

Preliminary Hydrogeological Investigation
5800 Yonge St.
Toronto, Ontario

Prepared For:

Life Construction Inc.

Project #: 18-733-100
Date: Mar 27th, 2019



DS CONSULTANTS LTD.
6221 Highway 7, Unit 16
Vaughan, Ontario, L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

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Hamid Ghadaki
Life Construction Inc.
3985 Highway 7, Suite 202
Markham, ON
L3R 2A2

Via email: hamid@timesgroupcorp.com

RE: Preliminary Hydrogeological Assessment – 5800 Yonge St., Toronto, ON

DS Consultants Limited (DS) was retained by Life Construction Inc. to complete a preliminary hydrogeological investigation for the proposed development at 5800 Yonge St., Toronto (Site). The Site is located on the west side of Yonge St., south of Drewry Ave. The Site is comprised of approximately 32,766 m² parcel of land which is currently occupied by a vacant building (formerly Toronto Hydro), a paved parking area and a park. The proposed development will consist of mixed residential and commercial developments with four (4) multi-storey buildings. It is understood that there will be two (2) phases of construction. Phase 1 will consist of the development located on the west side and Phase 2 will consist of the development on the east side of the Site. Each phase of development will have five (5) levels of underground parking (P5). The finished floor elevations of the proposed developments were not known to DS at the time of writing this report and are estimated to extend seventeen (17) meters below ground surface (mbgs). This preliminary hydrogeological assessment includes an overview of the existing geological and hydrogeological conditions at the Site and the surrounding area, an assessment of the hydrogeological constraints, impacts of the proposed development on the local groundwater and provides a preliminary estimation of construction dewatering and permanent drainage requirements during the proposed development phase. This investigation is based on monitoring wells installed by DS in support of the geotechnical, environmental and hydrogeological investigations at the Site.

If needed, the results of this investigation can be used in support of an application for a Category 3 Permit to Take Water (PTTW) or an Environmental Activity Sector Registry (EASR) for construction dewatering from the Ministry of the Environment Conservation and Parks (MECP).

Based on the results of our investigation, the following conclusions and recommendations are presented:

1. Based on the MECP water well records search, there are records of thirty (30) water wells within 500 m of the Site (Fig. 1). All wells were noted as test hole, monitoring well, not in use or unknown. The study area is fully serviced with municipal water supply. It is not expected that there are any groundwater users within a radius of 500 meters of the Site.
2. A total of ten (10) boreholes were drilled by DS as part of the geotechnical, environmental and hydrogeological investigations. The boreholes were advanced to depths of depths ranging between

- 6.5 to 21.5 meters below ground surface (mbgs) (Elev. 169.26 to 184.32 masl). Eight (8) boreholes (BH18-1 to BH18-7, BH18-10) were converted to monitoring wells (MWs) at the Site to allow for groundwater level monitoring, hydraulic conductivity testing, and assess groundwater quality. Six (6) shallow monitoring wells were screened into the clayey silt till and clayey silt units, ranging in depths of 6.1 to 6.5 (184.0 to 184.4 masl), and two (2) deep wells were screened in the silt and silty sand units (MW18-2 and MW18-6) to depths of 18.5 and 21.5 mbgs (Elev. 171.9 and 169.5 masl), respectively.
3. The overburden geology at the site and study area is dominated by clayey silt till, silty sand and silt. Bedrock is estimated at an elevation of 40 masl which is approximately 150 m below the ground surface.
 4. Groundwater levels were measured on February 4th, 7th and 22nd, 2019 in all accessible monitoring wells by DS. Perched groundwater was found in monitoring wells ranging from 0.55 to 3.5 mbgs (Elev. 187.6-190.0 masl) in the clayey silt till unit, representing the groundwater elevation at the Site. No groundwater was present in the deeper lithological units.
 5. Hydraulic conductivity testing was completed at all monitoring wells on February 7th, 2019. All shallow wells (MW18-1, MW18-3 to MW18-5, MW18-7, and MW18-10) were screened into the clayey silt till/ clayey silt units and the deep wells (MW18-2 and MW18-6) were screened into silty sand and sand units, respectively. The values of calculated hydraulic conductivity (k) ranges from 6.48×10^{-7} m/s to 1.13×10^{-6} in the silty and silty sand units, and ranges from 3.74×10^{-9} to 5.23×10^{-7} m/s in the clayey silt till unit.
 6. The preliminary estimated dewatering rate for an unsealed excavation method for Phase 1 (west) and Phase 2 (east) is approximately 318,000 L/day (318 m³/day) and 265,000 L/day (265 m³/day), respectively. These values include a safety factor of 2x and accounts for storm water that may accumulate as result of a 10 mm precipitation event in 24 hrs.
 7. The preliminary estimated value is above the MECP pumping limit of 50,000 L/day, as such, an EASR application is required to be submitted to the MECP for short-term dewatering. In addition, there is a need to obtain a temporary discharge permit from the City of Toronto in addition to the permanent drainage agreement at a later stage.
 8. Following construction of underground parking garages, long-term groundwater flow to the underdrain system for the buildings will be a function of the upward flux and from precipitation along the foundation wall. Based on current design, depth to water and flow rates, the estimated permanent theoretical flow is approximately 5,000 L/day (5 m³/day) under each of the two phases. The drainage control system around and beneath the buildings should be designed with enough capacity to handle the expected permanent volume. This value is recommended to be verified once the underground construction is completed and access is provided to DS to assess actual flow rates at the sumps.
 9. One (1) unfiltered groundwater sample was collected from monitoring well MW18-10 on March 11th, 2019. Groundwater quality analysis indicates that total manganese and total Polycyclic Aromatic Hydrocarbons (PAHs) exceeded Toronto Region Storm Sewer Use By-Law criteria. There were no parameters in which exceeded Toronto's Sanitary Sewer Use By-Law criteria. Therefore, groundwater

at the Site is not suitable for discharge into the City's storm sewers without pre-treatment. Groundwater can be discharged to the sanitary sewer system with no treatment. A discharge permit will be required from the City if private water is to be discharged to the sewer system.


10. There are structures and utilities within the predicted radius of when considering an unsealed excavation. Since the proposed building is anticipated to extend into the dry silty sand and silt units, settlement is unlikely. However, if groundwater is present, settlement due to the loss of fines may occur within the predicted zone of influence of about 87.8 m and 79.8 m from the center of excavation for Phase 1 and Phase 2, respectively.
11. In conformance with Regulation 903 of the Ontario Water Resources Act, the decommissioning of any dewatering system and monitoring wells should be carried out by a licensed contractor under the supervision of a licensed water well technician.

Should you have any questions regarding these findings, please do not hesitate to contact the undersigned.

DS Consultants Ltd.

Prepared By:

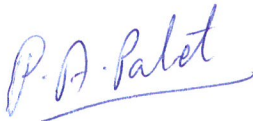
Reviewed By:



Dorothy Garda, M.Sc.
Junior Hydrogeologist



Martin Gedeon, M.Sc., P.Geo.
Senior Hydrogeologist



Pradeep Patel, M.Sc., P.Geo
Project Manager



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1. INTRODUCTION

DS Consultants Limited (DS) was retained by Life Construction Inc. to complete a preliminary hydrogeological investigation for the proposed development at 5800 Yonge St., Toronto (Site). The Site is approximately 32,766 m² and is currently occupied by a vacant building (formerly Toronto Hydro Lands), paved parking area and a park. The Site is located on the west side of Yonge St., south of Drewry Ave. The Site location is shown on **Figure 1**. The proposed development will consist 2 development phases (east and west) with four (4) multi-storey buildings with five (5) levels of underground parking (P5). The finished floor elevations of the proposed development were not known to DS at the time of writing this report, they are estimated to extend seventeen (17) meters below ground surface (mbgs). This hydrogeological investigation includes an overview of the existing geological and hydrogeological conditions at the Site and the surrounding area, an assessment of the hydrogeological constraints, impacts of the proposed development on the local groundwater and provides an estimation of construction dewatering and permanent drainage requirements during the proposed development phase. This investigation is based on monitoring wells installed by DS in support of the geotechnical, environmental and hydrogeological investigations at the Site.

If needed, the results of this investigation can be used in support of an application for a Category 3 Permit to Take Water (PTTW) or an Environmental Activity Sector Registry (EASR) for construction dewatering from the Ministry of the Environment Conservation and Parks (MECP).

1.1 Purpose

The purpose of this investigation was to review and determine the need for dewatering, estimate dewatering rates, assess groundwater quality, and determine the need for a Permit to Take Water (PTTW) or an Environmental Activity Sector Registry (EASR) from the Ministry of Environment and Conservation and Parks (MECP). Potential impacts related to construction dewatering and associated monitoring/mitigation measures were also to be investigated.

1.2 Scope of Work

The scope of work for this investigation included:

- (i) Site visits;
- (ii) Collecting and interpreting available reports and data including the MECP Water Well Records (WWR), geotechnical, hydrogeological and environmental studies completed at the Site;
- (iii) In-situ hydraulic conductivity testing of existing monitoring wells;
- (iv) Estimation of temporary groundwater flow rate during the construction;
- (v) Estimation of long-term or permanent discharge rate after the construction;
- (vi) Assessing groundwater quantity and quality to evaluate discharge options; and,
- (vii) Data analyses and report preparation.

2. PHYSICAL SETTING

A total of ten (10) boreholes were drilled by DS as part of the geotechnical, environmental and hydrogeological investigations (**Figure 4**). Boreholes were advanced from January 4-10, 2019 to depths of 6.5 to 21.5 meters below ground surface (mbgs) (Elev. 169.3 to 184.3 masl). Eight (8) boreholes (BH18-1 to BH18-7 and BH18-10) were converted to monitoring wells (MWs) at the Site to allow for groundwater level monitoring, hydraulic conductivity testing, and assess groundwater quality. Six (6) shallow monitoring wells were screened into the clayey silt till and clayey silt units, ranging in depths of 6.1 to 6.5 (184.0 to 184.4 masl), and two (2) deep wells were screened in the sand and silt units (MW18-2 and MW18-6) to depths of 18.5 and 21.5 mbgs (Elev. 171.9 and 169.5 masl), respectively.

3. PHYSICAL SETTING

Available topographic maps, environmental, geotechnical and hydrogeological reports were used to develop an understanding of the physical setting of the study area. The borehole logs from the site as well as the Ministry of the Environment, Conservation and Parks Water Wells Records (MECP WWRs) were used to interpret the geological and hydrogeological conditions at the Site.

3.1 Physiography and Drainage

The topography at the Site is relatively flat with a surface elevation of approximately 190-191 metres above sea level (masl). The topography within the study area generally slopes south-east towards the Newtonbrook creek which is a tributary of the east branch of the Don River, and south-west to the Westminster creek which is a tributary of the west branch of the Don River. Drainage is generally controlled by streams, artificial channels and underground utilities. The Newtonbrook creek and Westminster creek are located approximately 2.5 km and 3 km of the Site, respectively. Drainage at the Site is shown on the groundwater flow map (**Figure 3**).

3.2 Geology

The following presents a brief description of regional and site geology based on the review of available information and site-specific soil investigations.

3.2.1 Quaternary Geology

The study area (500 m radius) lies within the Peel Plain physiographic region of Southern Ontario and is characterized by the Bevelled Till Plain physiographic landform (as per OGS Earth). The surficial geology in the immediate vicinity of the site has been mapped as Halton Till (Ontario-Erie lobe): predominantly silt to clayey silt matrix, high in matrix carbonate content and clast poor. The surficial geology map is shown in **Figure 2**.

3.2.2 Bedrock Geology

Available published mapping shows that bedrock in the area is predominantly shale, limestone, dolostone and siltstone of the Georgian Bay Formation (MNDM Map 2544 Bedrock Geology of Ontario). Shale bedrock was not encountered at the time of this subsurface investigation. Bedrock is estimated at an elevation of 40 masl (as per OGS Earth) which is approximately 150 m below the ground surface.

3.2.3 Site Geology

On-site subsurface soils were interpreted from the boreholes/monitoring wells (BHs/MWs) drilled by DS. The locations of the BHs/MWs are shown on **Figure 4** and detailed subsurface conditions are presented on the in the borehole Logs in **Appendix A**. The subsurface conditions in the boreholes are summarized in the following paragraphs, and the geologic cross sections (A-A') and (B-B') are presented in **Figure 5A** and **Figure 5B**.

Pavement Structure:

Boreholes BH18-1 through BH18-4 and BH18-7 were drilled on paved surface and encountered a pavement structure consisting of 100mm to 125mm of asphaltic concrete overlying 200 to 360mm of granular base. 75 to 450mm thick topsoil was encountered in Boreholes BH18-5, BH18-6, BH18-8 to BH18-10

Fill:

Fill material was found in all boreholes extending to depths ranging from 0.9 to 3.1m below ground surface. The fill consisted of silty sand, sand and gravel and clayey silt and was in a firm to stiff consistency, with measured SPT 'N' values ranging from 4 to 10 blows per 300 mm penetration. Traces of organics and topsoil were also observed in fill material.

Cohesive Deposits (Clayey Silt Till/Silty Till/Clayey Silt):

Cohesive deposits of clayey silt till and clayey silt to clayey silt were encountered in all boreholes and extended to depths ranging from 5.7m to 9.4m below ground surface. Another layer of clayey silt was found in BH18-5 at a depth of 17.9m and extended to a depth of 19.5m below ground surface. Boreholes BH18-4 and BH18-7 were terminated in these deposits. Cohesive deposits were found to have very stiff to hard consistency with, measured SPT 'N' values ranging from 16 to more than 50 blows per 300 mm of penetration.

Cohesionless deposits (Sand, Silt, Sand and Gravel, Sandy Silt to Silty Sand): Below the cohesive deposits in Boreholes BH18-1, BH18-2, BH18-5, BH18-6 and BH18-10, cohesionless deposits of sand, silt, sand and gravel and sandy silt to silty sand were encountered and extended to the maximum explored depths in most of the boreholes. Boreholes BH18-1, BH18-5, BH18-6 and BH18-10 were terminated in cohesionless deposits. Cohesionless deposits were generally found in a very dense state with occasional dense layers with, measured SPT 'N' values ranging from 41 to more than 50 blows per 300 mm of penetration. Sand and gravel in Boreholes BH18-5 and BH18-6 were found wet at depths 16.7m and 13.4m, respectively.

Sandy Silt Till: These deposits were encountered at various depths in Boreholes BH18-2, BH18-3, BH18-6, BH18-8 and BH18-9. These deposits were found generally in a very dense state, with occasional dense layers with, measured SPT 'N' values ranging from 36 to more than 50 blows per 300 mm of penetration.

3.3 Hydrogeology

The hydrogeology at the Site was evaluated using the on-site monitoring wells installed by DS, local domestic wells and existing hydrogeological reports for the area.

3.3.1 Local Groundwater Use

As part of the hydrogeological study, DS completed a search of the Ministry of the Environment, Conservation and Parks (MECP) Water Well Record (WWR) database. Based on the MECP water well records search, there are thirty (30) water wells within 500 meters of the Site (**Appendix D**). All wells were noted as test hole, monitoring well, not in use or unknown. **Figure 1** shows the MECP water well location plan. The study area is fully serviced with municipal water and therefore, no groundwater users are expected in the area.

3.3.2 Groundwater Conditions

A total of ten (10) boreholes (BHs) and eight (8) monitoring wells (MWs) were used for the current groundwater assessment. Monitoring wells were installed in the clayey silt till, sand and silt units. Groundwater levels were measured on February 4th, 7th, and 22nd 2019 by DS. **Table 1** presents the groundwater levels in all monitoring wells. Groundwater was found in monitoring wells ranging from 0.55 to 3.6 mbgs (Elev. 187.6-190.0 masl) in the clayey silt till unit, representing the groundwater elevation at the Site. The groundwater flow direction within the study area is inferred to be south-east and south-west, towards the east and west branch of the Don River.

Table 1: Groundwater Levels in Monitoring Wells

					February 4 th , 2019		February 7 th , 2019		February 22 nd , 2019	
Well ID	Ground Elevation (masl)	Well Depth (mbgs)	Stick up (m)	Screened Interval (mbgs)	Depth to Water (mbgs)	Groundwater Elevation (masl)	Depth to Water (mbgs)	Groundwater Elevation (masl)	Depth to Water (mbgs)	Groundwater Elevation (masl)
MW18-1	190.5	6.1	n/a	3.1-6.1	2.2	188.3	2.4	188.1	1.9	188.6
MW18-2	190.4	18.5	n/a	15.5-18.5	dry		dry		dry	
MW18-3	190.8	6.4	n/a	3.4-6.4	1.8	189.1	1.8	189.0	inaccessible	
MW18-4	190.9	6.4	n/a	3.4-6.4	1.4	189.5	1.1	189.8	inaccessible	
MW18-5	191.1	6.3	0.93	3.3-6.3	1.4	189.7	1.1	190.0	2.3	187.9
MW18-6	190.9	21.5	n/a	18.5-21.5	dry		dry		dry	
MW18-7	191.1	6.2	n/a	3.2-6.2	3.5	187.6	1.5	189.6	3.6	187.6
MW18-10	190.5	6.5	0.60	3.5-6.5	0.77	189.7	0.55	190.0	1.4	188.4

3.3.3 Hydraulic Conductivity

Single Well Response Tests (SWRTs) were completed by DS in all monitoring wells on February 4th, 2019 to estimate hydraulic conductivity (k) for the representative geological units in which the wells were completed. SWRTs were completed by performing a rising head test (slug test) in the shallow wells with the use of one-liter bailer to ‘instantaneously’ remove water from the well at the wells screened into the clayey silt till and clayey silt units. A falling head test was completed at the deep dry wells screened into the underlying silty sand and sand units (MW18-2 and MW18-6) by pouring 2L of ozonated deionized water down the well. A data logger was placed at the bottom of the wells to monitor the recovery and drop in hydraulic head. Hydraulic conductivity (k) values were calculated using the Hvorslev method. **Table 2** presents a summary of the Hydraulic Conductivity (k) results for the representative geological units. The

values of calculated hydraulic conductivity (k) ranges from 6.48×10^{-7} m/s to 1.13×10^{-6} in the silt and silty sand units, and ranges from 3.74×10^{-9} to 5.23×10^{-7} m/s in the clayey silt till and clayey silt units, which is consistent with typical k-values 10^{-1} m/s to 10^{-7} m/s for sand/silt, and 10^{-6} m/s to 10^{-12} m/s for clayey silt till/clayey silt. The hydraulic testing results are provided in **Appendix B**.

