HYDROGEOLOGICAL INVESTIGATION

27 Grosvenor Street and 26 Grenville Street, Toronto, Ontario

Client

Greenwin Holdings Inc. & Choice Properties REIT
19 Lesmill Road
Toronto, Ontario
M3B 2T3

Project Number

BIGC-ENV-222A

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Date Submitted

February 26, 2019 (Original)
February 5, 2021 (Revision 2)

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1 Introduction

1.1 Project Description

B.I.G. Consulting Inc. (BIG) was retained by Greenwin Holdings Inc. & Choice Properties REIT (client) to provide geo-environmental services including environmental, geotechnical and hydrogeological investigations to support the proposed development of the site located at 27 Grosvenor Street and 26 Grenville Street, Toronto, Ontario, M7A 2G6 and M7A 2G9 (Site).

The Site is located south of Grosvenor Street and east of Bay Street, in Toronto, Ontario, as shown on Figure 1. The Site measures approximately 3,500 m² in size and is currently occupied by two (2) commercial buildings with two (2) levels of basement. The Site at 27 Grosvenor Street is occupied by a three (3) storey commercial building with two (2) levels of underground parking. The Site at 26 Grenville Street is occupied by a two (2) storey commercial building with a mezzanine overlying one (1) level of basement. The areas surrounding the Site buildings are covered with asphalt pavement with landscaped areas along the northern and southern property boundaries. A Site Location Plan is provided in Figure 1.

It is BIG's understanding that the proposed development will consist of rental housing mixed use buildings with three (3) levels of underground parking. If changes to the design are implemented, the recommendations in this report must be revised. Based on the drawing A-202, Building Sections – E/W, provided by Sweeny & Co Architects Inc. (Sweeny), dated February 1, 2021, the finished floor elevation (FFE) for level P3 is 93.71 m asl. BIG prepared a report previously and submitted in February 2019 which considered short-term construction dewatering evaluation. This revised report includes the evaluation of both short-term construction dewatering and long-term dewatering discharges.

This report addresses the hydrogeological aspects of the proposed project. The environmental and geotechnical assessment reports will be issued under separate covers. The field investigation for the hydrogeological assessment was carried out concurrently with that for the environmental and geotechnical assessments.

1.2 Project Objectives

The main objectives of the Preliminary Hydrogeological Investigation were to:

a) Establish the subsurface geological and hydrogeological conditions at the expected foundation elevation;
b) Estimate any potential construction dewatering flow rates; and,
c) Prepare a Preliminary Hydrogeological Investigation Report.

1.3 Scope of Work

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) Drilling five (5) boreholes (BH1 to BH5) to depths ranging from 2.6 m to 21.9 m to investigate the subsurface conditions;
d) Installation of four (4) monitoring wells (BH/MW1 to BH/MW4);
e) Perform slug tests at monitoring wells to assess the hydraulic characteristics of the saturated soils at the Site;
f) Initiation of bi-weekly groundwater monitoring for a period of three (3) months at installed monitoring wells;

g) Evaluate the information collected during the field investigation program, including borehole geological information, particle size distribution, groundwater level measurements and groundwater water quality;

h) Collection of one (1) groundwater sample for laboratory testing and compare it against the City of Toronto Storm and Combined/Sanitary Sewer Use By-Law parameters;

i) Preparation of site plan, cross section, geological mapping, and groundwater contour mapping for the Site;

j) Estimation of construction dewatering flow rates; and,

k) The preparation of a Hydrogeological Investigation Report.

2 Regional Setting

2.1 Regional Physiography

The Site is located in the Iroquois Plain physiographic region of Southern Ontario known as the bevelled till plain (Chapman & Putnam, 2007). 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 were much higher due to ice blockage in the St. Lawrence seaway. 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 below St. Clair Avenue West, north of the Site.

2.2 Regional Geology

The surficial geology of the immediate area around the Site described as coarse-textured glaciolacustrine deposits and fine-textured glaciolacustrine deposits consisting of sand, gravel, silt and clay, foreshore deposits, basinal deposits and massive to well laminated. 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 bedrock is expected at depths of approximately 40 m bgs at the Site.

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 river and lake. 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 3,500 m². The land is covered with asphalt pavement with landscaped areas along the northern and southern property boundaries. Precipitation falling within the Site is inferred to be directed to the nearby City of Toronto catch basins.

3.2 Local Surface Water Features

There are no surface water bodies on or immediately adjacent to the Site. The closest surface water body to the Site is the Don River is situated approximately 2.3 km east of the Site and Lake Ontario is situated approximately 2.4 km south of the Site. The Site is situated within the Lake Ontario watershed and is not within a Toronto and Region Conservation Authority (TRCA) regulated area.

3.3 MECP Water Well Review

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

The MECP WWR database indicated that there were 176 well records within a 500 m radius of the Site. All identified well records are marked on Figure 4. A summary of the Water Well Records is included in Appendix B. A review of the records indicate that the majority of the wells were classified as observation wells and test holes for 500 m radius of the Site. One (1) supply water well was identified within 500 m of the Site. However, the well is located within an urbanized area in Toronto, no private well water user is expected.

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

The MECP maintains a database of all active Permit to Take Water (PTTW) and Environmental Activity and Sector Registry (EASR) items related to Construction Dewatering. There are existing and expired PTTW registrations within 1 km of the Site and are summarized in Table B-2, Appendix B. There are a few registered EASR for construction dewatering for the neighboring properties, summarized in Table B-2, Appendix B. The location for each of these registrations is shown on Figure 5.

4 Field Program

4.1 Borehole and Monitoring Well Details

BIG advanced five (5) boreholes on-Site to a depth ranging from 2.6 m to 21.9 m from August 15 through December 12, 2018, four (4) of which were instrumented with monitoring wells. BH/MW3 was advanced from the ground, BH/MW1, BH/MW2, BH/MW4 and BH5 were advanced from the basement. The boreholes were advanced using truck mounted hollow stem continuous flight auger equipment under the direction and supervision of BIG field personnel. 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 returned to the BIG laboratory for detailed visual examination and for laboratory testing. The borehole records and monitoring well construction details are included in Appendix A. Figure 6 is a detailed Borehole/Monitoring Well Location Map of the Site.

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 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.

Layer	Description
Pavement structure/Slab-on-grade	BH/MW3 was drilled from the at-grade pavement. All remaining boreholes were drilled from the existing lowest underground parking garage floor level. BH/MW1 and BH/MW3 contacted a composite pavement structure consisting of 25 and 80 mm of asphaltic concrete overlying 280 and 130 mm of concrete which was in turn underlain by 200 and 280 mm of granular fill at the respective boreholes. At BH/MW2, BH/MW4 and BH5, drilled from the basement slab-on-grade, 300 to 360 mm of concrete overlying 50 to 130 mm of granular fill was contacted at the surface of the boreholes.
Fill	Beneath the pavement structure in BH/MW3, a layer of fill was encountered and extended to a depth of 1.7 m bgs. The fill generally consisted of silty sand with brick and slag inclusions below 0.49 m depth.
Silty Sand	Below the granular fill or fill in BH/MW1, BH/MW2, BH/MW4 ang BH5, a deposit of silty sand was contacted and extended to a depth ranging from 2.6 to 4.6 m bgs, and the maximum depth explored in BH5. Gravel inclusions were present in the deposit and the deposit was brown and became grey with increasing depth.
Sandy Silt/Sand and Silt (Glacial) Till	The predominant subsurface deposit encountered in the investigated depths was sandy silt/sand and silt (glacial) till which encountered to the maximum depth explored in BH/MW1 to BH/MW4, i.e. a depth ranging from 8.2 to 21.9 m bgs. Gravel was widely dispersed throughout the deposit and sand, silt and clay inclusions were prevalent. The deposit was generally moist to wet.

4.3 Water Level Monitoring

Water levels at each of the borehole and monitoring well locations were recorded both during the initial drilling and after installation. A summary of all water level observations is included below in Table 4-1. Groundwater was observed in all monitoring wells on January 11, 2019 and produces a continuous surface across the Site that is situated at an elevation of between 89.51 m and 93.01 m asl.

BIG conducted a three (3)-month groundwater monitoring program and the monitoring data indicated that there was marginal groundwater fluctuation.

An interpreted shallow groundwater contour map for the monitoring well water level measurements recorded on January 11, 2019 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 in the east/northeast direction.

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. It is also likely that some wells may take prolonged periods of time to equilibrate and provide true representative groundwater levels.

Table 4-1: Monitoring Well Details and Water Level Elevations

Borehole/ Well ID	Ground/ Basement Elevation (m asl)	Coordinates (NAD27-76 Adj. MTM10)		Well Depth (m)	December 13, 2018		January 11, 2019		January 25, 2019		February 8, 2019		February 22, 2019		March 8, 2019	
		Easting	Northing		Water Level (m bgs/below basement)	Groundwater Elevation (m asl)	Water Level (m bgs/below basement)	Groundwater Elevation (m asl)	Water Level (m bgs/below basement)	Groundwater Elevation (m asl)	Water Level (m bgs/below basement)	Groundwater Elevation (m asl)	Water Level (m bgs/below basement)	Groundwater Elevation (m asl)	Water Level (m bgs/below basement)	Groundwater Elevation (m asl)
BH/MW1	97.10	314062.9	4835641.1	7.4	4.31	92.79	4.41	92.69	4.44	92.66	4.43	92.67	4.44	92.66	4.41	92.69
BH/MW2	97.12	314030.6	4835631.3	6.1	3.92	93.20	4.11	93.01	4.13	92.99	4.13	92.99	4.13	92.99	4.10	93.02
BH/MW3	105.04	314043.6	4835599.4	19.8	15.41	89.63	15.53	89.51	15.50	89.54	15.48	89.56	15.53	89.51	15.43	89.61
BH/MW4	97.96	314082.1	4835574.0	9.1	4.84	93.12	4.97	92.99	4.98	92.98	4.98	92.98	4.99	92.97	4.95	93.01
BH5	97.93	314064.9	4835568.4	-	-	-	-	-	-	-	-	-	-	-	-	-

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. Single Well Response Test (SWRT) analyses were conducted at all monitoring wells (BH/MW1 to BH/MW4).

Given the low recovery rate of the native soil, a pump test is not applicable for the Site.

During the SWRT, a slug of water was instantaneously removed from the well and the response to the water level was recorded. The hydraulic conductivity values for each of the tested wells were calculated from the SWRT data using Aqtesolv Software and the Hvorlsev 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 4-2:

Table 4-2: Summary of Hydraulic Conductivity (K) Testing Results

Monitoring Well	Estimated Hydraulic conductivity (m/s)
BH/MW1	2.41×10^{-7}
BH/MW2	2.11×10^{-7}
BH/MW3	1.14×10^{-7}
BH/MW4	4.61×10^{-7}
Highest hydraulic conductivity	**4.61×10^{-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 City of Toronto Sanitary or Storm Sewer during dewatering activities, one (1) groundwater sample was collected from BH/MW1 on December 14, 2018 and November 2, 2020. 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, of Mississauga, Ontario, for analysis.

For the assessment purposes, the analytical results were compared to Table 1 – Limits for Sanitary and Combined Sewer Discharge (amended 2002-10-31 by By-Law No. 855-2002; 2010-07-08 by By-Law No.868-2010; 2016-02-4 by By-Law No.100-2016); and Table 2 – Limits for Storm Sewer Discharge (amended 2010-07-08 by By-Law No 868-2010; 2016-02-4 by By-Law No.100-2016) of Toronto Municipal Code (Toronto Municipal Code Chapter 681, 2016).

The laboratory Certificate of Analysis (COA) and chain of custody are enclosed in Appendix D.

The laboratory analyses of groundwater collected from BH/MW1 identified no exceedances of Table 1 - Limits for Sanitary and Combined Sewer Discharge.

When compared against the most stringent Table 2 – Limits for Storm Sewer Discharge, the sample indicated exceedances for total suspended solids (TSS), total manganese and total phosphorus. A summary of the exceedances is provided in Table 4-3.

Table 4-3: Summary of Analytical Results

Parameter	Limits for Sanitary and Combined Sewer Discharge (Table 1) (mg/L)	Limits for Storm Sewer Discharge (Table 2) (mg/L)	Concentration for BH/MW1 (December 14, 2018) (mg/L)	Concentration for BH/MW1 (November 2, 2020) (mg/L)
Total Suspended Solids	350	15	**18**	**160**
Total Manganese	5	0.05	**0.640**	**0.34**
Total Biochemical Oxygen Demand	300	15	**20**	12
Total Phosphorus	10	0.4	**0.440**	**1.1**
Total Zinc	2	0.04	**0.045**	0.02

Notes:
Bold indicates concentration exceeds the Storm Sewer Discharge Limit.

If the groundwater encountered during excavation activities or long-term dewatering is discharged to the City of Toronto storm sewer, it will require pre-treatment prior to discharge. Discharge water to the sanitary and combined sewer does not require pre-treatment prior to discharge.

5 Temporary Construction Dewatering

5.1 Construction Dewatering Requirements

The proposed development involves the construction of rental housing mixed use buildings with three (3) levels of underground parking. Based on the drawing A-202, Building Sections – E/W, provided by Sweeny, dated February 1, 2021, the lowest FFE for level P3 is 93.71 m asl. The footing elevation is assumed 2.6 m below FFE. For conservative purposes, the construction dewatering calculation is based on an open cut excavation at the present time. Water levels obtained on January 11, 2019 indicated that the groundwater elevation is between 89.51 m and 93.01 m asl. To excavate under dry conditions, the water level is anticipated to be lowered approximately 1.0 m below the footing elevation.

Please note that it is the responsibility of the contractor to ensure dry conditions are maintained within the excavation at all times.

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 estimate 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 to the calculation of the dewatering rate for the proposed excavation for the residential building is presented in Table 5-1.

Table 5-1: Dewatering Rate Assumptions

Input Parameter	Site	Notes
Proposed Groundwater Elevation	106.0 m asl	Based on the drawing A-202, Building Sections – E/W, provided by Sweeny, dated February 1, 2021
FFE Elevation/Basement Elevation	93.71 m asl	Based on the drawing A-202, Building Sections – E/W, provided by Sweeny, dated February 1, 2021
Footing Elevation	91.11 m asl	Assumed 2.6 m below FFE
Groundwater Elevation	93.01 m asl	Highest groundwater elevation on January 11, 2019
Dewatered Elevation Target	90.11 m asl	Assumed 1 m below footing elevation
Estimated Excavation Area	80 m x 45 m	Based on area extent equivalent
Hydraulic Conductivity (K) of Overburden	4.61 x 10^{-7} m/s	Highest K value

5.3 Dewatering Flow Rate Equation

The Dupuit equation for steady flow from a linear line source on both sides of a rectangular slot of an excavation through an unconfined aquifer resting on a horizontal impervious surface was used to obtain a flow rate estimate, and is expressed as follows:

$$Q_w = \frac{K(x + a)(H^2 - h^2)}{L_o}$$

Where:

Q_w = Rate of pumping (m^3/sec)
x = Length of excavation (m)
a = Width of excavation (m)
K = Hydraulic conductivity (m/sec)
H = Head beyond the influence of pumping (static groundwater elevation) (m)
h = Head above base of aquifer at the excavation (m)
L_o = Distance of Influence (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 linear flow is calculated based on the Sichardt equation, which is described as follows:

$$Lo = 1750\ (H - h)\sqrt{K}$$

Where:

K = Hydraulic conductivity (m/sec)
H = Static Saturated Head in m
h = Dynamic Saturated Head in m

Based on the Sichardt equation, the ROI while dewatering may extend up to approximately 3.5 m from the side of the excavation for Linear Flow (Lo=Ro/2). The ROI calculation is provided in Appendix E.

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)
Approximate excavation area	50,000	150,000

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 precipitation, 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 peak dewatering flow rate also provides additional capacity for the dewatering contractors. Given that the predicted dewatering volume exceeds the 50,000 L/day limit, it is necessary to register the construction activities through an EASR.

At the detailed design stage of the project and subject to the geotechnical consideration and the shoring system configuration, the dewatering quantities suggested above can be re-evaluated to verify if reduction in discharge volume can be achieved.

Please note that it is the responsibility of the contractor to ensure dry conditions are maintained within the excavation at all times.

Additional pumping capacity may be required to maintain dry conditions within the excavation during and following significant precipitation events.

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 is based on the proposed development information available at this time. If changes to the design are implemented (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 footing 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
Proposed Groundwater Elevation	106.0 m asl	Based on the drawing A-202, Building Sections – E/W, provided by Sweeny, dated February 1, 2021
FFE Elevation/Basement Elevation	93.71 m asl	Based on the drawing A-202, Building Sections – E/W, provided by Sweeny, dated February 1, 2021
Footing Elevation	91.11 m asl	Assumed 2.6 m below FFE
Groundwater Elevation	93.01 m asl	Highest groundwater elevation on January 11, 2019
Foundation Elevation	91.11 m asl	Assumed 2.6 m below FFE
Sub-drain Elevation Target	90.61 m asl	Assumed 0.5 m below the footing elevation
Drainage Dimensions	80 m x 45 m	Based on aerial extent of the Site
Hydraulic Conductivity (m/s)	4.61 x 10^{-7} m/s	Highest K value

6.2 Radius of Influence

The Radius of Influence (ROI) for the long-term dewatering is based on the empirical Weber 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 Weber 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 linear flow is calculated based on the Weber equation, which is described as follows:

$$\mathrm{Ro} = 2.45 \left(\frac{\mathrm{HKt}}{\mathrm{s}}\right)^{0.5}$$

Where:

K = Hydraulic conductivity (m/s)

H = Static Saturated Head in m

t = time in number of days

s = Storage coefficient (unitless)

Based on the Weber equation and the geometric mean K value, the ROI is approximately 23 m from the side of the excavation for linear flow. The ROI calculation is provided in Table G-1, Appendix G.

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 23 m from the side of edge 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	19,000	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 estimate represents 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 does not exceed the 50,000 L/day limit, a PTTW is not required.

If the groundwater encountered during excavation activities or long-term dewatering is discharged to the City of Toronto storm sewer, it will require pre-treatment prior to discharge. Discharge water to the sanitary and combined sewer does not require pre-treatment prior to discharge.

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

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 a heavily urbanized area of Toronto, which features 100% municipal water supply. There are no expected impacts to nearby groundwater users due to active dewatering.

7.2 Impacts to Nearby Structures

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 23 m from the side of edge 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.

8 Water Taking and Discharge Permits

8.1 EASR

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) if the excavation is to be undertaken all at once. Therefore, it is necessary to register the construction dewatering under the EASR guidelines, as the cumulative discharge rate for construction is 150,000 L/day. The limit for water taking under an EASR is 400,000 L/day. If combined storm and groundwater were to exceed this limit, the dewatering rate would need to be capped to 400,000 L/day of pumped water. If it is necessary to exceed 400,000 L/day of water taking, a PTTW as per O./Reg. 387/04 would be required.

8.2 City of Toronto Sewer Discharge Agreement

The City of Toronto describes any water source not supplied by the City as private water. This includes groundwater and storm water that accumulate on a property. If private water is to be discharged into a City of Toronto sanitary or storm sewer, a permit under the City of Toronto Municipal Code, Chapter 681 must be granted. The discharge agreement features two (2) types of approvals:

- Short Term Private Water Discharge Approval which covers temporary arrangements for activities such as construction dewatering, road work, etc.; and,
- Long Term Private Water Discharge Approval which is intended to cover long term discharges from building foundation drains and other applications.

