

**Hydro-geological Site Assessment
Proposed Mixed Commercial and
Residential Development
17 St. Andrew Street
Toronto, Ontario**

Prepared for
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1. Introduction

This report presents the results of a hydro-geological study carried out in the property located at 17 St. Andrew Street in Toronto, Ontario.

The project involves the proposed design and construction of a five (5) storey building plus rooftop mechanical and amenity level (6 storey) and; surface paved parking area and driveway. The proposed mixed use building will also have one (1) basement level and one (1) sunken courtyard. The preliminary site plan shows the basement floor slab will be placed at approximately 3.6 m below road grade on St. Andrew Street.

The Site is currently occupied in parts by a two (2) storey mixed residential and commercial building, surface paved parking area and driveway. The existing on-site building will be demolished to accommodate the construction of the proposed building.

The hydro-geological site assessment was carried out in conjunction with the geotechnical investigation. Results of the geotechnical investigation are provided under separate cover.

The purpose of this hydro-geological study was to confirm whether or not groundwater will need to be pumped as part of the building design, to determine the elevations of the groundwater level, the quality and quantity of groundwater proposed to be discharged to a City sewer and, the proposed groundwater discharge method.

2. Site Conditions

2.1 Site Locations and Descriptions

The Site is located on the south side of St. Andrew Street, approximately 80 m west of Spadina Street, in Toronto, Ontario. It is located in a mixed residential and commercial neighborhood.

The Site is currently occupied in parts by a two (2) storey mixed residential and commercial building, surface paved parking area and driveway. The existing on-site building will be demolished to accommodate the construction of the proposed building.

2.2 Site Topography and Drainage

The Site and surrounding lands consist of an urban area of the City of Toronto. The Site is generally flat with an approximate ground surface at \pm El. 98.5 m. There are no permanent water courses present on the Site. Storm water at the Site is expected to drain towards the catch basins located within the Site and on municipal roads adjacent to the Site.

2.3 Site Geology and Hydrogeology

The following topographic, geological and soil maps were reviewed:

- Topographical Map published by Natural Resources Canada dated 2015.
- "Quaternary Geology of Ontario" – Southern Sheet, Map 2556.
- "Bedrock Geology of Ontario" – Southern Sheet, Map 2554.
- "Metropolitan Toronto Bedrock Elevation Bedrock Contour" - Preliminary Map 102, dated 1961

The general area of the Site was developed for residential, commercial and institutional uses. Ground surfaces of the general area of the Site sloped down gently from north to south.

The Site is located within the physiographic region known as "Iroquois Plain" and the Lake Ontario Waterfront watershed.

The Site is not located in the wellhead protection area, Intake Protection zones, Municipal Surface Water Intakes and Significant Groundwater Recharge Areas (Approved and Updated Assessment Report, Toronto and Region Conservation Authority, dated July 24, 2015).

The Lake Ontario Waterfront watershed is made of a number of layers of successive glaciers over the thousand years: Lake Iroquois sand, Older Lake silt and clay, Older Lake silty clay till to silt till, Scarborough Formation sand (aquifer) and Georgian Bay Formation shale. The sand aquifer and shale bedrock are suited at least 75 m and 80 m below grade, respectively.

Edward Wong has completed a geotechnical investigation concurrently with this hydro-geological study. Three (3) boreholes were advanced to a depth of about 7.95 m below grade. All boreholes were completed with a 50 mm diameter monitoring well.

The subsoil profile, as revealed in the logs of borehole, consisted of a topsoil layer or pavement structure over a discontinuous fill stratum followed by native deposits of native deposits of clayey silt.

Boreholes 1 and 3 were dry, during drilling. Groundwater levels in Boreholes 1, 2 and 3 were measured at a depth of about 3.95 m, 2.05 and 2.63 m below grade, 7 days after drilling.

3. Geotechnical Investigation

3.1 Soil Sampling

The fieldworks were carried out on February 21, 2019. Three (3) sampled boreholes (Boreholes 1, 2 and 3) were drilled to a depth of about 7.95 m below grades at the approximate locations shown on the attached Borehole and Section Location Plan (Drawing No. 2).

The boreholes were advanced, using a truck-mounted drill rig equipped with continuous flight hollow stem augers owned, supplied and operated by a specialist drilling Contractor. The overburden soils were recovered using a conventional split spoon sampler in conjunction with standard penetration test (SPT). The fieldwork was supervised throughout by Edward Wong's geotechnical personnel who monitored the drilling and sampling operations and logged the borings.

Tests for the generation of methane gas and Total Organic Vapors were carried out in Boreholes 1, 2 and 3, using a portable combustible gas tester (RKI Eagle multi-gas detector).

The groundwater conditions in the open boreholes were closely monitored during and upon completion of drilling. Monitoring well, 50 mm in diameter, was installed in each of Boreholes 1, 2 and 3 for subsequent groundwater level measurements and groundwater sampling and testing.

The soil samples were examined in the field for lithology as well as aesthetic of impacts (i.e. stains, odors and debris). Soil samples were placed in plastic bags and reserved for headspace combustible vapor measurements. The headspace measurements were made inside the plastic samples' bags using a RKI Eagle multi-gas detector calibrated for hexane. The headspace monitoring was carried out for preliminary screening for hydrocarbons or volatile organic compounds to assist with the selection of soil samples for chemical analysis.

Soil samples for chemical testing were kept in laboratory supplied jars and vials. The jars and vials were kept in a portable cooler during field storage and transportation to the Maxxam Analytics in Mississauga for chemical analysis.

All recovered soil samples were transported to Edward Wong' geotechnical laboratory for detailed visual examinations and soil classifications. Moisture content determinations were carried out on all recovered soil samples.

Grain size analysis and hydrometer tests were carried out on two (2) representative soil samples, with the test results provided in Appendix B.

Borehole locations were established in the field by Edward Wong & Associates Inc. Prior to the commencement of drilling, the borehole locations were cleared for underground utilities

by a private locator retained by Edward Wong & Associates Inc. to minimize the potential of contacting them during drilling.

3.2 Development of Monitoring Well and Groundwater Sampling

Monitoring wells were installed in Boreholes 1, 2 and 3 to a depth of 7.95 m below grades. The monitoring wells were completed with a flush mount well cover. The monitoring well construction was shown in the relevant logs of borehole.

Development of the monitoring well and sampling of groundwater was carried out on February 28, 2019, seven (7) days after completion of drilling. Groundwater levels in Boreholes 1, 2 and 3 were measured at a depth of about 3.95 m, 2.05 m and 2.63 m below grade, respectively.

Groundwater was recovered from Boreholes 1 and 3. Prior to groundwater sampling, Boreholes 1 and 3 were developed and purged of more than three (3) well volumes of water, using clean polyethylene bailers. No free product or sheen was detected on the surface of the groundwater samples recovered from Boreholes 1 and 3.

Groundwater samples were collected and stored in laboratory supplied bottles and jars. The bottles and jars were kept in a portable cooler during field storage and transportation to Maxxam Analytics in Mississauga for chemical analysis.

Results of the groundwater testing are provided in Section 6.3.2 of the report.

4. Subsurface Conditions

The subsurface stratigraphy at the Site, as revealed in the logs of borehole, consisted of a pavement structure over a fill stratum followed by a native deposit of clayey silt. Soil profile is shown on attached Drawing 3.

4.1 Subsoil

A brief description of the soil profiles, in order of depth, are as follow.

4.1.1 Pavement Structure

Pavement structure was encountered at the ground surface in Boreholes 1, 2 and 3 advanced in the pavement areas. The pavement structure consisted of about 50 mm to 100 mm of asphaltic concrete over about 100 mm to 175 mm of crushed limestone. The granular materials were very moist.

4.1.2 Fill

Fill, extending to depths of about 2.25 m to 3 m below grade, was contacted at the ground surface in Boreholes 1, 2 and 3. The fill materials consisted of silty clay with topsoil and organic inclusions. Brick fragments were found in the fill sample recovered from Borehole 1 at about 2.25 m depth. SPT "N" values ranged from 4 blows per 300 mm penetration to 11 blows per 300 mm penetration. Based on the "N" values, the fill materials were considered as soft to stiff. The fill materials were very moist. Moisture contents ranged from 11 percent to 30 percent.

4.1.3 Clayey Silt

The predominant native soils at the Site was clayey silt. Clayey silt was found below the fill at depths of about 2.25 m to 3.0 m below grade in Boreholes 1, 2 and 3 and extended to termination depth of 7.95 m. SPT "N" values ranged from 10 blows per 300 mm penetration to 35 blows per 300 mm penetration. Un-confined compressive strength measured from the pocket penetrometer gave the values of un-drained shear strength from 75 kPa to greater than 225 kPa, corresponding to stiff to hard consistency. Moisture contents ranged from 9 percent to 26 percent, indicating a very moist condition.

Grain size analysis and hydrometer test was carried out on two (2) selected clayey silt samples. The test result is provided in Appendix B and summarized in Table 1 below.