Table 2: Summary of Hydraulic Conductivity (k) Test Results

Monitoring Well ID	Screened Interval (mbgs)	Screened Formation	In-situ K- Value (m/s)	Geomean (m/s)
MW18- 1	3.1-6.1	Clayey Silt Till/Clayey silt	5.65×10^{-7}	1.31×10^{-7}
MW18- 2	15.5-18.5	Silt	1.13×10^{-6}	
MW18- 3	3.4-6.4	Sandy Silt Till	4.56×10^{-8}	
MW18- 4	3.4-6.4	Clayey Silt Till	1.88×10^{-7}	
MW18- 5	3.3-6.3	Clayey Silt Till	7.56×10^{-8}	
MW18- 6	18.5-21.5	Silty Sand	6.48×10^{-7}	
MW18- 7	3.2-6.2	Clayey silt	3.74×10^{-9}	
MW18- 10	3.5-6.5	Clayey silt	8.81×10^{-8}	

3.3.4 Groundwater Quality

One (1) unfiltered groundwater sample was collected from monitoring well MW18-10 on March 11th, 2019. Groundwater samples were submitted to ALS Laboratory in Mississauga, Ontario for analysis. ALS Laboratory is a Canadian Association of Laboratory Accreditation Inc. (CALA) and Canadian Standard Association (CSA) certified. The reported results indicate that total manganese and total Polycyclic Aromatic Hydrocarbons (PAHs) exceeded Toronto's storm sewer criteria. There were no reported exceedances under Toronto's sanitary sewer criteria. **Table 3** presents a summary of exceeded parameters, and the certificate of analysis is provided in **Appendix C**.

Table 3: Parameters in Groundwater Exceeding the City of Toronto's By-Law Discharge Criteria

Parameter	Unit	Sanitary By-Law Criteria	Storm By-Law Criteria	MW 18-10 Concentration
PAHs- Total	µg/L	5	2	<u><3.5</u>
Manganese-Total	mg/L	5	0.05	<u>0.928</u>

Notes:

Criteria exceeding sanitary sewer criteria are **bold**

Criteria exceeding storm criteria are underlined

4.0 CONSTRUCTION DEWATERING

4.1 Estimation of Flow Rate- unsealed excavation method

For the dewatering calculations, five (5) levels of underground parking (P5) for each of the two (2) phases were considered, with an excavation depth of approximately 17 mbgs (Elev. 173.4 masl). Dewatering estimates for each phase were completed using approximated dimensions based on underground plans.

Excavation dimensions of 99 m long and 90 m wide for the phase 1 for the buildings located on the west side of the Site, and excavation dimensions of 99 m long and 65 m wide for the phase 2 for buildings located on the east side of the Site were considered for the dewatering calculation. The highest groundwater elevation (190.0 masl) was used in the calculations.

The estimated dewatering values are based on the highest k-value screened into the clayey silt till/clayey silt unit obtained from MW18-1 (5.65×10^{-7} m/s).

$$Q_R = K \times \frac{H^2 - h^2}{0.733} \times \text{Log} (R_0/r_e)$$

Where:

Parameters	Phase 1 (west)	Phase 2 (east)
K (m/s)	5.23×10^{-7}	
H (m)	20.5	
h (m)	4.6	
Dimensions (m)	99 x 90	99 x 65
r_e equivalent radius	53.2	42.3
r_0 Radius Cone of Depression	87.8	79.8
Q (L/day)	114,000	100,000

R_e - Equivalent radius:

$$r_e = \left(\frac{(a \times b)}{\pi} \right)^{0.5}$$

R_0 – Radius of the cone of depression:

$$R_0 = (r_e + 3000)(H - h)(k^{0.5})$$

4.2 Estimation of Flow Rate- Storm Water Consideration

Additional flow rate may be required from precipitation into the open excavation during construction. The estimated flow rate is based on an excavation dimensions for Phase 1 (west) and Phase 2 (east); about 99 meters long and 90 meters wide, and about 99 meters long and 65 meters wide, respectively, and in total 10 mm precipitation events in 24 hours. The total estimated dewatering that might be needed as a result of precipitation events for Phase 1 and Phase 2 would be approximately **90,000 L/day (90 m³/day)** and **65,000 L/day (65 m³/day)**, respectively.

4.3 Total Estimation of Flow Rate (Short-Term/ Temporary Discharge)

Perched groundwater was observed in the upper clayey silt till and clayey silt units, where the maximum well depths extended to 6.5 mbgs (Elev. 184 masl). However, no groundwater was observed in the underlying silty sand and silt units at MW18-2 and MW18-6, which extended to depths of 18.5 and 21.5 mbgs (Elev. 171.9 and 169.4 masl), respectively. A perched groundwater table was likely encountered during the current investigation where the accumulation of groundwater that is above the deeper water table in the

unsaturated zone occurs. The groundwater is usually trapped overlying an impermeable soil layer, such as clay, and forms a lens of saturated material in the unsaturated zone. The perched groundwater table often runs dry after being excavated due to lack of continuity and recharge. Groundwater has been previously reported in the area to extend to approximately 15.0 to 36.8 mbgs in the underlying silty sand and sandy silt till units (Golder, 2018). Furthermore, during the current investigation, wet sand seams below the clayey silt till unit were identified at BH18-5 and BH18-6 ranging in depths from 13.4 to 16.7 mbgs, suggesting the presence of groundwater. However, since groundwater was not identified in either of the two (2) deep wells (MW18-2 and MW18-6), the lower groundwater table in the unsaturated zone is inferred to be below the deepest well depth of 21.5 mbgs (Elev. 169.5 masl). A bi-weekly groundwater monitoring program for the period of three (3) months is being completed to verify seasonal groundwater fluctuations.

Since the proposed excavation depth is below the upper groundwater table, and no water was detected in the underlying silty sand unit, initial dewatering primarily from the upper water bearing unit will be required. Therefore, the highest K-value from the clayey silt till unit was considered for the dewatering calculation. Considering the unsealed excavation method, the estimated steady-state flow rate to the development during Phase 1 will be approximately **228,000 L/day (228 m³/day)** with a 2x safety factor. The estimated steady-state flow rate to the development during Phase 2 would be approximately **200,000 L/day (200 m³/day)** with a 2x safety factor. A high safety factor of x2 has been added to both development phases to account for the variability in hydraulic conductivity that may be encountered. The additional flow rate that may be needed as a result of precipitation events would be approximately **90,000 L/day (90 m³/day)** for Phase 1 and **65,000 L/day (65 m³/day)** for the development at Phase 2. Therefore, the recommended pumping rate for construction dewatering for the developments during Phase 1 and Phase 2 is approximately **318,000 L/day (318 m³/day)** and **265,000 L/day (265 m³/day)**, respectively.

4.4 Permanent Drainage (Long-term Discharge)

Following construction of the underground structure, long-term groundwater flow to the underfloor drainage system for the building will be a function of the upward flux and from drainage along the foundation wall. Under steady state flow conditions, groundwater follow to the underlain system will be controlled by horizontal gradient within the sand and silt soils. Therefore, the hydraulic conductivity in the silt unit from MW18-2 was considered for the following calculation. The Darcy flow equation was used to estimate permanent drainage to the building as follows:

$$Q = K \times i \times A$$

Where,

Parameter	Phase 1 (west)	Phase 2 (east)
Hydraulic Conductivity (K) (m/d)	0.10	
Hydraulic Gradient (i)	0.004	
Area (A)	8,910 m ²	6,435 m ²

Based on current design, depth to water and flow rates, the estimated permanent theoretical flow is approximately **5,000 L/day (5 m³/day)** for the development during Phase 1 and Phase 2 Construction. The drainage control system around and beneath the buildings should be designed with enough capacity to handle the expected permanent volume. This value is recommended to be verified once the underground construction is completed and access is provided to DS to assess actual flow rates at the sumps.

4.5 Permit Requirements

4.5.1 Environmental Activity and Sector Registry (EASR) /Permit to Take Water (PTTW) Application

An Environmental Activity Sector Registration (EASR) is required to be submitted to the Ministry of the Environment, Conservation and Parks (MECP) if the taking of groundwater and stormwater for a temporary construction project is between 50,000 L/day and 400,000 L/ day. The EASR application is an online registry and should be submitted to the MECP before any construction dewatering. A PTTW is required to be submitted to the MECP if the taking of groundwater and stormwater for a temporary construction project is more than 400,000 L/ day.

Since the expected design dewatering rate for the unsealed excavations for the developments for Phase 1 and Phase 2 are between 50,000 and 400,000 L/day, an EASR application is required to be submitted to the MECP for short-term dewatering. Based on current groundwater conditions, permanent groundwater flow or permanent drainage is expected to be less than the water taking limit of 50,000 L/day, therefore, a PTTW is not required on a permanent basis.

4.5.2 Discharge Permits (Construction Dewatering and Permanent Drainage)

A discharge permit will be required from Toronto Region if private water is to be sent to the sewer system.

5.0 POTENTIAL IMPACTS

The following are the predicted potential impacts as a result of construction dewatering:

5.1 Local Groundwater Use

The area is fully serviced by a municipal water supply. Since it is not expected to have any use of groundwater as a source of drinking water within a radius of 500 meters from the Site and there will be no short-term or long-term predicted impacts to private water wells occurring from the proposed dewatering activities.

5.2 Point of Discharge and Groundwater Quality

A discharge plan will be required for the discharge of pumped groundwater from construction dewatering activities. The plan must identify the discharge location and ensure the discharge will not result in any adverse impacts by identifying the discharge measures to be installed and control measures to limit the suspended solids in discharged water.

Groundwater quality analysis indicated that total manganese and total PAHs exceeded Toronto Region's Storm Sewer Use By-Law criteria. Therefore, groundwater at the Site is not suitable for discharge into the City's storm sewers without treatment. The groundwater can be discharged to the sanitary sewer system without treatment. Discharge permits and agreements are required from the City of Toronto for short-term and long-term discharge.

5.3 Settlement Due to Dewatering Activities

There are structures and utilities within the predicted radiuses of influence (about 87.8 m and 79.8 m from the center of excavation) when considering an unsealed excavation. There is a possibility of inducing settlement to neighbouring buildings, utilities and underground structures when lowering water levels or depressurizing an aquifer. Since the proposed building is anticipated to extend in the dry sand and silt units, settlement is unlikely. However, if groundwater is present, settlement due to the loss of fines is may occur within the predicted zone of influence. Therefore, settlement monitoring and bi-weekly groundwater level monitoring program is recommended during construction. Settlement can be reduced with the use of cut off structures, (i.e. caisson shoring wall) along the perimeter of the Site in order to reduce the zone of influence as a result of dewatering.

5.4 Well Decommissioning

Following the completion of construction activities, all dewatering wells, well points, eductors and monitoring wells installed at various stages of this project must be decommissioned. The installation and eventual decommissioning of the wells and the dewatering system must be carried out by a licenced water well contractor in accordance with Regulation 903 of the Ontario Water Resources Act.

6.0 MONITORING AND MITIGATION

- Water quality should be monitored during and following construction dewatering on a biweekly basis for a period of three (3) months to monitor seasonal fluctuations, and to ensure that water quality meets the discharge criteria.
- Based on the dewatering assessment, an EASR application is required to be submitted to the MECP for short-term dewatering.
- Once a groundwater dewatering system is set up at the Site, daily and weekly monitoring is recommended by DS to assess the groundwater conditions such as water levels, measurement of discharge flow, discharge water quality and any adverse impacts because of dewatering such as settlement.
- DS recommends implementing a settlement monitoring program during dewatering activities to identify any potential settlement. Subject to a detailed assessment and construction program, monitoring of the settlement points should be carried out on a weekly basis for the first three (3) months after the commencement of dewatering and then biweekly thereafter.
- DS recommends discharging into the Sanitary Sewer, where no treatment is required.

7.0 LIMITATIONS

This report was prepared for the sole use of Life Construction Inc. to provide an assessment of the hydrogeological conditions on the property. The information presented in this report is based on information collected during the completion of the hydrogeological investigation by DS Consultants Ltd. DS Consultants Ltd. was required to use and rely upon various information sources produced by other parties. The information provided in this report reflects DS' judgment in light of the information available at the time of report preparation. This report may not be relied upon by any other person or entity without the written authorization of DS Consultants Ltd. The scope of services performed in the execution of this investigation may not be appropriate to satisfy the needs of other users, and any use or reuse of this documents or findings, conclusions and recommendations represented herein, is at the sole risk of said users. The conclusions drawn from the Hydrogeological report were based on information at selected observation and sampling locations. Different conditions between and beyond these locations may become apparent during future investigations or on-site work, which could not be detected or anticipated at the time of this investigation. DS Consultants Ltd. cannot be held responsible for hydrogeological conditions at the site that was not apparent from the available information.

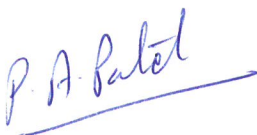
Should you have any questions regarding these findings, please do not hesitate to contact the undersigned.

DS Consultants Ltd.

Prepared By:



Dorothy Garda, M.Sc.
Junior Hydrogeologist



Pradeep Patel, M.Sc., P.Geo
Project Manager



Reviewed By:



Martin Gedeon, M.Sc., P.Geo.
Senior Hydrogeologist

8.0 CONSULTANTS QUALIFICATIONS

Martin Gedeon, M.Sc., P.Geo., is a Professional Geoscientist (P.Geo.) with over 23 years of experience as an environmental/hydrogeological consultant in the areas of groundwater and soil monitoring, environmental Site assessments, environmental due diligence, and remediation. Martin has significant experience in physical and contaminant hydrogeology across Canada and overseas and has provided hydrogeological/environmental technical support on various projects. Martin has prepared hundreds of hydrogeological reports in support of permit applications for private sector development application, municipal dewatering operations and provincial infrastructure projects across the province.

Dorothy Garda, M.Sc., has 1 year of environmental consulting experience. Dorothy has experience with conducting hydrogeological investigations in the Greater Toronto Area (GTA) for development, and has been involved with project coordination, field assessments, data interpretation and reporting. Dorothy has assisted with PTTW, EASRs and Discharge Permit applications in support of construction dewatering from the MECP and discharge permitting.

Pradeep Kumar Patel, M.Sc., P.Geo. is a hydrogeologist at DS Consultants Ltd. and has more than 9 years of experience working in the environmental industry. He is involved in numerous Hydrogeological and Geotechnical investigation projects. His experience includes the preparation of construction dewatering activities and hydrogeological investigations in support of Environmental Activity and Sector Registry (EASR) and Permit to Take Water (PTTW) applications.

9.0 REFERENCES

Chapman, L.J., and D.F. Putnam; The Physiography of Southern Ontario, Third Edition, Ontario Geological Survey Special Volume 2; 1984, & 2007.

