.

Scale: 1 : 47

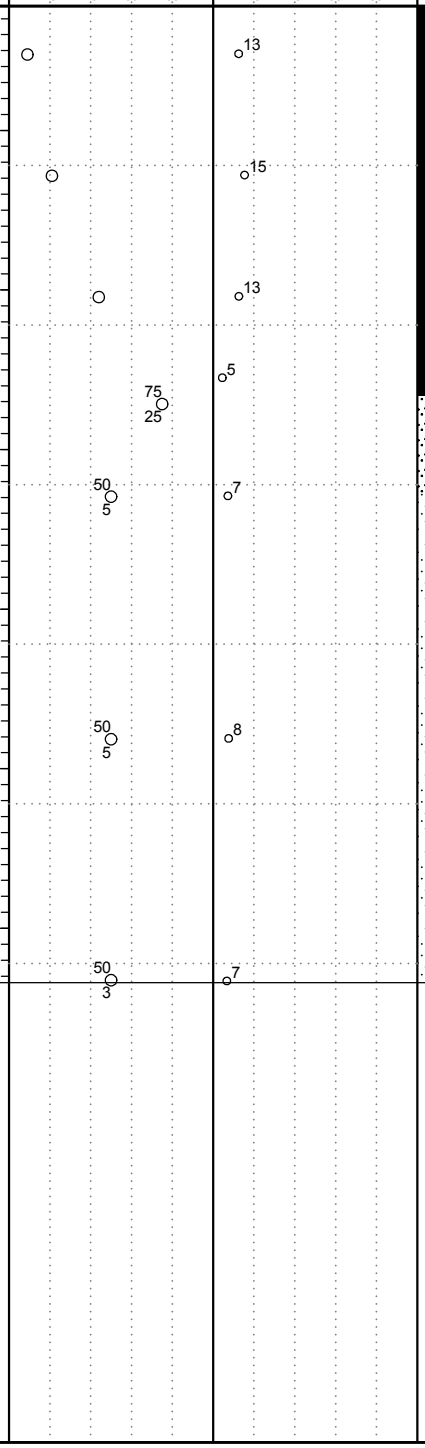
RECORD OF BOREHOLE No. BH/MW112

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Solid Stem Augers	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	21 Jan 21	Date Completed: 21 Jan 21	Revision No.: 1, 9/2/21

Geodetic Ground Surface Elevation: 102.78 m

Depth (m)	Description	Elevation (m)	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%
0	**TOPSOIL:** 150 mm	102.63				
	FILL: clayey silt, trace gravel, rootlets, brown, moist, stiff	0.2	SS	1	59	9
	------- grey	101.71	SS	2	100	21
1	**CLAYEY SILT TILL:** trace sand, trace gravel, fragments of Shale, oxidized fissures, mottled, grey, moist, very stiffto hard	1.1	SS	3	95	44
2		100.18	SS	4	100	75/25
	BEDROCK: Shale, highly weathered, occasional Limestone fragments, grey, moist, hard	2.6				
3			SS	5	100	50/5
4	-first water strike		SS	6	60	50/5
5		96.66	SS	7	100	50/3
6	**End of Borehole**	6.1				

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 5.18 m bgs measured upon completion of drilling.
3. Groundwater level reading at 4.23 m bgs on February 8, 2021.



INSTRUMENTATION INSTALLATION

SS1 sampled for Metals and Inorganics and PAHs on January 21, 2021

SS2 sampled for VOCs and PHCs on January 21, 2021

Groundwater sampled for PHCs, VOCs, Metals and Inorganics and PAHs on February 3, 2021 (DUP11201)

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Groundwater depth on completion of drilling: 5.18 m.

Groundwater depth observed on 08/02/2021 at a depth of: 4.23 m.

RECORD OF BOREHOLE No. BH/MW113

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Solid Stem Augers	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	21 Jan 21	Date Completed: 21 Jan 21	Revision No.: 1, 9/2/21

Geodetic Ground Surface Elevation: 103.45 m

Depth	Description	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	Elevation (m)
0.0	**GRAVEL:** 50 mm					103.40
	FILL: clayey silt, trace gravel, rootlets, organic staining, brown, moist, very stiff to stiff	SS	1	100	19	
1.1		SS	2	100	13	102.38
	CLAYEY SILT TILL: trace sand, trace gravel, fragments of Shale, oxidized fissures, mottled, grey, moist, stiff to hard	SS	3	100	44	
2.6		SS	4	100	90	100.85
	BEDROCK: Shale, highly weathered, occasional Limestone fragments, grey, moist	SS	5	100	50/5	
	-first water strike	SS	6	100	50/3	
6.1		SS	7	100	50/5	97.33
	End of Borehole					

Penetration Testing: SPT, DCPT; MTO Vane* (Intact, Remould); Nilcon Vane* (Intact, Remould); * Undrained Shear Strength (kPa) 20 40 60 80

Rinse pH Values 2 4 6 8 10 12

Soil Vapour Reading: parts per million (ppm) 100 200 300 400; Lower Explosive Limit (LEL)

Atterberg Limits: W_P W W_L; Plastic Liquid; 20 40 60 80

INSTRUMENTATION INSTALLATION

COMMENTS

SS1 sampled for Metals and Inorganics and PAHs on January 21, 2021

SS2 sampled for VOCs and PHCs on January 21, 2021

Groundwater sampled for PAHs on February 3, 2021

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level at 5.48 m bgs measured upon completion of drilling.
3. Groundwater level reading at 4.77 m bgs on February 8, 2021.

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Groundwater depth on completion of drilling: 5.48 m.

Groundwater depth observed on 08/02/2021 at a depth of: 4.77 m.

RECORD OF BOREHOLE No. BH/MW114

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Hollow Stem Augering + Rock Coring	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	21 Jan 21	Date Completed: 27 Jan 21	Revision No.: 1, 9/2/21

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
Lithology Plot	DESCRIPTION Geodetic Ground Surface Elevation: 103.31 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	PenetrationTesting: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L Plastic Liquid 20 40 60 80		
	TOPSOIL: 150 mm — 103.16					0	103				
	FILL: clayey silt, trace gravel, mottled, grey, moist, very stiff to firm — 0.2	SS	1	100	20			○ 11			SS1 sampled for Metals and Inorganics and PAHs on January 21, 2021
		SS	2	100	8	1	102	○ 19			SS2 sampled for Metals and Inorganics and PAHs on January 21, 2021
	101.63										
	CLAYEY SILT TILL: trace sand, trace gravel, frgments of Shalr, oxidized fissures, mottled, grey, moist, hard — 1.7	SS	3	100	37	2	101	○ 11			
	100.56	SS	4	100	57			○ 11			
	BEDROCK: Shale, highly weathered to excellent qaulity, occasional Limestone layers, grey, moist to damp — 2.8	SS	5	100	50/5	3	100	○ 50/5	○ 9		
	- first water strike	SS	6	60	50/5	4	99	○ 50/5	○ 7		
		SS	7	60	50/5	5	98	○ 50/5	○ 19		
	ROCK CORE BEGINS - Poor Quality	RC	1	98	35	6	97				
	- Poor Quality	RC	2	69	28	7	96				
						8	95				
						9					

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▽ Groundwater depth on completion of drilling: NOT MEASURED DUE TO DRILLING WATER m.

▼ Groundwater depth observed on 08/02/2021 at a depth of: 18.88 m.

Scale: 1 : 47

Continued on Next Page

RECORD OF BOREHOLE No. BH/MW114

Project Number: **BIGC-ENV-349B** Drilling Location: **See BH Location Plan** Logged by: **TVH**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	COMMENTS
	BEDROCK: Shale, highly weathered to excellent qaulity, occasional Limestone layers, grey, moist to damp						94	
	- Fair Quality	RC	3	98	62	10	93	
	- Good Quality	RC	4	100	87	11	92	
	- Good Quality	RC	5	100	76	12	91	
	- Good Quality	RC	6	100	83	13	90	
	- Excellent Quality	RC	7	100	98	14	89	
	- Good Quality	RC	8	97	89	15	88	
						16	87	
						17	86	
						18	85	
						19		

LITHOLOGY PROFILE | **SOIL SAMPLING** | **FIELD TESTING** | **LAB TESTING** | **INSTRUMENTATION INSTALLATION**

FIELD TESTING
PenetrationTesting: ○ SPT ● DCPT
MTO Vane*: △ Intact ▲ Remould
Nilcon Vane*: ◇ Intact ◆ Remould
* Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING
★ Rinse pH Values 2 4 6 8 10 12
Soil Vapour Reading
△ parts per million (ppm) 100 200 300 400
▲ Lower Explosive Limit (LEL)
W_P W W_L
Plastic Liquid
20 40 60 80

Scale: 1 : 47

Continued on Next Page

RECORD OF BOREHOLE No. BH/MW114

Project Number: **BIGC-ENV-349B** Drilling Location: **See BH Location Plan** Logged by: **TVH**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	BEDROCK: Shale, highly weathered to excellent qaulity, occasional Limestone layers, grey, moist to damp - Excellent Quality	RC	9	100	94	20	84 83				
	- Excellent Quality	RC	10	100	90	21	82				
	- Excellent Quality	RC	11	100	97	22 23	81				
	79.99 **Borehole terminated at 23.32** 23.3 Notes: 1. Borehole open upon completion of drilling. 2. Groundwater level not measured upon completion of drilling due to introduced drilling water. 3. Groundwater level reading at 18.88 m bgs on February 8, 2021.						80				

FIELD TESTING: Penetration Testing — ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: ★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL); W_P W W_L; Plastic Liquid 20 40 60 80

Scale: 1 : 47

RECORD OF BOREHOLE No. BH/MW115

Project Number:	BIGC-ENV-349B	Drilling Location:	See BH Location Plan	Logged by:	TVH
Project Client:	Distrikt Capital	Drilling Method:	150 mm Hollow Stem Augering + Rock Coring	Compiled by:	TVH
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill Rig	Reviewed by:	SS
Project Location:	217 & 227 Cross Ave. and 571 Argus Rd., Oakville, ON	Date Started:	22 Jan 21	Date Completed: 26 Jan 21	Revision No.: 1, 9/2/21

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
Lithology Plot	DESCRIPTION Geodetic Ground Surface Elevation: 101.72 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	Penetration Testing: SPT ○ DCPT ●; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L; Plastic 20 40 60 80 Liquid		
	ASPHALT: 100 mm asphalt concrete over 300 mm granular bases 101.32	SS	1	59	16	0	101	○ 50	○ 15		SS1 sampled for Metals and Inorganics and PAHs on January 22, 2021
	FILL: clayey silt, trace gravel, rootlets, organic staining, dark brown, moist, very stiff 0.4 100.88										
	CLAYEY SILT TILL: trace sand. trace gravel, oxidized fissures, mottled, grey, moist, stiff to hard 0.8	SS	2	100	12	1		○ 50	○ 13		SS2 sampled for Metals and Inorganics and PAHs on January 22, 2021
		SS	3	84	32	2	100	○ 50	○ 12		
	99.28	SS	4	100	50/13			○ 50/13	○ 10		
	BEDROCK: Shale, highly weathered to excellent qaulity, occasional Limestone layers, grey, moist to damp 2.4	SS	5	100	50/5	3	99	○ 50/5	○ 6		
	- first water strike	SS	6	60	50/5	4	98	○ 50/5	○ 5		
		SS	7	60	50/5	5	97	○ 50/5	○ 5		
	ROCK CORE BEGINS - Poor Quality	RC	1	83	30	6	96				
	- Fair Quality	RC	2	98	74	7	95				
						8	94	○			
						9	93	○			

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▽ Groundwater depth on completion of drilling: NOT MEASURED DUE TO DRILLING WATER m.

▼ Groundwater depth observed on 08/02/2021 at a depth of: 17.91 m.

Scale: 1 : 47

Continued on Next Page

RECORD OF BOREHOLE No. BH/MW115

Project Number: **BIGC-ENV-349B** Drilling Location: **See BH Location Plan** Logged by: **TVH**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	BEDROCK: Shale, highly weathered to excellent qaulity, occasional Limestone layers, grey, moist to damp										
	- Fair Quality	RC	3	99	61	10	92				
	- Good Quality	RC	4	99	77	11	91				
	- Excellent Quality	RC	5	100	98	12	90				
	- Good Quality	RC	6	98	87	13	89				
	- Excellent Quality	RC	7	100	95	14	88				
	- Excellent Quality	RC	8	100	92	15	87				
						16	86				
						17	85				
						18 ▼	84				
						19	83				

Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould

* Undrained Shear Strength (kPa) 20 40 60 80

★ Rinse pH Values 2 4 6 8 10 12

Soil Vapour Reading △ parts per million (ppm) 100 200 300 400

▲ Lower Explosive Limit (LEL)

W_P W W_L

Plastic Liquid

20 40 60 80

Continued on Next Page

Scale: 1 : 47

RECORD OF BOREHOLE No. BH/MW115

Project Number: **BIGC-ENV-349B** Drilling Location: **See BH Location Plan** Logged by: **TVH**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING: Penetration Testing (○ SPT ● DCPT); MTO Vane* (△ Intact ▲ Remould); Nilcon Vane* (◇ Intact ◆ Remould); * Undrained Shear Strength (kPa) 20 40 60 80	LAB TESTING: ★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L Plastic Liquid 20 40 60 80	INSTRUMENTATION INSTALLATION	COMMENTS
	BEDROCK: Shale, highly weathered to excellent qaulity, occasional Limestone layers, grey, moist to damp - Excellent Quality	RC	9	100	91	20	82	○			Groundwater sampled for Metals and Inorganics on February 3, 2021
	- Good Quality	RC	10	96	89	21	81	○			
	- Excellent Quality	RC	11	100	92	22	80	○			
	78.40					23	79				
	Borehole terminated at 23.32 23.3 Notes: 1. Borehole open upon completion of drilling. 2. Groundwater level not measured upon completion of drilling due to introduced drilling water. 3. Groundwater level reading at 17.91 m bgs on February 8, 2021.										

Scale: 1 : 47

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RECORD OF BOREHOLE No. BH1

METRIC 1 OF 1

PROJ. NO. BIGC-GEO-349A | LOCATION 571 Argus Road and 217 Cross Avenue, Oakville | ORIGINATED BY F.V.G

DATUM Geodetic | BOREHOLE TYPE Continous flight, 6 inches, Solid Stem Auger | COMPILED BY S.L

PROJ. NAME Geotechnical Investigation | DATE 2019.11.21 - 2019.11.21 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
101.55											
0.0 / 101.5	**ASPHALT:** 90 mm										
0.1 / 101.1	**GRANULAR:** 350 mm		1	SS1	25						
0.4 / 100.5	**FILL:** clayey silt to silty clay, some sand, organic staining, dark brown to black, moist		2	SS2	6						
1.1 / 98.9	**CLAYEY SILT TILL/SILTY CLAY TILL:** brown, moist, hard - trace rootlets between 1.1 m and 1.5 m		3	SS3	55						
			4	SS4	80						
2.7 / 98.4	**SHALE:** highly weathered, grey, damp										
3.2	**Borehole terminated at 3.2 m** Notes: 1. Open and dry upon completion of drilling										

$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

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RECORD OF BOREHOLE No. BH2

METRIC 1 OF 1

PROJ. NO. BIGC-GEO-349A | LOCATION 571 Argus Road and 217 Cross Avenue, Oakville | ORIGINATED BY F.V.G

DATUM Geodetic | BOREHOLE TYPE Continous flight, 6 inches, Solid Stem Auger | COMPILED BY S.L

PROJ. NAME Geotechnical Investigation | DATE 2019.11.21 - 2019.11.21 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
101.93											
101.9 / 0.0	**ASPHALT:** 75 mm										
0.1 / 101.5	**GRANULAR:** 330 mm		1	SS1	14						
0.4 / 101.0	**FILL:** clayey silt to silty clay, topsoil inclusion, some rootlets, dark brown to black, moist		2	SS2	9						
0.9 / 100.4	**SILT TO CLAYEY SILT:** trace rootlets, reddish brown, very moist, loose										
1.5 / 99.6	**CLAYEY SILT TILL/SILTY CLAY TILL:** brown, moist, hard - grey below 1.8 m		3	SS3	31						
2.3 / 98.7	**SHALE:** weathered, grey, damp		4	SS4	100						
			5	SS5	100						
3.2	- limestone at 3.2 m **Borehole terminated at 3.2 m** Notes: 1. Open and dry upon completion of drilling										

$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

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RECORD OF BOREHOLE No. BH/MW3

METRIC 1 OF 1

PROJ. NO. BIGC-GEO-349A | LOCATION 571 Argus Road and 217 Cross Avenue, Oakville | ORIGINATED BY F.V.G

DATUM Geodetic | BOREHOLE TYPE Continous flight, 8 inches, Hollow Stem Auger | COMPILED BY S.L