Table 1: Result of Grain Size Analysis and Hydrometer Test - Clayey Silt

Borehole No.	Depth	Composition (%) Gr, Sa, Si & Cl	Estimated Coefficient of Permeability (m/s)	Unified Soil Classification	Comments
1	4.5 - 4.95	3.5,15.8, 57.1, 23.6	$< 1 \times 10^{-6}$	ML (clayey silt)	Low Permeable
2	3.0 - 3.45	5.9, 10.1, 61.0, 23.0	$< 1 \times 10^{-6}$	ML (clayey silt)	Low Permeable

Note: Gr, Sa, Si, Cl - Gravel, Sand, Silt and Clay

4.2 Groundwater

Groundwater conditions were assessed in the open boreholes during the course of the fieldwork. Short term groundwater level measurements are shown in Table 2 below.

Table 2: Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Depth (Elevation (m))		
		Upon Completion of Drilling	Upon Completion of Drilling	Feb. 28, 2019 (7 days after completion of drilling)
1	100	Dry	6.80	3.95
2	100	2.25	2.30	2.05
3	100	Dry	Dry	2.63

The measured groundwater levels in Boreholes 1, 2 and 3 were originated from water perched in the fill or more previous seams within the clayey silt deposit. Table 2 above indicates the groundwater flow direction is to the southeast towards the Lake Ontario, which is located at 2 km to the south of the Site. The groundwater levels are expected to fluctuate on seasonal basis (± 1 m) and could be higher in spring or after prolonged period of rain.

4.3 Slug Test

On February 26, 2019, slug test was carried out in Boreholes 2 and 3 to assess the hydraulic conductivity of the in-situ conductivity of the subsoil. Screen of the monitoring well was placed within the clayey silt. Groundwater levels in Boreholes 2 and 3 were likely originated from water perched in the fill or more pervious seams within the clayey silt. At the time of the slug test, groundwater levels in Boreholes 2 and 3 was measured at about 2.05 m and 2.63 m below grade.

Water level readings and results of the slug test are provided in Appendix C of the report. The hydraulic conductivity of the native clayey silt in Boreholes 2 and 3 was found to be 8.95×10^{-10} m/ sec and 1.23×10^{-10} m/s. Water level readings and results of slug test analysis are provided in Appendix C.

4.4 Groundwater Quality

Samples of groundwater were collected by Edward Wong for chemical analysis. Sample locations and analytical data are listed in Table 3 below. Certificates of Chemical Analyses are provided in Appendix D.

Table 3: Sample Locations and Analytical Data

Sample I.D.	Borehole Location and Depth	Matrix	Analytical Data
JBY879	BH 1	Groundwater	General and Inorganic Parameters
JBY880	BH 2	Groundwater	Toronto Storm and Sanitary Sewer Use By Law
JBY881	BH 3	Groundwater	pH, Dissolved Sulphate and Chloride

Notes: PHC - Petroleum Hydrocarbons; VOC's - Volatile Organic Compounds

4.4.1 Comparison to MOE's Document entitled "Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act", dated April 2011

The analytical concentrations of the groundwater sample recovered from Borehole 1 complied with the applicable MOE Document Table 3 criteria for general and inorganic parameters. Based on the results of chemical analysis, groundwater remediation is not required.

The concentrations of dissolved chloride, barium and sodium (1,800 mg/L, 1,400 ug/L and 490,000 ug/L) in the groundwater sample recovered from Borehole 1 exceeded the applicable

MOE Document Table 1 criteria but below the corresponding MOE Document Table 3 criteria.

4.4.2 Comparison to Toronto Sanitary and Storm Sewer Use By Law Guidelines

The analytical concentrations in the groundwater sample recovered from Borehole 2 were below the City of Toronto Sanitary Sewer Use by Law Guideline criteria. Subject to the approval of the City of Toronto, groundwater collected from the dewatering devise may be discharged into the existing sanitary system.

With the following exceptions, the analytical concentrations in the groundwater sample recovered from Borehole 2 were below the City of Toronto Storm Sewer Use by Law Guideline criteria.

The measured concentrations of Total Suspended Solid and Total Manganese in the groundwater sample was 52 mg/L and 970 mg/ L, respectively, which exceeded the City of Toronto Storm Sewer Use by Law criterion of 15 mg/L and 50 mg/L. The groundwater collected from the dewatering devise should be treated to remove excess Total Suspended Solid and Total Manganese, prior to the discharge off at the existing storm sewer system. This, however, should be approved by the City of Toronto.

4.4.3 Comparison to CSA A23.1 Table 3

A pH value of 7.86 was recorded in the groundwater sample recovered from Borehole 3. The concentrations of dissolved sulphate and chloride in the tested groundwater sample was 26 mg/L and 270 mg/L, respectively, indicating negligible degree of sulphate and chloride attack on buried concrete structures. Normal Portland cement (Type 10) can be used in the sub-surface concrete, in accordance with CSA A23.1 - Table 3.

4.5 Subsoil Quality

Three (3) soil samples were submitted to Maxxam Analytics in Mississauga for chemical analysis. The results of the chemical analysis results were used to determine the disposal options for the excess soil materials.

Sample locations and analytical data are listed in Table 4 below. The Certificates of Chemical Analyses are provided in Appendix D.

Table 4: Sample Locations and Analytical Data

Sample I.D.	Borehole Location and Depth	Matrix	Analytical Data
JBY882	BH 1, SS3 1.5 - 2.25 m depth	Soil	General and Inorganic Parameters
JBY884	BH 3, SS2 0.75 - 1.2 m depth	Soil	General and Inorganic Parameters
JBY883	BH2, SS2 0.75 -1.2 m depth	Soil	PHC (F1- F4) and VOCs

4.5.1 Assessment Criteria

Comparison with the criteria listed the MOE Document Table 2 (potable groundwater conditions) was chosen as being most appropriate for the purpose of this study. The selection of Table 2 was based on the following:

- The subject property has not been identified as a sensitive Site;
- The subject property is located in an area where local groundwater may still be in use for potable purposes; and
- Full depth restoration of contamination (if encountered) is assumed.

Based on the proposed property use (maintenance shop), industrial/ commercial/ community (ICC) property use criteria under the MOE Document were considered to be applicable. Soils at the subject Site were visually assessed and classified as fine to medium textured.

Since some receptors of excess soils require conformance with MOE Document Table 1 (Background Site Condition) criteria, a comparison to Table 1 "Residential/ Parkland/ Institutional/ Industry/ Commercial/ Community" (RPIICC) property use criteria were also made.

4.5.2 Comparison to the MOE Document entitled "Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the *Environment Protection Act*"

4.5.2.1 General and Inorganic Parameters

The analytical concentrations of the soil samples generally complied with the applicable MOE Document Table 1 and 3 criteria for general and inorganic parameters, with the following exceptions.

A Sodium Adsorption Ratio (SAR) value of 14 was recorded in the soil sample from Borehole 3. The recorded SAR value exceeded the MOE Document Table 1 RPIICC and Table 3 RPI property use criterion of 2.4 and 5 for SAR, respectively.

Elevated concentrations of Conductivity (EC, (1.3 mS/cm and 2.1 mS/cm)) were measured in the soil samples recovered from Borehole 1 and 3, respectively. The measured EC concentration exceeded the MOE Document Table 1 RPIICC and Table 3 RPI property use criterion of 0.57 mS/cm and 0.7 mS/cm for EC, respectively.

4.5.2.2 Petroleum Hydrocarbons (F1 - F4 Fractions)

The analytical concentrations were below the laboratory detective limits and therefore complied the applicable MOE Document Table 1 and 3 criteria for Petroleum Hydrocarbons (F1- F4 Fractions).

4.5.2.3 Benzene, Toluene, Ethyl-benzene and Xylene

The measured concentrations were below the laboratory detective limits and complied the applicable MOE Document Table 1 and 3 criteria for Benzene, Toluene, Ethyl-benzene and Xylene.

4.5.2.4 Volatile Organic Compounds

The analytical concentrations were below the laboratory detective limits and therefore complied the applicable MOE Document Tables 1 and 3 criteria for Volatile Organic Compounds.

4.5.3 Comments

The SAR and EC parameters were associated with winter road salting activities. It should be noted that the elevated SAR and EC level are not considered to be harmful for human health but could interference with the growth of certain species of plants and vegetation. Therefore, near surface placement of these materials are not recommended for landscaping, parkland or agricultural purposes. As such, elevated levels of SAR and EC do not automatically preclude disposal at development Sites accepting clean fill.

Excess soil generated at the above captioned site may be disposed of at any land based Sites in Ontario that are being developed for "Residential/ Institutional/ Commercial/ Industrial/ Community" land uses in the areas where landscaping is not intended, subject to approval from individual receiving Site authorities.

5. Engineering Discussions and Recommendations

5.1 Short Term Groundwater Control Requirements (Construction Phase)

The highest groundwater level, which was measured in Borehole 2, was 2.05 m below grade. In view of the clayey nature of the subsoil, no major groundwater problems are anticipated during construction. Groundwater entering into the excavation may be controlled by temporary sump pumps.

At construction phase, the estimated zone of influence is less than 0.5 m (0.32 m). The estimated factored dewatering flow rate and direct precipitation is 0.61 m³ per day and 31.5 m³ per day, respectively. The estimated total factored dewatering flow rate including direct precipitation is 32.11 m³ per day. Detailed calculations are provided in Appendix D.

Under the new regulations, a Permit-To-Take Water (PTTW) is required from the Ministry of Environmental and Climate Change (MOECC) if a volume of water greater than 400 m³/ day is pumped from the excavations. If the volume of water to be pumped will be greater than 50 m³/ day but less than 400 m³/ day, the groundwater taking will not require a PPTW, but will need to be registered in the Environmental Activity and Sector Registry (EASR) as a prescribed activity. Based on the results of dewatering calculations, no PTTW and registration in the EASR will be required.