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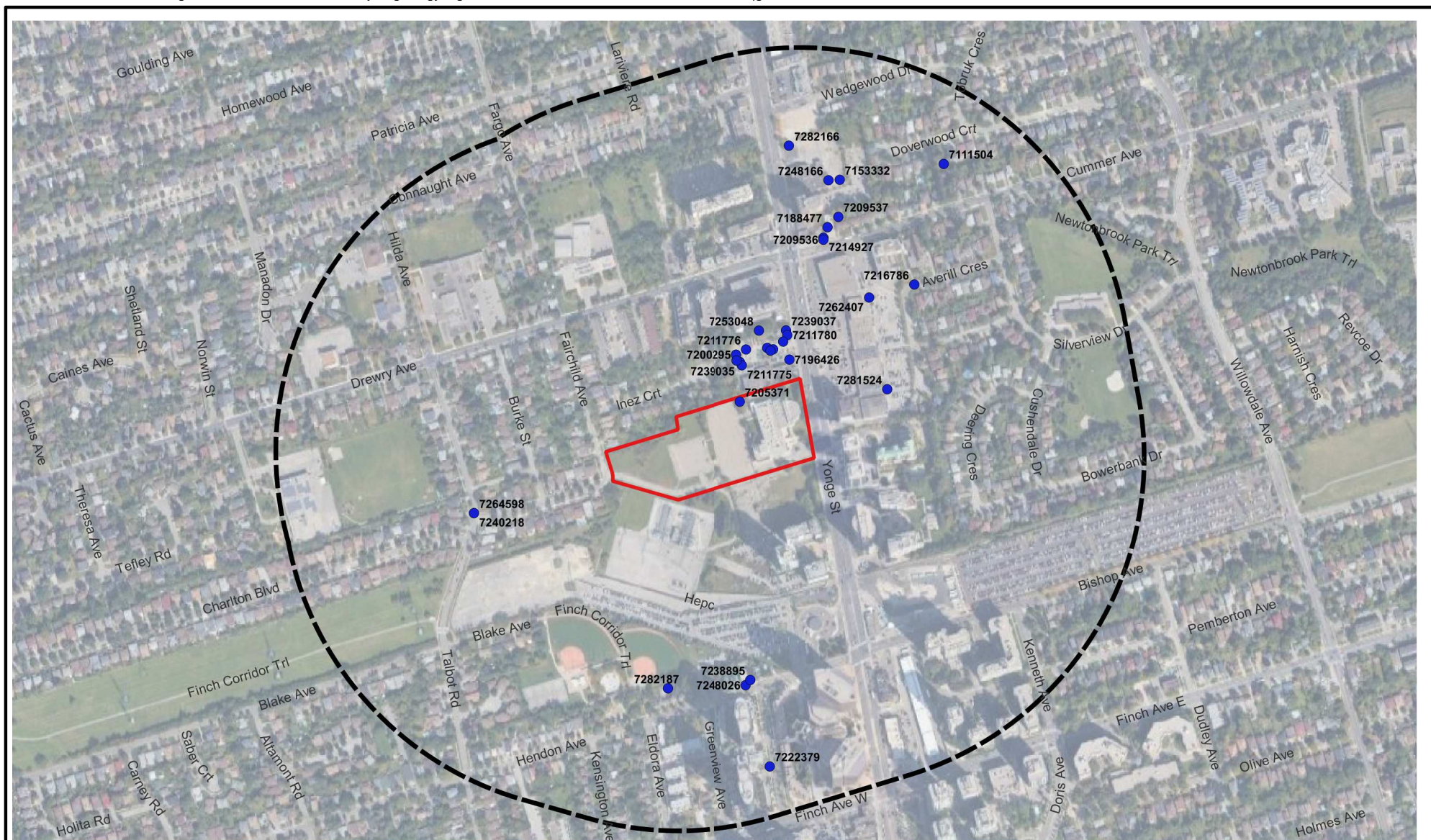
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Powers, J. Patrick, P.E. (1992); Construction Dewatering: New Methods and Applications - Second Edition, New York: John Wiley & Sons.

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Preliminary Geotechnical Investigation, 5800 Yonge Street, Toronto, Ontario by DS Consultants Ltd., February 2019.

Figures



Legend

- Approx. Property Boundary
- 500m Buffer
- Registered Water Well (MECP WWR)

0 150 300 m



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Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Client:

LIFE CONSTRUCTION

Project:

HYDROGEOLOGICAL INVESTIGATION
5800 Yonge Street, North York, ON

Title:

SITE LOCATION AND MECP WELL RECORDS

Size:
8.5 x 11

Rev:
0

Approved By:

P.P

Drawn By:

S.Y

Date:

February 2019

Scale:

As Shown

Project No.:

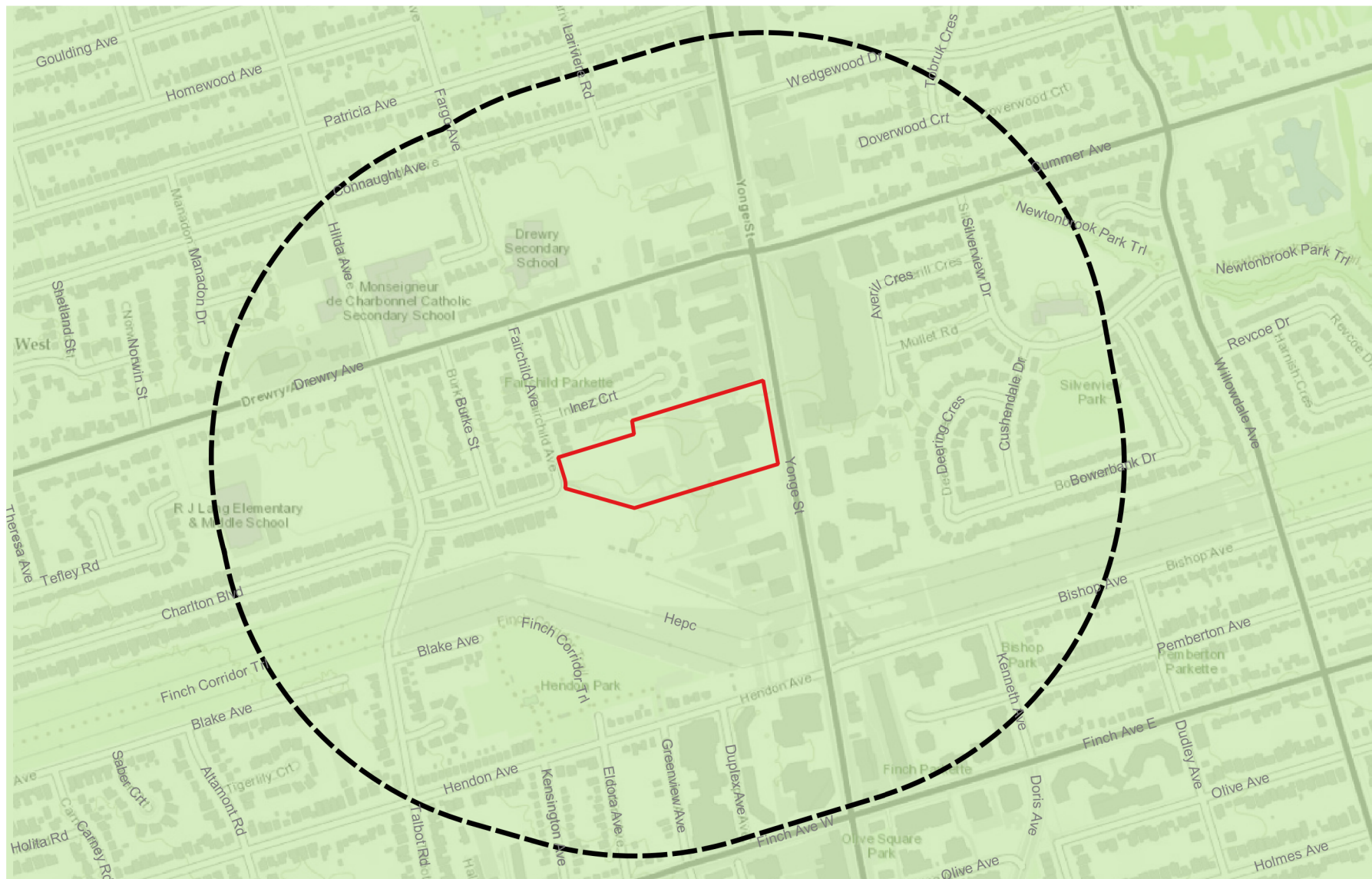
18-733-100

Figure No.:

1

Image/Map Source: Google Satellite Image





Legend

- Approx. Property Boundary
- 500m Buffer
- 5b - Till

0 150 300 m



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Project:

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5800 Yonge Street, North York, ON

Title:

SURFICIAL GEOLOGY MAP

Size:
8.5 x 11

Rev:
0

Approved By:

P.P

Drawn By:

S.Y

Date:

January 2019

Scale:

As Shown

Project No.:

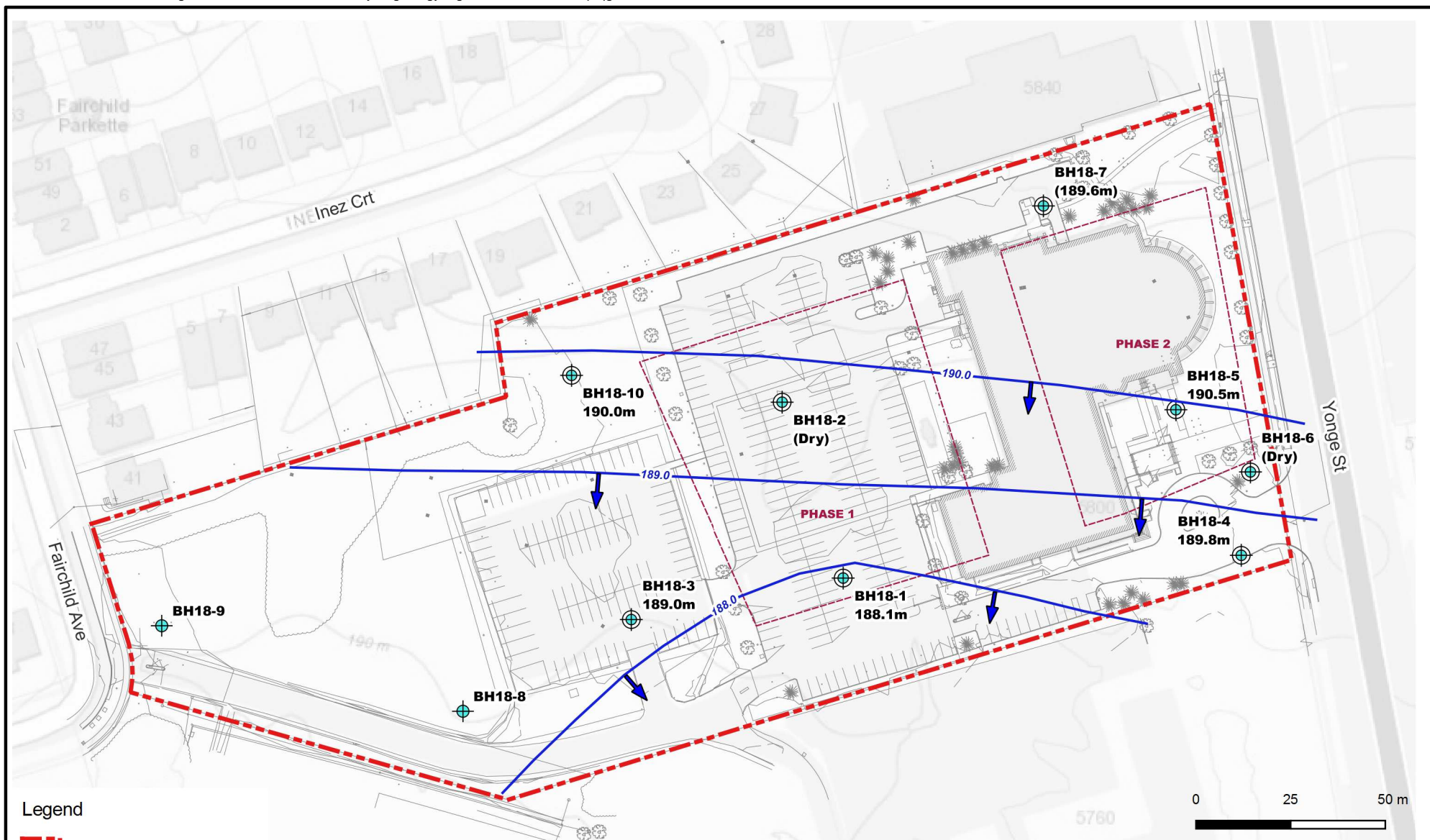
18-733-100

Figure No.:

2

Image/Map Source: <https://www.mnrm.gov.on.ca/> and Esri Topo





Legend

- Approx. Property Boundary
- Borehole Location
- Monitoring Well Location
- Groundwater Flow Direction
- Groundwater Contour

Note: BH18-7 outlier value



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Project:

HYDROGEOLOGICAL INVESTIGATION
5800 Yonge Street, North York, ON

Title:

GROUNDWATER FLOW MAP

Size:
8.5 x 11

Approved By:

P.P

Drawn By:

S.Y

Date:

February 2019

Rev:
0

Scale:

As Shown

Project No.:

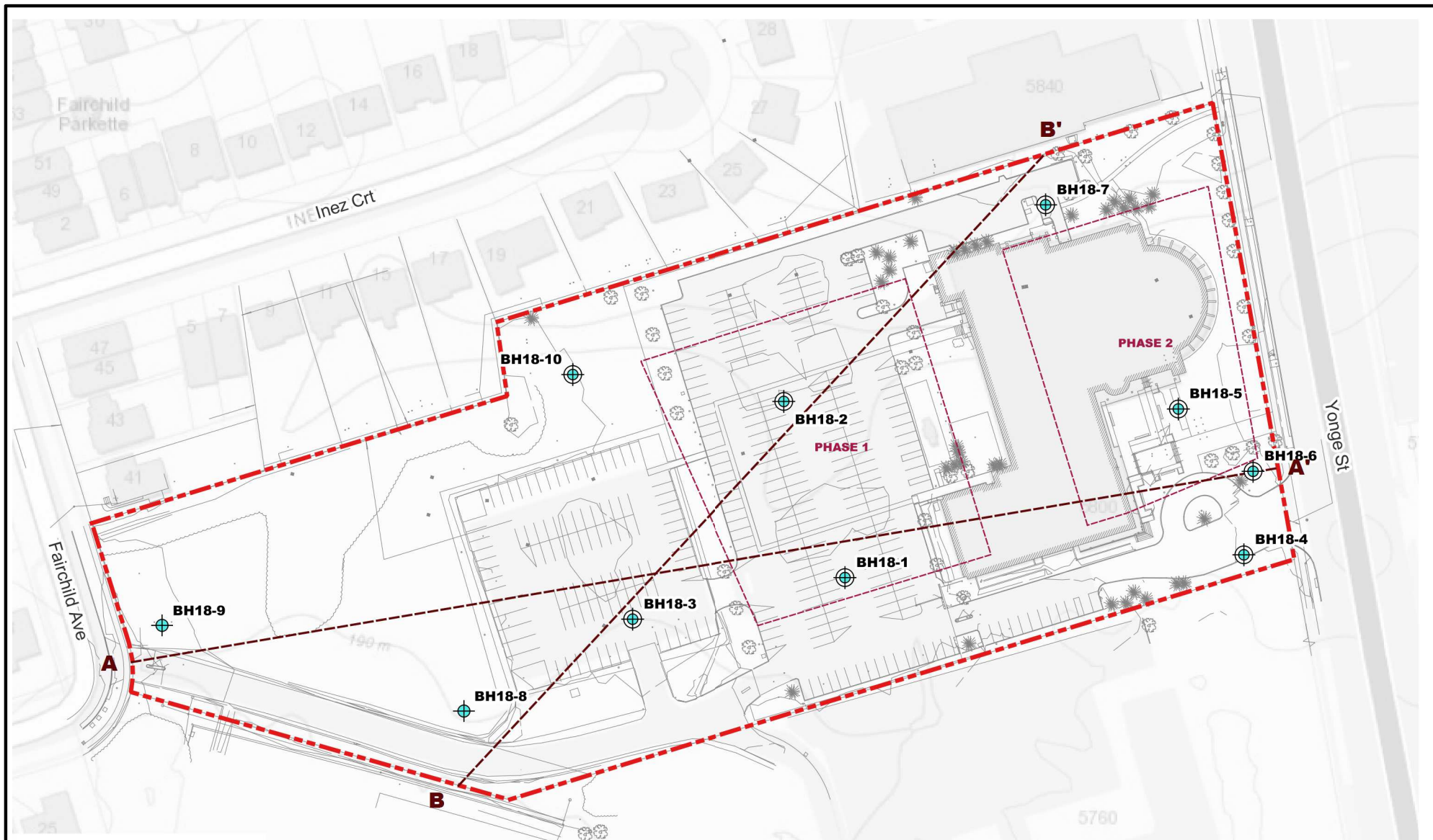
18-733-100

Figure No.:

3

Image/Map Source: Survey CAD Drawing





Legend

- Approx. Property Boundary
- Borehole Location
- Monitoring Well Location
- Cross Section Line

0 25 50 m



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Client:

LIFE CONSTRUCTION

Project:

**HYDROGEOLOGICAL INVESTIGATION
5800 Yonge Street, North York, ON**

Title:

BOREHOLE AND MONITORING WELL LOCATIONS



Size:
8.5 x 11

Approved By: P.P

Drawn By: S.Y

Date: February 2019

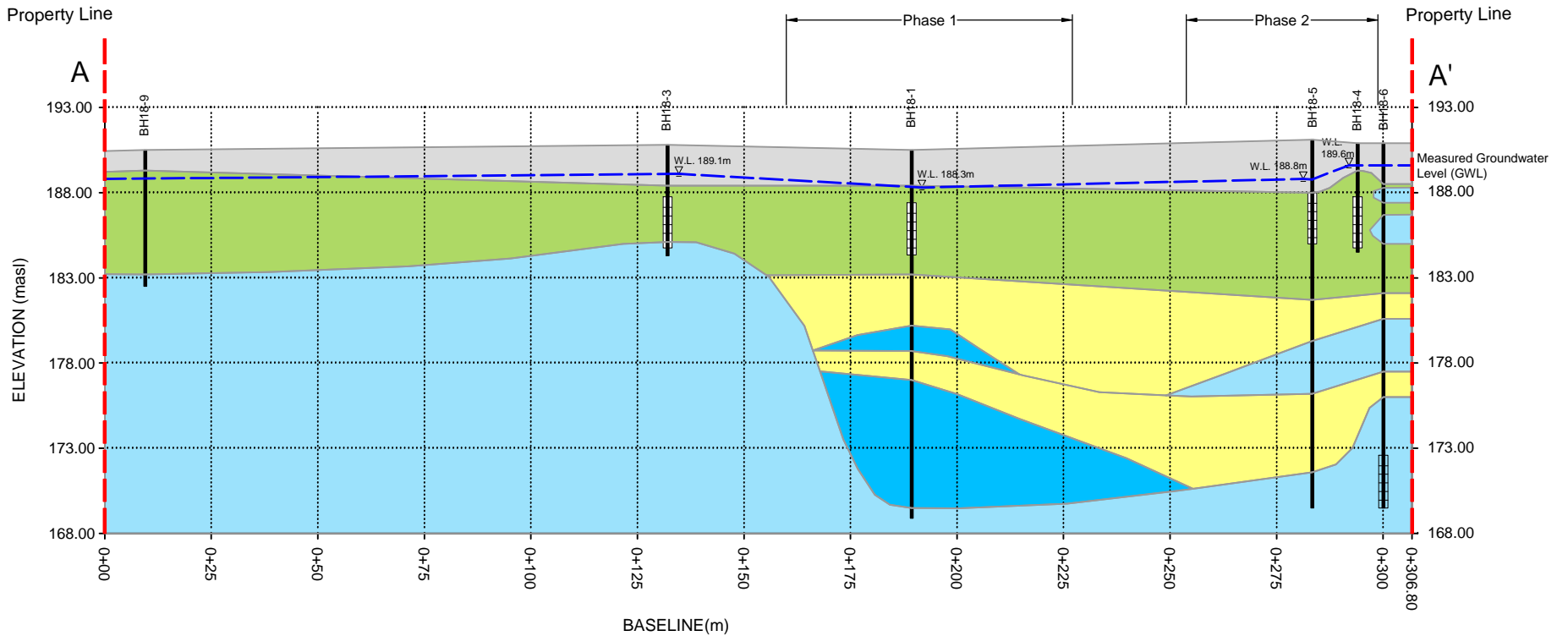
Rev:
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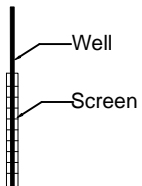
Project No.: 18-733-100