Given the current consideration for short-term and long-term discharges, a Private Water Discharge Approval (PWDS) with the City of Toronto will be 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 development will consist of rental housing mixed use buildings with three (3) levels of underground parking. If changes to the design are implemented, the recommendations in this report must be revised;
b) The Site is located within a physiographic region of Iroquois Plain known as the bevelled till plain;
c) The surficial geology around the Site is described as coarse-textured glaciolacustrine deposits and fine-textured glaciolacustrine deposits consisting of sand, gravel, silt and clay, foreshore deposits, basinal deposits and massive to well laminated;
d) The MECP Water Well Records indicate that there are 176 well records registered with the database within 500 m of the Site. One (1) supply water well was identified within 500 m of the Site. However, the well is located within an urbanized area in Toronto, no private well water user is expected;
e) Groundwater produces a continuous surface across the Site that is situated at an elevation of between 89.51 m and 93.01 m asl (January 11, 2019 readings);
f) Based on the water level measurements obtained, the inferred direction of groundwater flow within the shallow overburden formation across the Site is towards the east/northeast;
g) The estimated hydraulic conductivity for the overburden formation ranges between 1.14×10^{-7} m/s and 4.61×10^{-7} m/s;
h) Based on the assumptions outlined in this report, the estimated peak short-term construction dewatering flow rate for the proposed construction activities with a safety factor of 3 is approximately 150,000 L/day;
i) Due to the anticipated construction dewatering flow rate, it is recommended that a registration under the Environmental Activity and Sector Registry (EASR) be completed;
j) Based on the assumptions outlined in this report, the cumulative long-term contribution to the foundation drains is 19,000 L/day;
k) The laboratory COA shows that no exceedance under Table 1 – Limits for Sanitary and Combined Sewer Discharge;
l) When compared against the most stringent Table 2 – Limits for Storm Sewer Discharge, the sample indicated exceedances for total suspended solids (TSS), total manganese and total phosphorus; and,
m) If the groundwater discharges are directed to the City's storm sewer system, a treatment process will be required to meet the City's storm sewer use by-law. If the groundwater discharges are directed to the City's sanitary and combined sewer system, no treatment will be required.
n) A sewer discharge agreement with the City of Toronto Water division will be required for the short-term and long-term discharges.

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 this office.

Yours truly,

B.I.G. Consulting Inc.

Signed by:

Eileen Liu, M.Env.Sc., P.Geo.
Project Manager

Signed by:

Prem Manicks, P.Geo.
Partner

11 References

Cashman, P. M. (2013). Groundwater Lowering in Construction: A Practical Guide to Dewatering (Second Ed.).

Chapman, L., & Putnam, D. (2007). Physiography of Southern Ontario. Miscellaneous Release, Data 228 ISBN 978-1-4249-5158-1. Ontario Geological Survey.

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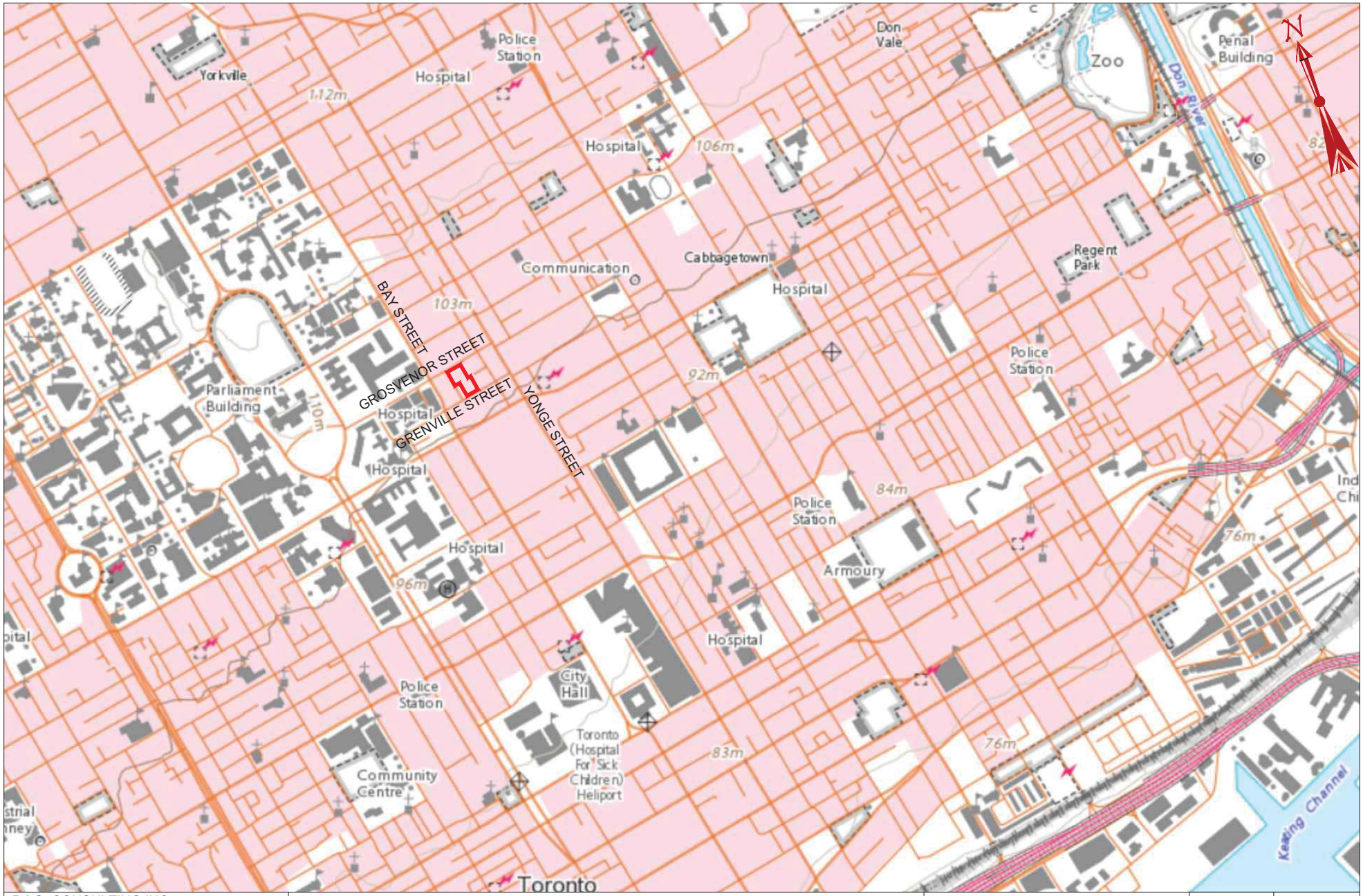
FIGURES



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LEGEND

APPROXIMATE SITE BOUNDARY

SCALE

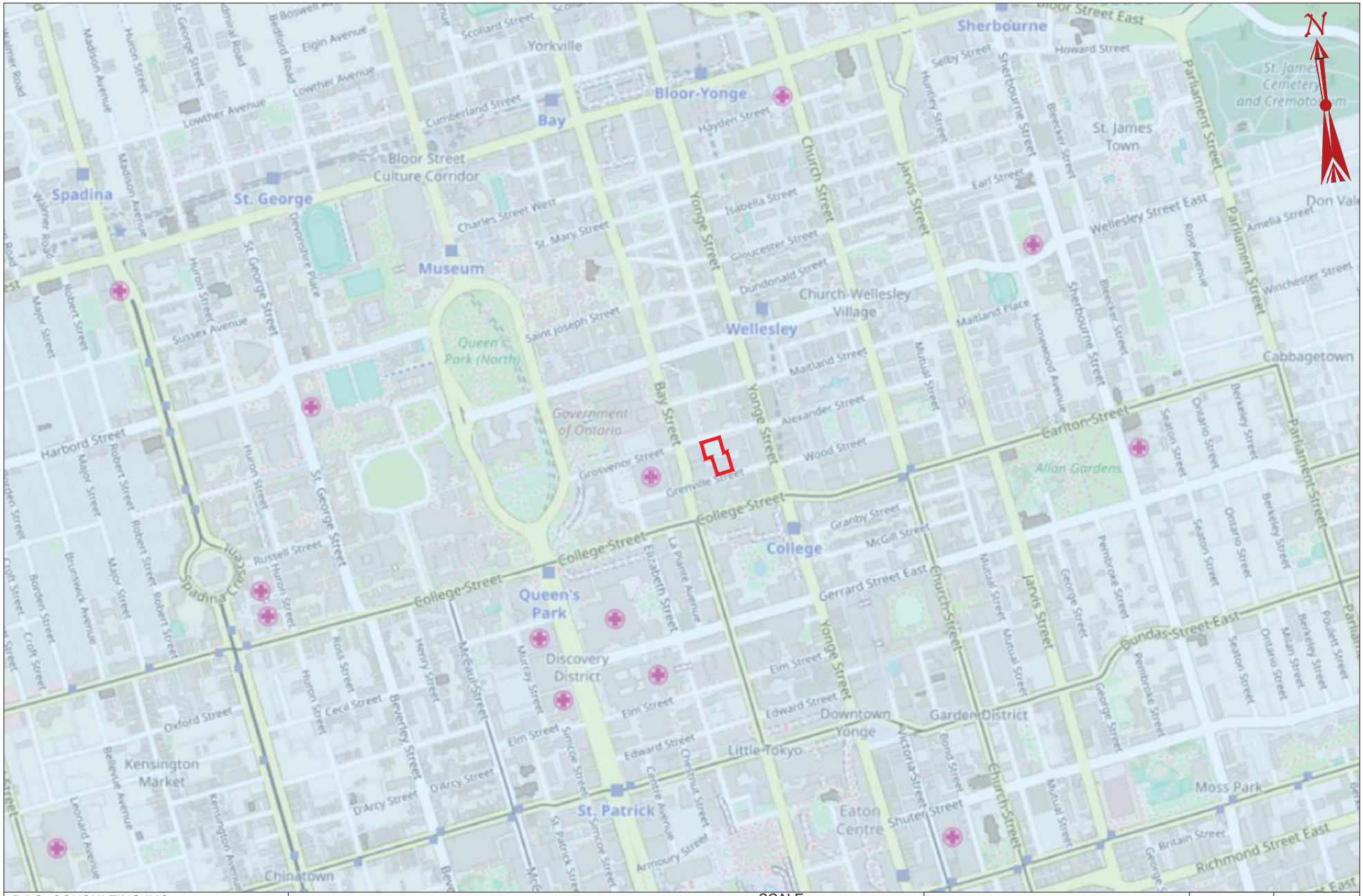
100m 0m 100m 200m 300m 400m 500m

IMAGERY OBTAINED FROM TOPORAMA, NATURAL RESOURCES CANADA, 2017

TITLE AND LOCATION

SITE LOCATION PLAN
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION
27 GROSVENOR STREET AND 26 GRENVILLE STREET, TORONTO, ONTARIO

PROJECT NO.	DWN.
BIGC-ENV-222A	O.A.
SCALE	CK.
AS NOTED	E.L.
DATE	FIG NO.
JANUARY 2019	1



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LEGEND

APPROXIMATE SITE BOUNDARY

IROQUOIS PLAIN

NOTES:

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

SCALE

100m 0m 100m 200m 300m 400m 500m

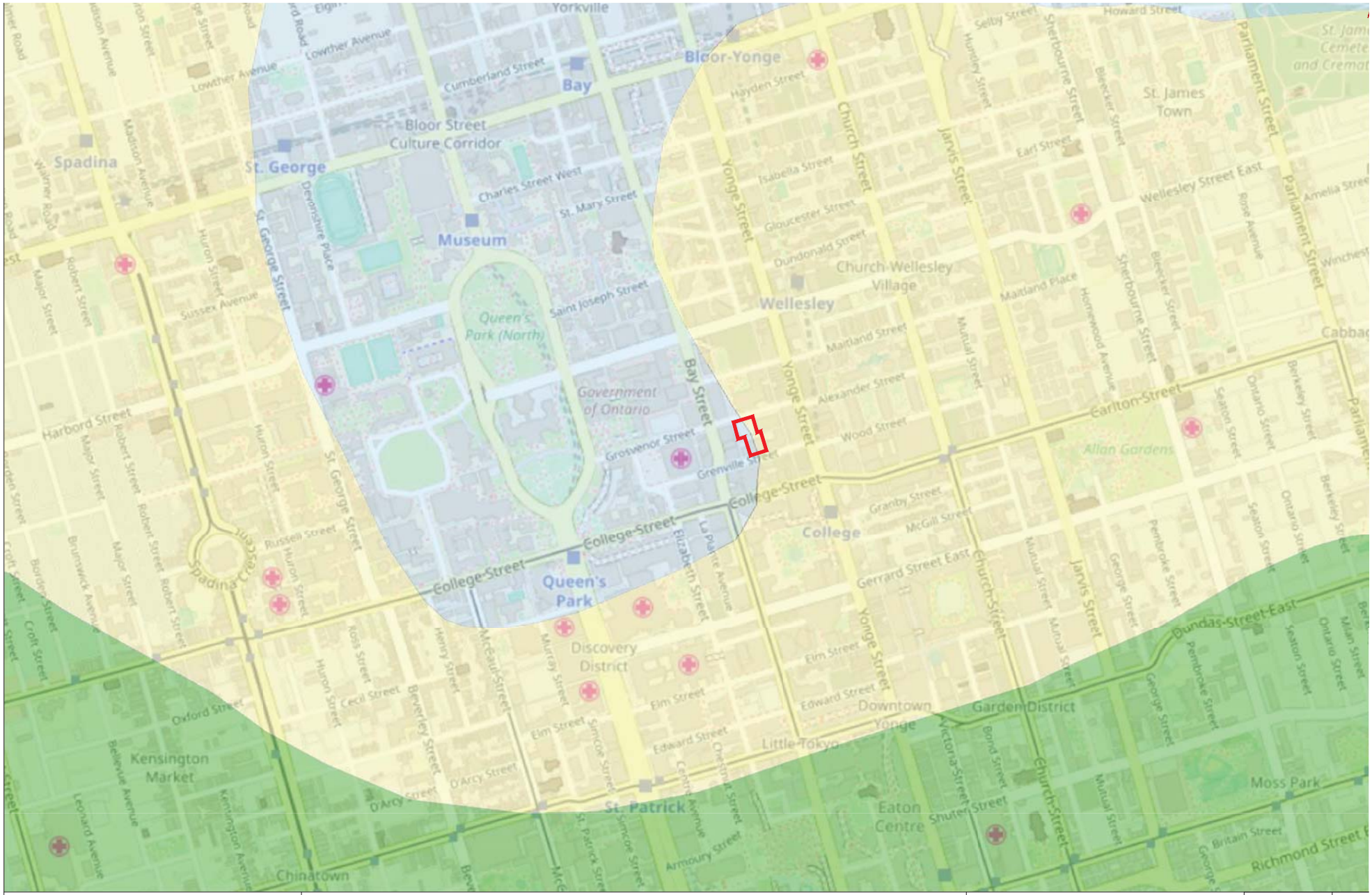
TITLE AND LOCATION

PHYSIOGRAPHIC REGIONS OF SOUTHERN ONTARIO

PRELIMINARY HYDROGEOLOGICAL INVESTIGATION

27 GROSVENOR STREET AND
26 GRENVILLE STREET,
TORONTO, ONTARIO

PROJECT NO.	DWN.
BIGC-ENV-222A	O.A.
SCALE	CK.
AS NOTED	E.L.
DATE	FIG NO.
JANUARY 2019	2



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LEGEND

- APPROXIMATE SITE BOUNDARY
- FINE-TEXTURED GLACIOLACUSTRINE DEPOSITS
- TILL
- COARSE-TEXTURED GLACIOLACUSTRINE DEPOSITS

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

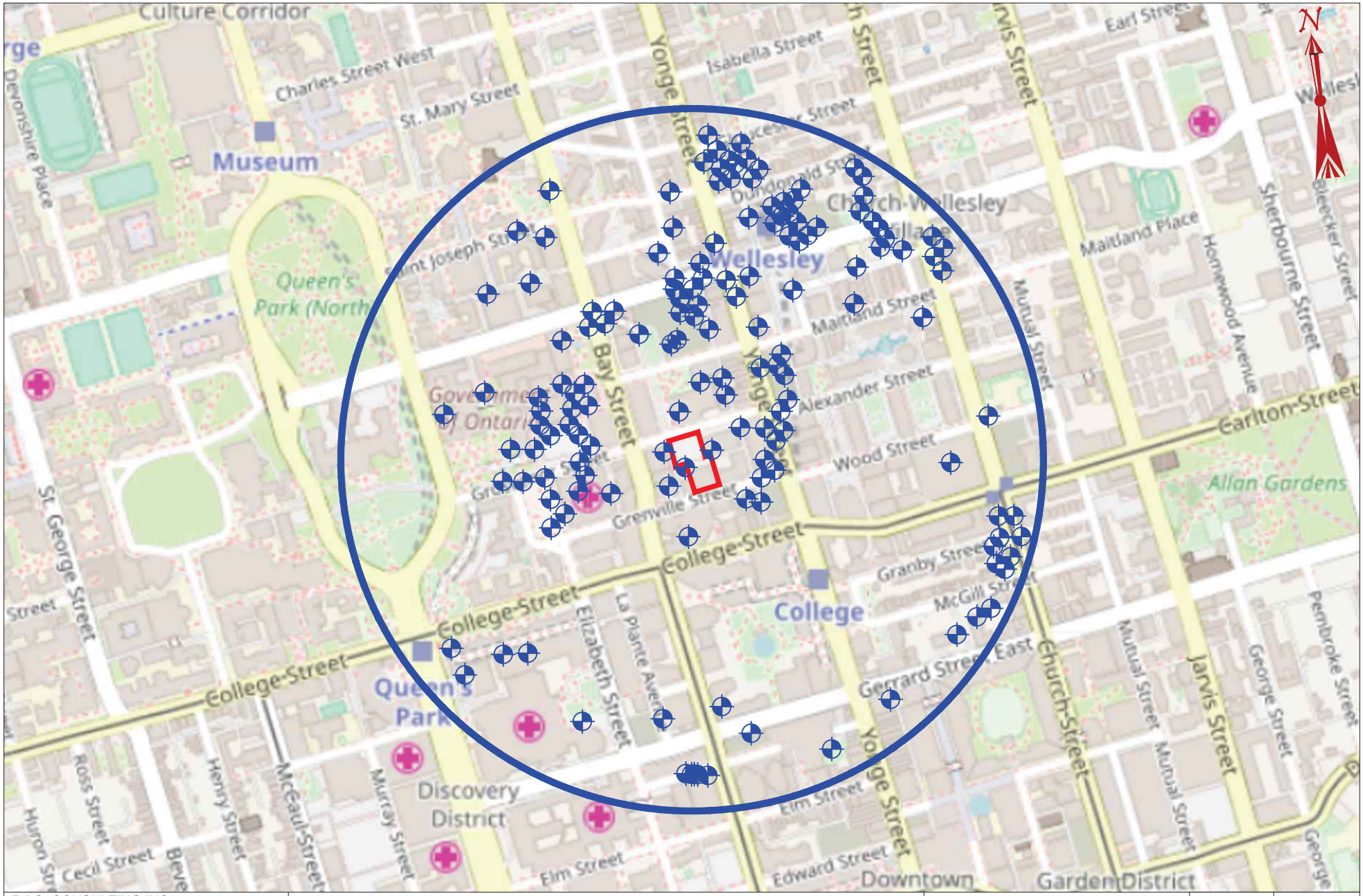
SCALE

100m 0m 100m 200m 300m 400m 500m

TITLE AND LOCATION

SURFICIAL GEOLOGY OF SOUTHERN ONTARIO
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION
27 GROSVENOR STREET AND 26 GRENVILLE STREET, TORONTO, ONTARIO