PROJ. NAME Geotechnical Investigation | DATE 2019.11.21 - 2019.11.21 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
102.87											
102.8	**ASPHALT:** 65 mm										
0.1	**GRANULAR:** 330 mm		1	SS1	14						
102.5											
0.4	**FILL:** clayey silt, organic staining, dark brown, moist										
102.3											
0.6	**CLAYEY SILT TILL/SILTY CLAY TILL:** mottled brown, moist, very stiff to hard		2	SS2	60						
	- shale-till complex below 1.5 m, brownish grey, moist, hard		3	SS3	100						
101.1											
1.8	**SHALE:** weathered, grey, damp		4	SS4	100						
100.6											
2.3	**Borehole terminated at 2.3 m**										

Notes:
1. Open and dry upon completion of drilling
2. Water level at 1.70 m bgs (Elev. 101.17 m asl) on November 29, 2019

$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

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RECORD OF BOREHOLE No. BH/MW4

METRIC 1 OF 2

PROJ. NO. BIGC-GEO-349A | LOCATION 571 Argus Road and 217 Cross Avenue, Oakville | ORIGINATED BY F.V.G

DATUM Geodetic | BOREHOLE TYPE Continous flight, 8 inches, Hollow Stem Auger | COMPILED BY S.L

PROJ. NAME Geotechnical Investigation | DATE 2019.11.21 - 2019.11.25 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
102.32											
102.2	**ASPHALT:** 75 mm										
0.1	**GRANULAR:** 280 mm										
102.0			1	SS1	15				○		
0.4	**CLAYEY SILT TILL/SILTY CLAY TILL:** mottled brown, moist, very stiff to hard										
			2	SS2	34				○		
	- shale-till complex below 1.5 m, brownish grey, moist, hard		3	SS3	100				○		
100.0											
2.3	**SHALE:** weathered, grey, damp		4	SS4	100				○		
99.6											
2.7	- Run # 1: 2.7 m to 4.0 m RQD = 0 % Recovery = 54 % - highly weathered, fine-grained grey shale with limestone interbeds - limestone at 2.8 m and 3.0 m - vertical fracture at 2.9 m - mottling due to water intrusion at 3.0 m - medium to hard rock		1	CORE							
98.3											
4.0	- Run # 2: 4.0 m to 5.5 m RQD = 51 % Recovery = 98 % - highly weathered grey shale between 4.0 m and 4.9 m - limestone between 4.0 m to 4.4 m with 100 mm of interbedded shale at 4.1 m - mottling at 4.0 m - fracture filling material observed at 4.2 m - natural fractures between 4.7 m and 4.9 m		2	CORE							
96.8											
5.5	- unweathered grey shale between 4.9 m and 5.5 m - Run # 3: 5.5 m to 7 m RQD = 65 % Recovery = 100 % - grey shale, fine-grained, medium to hard - slightly weathered to unweathered sections between 5.5 m and 5.6 m, between 5.6 m and 6.2 m, and between 6.4 m and 7.0 m - highly weathered section between 5.6 m and 5.7 m		3	CORE							
95.3											
7.0	- completely weathered with major fractures between 5.7 m and 5.9 m, filled with grey clayey silt till - major fractures filled with grey clayey silt till between 6.3 m and 6.4 m - 50 mm of fracture filling clayey silt till observed at 6.7 m - Run # 4: 7 m and 8.5 m RQD = 72 % Recovery = 98 % - slightly weathered grey shale with 25 mm of limestone interbeds at 7.3 m, very fine-grained, hard		4	CORE							
93.8											
8.5	- clean vertical fracture at 7.3 m - rough fractures with fracture filling material between 7.4 m and 7.5 m and between 7.8 m and 7.9 m - red staining/banding between 7.5 m and 7.7 m		5	CORE							

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

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RECORD OF BOREHOLE No. BH/MW4

METRIC 2 OF 2

PROJ. NO. BIGC-GEO-349A | LOCATION 571 Argus Road and 217 Cross Avenue, Oakville | ORIGINATED BY F.V.G

DATUM Geodetic | BOREHOLE TYPE Continous flight, 8 inches, Hollow Stem Auger | COMPILED BY S.L

PROJ. NAME Geotechnical Investigation | DATE 2019.11.21 - 2019.11.25 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (20 40 60 80 100): ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
92.2											
10.1	- Run # 5: 8.5 m and 10.1 m RQD = 70 % Recovery = 98 % - grey shale with limestone interbeds, very fine-grained, very hard rock - vertical fracture at 9.0 m - wide fracture filled with fracture filling material at 9.1 m - mottling between 9.1 m and 9.5 m - more than twelve (12+) horizontal mechanical fractures *(continued)*		6	CORE							
90.7	- Run # 6: 10.1 m and 11.6 m RQD = 80 % Recovery = 100 %										
11.6	- slightly weathered to unweathered grey shale with limestone interbeds, very hard rock - vertical fractures at 10.1 m and 11.5 m - very wide fracture filled with dark grey and very moist shale-till complex at 10.6 m - mottled and blotched discolourations of light to dark grey		7	CORE							
89.2	- Run # 7: 11.6 m and 13.1 m RQD = 88 % Recovery = 100 %										
13.1	- unweathered grey shale with minor limestone interbeds, hard rock - 75 mm of vertical fracture at 12.6 m - very narrow, slightly rough horizontal fractures in eroded/laminated shale between 12.7 m and 12.8 m, fractures filled with moist shale-till complex - more than eight (8+) horizontal mechanical fractures		8	CORE							
87.7	- Run # 8: 13.1 m and 14.6 m RQD = 97 % Recovery = 100 %										
14.6	- grey shale with limestone interbeds, very hard rock - no wide fractures - vertical fracture at 13.6 m - three (3) very narrow and smooth horizontal mechanical fractures		9	CORE							
86.1	- Run # 9: 14.6 m and 16.2 m RQD = 97 % Recovery = 100 % - unweathered grey shale with limestone interbeds, very fine-grained, very hard rock - blotched, light grey to dark grey throughout										
16.2	- red staining/banding between 14.6 m and 14.9 m - vertical fracture at 14.8 m for 150 mm - very narrow and smooth fractures with no fracture filling materials present		10	CORE							
84.6	- Run # 10: 16.2 m and 17.7 m RQD = 95 % Recovery = 85 % - unweathered grey shale with little to no limestone inlusions, very fine-grained, very hard rock										
17.7	- one (1) narrow and clean fracture with no fracture filling material - minimal horizontal fracturing, no vertical fractures										
	Borehole terminated at 17.7 m Notes: 1. Water at 16.2 m upon completion of drilling 2 Open upon completion of drilling 3. Water level at 3.56 m bgs (Elev. 98.76 m asl) on November 29, 2019										

$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

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RECORD OF BOREHOLE No. BH5

METRIC 1 OF 1

PROJ. NO. BIGC-GEO-349A | LOCATION 571 Argus Road and 217 Cross Avenue, Oakville | ORIGINATED BY F.V.G

DATUM Geodetic | BOREHOLE TYPE Continous flight, 6 inches, Solid Stem Auger | COMPILED BY S.L

PROJ. NAME Geotechnical Investigation | DATE 2019.11.21 - 2019.11.21 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
103.39											
0.0	**FILL:** clayey silt, some sand, mottled brown, moist		1	SS1	14						
102.9											
0.5	**CLAYEY SILT TILL/SILTY CLAY TILL:** mottled brown, moist, hard		2	SS2	28						
			3	SS3	38						
			4	SS4	51						
	- shale-till complex below 2.7 m, brownish grey, moist, hard										
100.3											
3.1	**SHALE:** weathered, grey, damp		5	SS5	100						
99.4											
4.0	**Borehole terminated at 4.0 m** Notes: 1. Open and dry upon completion of drilling										

$+^3, \times^3$: Numbers refer to Sensitivity

$\circ^{3\%}$ STRAIN AT FAILURE

B.I.G. Consulting Inc.
12-5500 Tomken Road
Mississauga, ON L4W 2Z4
www.bigconsultinginc.com

RECORD OF BOREHOLE No. BH/MW6

METRIC 1 OF 1

PROJ. NO. BIGC-GEO-349A | LOCATION 571 Argus Road and 217 Cross Avenue, Oakville | ORIGINATED BY F.V.G

DATUM Geodetic | BOREHOLE TYPE Continous flight, 8 inches, Hollow Stem Auger | COMPILED BY S.L

PROJ. NAME Geotechnical Investigation | DATE 2019.11.21 - 2019.11.21 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
102.74 0.0 102.7	**TOPSOIL:** 90 mm										
0.1 101.8	**FILL:** clayey silt, some sand, some rootlets, organic staining, dark brown, moist		1	SS1	8						
0.9	**CLAYEY SILT TILL/SILTY CLAY TILL:** mottled brown, moist, very stiff to hard		2	SS2	21						
	- shale-till complex below 2.3 m, grey, moist, hard		3	SS3	65						
99.6			4	SS4	33						
3.1 99.0	**SHALE:** weathered, grey, damp		5	SS5	100						
3.7	**Borehole terminated at 3.7 m** Notes: 1. Open and dry upon completion of drilling 2. Dry on November 29, 2019										

$+^3, \times^3$: Numbers refer to Sensitivity $\circ^{3\%}$ STRAIN AT FAILURE

APPENDIX B: MECP WWR, PTTW AND EASR SUMMARY TABLES

Table B-1: MECP WWR Summary Table

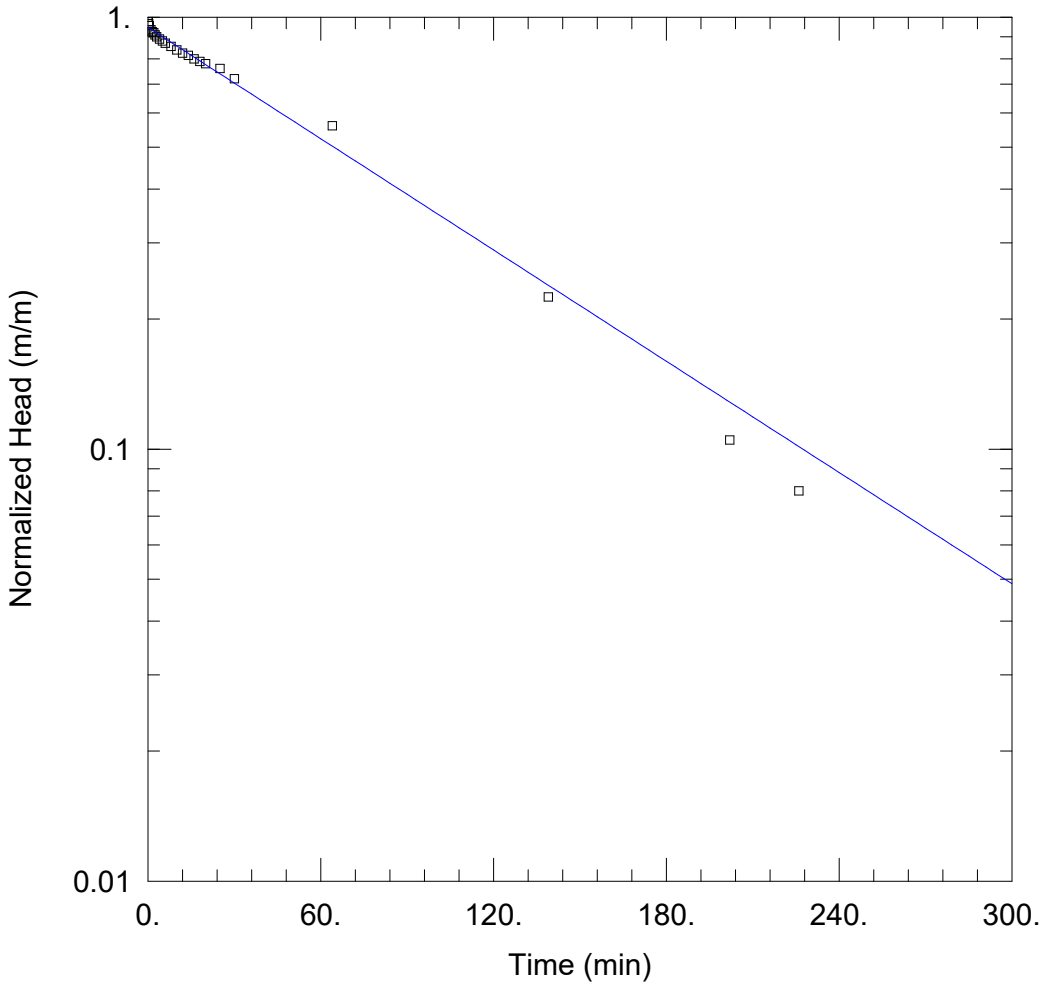
Count	Well ID	Date Completed	Depth (m)	Reported Water Level (m)	Status of Well
1.	2802422	07/21/1948	12.2	4.9	Water supply
2.	2810039	04/06/2004	5.1	N/A	Observation well
3.	2810078	09/03/2004	6.3	3.3	Observation well
4.	2810241	05/13/2005	N/A	N/A	Abandoned
5.	2810266	05/10/2005	5.2	N/A	Observation well
6.	2810285	02/01/2005	6.0	N/A	Observation well
7.	2810392	09/20/2005	4.5	N/A	Observation well
8.	2810455	12/13/2005	5.8	N/A	Observation well
9.	2810456	12/16/2005	N/A	N/A	Abandoned
10.	2810649	08/28/2006	7.6	N/A	Observation well
11.	7041205	01/12/2007	2.4	N/A	Observation well
12.	7100453	09/26/2007	4.7	N/A	Observation well
13.	7100453	09/26/2007	N/A	N/A	Observation well
14.	7101141	09/27/2007	N/A	N/A	Monitoring and test hole
15.	7101141	09/27/2007	N/A	N/A	Monitoring and test hole
16.	7125804	06/04/2009	9.1	N/A	Observation well
17.	7134031	09/16/2009	6.1	N/A	Observation well
18.	7152039	09/03/2010	4.0	N/A	Monitoring and test hole
19.	7152039	09/03/2010	N/A	N/A	Monitoring and test hole
20.	7152039	09/03/2010	N/A	N/A	Monitoring and test hole
21.	7152039	09/03/2010	N/A	N/A	Monitoring and test hole
22.	7152039	09/03/2010	N/A	N/A	Monitoring and test hole
23.	7152039	09/07/2010	N/A	N/A	Monitoring and test hole
24.	7152039	09/07/2010	N/A	N/A	Monitoring and test hole
25.	7152039	09/07/2010	N/A	N/A	Monitoring and test hole
26.	7152039	09/07/2010	N/A	N/A	Monitoring and test hole
27.	7152039	09/07/2010	N/A	N/A	Monitoring and test hole
28.	7152039	09/07/2010	N/A	N/A	Monitoring and test hole
29.	7152039	09/08/2010	N/A	N/A	Monitoring and test hole
30.	7152039	09/08/2010	N/A	N/A	Monitoring and test hole
31.	7152039	09/08/2010	N/A	N/A	Monitoring and test hole
32.	7152039	09/09/2010	N/A	N/A	Monitoring and test hole
33.	7152039	09/09/2010	N/A	N/A	Monitoring and test hole
34.	7161332	03/29/2011	3.4	N/A	Monitoring and test hole
35.	7161333	03/29/2011	3.4	N/A	Monitoring and test hole
36.	7161334	03/29/2011	3.4	N/A	Monitoring and test hole
37.	7173256	11/17/2011	5.5	N/A	Monitoring and test hole
38.	7173257	11/17/2011	4.6	N/A	Monitoring and test hole
39.	7173258	11/17/2011	4.3	N/A	Monitoring and test hole
40.	7173259	11/17/2011	4.3	N/A	Monitoring and test hole
41.	7173260	11/17/2011	4.3	N/A	Monitoring and test hole
42.	7187274	05/07/2012	N/A	1.3	Abandoned

Count	Well ID	Date Completed	Depth (m)	Reported Water Level (m)	Status of Well
43.	7187275	05/07/2012	N/A	1.5	Abandoned
44.	7187276	05/02/2012	N/A	1.5	Abandoned
45.	7187277	05/07/2012	N/A	1.5	Abandoned
46.	7187278	05/07/2012	N/A	1.5	Abandoned
47.	7187787	08/28/2012	3.4	N/A	Observation well
48.	7188619	04/13/2012	N/A	N/A	N/A
49.	7192191	05/18/2012	N/A	N/A	N/A
50.	7195037	06/19/2012	N/A	N/A	N/A
51.	7205225	06/21/2013	4.9	N/A	Monitoring and test hole
52.	7205226	06/21/2013	4.9	N/A	Monitoring and test hole
53.	7205227	06/20/2013	4.6	N/A	Monitoring and test hole
54.	7205228	06/20/2013	4.6	N/A	Monitoring and test hole
55.	7205229	06/20/2013	4.6	N/A	Monitoring and test hole
56.	7207704	07/15/2013	6.1	N/A	Monitoring and test hole
57.	7213467	11/21/2013	6.1	N/A	Monitoring and test hole
58.	7213468	11/18/2013	4.9	N/A	Monitoring and test hole
59.	7213469	11/28/2013	6.1	N/A	Monitoring and test hole
60.	7213470	11/18/2013	5.5	N/A	Monitoring and test hole
61.	7213474	11/20/2013	6.0	N/A	Monitoring and test hole
62.	7213475	11/20/2013	6.1	N/A	Monitoring and test hole
63.	7220358	03/18/2014	5.5	N/A	Monitoring and test hole
64.	7220359	03/18/2014	5.3	N/A	Monitoring and test hole
65.	7220360	03/17/2014	5.3	N/A	Monitoring and test hole
66.	7220361	03/17/2014	5.2	N/A	Monitoring and test hole
67.	7231230	09/08/2010	N/A	N/A	N/A
68.	7241968	02/11/2015	20.1	N/A	Observation well
69.	7247761	02/09/2015	N/A	N/A	N/A
70.	7253999	11/20/2015	6.1	N/A	Monitoring and test hole
71.	7254000	11/20/2015	6.1	N/A	Observation well
72.	7259855	09/09/2015	N/A	N/A	N/A
73.	7263647	04/23/2016	6.1	N/A	Monitoring and test hole
74.	7263648	04/23/2016	6.1	N/A	Monitoring and test hole
75.	7263649	04/23/2016	6.1	N/A	Monitoring and Test Hole
76.	7263650	04/23/2016	6.1	N/A	Monitoring and Test Hole
77.	7286766	N/A	N/A	N/A	N/A
78.	7318608	06/14/2018	N/A	N/A	N/A
79.	7322522	05/17/2018	6.1	N/A	Monitoring and Test Hole
80.	7322523	05/17/2018	5.0	N/A	Monitoring and test hole
81.	7322524	05/17/2018	6.4	N/A	Monitoring and test hole
82.	7325283	09/11/2018	N/A	N/A	N/A
83.	7327366	08/29/2018	N/A	N/A	N/A