Figure No.: **4**

Image/Map Source: Survey CAD Drawing



Horizontal Scale: 1:1500
Vertical Scale: 1:375



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Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Project: **HYDROGEOLOGICAL INVESTIGATION**
5800 Yonge Street, North York, ON

Title: **GEOLOGICAL CROSS SECTION A-A'**

Client:
LIFE CONSTRUCTION

Size:
8.5 x 11

Approved By:
P.P

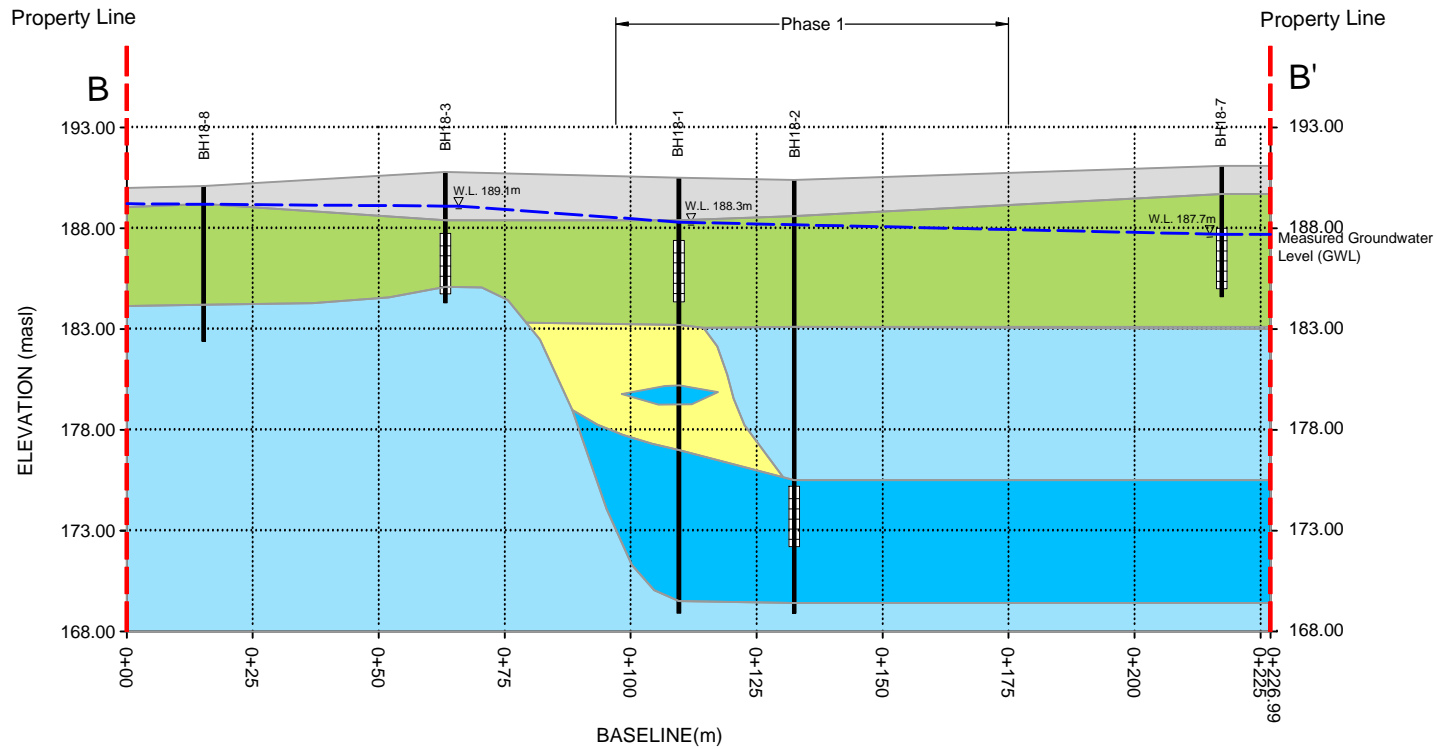
Drawn By:
S.Y

Date:
February 2019

Rev.
As Shown

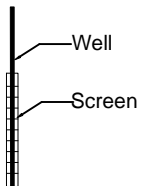
Project No:
18-733-100

Figure No.
5A



Fill
 Clayey Silt Till
 Sandy Silt Till
 Sand/Sand Gravel
 Silt

Horizontal Scale: 1:1500
Vertical Scale: 1:375



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Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Project: HYDROGEOLOGICAL INVESTIGATION
5800 Yonge Street, North York, ON

Title: **GEOLOGICAL CROSS SECTION B-B'**

Client: LIFE CONSTRUCTION

Size: 8.5 x 11

Approved By: P.P

Drawn By: S.Y

Date: February 2019

Rev.

Scale: As Shown

Project No: 18-733-100

Figure No. 5B

Appendices

Appendix A: Borehole Logs

PROJECT: Geotechnical Investigation- 5800 Yonge Street
 CLIENT: Life Construction
 PROJECT LOCATION: Toronto, ON
 DATUM: Geodetic
 BH LOCATION: See Drawing 1

DRILLING DATA

Method: Hollow Stem Auger
 Diameter: 203mm
 Date: Jan-07-2019

REF. NO.: 18-733-10

ENCL NO.: 2

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)							
190.5								20 40 60 80 100	20 40 60 80 100	10 20 30					GR SA SI CL
190.4	ASPHALT: 100 mm		1	SS	34										
190.2	GRANULAR BASE: 200mm		2	SS	13										
189.7	FILL: silty sand, trace gravel, some organics, wet, grey, dense		3	SS	13										
188.4	FILL: clayey silt, trace sand, some organics, grey, moist, stiff		4	SS	37										
188.3			5	SS	38										
186.1	CLAYEY SILT TILL: some sand to sandy, trace gravel, trace cobble/boulders, brown, moist, very stiff to hard		6	SS	57										
186.1			7	SS	27										
183.2	SAND: trace silt, trace clay, brown, moist, very dense		8	SS	50/100mm										
180.2			9	SS	50/100mm										
178.7	SILT: trace sand, trace clay, brown, moist, very dense		10	SS	50/100mm										
177.0	SAND AND GRAVEL: trace to some clay, occasional cobble/boulder, brown to grey, moist, very dense		11	SS	50/75mm										
177.0			12	SS	50/125mm										
173.0			13	SS	50/125mm										
171.0			14	SS	50/100mm										
167.0			15	SS	50/125mm										
167.0	grey below 16.7m														

Continued Next Page

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ = 3% Strain at Failure

DS SOIL LOG 18-733-100 5800 YONGE STREET GPJ DS GDT 19-2-7

PROJECT: Geotechnical Investigation- 5800 Yonge Street
 CLIENT: Life Construction
 PROJECT LOCATION: Toronto, ON
 DATUM: Geodetic
 BH LOCATION: See Drawing 1

DRILLING DATA

Method: Hollow Stem Auger
 Diameter: 203mm
 Date: Jan-07-2019

REF. NO.: 18-733-10

ENCL NO.: 2

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20 40 60 80 100	20 40 60 80 100	W _p	W	W _L			
169.5	SILT: trace sand, trace clay, brown, moist, very dense(Continued)		16	SS	50/100mm		170								
21.0	SANDY SILT: trace clay, grey, moist, very dense		17	SS	50/125mm		169								
21.6	END OF BOREHOLE Notes: 1) 50 mm dia. monitoring well installed upon completion. 2) Water Level Readings Date Feb. 04, 2019 Water Depth (mbgs) 2.2														

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ = 3% Strain at Failure

PROJECT: Geotechnical Investigation- 5800 Yonge Street

CLIENT: Life Construction

PROJECT LOCATION: Toronto, ON

DATUM: Geodetic

BH LOCATION: See Drawing 1

DRILLING DATA

Method: Solid Stem Augers

Diameter: 150 mm

Date: Jan-10-2019

REF. NO.: 18-733-10

ENCL NO.: 11

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)		W _p	W	W _L			
190.4								20 40 60 80 100							GR SA SI CL
190.0	TOPSOIL: 300mm		1	SS	6										
189.5	FILL: clayey silt mixed with topsoil, trace sand, brown, moist, stiff		2	SS	24										
189.1	CLAYEY SILT TILL: trace sand, trace gravel, occasional cobble/boulders, brown, moist, very stiff to hard		3	SS	36										
188.7			4	SS	33										
187.1			5	SS	50/ 25mm										
186.0	SAND: trace silt, trace clay, grey, wet, very dense														
186.0	SILTY CLAY: trace sand, grey, moist, hard		6	SS	50/ 100mm										
185.0			7	SS	62										
183.1															
182.7	SANDY SILT: trace clay, grey, moist, very dense		8	SS	50/ 150mm										
182.7	75mm thick sand layer at 7.5m														
182.7	END OF BOREHOLE														
182.7	Notes: 1) Groundwater was at 3.3m during drilling. 2) Water Level Readings Date Water Depth (mbgs) Feb. 04, 2019 1.3														

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH
NOTES+ 3, × 3: Numbers refer
to Sensitivity

○ = 3% Strain at Failure

PROJECT: Geotechnical Investigation- 5800 Yonge Street

CLIENT: Life Construction

PROJECT LOCATION: Toronto, ON

DATUM: Geodetic

BH LOCATION: See Drawing 1

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 203 mm

Date: Jan-04-2019

REF. NO.: 18-733-10

ENCL NO.: 3

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)	
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)								WATER CONTENT (%)
								○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE & Sensitivity × LAB VANE							
190.4								20 40 60 80 100	10 20 30						GR SA SI CL	
190.0	ASPHALT: 125 mm		1	SS	12											
190.3	GRANULAR BASE: 200mm															
189.6	FILL: silty trace silt, brown, wet, compact		2	SS	9											
188.6	FILL: clayey silt, trace sand, brown, moist, stiff		3	SS	31											
188.6	CLAYEY SILT TILL: some sand to sandy, trace gravel, trace cobble/boulders, brown, moist, very stiff to hard		4	SS	50/ 25mm											
			5	SS	50/ 25mm											
186.0	SILTY CLAY: trace sand, grey, moist, hard		6	SS	74											
			7	SS	38											
183.1	SILTY SAND: trace clay, brown, moist, very dense		8	SS	50/ 25mm											
			9	SS	50/ 100mm											
			10	SS	50/ 75mm											
			11	SS	50/ 75mm											
			12	SS	50/ 25mm											
			13	SS	50/ 25mm											
			14	SS	50/ 25mm											
			15	SS	50/ 25mm											
			16	SS	50/ 100mm											
			17	SS	50/ 25mm											
175.5	SILT: trace sand, trace clay, brown, moist, very dense															
14.9																

Continued Next Page

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH
NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ = 3% Strain at Failure

DS SOIL LOG 18-733-100 5800 YONGE STREET GPJ DS GDT 19-2-7

2 95 3

PROJECT: Geotechnical Investigation- 5800 Yonge Street

CLIENT: Life Construction

PROJECT LOCATION: Toronto, ON

DATUM: Geodetic

BH LOCATION: See Drawing 1

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 203 mm

Date: Jan-04-2019

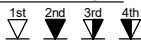
REF. NO.: 18-733-10

ENCL NO.: 3

[illegible]

GROUNDWATER ELEVATIONS

Measurement



GRAPH
NOTES

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

○ $\epsilon = 3\%$ Strain at Failure

PROJECT: Geotechnical Investigation- 5800 Yonge Street
 CLIENT: Life Construction
 PROJECT LOCATION: Toronto, ON
 DATUM: Geodetic
 BH LOCATION: See Drawing 1

DRILLING DATA

Method: Solid Stem Augers
 Diameter: 150 mm
 Date: Jan-08-2019

REF. NO.: 18-733-10

ENCL NO.: 4

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)		W _p	W	W _L			
190.8								20 40 60 80 100							GR SA SI CL
190.0	ASPHALT: 100 mm		1	SS	35										
190.4	GRANULAR BASE: 360 mm														
190.7	FILL: sand and gravel, trace clay, trace silt, brown, moist, dense		2	SS	16		190								
188.4	FILL: clayey silt, trace sand, trace to some organics, brown, moist, firm to very stiff		3	SS	6		Bentonite								
188.4			4	SS	31		W. L. 189.1 m Feb 04, 2019								
185.1	CLAYEY SILT TILL: trace sand, trace gravel, occasional cobble/boulders, brown, moist, very stiff to hard		5	SS	26		188								
184.3			6	SS	16		187								
185.1							Filter Pack Slotted Pipe								
184.3	SANDY SILT TILL: trace clay, trace gravel, occasional cobble/boulders, grey, moist, very dense		7	SS	79		186								
184.3	END OF BOREHOLE						185								
184.3	Notes: 1) 50 mm dia. monitoring well installed upon completion. 2) Water Level Readings Date Feb. 04, 2019 Water Depth (mbgs) 1.7														

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ = 3% Strain at Failure

PROJECT: Geotechnical Investigation- 5800 Yonge Street
 CLIENT: Life Construction
 PROJECT LOCATION: Toronto, ON
 DATUM: Geodetic
 BH LOCATION: See Drawing 1

DRILLING DATA

Method: Solid Stem Augers
 Diameter: 150 mm
 Date: Jan-08-2019

REF. NO.: 18-733-10

ENCL NO.: 5

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)									
190.9	ASPHALT: 100 mm		1	SS	14		190										
190.4	GRANULAR BASE: 360 mm		2	SS	21												
190.3	FILL: sand and gravel, trace clay, trace silt, brown, moist, compact		3	SS	15												
189.3	FILL: clayey silt, trace sand, brown, moist, very stiff		4	SS	19												
189.3	CLAYEY SILT TILL: trace sand, trace gravel, occasional cobble/boulders, brown, moist, very stiff to hard		5	SS	35												
188.3			6	SS	39												
186.3	grey below 4.6m		7	SS	38												
184.4	END OF BOREHOLE																
6.5	Notes: 1) 50 mm dia. monitoring well installed upon completion. 2) Water Level Readings Date Feb. 04, 2019 Water Depth (mbgs) 1.3																

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ = 3% Strain at Failure

PROJECT: Geotechnical Investigation- 5800 Yonge Street
 CLIENT: Life Construction
 PROJECT LOCATION: Toronto, ON
 DATUM: Geodetic
 BH LOCATION: See Drawing 1

DRILLING DATA

Method: Hollow Stem Auger
 Diameter: 203 mm
 Date: Jan-09-2019

REF. NO.: 18-733-10

ENCL NO.: 6

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)							
191.1							191	20 40 60 80 100		10 20 30					GR SA SI CL
190.8	TOPSOIL: 300 mm		1	SS	16		191	20 40 60 80 100		10 20 30					
0.3	FILL: clayey silt, trace sand, trace topsoil, some organics, brown to grey, moist, firm to very stiff		2	SS	7		190	20 40 60 80 100		10 20 30					
1			3	SS	16		190	20 40 60 80 100		10 20 30					
2			4	SS	10		189	20 40 60 80 100		10 20 30					
3			5	SS	50/ 150mm		188.8 m Feb 04, 2019	20 40 60 80 100		10 20 30					
3.1	CLAYEY SILT TILL: some sand to sandy, trace gravel, trace cobble/boulders, brown, moist, hard		6	SS	50/ 150mm		188	20 40 60 80 100		10 20 30					
4			7	SS	42		187	20 40 60 80 100		10 20 30					
5	grey below 4.6m		8	SS	53		186	20 40 60 80 100		10 20 30					
6			9	SS	50/ 125mm		185	20 40 60 80 100		10 20 30					
7			10	SS	50/ 125mm		184	20 40 60 80 100		10 20 30					
8			11	SS	50/ 125mm		183	20 40 60 80 100		10 20 30					
9.4	SAND: trace silt, trace clay, brown, moist, very dense		12	SS	50/ 125mm		182	20 40 60 80 100		10 20 30					
10			13	SS	50/ 125mm		181	20 40 60 80 100		10 20 30					
11.8	SILTY SAND TO SANDY SILT: trace clay, brown, moist, very dense		14	SS	50/ 125mm		180	20 40 60 80 100		10 20 30					
12			15	SS	50/ 100mm		179	20 40 60 80 100		10 20 30					
13.6	silt seams below 13.6m		16	SS	50/ 125mm		178	20 40 60 80 100		10 20 30					
14.9	SAND AND GRAVEL: trace silt, trace clay, brown, moist, very dense		17	SS	50/ 125mm		177	20 40 60 80 100		10 20 30					
16.7	wet at 16.7m		18	SS	50/ 125mm		176	20 40 60 80 100		10 20 30					
17.9	CLAYEY SILT: trace sand, brown, moist, hard		19	SS	50/ 100mm		175	20 40 60 80 100		10 20 30					
19.5			20	SS	50/ 100mm		174	20 40 60 80 100		10 20 30					