PROJECT NO.	DWN.
BIGC-ENV-222A	C
SCALE	CK.
AS NOTED	E
DATE	FIG NO.
JANUARY 2019	



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LEGEND

- APPROXIMATE SITE BOUNDARY
- WELL RECORD STUDY AREA BOUNDARY
- WELL RECORD LOCATION (2018)

SCALE

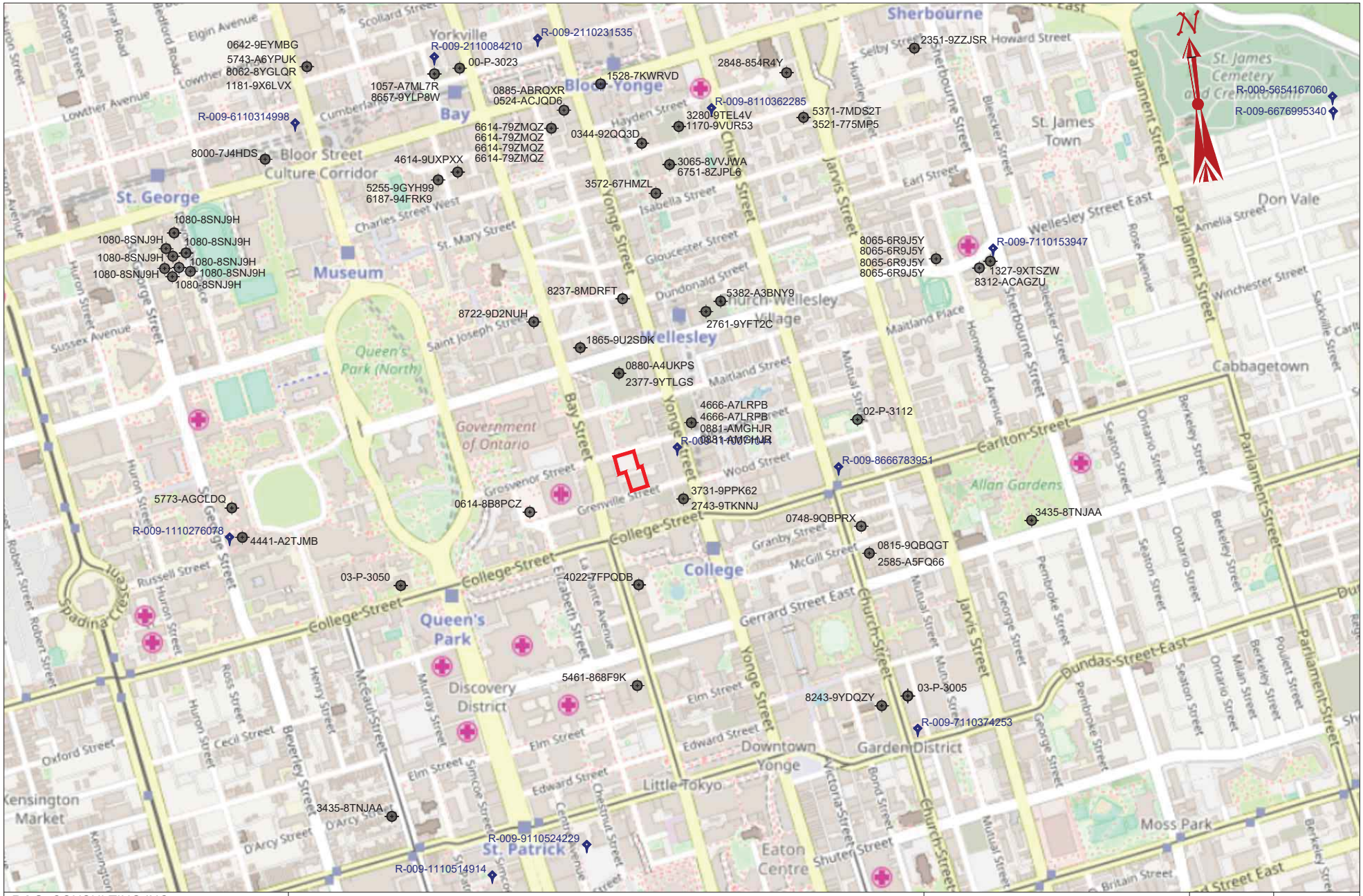
0m 300m
50m

IMAGERY OBTAINED FROM OPEN STREET MAP, 2016

TITLE AND LOCATION

MECP WATER WELL RECORD LOCATIONS
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION
27 GROSVENOR STREET AND 26 GRENVILLE STREET, TORONTO, ONTARIO

PROJECT NO.	DWN.
BIGC-ENV-222A	O.A.
SCALE	CK.
AS NOTED	E.L.
DATE	FIG NO.
JANUARY 2019	4



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LEGEND

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

SCALE

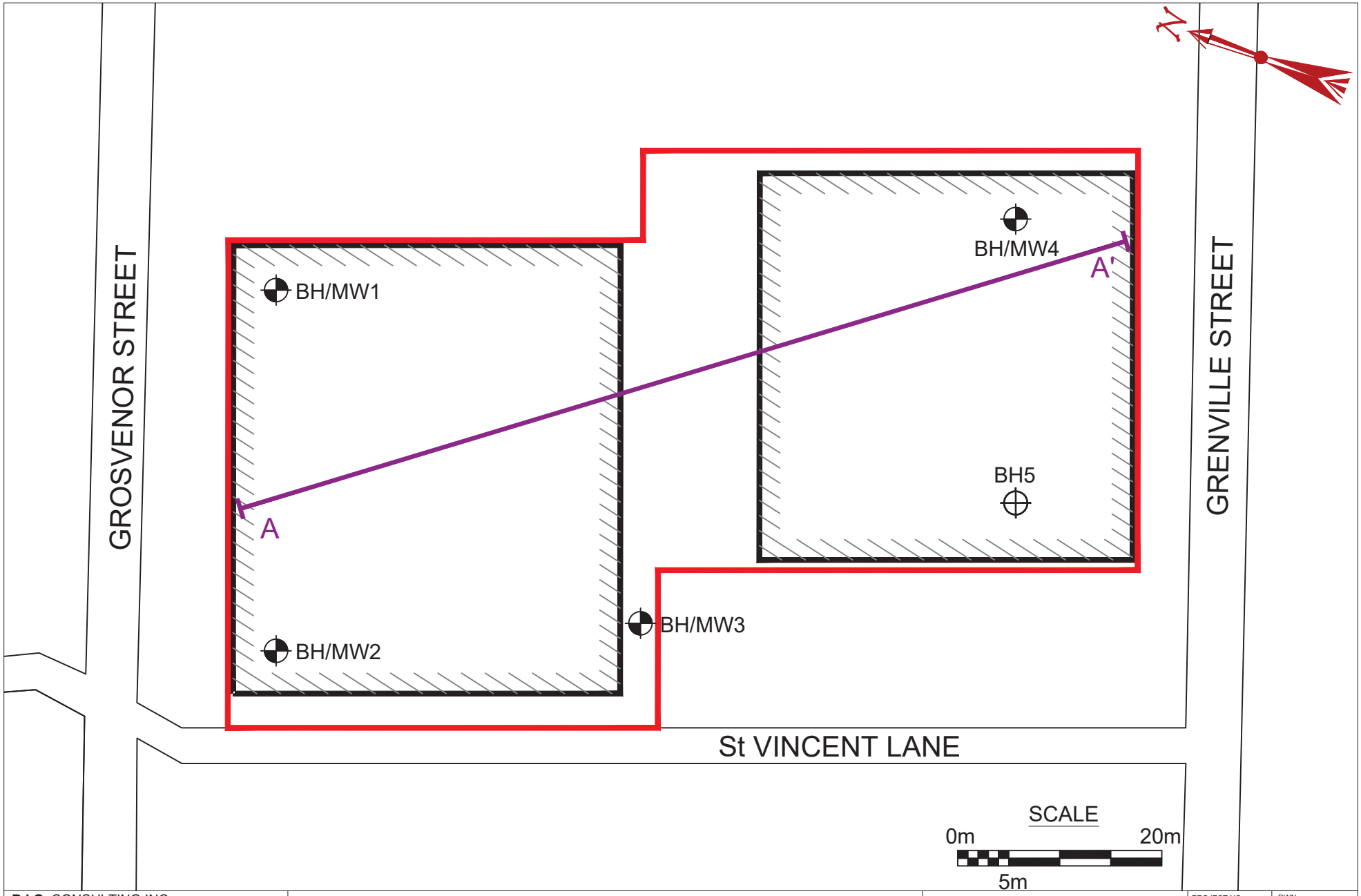
100m 0m 100m 200m 300m 400m 500m

IMAGERY OBTAINED FROM OPEN STREET MAP, 2016

TITLE AND LOCATION

PTTW AND EASR RECORD LOCATIONS
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION
27 GROSVENOR STREET AND 26 GRENVILLE STREET, TORONTO, ONTARIO

PROJECT NO.	DWN.
BIGC-ENV-222A	O.A.
SCALE	CK.
AS NOTED	E.L.
DATE	FIG NO.
JANUARY 2019	5



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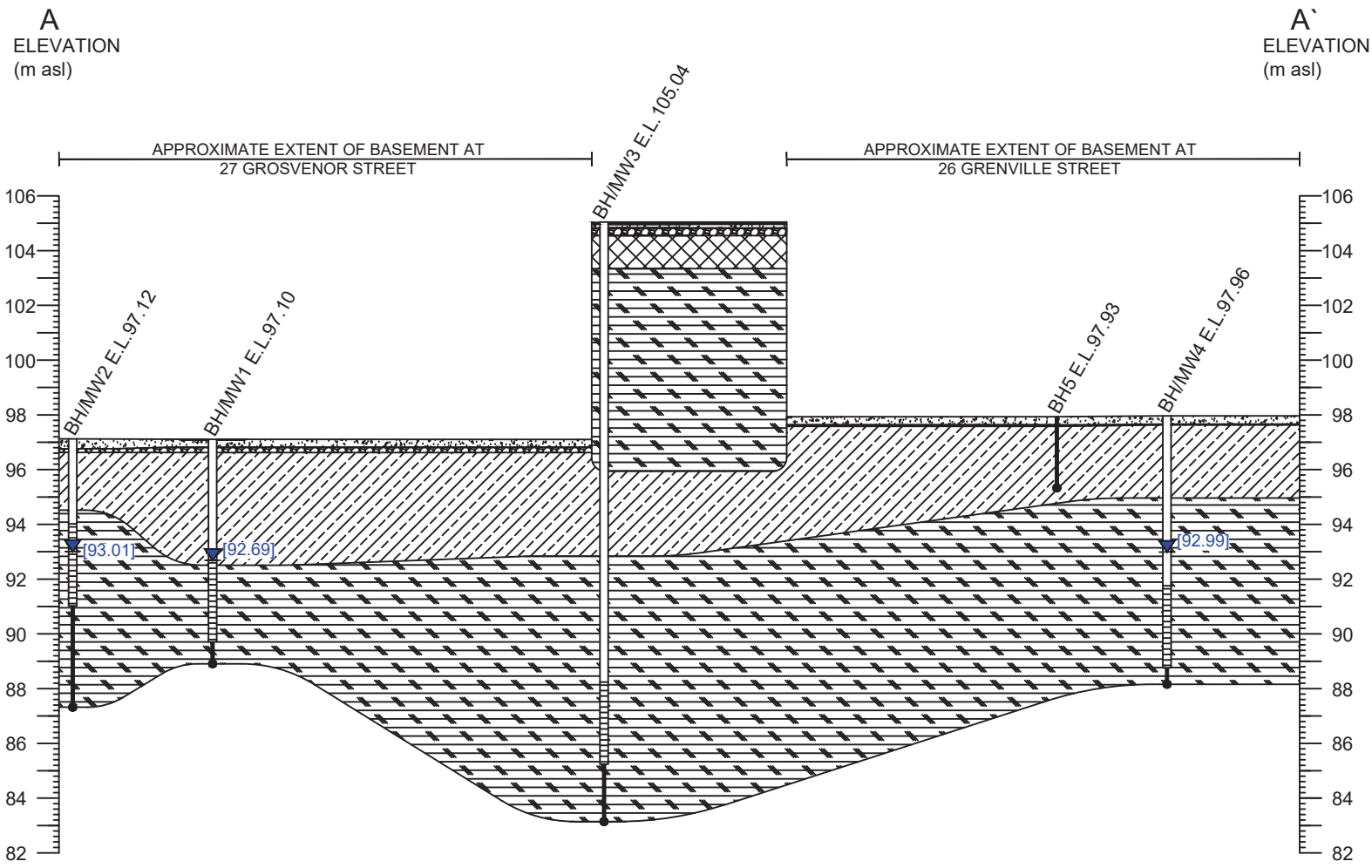
LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE BUILDING FOOTPRINT
- APPROXIMATE LOCATION OF BOREHOLE/MONITORING WELL
- APPROXIMATE LOCATION OF BOREHOLE
- A' — A GEOLOGICAL CROSS SECTION (SEE FIGURE 7)

TITLE AND LOCATION

BOREHOLE/MONITORING WELL LOCATION PLAN
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION
27 GROSVENOR STREET AND 26 GRENVILLE STREET, TORONTO, ONTARIO

PROJECT NO.	DWN.
BIGC-ENV-222A	O.A.
SCALE	CK.
AS NOTED	E.L.
DATE	FIG NO.
JANUARY 2019	6



HORIZONTAL SCALE

5m

0m 15m

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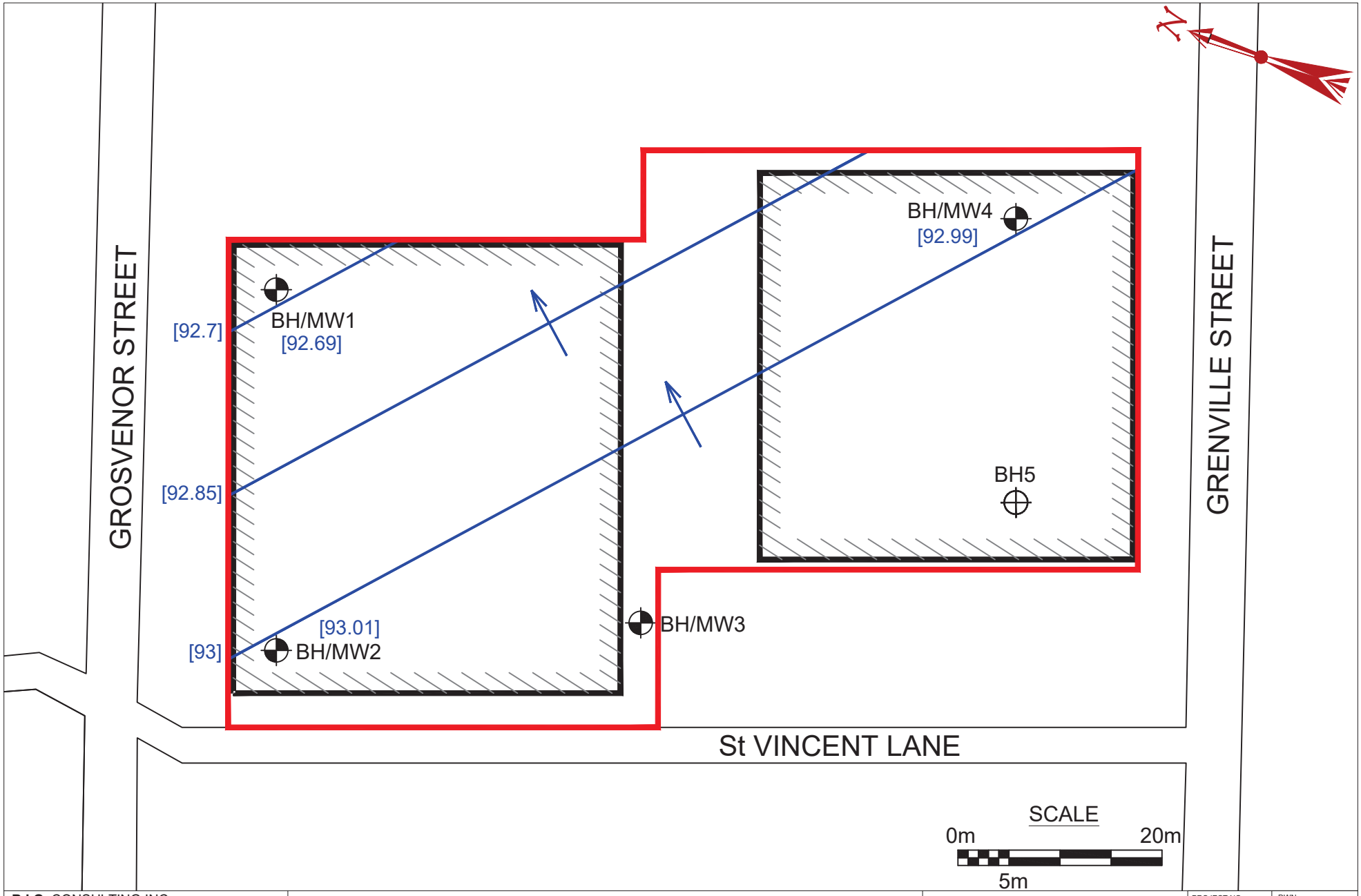
LEGEND

- ASPHALT
- CONCRETE
- GRANULAR
- FILL
- SILTY SAND
- SANDY SILT TILL / SAND AND SILT TILL
- WATER LEVEL
- [xx.xx] WATER LEVEL MEASUREMENT (JANUARY 11,2019)

TITLE AND LOCATION

GEOLOGICAL CROSS SECTION A-A'
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION
27 GROSVENOR STREET AND
26 GRENVILLE STREET,
TORONTO, ONTARIO

PROJECT NO.	DWN.
BIGC-ENV-222A	O.A.
SCALE	CK.
AS NOTED	E.L.
DATE	FIG NO.
JANUARY 2019	7



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LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE BUILDING FOOTPRINT
- APPROXIMATE LOCATION OF BOREHOLE/MONITORING WELL
- APPROXIMATE LOCATION OF BOREHOLE
- [XX.XX] WATER LEVEL MEASUREMENT (JANUARY 11,2019)
- GROUNDWATER CONTOUR
- INTERPRETED DIRECTION OF GROUNDWATER FLOW

TITLE AND LOCATION

INTERPRETED SHALLOW GROUNDWATER CONTOUR MAP
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION
27 GROSVENOR STREET AND 26 GRENVILLE STREET, TORONTO, ONTARIO

PROJECT NO.	DWN.
BIGC-ENV-222A	O.A.
SCALE	CK.
AS NOTED	E.L.
DATE	FIG NO.
JANUARY 2019	8

APPENDIX A: BOREHOLE LOGS

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RECORD OF BOREHOLE No BH/MW1

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-222A | LOCATION 27 Grosvenor Street, Toronto, ON. | ORIGINATED BY F.C.

DATUM Geodetic | BOREHOLE TYPE Continous flight hollow stem auger | COMPILED BY D.N.