5.2 Long Term Groundwater Control Requirements (Post-Construction Phase)

If the basement is a water-proofed structure, no long-term dewatering is required. In this case, the dewatering flow rate is could be 0 m³/ day.

If the basement is a drained structure, then a permanent dewatering system will be required. Weeping tiles may be installed along the perimeter wall footings and below the floor slab to control the groundwater. The estimated total factored dewatering rate for the mixed-use building is 0.28 m³ per day. Detailed calculations are shown in Appendix E.

5.3 Assessment of Potential Impacts

At the construction phase, the groundwater may be discharged to low lying area for percolation and evaporation. The chemical quality of the tested groundwater complied with the City of Toronto Sanitary Use by Law criteria. Should groundwater be discharged into the local sanitary sewer system, a permit or approval from the City of Toronto is required.

The on-site dewatering activities will lower down the local groundwater level, increase the effective stress on the existing footing founding level and increase the potential risk of consolidation.

The estimated zone of influence at construction phase and post construction phase is less than 0.32 m and 0.23 m, respectively. The estimated zone of influence will not extend beyond the property limits. Based on the above, the on-site dewatering activities will not compromise the stability and integrity of adjacent buildings, site services, landscaped and walkway. To avoid unjustified construction claims, it was recommended that a pre-construction survey be carried out.

The closest surface water feature to the Site is the Don River, which is located at about 3.62 km to the east of the Site. The Lake Ontario is located at about 2.04 km to the south of the Site. The groundwater control activities will result in localized depression of the groundwater level. The zone of influence is not expected to extend beyond the property limits. The on-site dewatering activities will not have any negative impacts to surface water features.

The Site and surrounding area are provided with municipal piped water and sewer supply. Groundwater is not used for water supply. There would be no impacts to drinking water wells.

No gasoline stations, auto garages and dry cleaner were noted in surrounding properties. The drawdown resulting from the on-site dewatering activities will be localized. The on-site dewatering activities are not expected to draw contaminants from neighborhood properties towards the Site.

5.3.1 Geotechnical Considerations

The on-site dewatering activities will lower down the local groundwater level, increase the effective stress on the existing footing founding level and increase the potential risk of consolidation.

The estimated zone of influence at construction phase and post construction phase is less than 0.32 m and 0.23 m, respectively. The estimated zone of influence will not extend beyond the property limits. Based on the above, the on-site dewatering activities will not compromise the stability and integrity of adjacent buildings, site services, landscaped and walkway. To avoid unjustified construction claims, it was recommended that a pre-construction survey be carried out.

5.3.2 Surface Water

The closest surface water feature to the Site is the Don River, which is located at about 3.62 km to the east of the Site. The Lake Ontario is located at about 2.04 km to the south of the Site. The groundwater control activities will result in localized depression of the groundwater level. The zone of influence is not expected to extend beyond the property limits. The on-site dewatering activities will not have any negative impacts to surface water features.

5.3.3 Local Wells

The Site and surrounding area are provided with municipal piped water and sewer supply. Groundwater is not used for water supply. There would be no impacts to drinking water wells.

5.3.4 Contamination Sources

No gasoline stations, auto garages and dry cleaner were noted in surrounding properties. The drawdown resulting from the on-site dewatering activities will be localized. The on-site dewatering activities are not expected to draw contaminants from neighborhood properties towards the Site.

6. General Comments

The recommendations in this report have been based on the findings in the boreholes. Soil conditions may vary between and beyond the boreholes. Consequently, during the future development of the property, conditions not observed during this investigation may become apparent; should this occur, Edward Wong & Associates Inc. should be contacted to assess the situation and additional testing and reporting may be required. Edward Wong & Associates Inc. has qualified personnel to provide assistance in regards to future geotechnical, environmental and hydro-geological issues related to this property.

The comments given in this report are intended only for the guidance of design engineers. Edward Wong & Associates Inc. should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, Edward Wong & Associates Inc. will assume no responsibility for interpretation of the recommendations in the report.

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

Yours truly,

Edward Wong & Associates Inc.



Edward B.H. Wong, M. Eng. P. Eng.



Distribution: Client

(2)

Appendix A

Logs of Borehole

CLIENT Neuhaus Development Inc. PROJECT NAME 17 St. Andrew Street

PROJECT NUMBER Ma004003a PROJECT LOCATION Toronto

DATE STARTED 2/21/19 COMPLETED 2/21/19 GROUND ELEVATION 98.5 m HOLE SIZE 150 mm

DRILLING CONTRACTOR Sonic Soil Sampling GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Augers AT TIME OF DRILLING Dry

LOGGED BY J.T. CHECKED BY E.W. ∇ AT END OF DRILLING 6.80 m / Elev 91.70 m

NOTES ∇ AFTER DRILLING 3.95 m / Elev 94.55 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
2	AU SS 1	18-12-13-12 (25)	MC = 15%	[Cross-hatched pattern]	0.18 PAVEMENT STRUCTURE - ~75 mm of asphaltic concrete over ~100 mm of grey, crushed limestone, very moist.	[Diagonal hatching] Portland Cement
	SS 2	3-4-7 (11)	MC = 12%		FILL - silty clay, topsoil and organic inclusions, grey and dark grey, very moist.	
4	SS 3	4-4-7 (11)	MC = 11%	[Diagonal hatching]	-occasional brick fragments at ~2.25 m depth	[Dotted pattern] Filter Sand, 50 mm dia. PVC Riser
	SS 4	2-4-6 (10)	MC = 26%			
6	SS 5	3-5-7 (12)	PP = 300 kPa MC = 14%	[Diagonal hatching]	3.00 CLAYEY SILT - some sand, trace gravel, scattered sand seams, brown, stiff, very moist.	[Dotted pattern] Filter Sand, 50 mm dia. PVC Riser
	SS 6	3-4-6 (10)	PP = 150 kPa MC = 16%		-becoming grey and below ~4.5 m depth	
8	SS 7	3-6-7 (13)	PP = 150 kPa MC = 10%	[Diagonal hatching]	∇	[Dotted pattern] Filter Sand, 50 mm dia. PVC Riser
	SS 8	3-7-22 (29)	PP >450 kPa MC = 9%		-becoming moist and hard below ~7.5 m depth	
					7.95 Bottom of hole at 7.95 m.	90.55

GENERAL BH / TP / WELL_04003A-17 ST. ANDREW.GPJ GINT CANADA.GDT_10/27/02

CLIENT Neuhaus Development Inc. PROJECT NAME 17 St. Andrew Street

PROJECT NUMBER Ma004003a PROJECT LOCATION Toronto

DATE STARTED 2/21/19 COMPLETED 2/21/19 GROUND ELEVATION 98.5 m HOLE SIZE 150 mm

DRILLING CONTRACTOR Sonic Soil Sampling GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Augers ∇ AT TIME OF DRILLING 2.25 m / Elev 96.25 m

LOGGED BY J.T. CHECKED BY E.W. ∇ AT END OF DRILLING 2.30 m / Elev 96.20 m

NOTES ∇ AFTER DRILLING 2.05 m / Elev 96.45 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.23	AU					Portland Cemen
	SS 1	14-22-17-9 (39)	MC = 25%		PAVEMENT STRUCTURE - ~100 mm of asphaltic concrete over ~125 mm of grey, crushed limestone, very moist. FILL - silty clay, occasional gravel, topsoil and organic inclusions, grey and dark grey, very moist.	Bentonite
	SS 2	3-2-2 (4)	MC = 28%			
	SS 3	2-2-2 (4)	MC = 11%			
2.25	SS 4	3-7-11 (18)	PP = 350 kPa MC = 12%		CLAYEY SILT - trace sand, trace gravel, scattered sand seams, mottled brown and grey, very moist, very stiff. -groundwater was first encountered at ~2.25 m depth -becoming brown below ~ 3 m depth.	Filter Sand, 50 mm dia. PVC Riser
	SS 5	5-6-9 (15)	PP = 350 kPa MC = 12%			
	SS 6	6-8-12 (20)	PP = 300 kPa MC = 16%		-becoming grey below ~4.5 m depth	
	SS 7	4-6-9 (15)	PP = 250 kPa MC = 11%			
	SS 8	7-13-22 (35)	PP >450 kPa MC = 16%		-becoming hard below ~7.5 m depth	Filter Sand, Filter Sock, 50 mm dia. PVC Slotted Pipe
7.95					Bottom of hole at 7.95 m.	