Continued Next Page

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ = 3% Strain at Failure

10 79 11

DS SOIL LOG 18-733-100 5800 YONGE STREET GPJ DS GDT 19-2-7

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 203 mm

REF. NO.: 18-733-10

Date: Jan-09-2019

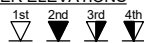
ENCL NO.: 6

BH LOCATION: See Drawing 1

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m										
SHEAR STRENGTH (kPa)															
								20 40 60 80 100	20 40 60 80 100						
								○ UNCONFINED	○ UNCONFINED						
								● QUICK TRIAXIAL	● QUICK TRIAXIAL						
								× LAB VANE	× LAB VANE						

GROUNDWATER ELEVATIONS

Measurement



GRAPH
NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ $\epsilon = 3\%$ Strain at Failure

ENCL NO.: 7

○ **$\epsilon = 3\%$** Strain at Failure

[illegible]

○ $\epsilon = 3\%$ Strain at Failure

PROJECT: Geotechnical Investigation- 5800 Yonge Street
 CLIENT: Life Construction
 PROJECT LOCATION: Toronto, ON
 DATUM: Geodetic
 BH LOCATION: See Drawing 1

DRILLING DATA

Method: Solid Stem Augers
 Diameter: 150 mm
 Date: Jan-08-2019

REF. NO.: 18-733-10

ENCL NO.: 8

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)			
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)							WATER CONTENT (%)		
								20	40	60	80				100	PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W
191.1																	
190.9	ASPHALT: 100 mm		1	SS	9												
190.8	GRANULAR BASE: 200 mm																
190.3	FILL: sand and gravel, trace silt, trace clay, brown, moist, compact		2	SS	39												
189.7	FILL: sandy silt, trace clay, brown, moist, dense		3	SS	66												
189.7	CLAYEY SILT TILL: trace sand, trace gravel, occassional cobble/boulders, brown, moist, hard		4	SS	50/ 25mm												
188	grey below 3.1m		5	SS	50/ 25mm												
186.6	CLAYEY SILT: trace sand, grey, moist, hard		6	SS	80												
184.6	END OF BOREHOLE		7	SS	51												
6.5	Notes: 1) 50 mm dia. monitoring well installed upon completion. 2) Water Level Readings Date Water Depth (mbgs) Feb. 04, 2019 3.4																

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH
NOTES

+ 3 , × 3 : Numbers refer
to Sensitivity

○ = 3% Strain at Failure

PROJECT: Geotechnical Investigation- 5800 Yonge Street
 CLIENT: Life Construction
 PROJECT LOCATION: Toronto, ON
 DATUM: Geodetic
 BH LOCATION: See Drawing 1

DRILLING DATA

Method: Solid Stem Augers
 Diameter: 150 mm
 Date: Jan-08-2019

REF. NO.: 18-733-10

ENCL NO.: 9

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)		WATER CONTENT (%)					
								20 40 60 80 100	20 40 60 80 100	W _P	W	W _L			
190.1			1	SS	8										GR SA SI CL
190.0															
189.2			2	SS	28										
0.9															
			3	SS	30										
			4	SS	44										
			5	SS	30										
			6	SS	21										
184.2			7	SS	50/ 50mm										
5.9															

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH
NOTES

+ 3 , × 3 : Numbers refer
to Sensitivity

○ = 3% Strain at Failure

PROJECT: Geotechnical Investigation- 5800 Yonge Street
 CLIENT: Life Construction
 PROJECT LOCATION: Toronto, ON
 DATUM: Geodetic
 BH LOCATION: See Drawing 1

DRILLING DATA

Method: Solid Stem Augers
 Diameter: 150 mm
 Date: Jan-08-2019

REF. NO.: 18-733-10

ENCL NO.: 10

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		SHEAR STRENGTH (kPa)		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT		POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20 40 60 80 100	20 40 60 80 100	W _p	W	W _L	W _p			
190.5																GR SA SI CL
190.4	TOPSOIL: 75mm		1	SS	7		190									
189.3	FILL: clayey silt mixed with topsoil, trace sand, brown, moist, stiff		2	SS	14		189									
1.2	CLAYEY SILT TILL: trace sand, trace gravel, occasional cobble/boulders, brown, moist, very stiff to hard		3	SS	22		189									
			4	SS	40		188									
			5	SS	25		187									
							186									
	grey below 4.6m		6	SS	16		185									
							184									
	wet sand seams at 6.1m		7	SS	22		183									
183.2	SANDY SILT TILL: trace to some clay, trace gravel, occasional cobble/boulders, grey, moist, very dense		8	SS	70											
182.5																
8.0	END OF BOREHOLE Notes: 1) Borehole dry and open upon completion.															

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ = 3% Strain at Failure

Appendix B: Hydraulic Conductivity Analysis



Slug Test Analysis Report

Project: 5800 Yonge St

Number: 18-733-100

Client: Times Group Corp

Location: 5800 Yonge St.

Slug Test: BH18-1

Test Well: BH18-1

Test Conducted by: DG

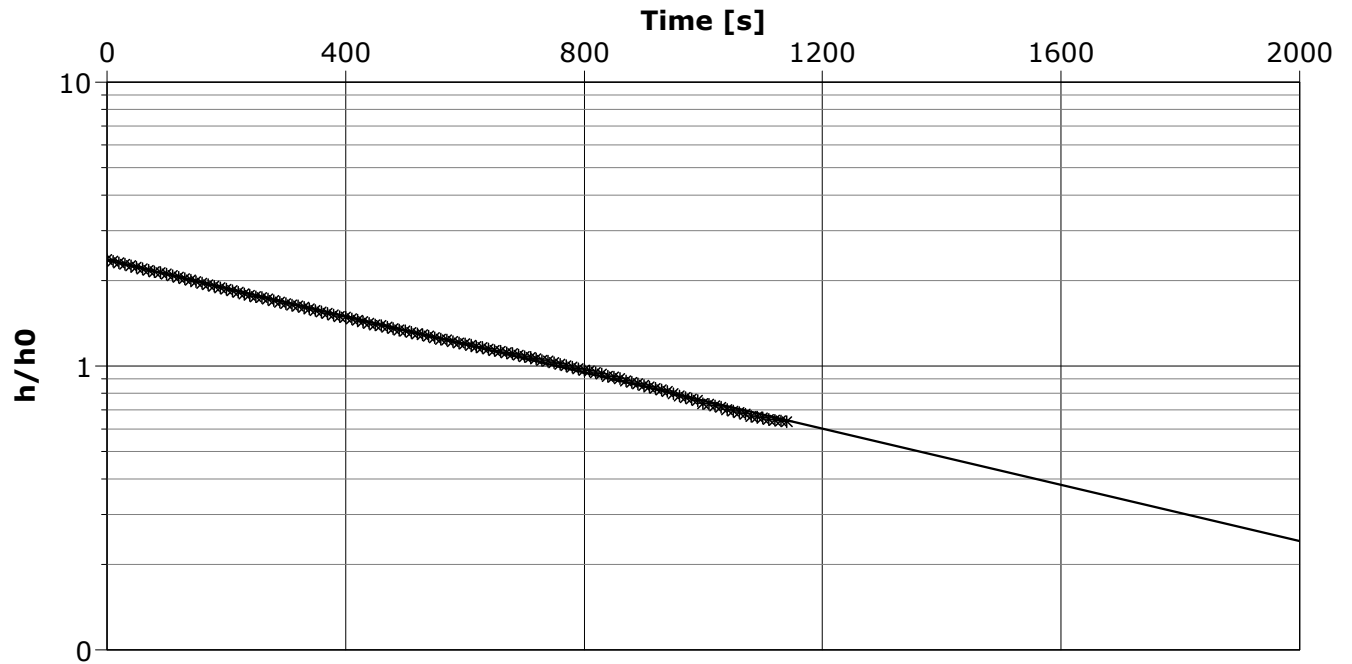
Test Date: 2019-02-04

Analysis Performed by: DG

BH18-1

Analysis Date: 2019-02-06

Aquifer Thickness: 6.12 m



* BH18-1

Calculation using Hvorslev

Observation Well

Hydraulic Conductivity
[m/s]

BH18-1

5.65×10^{-7}



Slug Test Analysis Report

Project: 5800 Yonge St

Number: 18-733-100

Client: Times Group Corp

Location: 5800 Yonge St.

Slug Test: BH18-3

Test Well: BH18-3

Test Conducted by: DG

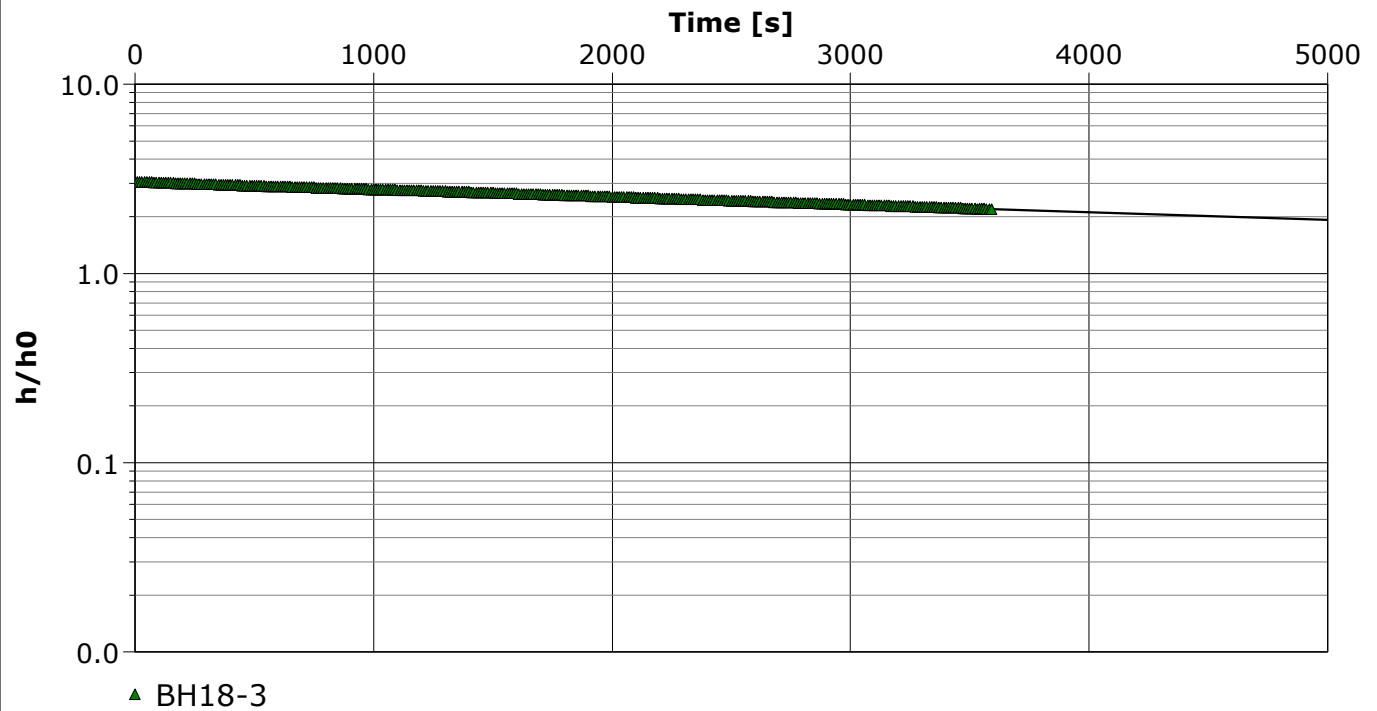
Test Date: 2019-02-04

Analysis Performed by: DG

BH18-3

Analysis Date: 2019-02-06

Aquifer Thickness: 6.35 m



Calculation using Hvorslev

Observation Well

Hydraulic Conductivity
[m/s]

BH18-3

4.56×10^{-8}



Slug Test Analysis Report

Project: 5800 Yonge St

Number: 18-733-100

Client: Times Group Corp

Location: 5800 Yonge St.

Slug Test: BH18-4

Test Well: BH18-4

Test Conducted by: DG

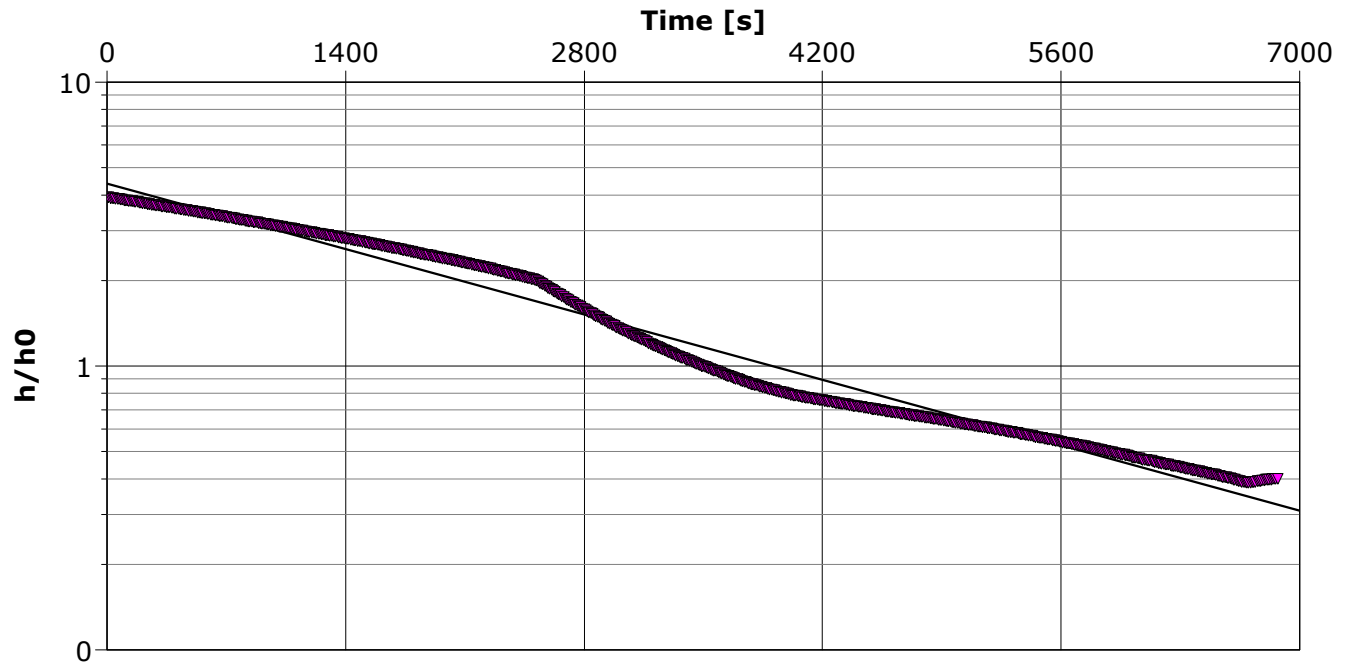
Test Date: 2019-02-04

Analysis Performed by: DG

BH18-4

Analysis Date: 2019-02-06

Aquifer Thickness: 6.20 m



▼ BH18-4

Calculation using Hvorslev

Observation Well

Hydraulic Conductivity
[m/s]

BH18-4

1.88×10^{-7}



Slug Test Analysis Report

Project: 5800 Yonge St

Number: 18-733-100

Client: Times Group Corp

Location: 5800 Yonge St.