PROJ. NAME Geotechnical Investigation | DATE 2018.08.15 - 2018.08.15 | 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
97.10											
97.0	**ASPHALT:** 25 mm		1	SS	0				○		
96.8	**CONCRETE:** 280 mm										
96.6	**GRANULAR:** 200 mm										
	SILTY SAND: trace gravel, brown, moist, very dense		2	SS	55				○		6 72 (22)
			3	SS	100				○		
			4	SS	100				○		
	- sand and silt at 3 m		5	SS	100				○		2 54 (44)
92.5											
4.6	**SAND AND SILT TILL:** trace gravel, grey, wet, very dense		6	SS	100				○		
			7	SS	100				○		
88.9			8	SS	100				○		
8.2	**Borehole terminated at 8.2 m** Notes: 1. Water at 6.4 m upon completion of drilling 2. Open to 6.7 m upon completion of drilling 3. Water level at 4.31 m (Elev. 92.8 m ASL) on Dec. 13, 2018 4. Water level at 4.41 m (Elev. 92.7 m ASL) on Jan. 11, 2019										

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

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RECORD OF BOREHOLE No BH/MW2

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-222A | LOCATION 27 Grosvenor Street, Toronto, ON. | ORIGINATED BY F.C.

DATUM Geodetic | BOREHOLE TYPE Continuous flight hollow stem auger | COMPILED BY D.N.

PROJ. NAME Geotechnical Investigation | DATE 2018.08.16 - 2018.08.16 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	"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
97.12											
0.0 / 96.9	**CONCRETE:** 360 mm		1	SS	0	▼			○		
0.4	**GRANULAR:** 130 mm					▼					
0.5	**SILTY SAND:** trace gravel, brown, oxidized pockets, moist, dense		2	SS	69				○		
	- clayey silt pockets, grey, very dense below 1.5 m		3	SS	100				○		
94.5			4	SS	100				○		
2.6	**SAND AND SILT TILL:** fine sand pockets, brown-grey, moist, very dense - grey below 3.1 m		5	SS	100				○		
			6	SS	100				○		
	- wet, rocks throughout below 6.1 m		7	SS	100				○		
			8	SS	100				○		
87.3			9	SS	100				○		7
9.8	**Borehole terminated at 9.8 m** Notes: 1. Water at 5.2 m upon completion of drilling 2. Open to 6.1 m upon completion of drilling 3. Water level at 3.92 m (Elev. 93.2 m ASL) on Dec. 13, 2018 4. Water level at 4.11 m (Elev. 93.0 m ASL) on Jan. 11, 2019										

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

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RECORD OF BOREHOLE No BH/MW3

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-222A | LOCATION 27 Grosvenor Street, Toronto, ON. | ORIGINATED BY F.C.

DATUM Geodetic | BOREHOLE TYPE Continuous flight hollow stem auger | COMPILED BY D.N.

PROJ. NAME Geotechnical Investigation | DATE 2018.08.20 - 2018.08.20 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" VALUES
105.04				
105.0 / 0.0	**ASPHALT:** 80 mm	1	SS	5
104.9 / 0.2	**CONCRETE:** 130 mm			
104.6 / 0.5	**GRANULAR:** 280 mm	2	SS	2
103.3 / 1.7	**FILL:** silty sand, brown, moist, loose - brick, slag inclusions, very loose at 0.8 m	3	SS	4
	SANDY SILT TILL brown, moist, compact - oxidized fissures at 2.3 m	4	SS	20
	- silt pockets from 3.1 m to 3.4 m - light brown, stiff below 3.1 m	5	SS	10
	- grey silt pockets at 4.6 m - fine grey sand seam, moist to wet at 4.9 m	6	SS	16
98.9 / 6.1	**SAND AND SILT TILL:** fine - medium and coarse sand pockets, grey, moist, dense - very moist at 6.6 m	7	SS	36
	- very dense below 7.6 m	8	SS	100
95.9 / 9.1	**SILTY SAND:** trace gravel, grey, moist to very moist, very dense	9	SS	72
	- very moist at 10.7 m	10	SS	100
92.8 / 12.2	**SANDY SILT TILL:** with silt pockets, grey, moist to very moist, very dense	11	SS	72
	- interbedded sand and silt layers and pockets at 13.7 m	12	SS	85
	- saturated below 15.2 m	13	SS	77
	- dense at 16.9 m	14	SS	43
	- wet at 18.3 m	15	SS	100
	- coarse sand inclusions below 19.8 m	16	SS	86
83.1 / 21.9	- silt interbeds below 21.3 m	17	SS	100
	Borehole terminated at 21.9 m			

Notes:
1. Water at 14.6 m upon completion of drilling
2. Open to 15.2 m upon completion of drilling
3. Water level at 15.41 m (Elev. 89.6 m ASL) on Dec. 13, 2018
4. Water level at 15.53 m (Elev. 89.5 m ASL) on Jan. 11, 2019

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × 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
			7
			9

GROUND WATER CONDITIONS

ELEVATION SCALE

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

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

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RECORD OF BOREHOLE No BH/MW4

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-222A | LOCATION 26 Grenville Street, Toronto, ON. | ORIGINATED BY F.C.

DATUM Geodetic | BOREHOLE TYPE Continuous flight hollow stem auger | COMPILED BY D.N.

PROJ. NAME Geotechnical Investigation | DATE 2018.12.10 - 2018.12.10 | 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
97.96											
97.7	**CONCRETE:** 300 mm		1	SS	67				○		
97.6	**GRANULAR:** 50 mm										
0.4	**SILTY SAND:** trace gravel, brown, moist, very dense		2	SS	100				○		2 75 (23)
	- grey at 1.5 m		3	SS	100				○		
	- silt pockets at 2.3 m		4	SS	100				○		
95.0											
3.0	**SAND AND SILT TILL:** grey, moist to very moist, very dense		5	SS	100				○		1 58 (41)
			6	SS	100	▽			○		
			7	SS	100				○		
	- wet below 7.6 m		8	SS	100				○		5 46 (50)
	- some clay, very moist at 9.1 m		9	SS	100				○		
88.2											
9.8	**Borehole terminated at 9.8 m**										

Notes:
1. Water at 5.2 m upon completion of drilling
2. Open to 6.6 m upon completion of drilling
3. Water level at 4.84 m (Elev. 93.1 m ASL) on Dec. 13, 2018
4. Water level at 4.97 m (Elev. 93.0 m ASL) on Jan. 11, 2019

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

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RECORD OF BOREHOLE No BH5

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-222A | LOCATION 26 Grenville Street, Toronto, ON. | ORIGINATED BY F.C.

DATUM Geodetic | BOREHOLE TYPE Continuous flight hollow stem auger | COMPILED BY D.N.

PROJ. NAME Geotechnical Investigation | DATE 2018.12.11 - 2018.12.11 | 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
97.93											
97.8	**CONCRETE:** 300 mm		1	SS	54				○		
97.6	**GRANULAR:** 50 mm										
0.4	**SILTY SAND:** brown, moist, very dense		2	SS	100				○		
	- grey, moistbelow 1.5 m		3	SS	100				○		
95.3			4	SS	100				○		
2.6	**Borehole terminated at 2.6 m** Notes 1. Open and dry upon completion of drilling 2. Refusal at 2.6 m										

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

APPENDIX B: MECP WATER WELL SUMMARY AND CONSTRUCTION DEWATERING RECORDS

Table B-1: MECP WWR Summary Table

Count	Well ID	Date Constructed	Total Depth (m bgs)	Reported Water Depth (m bgs)	Status of Well
1.	6928671	01/21/2005	3.8	N/A	Observation well
2.	6929168	03/21/2005	15	N/A	Observation well
3.	6929538	08/25/2005	10.5	6	Observation well
4.	6931041	10/24/2006	7.6	4.5	Observation well
5.	6931118	11/21/2006	23	12	Dewatering
6.	7042961	03/12/2007	23	N/A	Abandoned
7.	7043542	03/19/2007	N/A	N/A	Observation well
8.	7043550	03/09/2007	N/A	N/A	Observation well
9.	7043553	03/13/2007	N/A	N/A	Observation well
10.	7045476	04/19/2007	7	N/A	Observation well
11.	7050785	09/30/2007	12.2	9.1	Observation well
12.	7100820	11/27/2007	N/A	N/A	Observation well
13.	7100820	11/29/2007	9.1	N/A	Observation well
14.	7100820	11/27/2007	N/A	N/A	Observation well
15.	7111309	08/25/2008	4.6	N/A	Test hole
16.	7122591	01/01/2009	6.1	N/A	Test hole
17.	7129574	05/21/2009	N/A	N/A	Monitoring
18.	7129574	05/12/2009	N/A	N/A	Monitoring
19.	7130065	08/11/2009	N/A	N/A	Observation well
20.	7130066	08/10/2009	9.1	N/A	Observation well
21.	7130067	08/05/2009	13.4	N/A	Observation well
22.	7130068	08/05/2009	3.7	N/A	Monitoring and test hole
23.	7130070	08/11/2009	N/A	N/A	Observation well
24.	7130071	07/12/2009	4.2	N/A	Monitoring and test hole
25.	7130072	08/13/2009	3.7	N/A	Monitoring and test hole
26.	7144206	03/16/2010	6.1	N/A	Monitoring and test hole
27.	7145210	04/25/2010	14.6	12.8	N/A
28.	7145211	04/25/2010	14.3	12.8	Dewatering
29.	7145212	04/25/2010	14.6	12.8	N/A
30.	7145213	04/25/2010	14.6	12.8	N/A
31.	7145238	04/25/2010	14.3	12.8	Dewatering
32.	7145795	04/28/2010	7.5	6.85	Observation well
33.	7150698	08/04/2010	5.1	2.7	Observation well
34.	7150698	08/05/2010	N/A	N/A	Observation well
35.	7151817	08/27/2010	13.6	12	Test hole
36.	7151817	08/27/2010	N/A	N/A	Test hole
37.	7151817	08/27/2010	N/A	N/A	Test hole
38.	7153327	09/27/2010	N/A	N/A	Abandoned
39.	7153328	09/27/2010	N/A	N/A	Abandoned
40.	7155368	09/15/2010	17.5	N/A	Observation well
41.	7156067	11/29/2010	14.6	N/A	Dewatering
42.	7156456	11/15/2010	N/A	N/A	N/A
43.	7158476	11/15/2010	N/A	N/A	N/A
44.	7159354	01/25/2011	4.9	N/A	Test hole

Count	Well ID	Date Constructed	Total Depth (m bgs)	Reported Water Depth (m bgs)	Status of Well
45.	7159355	01/25/2011	5	N/A	Test hole
46.	7162002	04/06/2011	2.4	N/A	Monitoring and test hole
47.	7162003	04/06/2011	2.4	N/A	Monitoring and test hole
48.	7168503	08/09/2011	N/A	N/A	Dewatering
49.	7168504	08/07/2011	N/A	N/A	Test hole
50.	7170726	10/20/2011	7.6	N/A	Observation well
51.	7170727	10/28/2011	8.5	N/A	Monitoring and test hole
52.	7170728	10/20/2011	7.6	N/A	Monitoring and test hole
53.	7174167	01/18/2011	N/A	N/A	N/A
54.	7174347	12/16/2011	6.1	N/A	Monitoring and test hole
55.	7174348	12/16/2011	6.1	N/A	Monitoring and test hole
56.	7174349	12/16/2011	6.1	N/A	Monitoring and test hole
57.	7176929	01/06/2012	9.1	N/A	Monitoring and test hole
58.	7179832	01/19/2012	12.2	N/A	Test hole
59.	7182408	02/15/2012	17.8	N/A	Test hole
60.	7182702	03/05/2012	19	4	Observation well
61.	7182703	03/05/2012	5.8	1.2	Observation well
62.	7182868	05/25/2012	7.6	N/A	Test hole
63.	7182869	05/28/2012	8.5	N/A	Test hole
64.	7182870	05/28/2012	7	N/A	Test hole
65.	7198811	03/01/2013	N/A	N/A	N/A
66.	7202372	04/16/2013	10.6	N/A	Observation well
67.	7204225	06/03/2013	N/A	N/A	Abandoned monitoring and test hole
68.	7204226	06/03/2013	N/A	N/A	Abandoned monitoring and test hole
69.	7204227	06/03/2013	N/A	N/A	Abandoned monitoring and test hole
70.	7204228	06/03/2013	N/A	N/A	Abandoned monitoring and test hole
71.	7205383	07/06/2013	N/A	N/A	N/A
72.	7206326	06/15/2013	N/A	N/A	N/A
73.	7207714	07/11/2013	4.9	N/A	Monitoring and test hole
74.	7207715	07/11/2013	4.1	N/A	Monitoring and test hole
75.	7207716	07/11/2013	3.7	N/A	Monitoring and test hole
76.	7207972	06/26/2013	N/A	N/A	N/A
77.	7210949	09/28/2013	12.2	N/A	Monitoring and test hole
78.	7210959	09/27/2013	9.1	N/A	Monitoring and test hole
79.	7210960	09/27/2013	7.6	N/A	Monitoring and test hole
80.	7210961	09/27/2013	6.1	N/A	Monitoring and test hole
81.	7210962	09/28/2013	12.2	N/A	Monitoring and test hole
82.	7212132	10/23/2013	3	N/A	Monitoring and test hole
83.	7212133	10/23/2013	3	N/A	Monitoring and test hole
84.	7212980	10/09/2013	N/A	N/A	N/A
85.	7213818	N/A	N/A	N/A	N/A

Count	Well ID	Date Constructed	Total Depth (m bgs)	Reported Water Depth (m bgs)	Status of Well
86.	7218176	02/28/2014	7	N/A	Dewatering
87.	7218893	03/20/2014	N/A	N/A	N/A
88.	7220160	03/19/2014	19.8	N/A	Observation
89.	7224041	06/16/2014	4.6	N/A	Test hole
90.	7226042	08/19/2014	N/A	N/A	Abandoned
91.	7228938	09/15/2014	10.7	9.1	Observation well
92.	7229484	N/A	N/A	N/A	Abandoned
93.	7230249	04/30/2014	N/A	N/A	N/A
94.	7230861	10/05/2014	4	N/A	Test hole
95.	7232982	10/04/2014	5.5	N/A	Observation
96.	7232983	10/04/2014	19.8	N/A	Observation
97.	7233080	09/30/2014	15.5	N/A	Test hole
98.	7233270	09/24/2014	16.1	18.3	Observation well
99.	7234532	12/05/2014	12.2	9.1	Observation well
100.	7235328	12/04/2014	3.5	1.2	Monitoring and test hole
101.	7235329	12/05/2014	8.5	N/A	Monitoring and test hole
102.	7235330	12/05/2014	8.5	N/A	Monitoring and test hole
103.	7235331	05/14/2014	6.1	N/A	Monitoring and test hole
104.	7236533	11/22/2014	16.5	N/A	Monitoring and test hole
105.	7237792	12/19/2014	21.3	N/A	Observation well
106.	7239038	02/03/2015	19.8	N/A	Observation well
107.	7239039	02/03/2015	9.2	N/A	Observation well
108.	7239040	02/03/2015	18.3	N/A	Observation well
109.	7239041	02/03/2015	4.6	N/A	Observation well
110.	7239042	02/03/2015	9.2	N/A	Observation well
111.	7240354	04/11/2015	12.8	N/A	Monitoring and test hole
112.	7240355	04/11/2015	12.2	N/A	Monitoring and test hole
113.	7240356	04/11/2015	11.3	N/A	Monitoring and test hole
114.	7240620	03/18/2015	3	2.4	Test hole
115.	7240621	03/17/2015	6.7	2.9	Test hole
116.	7240622	03/18/2015	4.6	2.8	Test hole
117.	7240623	03/18/2015	4.6	2.8	Test hole
118.	7241571	04/24/2015	N/A	N/A	N/A
119.	7242240	05/13/2015	N/A	N/A	N/A
120.	7242272	05/01/2015	30.5	N/A	Observation well
121.	7244480	04/30/2015	13.7	N/A	Observation well
122.	7244622	06/23/2015	N/A	N/A	Abandoned
123.	7244623	06/23/2015	N/A	N/A	Abandoned
124.	7244624	06/23/2015	N/A	N/A	Abandoned
125.	7244625	06/23/2015	N/A	N/A	Abandoned
126.	7244672	05/15/2015	N/A	N/A	N/A
127.	7245848	05/19/2015	N/A	N/A	N/A
128.	7248167	07/14/2015	24.4	N/A	Observation well
129.	7248614	08/28/2015	4.6	N/A	Monitoring and test well
130.	7248615	08/27/2015	5.3	N/A	Monitoring and test well

Count	Well ID	Date Constructed	Total Depth (m bgs)	Reported Water Depth (m bgs)	Status of Well
131.	7249968	09/09/2015	18.3	N/A	Observation well
132.	7250903	10/02/2015	30.5	N/A	Observation well
133.	7251073	08/27/2015	22.9	N/A	Observation well
134.	7251887	08/15/2015	21.3	11	Test hole
135.	7253213	10/30/2015	N/A	N/A	N/A
136.	7253709	10/09/2015	18.3	N/A	Water supply
137.	7253837	11/27/2015	N/A	N/A	N/A
138.	7254016	11/20/2015	1.2	N/A	Observation well
139.	7256286	12/22/2015	N/A	N/A	N/A
140.	7256287	12/21/2015	N/A	N/A	N/A
141.	7256847	01/07/2016	N/A	N/A	N/A
142.	7259781	10/01/2015	N/A	N/A	N/A
143.	7259798	05/13/2015	30.6	16	Observation well
144.	7260000	07/31/2015	6.1	N/A	Test hole
145.	7260901	09/25/2015	N/A	5.2	Test hole
146.	7261489	02/26/2016	14.2	N/A	Observation well
147.	7261506	02/24/2016	N/A	N/A	N/A
148.	7261932	04/01/2016	6.1	N/A	Monitoring and test hole
149.	7261933	03/31/2016	2.4	N/A	Monitoring and test hole
150.	7261934	03/31/2016	2.6	N/A	Monitoring and test hole
151.	7262396	12/17/2015	12.2	N/A	Observation well
152.	7262717	04/16/2016	N/A	N/A	Test hole
153.	7262718	04/16/2016	N/A	N/A	Test hole
154.	7262719	04/16/2016	N/A	N/A	Test hole
155.	7266927	10/20/2014	N/A	N/A	N/A
156.	7267380	05/31/2016	6.7	N/A	Monitoring and test hole
157.	7267381	06/02/2016	6.1	N/A	Monitoring and test hole
158.	7267382	01/02/2016	5.8	N/A	Monitoring and test hole
159.	7267383	05/31/2016	8.5	N/A	Monitoring and test hole
160.	7267384	06/07/2016	8.5	N/A	Monitoring and test hole
161.	7268268	06/20/2016	N/A	N/A	N/A
162.	7268612	07/12/2016	19.8	N/A	N/A
163.	7270456	04/14/2016	15.2	N/A	Observation well
164.	7270708	09/29/2015	N/A	N/A	N/A
165.	7272336	N/A	N/A	N/A	N/A
166.	7274391	N/A	N/A	N/A	N/A
167.	7278285	07/13/2016	18	3.7	Test hole
168.	7281549	08/09/2016	9.1	N/A	Observation well
169.	7283395	02/03/2017	N/A	N/A	N/A
170.	7283396	02/03/2017	N/A	N/A	N/A
171.	7284944	03/07/2017	8.5	N/A	Monitoring and test hole
172.	7284945	03/02/2017	9.1	N/A	Monitoring and test hole
173.	7285674	04/20/2017	N/A	N/A	N/A
174.	7287485	04/20/2017	N/A	N/A	N/A
175.	7292234	05/19/2015	17.1	12.2	Test hole