Table B-2: MECP EASR Summary Table

Permit Number	Purpose	Address	Municipality	Water Source	Max L/Day	Active
8107-9KKLR9	Unknown	Queen Elizabeth Way (Hwy 403)	Oakville	Surface water	449,280,000	No
2560-A5PKQW	Dewatering construction	477 Maple Avenue	Oakville	Groundwater	390,000	No
0551-72YPT5	Dewatering construction	Northeast of Queen Elizabeth Way (Hwy 403) and Kerr Street	Oakville	Groundwater	1,962,744	No
2668-6TRQ7G	Dewatering construction	Northeast of Queen Elizabeth Way (Hwy 403) and Kerr Street	Oakville	Groundwater	1,962,744	No
4375-6NYL7V	Dewatering construction	Northeast of Queen Elizabeth Way (Hwy 403) and Kerr Street	Oakville	Groundwater	1,962,744	No
0772-AF3HTJ	Tunnel	Canadian National Railway and Cross Avenue	Oakville	Groundwater	20,000	No
0772-AF3HTJ	Mine – shaft or other	Canadian National Railway and Cross Avenue	Oakville	Groundwater	428,000	No
0772-AF3HTJ	Unknown	Canadian National Railway and Cross Avenue	Oakville	Groundwater	400,000	No
62-P-17	Lake	419 River Side Drive	Oakville	Surface water	1,083,940	No
R-009-2112317313	Construction dewatering	547 Trafalgar Road	Oakville	Groundwater	50,000 to 400,000	Yes
R-009-9112436776	Construction dewatering	Trans-Northern Pipelines Inc.	Oakville	Groundwater	50,000 to 400,000	Yes
R-009-9110219284	Construction dewatering	Part 57, Reference Plan 1009, Part 57	Oakville	Groundwater	50,000 to 400,000	No

APPENDIX C: SWRT RESULTS



WELL TEST ANALYSIS

Data Set: C:\...\MW1A.aqt
Date: 10/26/21 Time: 16:02:54

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Oakville Argus Cross LP
Project: BIGC-GEO-490A
Location: 581-587 Argus Road, ON
Test Well: BH/MW1
Test Date: October 13, 2021

AQUIFER DATA

Saturated Thickness: 2.67 m Anisotropy Ratio (Kz/Kr): 1.

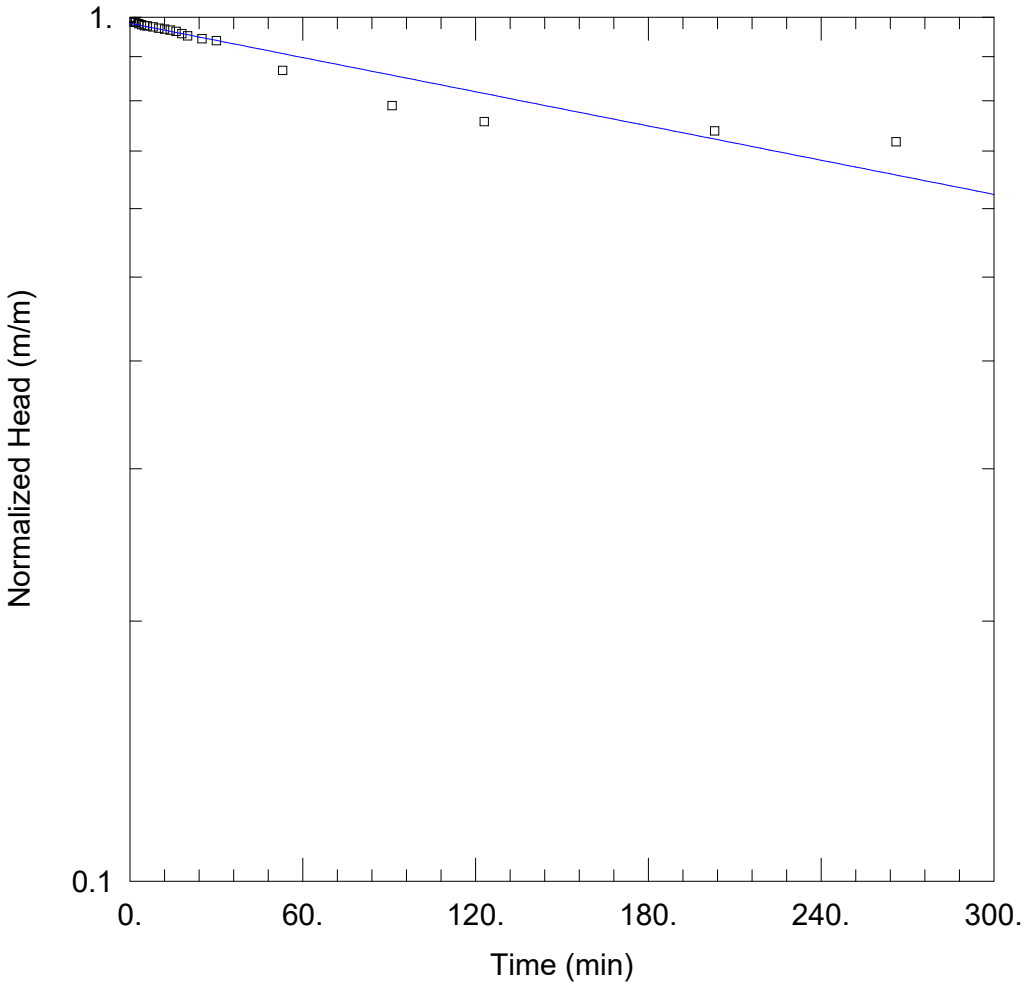
WELL DATA (BH/MW1)

Initial Displacement: 1. m
Total Well Penetration Depth: 2.67 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.67 m
Screen Length: 2.67 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 1.055E-7 m/sec y0 = 0.9464 m



WELL TEST ANALYSIS

Data Set: C:\...\MW2A.aqt
Date: 10/26/21 Time: 22:58:16

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Oakville Argus Cross LP
Project: BIGC-GEO-490A
Location: 581-587 Argus Road, ON
Test Well: BH/MW2
Test Date: October 13, 2021

AQUIFER DATA

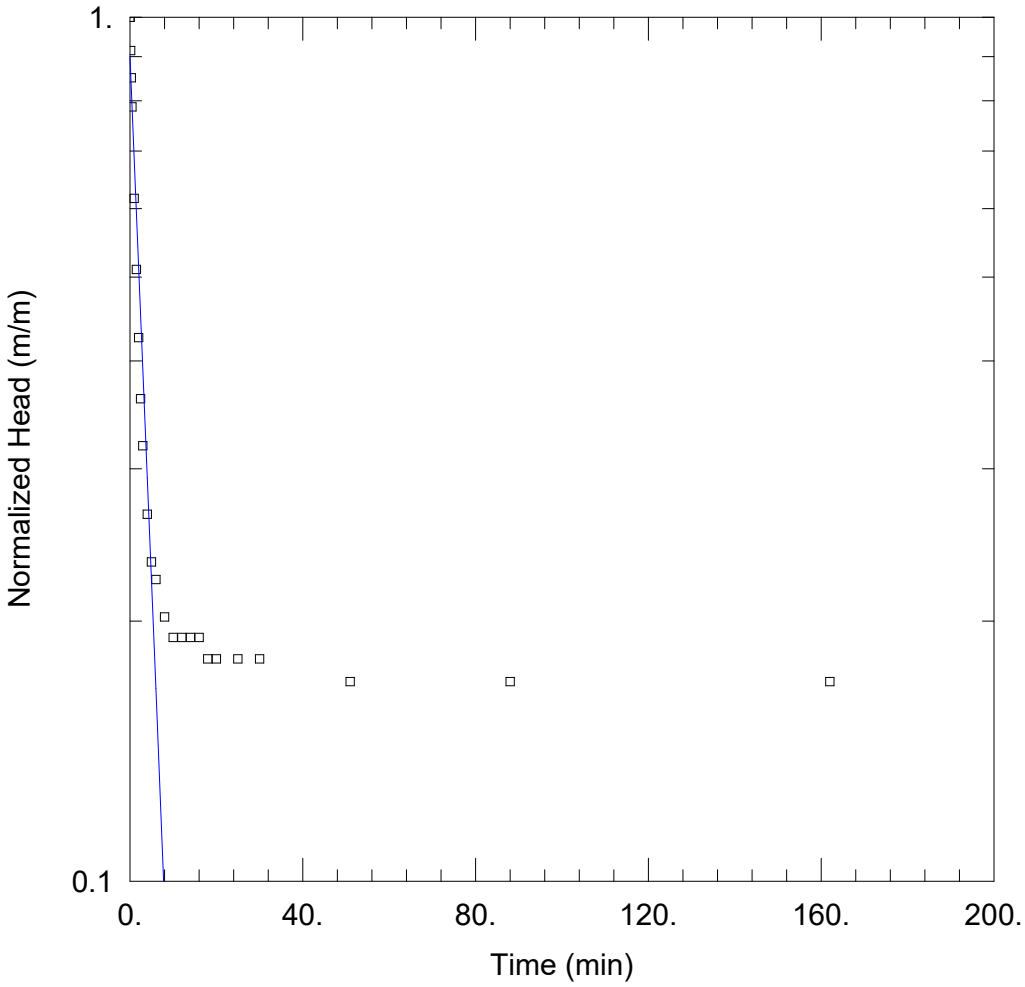
Saturated Thickness: 5.74 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH/MW2)

Initial Displacement: 4.28 m
Total Well Penetration Depth: 5.74 m
Casing Radius: 0.0254 m
Static Water Column Height: 5.74 m
Screen Length: 3. m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.488E-8 m/sec
y0 = 4.21 m



WELL TEST ANALYSIS

Data Set: C:\...\MW3A.aqt
Date: 10/26/21 Time: 16:05:15

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Oakville Argus Cross LP
Project: BIGC-GEO-490A
Location: 581-587 Argus Road, ON
Test Well: BH/MW3
Test Date: October 13, 2021

AQUIFER DATA

Saturated Thickness: 0.65 m Anisotropy Ratio (Kz/Kr): 1.

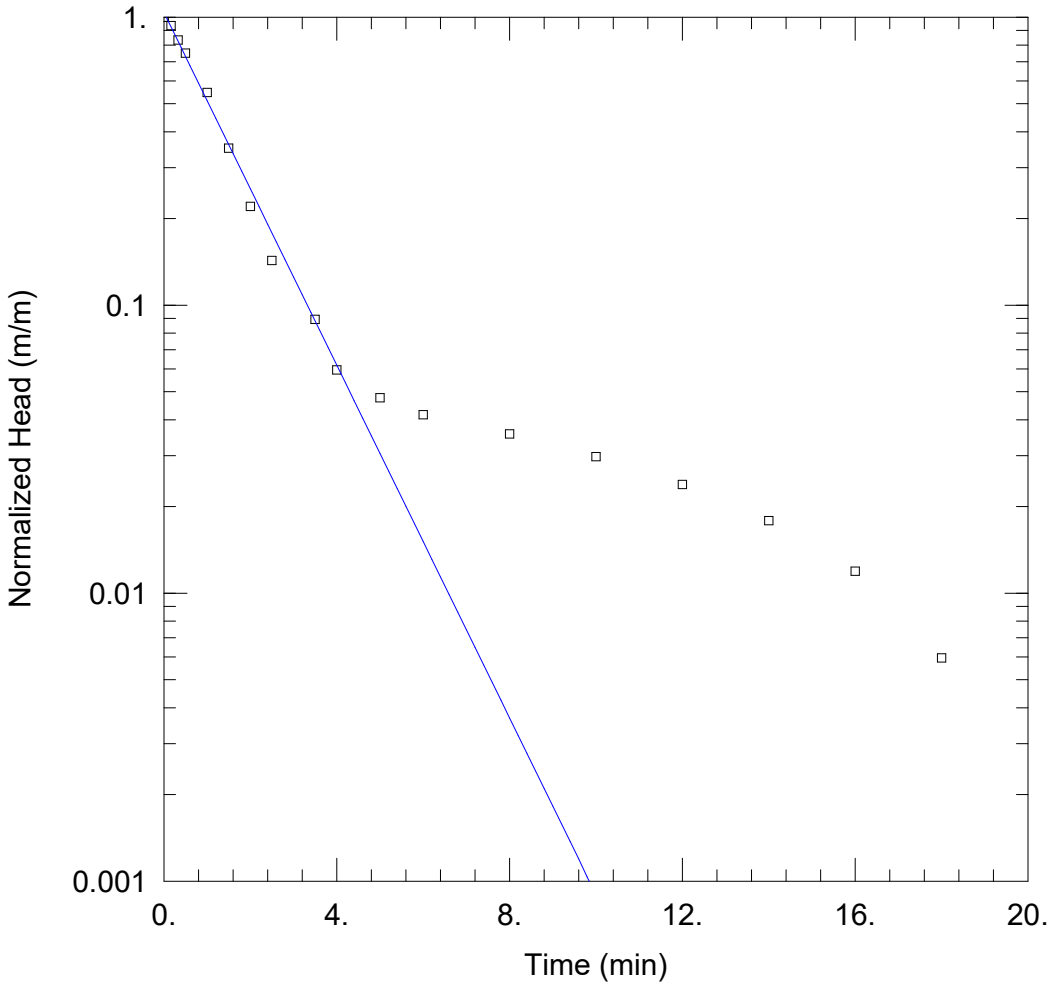
WELL DATA (BH/MW3)

Initial Displacement: 0.47 m
Total Well Penetration Depth: 0.65 m
Casing Radius: 0.0254 m
Static Water Column Height: 0.65 m
Screen Length: 0.65 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 1.23E-5 m/sec y0 = 0.4232 m



WELL TEST ANALYSIS

Data Set: C:\...\MW4A.aqt
Date: 10/26/21 Time: 16:01:33

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Oakville Argus Cross LP
Project: BIGC-GEO-490A
Location: 581-587 Argus Road, ON
Test Well: BH/MW4
Test Date: October 13, 2021

AQUIFER DATA

Saturated Thickness: 2.61 m Anisotropy Ratio (Kz/Kr): 1.