GENERAL BH / TP / WELL 04003A-17 ST. ANDREW/GPJ GINT CANADA GDT 10/27/02

Appendix B

Results of Grain Size Analysis and Hydrometer Tests

Grain Size Analysis and Hydrometer Test

Sample Test No.: S1 Report No.: 1 Date Reported: 22/02/2019

Project No.: Ma004003a
 Project Name: 17 St. Andrew Street, Toronto

Grain Size Proportion (%)

Gravel (> 4.75mm): 3.5
 Sand (> 75µm, < 4.75mm): 15.8
 Silt (> 2µm), < 75µm): 57.1
 Clay (< 2µm): 23.6

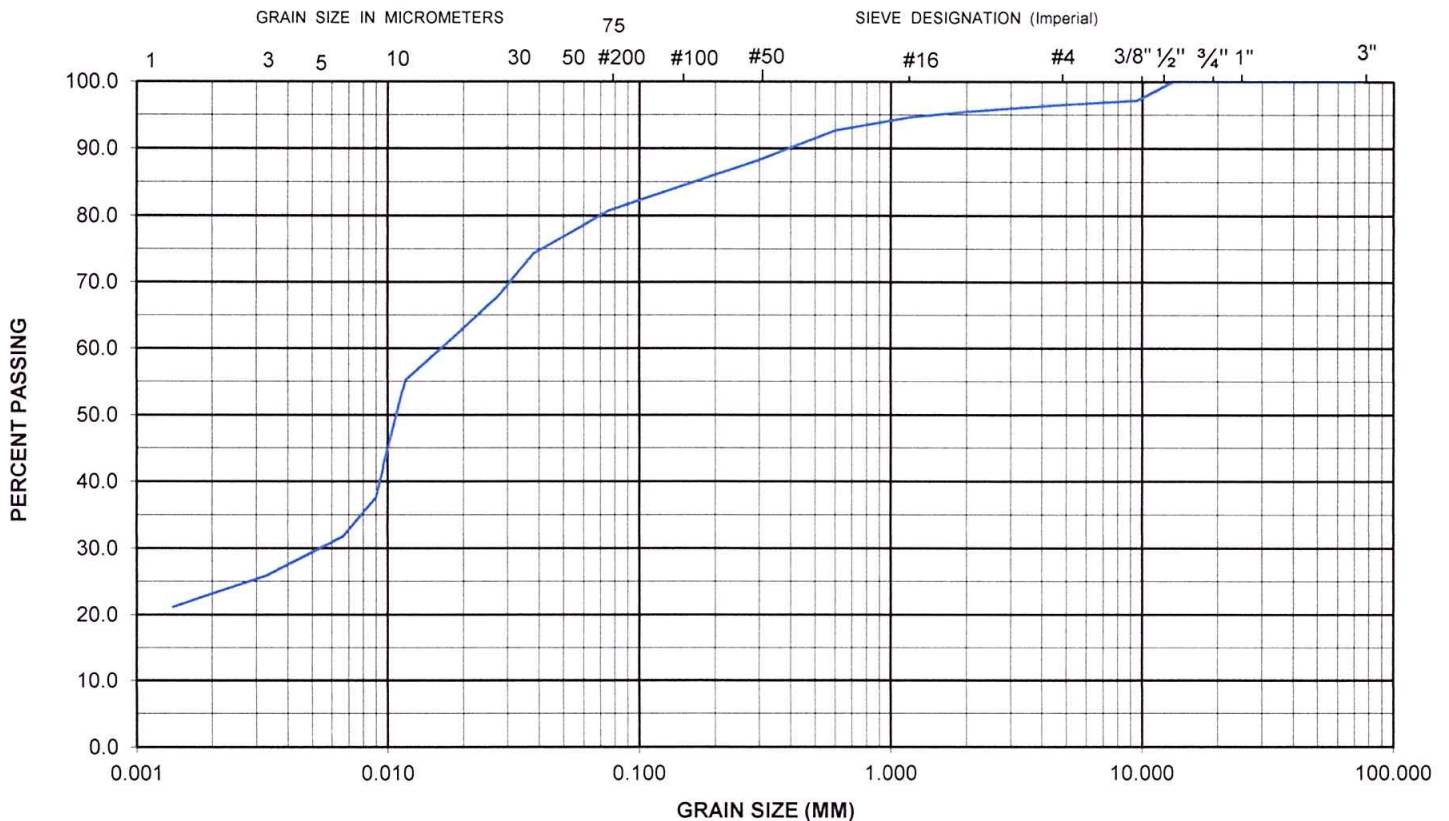
Sample Information

Sample Location: BH 1
 Sample No.: 5
 Sample Method: SPT
 Depth (m): 4.5 - 4.95 m
 Sample Description: Brown Clayey Silt
 some sand trace gravel
 Sampled By: J.T
 Sampling Date: Feb. 21, 2019
 Client Sample ID:
 Comments:

Grain Size (mm)	% Passing	Grain Size (mm)	% Passing
75.00	100.0	0.009	37.6
26.50	100.0	0.007	31.8
19.00	100.0	0.003	25.9
13.25	100.0	0.001	21.2
9.50	97.2		
4.75	96.5		
2.00	95.5		
1.180	94.6		
0.600	92.7		
0.300	88.3		
0.150	84.5		
0.075	80.7		
0.039	74.3		
0.028	67.7		
0.018	61.5		
0.012	55.2		

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



Appendix C

Results of Slug Test

Edward Wong & Associates Inc.
441 Esna Park Drive, Unit 19
Markham, Ontario
L3R 1H7

Slug Test - Water Level Data

Page 1 of 1

Project: 17 St. Andrew Street

Number: Ma004003a

Client: The Impression Group

Location: Toronto, Ontario

Slug Test: Slug Test 1

Test Well: BH 2

Test conducted by: JT.

Test date: 2/26/2019

Water level at t=0 [m]: 7.70

Static water level [m]: 2.05

Water level change at t=0 [m]: 5.65

	Time [s]	Water Level [m]	WL Change [m]
1	22	7.68	5.63
2	87	7.65	5.60
3	147	7.632	5.582
4	211	7.614	5.564
5	309	7.562	5.512
6	804	7.5571	5.5071
7	1108	7.5309	5.4809
8	1405	7.4754	5.4254
9	1703	7.4752	5.4252
10	2003	7.487	5.437
11	2358	7.502	5.452
12	2653	7.5009	5.4509
13	2900	7.4986	5.4486
14	3198	7.4939	5.4439
15	3960	7.4907	5.4407
16	4941	7.4877	5.4377
17	5766	7.486	5.436
18	6055	7.483	5.433
19	6342	7.48	5.43
20	7229	7.4776	5.4276
21	9097	7.4742	5.4242
22	11065	7.468	5.418
23	13033	7.395	5.345
24	14796	7.45	5.40

Edward Wong & Associates Inc.
 441 Esna Park Drive, Unit 19
 Markham, Ontario
 L3R 1H7

Slug Test Analysis Report

Project: 17 St. Andrew Street

Number: Ma004003a

Client: The Impression Group

Location: Toronto, Ontario

Slug Test: Slug Test 1

Test Well: BH 2

Test conducted by: JT

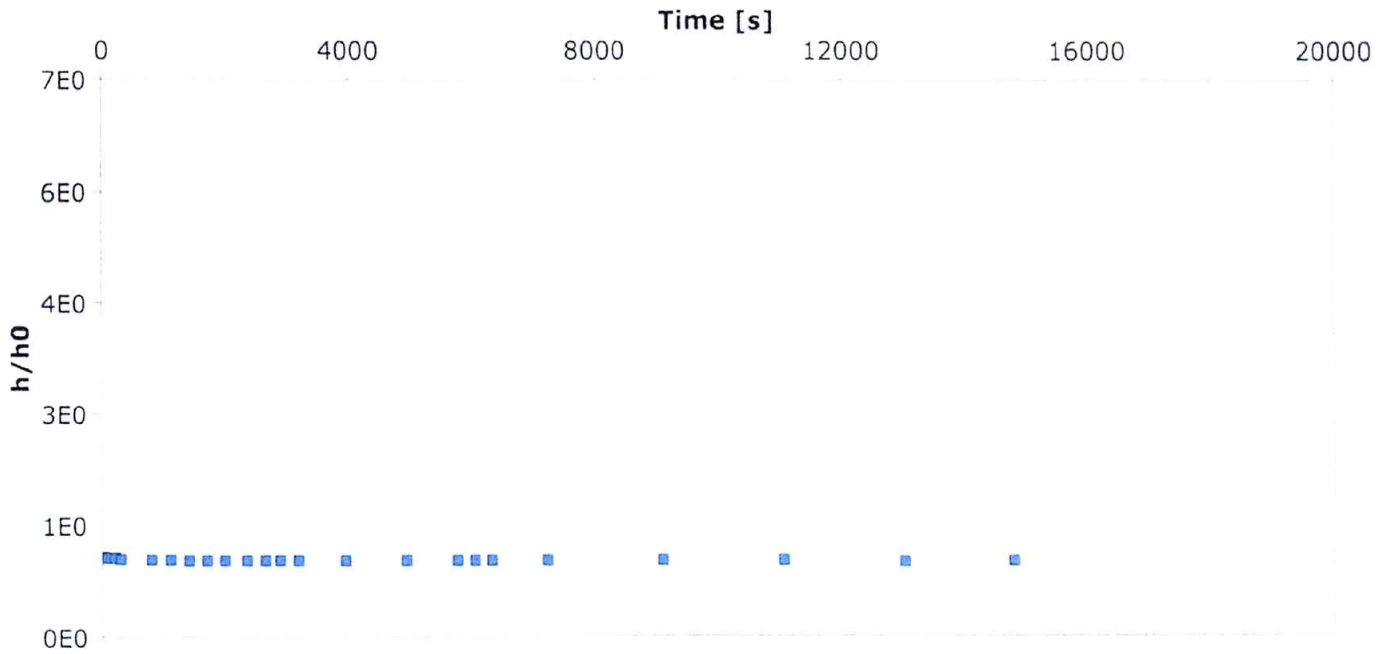
Test date: 2/26/2019

Analysis performed by:

Hvorslev

Analysis date: 3/30/2019

Aquifer Thickness: 7.95 m



Calculation after Hvorslev

Observation well

Hydraulic Conductivity

[m/s]

BH 2

8.95×10^{-10}

Edward Wong & Associates Inc.
441 Esna Park Drive, Unit 19
Markham, Ontario
L3R 1H7

Slug Test - Water Level Data

Project: 17 St. Andrew Street

Number: Ma004003a

Client: The Impression Group

Location: Toronto, Ontario

Slug Test: Slug Test 1

Test Well: BH 3

Test conducted by:

Test date: 2/26/2019

Water level at t=0 [m]: 7.79

Static water level [m]: 2.63

Water level change at t=0 [m]: 5.16

	Time [s]	Water Level [m]	WL Change [m]
1	60	7.7139	5.0839
2	360	7.7805	5.1505
3	660	7.7796	5.1496
4	1020	7.7786	5.1486
5	1620	7.7762	5.1462
6	2640	7.7718	5.1418
7	3300	7.7697	5.1397
8	3960	7.7682	5.1382
9	4620	7.765	5.135
10	5460	7.763	5.133
11	6900	7.759	5.129
12	7920	7.7585	5.1285
13	8760	7.7581	5.1281
14	9660	7.754	5.124
15	11040	7.751	5.121
16	12780	7.744	5.114
17	14520	7.74	5.11
18	19980	7.7339	5.1039
19	23580	7.73	5.10
20	25380	7.7287	5.0987
21	27180	7.724	5.094
22	28980	7.726	5.096
23	30780	7.722	5.092
24	32640	7.7179	5.0879
25	34560	7.7166	5.0866
26	39720	7.7179	5.0879
27	43380	7.71	5.08

Edward Wong & Associates Inc.
 441 Esna Park Drive, Unit 19
 Markham, Ontario
 L3R 1H7

Slug Test Analysis Report

Project: 17 St. Andrew Street

Number: Ma004003a

Client: The Impression Group

Location: Toronto, Ontario

Slug Test: Slug Test 1

Test Well: BH 3

Test conducted by:

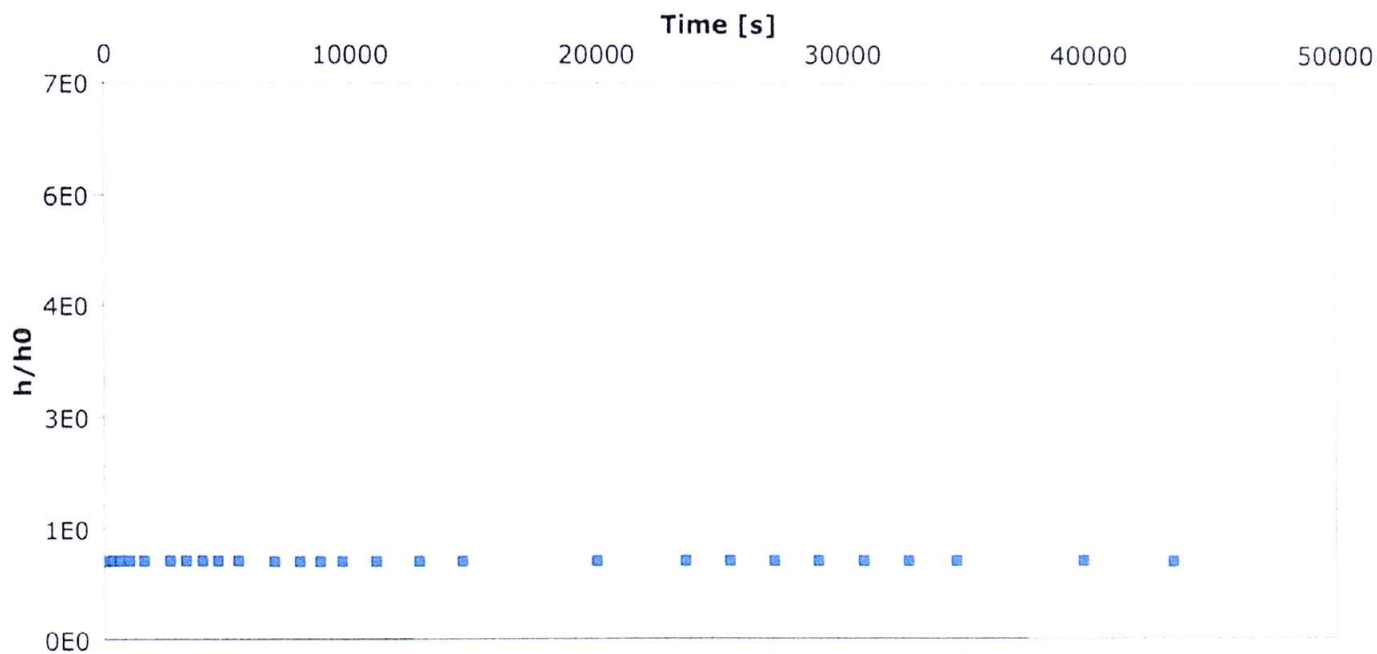
Test date: 2/26/2019

Analysis performed by:

Hvorslev

Analysis date: 3/30/2019

Aquifer Thickness: 7.95 m



Calculation after Hvorslev

Observation well	Hydraulic Conductivity [m/s]
BH 3	1.23×10^{-10}

Appendix D

Certificate of Chemical Analysis

Your Project #: 17 ST ANDREW TORONTO
 Site#: MA004003A
 Your C.O.C. #: 101208

Attention: Edward Wong

Edward Wong & Associates Inc
 441 Esna Park Dr
 Unit 19
 Markham, ON
 CANADA L3R 1H7

Report Date: 2019/03/13
 Report #: R5627015
 Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B953064

Received: 2019/02/28, 13:54

Sample Matrix: Water
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Sewer Use By-Law Semivolatile Organics	1	2019/03/05	2019/03/06	CAM SOP 00301	EPA 8270 m
Biochemical Oxygen Demand (BOD)	1	2019/03/02	2019/03/07	CAM SOP-00427	SM 23 5210B m
Chromium (VI) in Water	1	N/A	2019/03/04	CAM SOP-00436	EPA 7199 m
Total Cyanide	1	2019/03/05	2019/03/05	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2019/03/01	2019/03/04	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2019/03/04	2019/03/04	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	1	N/A	2019/03/05	CAM SOP-00447	EPA 6020B m
E.coli, (CFU/100mL)	1	N/A	2019/02/28	CAM SOP-00552	MOE LSB E3371
Total Nonylphenol in Liquids by HPLC	1	2019/03/04	2019/03/05	CAM SOP-00313	In-house Method
Nonylphenol Ethoxylates in Liquids: HPLC	1	2019/03/04	2019/03/05	CAM SOP-00313	In-house Method
Animal and Vegetable Oil and Grease	1	N/A	2019/03/05	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2019/03/05	2019/03/05	CAM SOP-00326	EPA1664B m,SM5520A m
Polychlorinated Biphenyl in Water	1	2019/03/02	2019/03/04	CAM SOP-00309	EPA 8082A m
pH	1	2019/03/01	2019/03/04	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2019/03/04	CAM SOP-00444	OMOE E3179 m
Total Kjeldahl Nitrogen in Water	1	2019/03/04	2019/03/05	CAM SOP-00938	OMOE E3516 m
Total PAHs (1)	1	N/A	2019/03/07	CAM SOP - 00301	EPA 8270 m
Mineral/Synthetic O & G (TPH Heavy Oil) (2)	1	2019/03/05	2019/03/05	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2019/03/01	2019/03/02	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2019/03/04	CAM SOP-00228	EPA 8260C m

Remarks:

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

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

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

Your Project #: 17 ST ANDREW TORONTO
Site#: MA004003A
Your C.O.C. #: 101208

Attention: Edward Wong

Edward Wong & Associates Inc
441 Esna Park Dr
Unit 19
Markham, ON
CANADA L3R 1H7

Report Date: 2019/03/13
Report #: R5627015
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B953064

Received: 2019/02/28, 13:54

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

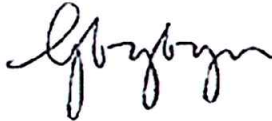
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Total PAHs include only those PAHs specified in the sewer use by-law.