Count	Well ID	Date Constructed	Total Depth (m bgs)	Reported Water Depth (m bgs)	Status of Well
176.	7292756	N/A	2.5	2.3	Observation well

Table B-2: MECP Permit to Take Water and EASR Water Taking Registration

Permit Number	Purpose	Address	Water Source	Maximum L/Day	Active
0881-AMGHJR	Dewatering Construction	501 Yonge Street	Surface and ground water	1,152,000	Yes
0881-AMGHJR	Dewatering	501 Yonge Street	Surface and ground water	432,000	Yes
0880-A4UKPS	Dewatering	Breadalbane Street and St. Luke Lane	Groundwater	374,000	Yes
0524-ACJQD6	Dewatering Construction	Bloor Street West and Yonge Street	Groundwater	700,000	Yes
2377-9YTLGS	Dewatering Construction	11 Wellesley Street West	Groundwater	653,000	No
8237-8MDRFT	Dewatering Construction	5 St. Joseph Street	Groundwater	435,000	No
2761-9YFT2C	Dewatering Construction	40 Wellesley Street	Groundwater	300,000	No
5382-A3BNY9	Dewatering Construction	50 Wellesley Street	Groundwater	432,000	No
8065-6R9J5Y	Dewatering Construction	146-160 Wellesley Street	Groundwater	328,000	No
8312-ACAGZU	Dewatering Construction	159 Wellesley Street East	Groundwater	915,000	No
1327-9XTSZW	Dewatering Construction	159 Wellesley Street East	Groundwater	915,000	No
3572-67HMZL	Dewatering Construction	33 Charles Street East	Groundwater	1,090,200	No
6751-8ZJPL6	Dewatering Construction	45 Charles Street East	Groundwater	480,000	No
3280-9TEL4V	Dewatering Construction	7 and 8	Groundwater	100,000	No
0344-92QQ3D	Dewatering Construction	Registered Plan 163	Groundwater	185,000	No
3521-775MP5	Dewatering Construction	590 Jarvis Street	Groundwater	1,400,000	No
2351-9ZZJSR	Dewatering Construction	592 Sherbourne Street	Groundwater	200,000	No
2848-854R4Y	Dewatering Construction	600 Jarvis Street	Groundwater	250,560	No
6614-79ZMQZ	Dewatering Construction	7-21 Balmuto Street	Groundwater	252,000	No
1528-7KWRVD	Dewatering Construction	1 Bloor Street East	Groundwater	1,296,000	No

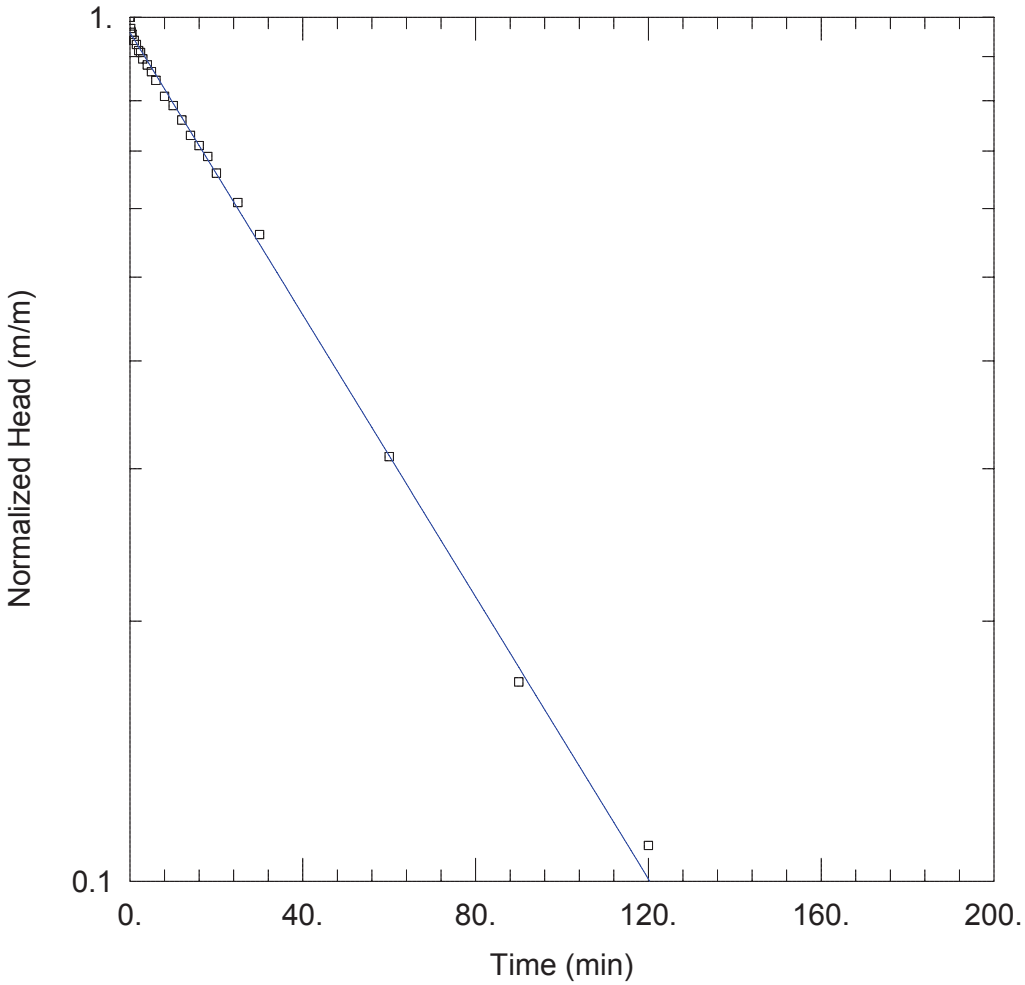
Permit Number	Purpose	Address	Water Source	Maximum L/Day	Active
4750-A35QA2	Dewatering Construction	1 Yorkville Avenue southwest corner of Yorkville Avenue and Yonge Street	Groundwater	302,400	No
00-P-3023	Dewatering	N/A	Groundwater	288,000	No
1057-A7ML7R	Dewatering Construction	94 Cumberland Street	Groundwater	100,000	No
1181-9X6LVX	Dewatering Construction	21 Avenue Road	Groundwater	1,080,000	No
8000-7J4HDS	Dewatering Construction	206 Bloor Street West	Groundwater	612,000	No
1080-8SNJ9H	Dewatering Construction	100 Devonshire Place	Groundwater	75,000	No
1080-8SNJ9H	Dewatering Construction	100 Devonshire Place	Groundwater	600,000	No
1080-8SNJ9H	Dewatering Construction	100 Devonshire Place	Groundwater	75,000	No
1080-8SNJ9H	Dewatering Construction	100 Devonshire Place	Groundwater	75,000	No
1080-8SNJ9H	Dewatering Construction	100 Devonshire Place	Groundwater	75,000	No
1080-8SNJ9H	Dewatering Construction	100 Devonshire Place	Groundwater	75,000	No
1080-8SNJ9H	Dewatering Construction	100 Devonshire Place	Groundwater	75,000	No
1080-8SNJ9H	Dewatering Construction	100 Devonshire Place	Groundwater	75,000	No
6187-94FRK9	Dewatering Construction	N/A	Groundwater	85,000	No
4614-9UXPXX	Dewatering Construction	1357 and 9 Sultan Street, 11 St. Thomas Street	Groundwater	85,000	No
8722-9D2NUH	Dewatering Construction	1000 Bay Street	Groundwater	210,000	No
1865-9U2SDK	Dewatering Construction	951 Bay Street	Groundwater	453,600	No
5773-AGCLDQ	Dewatering Construction	N/A	Groundwater	151,000	No
4441-A2TJMB	Dewatering Construction	N/A	Groundwater	151,000	No
0614-8B8PCZ	Dewatering Construction	76 Grenville Street	Groundwater	1,215,000	No
03-P-3050	Dewatering	N/A	Groundwater	288,000	No
4022-7FPQDB	Dewatering Construction	770 Bay Street	Groundwater	150,000	No
5461-868F9K	Dewatering Construction	674 and 686 Bay Street	Groundwater	316,000	No

Permit Number	Purpose	Address	Water Source	Maximum L/Day	Active
3435-8TNJAA	Dewatering Construction	Intersection of D'Arcy and McCaul Street, Gerrard Street West at Pembroke Street, River Street North at Mark Street	Groundwater	250,000	No
3435-8TNJAA	Dewatering Construction	Intersection of D'Arcy and McCaul Street, Gerrard Street West at Pembroke Street, River Street North at Mark Street	Groundwater	500,000	No
3731-9PPK62	Dewatering Construction	454 Yonge Street	Groundwater	100,000	No
02-P-3112	Dewatering	N/A	Groundwater	272,550	No
0748-9QBPRX	Dewatering Construction	365 Church Street	Groundwater	200,000	No
0815-9QBQGT	Dewatering Construction	355 Church Street	Groundwater	150,000	No
03-P-3005	Dewatering	N/A	Groundwater	288,000	No
8243-9YDQZY	Dewatering Construction	270-288 Church Street	Groundwater	80,000	No
R-009-1110071044	Construction Dewatering	480-494 Yonge Street	Groundwater	50,00 to 400,000	Yes
R-009-5654167060	Construction Dewatering	11 Wellesley Avenue	Groundwater	50,00 to 400,000	No
R-009-6676995340	Construction Dewatering	11 Wellesley Avenue	Groundwater	50,00 to 400,000	No
R-009-8110362285	Construction Dewatering	628 Church Street	Groundwater	50,000 to 400,000	Yes
R-009-2110231535	Construction Dewatering	8 Cumberland Street	Groundwater	50,000 to 400,000	Yes
R-009-2110084210	Construction Dewatering	94 Cumberland Street	Groundwater	50,000 to 400,000	Yes
R-009-6110314998	Construction Dewatering	4 Avenue Road	Groundwater	50,000 to 400,000	Yes
R-009-1110276078	Construction Dewatering	55 St. George Street	Groundwater	50,000 to 400,000	Yes
R-009-1110514914	Construction Dewatering	234 Simcoe Street	Groundwater	50,000 to 400,000	Yes
R-009-9110524229	Construction Dewatering	11 Center Avenue	Groundwater	50,000 to 400,000	Yes
R-009-7110374253	Construction Dewatering	229 Church Street	Groundwater	50,000 to 400,000	Yes
R-009-8666783951	Construction Dewatering	70 Carlton Street	Groundwater	50,000 to 400,000	Yes
R-009-7110153947	Construction Dewatering	159 Wellesley Street East	Groundwater	50,000 to 400,000	Yes

APPENDIX C: SWRT PROCUDURES AND RESULTS

SWRT PROCEDURES

At the start of each falling test, a slug of known volume was inserted in the well; and, at the start of each rising test, the slug was removed from the well. Groundwater level monitoring began immediately after water removal and continued until the water level had recovered by at least 90 %. Water levels were initially recorded at approximately 10 to 30 second intervals during the first minute of the test and measured at increasing intervals after one minute. Water levels were recorded using an electronic water level tape.



WELL TEST ANALYSIS

Data Set: C:\...\MW1.aqt
Date: 12/17/18 Time: 13:22:38

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Greenwin Holdings Inc.
Project: BIGC-ENV-222A
Location: 27 Grosvenor Street, Toronto
Test Date: December 13, 2018

AQUIFER DATA

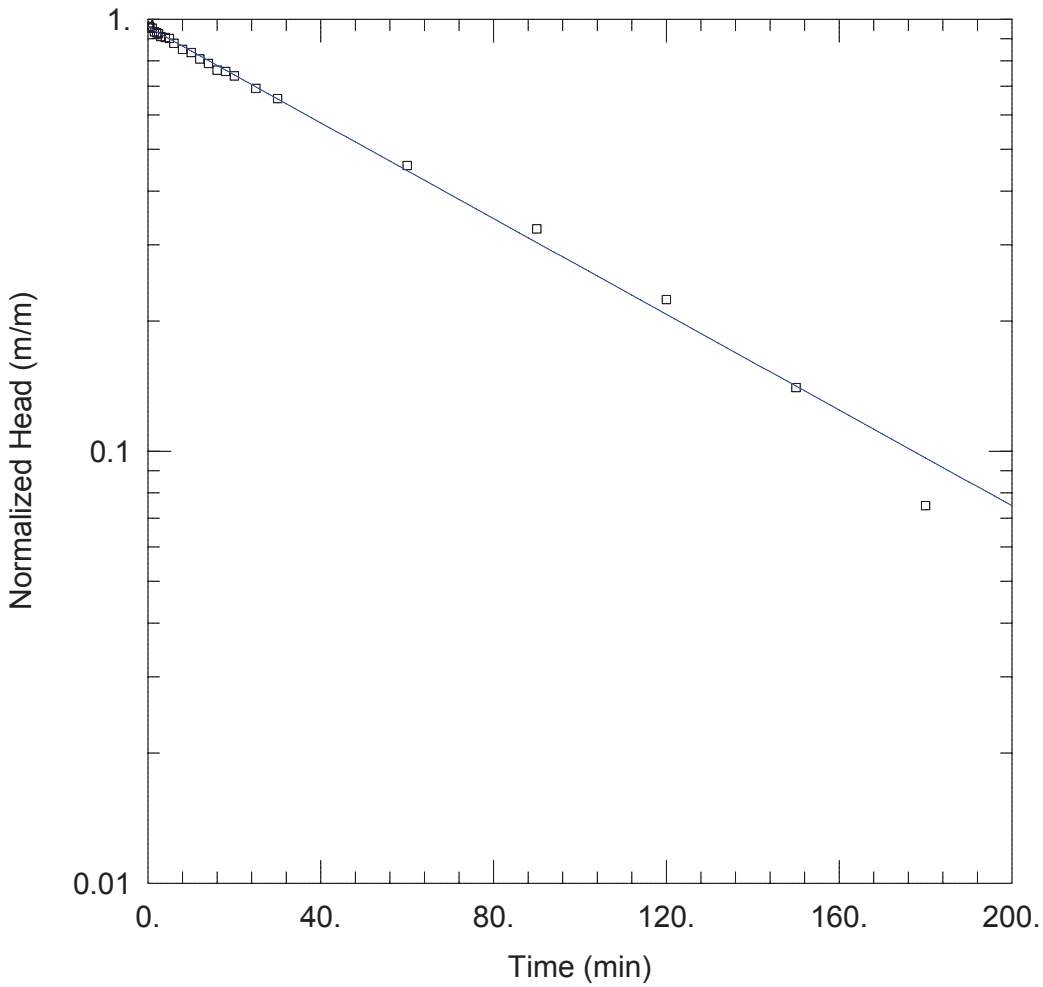
Saturated Thickness: 2.15 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW1)

Initial Displacement: 1. m
Total Well Penetration Depth: 2.15 m
Casing Radius: 0.025 m
Static Water Column Height: 2.15 m
Screen Length: 2.15 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 2.412E-7 m/sec
y0 = 0.9594 m



WELL TEST ANALYSIS

Data Set: C:\...\Mw2..aqt
Date: 12/17/18 Time: 13:23:23

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Greenwin Holdings Inc.
Project: BIGC-ENV-222A
Location: 27 Grosvenor Street, Toronto
Test Date: December 13, 2018

AQUIFER DATA

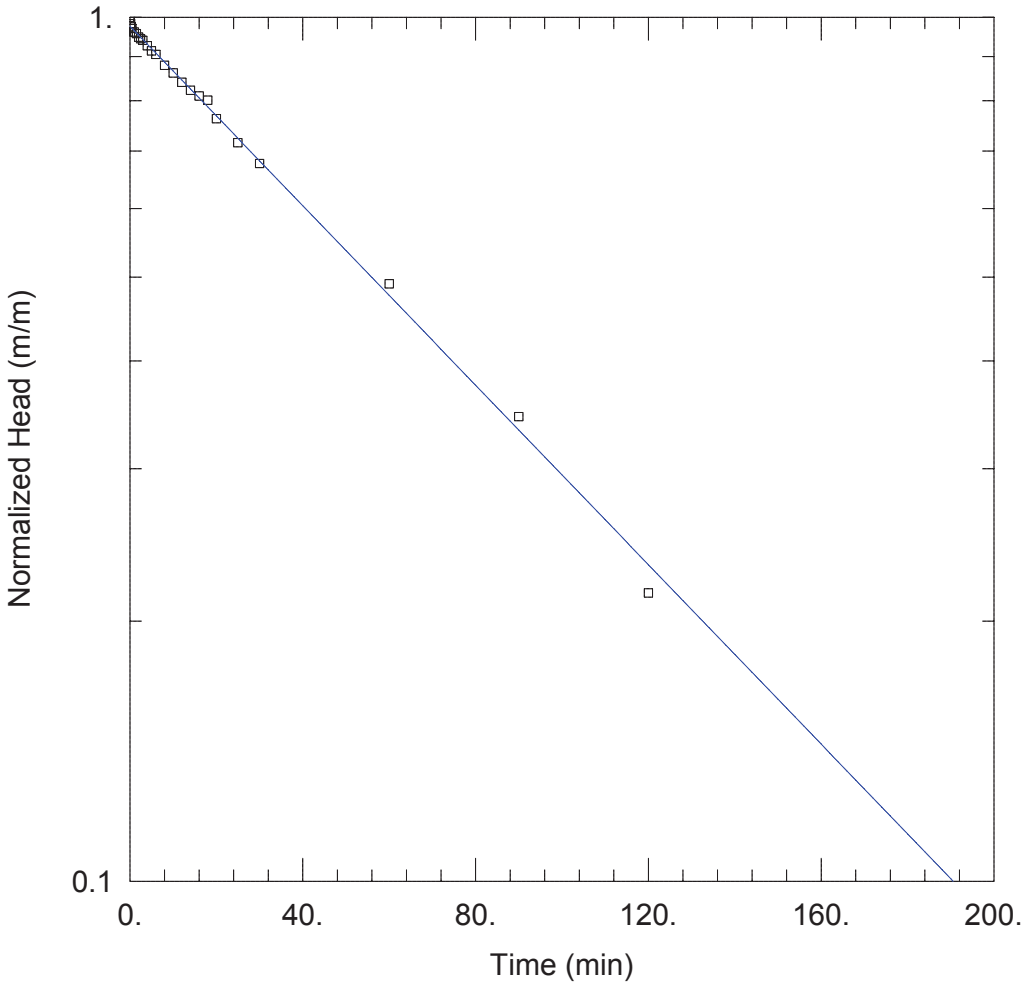
Saturated Thickness: 1.67 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW2)

Initial Displacement: 1.07 m
Total Well Penetration Depth: 1.67 m
Casing Radius: 0.025 m
Static Water Column Height: 1.67 m
Screen Length: 1.67 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 2.108E-7 m/sec
y0 = 1.025 m



WELL TEST ANALYSIS

Data Set: C:\...\MW3.aqt
Date: 12/17/18 Time: 13:24:26

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Greenwin Holdings Inc.
Project: BIGC-ENV-222A
Location: 27 Grosvenor Street, Toronto
Test Date: December 13, 2018

AQUIFER DATA

Saturated Thickness: 4.61 m Anisotropy Ratio (Kz/Kr): 1.