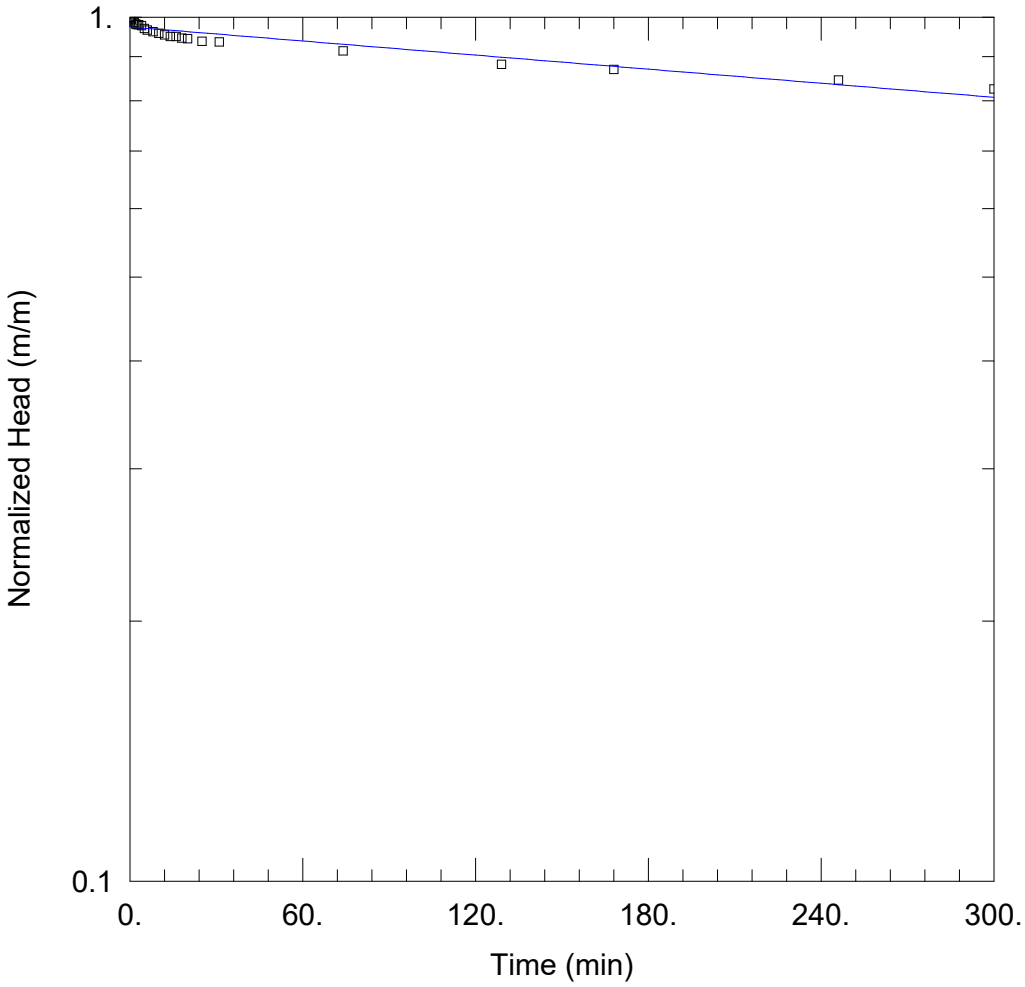
WELL DATA (BH/MW4)

Initial Displacement: 0.84 m
Total Well Penetration Depth: 2.61 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.61 m
Screen Length: 2.61 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 7.694E-6 m/sec y0 = 0.8713 m



WELL TEST ANALYSIS

Data Set: C:\...\MW5A.aqt
Date: 10/26/21 Time: 23:23:18

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Oakville Argus Cross LP
Project: BIGC-GEO-490A
Location: 581-587 Argus Road, ON
Test Well: BH/MW3
Test Date: October 13, 2021

AQUIFER DATA

Saturated Thickness: 3.84 m Anisotropy Ratio (Kz/Kr): 1.

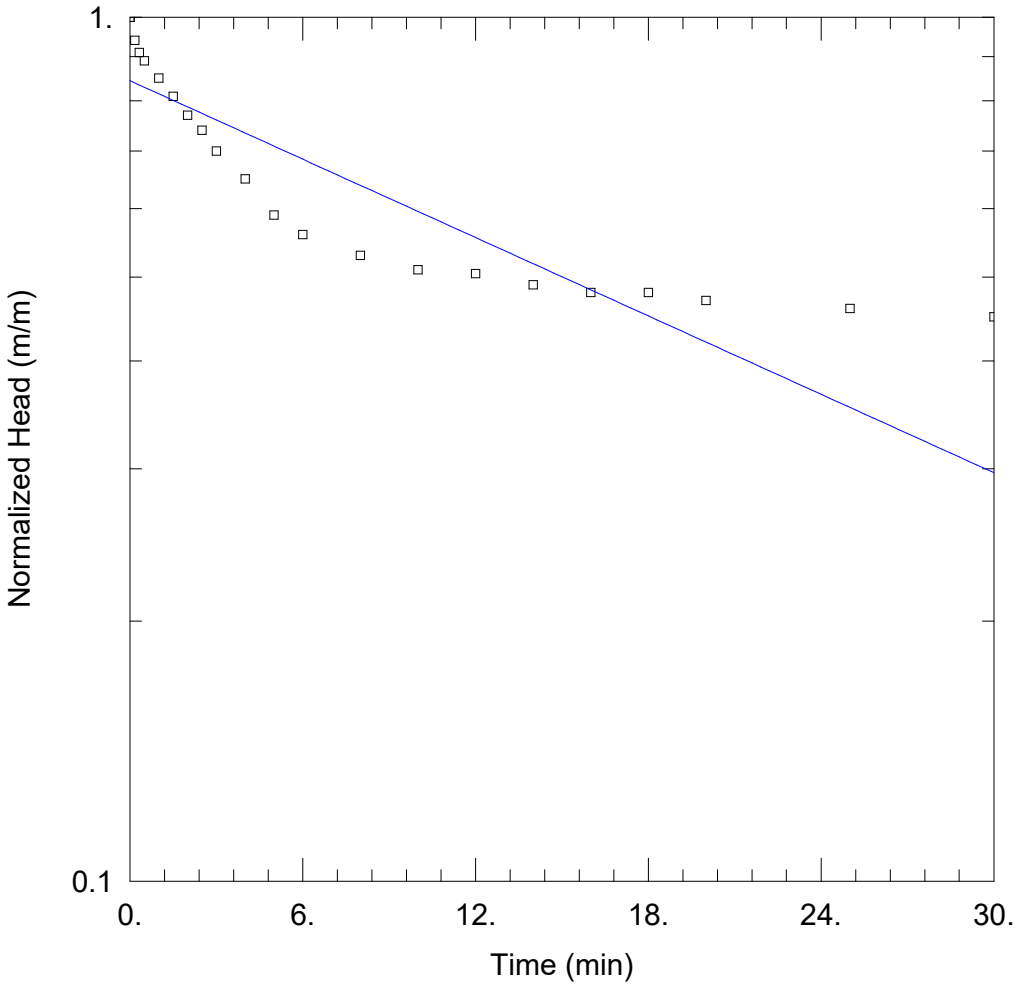
WELL DATA (BH/MW5)

Initial Displacement: 2.495 m
Total Well Penetration Depth: 4.84 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.84 m
Screen Length: 3. m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 6.119E-9 m/sec y0 = 2.43 m



WELL TEST ANLYSIS

Data Set: C:\...\MW104.aqt
Date: 03/03/21 Time: 10:05:54

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Distrikt Capital
Project: BIGC-ENV-349B
Location: Cross and Argus, Oakville, ON
Test Well: BH/MW104
Test Date: February 2, 2021

AQUIFER DATA

Saturated Thickness: 3.63 m Anisotropy Ratio (Kz/Kr): 1.

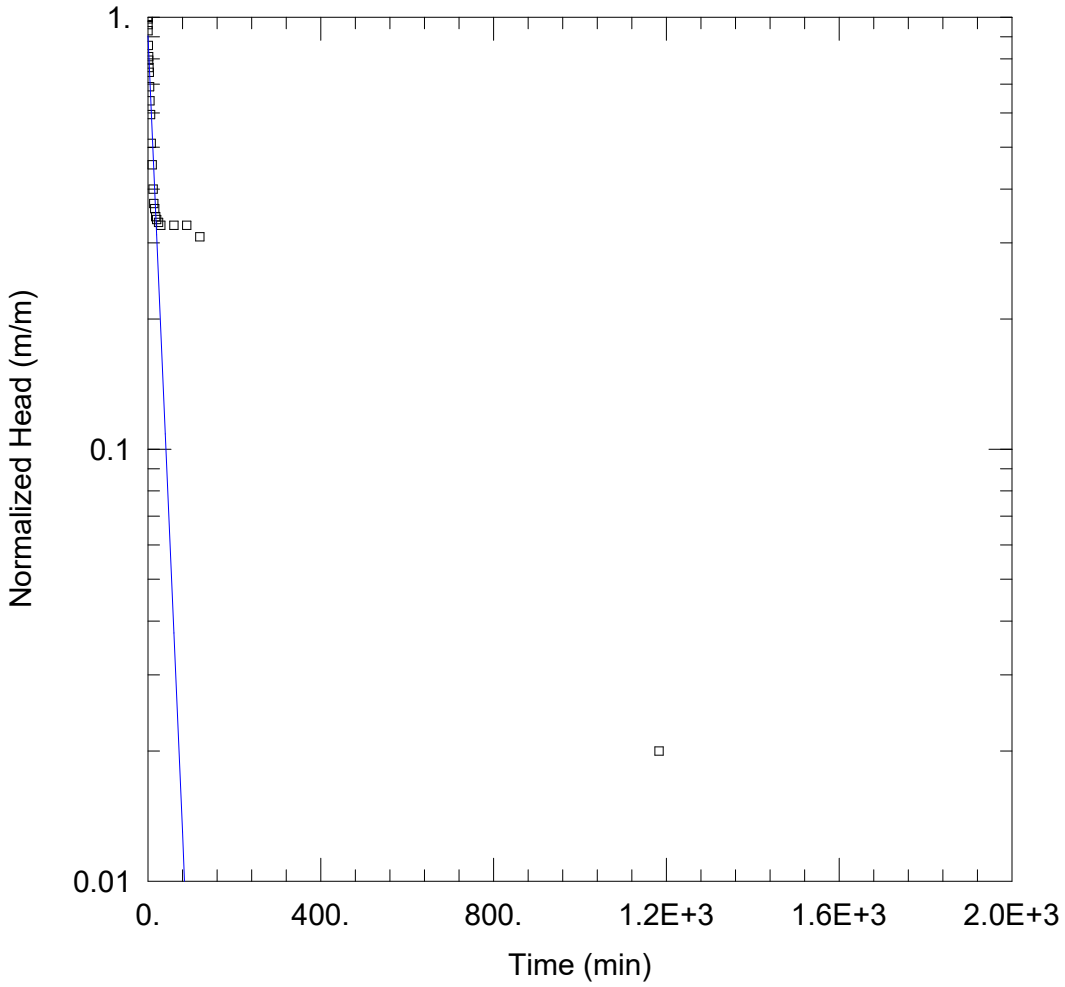
WELL DATA (BH/MW104)

Initial Displacement: 1. m
Total Well Penetration Depth: 3.63 m
Casing Radius: 0.025 m
Static Water Column Height: 3.63 m
Screen Length: 3. m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 3.314E-7 m/sec y0 = 0.844 m



WELL TEST ANALYSIS

Data Set: C:\...\MW106.aqt
Date: 03/03/21 Time: 10:05:38

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Distrikt Capital
Project: BIGC-ENV-349B
Location: Cross and Argus, Oakville, ON
Test Well: BH/MW106
Test Date: February 1, 2021

AQUIFER DATA

Saturated Thickness: 2.5 m Anisotropy Ratio (Kz/Kr): 1.

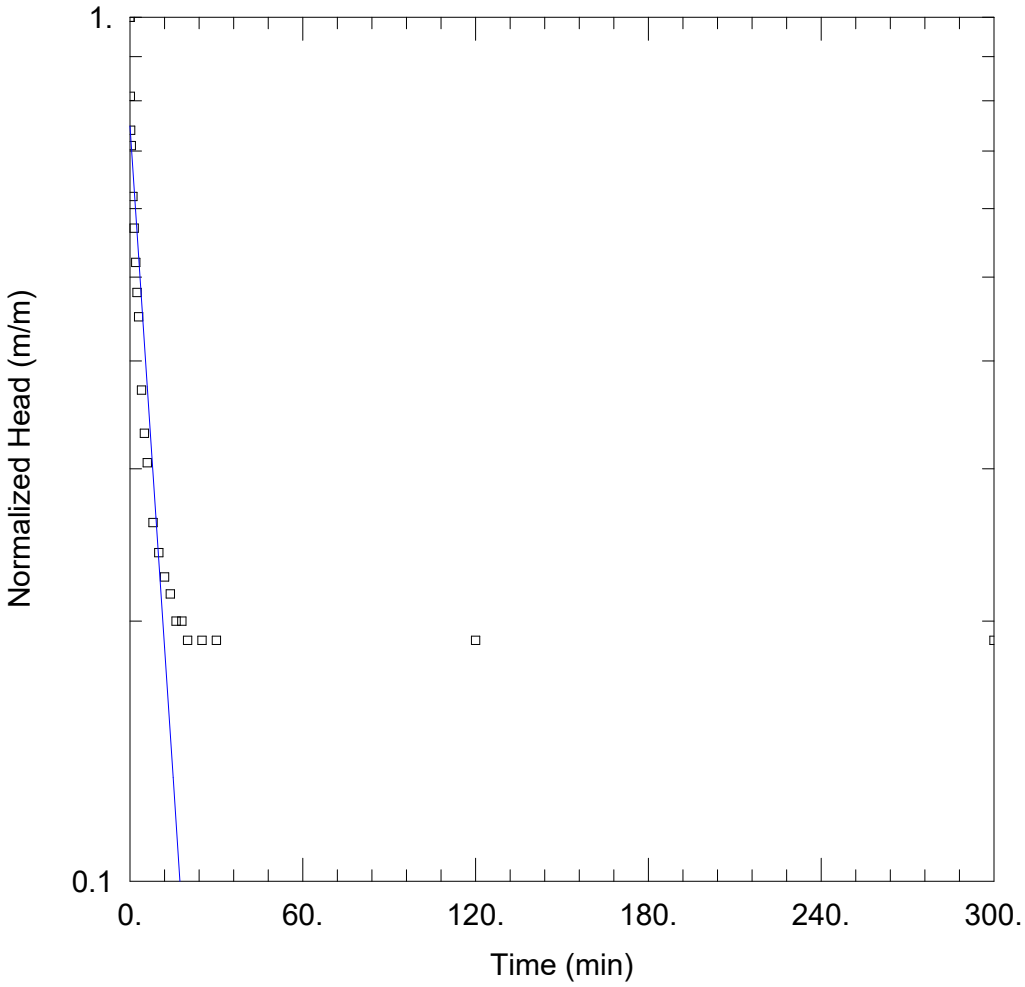
WELL DATA (BH/MW106)

Initial Displacement: 1. m
Total Well Penetration Depth: 2.5 m
Casing Radius: 0.025 m
Static Water Column Height: 2.5 m
Screen Length: 2.5 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 5.855E-7 m/sec y0 = 0.9044 m



WELL TEST ANALYSIS

Data Set: C:\...\MW110.aqt
Date: 03/03/21 Time: 10:05:17

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Distrikt Capital
Project: BIGC-ENV-349B
Location: Cross and Argus, Oakville, ON
Test Well: BH/MW110
Test Date: February 2, 2021

AQUIFER DATA

Saturated Thickness: 2.66 m Anisotropy Ratio (Kz/Kr): 1.

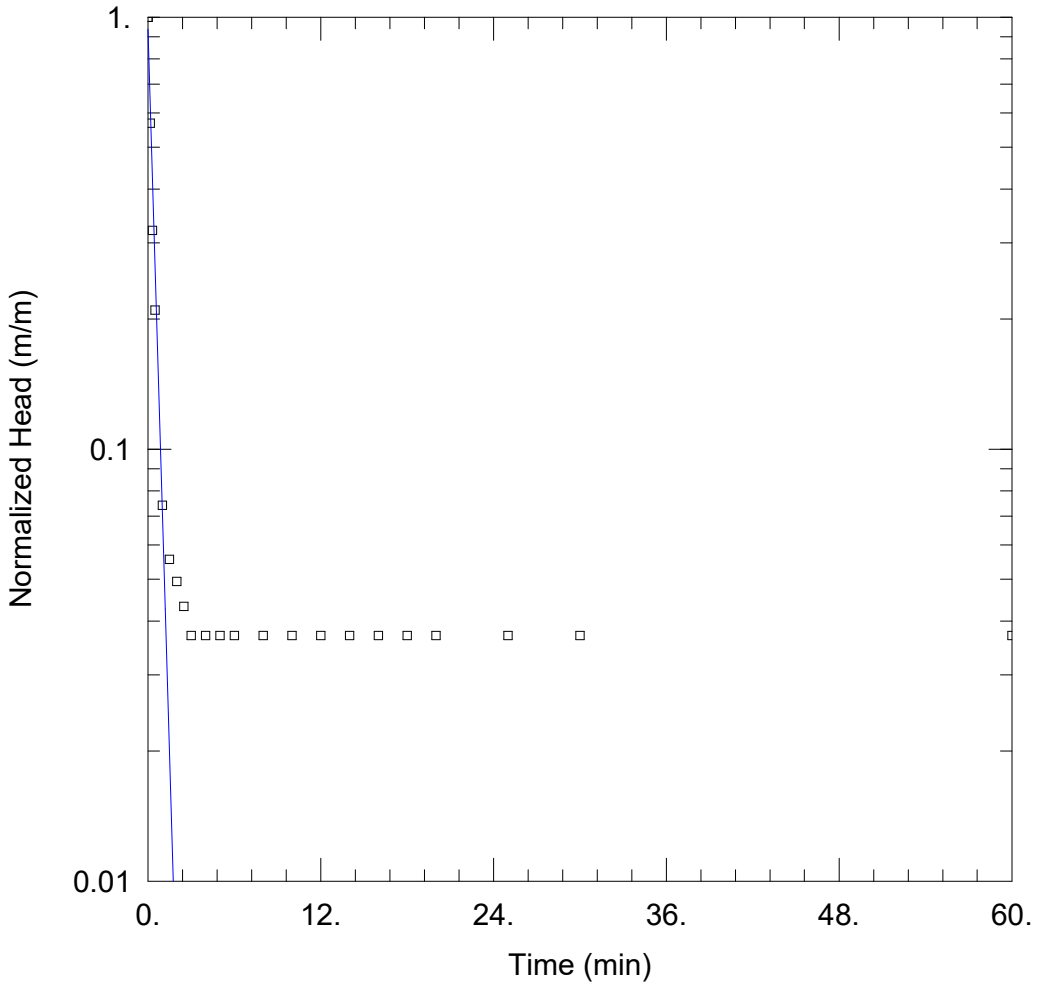
WELL DATA (BH/MW110)

Initial Displacement: 1. m
Total Well Penetration Depth: 2.66 m
Casing Radius: 0.025 m
Static Water Column Height: 2.66 m
Screen Length: 2.66 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 1.201E-6 m/sec y0 = 0.7479 m



WELL TEST ANALYSIS

Data Set: C:\...\MW113.aqt
Date: 03/03/21 Time: 10:04:55

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Distrikt Capital
Project: BIGC-ENV-349B
Location: Cross and Argus, Oakville, ON
Test Well: BH/MW113
Test Date: February 1, 2021

AQUIFER DATA

Saturated Thickness: 1.33 m Anisotropy Ratio (Kz/Kr): 1.