(2) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key



Gina Baybayan
Project Manager
13 Mar 2019 11:53:32

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Gina Baybayan, Project Manager

Email: GBaybayan@maxxam.ca

Phone# (905)817-5766

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

RESULTS OF ANALYSES OF WATER

Maxxam ID				JBY880	
Sampling Date				2019/02/28	
COC Number				101208	
	UNITS	San	Stm	BH2	RDL
Calculated Parameters					
Total Animal/Vegetable Oil and Grease	mg/L	150	-	1.8	0.50
Inorganics					
Total BOD	mg/L	300	15	<2	2
Fluoride (F-)	mg/L	10	-	0.18	0.10
Total Kjeldahl Nitrogen (TKN)	mg/L	100	-	9.5	0.50
pH	pH	6.0:11.5	6.0:9.5	7.59	N/A
Phenols-4AAP	mg/L	1.0	0.008	<0.0010	0.0010
Total Suspended Solids	mg/L	350	15	52	10
Total Cyanide (CN)	mg/L	2	0.02	<0.0050	0.0050
Petroleum Hydrocarbons					
Total Oil & Grease	mg/L	-	-	1.8	0.50
Total Oil & Grease Mineral/Synthetic	mg/L	15	-	<0.50	0.50
No Fill	No Exceedance				
Grey	Exceeds 1 criteria policy/level				
Black	Exceeds both criteria/levels				
RDL = Reportable Detection Limit					
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively.					
Referenced to Chapter 681					
N/A = Not Applicable					

NONYL PHENOL AND NONYL PHENOL ETHOXYLATE (WATER)

Maxxam ID				JBY880	
Sampling Date				2019/02/28	
COC Number				101208	
	UNITS	San	Stm	BH2	RDL
Miscellaneous Parameters					
Nonylphenol Ethoxylate (Total)	mg/L	0.2	0.01	<0.005	0.005
Nonylphenol (Total)	mg/L	0.02	0.001	<0.001	0.001
No Fill	No Exceedance				
Grey	Exceeds 1 criteria policy/level				
Black	Exceeds both criteria/levels				
RDL = Reportable Detection Limit					
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681					

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID				JBY880	JBY880	
Sampling Date				2019/02/28	2019/02/28	
COC Number				101208	101208	
	UNITS	San	Stm	BH2	BH2 Lab-Dup	RDL
Metals						
Chromium (VI)	ug/L	2000	40	<0.50	N/A	0.50
Mercury (Hg)	mg/L	0.01	0.0004	<0.0001	<0.0001	0.0001
Total Aluminum (Al)	ug/L	50000	-	650	N/A	5.0
Total Antimony (Sb)	ug/L	5000	-	2.2	N/A	0.50
Total Arsenic (As)	ug/L	1000	20	2.0	N/A	1.0
Total Cadmium (Cd)	ug/L	700	8	<0.10	N/A	0.10
Total Chromium (Cr)	ug/L	4000	80	<5.0	N/A	5.0
Total Cobalt (Co)	ug/L	5000	-	1.7	N/A	0.50
Total Copper (Cu)	ug/L	2000	40	1.6	N/A	1.0
Total Lead (Pb)	ug/L	1000	120	2.3	N/A	0.50
Total Manganese (Mn)	ug/L	5000	50	970	N/A	2.0
Total Molybdenum (Mo)	ug/L	5000	-	9.5	N/A	0.50
Total Nickel (Ni)	ug/L	2000	80	5.4	N/A	1.0
Total Phosphorus (P)	ug/L	10000	400	<100	N/A	100
Total Selenium (Se)	ug/L	1000	20	<2.0	N/A	2.0
Total Silver (Ag)	ug/L	5000	120	<0.10	N/A	0.10
Total Tin (Sn)	ug/L	5000	-	1.4	N/A	1.0
Total Titanium (Ti)	ug/L	5000	-	20	N/A	5.0
Total Zinc (Zn)	ug/L	2000	40	8.6	N/A	5.0
No Fill	No Exceedance					
Grey	Exceeds 1 criteria policy/level					
Black	Exceeds both criteria/levels					
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively.						
Referenced to Chapter 681						
N/A = Not Applicable						

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID				JBY880	
Sampling Date				2019/02/28	
COC Number				101208	
	UNITS	San	Stm	BH2	RDL
Semivolatle Organics					
Di-N-butyl phthalate	ug/L	80	15	<2	2
Bis(2-ethylhexyl)phthalate	ug/L	12	8.8	<2	2
3,3'-Dichlorobenzidine	ug/L	2	0.8	<0.8	0.8
Pentachlorophenol	ug/L	5	2	<1	1
Phenanthrene	ug/L	-	-	<0.2	0.2
Anthracene	ug/L	-	-	<0.2	0.2
Fluoranthene	ug/L	-	-	<0.2	0.2
Pyrene	ug/L	-	-	<0.2	0.2
Benzo(a)anthracene	ug/L	-	-	<0.2	0.2
Chrysene	ug/L	-	-	<0.2	0.2
Benzo(b/j)fluoranthene	ug/L	-	-	<0.2	0.2
Benzo(k)fluoranthene	ug/L	-	-	<0.2	0.2
Benzo(a)pyrene	ug/L	-	-	<0.2	0.2
Indeno(1,2,3-cd)pyrene	ug/L	-	-	<0.2	0.2
Dibenz(a,h)anthracene	ug/L	-	-	<0.2	0.2
Benzo(g,h,i)perylene	ug/L	-	-	<0.2	0.2
Dibenzo(a,i)pyrene	ug/L	-	-	<0.2	0.2
Benzo(e)pyrene	ug/L	-	-	<0.2	0.2
Perylene	ug/L	-	-	<0.2	0.2
Dibenzo(a,j) acridine	ug/L	-	-	<0.4	0.4
7H-Dibenzo(c,g) Carbazole	ug/L	-	-	<0.4	0.4
1,6-Dinitropyrene	ug/L	-	-	<0.4	0.4
1,3-Dinitropyrene	ug/L	-	-	<0.4	0.4
1,8-Dinitropyrene	ug/L	-	-	<0.4	0.4
Calculated Parameters					
Total PAHs (18 PAHs)	ug/L	5	2	<1	1
Surrogate Recovery (%)					
2,4,6-Tribromophenol	%	-	-	79	N/A
2-Fluorobiphenyl	%	-	-	90	N/A
D14-Terphenyl (FS)	%	-	-	105	N/A
D5-Nitrobenzene	%	-	-	100	N/A
No Fill	No Exceedance				
Grey	Exceeds 1 criteria policy/level				
Black	Exceeds both criteria/levels				
RDL = Reportable Detection Limit					
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681					
N/A = Not Applicable					

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID				JBY880	
Sampling Date				2019/02/28	
COC Number				101208	
	UNITS	San	Stm	BH2	RDL
D8-Acenaphthylene	%	-	-	94	N/A
No Fill	No Exceedance				
Grey	Exceeds 1 criteria policy/level				
Black	Exceeds both criteria/levels				
RDL = Reportable Detection Limit					
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681					
N/A = Not Applicable					

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID				JBY880	
Sampling Date				2019/02/28	
COC Number				101208	
	UNITS	San	Stm	BH2	RDL
Volatile Organics					
Benzene	ug/L	10	2	<0.20	0.20
Chloroform	ug/L	40	2	<0.20	0.20
1,2-Dichlorobenzene	ug/L	50	5.6	<0.50	0.50
1,4-Dichlorobenzene	ug/L	80	6.8	<0.50	0.50
cis-1,2-Dichloroethylene	ug/L	4000	5.6	<0.50	0.50
trans-1,3-Dichloropropene	ug/L	140	5.6	<0.40	0.40
Ethylbenzene	ug/L	160	2	<0.20	0.20
Methylene Chloride(Dichloromethane)	ug/L	2000	5.2	<2.0	2.0
1,1,1,2-Tetrachloroethane	ug/L	1400	17	<0.50	0.50
Tetrachloroethylene	ug/L	1000	4.4	<0.20	0.20
Toluene	ug/L	16	2	<0.20	0.20
Trichloroethylene	ug/L	400	7.6	<0.20	0.20
p+m-Xylene	ug/L	1400	4.4	<0.20	0.20
o-Xylene	ug/L	1400	4.4	<0.20	0.20
Total Xylenes	ug/L	1400	4.4	<0.20	0.20
Surrogate Recovery (%)					
4-Bromofluorobenzene	%	-	-	95	N/A
D4-1,2-Dichloroethane	%	-	-	110	N/A
D8-Toluene	%	-	-	94	N/A
No Fill	No Exceedance				
Grey	Exceeds 1 criteria policy/level				
Black	Exceeds both criteria/levels				
RDL = Reportable Detection Limit					
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681					
N/A = Not Applicable					

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID				JBY880	
Sampling Date				2019/02/28	
COC Number				101208	
	UNITS	San	Stm	BH2	RDL
PCBs					
Total PCB	ug/L	1	0.4	<0.05	0.05
Surrogate Recovery (%)					
Decachlorobiphenyl	%	-	-	90	N/A
No Fill	No Exceedance				
Grey	Exceeds 1 criteria policy/level				
Black	Exceeds both criteria/levels				
RDL = Reportable Detection Limit					
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681					
N/A = Not Applicable					

MICROBIOLOGY (WATER)

Maxxam ID			JBY880	
Sampling Date			2019/02/28	
COC Number			101208	
	UNITS	Stm	BH2	RDL
Microbiological				
Escherichia coli	CFU/100mL	200	<10	10
No Fill	No Exceedance			
Grey	Exceeds 1 criteria policy/level			
Black	Exceeds both criteria/levels			
RDL = Reportable Detection Limit				
Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681				

GENERAL COMMENTS

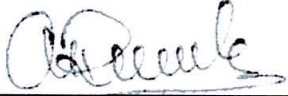
Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.7°C
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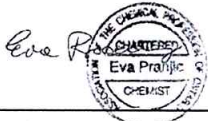
Results relate only to the items tested.

VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist



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



Krishnakant Patel, Analyst 1

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

Your Project #: 17 ST ANDREW TORONTO

Site#: MA004003A

Your C.O.C. #: 101208

Attention: Edward Wong

Edward Wong & Associates Inc
441 Esna Park Dr
Unit 19
Markham, ON
CANADA L3R 1H7

Report Date: 2019/03/08

Report #: R5621774

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B953064

Received: 2019/02/28, 13:54

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Hot Water Extractable Boron	2	2019/03/04	2019/03/04	CAM SOP-00408	R153 Ana. Prot. 2011
Free (WAD) Cyanide	2	2019/03/01	2019/03/04	CAM SOP-00457	OMOE E3015 m
Conductivity	2	2019/03/05	2019/03/05	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1)	2	2019/03/04	2019/03/04	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydrocarbons F2-F4 in Soil (2)	1	2019/03/02	2019/03/02	CAM SOP-00316	CCME CWS m
Strong Acid Leachable Metals by ICPMS	2	2019/03/04	2019/03/04	CAM SOP-00447	EPA 6020B m
Moisture	3	N/A	2019/03/01	CAM SOP-00445	Carter 2nd ed 51.2 m
pH CaCl2 EXTRACT	2	2019/03/04	2019/03/04	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR)	2	N/A	2019/03/06	CAM SOP-00102	EPA 6010C

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Chloride by Automated Colourimetry	2	N/A	2019/03/04	CAM SOP-00463	EPA 325.2 m
Chromium (VI) in Water	1	N/A	2019/03/04	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide	1	N/A	2019/03/05	CAM SOP-00457	OMOE E3015 m
Mercury	1	2019/03/04	2019/03/04	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	1	N/A	2019/03/05	CAM SOP-00447	EPA 6020B m
pH	1	N/A	2019/03/04	CAM SOP-00413	SM 4500H+ B m
Sulphate by Automated Colourimetry	1	N/A	2019/03/04	CAM SOP-00464	EPA 375.4 m

Remarks:

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

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

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

Your Project #: 17 ST ANDREW TORONTO
Site#: MA004003A
Your C.O.C. #: 101208

Attention: Edward Wong
Edward Wong & Associates Inc
441 Esna Park Dr
Unit 19
Markham, ON
CANADA L3R 1H7

Report Date: 2019/03/08
Report #: R5621774
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B953064

Received: 2019/02/28, 13:54

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

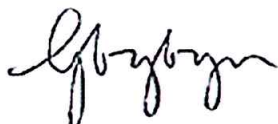
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key



Gina Baybayan
Project Manager
08 Mar 2019 16:56:54

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Gina Baybayan, Project Manager

Email: GBaybayan@maxxam.ca

Phone# (905)817-5766

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

O.REG 153 METALS & INORGANICS PKG (SOIL)

Maxxam ID			JBY882	JBY884	JBY884	
Sampling Date			2019/02/21	2019/02/21	2019/02/21	
COC Number			101208	101208	101208	
	UNITS	Criteria	BH1, SS3	BH3, SS2	BH3, SS2 Lab-Dup	RDL
Calculated Parameters						
Sodium Adsorption Ratio	N/A	2.4	2.3	14	N/A	N/A
Inorganics						
Conductivity	mS/cm	0.57	1.3	2.1	2.0	0.002
Moisture	%	-	19	16	N/A	1.0
Available (CaCl2) pH	pH	-	7.47	7.94	N/A	N/A
WAD Cyanide (Free)	ug/g	0.051	<0.01	<0.01	N/A	0.01
Chromium (VI)	ug/g	0.66	0.2	<0.2	N/A	0.2
Metals						
Hot Water Ext. Boron (B)	ug/g	-	0.17	0.46	N/A	0.050
Acid Extractable Antimony (Sb)	ug/g	1.3	<0.20	0.96	N/A	0.20
Acid Extractable Arsenic (As)	ug/g	18	2.7	4.7	N/A	1.0
Acid Extractable Barium (Ba)	ug/g	220	110	89	N/A	0.50
Acid Extractable Beryllium (Be)	ug/g	2.5	0.83	0.38	N/A	0.20
Acid Extractable Boron (B)	ug/g	36	8.1	6.6	N/A	5.0
Acid Extractable Cadmium (Cd)	ug/g	1.2	<0.10	0.16	N/A	0.10
Acid Extractable Chromium (Cr)	ug/g	70	40	14	N/A	1.0
Acid Extractable Cobalt (Co)	ug/g	21	13	5.4	N/A	0.10
Acid Extractable Copper (Cu)	ug/g	92	23	20	N/A	0.50
Acid Extractable Lead (Pb)	ug/g	120	11	93	N/A	1.0
Acid Extractable Molybdenum (Mo)	ug/g	2	<0.50	0.76	N/A	0.50
Acid Extractable Nickel (Ni)	ug/g	82	31	12	N/A	0.50
Acid Extractable Selenium (Se)	ug/g	1.5	<0.50	<0.50	N/A	0.50
Acid Extractable Silver (Ag)	ug/g	0.5	<0.20	<0.20	N/A	0.20
Acid Extractable Thallium (Tl)	ug/g	1	0.20	0.090	N/A	0.050
Acid Extractable Uranium (U)	ug/g	2.5	0.60	0.40	N/A	0.050
Acid Extractable Vanadium (V)	ug/g	86	45	23	N/A	5.0
Acid Extractable Zinc (Zn)	ug/g	290	58	70	N/A	5.0
Acid Extractable Mercury (Hg)	ug/g	0.27	<0.050	0.28	N/A	0.050
No Fill	No Exceedance					
Grey	Exceeds 1 criteria policy/level					
Black	Exceeds both criteria/levels					
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)						
Table 1: Full Depth Background Site Condition Standards						
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use						
N/A = Not Applicable						

O.REG 153 PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID			JBY883	
Sampling Date			2019/02/21	
COC Number			101208	
	UNITS	Criteria	BH2, SS2	RDL
Inorganics				
Moisture	%	-	11	1.0
F2-F4 Hydrocarbons				
F2 (C10-C16 Hydrocarbons)	ug/g	10	<10	10
F3 (C16-C34 Hydrocarbons)	ug/g	240	<50	50
F4 (C34-C50 Hydrocarbons)	ug/g	120	<50	50
Reached Baseline at C50	ug/g	-	Yes	N/A
Surrogate Recovery (%)				
o-Terphenyl	%	-	99	N/A
No Fill	No Exceedance			
Grey	Exceeds 1 criteria policy/level			
Black	Exceeds both criteria/levels			
RDL = Reportable Detection Limit				
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)				
Table 1: Full Depth Background Site Condition Standards				
Soil -				
Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use				
N/A = Not Applicable				

RESULTS OF ANALYSES OF WATER

Maxxam ID			JBY881		JBY881
Sampling Date			2019/02/28		2019/02/28
COC Number			101208		101208
	UNITS	Criteria	BH3	RDL	BH3 Lab-Dup
Inorganics					
pH	pH	-	7.86	N/A	7.96
Dissolved Sulphate (SO4)	mg/L	-	26	1.0	N/A
Dissolved Chloride (Cl-)	mg/L	790	270	3.0	N/A
No Fill	No Exceedance				
Grey	Exceeds 1 criteria policy/level				
Black	Exceeds both criteria/levels				
RDL = Reportable Detection Limit					
Lab-Dup = Laboratory Initiated Duplicate					
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)					
Table 1: Full Depth Background Site Condition Standards					
Ground Water - All Types of Property Uses					
N/A = Not Applicable					

O.REG 153 METALS & INORGANICS PKG (WTR)

Maxxam ID			JBY879	
Sampling Date			2019/02/28	
COC Number			101208	
	UNITS	Criteria	BH1	RDL
Inorganics				
WAD Cyanide (Free)	ug/L	5	<1	1
Dissolved Chloride (Cl-)	mg/L	790	1800	20
Metals				
Chromium (VI)	ug/L	25	<0.50	0.50
Mercury (Hg)	ug/L	0.1	<0.1	0.1
Dissolved Antimony (Sb)	ug/L	1.5	1.9	0.50
Dissolved Arsenic (As)	ug/L	13	1.5	1.0
Dissolved Barium (Ba)	ug/L	610	1400	2.0
Dissolved Beryllium (Be)	ug/L	0.5	<0.50	0.50
Dissolved Boron (B)	ug/L	1700	110	10
Dissolved Cadmium (Cd)	ug/L	0.5	<0.10	0.10
Dissolved Chromium (Cr)	ug/L	11	<5.0	5.0
Dissolved Cobalt (Co)	ug/L	3.8	1.4	0.50
Dissolved Copper (Cu)	ug/L	5	1.9	1.0
Dissolved Lead (Pb)	ug/L	1.9	<0.50	0.50
Dissolved Molybdenum (Mo)	ug/L	23	18	0.50
Dissolved Nickel (Ni)	ug/L	14	15	1.0
Dissolved Selenium (Se)	ug/L	5	<2.0	2.0
Dissolved Silver (Ag)	ug/L	0.3	<0.10	0.10
Dissolved Sodium (Na)	ug/L	490000	1700000	500
Dissolved Thallium (Tl)	ug/L	0.5	<0.050	0.050
Dissolved Uranium (U)	ug/L	8.9	5.1	0.10
Dissolved Vanadium (V)	ug/L	3.9	1.5	0.50
Dissolved Zinc (Zn)	ug/L	160	<5.0	5.0
No Fill	No Exceedance			
Grey	Exceeds 1 criteria policy/level			
Black	Exceeds both criteria/levels			
RDL = Reportable Detection Limit				
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)				
Table 1: Full Depth Background Site Condition Standards				
Ground Water - All Types of Property Uses				

GENERAL COMMENTS

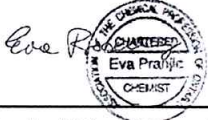
Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.7°C
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Results relate only to the items tested.