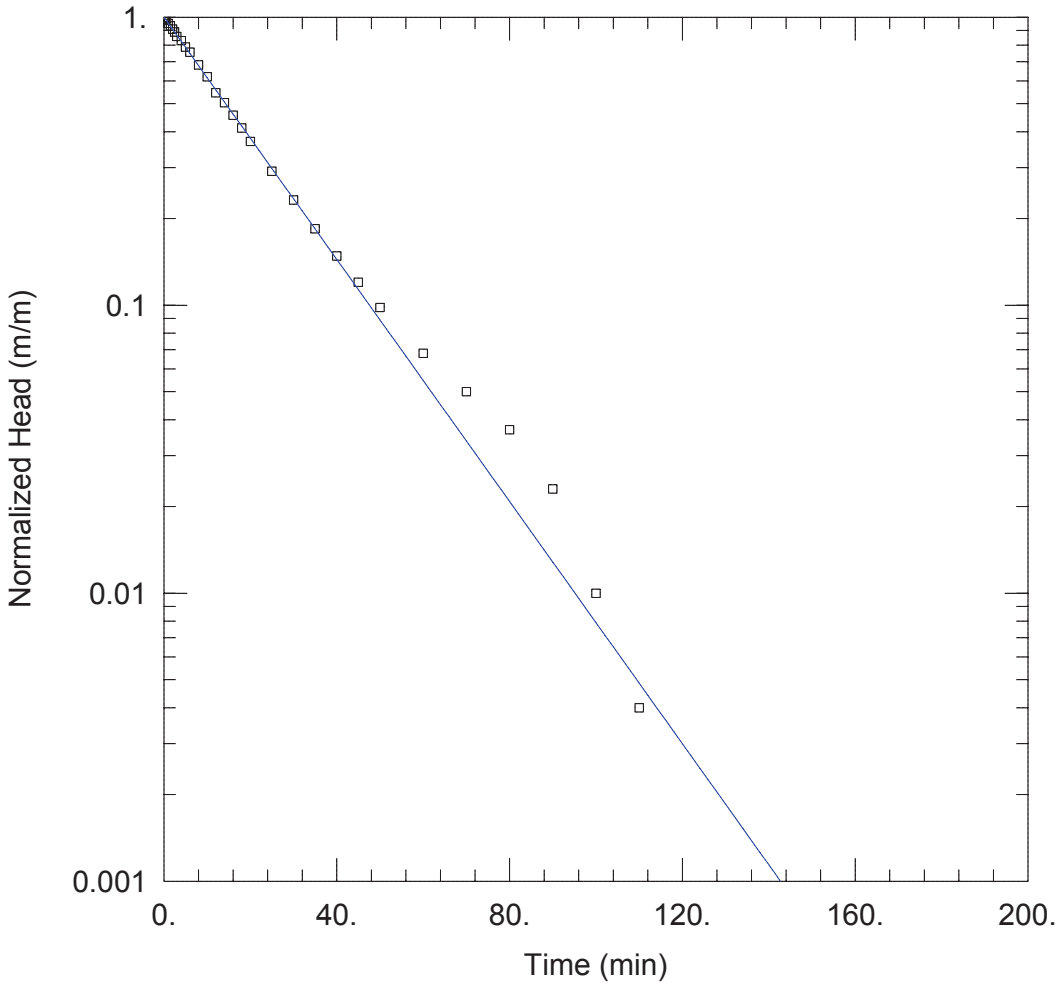
WELL DATA (MW3)

Initial Displacement: 1.16 m
Total Well Penetration Depth: 4.61 m
Casing Radius: 0.025 m
Static Water Column Height: 4.61 m
Screen Length: 3. m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 1.138E-7 m/sec y0 = 1.132 m



WELL TEST ANALYSIS

Data Set: C:\...\MW4.aqt
Date: 12/17/18 Time: 13:24:43

PROJECT INFORMATION

Company: B.I.G. Consulting Inc.
Client: Greenwin Holdings Inc.
Project: BIGC-ENV-222A
Location: 27 Grosvenor Street, Toronto
Test Date: December 13, 2018

AQUIFER DATA

Saturated Thickness: 3.64 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW4)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 3.64 m
Casing Radius: 0.025 m
Static Water Column Height: 3.64 m
Screen Length: 3. m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 4.606E-7 m/sec y0 = 2.498 m

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

Your Project #: BIGC-ENV-222D
Site Location: GROSVENOR/GRENVILLE
Your C.O.C. #: 799892-01-01

Attention: Eileen Liu

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

Report Date: 2020/11/09
Report #: R6404166
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C0S9399
Received: 2020/11/02, 14:25

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sewer Use By-Law Semivolatile Organics	1	2020/11/03	2020/11/04	CAM SOP 00301	EPA 8270 m
Biochemical Oxygen Demand (BOD)	1	2020/11/03	2020/11/08	CAM SOP-00427	SM 23 5210B m
Chromium (VI) in Water	1	N/A	2020/11/05	CAM SOP-00436	EPA 7199 m
Total Cyanide	1	2020/11/04	2020/11/04	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2020/11/03	2020/11/05	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2020/11/05	2020/11/05	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	1	N/A	2020/11/06	CAM SOP-00447	EPA 6020B m
E.coli, (CFU/100mL)	1	N/A	2020/11/02	CAM SOP-00552	MOE LSB E3371
Total Nonylphenol in Liquids by HPLC	1	2020/11/05	2020/11/06	CAM SOP-00313	In-house Method
Nonylphenol Ethoxylates in Liquids: HPLC	1	2020/11/05	2020/11/06	CAM SOP-00313	In-house Method
Animal and Vegetable Oil and Grease	1	N/A	2020/11/07	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2020/11/07	2020/11/07	CAM SOP-00326	EPA1664B m,SM5520B m
Polychlorinated Biphenyl in Water	1	2020/11/04	2020/11/05	CAM SOP-00309	EPA 8082A m
pH	1	2020/11/03	2020/11/05	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2020/11/04	CAM SOP-00444	OMOE E3179 m
Total Kjeldahl Nitrogen in Water	1	2020/11/03	2020/11/04	CAM SOP-00938	OMOE E3516 m
Mineral/Synthetic O & G (TPH Heavy Oil) (1)	1	2020/11/07	2020/11/07	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2020/11/04	2020/11/05	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2020/11/05	CAM SOP-00228	EPA 8260C m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs 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 BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and

Your Project #: BIGC-ENV-222D
Site Location: GROSVENOR/GRENVILLE
Your C.O.C. #: 799892-01-01

Attention: Eileen Liu

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

Report Date: 2020/11/09
Report #: R6404166
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CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C0S9399
Received: 2020/11/02, 14:25

use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs 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 BV Labs, 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) 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@bvlabs.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 #: C0S9399
Report Date: 2020/11/09

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222D
Site Location: GROSVENOR/GRENVILLE
Sampler Initials: SL

TORONTO SANITARY&STORM SEWER (100-2016)

BV Labs ID				OAY404		
Sampling Date				2020/11/02 11:00		
COC Number				799892-01-01		
	UNITS	San	Stm	MW1	RDL	QC Batch
Calculated Parameters						
Total Animal/Vegetable Oil and Grease	mg/L	150	-	1.0	0.50	7032586
Inorganics						
Total BOD	mg/L	300	15	12	2	7034561
Fluoride (F-)	mg/L	10	-	ND	0.10	7035722
Total Kjeldahl Nitrogen (TKN)	mg/L	100	-	2.7	0.10	7036312
pH	pH	6.0:11.5	6.0:9.5	7.46		7035730
Phenols-4AAP	mg/L	1.0	0.008	ND	0.0010	7037116
Total Suspended Solids	mg/L	350	15	**160**	10	7036520
Total Cyanide (CN)	mg/L	2	0.02	ND	0.0050	7037129
Petroleum Hydrocarbons						
Total Oil & Grease	mg/L	-	-	1.7	0.50	7044353
Total Oil & Grease Mineral/Synthetic	mg/L	15	-	0.70	0.50	7044354
Miscellaneous Parameters						
Nonylphenol Ethoxylate (Total)	mg/L	0.2	0.01	ND	0.005	7040925
Nonylphenol (Total)	mg/L	0.02	0.001	ND	0.001	7040915
Metals						
Chromium (VI)	ug/L	2000	40	ND	0.50	7033095
Mercury (Hg)	mg/L	0.01	0.0004	ND	0.00010	7039581
Total Aluminum (Al)	ug/L	50000	-	640	4.9	7040322
Total Antimony (Sb)	ug/L	5000	-	ND	0.50	7040322
Total Arsenic (As)	ug/L	1000	20	2.7	1.0	7040322
Total Cadmium (Cd)	ug/L	700	8	ND	0.090	7040322
Total Chromium (Cr)	ug/L	4000	80	ND	5.0	7040322
Total Cobalt (Co)	ug/L	5000	-	0.52	0.50	7040322
Total Copper (Cu)	ug/L	2000	40	1.9	0.90	7040322
Total Lead (Pb)	ug/L	1000	120	6.0	0.50	7040322
Total Manganese (Mn)	ug/L	5000	50	**340**	2.0	7040322
Total Molybdenum (Mo)	ug/L	5000	-	ND	0.50	7040322

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 68

ND = Not detected

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BV Labs Job #: C0S9399
Report Date: 2020/11/09

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222D
Site Location: GROSVENOR/GRENVILLE
Sampler Initials: SL

TORONTO SANITARY&STORM SEWER (100-2016)

BV Labs ID				OAY404		
Sampling Date				2020/11/02 11:00		
COC Number				799892-01-01		
	UNITS	San	Stm	MW1	RDL	QC Batch
Total Nickel (Ni)	ug/L	2000	80	1.7	1.0	7040322
Total Phosphorus (P)	ug/L	10000	400	**1100**	100	7040322
Total Selenium (Se)	ug/L	1000	20	ND	2.0	7040322
Total Silver (Ag)	ug/L	5000	120	ND	0.090	7040322
Total Tin (Sn)	ug/L	5000	-	3.0	1.0	7040322
Total Titanium (Ti)	ug/L	5000	-	26	5.0	7040322
Total Zinc (Zn)	ug/L	2000	40	20	5.0	7040322
Semivolatile Organics						
Di-N-butyl phthalate	ug/L	80	15	ND	8	7034603
Bis(2-ethylhexyl)phthalate	ug/L	12	8.8	ND	8	7034603
3,3'-Dichlorobenzidine	ug/L	2	0.8	ND	0.8	7034603
Pentachlorophenol	ug/L	5	2	ND	2	7034603
Phenanthrene	ug/L	-	-	4.4	0.8	7034603
Anthracene	ug/L	-	-	ND	0.8	7034603
Fluoranthene	ug/L	-	-	21	0.8	7034603
Pyrene	ug/L	-	-	15	0.8	7034603
Benzo(a)anthracene	ug/L	-	-	11	0.8	7034603
Chrysene	ug/L	-	-	13	0.8	7034603
Benzo(b/j)fluoranthene	ug/L	-	-	23	0.8	7034603
Benzo(k)fluoranthene	ug/L	-	-	8.4	0.8	7034603
Benzo(a)pyrene	ug/L	-	-	8.2	0.8	7034603
Indeno(1,2,3-cd)pyrene	ug/L	-	-	10	0.8	7034603
Dibenzo(a,h)anthracene	ug/L	-	-	2.3	0.8	7034603
Benzo(g,h,i)perylene	ug/L	-	-	8.8	0.8	7034603
Dibenzo(a,i)pyrene	ug/L	-	-	ND (1)	1	7034603
Benzo(e)pyrene	ug/L	-	-	11	0.8	7034603
Perylene	ug/L	-	-	3.0	0.8	7034603
Dibenzo(a,j) acridine	ug/L	-	-	ND	2	7034603

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

RDL = Reportable Detection Limit
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ND = Not detected
(1) Detection Limit was raised due to matrix interferences.

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TORONTO SANITARY&STORM SEWER (100-2016)

BV Labs ID				OAY404		
Sampling Date				2020/11/02 11:00		
COC Number				799892-01-01		
	UNITS	San	Stm	MW1	RDL	QC Batch
7H-Dibenzo(c,g) Carbazole	ug/L	-	-	ND	2	7034603
1,6-Dinitropyrene	ug/L	-	-	ND	2	7034603
1,3-Dinitropyrene	ug/L	-	-	ND	2	7034603
1,8-Dinitropyrene	ug/L	-	-	ND	2	7034603
Volatile Organics						
Benzene	ug/L	10	2	ND	0.40	7034323
Chloroform	ug/L	40	2	ND	0.40	7034323
1,2-Dichlorobenzene	ug/L	50	5.6	ND	0.80	7034323
1,4-Dichlorobenzene	ug/L	80	6.8	ND	0.80	7034323
cis-1,2-Dichloroethylene	ug/L	4000	5.6	ND	1.0	7034323
trans-1,3-Dichloropropene	ug/L	140	5.6	ND	0.80	7034323
Ethylbenzene	ug/L	160	2	ND	0.40	7034323
Methylene Chloride(Dichloromethane)	ug/L	2000	5.2	ND	4.0	7034323
1,1,2,2-Tetrachloroethane	ug/L	1400	17	ND	0.80	7034323
Tetrachloroethylene	ug/L	1000	4.4	ND	0.40	7034323
Toluene	ug/L	16	2	ND	0.40	7034323
Trichloroethylene	ug/L	400	7.6	ND	0.40	7034323
p+m-Xylene	ug/L	1400	4.4	ND	0.40	7034323
o-Xylene	ug/L	1400	4.4	ND	0.40	7034323
Total Xylenes	ug/L	1400	4.4	ND	0.40	7034323
PCBs						
Total PCB	ug/L	1	0.4	ND	0.05	7038044
Microbiological						
Escherichia coli	CFU/100mL	-	200	<10	10	7033849
Surrogate Recovery (%)						
2,4,6-Tribromophenol	%	-	-	24		7034603
2-Fluorobiphenyl	%	-	-	56		7034603
D14-Terphenyl (FS)	%	-	-	110		7034603
D5-Nitrobenzene	%	-	-	66		7034603

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 68

ND = Not detected

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BV Labs Job #: C0S9399
Report Date: 2020/11/09

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222D
Site Location: GROSVENOR/GRENVILLE
Sampler Initials: SL

TORONTO SANITARY&STORM SEWER (100-2016)

BV Labs ID				OAY404		
Sampling Date				2020/11/02 11:00		
COC Number				799892-01-01		
	UNITS	San	Stm	MW1	RDL	QC Batch
D8-Acenaphthylene	%	-	-	73		7034603
Decachlorobiphenyl	%	-	-	73		7038044
4-Bromofluorobenzene	%	-	-	96		7034323
D4-1,2-Dichloroethane	%	-	-	108		7034323
D8-Toluene	%	-	-	100		7034323

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
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BV Labs Job #: C0S9399
Report Date: 2020/11/09

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222D
Site Location: GROSVENOR/GRENVILLE
Sampler Initials: SL

GENERAL COMMENTS

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

Package 1	13.7°C

Revised report (2020/11/09): Amended parameter list.

Sample OAY404 [MW1] : ABN Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.
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 #: C0S9399
Report Date: 2020/11/09

QUALITY ASSURANCE REPORT

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222D
Site Location: GROSVENOR/GRENVILLE
Sampler Initials: SL