Slug Test: BH18-5

Test Well: BH18-5

Test Conducted by: DG

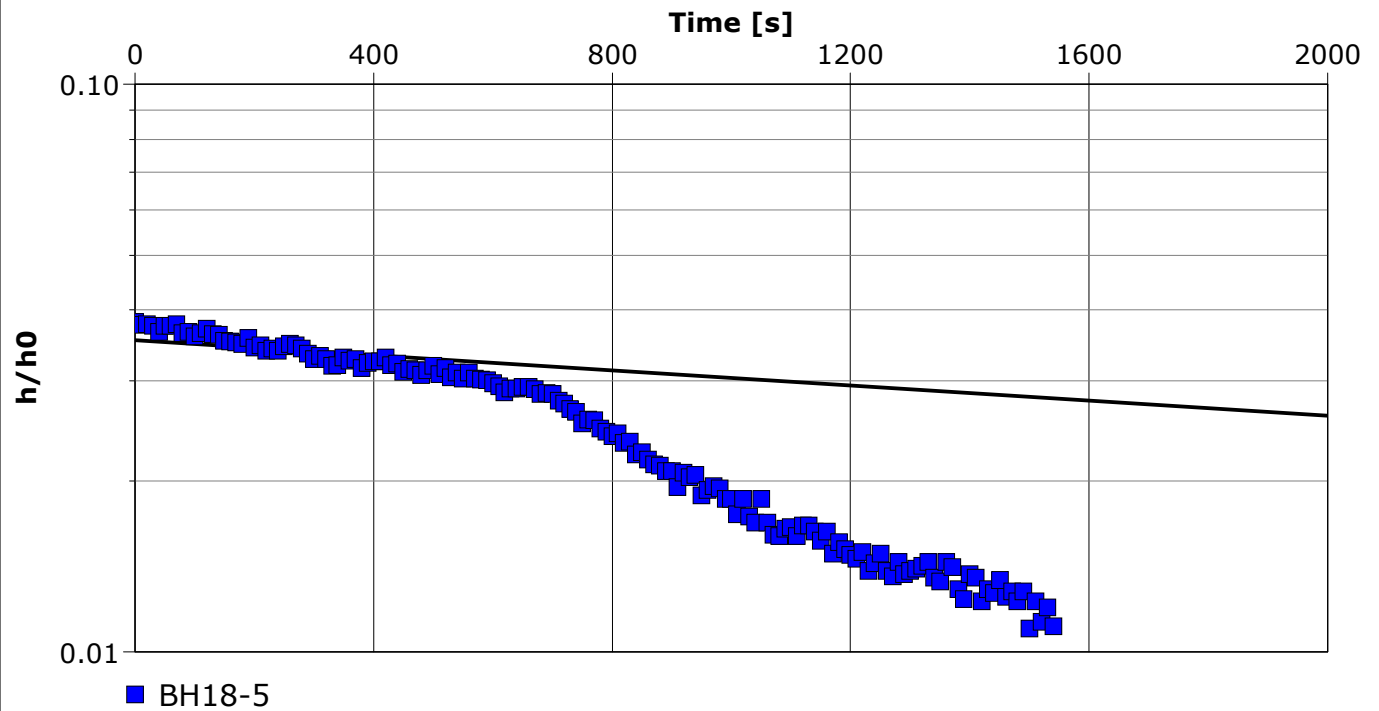
Test Date: 2019-02-04

Analysis Performed by: DG

BH18-5

Analysis Date: 2019-02-06

Aquifer Thickness: 7.08 m



Calculation using Hvorslev

Observation Well

Hydraulic Conductivity
[m/s]

BH18-5

7.56×10^{-8}



Slug Test Analysis Report

Project: 5800 Yonge St

Number: 18-733-100

Client: Times Group Corp

Location: 5800 Yonge St.

Slug Test: BH18-7

Test Well: BH18-7

Test Conducted by: DG

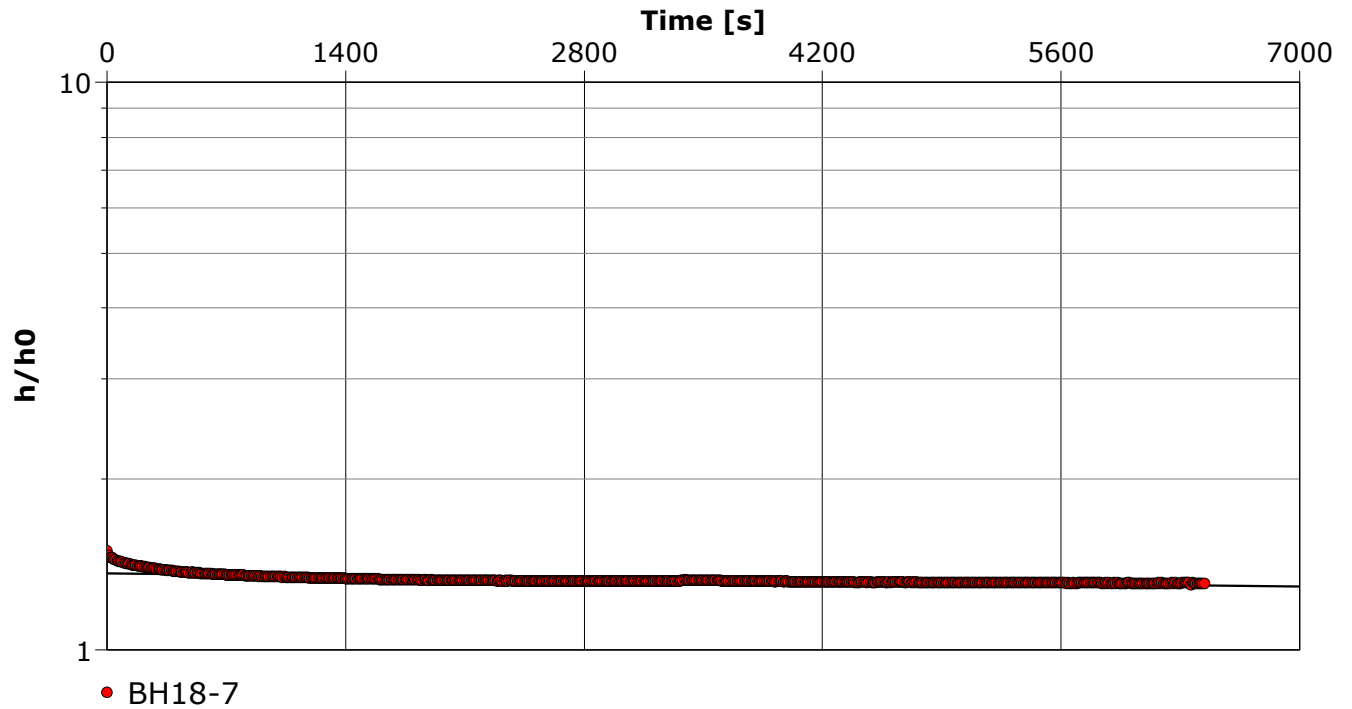
Test Date: 2019-02-04

Analysis Performed by: DG

BH18-7

Analysis Date: 2019-02-06

Aquifer Thickness:



Calculation using Hvorslev

Observation Well

Hydraulic Conductivity
[m/s]

BH18-7

3.74×10^{-9}



Slug Test Analysis Report

Project: 5800 Yonge St

Number: 18-733-100

Client: Times Group Corp

Location: 5800 Yonge St.

Slug Test: BH18-10

Test Well: BH18-10

Test Conducted by: DG

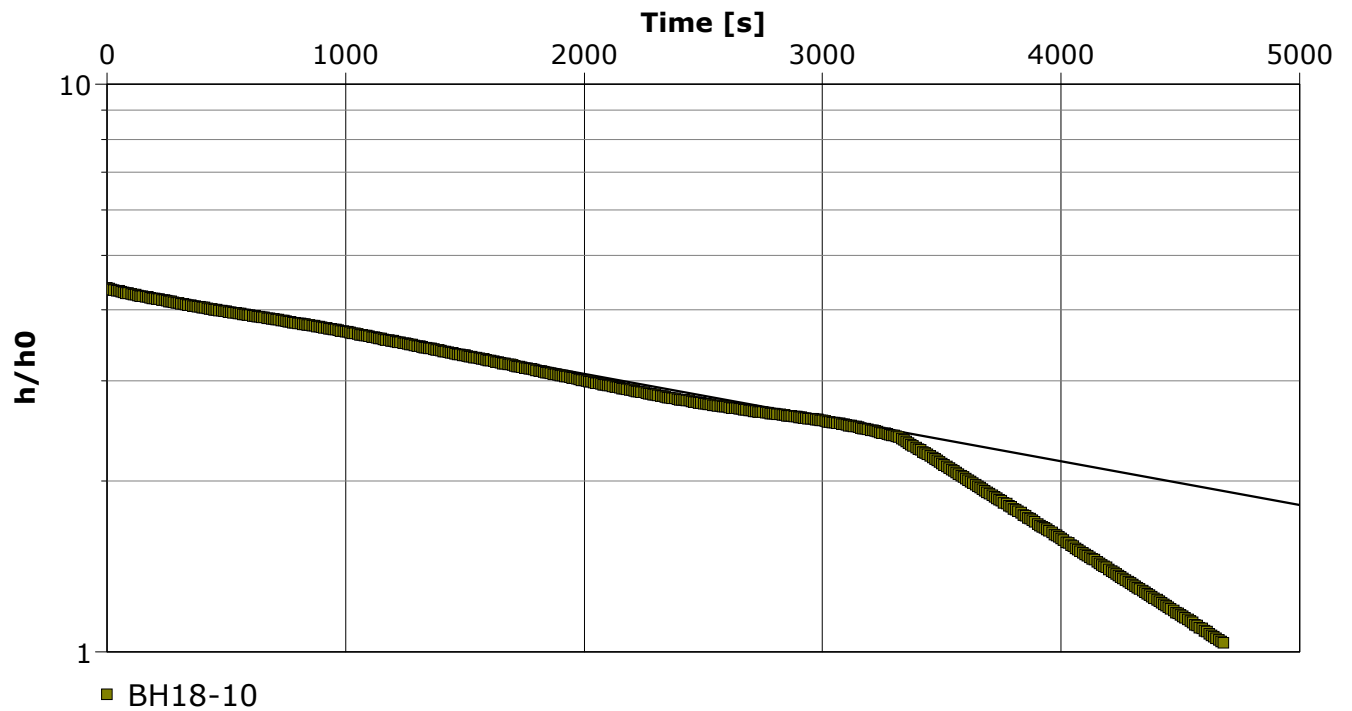
Test Date: 2019-02-04

Analysis Performed by: DG

BH18-1

Analysis Date: 2019-02-11

Aquifer Thickness: 7.13 m



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]
------------------	---------------------------------

BH18-10	8.81×10^{-8}
---------	-----------------------



Slug Test Analysis Report

Project: 5800 Yonge St

Number: 18-733-100

Client: Times Group Corp

Location: 5800 Yonge St.

Slug Test: BH18-6

Test Well: BH18-6

Test Conducted by: DG

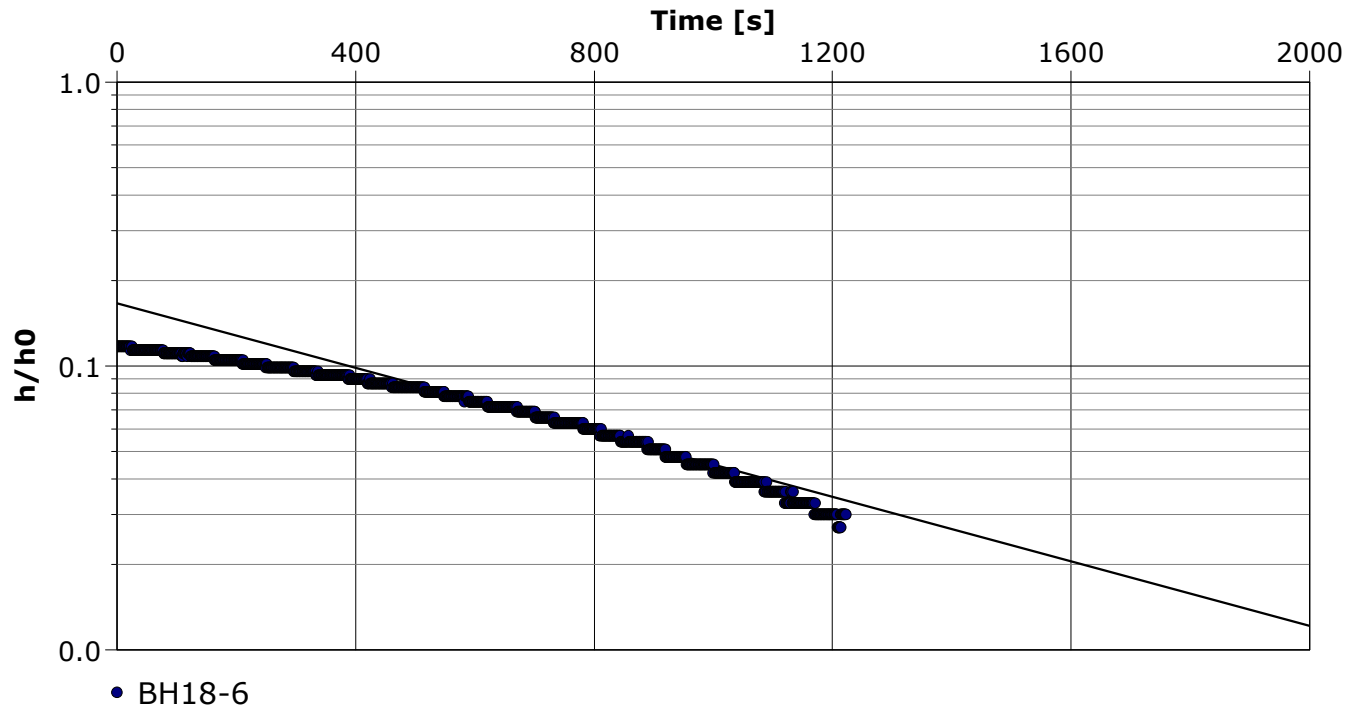
Test Date: 2019-02-04

Analysis Performed by: DG

BH18-6

Analysis Date: 2019-02-22

Aquifer Thickness: 21.60 m



Calculation using Hvorslev

Observation Well

Hydraulic Conductivity
[m/s]

BH18-6

6.48×10^{-7}



Slug Test Analysis Report

Project: 5800 Yonge St

Number: 18-733-100

Client: Times Group Corp

Location: 5800 Yonge St.

Slug Test: BH18-2

Test Well: BH18-2

Test Conducted by: DG

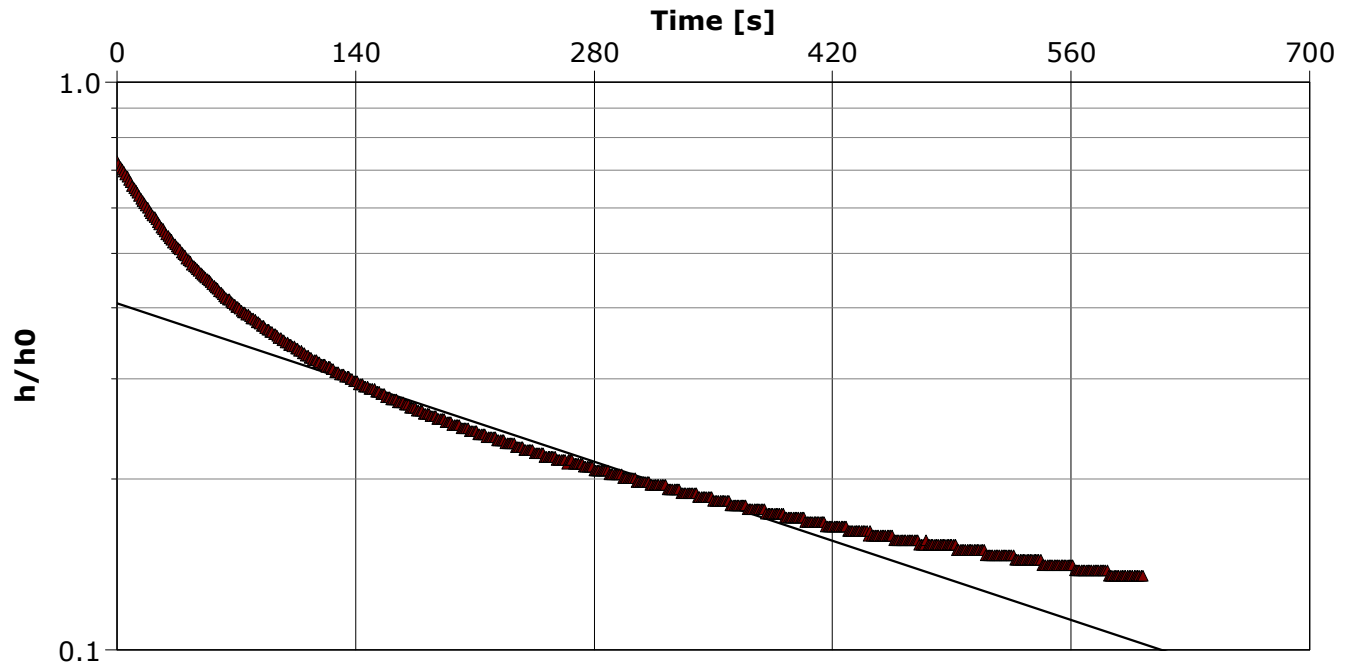
Test Date: 2019-02-04

Analysis Performed by: DG

BH18-2

Analysis Date: 2019-02-22

Aquifer Thickness: 18.50 m



▲ BH18-2

Calculation using Hvorslev

Observation Well

Hydraulic Conductivity
[m/s]

BH18-2

1.13×10^{-6}

Appendix C: Groundwater Quality Certificate of Analysis



DS Consultants (Vaughan)
ATTN: Dorothy Garda
6221 Highway 7
Unit 16
Vaughan ON L4H 0K8

Date Received: 12-MAR-19
Report Date: 19-MAR-19 12:49 (MT)
Version: FINAL

Client Phone: 905-264-9393

Certificate of Analysis

Lab Work Order #: L2243112
Project P.O. #: NOT SUBMITTED
Job Reference: 18-733-100
C of C Numbers: 17-724656
Legal Site Desc:

Amanda Fazekas
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 5730 Coopers Avenue, Unit #26, Mississauga, ON L4Z 2E9 Canada | Phone: +1 905 507 6910 | Fax: +1 905 507 6927
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ANALYTICAL REPORT

Summary of Guideline Exceedances

Guideline		Client ID	Grouping	Analyte	Result	Guideline Limit	Unit						
ALS ID													
Ontario Toronto Sanitary Discharge Sewer By-Law 100-2016 (FEB 4,2016) - Ontario Toronto Sanitary Discharge Sewer By-Law													
(No parameter exceedances)													
Ontario Toronto Sanitary Discharge Sewer By-Law 100-2016 (FEB 4,2016) - Ontario Toronto Storm Sewer By-Law													
L2243112-1	BH18-10	Total Metals	Manganese (Mn)-Total	0.928	0.05	mg/L							
		Polycyclic Aromatic Hydrocarbons	Total PAHs	<3.5	2	ug/L							

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - WATER

		Lab ID	L2243112-1		
		Sample Date	11-MAR-19		
		Sample ID	BH18-10		
		Guide Limits			
Analyte	Unit	#1	#2		
pH	pH units	6.00-11.5	6.0-9.5	6.95	
Total Suspended Solids	mg/L	350	15	6.7	

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law

Guide Limit #2: Ontario Toronto Storm Sewer By-Law

- Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
- Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Anions and Nutrients - WATER

		Lab ID	L2243112-1		
		Sample Date	11-MAR-19		
		Sample ID	BH18-10		
		Guide Limits			
Analyte	Unit	#1	#2		
Fluoride (F)	mg/L	10	-	<0.20 ^{DLDS}	
Total Kjeldahl Nitrogen	mg/L	100	-	0.60	
Phosphorus, Total	mg/L	10	0.4	0.0123	

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law

Guide Limit #2: Ontario Toronto Storm Sewer By-Law

- Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
- Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.