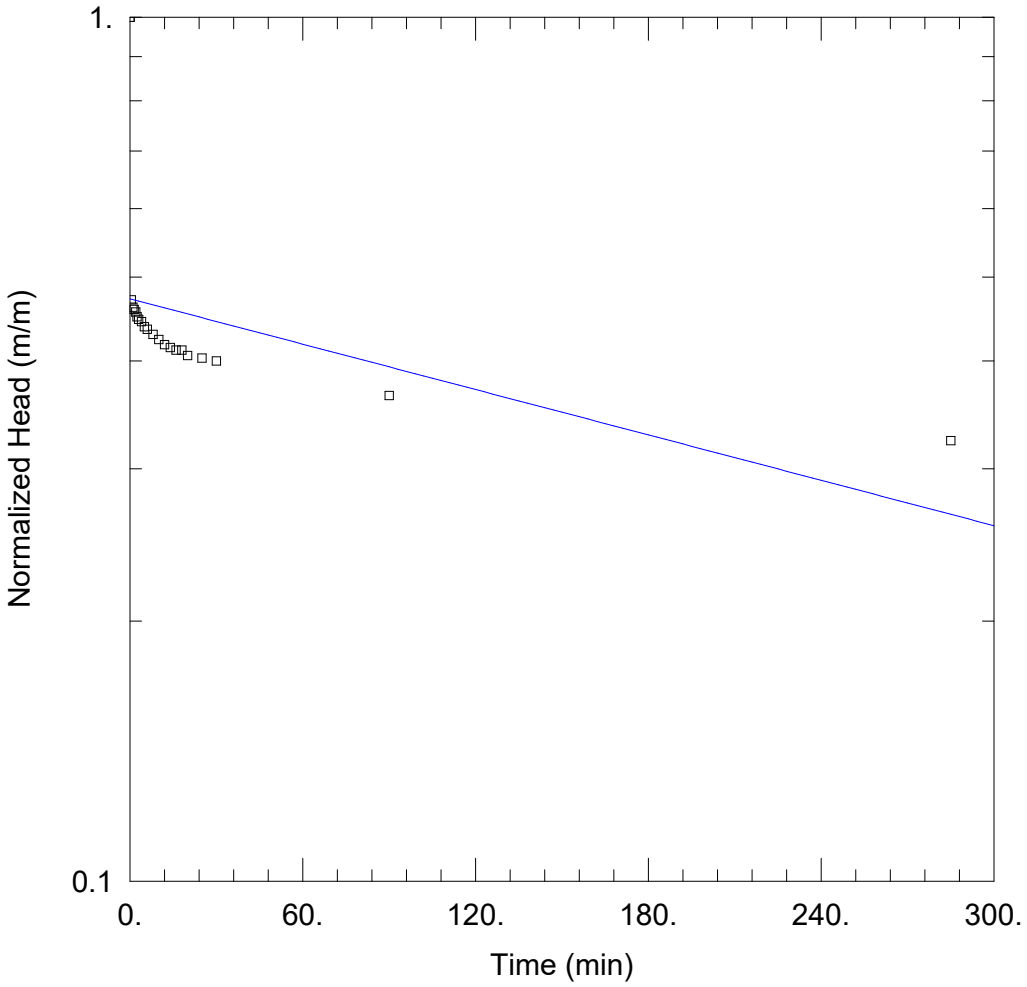
WELL DATA (BH/MW113)

Initial Displacement: 0.81 m
Total Well Penetration Depth: 1.33 m
Casing Radius: 0.025 m
Static Water Column Height: 1.33 m
Screen Length: 1.33 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 5.342E-5 m/sec y0 = 0.7584 m



WELL TEST ANALYSIS

Data Set: C:\...\MW114.aqt
Date: 03/03/21 Time: 10:04:37

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Distrikt Capital
Project: BIGC-ENV-349B
Location: Cross and Argus, Oakville, ON
Test Well: BH/MW114
Test Date: February 3, 2021

AQUIFER DATA

Saturated Thickness: 2.89 m Anisotropy Ratio (Kz/Kr): 1.

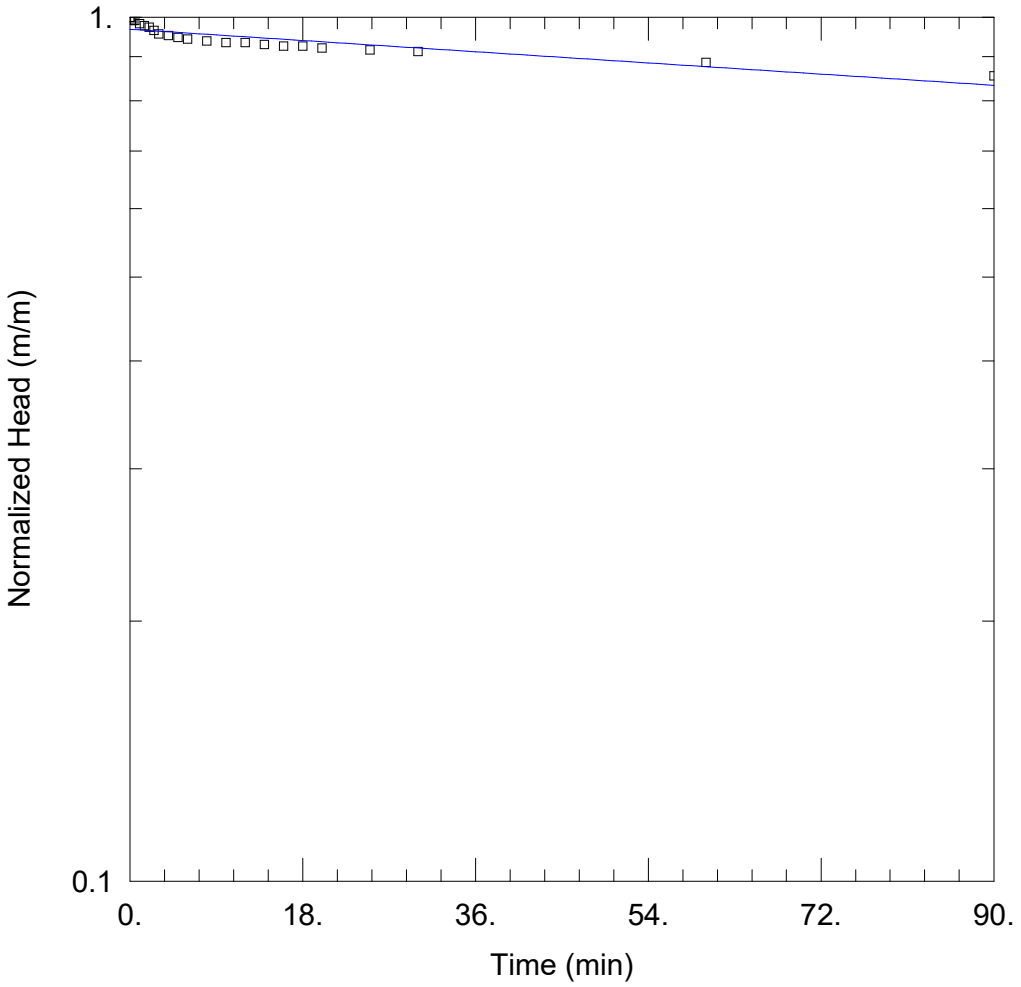
WELL DATA (BH/MW114)

Initial Displacement: 1.7 m
Total Well Penetration Depth: 2.89 m
Casing Radius: 0.025 m
Static Water Column Height: 2.89 m
Screen Length: 2.89 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 1.925E-8 m/sec y0 = 0.8025 m



WELL TEST ANALYSIS

Data Set: C:\...\MW115(2).aqt
Date: 03/03/21 Time: 10:04:08

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Distrikt Capital
Project: BIGC-ENV-349B
Location: Cross and Argus, Oakville, ON
Test Well: BH/MW115
Test Date: February 8, 2021

AQUIFER DATA

Saturated Thickness: 3.93 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH/MW115)

Initial Displacement: 1.14 m
Total Well Penetration Depth: 3.93 m
Casing Radius: 0.025 m
Static Water Column Height: 3.93 m
Screen Length: 3. m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 1.576E-8 m/sec y0 = 1.103 m

APPENDIX D: WATER QUALITY LABORATORY CERTIFICATE OF ANALYSIS AND CHAIN OF CUSTODY

Your Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Your C.O.C. #: 850711-01-01

Attention: Eileen Liu

B.I.G Consulting Inc.
12-5500 Tomken Road
Mississauga, ON
CANADA L4W 2Z4

Report Date: 2021/10/21
Report #: R6863331
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1T7498
Received: 2021/10/13, 17:40

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sewer Use By-Law Semivolatile Organics	1	2021/10/14	2021/10/15	CAM SOP 00301	EPA 8270 m
Biochemical Oxygen Demand (BOD)	1	2021/10/16	2021/10/21	CAM SOP-00427	SM 23 5210B m
Carbonaceous BOD	1	2021/10/14	2021/10/19	CAM SOP-00427	SM 23 5210B m
Chromium (VI) in Water	1	N/A	2021/10/18	CAM SOP-00436	EPA 7199 m
Total Cyanide	1	2021/10/15	2021/10/15	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2021/10/14	2021/10/15	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2021/10/15	2021/10/15	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	1	N/A	2021/10/18	CAM SOP-00447	EPA 6020B m
E.coli, (CFU/100mL)	1	N/A	2021/10/13	CAM SOP-00552	MOE LSB E3371
Total Nonylphenol in Liquids by HPLC	1	2021/10/15	2021/10/15	CAM SOP-00313	In-house Method
Nonylphenol Ethoxylates in Liquids: HPLC	1	2021/10/15	2021/10/15	CAM SOP-00313	In-house Method
Animal and Vegetable Oil and Grease	1	N/A	2021/10/21	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2021/10/21	2021/10/21	CAM SOP-00326	EPA1664B m,SM5520B m
OC Pesticides (Selected) & PCB (1)	1	2021/10/15	2021/10/16	CAM SOP-00307	EPA 8081A/8082B m
OC Pesticides Summed Parameters	1	N/A	2021/10/14	CAM SOP-00307	EPA 8081A/8082B m
pH	1	2021/10/14	2021/10/15	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2021/10/14	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	1	N/A	2021/10/15	CAM SOP-00464	EPA 375.4 m
Total Kjeldahl Nitrogen in Water	1	2021/10/15	2021/10/18	CAM SOP-00938	OMOE E3516 m
Total PAHs (2)	1	N/A	2021/10/18	CAM SOP - 00301	
Mineral/Synthetic O & G (TPH Heavy Oil) (3)	1	2021/10/21	2021/10/21	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2021/10/16	2021/10/19	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2021/10/20	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

Your Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Your C.O.C. #: 850711-01-01

Attention: Eileen Liu

B.I.G Consulting Inc.
12-5500 Tomken Road
Mississauga, ON
CANADA L4W 2Z4

Report Date: 2021/10/21
Report #: R6863331
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1T7498
Received: 2021/10/13, 17:40

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 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) Chlordane (Total) = Alpha Chlordane + Gamma Chlordane
(2) Total PAHs include only those PAHs specified in the sewer use by-by-law.
(3) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Deepthi Shaji
Project Manager
22 Oct 2021 16:53:16

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Deepthi Shaji, Project Manager
Email: Deepthi.Shaji@bureauveritas.com
Phone# (905)817-5700 Ext:7065843

==========

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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Bureau Veritas Job #: C1T7498
Report Date: 2021/10/21

B.I.G Consulting Inc.
Client Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Sampler Initials: LCK

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID				QXP806		
Sampling Date				2021/10/13 16:00		
COC Number				850711-01-01		
	UNITS	Criteria	Criteria-2	MW4	RDL	QC Batch
Calculated Parameters						
Total Animal/Vegetable Oil and Grease	mg/L	-	150	ND	0.50	7633045
Inorganics						
Total BOD	mg/L	15	-	ND	2	7641189
Total Carbonaceous BOD	mg/L	-	300	ND	2	7635932
Fluoride (F-)	mg/L	-	10	0.21	0.10	7638130
Total Kjeldahl Nitrogen (TKN)	mg/L	-	100	1.3	0.10	7640574
pH	pH	6.5:8.5	6.0:10.0	7.48		7638149
Phenols-4AAP	mg/L	0.008	1	ND	0.0010	7636523
Total Suspended Solids	mg/L	15	350	**88**	10	7638817
Dissolved Sulphate (SO4)	mg/L	-	1500	200	1.0	7638150
Total Cyanide (CN)	mg/L	0.02	2	ND	0.0050	7638757
Petroleum Hydrocarbons						
Total Oil & Grease	mg/L	-	-	ND	0.50	7650810
Total Oil & Grease Mineral/Synthetic	mg/L	-	-	ND	0.50	7650812

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Town of Oakville Storm Sewer Discharge By Law 2009-031
Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C1T7498
Report Date: 2021/10/21

B.I.G Consulting Inc.
Client Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Sampler Initials: LCK

NONYL PHENOL AND NONYL PHENOL ETHOXYLATE (WATER)

Bureau Veritas ID			QXP806		
Sampling Date			2021/10/13 16:00		
COC Number			850711-01-01		
	UNITS	Criteria	MW4	RDL	QC Batch
Miscellaneous Parameters					
Nonylphenol Ethoxylate (Total)	mg/L	0.01	ND	0.005	7638827
Nonylphenol (Total)	mg/L	0.001	ND	0.001	7638824

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Town of Oakville Storm Sewer Discharge By Law 2009-031
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C1T7498
Report Date: 2021/10/21

B.I.G Consulting Inc.
Client Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Sampler Initials: LCK

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID				QXP806			QXP806		
Sampling Date				2021/10/13 16:00			2021/10/13 16:00		
COC Number				850711-01-01			850711-01-01		
	UNITS	Criteria	Criteria-2	MW4	RDL	QC Batch	MW4 Lab-Dup	RDL	QC Batch
Metals									
Chromium (VI)	ug/L	40	-	ND	0.50	7635020			
Mercury (Hg)	mg/L	0.0004	0.05	ND	0.00010	7639369	ND	0.00010	7639369
Total Aluminum (Al)	ug/L	-	50000	36000	25	7642071			
Total Antimony (Sb)	ug/L	-	5000	ND	0.50	7642071			
Total Arsenic (As)	ug/L	20	1000	**21**	1.0	7642071			
Total Cadmium (Cd)	ug/L	8	1000	ND	0.090	7642071			
Total Chromium (Cr)	ug/L	80	3000	60	5.0	7642071			
Total Cobalt (Co)	ug/L	-	5000	35	0.50	7642071			
Total Copper (Cu)	ug/L	40	3000	**150**	0.90	7642071			
Total Iron (Fe)	ug/L	-	50000	**68000**	100	7642071			
Total Lead (Pb)	ug/L	120	3000	6.2	0.50	7642071			
Total Manganese (Mn)	ug/L	50	5000	**2300**	2.0	7642071			
Total Molybdenum (Mo)	ug/L	-	5000	1.5	0.50	7642071			
Total Nickel (Ni)	ug/L	80	3000	72	1.0	7642071			
Total Phosphorus (P)	ug/L	400	10000	**1600**	100	7642071			
Total Selenium (Se)	ug/L	20	5000	ND	2.0	7642071			
Total Silver (Ag)	ug/L	120	5000	0.21	0.090	7642071			
Total Tin (Sn)	ug/L	-	5000	1.6	1.0	7642071			
Total Titanium (Ti)	ug/L	-	5000	230	5.0	7642071			
Total Zinc (Zn)	ug/L	40	3000	**150**	5.0	7642071			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: The Town of Oakville Storm Sewer Discharge By Law 2009-031
Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID				QXP806		
Sampling Date				2021/10/13 16:00		
COC Number				850711-01-01		
	UNITS	Criteria	Criteria-2	MW4	RDL	QC Batch
Semivolatile Organics						
Naphthalene	ug/L	-	140	ND	0.3	7636065
Di-N-butyl phthalate	ug/L	15	-	ND	2	7636065
Bis(2-ethylhexyl)phthalate	ug/L	8.8	-	ND	2	7636065
3,3'-Dichlorobenzidine	ug/L	0.8	-	ND	0.8	7636065
Pentachlorophenol	ug/L	2	-	ND	1	7636065
Phenanthrene	ug/L	-	-	ND	0.2	7636065
Anthracene	ug/L	-	-	ND	0.2	7636065
Fluoranthene	ug/L	-	-	ND	0.2	7636065
Pyrene	ug/L	-	-	ND	0.2	7636065
Benzo(a)anthracene	ug/L	-	-	ND	0.2	7636065
Chrysene	ug/L	-	-	ND	0.2	7636065
Benzo(b/j)fluoranthene	ug/L	-	-	ND	0.2	7636065
Benzo(k)fluoranthene	ug/L	-	-	ND	0.2	7636065
Benzo(a)pyrene	ug/L	-	-	ND	0.2	7636065
Indeno(1,2,3-cd)pyrene	ug/L	-	-	ND	0.2	7636065
Dibenzo(a,h)anthracene	ug/L	-	-	ND	0.2	7636065
Benzo(g,h,i)perylene	ug/L	-	-	ND	0.2	7636065
Dibenzo(a,i)pyrene	ug/L	-	-	ND	0.2	7636065
Benzo(e)pyrene	ug/L	-	-	ND	0.2	7636065
Perylene	ug/L	-	-	ND	0.2	7636065
Dibenzo(a,j) acridine	ug/L	-	-	ND	0.4	7636065
7H-Dibenzo(c,g) Carbazole	ug/L	-	-	ND	0.4	7636065
1,6-Dinitropyrene	ug/L	-	-	ND	0.4	7636065
1,3-Dinitropyrene	ug/L	-	-	ND	0.4	7636065
1,8-Dinitropyrene	ug/L	-	-	ND	0.4	7636065
Calculated Parameters						
Total PAHs (18 PAHs)	ug/L	2	-	ND	1	7634978