			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
7034323	4-Bromofluorobenzene	2020/11/04	98	70 - 130	98	70 - 130	96	%				
7034323	D4-1,2-Dichloroethane	2020/11/04	108	70 - 130	103	70 - 130	105	%				
7034323	D8-Toluene	2020/11/04	100	70 - 130	101	70 - 130	100	%				
7034603	2,4,6-Tribromophenol	2020/11/03	71	10 - 130	111	10 - 130	65	%				
7034603	2-Fluorobiphenyl	2020/11/03	69	30 - 130	84	30 - 130	82	%				
7034603	D14-Terphenyl (FS)	2020/11/03	112	30 - 130	109	30 - 130	109	%				
7034603	D5-Nitrobenzene	2020/11/03	79	30 - 130	93	30 - 130	94	%				
7034603	D8-Acenaphthylene	2020/11/03	81	30 - 130	87	30 - 130	77	%				
7038044	Decachlorobiphenyl	2020/11/05	96	60 - 130	88	60 - 130	86	%				
7033095	Chromium (VI)	2020/11/05	97	80 - 120	101	80 - 120	ND, RDL=0.50	ug/L	NC	20		
7034323	1,1,2,2-Tetrachloroethane	2020/11/04	99	70 - 130	92	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7034323	1,2-Dichlorobenzene	2020/11/04	92	70 - 130	88	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7034323	1,4-Dichlorobenzene	2020/11/04	105	70 - 130	101	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7034323	Benzene	2020/11/04	91	70 - 130	89	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7034323	Chloroform	2020/11/04	97	70 - 130	96	70 - 130	ND, RDL=0.20	ug/L	2.2	30		
7034323	cis-1,2-Dichloroethylene	2020/11/04	95	70 - 130	93	70 - 130	ND, RDL=0.50	ug/L	NC	30		
7034323	Ethylbenzene	2020/11/04	91	70 - 130	90	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7034323	Methylene Chloride(Dichloromethane)	2020/11/04	97	70 - 130	94	70 - 130	ND, RDL=2.0	ug/L	NC	30		
7034323	o-Xylene	2020/11/04	89	70 - 130	87	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7034323	p+m-Xylene	2020/11/04	93	70 - 130	92	70 - 130	ND, RDL=0.20	ug/L	7.2	30		
7034323	Tetrachloroethylene	2020/11/04	84	70 - 130	84	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7034323	Toluene	2020/11/04	90	70 - 130	89	70 - 130	ND, RDL=0.20	ug/L	2.8	30		
7034323	Total Xylenes	2020/11/04					ND, RDL=0.20	ug/L	7.2	30		
7034323	trans-1,3-Dichloropropene	2020/11/04	102	70 - 130	90	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7034323	Trichloroethylene	2020/11/04	98	70 - 130	95	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7034561	Total BOD	2020/11/08					ND,RDL=2	mg/L	NC	30	99	80 - 120
7034603	1,3-Dinitropyrene	2020/11/03	79	30 - 130	101	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7034603	1,6-Dinitropyrene	2020/11/03	65	30 - 130	98	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7034603	1,8-Dinitropyrene	2020/11/03	68	30 - 130	111	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7034603	3,3'-Dichlorobenzidine	2020/11/03	0.45 (1)	30 - 130	117	30 - 130	ND, RDL=0.8	ug/L	NC	40		
7034603	7H-Dibenzo(c,g) Carbazole	2020/11/03	50	30 - 130	93	30 - 130	ND, RDL=0.4	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
7034603	Anthracene	2020/11/03	126	30 - 130	127	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Benzo(a)anthracene	2020/11/03	105	30 - 130	102	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Benzo(a)pyrene	2020/11/03	117	30 - 130	122	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Benzo(b/j)fluoranthene	2020/11/03	93	30 - 130	97	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Benzo(e)pyrene	2020/11/03	114	30 - 130	116	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Benzo(g,h,i)perylene	2020/11/03	111	30 - 130	124	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Benzo(k)fluoranthene	2020/11/03	104	30 - 130	100	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Bis(2-ethylhexyl)phthalate	2020/11/03	107	30 - 130	100	30 - 130	ND,RDL=2	ug/L	17	40		
7034603	Chrysene	2020/11/03	99	30 - 130	98	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Dibenzo(a,h)anthracene	2020/11/03	112	30 - 130	123	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Dibenzo(a,i)pyrene	2020/11/03	67	30 - 130	115	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Dibenzo(a,j) acridine	2020/11/03	94	30 - 130	103	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7034603	Di-N-butyl phthalate	2020/11/03	107	30 - 130	102	30 - 130	ND,RDL=2	ug/L	NC	40		
7034603	Fluoranthene	2020/11/03	102	30 - 130	100	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Indeno(1,2,3-cd)pyrene	2020/11/03	115	30 - 130	125	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Pentachlorophenol	2020/11/03	89	30 - 130	40	30 - 130	ND,RDL=1	ug/L	NC	40		
7034603	Perylene	2020/11/03	90	30 - 130	96	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Phenanthrene	2020/11/03	129	30 - 130	125	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7034603	Pyrene	2020/11/03	102	30 - 130	99	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7035722	Fluoride (F-)	2020/11/05	95	80 - 120	105	80 - 120	ND, RDL=0.10	mg/L	NC	20		
7035730	pH	2020/11/05			102	98 - 103			0.67	N/A		
7036312	Total Kjeldahl Nitrogen (TKN)	2020/11/04	98	80 - 120	104	80 - 120	ND, RDL=0.10	mg/L	6.9	20	107	80 - 120
7036520	Total Suspended Solids	2020/11/05					ND, RDL=10	mg/L	2.8	25	98	85 - 115
7037116	Phenols-4AAP	2020/11/04	109	80 - 120	105	80 - 120	ND, RDL=0.0010	mg/L	NC	20		
7037129	Total Cyanide (CN)	2020/11/04	100	80 - 120	101	80 - 120	ND, RDL=0.0050	mg/L	NC	20		
7038044	Total PCB	2020/11/05	114	60 - 130	106	60 - 130	ND, RDL=0.05	ug/L	NC	40		
7039581	Mercury (Hg)	2020/11/05	98	75 - 125	95	80 - 120	ND, RDL=0.00010	mg/L	NC	20		
7040322	Total Aluminum (Al)	2020/11/06	102	80 - 120	99	80 - 120	ND, RDL=4.9	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
7040322	Total Antimony (Sb)	2020/11/06	103	80 - 120	98	80 - 120	ND, RDL=0.50	ug/L				
7040322	Total Arsenic (As)	2020/11/06	102	80 - 120	104	80 - 120	ND, RDL=1.0	ug/L				
7040322	Total Cadmium (Cd)	2020/11/06	101	80 - 120	98	80 - 120	ND, RDL=0.090	ug/L				
7040322	Total Chromium (Cr)	2020/11/06	98	80 - 120	98	80 - 120	ND, RDL=5.0	ug/L				
7040322	Total Cobalt (Co)	2020/11/06	101	80 - 120	102	80 - 120	ND, RDL=0.50	ug/L				
7040322	Total Copper (Cu)	2020/11/06	99	80 - 120	99	80 - 120	ND, RDL=0.90	ug/L	6.1	20		
7040322	Total Lead (Pb)	2020/11/06	98	80 - 120	98	80 - 120	ND, RDL=0.50	ug/L				
7040322	Total Manganese (Mn)	2020/11/06	100	80 - 120	100	80 - 120	ND, RDL=2.0	ug/L				
7040322	Total Molybdenum (Mo)	2020/11/06	99	80 - 120	96	80 - 120	ND, RDL=0.50	ug/L				
7040322	Total Nickel (Ni)	2020/11/06	99	80 - 120	100	80 - 120	ND, RDL=1.0	ug/L				
7040322	Total Phosphorus (P)	2020/11/06	99	80 - 120	107	80 - 120	ND, RDL=100	ug/L				
7040322	Total Selenium (Se)	2020/11/06	104	80 - 120	102	80 - 120	ND, RDL=2.0	ug/L				
7040322	Total Silver (Ag)	2020/11/06	97	80 - 120	94	80 - 120	ND, RDL=0.090	ug/L				
7040322	Total Tin (Sn)	2020/11/06	102	80 - 120	98	80 - 120	ND, RDL=1.0	ug/L				
7040322	Total Titanium (Ti)	2020/11/06	97	80 - 120	97	80 - 120	ND, RDL=5.0	ug/L				
7040322	Total Zinc (Zn)	2020/11/06	103	80 - 120	105	80 - 120	ND, RDL=5.0	ug/L	15	20		
7040915	Nonylphenol (Total)	2020/11/06	69	50 - 130	97	50 - 130	ND, RDL=0.001	mg/L	NC	40		
7040925	Nonylphenol Ethoxylate (Total)	2020/11/06	77	50 - 130	95	50 - 130	ND, RDL=0.005	mg/L	NC	40		
7044353	Total Oil & Grease	2020/11/07			96	85 - 115	ND, RDL=0.50	mg/L	3.6	25		

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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
7044354	Total Oil & Grease Mineral/Synthetic	2020/11/07			93	85 - 115	ND, RDL=0.50	mg/L	1.6	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.

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BV Labs Job #: C0S9399
Report Date: 2020/11/09

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222D
Site Location: GROSVENOR/GRENVILLE
Sampler Initials: SL

VALIDATION SIGNATURE PAGE

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

Brad Newman, B.Sc., C.Chem., Scientific Service Specialist

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

Sirimathie Aluthwala, Campobello Micro

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

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BV Labs Job #: C0S9399
Report Date: 2020/11/09

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222D
Site Location: GROSVENOR/GRENVILLE
Sampler Initials: SL

Exceedance Summary Table – Toronto San/Stm Sewer

Result Exceedances

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

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

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Maxxam
A Bureau Veritas Group Company

Your Project #: BIGC-ENV-222a
Site Location: Grosvenor
Your C.O.C. #: 61686

Attention: Rebecca Morrison

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

Report Date: 2018/12/21
Report #: R5536257
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8X6017
Received: 2018/12/14, 17:16

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Sewer Use By-Law Semivolatile Organics	1	2018/12/17	2018/12/18	CAM SOP 00301	EPA 8270 m
Biochemical Oxygen Demand (BOD)	1	2018/12/16	2018/12/21	CAM SOP-00427	SM 23 5210B m
Chromium (VI) in Water	1	N/A	2018/12/20	CAM SOP-00436	EPA 7199 m
Total Cyanide	1	2018/12/18	2018/12/18	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2018/12/15	2018/12/17	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2018/12/18	2018/12/18	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	1	N/A	2018/12/20	CAM SOP-00447	EPA 6020B m
E.coli, (CFU/100mL)	1	N/A	2018/12/14	CAM SOP-00552	MOE LSB E3371
Total Nonylphenol in Liquids by HPLC	1	2018/12/18	2018/12/19	CAM SOP-00313	In-house Method
Nonylphenol Ethoxylates in Liquids: HPLC	1	2018/12/18	2018/12/19	CAM SOP-00313	In-house Method
Animal and Vegetable Oil and Grease	1	N/A	2018/12/20	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2018/12/20	2018/12/20	CAM SOP-00326	EPA1664B m,SM5520A m
Polychlorinated Biphenyl in Water	1	2018/12/19	2018/12/20	CAM SOP-00309	EPA 8082A m
pH	1	N/A	2018/12/17	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2018/12/17	CAM SOP-00444	OMOE E3179 m
Total Kjeldahl Nitrogen in Water	1	2018/12/18	2018/12/19	CAM SOP-00938	OMOE E3516 m
Mineral/Synthetic O & G (TPH Heavy Oil) (1)	1	2018/12/20	2018/12/20	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2018/12/15	2018/12/17	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2018/12/18	CAM SOP-00226	EPA 8260C m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

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

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise

Your Project #: BIGC-ENV-222a
Site Location: Grosvenor
Your C.O.C. #: 61686

Attention: Rebecca Morrison

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

Report Date: 2018/12/21
Report #: R5536257
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8X6017
Received: 2018/12/14, 17:16

agreed in writing. Maxxam 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 Maxxam, 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) 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.
Tanya Fidlin, Project Manager
Email: tfidlin@maxxam.ca
Phone# (905)817-5700

==========

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Maxxam Job #: B8X6017
Report Date: 2018/12/21

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222a
Site Location: Grosvenor
Sampler Initials: FC

TORONTO SANITARY & STORM SEWER PACKAGE (WATER)

Maxxam ID				IOH164			IOH164		
Sampling Date				2018/12/14 09:00			2018/12/14 09:00		
COC Number				61686			61686		
	UNITS	San	Stm	MW1	RDL	QC Batch	MW1 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Total Animal/Vegetable Oil and Grease	mg/L	150	-	ND	0.50	5888894			
Inorganics									
Total BOD	mg/L	300	15	**20**	2	5891288	**21**	2	5891288
Fluoride (F-)	mg/L	10	-	ND	0.10	5891110			
Total Kjeldahl Nitrogen (TKN)	mg/L	100	-	2.0	0.10	5894234			
pH	pH	6.0:11.5	6.0:9.5	7.40		5891112			
Phenols-4AAP	mg/L	1.0	0.008	ND	0.0010	5891889			
Total Suspended Solids	mg/L	350	15	**18**	10	5891051			
Total Cyanide (CN)	mg/L	2	0.02	ND	0.0050	5893995			
Petroleum Hydrocarbons									
Total Oil & Grease	mg/L	-	-	ND	0.50	5898725			
Total Oil & Grease Mineral/Synthetic	mg/L	15	-	ND	0.50	5898729			
Miscellaneous Parameters									
Nonylphenol Ethoxylate (Total)	mg/L	0.2	0.01	ND	0.005	5894919			
Nonylphenol (Total)	mg/L	0.02	0.001	ND	0.001	5894918			
Metals									
Chromium (VI)	ug/L	2000	40	ND	0.50	5896767			
Mercury (Hg)	mg/L	0.01	0.0004	ND	0.0001	5894474			
Total Aluminum (Al)	ug/L	50000	-	8400	5.0	5898924			
Total Antimony (Sb)	ug/L	5000	-	ND	0.50	5898924			
Total Arsenic (As)	ug/L	1000	20	2.3	1.0	5898924			
Total Cadmium (Cd)	ug/L	700	8	ND	0.10	5898924			
Total Chromium (Cr)	ug/L	4000	80	17	5.0	5898924			
Total Cobalt (Co)	ug/L	5000	-	6.6	0.50	5898924			
Total Copper (Cu)	ug/L	2000	40	14	1.0	5898924			
Total Lead (Pb)	ug/L	1000	120	9.4	0.50	5898924			
Total Manganese (Mn)	ug/L	5000	50	**640**	2.0	5898924			
Total Molybdenum (Mo)	ug/L	5000	-	ND	0.50	5898924			

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
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681
ND = Not detected

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Maxxam Job #: B8X6017
Report Date: 2018/12/21

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222a
Site Location: Grosvenor
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TORONTO SANITARY & STORM SEWER PACKAGE (WATER)

Maxxam ID				IOH164			IOH164		
Sampling Date				2018/12/14 09:00			2018/12/14 09:00		
COC Number				61686			61686		
	UNITS	San	Stm	MW1	RDL	QC Batch	MW1 Lab-Dup	RDL	QC Batch
Total Nickel (Ni)	ug/L	2000	80	14	1.0	5898924			
Total Phosphorus (P)	ug/L	10000	400	**440**	100	5898924			
Total Selenium (Se)	ug/L	1000	20	ND	2.0	5898924			
Total Silver (Ag)	ug/L	5000	120	ND	0.10	5898924			
Total Tin (Sn)	ug/L	5000	-	ND	1.0	5898924			
Total Titanium (Ti)	ug/L	5000	-	440	5.0	5898924			
Total Zinc (Zn)	ug/L	2000	40	**45**	5.0	5898924			
Semivolatile Organics									
Di-N-butyl phthalate	ug/L	80	15	ND	2	5892853			
Bis(2-ethylhexyl)phthalate	ug/L	12	8.8	ND	2	5892853			
3,3'-Dichlorobenzidine	ug/L	2	0.8	ND	0.8	5892853			
Pentachlorophenol	ug/L	5	2	ND	1	5892853			
Phenanthrene	ug/L	-	-	ND	0.2	5892853			
Anthracene	ug/L	-	-	ND	0.2	5892853			
Fluoranthene	ug/L	-	-	0.6	0.2	5892853			
Pyrene	ug/L	-	-	0.5	0.2	5892853			
Benzo(a)anthracene	ug/L	-	-	0.2	0.2	5892853			
Chrysene	ug/L	-	-	0.4	0.2	5892853			
Benzo(b/j)fluoranthene	ug/L	-	-	0.4	0.2	5892853			
Benzo(k)fluoranthene	ug/L	-	-	ND	0.2	5892853			
Benzo(a)pyrene	ug/L	-	-	ND	0.2	5892853			
Indeno(1,2,3-cd)pyrene	ug/L	-	-	0.2	0.2	5892853			
Dibenz(a,h)anthracene	ug/L	-	-	ND	0.2	5892853			
Benzo(g,h,i)perylene	ug/L	-	-	ND	0.2	5892853			
Dibenzo(a,i)pyrene	ug/L	-	-	ND	0.2	5892853			
Benzo(e)pyrene	ug/L	-	-	0.2	0.2	5892853			
Perylene	ug/L	-	-	ND	0.2	5892853			
Dibenzo(a,j) acridine	ug/L	-	-	ND	0.4	5892853			
7H-Dibenzo(c,g) Carbazole	ug/L	-	-	ND	0.4	5892853			

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Maxxam Job #: B8X6017
Report Date: 2018/12/21

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222a
Site Location: Grosvenor
Sampler Initials: FC

TORONTO SANITARY & STORM SEWER PACKAGE (WATER)

Maxxam ID				IOH164			IOH164		
Sampling Date				2018/12/14 09:00			2018/12/14 09:00		
COC Number				61686			61686		
	UNITS	San	Stm	MW1	RDL	QC Batch	MW1 Lab-Dup	RDL	QC Batch
1,6-Dinitropyrene	ug/L	-	-	ND	0.4	5892853			
1,3-Dinitropyrene	ug/L	-	-	ND	0.4	5892853			
1,8-Dinitropyrene	ug/L	-	-	ND	0.4	5892853			
Volatile Organics									
Benzene	ug/L	10	2	ND	1.0	5891885			
Chloroform	ug/L	40	2	ND	1.0	5891885			
1,2-Dichlorobenzene	ug/L	50	5.6	ND	2.0	5891885			
1,4-Dichlorobenzene	ug/L	80	6.8	ND	2.0	5891885			
cis-1,2-Dichloroethylene	ug/L	4000	5.6	ND	1.0	5891885			
trans-1,3-Dichloropropene	ug/L	140	5.6	ND	2.0	5891885			
Ethylbenzene	ug/L	160	2	ND	1.0	5891885			
Methylene Chloride(Dichloromethane)	ug/L	2000	5.2	ND	5.0	5891885			
1,1,2,2-Tetrachloroethane	ug/L	1400	17	ND	2.0	5891885			
Tetrachloroethylene	ug/L	1000	4.4	ND	1.0	5891885			
Toluene	ug/L	16	2	ND	2.0	5891885			
Trichloroethylene	ug/L	400	7.6	ND	1.0	5891885			
p+m-Xylene	ug/L	1400	4.4	ND	1.0	5891885			
o-Xylene	ug/L	1400	4.4	ND	1.0	5891885			
Total Xylenes	ug/L	1400	4.4	ND	1.0	5891885			
PCBs									
Total PCB	ug/L	1	0.4	ND	0.05	5896529			
Microbiological									
Escherichia coli	CFU/100mL	-	200	<10	10	5890338			
Surrogate Recovery (%)									
2,4,6-Tribromophenol	%	-	-	83		5892853			
2-Fluorobiphenyl	%	-	-	46		5892853			
D14-Terphenyl (FS)	%	-	-	88		5892853			
D5-Nitrobenzene	%	-	-	77		5892853			
D8-Acenaphthylene	%	-	-	66		5892853			

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

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Maxxam Job #: B8X6017
Report Date: 2018/12/21

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222a
Site Location: Grosvenor
Sampler Initials: FC

TORONTO SANITARY & STORM SEWER PACKAGE (WATER)

Maxxam ID				IOH164			IOH164		
Sampling Date				2018/12/14 09:00			2018/12/14 09:00		
COC Number				61686			61686		
	UNITS	San	Stm	MW1	RDL	QC Batch	MW1 Lab-Dup	RDL	QC Batch
Decachlorobiphenyl	%	-	-	87		5896529			
4-Bromofluorobenzene	%	-	-	98		5891885			
D4-1,2-Dichloroethane	%	-	-	103		5891885			
D8-Toluene	%	-	-	97		5891885			

No Fill	No Exceedance
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Lab-Dup = Laboratory Initiated Duplicate
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B8X6017
Report Date: 2018/12/21

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222a
Site Location: Grosvenor
Sampler Initials: FC

GENERAL COMMENTS

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

Package 1	12.3°C
Package 2	10.3°C

Sample IOH164 [MW1] : 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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Maxxam Job #: B8X6017
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QUALITY ASSURANCE REPORT

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222a
Site Location: Grosvenor
Sampler Initials: FC