ANALYTICAL REPORT

Cyanides - WATER

		Lab ID	L2243112-1		
		Sample Date	11-MAR-19		
		Sample ID	BH18-10		
		Guide Limits			
Analyte	Unit	#1	#2		
Cyanide, Total	mg/L	2	0.02	<0.020 ^{DLM}	

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law

Guide Limit #2: Ontario Toronto Storm Sewer By-Law

 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.



Environmental

ANALYTICAL REPORT

Bacteriological Tests - WATER

Lab ID L2243112-1
Sample Date 11-MAR-19
Sample ID BH18-10

Guide Limits
#1 #2

Analyte**Unit**

Analyte	Unit	#1	#2
E. Coli	CFU/100m L	-	200

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law**Guide Limit #2: Ontario Toronto Storm Sewer By-Law**

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.


ANALYTICAL REPORT


Total Metals - WATER

		Lab ID		L2243112-1
		Sample Date		11-MAR-19
		Sample ID		BH18-10
		Guide Limits		
Analyte	Unit	#1	#2	
Aluminum (Al)-Total	mg/L	50	-	<0.050 ^{DLHC}
Antimony (Sb)-Total	mg/L	5	-	<0.0010 ^{DLHC}
Arsenic (As)-Total	mg/L	1	0.02	<0.0010 ^{DLHC}
Cadmium (Cd)-Total	mg/L	0.7	0.008	<0.00050 ^{DLHC}
Chromium (Cr)-Total	mg/L	4	0.08	<0.0050 ^{DLHC}
Cobalt (Co)-Total	mg/L	5	-	0.0028 ^{DLHC}
Copper (Cu)-Total	mg/L	2	0.04	<0.010 ^{DLHC}
Lead (Pb)-Total	mg/L	1	0.12	<0.00050 ^{DLHC}
Manganese (Mn)-Total	mg/L	5	0.05	0.928 ^{DLHC}
Mercury (Hg)-Total	mg/L	0.01	0.0004	<0.000010
Molybdenum (Mo)-Total	mg/L	5	-	<0.00050 ^{DLHC}
Nickel (Ni)-Total	mg/L	2	0.08	0.0054 ^{DLHC}
Selenium (Se)-Total	mg/L	1	0.02	<0.00050 ^{DLHC}
Silver (Ag)-Total	mg/L	5	0.12	<0.00050 ^{DLHC}
Tin (Sn)-Total	mg/L	5	-	<0.0010 ^{DLHC}
Titanium (Ti)-Total	mg/L	5	-	<0.0030 ^{DLHC}
Zinc (Zn)-Total	mg/L	2	0.04	<0.030 ^{DLHC}

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law

Guide Limit #2: Ontario Toronto Storm Sewer By-Law

 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.



Environmental

ANALYTICAL REPORT

Speciated Metals - WATER

		Lab ID	L2243112-1	
		Sample Date	11-MAR-19	
		Sample ID	BH18-10	
		Guide Limits		
Analyte	Unit	#1	#2	
Chromium, Hexavalent	mg/L	2	0.04	<0.00050

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law

Guide Limit #2: Ontario Toronto Storm Sewer By-Law

 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.



Environmental

ANALYTICAL REPORT

Aggregate Organics - WATER

		Lab ID	L2243112-1		
		Sample Date	11-MAR-19		
		Sample ID	BH18-10		
		Guide Limits			
Analyte	Unit	#1	#2		
BOD	mg/L	300	15	<2.0	
Oil and Grease, Total	mg/L	-	-	<2.0	
Animal/Veg Oil & Grease	mg/L	150	-	<2.0	
Mineral Oil and Grease	mg/L	15	-	<1.0	
Phenols (4AAP)	mg/L	1.0	0.008	0.0011	

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law**Guide Limit #2: Ontario Toronto Storm Sewer By-Law**

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Volatile Organic Compounds - WATER

		Lab ID		L2243112-1
		Sample Date		11-MAR-19
		Sample ID		BH18-10
		Guide Limits		
Analyte	Unit	#1	#2	
Benzene	ug/L	10	2	<0.50
Chloroform	ug/L	40	2	<1.0
1,2-Dichlorobenzene	ug/L	50	5.6	<0.50
1,4-Dichlorobenzene	ug/L	80	6.8	<0.50
cis-1,2-Dichloroethylene	ug/L	4000	5.6	<0.50
Dichloromethane	ug/L	2000	5.2	<2.0
trans-1,3-Dichloropropene	ug/L	140	-	<0.50
Ethylbenzene	ug/L	160	2	<0.50
1,1,2,2-Tetrachloroethane	ug/L	1400	17	<0.50
Tetrachloroethylene	ug/L	1000	4.4	<0.50
Toluene	ug/L	16	2	<0.50
Trichloroethylene	ug/L	400	7.6	<0.50
o-Xylene	ug/L	-	-	<0.50
m+p-Xylenes	ug/L	-	-	<1.0
Xylenes (Total)	ug/L	1400	4.4	<1.1
Surrogate: 4-Bromofluorobenzene	%	-	-	96.2
Surrogate: 1,4-Difluorobenzene	%	-	-	100.0

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law

Guide Limit #2: Ontario Toronto Storm Sewer By-Law

- Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
- Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.



ANALYTICAL REPORT

Polycyclic Aromatic Hydrocarbons - WATER

		Lab ID	L2243112-1	
		Sample Date	11-MAR-19	
		Sample ID	BH18-10	

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law

Guide Limit #2: Ontario Toronto Storm Sewer By-Law

 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.



Environmental

ANALYTICAL REPORT

Phthalate Esters - WATER

		Lab ID	L2243112-1		
		Sample Date	11-MAR-19		
		Sample ID	BH18-10		
		Guide Limits			
Analyte	Unit	#1	#2		
Bis(2-ethylhexyl)phthalate	ug/L	12	8.8	<2.0	
Surrogate: 2-fluorobiphenyl	%	-	-	90.9	
Surrogate: p-Terphenyl d14	%	-	-	101.3	

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law**Guide Limit #2: Ontario Toronto Storm Sewer By-Law**

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.



Environmental

ANALYTICAL REPORT

Semi-Volatile Organics - WATER

		Lab ID	L2243112-1		
		Sample Date	11-MAR-19		
		Sample ID	BH18-10		
		Guide Limits			
Analyte	Unit	#1	#2		
3,3'-Dichlorobenzidine	ug/L	2	0.8	<0.40	
Di-n-butylphthalate	ug/L	80	15	<1.0	
Surrogate: 2-Fluorobiphenyl	%	-	-	90.9	
Surrogate: p-Terphenyl d14	%	-	-	101.3	

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law**Guide Limit #2: Ontario Toronto Storm Sewer By-Law**

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.




ANALYTICAL REPORT


Phenolics - WATER

		Lab ID	L2243112-1		
		Sample Date	11-MAR-19		
		Sample ID	BH18-10		
		Guide Limits			
Analyte	Unit	#1	#2		
Pentachlorophenol	ug/L	5	2	<0.50	
Surrogate: 2,4,6-Tribromophenol	%	-	-	122.1	

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law

Guide Limit #2: Ontario Toronto Storm Sewer By-Law

 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Polychlorinated Biphenyls - WATER

		Lab ID	L2243112-1	
		Sample Date	11-MAR-19	
		Sample ID	BH18-10	
		Guide Limits		
Analyte	Unit	#1	#2	
Aroclor 1242	ug/L	-	-	<0.020
Aroclor 1248	ug/L	-	-	<0.020
Aroclor 1254	ug/L	-	-	<0.020
Aroclor 1260	ug/L	-	-	<0.020
Total PCBs	ug/L	1	0.4	<0.040
Surrogate: 2-Fluorobiphenyl	%	-	-	93.1

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law

Guide Limit #2: Ontario Toronto Storm Sewer By-Law

- Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
- Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.




ANALYTICAL REPORT


Organic Parameters - WATER

		Lab ID	L2243112-1		
		Sample Date	11-MAR-19		
		Sample ID	BH18-10		
		Guide Limits			
Analyte	Unit	#1	#2		
Nonylphenol	ug/L	20	1	<1.0	
Nonylphenol Diethoxylates	ug/L	-	-	0.14	
Total Nonylphenol Ethoxylates	ug/L	200	10	<2.0	
Nonylphenol Monoethoxylates	ug/L	-	-	<2.0	

Guide Limit #1: Ontario Toronto Sanitary Discharge Sewer By-Law

Guide Limit #2: Ontario Toronto Storm Sewer By-Law

 Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Reference Information

L2243112 CONT'D....
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Additional Comments for Sample Listed:

Sample Number	Matrix	Report Remarks	Sample Comments
L2243112-1	Water	Note: RRR; Reporting limit has been adjusted based on lower instrument responses	

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
RRR	Refer to Report Remarks for issues regarding this analysis

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
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625-33DCBENZIDINE-WT Water 3,3-Dichlorobenzidine SW846 8270

Aqueous samples are extracted and extracts are analyzed on GC/MSD.

625-BIS-2-PHTH-WT Water Bis(2-ethylhexyl)phthalate SW846 8270

Aqueous samples are extracted and extracts are analyzed on GC/MSD.

625-DNB-PHTH-WT Water Di-n-Butyl Phthalate SW846 8270

Aqueous samples are extracted and extracts are analyzed on GC/MSD.

625-PAH-LOW-WT Water EPA 8270 PAH (Low Level) SW846 8270

Aqueous samples are extracted and extracts are analyzed on GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

625-PCP-WT Water Pentachlorophenol SW846 8270

BOD-WT Water BOD APHA 5210 B

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

CN-TOT-WT Water Cyanide, Total ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

CR-CR6-IC-WT Water Chromium +6 EPA 7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Chromium (III) is calculated as the difference between the total chromium and the chromium (VI) results.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
EC-WW-MF-WT	Water	E. Coli	SM 9222D
A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 °C for 24 – 2 h. Method ID: WT-TM-1200			
F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
NP,NPE-LCMS-WT	Water	Nonylphenols and Ethoxylates by LC/MS-MS	J. Chrom A849 (1999) p.467-482
Water samples are filtered and analyzed on LCMS/MS by direct injection.			
OGG-SPEC-CALC-WT	Water	Speciated Oil and Grease A/V Calc	CALCULATION
Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.			
OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B
The procedure involves an extraction of the entire water sample with hexane. Sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.			
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.			
PAH-EXTRA-WT	Water	Sanitary Sewer Use By-Law Additional PAH	SW846 8270
PAH-SUM-CALC-WT	Water	TOTAL PAH's	CALCULATION
Total PAH represents the sum of all PAH analytes reported for a given sample. Note that regulatory agencies and criteria differ in their definitions of Total PAH in terms of the individual PAH analytes to be included.			
PCB-WT	Water	Polychlorinated Biphenyls	EPA 8082
PCBs are extracted from an aqueous sample at neutral pH with aliquots of dichloromethane using a modified separatory funnel technique. The extracts are analyzed by GC/MSD.			
PH-WT	Water	pH	APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.			

Reference Information

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Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days			
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.			
TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D
This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.			
VOC-ROU-HS-WT	Water	Volatile Organic Compounds	SW846 8260
Aqueous samples are analyzed by headspace-GC/MS.			
XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION
Total xylenes represents the sum of o-xylene and m&p-xylene.			

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

17-724656

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Reference Information

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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.



Environmental

Quality Control Report

Workorder: L2243112

Report Date: 19-MAR-19

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Client: DS Consultants (Vaughan)
6221 Highway 7 Unit 16
Vaughan ON L4H 0K8

Contact: Dorothy Garda

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
625-33DCBENZIDINE-WT Water								
Batch	R4563568							
WG3005132-2	LCS							
3,3'-Dichlorobenzidine			82.9		%		50-140	14-MAR-19
WG3005132-1	MB							
3,3'-Dichlorobenzidine			<0.40		ug/L		0.4	14-MAR-19
Surrogate: p-Terphenyl d14			114.5		%		40-130	14-MAR-19
625-BIS-2-PHTH-WT Water								
Batch	R4563568							
WG3005132-2	LCS							
Bis(2-ethylhexyl)phthalate			132.5		%		50-140	14-MAR-19
WG3005132-1	MB							
Bis(2-ethylhexyl)phthalate			<2.0		ug/L		2	14-MAR-19
Surrogate: 2-fluorobiphenyl			81.7		%		40-130	14-MAR-19
Surrogate: p-Terphenyl d14			114.5		%		40-130	14-MAR-19
625-DNB-PHTH-WT Water								
Batch	R4563568							
WG3005132-2	LCS							
Di-n-butylphthalate			119.2		%		50-150	14-MAR-19
WG3005132-1	MB							
Di-n-butylphthalate			<1.0		ug/L		1	14-MAR-19
Surrogate: 2-Fluorobiphenyl			81.7		%		40-130	14-MAR-19
Surrogate: p-Terphenyl d14			114.5		%		40-130	14-MAR-19
625-PAH-LOW-WT Water								
Batch	R4564230							
WG3005132-2	LCS							
Acenaphthene			104.7		%		50-140	14-MAR-19
Anthracene			105.4		%		50-140	14-MAR-19
Benzo(a)anthracene			109.4		%		50-140	14-MAR-19
Benzo(a)pyrene			104.3		%		60-130	14-MAR-19
Benzo(b)fluoranthene			94.1		%		50-140	14-MAR-19
Benzo(ghi)perylene			107.5		%		50-140	14-MAR-19
Benzo(k)fluoranthene			123.9		%		50-140	14-MAR-19
Chrysene			109.2		%		50-140	14-MAR-19
Dibenzo(a,h)anthracene			106.5		%		50-140	14-MAR-19
Fluoranthene			108.8		%		50-140	14-MAR-19
Fluorene			110.3		%		50-140	14-MAR-19
Indeno(1,2,3-cd)pyrene			113.2				50-140	

Quality Control Report

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Client: DS Consultants (Vaughan)
6221 Highway 7 Unit 16
Vaughan ON L4H 0K8

Contact: Dorothy Garda

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT		Water						
Batch	R4559871							
WG3004984-2	LCS							
Aluminum (Al)-Total			96.3		%		80-120	12-MAR-19
Antimony (Sb)-Total			99.97		%		80-120	12-MAR-19
Arsenic (As)-Total			94.5		%		80-120	12-MAR-19
Cadmium (Cd)-Total			95.8		%		80-120	12-MAR-19
Chromium (Cr)-Total			94.8		%		80-120	12-MAR-19
Cobalt (Co)-Total			95.5		%		80-120	12-MAR-19
Copper (Cu)-Total			95.8		%		80-120	12-MAR-19
Lead (Pb)-Total			97.3		%		80-120	12-MAR-19
Manganese (Mn)-Total			97.0		%		80-120	12-MAR-19
Molybdenum (Mo)-Total			97.0		%		80-120	12-MAR-19
Nickel (Ni)-Total			96.1		%		80-120	12-MAR-19
Selenium (Se)-Total			94.5		%		80-120	12-MAR-19
Silver (Ag)-Total			95.9		%		80-120	12-MAR-19
Tin (Sn)-Total			97.3		%		80-120	12-MAR-19
Titanium (Ti)-Total			94.4		%		80-120	12-MAR-19
Zinc (Zn)-Total			92.0		%		80-120	12-MAR-19
WG3004984-1	MB							
Aluminum (Al)-Total			<0.0050		mg/L		0.005	12-MAR-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	12-MAR-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	12-MAR-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	12-MAR-19
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	12-MAR-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	12-MAR-19
Copper (Cu)-Total			<0.0010		mg/L		0.001	12-MAR-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	12-MAR-19
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	12-MAR-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	12-MAR-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	12-MAR-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	12-MAR-19
Silver (Ag)-Total			<0.000050		mg/L		0.00005	12-MAR-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	12-MAR-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	12-MAR-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	12-MAR-19
WG3004984-5	MS	WG3004984-6						

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Workorder: L2243112

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Client: DS Consultants (Vaughan)
6221 Highway 7 Unit 16
Vaughan ON L4H 0K8