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Town of Oakville Storm Sewer Discharge By Law 2009-031
Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C1T7498
Report Date: 2021/10/21

B.I.G Consulting Inc.
Client Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Sampler Initials: LCK

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID				QXP806		
Sampling Date				2021/10/13 16:00		
COC Number				850711-01-01		
	UNITS	Criteria	Criteria-2	MW4	RDL	QC Batch
Surrogate Recovery (%)						
2,4,6-Tribromophenol	%	-	-	69		7636065
2-Fluorobiphenyl	%	-	-	56		7636065
D14-Terphenyl (FS)	%	-	-	84		7636065
D5-Nitrobenzene	%	-	-	75		7636065
D8-Acenaphthylene	%	-	-	66		7636065

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Town of Oakville Storm Sewer Discharge By Law 2009-031
Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)

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Bureau Veritas Job #: C1T7498
Report Date: 2021/10/21

B.I.G Consulting Inc.
Client Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Sampler Initials: LCK

VOLATILE ORGANICS BY GC/MS (WATER)

Bureau Veritas ID				QXP806		
Sampling Date				2021/10/13 16:00		
COC Number				850711-01-01		
	UNITS	Criteria	Criteria-2	MW4	RDL	QC Batch
Volatile Organics						
Benzene	ug/L	2	10	ND	0.40	7640505
Chloroform	ug/L	2	40	ND	0.40	7640505
1,2-Dichlorobenzene	ug/L	5.6	-	ND	0.80	7640505
1,4-Dichlorobenzene	ug/L	6.8	80	ND	0.80	7640505
cis-1,2-Dichloroethylene	ug/L	5.6	-	ND	1.0	7640505
trans-1,3-Dichloropropene	ug/L	5.6	-	ND	0.80	7640505
Ethylbenzene	ug/L	2	160	ND	0.40	7640505
Methylene Chloride(Dichloromethane)	ug/L	5.2	2000	ND	4.0	7640505
1,1,2,2-Tetrachloroethane	ug/L	17	-	ND	0.80	7640505
Tetrachloroethylene	ug/L	4.4	1000	ND	0.40	7640505
Toluene	ug/L	2	16	ND	0.40	7640505
Trichloroethylene	ug/L	7.6	400	ND	0.40	7640505
Total Xylenes	ug/L	4.4	-	ND	0.40	7640505
Surrogate Recovery (%)						
4-Bromofluorobenzene	%	-	-	97		7640505
D4-1,2-Dichloroethane	%	-	-	107		7640505
D8-Toluene	%	-	-	97		7640505

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Town of Oakville Storm Sewer Discharge By Law 2009-031
Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C1T7498
Report Date: 2021/10/21

B.I.G Consulting Inc.
Client Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Sampler Initials: LCK

ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

Bureau Veritas ID			QXP806		
Sampling Date			2021/10/13 16:00		
COC Number			850711-01-01		
	UNITS	Criteria	MW4	RDL	QC Batch
Calculated Parameters					
Aldrin + Dieldrin	ug/L	0.08	ND	0.005	7634920
Chlordane (Total)	ug/L	40	ND	0.005	7634920
DDT+ Metabolites	ug/L	-	ND	0.005	7634920
Heptachlor + Heptachlor epoxide	ug/L	-	ND	0.005	7634920
o,p-DDD + p,p-DDD	ug/L	-	ND	0.005	7634920
o,p-DDE + p,p-DDE	ug/L	-	ND	0.005	7634920
o,p-DDT + p,p-DDT	ug/L	-	ND	0.005	7634920
Total Endosulfan	ug/L	-	ND	0.005	7634920
Total PCB	ug/L	0.4	ND	0.05	7634920
Pesticides & Herbicides					
Aldrin	ug/L	-	ND	0.005	7640988
Dieldrin	ug/L	-	ND	0.005	7640988
a-Chlordane	ug/L	-	ND	0.005	7640988
g-Chlordane	ug/L	-	ND	0.005	7640988
o,p-DDT	ug/L	0.04	ND	0.005	7640988
p,p-DDT	ug/L	0.04	ND	0.005	7640988
Lindane	ug/L	40	ND	0.003	7640988
Hexachlorobenzene	ug/L	0.04	ND	0.005	7640988
Mirex	ug/L	40	ND	0.005	7640988
Surrogate Recovery (%)					
2,4,5,6-Tetrachloro-m-xylene	%	-	41 (1)		7640988
Decachlorobiphenyl	%	-	84		7640988

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Town of Oakville Storm Sewer Discharge By Law 2009-031
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Surrogate recovery is below the control limit stipulated by Ont Reg 153, however, this recovery is still within Bureau Veritas performance based limits. Results reported with recoveries within this range are still valid but may have a low bias.

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Bureau Veritas Job #: C1T7498
Report Date: 2021/10/21

B.I.G Consulting Inc.
Client Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Sampler Initials: LCK

MICROBIOLOGY (WATER)

Bureau Veritas ID			QXP806		
Sampling Date			2021/10/13 16:00		
COC Number			850711-01-01		
	UNITS	Criteria	MW4	RDL	QC Batch
Microbiological					
Escherichia coli	CFU/100mL	200	<10	10	7634979

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Town of Oakville Storm Sewer Discharge By Law 2009-031

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B.I.G Consulting Inc.
Client Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Sampler Initials: LCK

GENERAL COMMENTS

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

Package 1	18.0°C

Sample QXP806 [MW4] : 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

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7636065	2,4,6-Tribromophenol	2021/10/15	85	10 - 130	80	10 - 130	67	%				
7636065	2-Fluorobiphenyl	2021/10/15	60	30 - 130	50	30 - 130	50	%				
7636065	D14-Terphenyl (FS)	2021/10/15	82	30 - 130	80	30 - 130	85	%				
7636065	D5-Nitrobenzene	2021/10/15	82	30 - 130	76	30 - 130	74	%				
7636065	D8-Acenaphthylene	2021/10/15	72	30 - 130	62	30 - 130	60	%				
7640505	4-Bromofluorobenzene	2021/10/20	98	70 - 130	101	70 - 130	100	%				
7640505	D4-1,2-Dichloroethane	2021/10/20	103	70 - 130	102	70 - 130	105	%				
7640505	D8-Toluene	2021/10/20	100	70 - 130	99	70 - 130	95	%				
7640988	2,4,5,6-Tetrachloro-m-xylene	2021/10/16	36 (3)	50 - 130	52	50 - 130	49 (3)	%				
7640988	Decachlorobiphenyl	2021/10/16	86	50 - 130	80	50 - 130	86	%				
7635020	Chromium (VI)	2021/10/18	99	80 - 120	100	80 - 120	ND, RDL=0.50	ug/L	9.2	20		
7635932	Total Carbonaceous BOD	2021/10/19					ND,RDL=2	mg/L	7.8	30	99	85 - 115
7636065	1,3-Dinitropyrene	2021/10/15	106	30 - 130	106	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7636065	1,6-Dinitropyrene	2021/10/15	100	30 - 130	103	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7636065	1,8-Dinitropyrene	2021/10/15	96	30 - 130	128	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7636065	3,3'-Dichlorobenzidine	2021/10/15	100	30 - 130	98	30 - 130	ND, RDL=0.8	ug/L	NC	40		
7636065	7H-Dibenzo(c,g) Carbazole	2021/10/15	95	30 - 130	88	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7636065	Anthracene	2021/10/15	81	30 - 130	78	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Benzo(a)anthracene	2021/10/15	85	30 - 130	83	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Benzo(a)pyrene	2021/10/15	72	30 - 130	69	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Benzo(b/j)fluoranthene	2021/10/15	85	30 - 130	83	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Benzo(e)pyrene	2021/10/15	86	30 - 130	84	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Benzo(g,h,i)perylene	2021/10/15	103	30 - 130	100	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Benzo(k)fluoranthene	2021/10/15	83	30 - 130	83	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Bis(2-ethylhexyl)phthalate	2021/10/15	89	30 - 130	88	30 - 130	ND,RDL=2	ug/L	NC	40		
7636065	Chrysene	2021/10/15	84	30 - 130	82	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Dibenzo(a,h)anthracene	2021/10/15	104	30 - 130	101	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Dibenzo(a,i)pyrene	2021/10/15	90	30 - 130	89	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Dibenzo(a,j) acridine	2021/10/15	98	30 - 130	94	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7636065	Di-N-butyl phthalate	2021/10/15	92	30 - 130	92	30 - 130	ND,RDL=2	ug/L	NC	40		
7636065	Fluoranthene	2021/10/15	88	30 - 130	87	30 - 130	ND, RDL=0.2	ug/L	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7636065	Indeno(1,2,3-cd)pyrene	2021/10/15	106	30 - 130	103	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Naphthalene	2021/10/15	57	30 - 130	58	30 - 130	ND, RDL=0.3	ug/L				
7636065	Pentachlorophenol	2021/10/15	64	30 - 130	58	30 - 130	ND,RDL=1	ug/L	NC	40		
7636065	Perylene	2021/10/15	84	30 - 130	81	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Phenanthrene	2021/10/15	83	30 - 130	81	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636065	Pyrene	2021/10/15	87	30 - 130	86	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7636523	Phenols-4AAP	2021/10/14	94	80 - 120	95	80 - 120	ND, RDL=0.0010	mg/L	NC	20		
7638130	Fluoride (F-)	2021/10/15	32 (1)	80 - 120	100	80 - 120	ND, RDL=0.10	mg/L	NC	20		
7638149	pH	2021/10/15			101	98 - 103			0.55	N/A		
7638150	Dissolved Sulphate (SO4)	2021/10/15	109	75 - 125	101	80 - 120	ND, RDL=1.0	mg/L	NC	20		
7638757	Total Cyanide (CN)	2021/10/15	99	80 - 120	99	80 - 120	ND, RDL=0.0050	mg/L	NC	20		
7638817	Total Suspended Solids	2021/10/19					ND, RDL=10	mg/L	NC	25	100	85 - 115
7638824	Nonylphenol (Total)	2021/10/16	86	50 - 130	79	50 - 130	ND, RDL=0.001	mg/L	NC	40		
7638827	Nonylphenol Ethoxylate (Total)	2021/10/16	91	50 - 130	74	50 - 130	ND, RDL=0.005	mg/L	NC	40		
7639369	Mercury (Hg)	2021/10/15	104	75 - 125	101	80 - 120	ND, RDL=0.00010	mg/L	NC	20		
7640505	1,1,2,2-Tetrachloroethane	2021/10/20	63 (2)	70 - 130	94	70 - 130	ND, RDL=0.40	ug/L				
7640505	1,2-Dichlorobenzene	2021/10/20	90	70 - 130	88	70 - 130	ND, RDL=0.40	ug/L				
7640505	1,4-Dichlorobenzene	2021/10/20	101	70 - 130	99	70 - 130	ND, RDL=0.40	ug/L				
7640505	Benzene	2021/10/20	88	70 - 130	88	70 - 130	ND, RDL=0.20	ug/L				
7640505	Chloroform	2021/10/20	92	70 - 130	92	70 - 130	ND, RDL=0.20	ug/L	1.7	30		
7640505	cis-1,2-Dichloroethylene	2021/10/20	96	70 - 130	96	70 - 130	ND, RDL=0.50	ug/L				
7640505	Ethylbenzene	2021/10/20	85	70 - 130	85	70 - 130	ND, RDL=0.20	ug/L				
7640505	Methylene Chloride(Dichloromethane)	2021/10/20	90	70 - 130	90	70 - 130	ND, RDL=2.0	ug/L				
7640505	Tetrachloroethylene	2021/10/20	87	70 - 130	85	70 - 130	ND, RDL=0.20	ug/L				
7640505	Toluene	2021/10/20	88	70 - 130	89	70 - 130	ND, RDL=0.20	ug/L				
7640505	Total Xylenes	2021/10/20					ND, RDL=0.20	ug/L				
7640505	trans-1,3-Dichloropropene	2021/10/20	98	70 - 130	92	70 - 130	ND, RDL=0.40	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7640505	Trichloroethylene	2021/10/20	140 (2)	70 - 130	97	70 - 130	ND, RDL=0.20	ug/L				
7640574	Total Kjeldahl Nitrogen (TKN)	2021/10/18	101	80 - 120	100	80 - 120	ND, RDL=0.10	mg/L	NC	20	103	80 - 120
7640988	a-Chlordane	2021/10/16	75	50 - 130	67	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7640988	Aldrin	2021/10/16	58	50 - 130	54	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7640988	Dieldrin	2021/10/16	91	50 - 130	88	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7640988	g-Chlordane	2021/10/16	69	50 - 130	64	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7640988	Hexachlorobenzene	2021/10/16	70	50 - 130	68	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7640988	Lindane	2021/10/16	112	50 - 130	109	50 - 130	ND, RDL=0.003	ug/L	NC	30		
7640988	Mirex	2021/10/16	74	30 - 130	57	30 - 130	ND, RDL=0.005	ug/L	NC	40		
7640988	o,p-DDT	2021/10/16	77	50 - 130	64	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7640988	p,p-DDT	2021/10/16	70	50 - 130	59	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7641189	Total BOD	2021/10/21					ND,RDL=2	mg/L	6.5	30	91	80 - 120
7642071	Total Aluminum (Al)	2021/10/18	101	80 - 120	100	80 - 120	ND, RDL=4.9	ug/L	4.0	20		
7642071	Total Antimony (Sb)	2021/10/18	109	80 - 120	106	80 - 120	ND, RDL=0.50	ug/L				
7642071	Total Arsenic (As)	2021/10/18	103	80 - 120	102	80 - 120	ND, RDL=1.0	ug/L				
7642071	Total Cadmium (Cd)	2021/10/18	101	80 - 120	102	80 - 120	ND, RDL=0.090	ug/L	NC	20		
7642071	Total Chromium (Cr)	2021/10/18	97	80 - 120	98	80 - 120	ND, RDL=5.0	ug/L	NC	20		
7642071	Total Cobalt (Co)	2021/10/18	100	80 - 120	101	80 - 120	ND, RDL=0.50	ug/L				
7642071	Total Copper (Cu)	2021/10/18	102	80 - 120	104	80 - 120	ND, RDL=0.90	ug/L	5.6	20		
7642071	Total Iron (Fe)	2021/10/18	100	80 - 120	100	80 - 120	ND, RDL=100	ug/L	NC	20		
7642071	Total Lead (Pb)	2021/10/18	100	80 - 120	101	80 - 120	ND, RDL=0.50	ug/L	NC	20		
7642071	Total Manganese (Mn)	2021/10/18	99	80 - 120	99	80 - 120	ND, RDL=2.0	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7642071	Total Molybdenum (Mo)	2021/10/18	101	80 - 120	98	80 - 120	ND, RDL=0.50	ug/L				
7642071	Total Nickel (Ni)	2021/10/18	96	80 - 120	99	80 - 120	ND, RDL=1.0	ug/L	0.36	20		
7642071	Total Phosphorus (P)	2021/10/18	103	80 - 120	113	80 - 120	ND, RDL=100	ug/L				
7642071	Total Selenium (Se)	2021/10/18	106	80 - 120	107	80 - 120	ND, RDL=2.0	ug/L				
7642071	Total Silver (Ag)	2021/10/18	96	80 - 120	100	80 - 120	ND, RDL=0.090	ug/L				
7642071	Total Tin (Sn)	2021/10/18	105	80 - 120	103	80 - 120	ND, RDL=1.0	ug/L				
7642071	Total Titanium (Ti)	2021/10/18	98	80 - 120	97	80 - 120	ND, RDL=5.0	ug/L				
7642071	Total Zinc (Zn)	2021/10/18	100	80 - 120	104	80 - 120	ND, RDL=5.0	ug/L	0.53	20		
7650810	Total Oil & Grease	2021/10/21			98	85 - 115	ND, RDL=0.50	mg/L	1.3	25		
7650812	Total Oil & Grease Mineral/Synthetic	2021/10/21			95	85 - 115	ND, RDL=0.50	mg/L	1.0	25		

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).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) The pH of the spiked sample was checked with pH test paper and observed to be neutral/basic. 1,1,2,2-tetrachloroethane is known to degrade to trichloroethylene in neutral or basic solution. There will be no impact for samples not containing 1,1,2,2-tetrachloroethane.