			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
5891885	4-Bromofluorobenzene	2018/12/18	100	70 - 130	101	70 - 130	97	%				
5891885	D4-1,2-Dichloroethane	2018/12/18	100	70 - 130	100	70 - 130	100	%				
5891885	D8-Toluene	2018/12/18	101	70 - 130	99	70 - 130	98	%				
5892853	2,4,6-Tribromophenol	2018/12/18	88	10 - 130	98	10 - 130	75	%				
5892853	2-Fluorobiphenyl	2018/12/18	41	30 - 130	56	30 - 130	49	%				
5892853	D14-Terphenyl (FS)	2018/12/18	84	30 - 130	87	30 - 130	87	%				
5892853	D5-Nitrobenzene	2018/12/18	64	30 - 130	82	30 - 130	68	%				
5892853	D8-Acenaphthylene	2018/12/18	54	30 - 130	66	30 - 130	55	%				
5896529	Decachlorobiphenyl	2018/12/20	88	60 - 130	76	60 - 130	84	%				
5891051	Total Suspended Solids	2018/12/17					ND, RDL=10	mg/L	NC	25	100	N/A
5891110	Fluoride (F-)	2018/12/17	105	80 - 120	99	80 - 120	ND, RDL=0.10	mg/L	5.2	20		
5891112	pH	2018/12/17			102	98 - 103			0.45	N/A		
5891288	Total BOD	2018/12/21					ND,RDL=2	mg/L	4.9	30	91	80 - 120
5891885	1,1,2,2-Tetrachloroethane	2018/12/18	93	70 - 130	95	70 - 130	ND, RDL=0.20	ug/L	NC	30		
5891885	1,2-Dichlorobenzene	2018/12/18	94	70 - 130	96	70 - 130	ND, RDL=0.20	ug/L	NC	30		
5891885	1,4-Dichlorobenzene	2018/12/18	99	70 - 130	98	70 - 130	ND, RDL=0.20	ug/L	NC	30		
5891885	Benzene	2018/12/18	99	70 - 130	98	70 - 130	ND, RDL=0.10	ug/L	2.1	30		
5891885	Chloroform	2018/12/18	98	70 - 130	98	70 - 130	ND, RDL=0.10	ug/L	NC	30		
5891885	cis-1,2-Dichloroethylene	2018/12/18	101	70 - 130	101	70 - 130	ND, RDL=0.10	ug/L	0.44	30		
5891885	Ethylbenzene	2018/12/18	102	70 - 130	99	70 - 130	ND, RDL=0.10	ug/L	NC	30		
5891885	Methylene Chloride(Dichloromethane)	2018/12/18	94	70 - 130	95	70 - 130	ND, RDL=0.50	ug/L	NC	30		
5891885	o-Xylene	2018/12/18	102	70 - 130	101	70 - 130	ND, RDL=0.10	ug/L	NC	30		
5891885	p+m-Xylene	2018/12/18	103	70 - 130	100	70 - 130	ND, RDL=0.10	ug/L	NC	30		
5891885	Tetrachloroethylene	2018/12/18	99	70 - 130	97	70 - 130	ND, RDL=0.10	ug/L	NC	30		
5891885	Toluene	2018/12/18	99	70 - 130	97	70 - 130	ND, RDL=0.20	ug/L	NC	30		
5891885	Total Xylenes	2018/12/18					ND, RDL=0.10	ug/L	NC	30		
5891885	trans-1,3-Dichloropropene	2018/12/18	100	70 - 130	100	70 - 130	ND, RDL=0.20	ug/L	NC	30		
5891885	Trichloroethylene	2018/12/18	100	70 - 130	100	70 - 130	ND, RDL=0.10	ug/L	1.8	30		
5891889	Phenols-4AAP	2018/12/17	97	80 - 120	95	80 - 120	ND, RDL=0.0010	mg/L	NC	20		
5892853	1,3-Dinitropyrene	2018/12/18	75	30 - 130	83	30 - 130	ND, RDL=0.4	ug/L	NC	40		
5892853	1,6-Dinitropyrene	2018/12/18	82	30 - 130	88	30 - 130	ND, RDL=0.4	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
5892853	1,8-Dinitropyrene	2018/12/18	75	30 - 130	82	30 - 130	ND, RDL=0.4	ug/L	NC	40		
5892853	3,3'-Dichlorobenzidine	2018/12/18	46	30 - 130	68	30 - 130	ND, RDL=0.8	ug/L	NC	40		
5892853	7H-Dibenzo(c,g) Carbazole	2018/12/18	64	30 - 130	74	30 - 130	ND, RDL=0.4	ug/L	NC	40		
5892853	Anthracene	2018/12/18	78	30 - 130	86	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Benzo(a)anthracene	2018/12/18	78	30 - 130	79	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Benzo(a)pyrene	2018/12/18	89	30 - 130	88	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Benzo(b/j)fluoranthene	2018/12/18	90	30 - 130	88	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Benzo(e)pyrene	2018/12/18	95	30 - 130	93	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Benzo(g,h,i)perylene	2018/12/18	86	30 - 130	92	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Benzo(k)fluoranthene	2018/12/18	90	30 - 130	90	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Bis(2-ethylhexyl)phthalate	2018/12/18	98	30 - 130	96	30 - 130	ND,RDL=2	ug/L	16	40		
5892853	Chrysene	2018/12/18	103	30 - 130	102	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Dibenz(a,h)anthracene	2018/12/18	92	30 - 130	98	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Dibenzo(a,i)pyrene	2018/12/18	79	30 - 130	86	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Dibenzo(a,j) acridine	2018/12/18	79	30 - 130	88	30 - 130	ND, RDL=0.4	ug/L	NC	40		
5892853	Di-N-butyl phthalate	2018/12/18	106	30 - 130	106	30 - 130	ND,RDL=2	ug/L	NC	40		
5892853	Fluoranthene	2018/12/18	90	30 - 130	90	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Indeno(1,2,3-cd)pyrene	2018/12/18	89	30 - 130	96	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Pentachlorophenol	2018/12/18	70	30 - 130	70	30 - 130	ND,RDL=1	ug/L	NC	40		
5892853	Perylene	2018/12/18	101	30 - 130	108	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Phenanthrene	2018/12/18	80	30 - 130	88	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5892853	Pyrene	2018/12/18	90	30 - 130	91	30 - 130	ND, RDL=0.2	ug/L	NC	40		
5893995	Total Cyanide (CN)	2018/12/18	103	80 - 120	105	80 - 120	ND, RDL=0.0050	mg/L	NC (1)	20		
5894234	Total Kjeldahl Nitrogen (TKN)	2018/12/19	108	80 - 120	98	80 - 120	ND, RDL=0.10	mg/L	NC	20	98	80 - 120
5894474	Mercury (Hg)	2018/12/18	104	75 - 125	97	80 - 120	ND, RDL=0.0001	mg/L	NC	20		
5894918	Nonylphenol (Total)	2018/12/19	123	50 - 130	107	50 - 130	ND, RDL=0.001	mg/L	NC	40		
5894919	Nonylphenol Ethoxylate (Total)	2018/12/19	86	50 - 130	89	50 - 130	ND, RDL=0.005	mg/L	NC	40		
5896529	Total PCB	2018/12/20	104	60 - 130	80	60 - 130	ND, RDL=0.05	ug/L	NC	40		
5896767	Chromium (VI)	2018/12/20	104	80 - 120	105	80 - 120	ND, RDL=0.50	ug/L	NC	20		

Maxxam Job #: B8X6017
Report Date: 2018/12/21

QUALITY ASSURANCE REPORT(CONT'D)

B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222a
Site Location: Grosvenor
Sampler Initials: FC

			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
5898725	Total Oil & Grease	2018/12/20			101	85 - 115	ND, RDL=0.50	mg/L	4.6	25		
5898729	Total Oil & Grease Mineral/Synthetic	2018/12/20			95	85 - 115	ND, RDL=0.50	mg/L	3.2	25		
5898924	Total Aluminum (Al)	2018/12/20	93	80 - 120	94	80 - 120	ND, RDL=5.0	ug/L				
5898924	Total Antimony (Sb)	2018/12/20	103	80 - 120	105	80 - 120	ND, RDL=0.50	ug/L				
5898924	Total Arsenic (As)	2018/12/20	99	80 - 120	99	80 - 120	ND, RDL=1.0	ug/L	NC	20		
5898924	Total Cadmium (Cd)	2018/12/20	99	80 - 120	101	80 - 120	ND, RDL=0.10	ug/L				
5898924	Total Chromium (Cr)	2018/12/20	92	80 - 120	93	80 - 120	ND, RDL=5.0	ug/L	NC	20		
5898924	Total Cobalt (Co)	2018/12/20	93	80 - 120	94	80 - 120	ND, RDL=0.50	ug/L				
5898924	Total Copper (Cu)	2018/12/20	94	80 - 120	98	80 - 120	ND, RDL=1.0	ug/L	0.72	20		
5898924	Total Lead (Pb)	2018/12/20	91	80 - 120	93	80 - 120	ND, RDL=0.50	ug/L				
5898924	Total Manganese (Mn)	2018/12/20	93	80 - 120	93	80 - 120	ND, RDL=2.0	ug/L				
5898924	Total Molybdenum (Mo)	2018/12/20	99	80 - 120	101	80 - 120	ND, RDL=0.50	ug/L				
5898924	Total Nickel (Ni)	2018/12/20	92	80 - 120	93	80 - 120	ND, RDL=1.0	ug/L				
5898924	Total Phosphorus (P)	2018/12/20	105	80 - 120	104	80 - 120	ND, RDL=100	ug/L				
5898924	Total Selenium (Se)	2018/12/20	104	80 - 120	104	80 - 120	ND, RDL=2.0	ug/L				
5898924	Total Silver (Ag)	2018/12/20	94	80 - 120	97	80 - 120	ND, RDL=0.10	ug/L				
5898924	Total Tin (Sn)	2018/12/20	98	80 - 120	100	80 - 120	ND, RDL=1.0	ug/L				
5898924	Total Titanium (Ti)	2018/12/20	95	80 - 120	90	80 - 120	ND, RDL=5.0	ug/L				
5898924	Total Zinc (Zn)	2018/12/20	97	80 - 120	102	80 - 120	ND, RDL=5.0	ug/L				

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) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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Maxxam Job #: B8X6017
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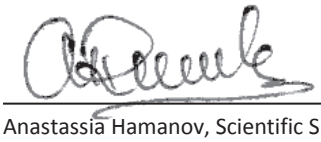
B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222a
Site Location: Grosvenor
Sampler Initials: FC

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

Jigarkumar Shah, Microbiology Analyst

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B8X6017
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B.I.G Consulting Inc.
Client Project #: BIGC-ENV-222a
Site Location: Grosvenor
Sampler Initials: FC

Exceedence Summary Table – Toronto San/Stm Sewer

Result Exceedences

Sample ID	Maxxam ID	Parameter	Criteria	Result	DL	Units
No Exceedences						

The exceedence 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.bvlabs.com

02-Nov-20 14:25
Christine Gripton
C0S9399

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		
Company Name:	#31796 B.I.G Consulting Inc.	Company Name:	Same as Invoice	Quotation #:	B64476	Bottle Order #: 799892
Attention:	Eileen Liu	Attention:		P.O. #:		
Address:	12-5500 Tomken Road Mississauga ON L4W 2Z4	Address:		Project:	BIGC-ENV-222D	
Tel:	(416) 214-4880 Fax:	Tel:	Fax:	Project Name:	Grosvenor/Grenville	COC #: C#799892-01-01
Email:	eliu@brownfieldigi.com	Email:		Site #:		Project Manager: Christine Gripton
				Sampled By:	SL	

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 Toronto ☐ 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	Toronto Sanitary&Storm Sewer (100-2016)									# of Bottles	Comments
1		MW1	20/11/02	1100	GW	N	✓									19	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Shirley Li	20/11/02	14:20		20/11/02	1425	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Rec'd	Custody Seal	Yes	No
	13/14/14	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

Bureau Veritas Canada (2019) Inc.

eCOC: T61686

Project Information: B8X6017
Job Received: 2018/12/14 17:16
Results Required By: 2018/12/21 18:00 18:00

Invoice Information

Attn: Accounts Payable
B.I.G Consulting Inc.
12-5500 Tomken Road
Mississauga, ON
L4W 2Z4 , CANADA
Email to:
ldougherty@brownfieldigi.com

Report Information

Attn: Rebecca Morrison
B.I.G Consulting Inc.
12-5500 Tomken Road
Mississauga, ON
L4W 2Z4 , CANADA
Email to:
rmorrison@brownfieldigi.com
dstrajin@brownfieldigi.com

Project Information

Quote #: B64476
PO/AFE#:
Project #: BIGC-ENV-222a
Site Location: Grosvenor
Sampled By: fc

Analytical Summary

A: Due On 2018/12/21 18:00

Client Sample ID	Sampling Date/Time	Matrix	Toronto Sanitary & Storm Sewer Package
MW1	2018/12/14 09:00	WATER	A

Criteria : Toronto San/Stm Sewer

Submission Information

# of Samples: 1

Parameter Summary

Package/Test	Parameter	RDL *	Unit	Samples
Toronto Sanitary & Storm Sewer Package	Total Animal/Vegetable Oil and Grease	0.5	mg/L	All
	Total BOD	2	mg/L	All
	Chromium (VI)	0.5	ug/L	All
	Escherichia coli	10	CFU/100mL	All
	Fluoride (F-)	0.1	mg/L	All
	Mercury (Hg)	0.0001	mg/L	All
	Total Oil & Grease Mineral/Synthetic	0.5	mg/L	All
	Nonylphenol Ethoxylate (Total)	0.005	mg/L	All
	pH	N/A	pH	All
	Phenols-4AAP	0.001	mg/L	All
	Total PCB	0.05	ug/L	All
	Di-N-butyl phthalate	2	ug/L	All
	Bis(2-ethylhexyl)phthalate	2	ug/L	All
	3,3'-Dichlorobenzidine	0.8	ug/L	All
	Pentachlorophenol	1	ug/L	All
	Phenanthrene	0.2	ug/L	All
	Anthracene	0.2	ug/L	All
	Fluoranthene	0.2	ug/L	All
	Pyrene	0.2	ug/L	All
	Benzo(a)anthracene	0.2	ug/L	All
	Chrysene	0.2	ug/L	All
	Benzo(b/j)fluoranthene	0.2	ug/L	All
	Benzo(k)fluoranthene	0.2	ug/L	All
	Benzo(a)pyrene	0.2	ug/L	All
	Indeno(1,2,3-cd)pyrene	0.2	ug/L	All
	Dibenz(a,h)anthracene	0.2	ug/L	All
	Benzo(g,h,i)perylene	0.2	ug/L	All
	Dibenzo(a,i)pyrene	0.2	ug/L	All
	Benzo(e)pyrene	0.2	ug/L	All
	Perylene	0.2	ug/L	All
	Dibenzo(a,j) acridine	0.4	ug/L	All
	7H-Dibenzo(c,g) Carbazole	0.4	ug/L	All
	1,6-Dinitropyrene	0.4	ug/L	All
	1,3-Dinitropyrene	0.4	ug/L	All
	1,8-Dinitropyrene	0.4	ug/L	All
	Total Cyanide (CN)	0.005	mg/L	All
	Total Kjeldahl Nitrogen (TKN)	0.1	mg/L	All
	Total Aluminum (Al)	5	ug/L	All
	Total Antimony (Sb)	0.5	ug/L	All
	Total Arsenic (As)	1	ug/L	All
	Total Cadmium (Cd)	0.1	ug/L	All
	Total Chromium (Cr)	5	ug/L	All
	Total Cobalt (Co)	0.5	ug/L	All
	Total Copper (Cu)	1	ug/L	All

Parameter Summary

Package/Test	Parameter	RDL *	Unit	Samples
	Total Lead (Pb)	0.5	ug/L	All
	Total Manganese (Mn)	2	ug/L	All
	Total Molybdenum (Mo)	0.5	ug/L	All
	Total Nickel (Ni)	1	ug/L	All
	Total Phosphorus (P)	100	ug/L	All
	Total Selenium (Se)	2	ug/L	All
	Total Silver (Ag)	0.1	ug/L	All
	Total Tin (Sn)	1	ug/L	All
	Total Titanium (Ti)	5	ug/L	All
	Total Zinc (Zn)	5	ug/L	All
	Nonylphenol (Total)	0.001	mg/L	All
	Total Oil & Grease	0.5	mg/L	All
	Total PAHs (18 PAHs)	2	ug/L	All
	Total Suspended Solids	10	mg/L	All
Toronto Sanitary & Storm Sewer Package	Benzene	0.1	ug/L	All
	Chloroform	0.1	ug/L	All
	1,2-Dichlorobenzene	0.2	ug/L	All
	1,4-Dichlorobenzene	0.2	ug/L	All
	cis-1,2-Dichloroethylene	0.1	ug/L	All
	trans-1,3-Dichloropropene	0.2	ug/L	All
	Ethylbenzene	0.1	ug/L	All
	Methylene Chloride(Dichloromethane)	0.5	ug/L	All
	1,1,2,2-Tetrachloroethane	0.2	ug/L	All
	Tetrachloroethylene	0.1	ug/L	All
	Toluene	0.2	ug/L	All
	Trichloroethylene	0.1	ug/L	All
	p+m-Xylene	0.1	ug/L	All
	o-Xylene	0.1	ug/L	All
	Total Xylenes	0.1	ug/L	All

**RDLs are subject to change based on interferences present at the time of analysis.*

Cost Estimate

#	Description	Matrix	Quote #	Rate	Test Total
1	Toronto Sanitary & Storm Sewer Package	WATER	B64476	$ 803.25	$ 803.25
				Total (excluding applicable taxes):	**$ 803.25**

eCOC: T61686 - Field Data

Project Information: B8X6017
Job Received: 2018/12/14 17:16
Results Required By: 2018/12/21 18:00
18:00

Field Data		DISSOLVED METALS FIELD FILTERED?
Client Sample ID	**Matrix**	
MW1	W	No

APPENDIX E: CONSTRUCTION DEWATERING ESTIMATE RATE CALCULATIONS

Construction Dewatering Rate Estimate

27 Grosvenor Street and 26 Grenville Street, Toronto, Ontario
Unconfined Aquifer, Groundwater seepage to rectangular excavation (line source)

Table E-1: Construction Dewatering Rate Estimates

Description	Symbol	Values	Unit	Explanation
Input Data				
Proposed Ground Elevation		106.00	m asl	Based on the drawing A-202, Building Sections – E/W, provided by Sweeny, dated February 1, 2021
Highest Groundwater Elevation		93.01	m asl	Highest groundwater elevation (January 11, 2019)
Footing Elevation		91.11	m asl	Assumed 2.6 m below FFE, FFE is 93.71 m asl based on the drawing A-202, Building Sections – E/W, provided by Sweeny, dated February 1, 2021
Aquifer Bottom		85.61	m asl	Assumed 5.5 m below footing elevation
Hydraulic Conductivity	K	4.61E-07	m/s	Highest K value
Length of Excavation	x	80.0	m	Based on area extent equivalent
Width of Excavation	a	45.0	m	Based on area extent equivalent
Output				
Top of Aquifer		93.01	m asl	Water table for unconfined aquifer
Target Water Level		90.11	m asl	Assumed 1.0 m below basement floor level
Water Level above aquifer bottom before dewatering	H	7.4	m	
Target water level above aquifer bottom	h	4.5	m	
Radius of Influence	L (R_0)	3.45	m	Sichardt Equation (C=1750 for line source)
Construction Dewatering Flow Rate - Steady State	Q	49.9	m^3/day	Construction Dewatering Flow - Dupuit Equation
Maximum Construction Flow Rate (safety factor of 3)	3Q	149.6	m^3/day	During the initial period and after rains
Construction Dewatering Flow Rate - Steady State	Q	**50,000**	L/day	
Maximum Construction Flow Rate (safety factor of 3)	3Q	**150,000**	L/day	

APPENDIX F: LONG TERM DRAINAGE FLOW RATE ESTIMATE CALCULATION

Foundation Drain Flow Rate Estimate

27 Grosvenor Street and 26 Grenville Street, Toronto, Ontario

Unconfined Aquifer, Groundwater seepage to rectangular excavation (line source)

Table F-1: Foundation Drain Flow Rate Estimates

Description	Symbol	Values	Unit	Explanation
Input				
Proposed Ground Elevation		106.00	m asl	Based on the drawing A-202, Building Sections – E/W, provided by Sweeny, dated February 1, 2021
Highest Groundwater Elevation		93.01	m asl	Highest groundwater elevation (January 11, 2019)
Footing Elevation		91.11	m asl	Assumed 2.6 m below FFE, FFE is 93.71 m asl based on the drawing A-202, Building Sections – E/W, provided by Sweeny, dated February 1, 2021
Aquifer Bottom		85.61	m asl	Assumed 5.5 m below footing elevation
Hydraulic Conductivity	K	4.61E-07	m/s	Highest K value
Length of Excavation	x	80.0	m	Based on area extent equivalent
Width of Excavation	a	45.0	m	Based on area extent equivalent
Output				
Top of Aquifer		93.0	m asl	Water table for unconfined aquifer
Target Water Level		90.61	m asl	Assumed 0.5 m below footing elevation
Water Level above aquifer bottom before dewatering	H	7.4	m	
Target water level above aquifer bottom	h	5.0	m	
Radius of Influence	L (R_0)	23.04	m	Weber's Equation - R_0 after 45 days (from side of drainage area)
Foundation Drain Flow Rate - Steady State	Q	6.4	m^3/day	Long-term flow rate – Dupuit Equation
Maximum Foundation Drain Flow Rate (safety factor of 3)	3Q	19.29	m^3/day	During the initial period and after rains
Estimated Long-term Foundation Drain Flow Rate	Q	**6,400**	L/day	
Estimated Maximum Foundation Drain Flow Rate	3Q	**19,000**	L/day	