Contact: Dorothy Garda

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT		Water						
Batch	R4559871							
WG3004984-5 MS		WG3004984-6						
Aluminum (Al)-Total			103.2		%		70-130	12-MAR-19
Antimony (Sb)-Total			99.2		%		70-130	12-MAR-19
Arsenic (As)-Total			99.0		%		70-130	12-MAR-19
Cadmium (Cd)-Total			90.3		%		70-130	12-MAR-19
Chromium (Cr)-Total			100.9		%		70-130	12-MAR-19
Cobalt (Co)-Total			98.5		%		70-130	12-MAR-19
Copper (Cu)-Total			92.2		%		70-130	12-MAR-19
Lead (Pb)-Total			87.9		%		70-130	12-MAR-19
Manganese (Mn)-Total			N/A	MS-B	%		-	12-MAR-19
Molybdenum (Mo)-Total			102.5		%		70-130	12-MAR-19
Nickel (Ni)-Total			95.1		%		70-130	12-MAR-19
Selenium (Se)-Total			97.8		%		70-130	12-MAR-19
Silver (Ag)-Total			84.0		%		70-130	12-MAR-19
Tin (Sn)-Total			97.8		%		70-130	12-MAR-19
Titanium (Ti)-Total			106.6		%		70-130	12-MAR-19
Zinc (Zn)-Total			77.0		%		70-130	12-MAR-19
NP,NPE-LCMS-WT		Water						
Batch	R4567753							
WG3006894-3 DUP		WG3006894-5						
Nonylphenol		<1.0	<1.0	RPD-NA	ug/L	N/A	30	15-MAR-19
Nonylphenol Monoethoxylates		<10	<10	RPD-NA	ug/L	N/A	30	15-MAR-19
Nonylphenol Diethoxylates		<0.50	<0.50	RPD-NA	ug/L	N/A	30	15-MAR-19
WG3006894-2 LCS								
Nonylphenol			87.2		%		75-125	15-MAR-19
Nonylphenol Monoethoxylates			93.0		%		75-125	15-MAR-19
Nonylphenol Diethoxylates			101.0		%		75-125	15-MAR-19
WG3006894-1 MB								
Nonylphenol			<1.0		ug/L		1	15-MAR-19
Nonylphenol Monoethoxylates			<2.0		ug/L		2	15-MAR-19
Nonylphenol Diethoxylates			<0.10		ug/L		0.1	15-MAR-19
WG3006894-4 MS		WG3006894-5						
Nonylphenol			96.4		%		50-150	15-MAR-19
Nonylphenol Monoethoxylates			136.7		%		50-150	15-MAR-19
Nonylphenol Diethoxylates			99.4		%		50-150	15-MAR-19



Environmental

Quality Control Report

Workorder: L2243112

Report Date: 19-MAR-19

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Client: DS Consultants (Vaughan)
6221 Highway 7 Unit 16
Vaughan ON L4H 0K8

Contact: Dorothy Garda

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
OGG-SPEC-WT		Water						
Batch	R4569571							
WG3008450-2	LCS							
Oil and Grease, Total			94.4		%		70-130	18-MAR-19
Mineral Oil and Grease			88.6		%		70-130	18-MAR-19
WG3008450-1	MB							
Oil and Grease, Total			<2.0		mg/L		2	18-MAR-19
Mineral Oil and Grease			<1.0		mg/L		1	18-MAR-19
P-T-COL-WT		Water						
Batch	R4567388							
WG3006769-3	DUP	L2243274-1						
Phosphorus, Total		0.0319	0.0334		mg/L	4.5	20	15-MAR-19
WG3006769-2	LCS							
Phosphorus, Total			101.5		%		80-120	15-MAR-19
WG3006769-1	MB							
Phosphorus, Total			<0.0030		mg/L		0.003	15-MAR-19
WG3006769-4	MS	L2243274-1						
Phosphorus, Total			78.6		%		70-130	15-MAR-19
PAH-EXTRA-WT		Water						
Batch	R4563268							
WG3005132-2	LCS							
Benzo(e)pyrene			101.0	LCS-H	%		60-130	14-MAR-19
1,3-Dinitropyrene			146.2		%		60-130	14-MAR-19
1,6-Dinitropyrene			127.4		%		60-130	14-MAR-19
Dibenz(a,h)acridine			126.0		%		60-130	14-MAR-19
1,8-Dinitropyrene			98.4		%		60-130	14-MAR-19
Dibenz(a,j)acridine			93.2		%		60-130	14-MAR-19
7H-Dibenzo(c,g)carbazole			122.9		%		60-130	14-MAR-19
Dibenzo(a,i)pyrene			86.7		%		60-130	14-MAR-19
WG3005132-1	MB							
Benzo(e)pyrene			<0.050		ug/L		0.05	14-MAR-19
1,3-Dinitropyrene			<1.0		ug/L		1	14-MAR-19
1,6-Dinitropyrene			<1.0		ug/L		1	14-MAR-19
Dibenz(a,h)acridine			<0.050		ug/L		0.05	14-MAR-19
1,8-Dinitropyrene			<1.0		ug/L		1	14-MAR-19
Dibenz(a,j)acridine			<0.050		ug/L		0.05	14-MAR-19
7H-Dibenzo(c,g)carbazole			<0.050		ug/L		0.05	14-MAR-19
Dibenzo(a,i)pyrene			<0.050		ug/L		0.05	14-MAR-19



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Client: DS Consultants (Vaughan)
6221 Highway 7 Unit 16
Vaughan ON L4H 0K8

Contact: Dorothy Garda

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT		Water						
Batch	R4567980							
WG3007132-3 DUP		L2242974-2						
Total Suspended Solids		3060	2600		mg/L	16	20	18-MAR-19
WG3007132-2 LCS								
Total Suspended Solids			100.7		%		85-115	18-MAR-19
WG3007132-1 MB								
Total Suspended Solids			<2.0		mg/L		2	18-MAR-19
TKN-WT		Water						
Batch	R4567143							
WG3006258-3 DUP		L2242644-1						
Total Kjeldahl Nitrogen		11.6	11.6		mg/L	0.5	20	14-MAR-19
WG3006258-2 LCS								
Total Kjeldahl Nitrogen			104.2		%		75-125	14-MAR-19
WG3006258-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	14-MAR-19
WG3006258-4 MS		L2242644-1						
Total Kjeldahl Nitrogen			N/A	MS-B	%		-	14-MAR-19
VOC-ROU-HS-WT		Water						
Batch	R4563027							
WG3001900-4 DUP		WG3001900-3						
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-MAR-19
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-MAR-19
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-MAR-19
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-MAR-19
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-MAR-19
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-MAR-19
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	14-MAR-19
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-MAR-19
m+p-Xylenes		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-MAR-19
o-Xylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-MAR-19
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-MAR-19
Toluene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-MAR-19
trans-1,3-Dichloropropene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-MAR-19
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-MAR-19
WG3001900-1 LCS								
1,1,2,2-Tetrachloroethane			97.1		%		70-130	14-MAR-19
1,2-Dichlorobenzene			108.8		%		70-130	14-MAR-19

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Client: DS Consultants (Vaughan)
6221 Highway 7 Unit 16
Vaughan ON L4H 0K8

Contact: Dorothy Garda

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R4563027							
WG3001900-1 LCS								
1,4-Dichlorobenzene			111.8		%		70-130	14-MAR-19
Benzene			111.4		%		70-130	14-MAR-19
Chloroform			109.3		%		70-130	14-MAR-19
cis-1,2-Dichloroethylene			101.3		%		70-130	14-MAR-19
Dichloromethane			103.5		%		70-130	14-MAR-19
Ethylbenzene			104.1		%		70-130	14-MAR-19
m+p-Xylenes			105.7		%		70-130	14-MAR-19
o-Xylene			102.7		%		70-130	14-MAR-19
Tetrachloroethylene			110.3		%		70-130	14-MAR-19
Toluene			104.4		%		70-130	14-MAR-19
trans-1,3-Dichloropropene			102.2		%		70-130	14-MAR-19
Trichloroethylene			114.7		%		70-130	14-MAR-19
WG3001900-2 MB								
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	14-MAR-19
1,2-Dichlorobenzene			<0.50		ug/L		0.5	14-MAR-19
1,4-Dichlorobenzene			<0.50		ug/L		0.5	14-MAR-19
Benzene			<0.50		ug/L		0.5	14-MAR-19
Chloroform			<1.0		ug/L		1	14-MAR-19
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	14-MAR-19
Dichloromethane			<2.0		ug/L		2	14-MAR-19
Ethylbenzene			<0.50		ug/L		0.5	14-MAR-19
m+p-Xylenes			<1.0		ug/L		1	14-MAR-19
o-Xylene			<0.50		ug/L		0.5	14-MAR-19
Tetrachloroethylene			<0.50		ug/L		0.5	14-MAR-19
Toluene			<0.50		ug/L		0.5	14-MAR-19
trans-1,3-Dichloropropene			<0.50		ug/L		0.5	14-MAR-19
Trichloroethylene			<0.50		ug/L		0.5	14-MAR-19
Surrogate: 1,4-Difluorobenzene			100.9		%		70-130	14-MAR-19
Surrogate: 4-Bromofluorobenzene			96.3		%		70-130	14-MAR-19
WG3001900-5 MS		WG3001900-3						
1,1,2,2-Tetrachloroethane			107.4		%		50-150	14-MAR-19
1,2-Dichlorobenzene			107.8		%		50-150	14-MAR-19
1,4-Dichlorobenzene			107.2		%		50-150	14-MAR-19
Benzene			112.1		%		50-150	14-MAR-19



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Client: DS Consultants (Vaughan)
6221 Highway 7 Unit 16
Vaughan ON L4H 0K8

Contact: Dorothy Garda

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R4563027							
WG3001900-5	MS	WG3001900-3						
Chloroform			111.7		%		50-150	14-MAR-19
cis-1,2-Dichloroethylene			102.4		%		50-150	14-MAR-19
Dichloromethane			106.3		%		50-150	14-MAR-19
Ethylbenzene			100.8		%		50-150	14-MAR-19
m+p-Xylenes			102.1		%		50-150	14-MAR-19
o-Xylene			100.6		%		50-150	14-MAR-19
Tetrachloroethylene			104.6		%		50-150	14-MAR-19
Toluene			102.1		%		50-150	14-MAR-19
trans-1,3-Dichloropropene			98.6		%		50-150	14-MAR-19
Trichloroethylene			111.1		%		50-150	14-MAR-19

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Workorder: L2243112

Report Date: 19-MAR-19

Client: DS Consultants (Vaughan)
6221 Highway 7 Unit 16
Vaughan ON L4H 0K8

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Contact: Dorothy Garda

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
J	Duplicate results and limits are expressed in terms of absolute difference.
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



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WHITE - LABORATORY COPY YELLOW - CLIENT COPY

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

JULY 2012 GROWTH

Appendix D: MECP Water Wells Records

18-733-30

5800 Yonge Street, North York , ON

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
NORTH YORK BOROUGH	17 627569 4847581 W	2008/02 6607	2.00	FR 0030		MO		7111504 (M01274) A059254	BRWN FILL 0008 BRWN TILL GRVL DNSE 0013 GREY TILL SILT 0016 GREY SILT TILL DNSE 0020 GREY SAND SILT LOOS 0035
NORTH YORK BOROUGH	17 627415 4849557 W	2010/09 7215	2			TH	0025 15	7153332 (Z121765) A103131	BRWN FILL WBRG 0004 BRWN SILT CLAY DRY 0010 BRWN SILT SAND DRY 0040
NORTH YORK BOROUGH	17 627398 4849485 W	2012/08 7218						7188477 (C19331) A136190 P	
NORTH YORK BOROUGH	17 627344 4849284 W	2012/12 6032	2			MO	0010 10	7196426 (Z158130) A102117	GREY CLAY SILT DNSE 0015 GREY CLAY SILT DNSE 0020
NORTH YORK BOROUGH	17 627263 4849290 W	2013/03 7501	2	UT		MT	0055 10	7200295 (Z165098) A143165	BRWN SILT CLAY SAND 0008 GREY SILT CLAY DNSE 0030 BRWN SAND SILT DNSE 0035 BRWN SILT SAND DNSE 0060 GREY SILT CLAY DNSE 0065
NORTH YORK BOROUGH	17 627264 4849281 W	2013/04 7501	2			MT	0070 10	7202744 (Z165053) A143109	BRWN CLAY SILT DNSE 0030 BRWN SAND MGRD 0032 GREY SILT SAND DNSE 0065 GREY SILT CLAY DNSE 0080
NORTH YORK BOROUGH	17 627270 4849219 W	2012/07 7215						7205371 (C19348) A128792 P	
NORTH YORK BOROUGH	17 627392 4849466 W	2013/10 7147	1.97	FR 0011			0004 10	7209536 (Z171606) A	
NORTH YORK BOROUGH	17 627414 4849501 W	2013/10 7147	1.97	FR 0011			0004 10	7209537 (Z171607) A118428 A	
NORTH YORK BOROUGH	17 627272 4849274 W	2013/10 7472	2.04			MO	0015 10	7211775 (Z181825) A158415	BRWN FSND FILL LOOS 0005 BRWN SILT CLAY DNSE 0025
NORTH YORK BOROUGH	17 627278 4849298 W	2013/10 7472	2.04			MO	0015 10	7211776 (Z181817) A158414	BRWN FSND FILL LOOS 0005 BRWN SILT CLAY DNSE 0025
NORTH YORK BOROUGH	17 627315 4849297 W	2013/10 7472	2.04			MO	0060 10	7211777 (Z181826) A158413	BRWN FSND FILL LOOS 0005 BRWN SILT CLAY DNSE 0034 BRWN FSND SILT DNSE 0070
NORTH YORK BOROUGH	17 627319 4849299 W	2013/10 7472	2.04			MO	0015 10	7211778 (Z181815) A158418	BRWN FSND FILL LOOS 0005 BRWN SILT CLAY DNSE 0025
NORTH YORK BOROUGH	17 627334 4849311 W	2013/10 7472	2.04			MO	0015 10	7211779 (Z181814) A158417	BRWN FSND FILL LOOS 0005 BRWN SILT CLAY DNSE 0025
NORTH YORK BOROUGH	17 627340 4849321 W	2013/10 7472	2.04			MO	0060 10	7211780 (Z181813) A158416	BRWN FSND FILL LOOS 0005 BRWN SILT CLAY DNSE 0035 BRWN FSND SILT DNSE 0070
NORTH YORK BOROUGH	17 627392 4849469 W	2013/09 6988						7214927 (C20118) A118428 P	
NORTH YORK BOROUGH	17 627531 4849401 W	2013/06 7230						7216786 (C23273) A139271 P	
NORTH YORK BOROUGH	17 627294 4848799 W	2014/12 6988	2.00			TH	0042 10	7238895 (Z199440) A174899	BRWN FILL LOOS 0005 BRWN CLAY SILT TILL 0020 GREY CLAY SILT TILL 0052
NORTH YORK BOROUGH	17 627269 4849279 W	2015/02 7472	2.04			MO	0080 10	7239035 (Z208532) A179678	BRWN LOAM GRVL LOOS 0010 GREY SILT CLAY PCKD 0025 BRWN MSND PCKD 0065 GREY SILT STNS DNSE 0090
NORTH YORK BOROUGH	17 627310 4849301 W	2015/02 7472	2.04			MO	0085 10	7239036 (Z208533) A179679	BRWN LOAM GRVL FILL 0010 GREY SILT CLAY PCKD 0025 BRWN MSND PCKD 0065 GREY SILT STNS DNSE 0095

NORTH YORK BOROUGH	17 627338 4849328 W	2015/02 7472	2.04			MO	0008 82	7239037 (Z208534) A179680	BRWN LOAM GRVL FILL 0010 GREY SILT CLAY PCKD 0025 BRWN MSND PCKD 0065 GREY SILT STNS DNSE 0090
NORTH YORK BOROUGH	17 626869 4849043 W	2015/03 6902	2.00			MO	0010 5	7240218 (Z204745) A174860	BLCK DNSE 0000 GREY SAND GRVL 0002 BRWN FILL SAND CLAY 0005 BRWN CLAY SLTY SOFT 0015
NORTH YORK BOROUGH	17 627287 4848791 W	2015/05 6988						7248026 (C27479) A174918 P	
NORTH YORK BOROUGH	17 627398 4849556 W	2015/07 6032	1.79	UT 0040		MO	0055 10	7248166 (Z194283) A181478	BRWN SAND GRVL DNSE 0040 GREY SAND SILT DNSE 0057 GREY SAND 0070
NORTH YORK BOROUGH	17 627297 4849327 W	2014/08 7215	2			TH	0014 10	7253048 (Z178760) A172177	BRWN FILL 0002 BRWN SAND 0010 BRWN SILT CLAY 0014
NORTH YORK BOROUGH	17 627463 4849380 W	2016/03 6032	1.97	UT 0118		MT	0115 10	7262407 (Z206892) A194321	BRWN CLAY DNSE 0039 BRWN SAND DNSE 0098 GREY SAND 0125
NORTH YORK BOROUGH	17 626869 4849043 W	2016/05 6902				MO		7264598 (Z211025) A174860 A	
NORTH YORK BOROUGH	17 627493 4849242 W	2016/06 6032	2			MO	0104 10	7281524 (Z206947) A202418	BRWN SAND SILT SOFT 0007 BRWN SILT SAND DNSE 0090 GREY SAND SILT DNSE 0114
NORTH YORK BOROUGH	17 627337 4849607 W	2016/07 7230	2.04	FR		TH MO	0050 10	7282166 (Z247266) A209436	BRWN FILL SAND LOOS 0016 BRWN SILT SAND DNSE 0025 BRWN SAND CLAY DNSE 0030 BRWN SILT SAND DNSE 0060
NORTH YORK BOROUGH	17 627168 4848784 W	2016/10 7230						7282187 (C36610) A217106 P	