(3) Surrogate recovery is below the control limit stipulated by Ont Reg 153, however, this recovery is still within Bureau Veritas performance based limits. Results reported with recoveries within this range are still valid but may have a low bias.

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Bureau Veritas Job #: C1T7498
Report Date: 2021/10/21

B.I.G Consulting Inc.
Client Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Sampler Initials: LCK

VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, Scientific Specialist

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Soham Patel, Analyst 2

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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Bureau Veritas Job #: C1T7498
Report Date: 2021/10/21

B.I.G Consulting Inc.
Client Project #: BIGC-GEO-490A
Site Location: 581 ARGUS RD, OAKVILLE
Sampler Initials: LCK

Exceedance Summary Table – Oakville Storm Sewer

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
MW4	QXP806-13	Total Arsenic (As)	20	21	1.0	ug/L
MW4	QXP806-13	Total Copper (Cu)	40	150	0.90	ug/L
MW4	QXP806-13	Total Manganese (Mn)	50	2300	2.0	ug/L
MW4	QXP806-13	Total Phosphorus (P)	400	1600	100	ug/L
MW4	QXP806-06	Total Suspended Solids	15	88	10	mg/L
MW4	QXP806-13	Total Zinc (Zn)	40	150	5.0	ug/L

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.

Exceedance Summary Table – Halton Sanitary Sewer

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
MW4	QXP806-13	Total Iron (Fe)	50000	68000	100	ug/L

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
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvna.com

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#31796 B.I.G Consulting Inc.	Company Name:	BIG Consulting	Quotation #:	C12477	BV Labs Job #:	Bottle Order #: 850711
Attention:	Accounts Payable	Attention:	Eileen Liu	P.O. #:			
Address:	12-5500 Tomken Road Mississauga ON L4W 2Z4	Address:	12-5500 Tomken Road Mississauga ON L4W 2Z4	Project:	BIGC-GEO-490A	COC #:	Project Manager:
Tel:	(416) 214-4880 Fax:	Tel:	647-200-6433 Fax:	Project Name:	581 Argus Rd, Oakville	C#850711-01-01	Deepthi Shaji
Email:	ldougherty@brownfieldigi.com;admin@brownfieldigi.co	Email:	eliu@brownfieldigi.com	Site #:			
				Sampled By:	MW/LCK		

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 ☒ Sanitary Sewer Bylaw
- ☐ Reg 558 ☒ Storm Sewer Bylaw
- ☐ MISA Municipality Halton
- ☐ PWQO ☐ Reg 406 Table
- ☐ Other

Special Instructions

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

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 #)*

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Halton Sanitary and Oakville Storm Package	# of Bottles	Comments
1		MW4	2021/10/13	16:00	GW	N/A	X	19	
2									
3									
4									
5									
6									
7									
8									
9									
10									

13-Oct-21 17:40
Deepthi Shaji
C1T7498
DSG ENV-1454

* 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: Time Sensitive	Temperature (°C) on Rece	Custody Seal	Yes	No
Libby Knit	21/10/13	17:30		2021/10/13	17:40	N/A		18 18 18	Present 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

On Ice

Your Project #: BIGC-ENV-349B
Site#: 217 Cross
Site Location: 217 Cross
Your C.O.C. #: 812029-01-01

Attention: Eileen Liu

B.I.G Consulting Inc.
12-5500 Tomken Road
Mississauga, ON
CANADA L4W 2Z4

Report Date: 2021/02/12
Report #: R6516360
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C130104
Received: 2021/02/03, 17:37

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sewer Use By-Law Semivolatile Organics	1	2021/02/05	2021/02/05	CAM SOP 00301	EPA 8270 m
Biochemical Oxygen Demand (BOD)	1	2021/02/04	2021/02/09	CAM SOP-00427	SM 23 5210B m
Carbonaceous BOD	1	2021/02/06	2021/02/11	CAM SOP-00427	SM 23 5210B m
Chromium (VI) in Water	1	N/A	2021/02/09	CAM SOP-00436	EPA 7199 m
Total Cyanide	1	2021/02/04	2021/02/04	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2021/02/04	2021/02/04	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2021/02/05	2021/02/05	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	1	N/A	2021/02/05	CAM SOP-00447	EPA 6020B m
E.coli, (CFU/100mL)	1	N/A	2021/02/03	CAM SOP-00552	MOE LSB E3371
Total Nonylphenol in Liquids by HPLC	1	2021/02/06	2021/02/07	CAM SOP-00313	In-house Method
Nonylphenol Ethoxylates in Liquids: HPLC	1	2021/02/06	2021/02/07	CAM SOP-00313	In-house Method
Animal and Vegetable Oil and Grease	1	N/A	2021/02/10	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2021/02/09	2021/02/09	CAM SOP-00326	EPA1664B m,SM5520B m
OC Pesticides (Selected) & PCB (1)	1	2021/02/09	2021/02/11	CAM SOP-00307	EPA 8081A/8082B m
OC Pesticides Summed Parameters	1	N/A	2021/02/04	CAM SOP-00307	EPA 8081A/8082B m
pH	1	2021/02/04	2021/02/04	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2021/02/04	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	1	N/A	2021/02/05	CAM SOP-00464	EPA 375.4 m
Total Kjeldahl Nitrogen in Water	1	2021/02/04	2021/02/08	CAM SOP-00938	OMOE E3516 m
Total PAHs (2)	1	N/A	2021/02/08	CAM SOP - 00301	
Mineral/Synthetic O & G (TPH Heavy Oil) (3)	1	2021/02/09	2021/02/09	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2021/02/06	2021/02/08	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2021/02/06	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

Your Project #: BIGC-ENV-349B
Site#: 217 Cross
Site Location: 217 Cross
Your C.O.C. #: 812029-01-01

Attention: Eileen Liu

B.I.G Consulting Inc.
12-5500 Tomken Road
Mississauga, ON
CANADA L4W 2Z4

Report Date: 2021/02/12
Report #: R6516360
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C130104
Received: 2021/02/03, 17:37

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 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.

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) Chlordane (Total) = Alpha Chlordane + Gamma Chlordane
(2) Total PAHs include only those PAHs specified in the sewer use by-by-law.
(3) 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.
Christine Gripton, Senior Project Manager
Email: Christine.Gripton@bureauveritas.com
Phone# (519)652-9444
==========
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 #: C130104
Report Date: 2021/02/12

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-349B
Site Location: 217 Cross
Sampler Initials: AB

OIL & GREASE - A/V/M/T (WATER)

BV Labs ID			OTM123		
Sampling Date			2021/02/03 16:00		
COC Number			812029-01-01		
	UNITS	Criteria	BH/MW 113	RDL	QC Batch
Calculated Parameters					
Total Animal/Vegetable Oil and Grease	mg/L	150	ND	0.50	7182572
Petroleum Hydrocarbons					
Total Oil & Grease	mg/L	-	ND	0.50	7193034
Total Oil & Grease Mineral/Synthetic	mg/L	-	ND	0.50	7193048

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Halton Sanitary & Combined Sewer Bylaw (2-03)
ND = Not detected

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BV Labs Job #: C130104
Report Date: 2021/02/12

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-349B
Site Location: 217 Cross
Sampler Initials: AB

OAKVILLE STORM SEWER BYLAW (2009-031)

BV Labs ID				OTM123		
Sampling Date				2021/02/03 16:00		
COC Number				812029-01-01		
	UNITS	Criteria	Criteria-2	BH/MW 113	RDL	QC Batch
Inorganics						
Total BOD	mg/L	-	15	ND	2	7184367
pH	pH	6.0:10.0	6.5:8.5	7.46		7183500
Phenols-4AAP	mg/L	1	0.008	ND	0.0010	7184315
Total Suspended Solids	mg/L	350	15	**19**	10	7186632
Total Cyanide (CN)	mg/L	2	0.02	ND	0.0050	7184986
Miscellaneous Parameters						
Nonylphenol Ethoxylate (Total)	mg/L	-	0.01	ND	0.005	7188593
Nonylphenol (Total)	mg/L	-	0.001	ND	0.001	7188589
Metals						
Chromium (VI)	ug/L	-	40	ND	0.50	7183208
Mercury (Hg)	mg/L	0.05	0.0004	ND	0.00010	7186529
Total Arsenic (As)	ug/L	1000	20	5.7	1.0	7186481
Total Cadmium (Cd)	ug/L	1000	8	ND	0.090	7186481
Total Chromium (Cr)	ug/L	3000	80	12	5.0	7186481
Total Copper (Cu)	ug/L	3000	40	**61**	0.90	7186481
Total Lead (Pb)	ug/L	3000	120	2.2	0.50	7186481
Total Manganese (Mn)	ug/L	5000	50	**610**	2.0	7186481
Total Nickel (Ni)	ug/L	3000	80	16	1.0	7186481
Total Phosphorus (P)	ug/L	10000	400	370	100	7186481
Total Selenium (Se)	ug/L	5000	20	ND	2.0	7186481
Total Silver (Ag)	ug/L	5000	120	ND	0.090	7186481
Total Zinc (Zn)	ug/L	3000	40	33	5.0	7186481
Semivolatile Organics						
Di-N-butyl phthalate	ug/L	-	15	ND	2	7186355
Bis(2-ethylhexyl)phthalate	ug/L	-	8.8	ND	2	7186355
3,3'-Dichlorobenzidine	ug/L	-	0.8	ND	0.8	7186355
Pentachlorophenol	ug/L	-	2	ND	1	7186355
Phenanthrene	ug/L	-	-	ND	0.2	7186355

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Halton Sanitary & Combined Sewer Bylaw (2-03)
Criteria-2: The Town of Oakville Storm Sewer Discharge By Law 2009-031
ND = Not detected

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OAKVILLE STORM SEWER BYLAW (2009-031)

BV Labs ID				OTM123		
Sampling Date				2021/02/03 16:00		
COC Number				812029-01-01		
	UNITS	Criteria	Criteria-2	BH/MW 113	RDL	QC Batch
Anthracene	ug/L	-	-	ND	0.2	7186355
Fluoranthene	ug/L	-	-	ND	0.2	7186355
Pyrene	ug/L	-	-	ND	0.2	7186355
Benzo(a)anthracene	ug/L	-	-	ND	0.2	7186355
Chrysene	ug/L	-	-	ND	0.2	7186355
Benzo(b/j)fluoranthene	ug/L	-	-	ND	0.2	7186355
Benzo(k)fluoranthene	ug/L	-	-	ND	0.2	7186355
Benzo(a)pyrene	ug/L	-	-	ND	0.2	7186355
Indeno(1,2,3-cd)pyrene	ug/L	-	-	ND	0.2	7186355
Dibenzo(a,h)anthracene	ug/L	-	-	ND	0.2	7186355
Benzo(g,h,i)perylene	ug/L	-	-	ND	0.2	7186355
Dibenzo(a,i)pyrene	ug/L	-	-	ND	0.2	7186355
Benzo(e)pyrene	ug/L	-	-	ND	0.2	7186355
Perylene	ug/L	-	-	ND	0.2	7186355
Dibenzo(a,j) acridine	ug/L	-	-	ND	0.4	7186355
7H-Dibenzo(c,g) Carbazole	ug/L	-	-	ND	0.4	7186355
1,6-Dinitropyrene	ug/L	-	-	ND	0.4	7186355
1,3-Dinitropyrene	ug/L	-	-	ND	0.4	7186355
1,8-Dinitropyrene	ug/L	-	-	ND	0.4	7186355
Calculated Parameters						
Total PAHs (18 PAHs)	ug/L	-	2	ND	1	7182573
Volatile Organics						
Benzene	ug/L	10	2	ND	0.40	7184452
Chloroform	ug/L	40	2	ND	0.40	7184452
1,2-Dichlorobenzene	ug/L	-	5.6	ND	0.80	7184452
1,4-Dichlorobenzene	ug/L	80	6.8	ND	0.80	7184452
cis-1,2-Dichloroethylene	ug/L	-	5.6	ND	1.0	7184452
trans-1,3-Dichloropropene	ug/L	-	5.6	ND	0.80	7184452
Ethylbenzene	ug/L	160	2	ND	0.40	7184452

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Halton Sanitary & Combined Sewer Bylaw (2-03)
Criteria-2: The Town of Oakville Storm Sewer Discharge By Law 2009-031
ND = Not detected

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OAKVILLE STORM SEWER BYLAW (2009-031)

BV Labs ID				OTM123		
Sampling Date				2021/02/03 16:00		
COC Number				812029-01-01		
	UNITS	Criteria	Criteria-2	BH/MW 113	RDL	QC Batch
Methylene Chloride(Dichloromethane)	ug/L	2000	5.2	ND	4.0	7184452
1,1,2,2-Tetrachloroethane	ug/L	-	17	ND	0.80	7184452
Tetrachloroethylene	ug/L	1000	4.4	ND	0.40	7184452
Toluene	ug/L	16	2	ND	0.40	7184452
Trichloroethylene	ug/L	400	7.6	ND	0.40	7184452
Total Xylenes	ug/L	-	4.4	ND	0.40	7184452
Pesticides & Herbicides						
Aldrin	ug/L	-	-	ND	0.005	7193127
Dieldrin	ug/L	-	-	ND	0.005	7193127
a-Chlordane	ug/L	-	-	ND	0.005	7193127
g-Chlordane	ug/L	-	-	ND	0.005	7193127
o,p-DDT	ug/L	-	0.04	ND	0.005	7193127
p,p-DDT	ug/L	-	0.04	ND	0.005	7193127
Lindane	ug/L	-	40	ND	0.003	7193127
Hexachlorobenzene	ug/L	-	0.04	ND	0.005	7193127
Mirex	ug/L	-	40	ND	0.005	7193127
Microbiological						
Escherichia coli	CFU/100mL	-	200	<10	10	7183860
Surrogate Recovery (%)						
2,4,6-Tribromophenol	%	-	-	94		7186355
2-Fluorobiphenyl	%	-	-	90		7186355
D14-Terphenyl (FS)	%	-	-	96		7186355
D5-Nitrobenzene	%	-	-	111		7186355
D8-Acenaphthylene	%	-	-	96		7186355
2,4,5,6-Tetrachloro-m-xylene	%	-	-	91		7193127
Decachlorobiphenyl	%	-	-	103		7193127
4-Bromofluorobenzene	%	-	-	95		7184452
D4-1,2-Dichloroethane	%	-	-	108		7184452
D8-Toluene	%	-	-	94		7184452

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Halton Sanitary & Combined Sewer Bylaw (2-03)
Criteria-2: The Town of Oakville Storm Sewer Discharge By Law 2009-031
ND = Not detected

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BV Labs Job #: C130104
Report Date: 2021/02/12

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-349B
Site Location: 217 Cross
Sampler Initials: AB

RESULTS OF ANALYSES OF WATER

BV Labs ID			OTM123		
Sampling Date			2021/02/03 16:00		
COC Number			812029-01-01		
	UNITS	Criteria	BH/MW 113	RDL	QC Batch
Inorganics					
Total Carbonaceous BOD	mg/L	300	ND	2	7188422
Fluoride (F-)	mg/L	10	0.20	0.10	7183467
Total Kjeldahl Nitrogen (TKN)	mg/L	100	2.3	0.10	7185488
Dissolved Sulphate (SO4)	mg/L	1500	250	1.0	7184723

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Halton Sanitary & Combined Sewer Bylaw (2-03)
ND = Not detected

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BV Labs Job #: C130104
Report Date: 2021/02/12

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-349B
Site Location: 217 Cross
Sampler Initials: AB

ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

BV Labs ID			OTM123		
Sampling Date			2021/02/03 16:00		
COC Number			812029-01-01		
	UNITS	Criteria	BH/MW 113	RDL	QC Batch
Calculated Parameters					
Aldrin + Dieldrin	ug/L	0.08	ND	0.005	7182829
Chlordane (Total)	ug/L	40	ND	0.005	7182829
DDT+ Metabolites	ug/L	-	ND	0.005	7182829
Heptachlor + Heptachlor epoxide	ug/L	-	ND	0.005	7182829
o,p-DDD + p,p-DDD	ug/L	-	ND	0.005	7182829
o,p-DDE + p,p-DDE	ug/L	-	ND	0.005	7182829
o,p-DDT + p,p-DDT	ug/L	-	ND	0.005	7182829
Total Endosulfan	ug/L	-	ND	0.005	7182829
Total PCB	ug/L	0.4	ND	0.05	7182829

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Town of Oakville Storm Sewer Discharge By Law 2009-031
ND = Not detected

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

BV Labs Job #: C130104
Report Date: 2021/02/12

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-349B
Site Location: 217 Cross
Sampler Initials: AB

GENERAL COMMENTS

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

Package 1	7.7°C

Revised report (2021/02/12): Amended to include Oakville Storm bylaw criteria.

Sample OTM123 [BH/MW 113] : 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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BV Labs Job #: C130104
Report Date: 2021/02/12

QUALITY ASSURANCE REPORT

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-349B
Site Location: 217 Cross
Sampler Initials: AB

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7184452	4-Bromofluorobenzene	2021/02/06	101	70 - 130	102	70 - 130	99	%				
7184452	D4-1,2-Dichloroethane	2021/02/06	102	70 - 130	104	70 - 130	105	%				
7184452	D8-Toluene	2021/02/06	101	70 - 130	100	70 - 130	95	%				
7186355	2,4,6-Tribromophenol	2021/02/05	106	10 - 130	90	10 - 130	75	%				
7186355	2-Fluorobiphenyl	2021/02/05	98	30 - 130	99	30 - 130	103	%				
7186355	D14-Terphenyl (FS)	2021/02/05	100	30 - 130	98	30 - 130	99	%				
7186355	D5-Nitrobenzene	2021/02/05	118	30 - 130	121	30 - 130	119	%				
7186355	D8-Acenaphthylene	2021/02/05	99	30 - 130	97	30 - 130	92	%				
7193127	2,4,5,6-Tetrachloro-m-xylene	2021/02/11	93	50 - 130	83	50 - 130	80	%				
7193127	Decachlorobiphenyl	2021/02/11	86	50 - 130	93	50 - 130	104	%				
7183208	Chromium (VI)	2021/02/09	98	80 - 120	101	80 - 120	ND, RDL=0.50	ug/L	NC	20		
7183467	Fluoride (F-)	2021/02/04	113	80 - 120	106	80 - 120	ND, RDL=0.10	mg/L	1.9	20		
7183500	pH	2021/02/04			102	98 - 103			0.32	N/A		
7184315	Phenols-4AAP	2021/02/04	104	80 - 120	98	80 - 120	ND, RDL=0.0010	mg/L	NC	20		
7184367	Total BOD	2021/02/09					ND,RDL=2	mg/L	NC	30	101	80 - 120
7184452	1,1,2,2-Tetrachloroethane	2021/02/06	97	70 - 130	100	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7184452	1,2-Dichlorobenzene	2021/02/06	96	70 - 130	97	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7184452	1,4-Dichlorobenzene	2021/02/06	112	70 - 130	112	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7184452	Benzene	2021/02/06	93	70 - 130	95	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7184452	Chloroform	2021/02/06	100	70 - 130	102	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7184452	cis-1,2-Dichloroethylene	2021/02/06	102	70 - 130	105	70 - 130	ND, RDL=0.50	ug/L	NC	30		
7184452	Ethylbenzene	2021/02/06	92	70 - 130	93	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7184452	Methylene Chloride(Dichloromethane)	2021/02/06	100	70 - 130	103	70 - 130	ND, RDL=2.0	ug/L	NC	30		
7184452	Tetrachloroethylene	2021/02/06	92	70 - 130	91	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7184452	Toluene	2021/02/06	93	70 - 130	94	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7184452	Total Xylenes	2021/02/06					ND, RDL=0.20	ug/L	NC	30		
7184452	trans-1,3-Dichloropropene	2021/02/06	107	70 - 130	106	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7184452	Trichloroethylene	2021/02/06	103	70 - 130	105	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7184723	Dissolved Sulphate (SO4)	2021/02/05	NC	75 - 125	104	80 - 120	ND, RDL=1.0	mg/L	1.4	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7184986	Total Cyanide (CN)	2021/02/04	92	80 - 120	96	80 - 120	ND, RDL=0.0050	mg/L	NC	20		
7185488	Total Kjeldahl Nitrogen (TKN)	2021/02/08	NC	80 - 120	98	80 - 120	ND, RDL=0.10	mg/L	2.4	20	98	80 - 120
7186355	1,3-Dinitropyrene	2021/02/05	46	30 - 130	124	30 - 130	ND, RDL=0.4	ug/L				
7186355	1,6-Dinitropyrene	2021/02/05	51	30 - 130	116	30 - 130	ND, RDL=0.4	ug/L				
7186355	1,8-Dinitropyrene	2021/02/05	40	30 - 130	110	30 - 130	ND, RDL=0.4	ug/L				
7186355	3,3'-Dichlorobenzidine	2021/02/05	8.9 (1)	30 - 130	117	30 - 130	ND, RDL=0.8	ug/L	NC	40		
7186355	7H-Dibenzo(c,g) Carbazole	2021/02/05	98	30 - 130	98	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7186355	Anthracene	2021/02/05	98	30 - 130	98	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Benzo(a)anthracene	2021/02/05	107	30 - 130	105	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Benzo(a)pyrene	2021/02/05	99	30 - 130	101	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Benzo(b/j)fluoranthene	2021/02/05	108	30 - 130	110	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Benzo(e)pyrene	2021/02/05	115	30 - 130	115	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Benzo(g,h,i)perylene	2021/02/05	121	30 - 130	120	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Benzo(k)fluoranthene	2021/02/05	112	30 - 130	113	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Bis(2-ethylhexyl)phthalate	2021/02/05	115	30 - 130	111	30 - 130	ND,RDL=2	ug/L	NC	40		
7186355	Chrysene	2021/02/05	113	30 - 130	115	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Dibenzo(a,h)anthracene	2021/02/05	122	30 - 130	120	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Dibenzo(a,i)pyrene	2021/02/05	82	30 - 130	100	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Dibenzo(a,j) acridine	2021/02/05	111	30 - 130	107	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7186355	Di-N-butyl phthalate	2021/02/05	114	30 - 130	103	30 - 130	ND,RDL=2	ug/L	NC	40		
7186355	Fluoranthene	2021/02/05	122	30 - 130	119	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Indeno(1,2,3-cd)pyrene	2021/02/05	127	30 - 130	123	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Pentachlorophenol	2021/02/05	103	30 - 130	76	30 - 130	ND,RDL=1	ug/L	NC	40		
7186355	Perylene	2021/02/05	110	30 - 130	110	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186355	Phenanthrene	2021/02/05	105	30 - 130	102	30 - 130	ND, RDL=0.2	ug/L	6.2	40		
7186355	Pyrene	2021/02/05	123	30 - 130	120	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7186481	Total Arsenic (As)	2021/02/05	99	80 - 120	96	80 - 120	ND, RDL=1.0	ug/L	5.5	20		
7186481	Total Cadmium (Cd)	2021/02/05	95	80 - 120	96	80 - 120	ND, RDL=0.090	ug/L	14	20		
7186481	Total Chromium (Cr)	2021/02/05	95	80 - 120	93	80 - 120	ND, RDL=5.0	ug/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7186481	Total Copper (Cu)	2021/02/05	96	80 - 120	92	80 - 120	ND, RDL=0.90	ug/L	2.7	20		
7186481	Total Lead (Pb)	2021/02/05	91	80 - 120	95	80 - 120	ND, RDL=0.50	ug/L	2.7	20		
7186481	Total Manganese (Mn)	2021/02/05	NC	80 - 120	92	80 - 120	ND, RDL=2.0	ug/L	4.9	20		
7186481	Total Nickel (Ni)	2021/02/05	89	80 - 120	90	80 - 120	ND, RDL=1.0	ug/L	8.5	20		
7186481	Total Phosphorus (P)	2021/02/05	101	80 - 120	98	80 - 120	ND, RDL=100	ug/L	NC	20		
7186481	Total Selenium (Se)	2021/02/05	96	80 - 120	101	80 - 120	ND, RDL=2.0	ug/L	NC	20		
7186481	Total Silver (Ag)	2021/02/05	91	80 - 120	94	80 - 120	ND, RDL=0.090	ug/L	NC	20		
7186481	Total Zinc (Zn)	2021/02/05	NC	80 - 120	96	80 - 120	ND, RDL=5.0	ug/L	3.9	20		
7186529	Mercury (Hg)	2021/02/05	96	75 - 125	97	80 - 120	ND, RDL=0.00010	mg/L	NC	20		
7186632	Total Suspended Solids	2021/02/08					ND, RDL=10	mg/L	0	25	95	85 - 115
7188422	Total Carbonaceous BOD	2021/02/11					ND,RDL=2	mg/L	11	30	93	85 - 115
7188589	Nonylphenol (Total)	2021/02/07	112	50 - 130	112	50 - 130	ND, RDL=0.001	mg/L	NC	40		
7188593	Nonylphenol Ethoxylate (Total)	2021/02/07	97	50 - 130	99	50 - 130	ND, RDL=0.005	mg/L	NC	40		
7193034	Total Oil & Grease	2021/02/09			99	85 - 115	ND, RDL=0.50	mg/L	2.0	25		
7193048	Total Oil & Grease Mineral/Synthetic	2021/02/09			91	85 - 115	ND, RDL=0.50	mg/L	2.7	25		
7193127	a-Chlordane	2021/02/11	110	50 - 130	100	50 - 130	ND, RDL=0.005	ug/L	0.18	30		
7193127	Aldrin	2021/02/11	97	50 - 130	87	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7193127	Dieldrin	2021/02/11	128	50 - 130	124	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7193127	g-Chlordane	2021/02/11	110	50 - 130	100	50 - 130	ND, RDL=0.005	ug/L	0.12	30		
7193127	Hexachlorobenzene	2021/02/11	91	50 - 130	91	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7193127	Lindane	2021/02/11	102	50 - 130	98	50 - 130	ND, RDL=0.003	ug/L	2.0	30		
7193127	Mirex	2021/02/11	117	30 - 130	99	30 - 130	ND, RDL=0.005	ug/L	3.0	40		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7193127	o,p-DDT	2021/02/11	123	50 - 130	108	50 - 130	ND, RDL=0.005	ug/L	0.58	30		
7193127	p,p-DDT	2021/02/11	87	50 - 130	95	50 - 130	ND, RDL=0.005	ug/L	8.3	30		

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 (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

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).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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

BV Labs Job #: C130104
Report Date: 2021/02/12

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-349B
Site Location: 217 Cross
Sampler Initials: AB

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Anastassia Hamanov, Scientific Specialist

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Farhana Rahman

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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Exceedance Summary Table – Halton Sanitary 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.

Exceedance Summary Table – Oakville Storm Sewer

Result Exceedances

Sample ID	BV Labs ID	Parameter	Criteria	Result	DL	UNITS
BH/MW 113	OTM123-08	Total Copper (Cu)	40	61	0.90	ug/L
BH/MW 113	OTM123-08	Total Manganese (Mn)	50	610	2.0	ug/L
BH/MW 113	OTM123-07	Total Suspended Solids	15	19	10	mg/L

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

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CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#31796 B.I.G Consulting Inc.	Company Name:	BIG Consulting Inc	Quotation #:	B64476	BV Labs Job #:	Bottle Order #: 812029
Attention:	Accounts Payable	Attention:	Eileen Liu	P.O. #:			
Address:	12-5500 Tomken Road Mississauga ON L4W 2Z4	Address:	Same as Invoice to	Project:	BIGC-ENV-349B		
Tel:	(416) 214-4880 Fax:	Tel:	Fax:	Project Name:	217 Cross	COC #: C#812029-01-01	Project Manager: Christine Gripton
Email:	ldougherty@brownfieldigi.com; admin@brownfieldigi.co	Email:	eliu@brownfieldigi.com	Site #:			
				Sampled By:	AB		

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)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___	☐ CCME ☒ Sanitary Sewer Bylaw ☐ Reg 558 ☒ Storm Sewer Bylaw ☐ MISA Municipality Halton / Oakville ☐ PWQO ☐ Reg 406 Table ☐ Other	

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

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 #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ANALYSIS REQUESTED (PLEASE BE SPECIFIC): Halton Sanitary + Oakville Storm	# of Bottles	Comments
1		BH/MW 113	21/02/03	~~16:00~~	GW		X	19	
2									
3									
4									
5									
6									
7									
8									
9									
10									

03-Feb-21 17:37
Christine Gripton
C130104
DSG env-1305

* 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			
	21/02/03	17:30	Rv/ ALEXANDRA FODOR	2021/02/03	17:37		Time Sensitive	Temperature (°C) on Recei 8/5/6 ICE	Custody Seal Present / Intact	Yes / No

* 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

Bureau Veritas Canada (2019) Inc.

APPENDIX E: CONSTRUCTION DEWATERING ESTIMATE RATE CALCULATIONS

Construction Dewatering Rate Estimate

217 and 227 Cross Avenue and 571, 581 and 587 - 595 Argus Road, Oakville, Ontario
Seven (7) levels of underground parking, unconfined aquifer, groundwater seepage to square excavation (radial source)

Table E-1: Construction Dewatering Rate Estimates

Description	Symbol	Values	Unit	Explanation
Input				
Established Grade Elevation		102.59	m asl	Based on Drawing A451.S Building A and B Sections, prepared by BDP, dated September 20, 2024
Highest Groundwater Level		101.15	m asl	Highest groundwater elevation on February 8, 2021
Footing Elevation		75.10	m asl	Assumed footing is 2 m below P7 FFE. The P7 FFE is 77.1 masl, based on Drawing A451.S Building A and B Sections, prepared by BDP, dated September 20, 2024
Aquifer Bottom		71.10	m asl	Assumed 4 m below footing elevation
Hydraulic Conductivity		3.19E-07	m/s	Geometric mean K
Length of Excavation	x	88.0	m	Based on Drawing A151.S P7 and P3-P6 Underground Plans, prepared by BDP, dated September 20, 2024
Width of Excavation	a	110.0	m	
Output				
Top of Aquifer		101.15	m asl	Water table for unconfined aquifer
Target Water Level		74.10	m asl	Assumed 1.0 m below footing elevation
Water Level above aquifer bottom before dewatering	H	30.1	m	
Target water level above aquifer bottom	h	3.0	m	
Equivalent radius	R_e	63.0	m	Equal perimeter
Radius of Influence	L (R_0)	108.84	m	Sichardt's Formula (C=3000 for radial source)
Construction dewatering flow rate - Steady State	Q	141.56	m^3/day	Construction Dewatering flow – Dupuit Equation
Maximum construction dewatering flow rate (safety factor of 3)	3Q	424.68	m^3/day	During the initial period and after rains
Construction Dewatering Flow Rate - Steady State	Q	**142,000**	L/day	
Maximum Construction Flow Rate (safety factor of 3)	3Q	**426,000**	L/day	

APPENDIX F: LONG TERM DRAINAGE FLOW RATE ESTIMATE CALCULATIONS

Foundation Drain Flow Rate Estimate

217 and 227 Cross Avenue and 571, 581 and 587 - 595 Argus Road, Oakville, Ontario
Seven (7) levels of underground parking, unconfined aquifer, groundwater seepage to square excavation (radial source)

Table F-1: Foundation Drain Flow Rate Estimate of Southern Portion

Description	Symbol	Values	Unit	Explanation
Input				
Established Grade Elevation		102.59	m asl	Based on Drawing A451.S Building A and B Sections, prepared by BDP, dated September 20, 2024
Highest Groundwater Level		87.48	m asl	Highest deep groundwater elevation on February 13, 2023
P7 Slab Elevation		77.10	m asl	Based on Drawing A451.S Building A and B Sections, prepared by BDP, dated September 20, 2024
Aquifer Bottom		74.10	m asl	Assumed 3 m below basement elevation
Hydraulic Conductivity		3.19E-07	m/s	Geometric mean K
Length of Excavation	x	88.0	m	Based on Drawing A151.S P7 and P3-P6 Underground Plans, prepared by BDP, dated September 20, 2024
Width of Excavation	a	110.0	m	
Output				
Top of Aquifer		87.48	m asl	Water table for unconfined aquifer
Target Water Level		76.60	m asl	Assumed 0.5 m below basement floor level
Water Level above aquifer bottom before dewatering	H	13.4	m	
Target water level above aquifer bottom	h	2.5	m	
Equivalent radius	R_e	63.0	m	Equal perimeter
Radius of Influence	L (R_0)	103.74	m	Weber's Equation (from centre of drainage area)
Foundation Drain Flow Rate - Steady State	Q	29.99	m^3/day	Long-term flow rate – Dupuit Equation
Maximum Foundation Drain Flow Rate (safety factor of 3)	3Q	89.97	m^3/day	During the initial period and after rains
Estimated Long-term Foundation Drain Flow Rate	Q	**30,000**	L/day	
Estimated Maximum Foundation Drain Flow Rate	3Q	**90,000**	L/day	