VALIDATION SIGNATURE PAGE

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



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

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



740 Campbell Rd., Mississauga, Ontario L5N 2L8
 Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
 A Bureau Veritas Group Company CAM FCD-01191/3

101208 Page 1 of 1

CHAIN OF CUSTODY RECORD

Invoice information
 Company Name: Edward Wong & Associates Inc.
 Contact Name: Ed. Wong
 Address: 441 Esna Park Drive
Unit 19 Markham
 Phone: _____ Fax: _____
 Email: _____

Report information (if differs from invoice)
 Company Name: _____
 Contact Name: _____
 Address: _____
 Phone: _____ Fax: _____
 Email: _____

Project information (where applicable)
 Quantation #: _____
 P.O. #/AF# _____
 Project #: 17 St Andrew Toronto
 Site Location: _____
 Site #: MAGC040030
 Sampled By: S.H.
 Date Required: _____

Turnaround Time (TAT) Required
 Regular TAT (5-7 days) Most analyses
 PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
 Rush TAT (Surcharges will be applied)
 1 Day 2 Days 3-4 Days

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

Regulation 153
 Table 1 Res/Park CCME Sanitary Sewer Bylaw
 Table 2 Ind/Comm MISA Storm Sewer Bylaw
 Table 3 Agr/Other PWQO Region _____
 Table _____ Other (Specify) _____
 FOR RSC (PLEASE CIRCLE) Y / N REG 548 (MIN. 3 DAY TAT REQUIRED)

Other Regulations
 Sanitary Sewer Bylaw
 Storm Sewer Bylaw
 Region _____
 Other (Specify) _____

LABORATORY USE ONLY
 CUSTODY SEAL Y / N
 Present Intact
 COOLING MEDIA PRESENT Y / N
 COMMENTS: Contact Quva
 COOLER TEMPERATURES: 618/6

SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED										DATE: (YYYY/MM/DD)	TIME (HH:MM)	
				FIELD FILTERED (CIRCLES) Meq/L / Mg / CM	BTEX / PHC F1	PHCS F2 - F4	VOCs	REG 153 (CPMS METALS & INORGANICS)	REG 153 (CPMS METALS)	REG 153 METALS (HEAVY METALS: HHS, B)	GENERAL AND ORGANIC	TRANSFORMED	SYNTHETIC			PT, RESIDUE CHLORIDE AND SULPHATE
1 BH1	Feb 23, 19	11:00	GW													
2 BH2	Feb 28, 19															
3 BH3	Feb 28, 19															
4 BH1, 553	Feb 21, 19		S-1													
5 BH2, 552	Feb 21, 19		"													
6 BH3, 552	Feb 21, 19		"													
7																
8																
9																
10																

28-Feb-19 13:54
 Gina Baybayan
 B953064
 CA2 ENV-895

RELIQUISHED BY (Signature/Print): [Signature]
 DATE: Feb 28, 19 TIME: 7:00

RECEIVED BY (Signature/Print): [Signature]
 DATE: 02/28/2019 TIME: 13:54

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms. Sample container, preservation, hold time and packages information can be viewed at <http://www.maxxam.ca/wp-content/uploads/Ontario-COC.pdf>

Appendix E

Dewatering Flow Rate Calculations

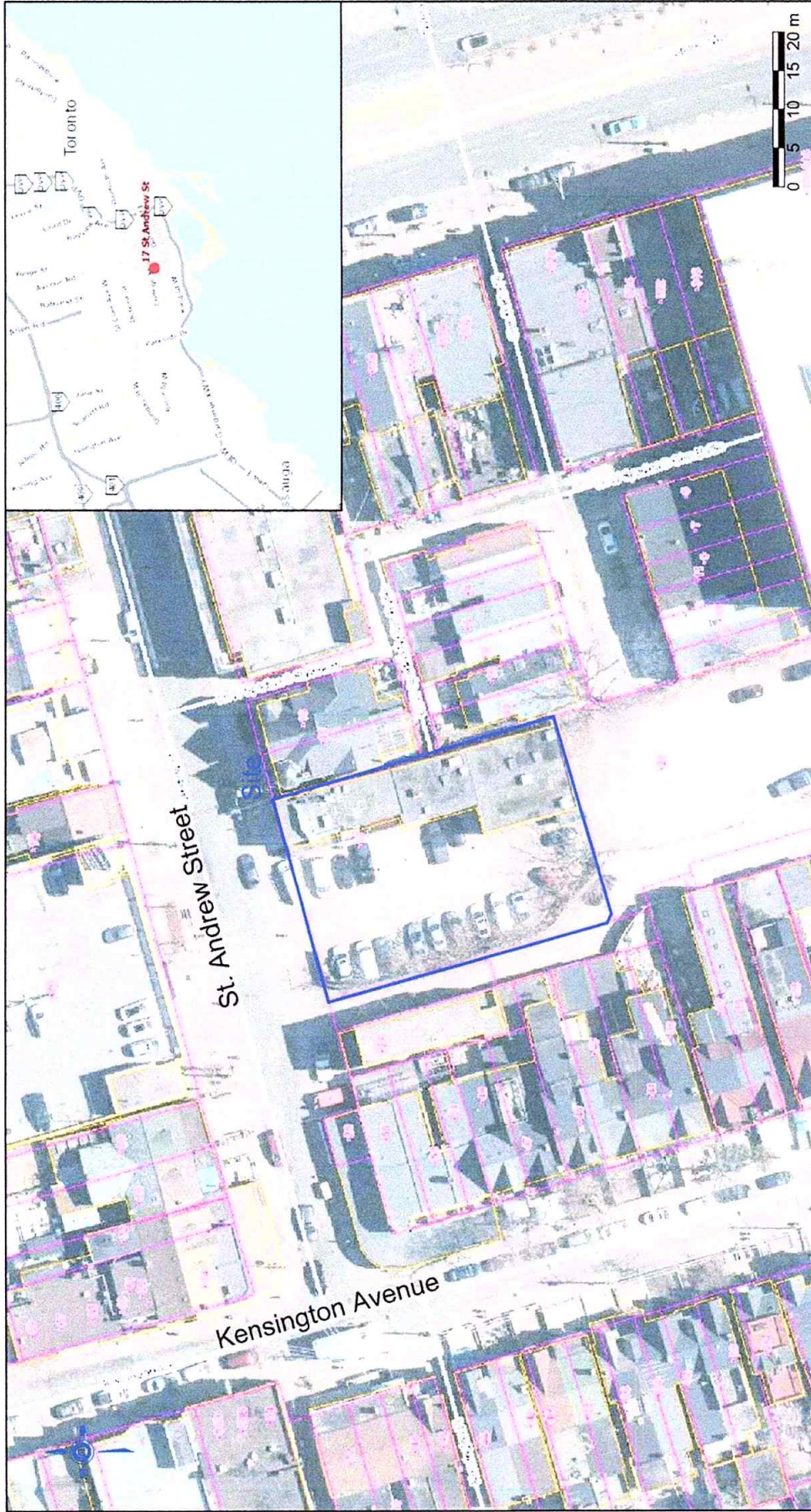
Project No.: Ma004003a
 Location: 17 St. Andrew Street, Toronto
 Title: Dewatering Flow Rates

$R_0 = 3000 \times d_h \times K^{0.5}$ (confined aquifer)
 $a = 32.3 \text{ m}$
 $b = 26.1 \text{ m}$
 $r_s = (a + b) / 3.14$ when $a/b < 1.5$
 $r_s = ((a \times b) / 3.14)^{0.5}$
 $r_s = 18.6 \text{ m}$
 $Q = \frac{3.14 \times K \times (H^2 - h^2)}{\ln(R_0 + r_s / r_s)}$

	Construction Phase	Post Construction Phase
K (m ³ /s)	8.95 x 10-10	8.95 x 10-10
H (m)	5.55	3.05
h (m)	1.5	0
dH (m)	4.05	3.05
R ₀ (m)	0.32	0.23
r _s (m)	18.6	18.6
r _s + R ₀ (m)	18.92	18.83
Q (m ³ / sec.)	4.7 x 10-6	2.1 x 10-6
Q (m ³ / day)	0.41	0.18
Q _f (m ³ / day)	0.61	0.28
Q rain (m ³ / day)	21	0
Q _f rain	31.5	0
Q total	32.11	0.28
	(pre-construction)	(post construction)
Data		
Borehole	3	3
Ground Surface (masl)	100	100
Highest W.L. (masl)	97.95	97.95
Base of Excavation (m)	94.9 (1.5 m below slab)	94.9
Draw down target (m)	93.9 (1 m below excav.)	94.9
Aquifer Bottom (masl)	92.4 (1.5 m below target water level)	94.9
Rainfall (mm)	25	0 (roof cover)
Factor of Safety	1.5	1.5


Reference : J.Patrick Powers, Construction Dewatering and Groundwater Control, 2007

Drawings
Site Location Plan
Borehole and Section Location Plan
Sections A-A
Topographical Map



Title: Site Location Plan
 Project: Proposed Mixed Commercial and Residential Development
 Location: 17 St. Andrew Street, Toronto

Legend:
 — - Property Boundary

Date: April 2, 2019
 Project No.: Ma004003b
 Drawing No.: 1
 Edward Wong



Title: Borehole and Section Location Plan
 Project: Proposed Mixed Commercial and Residential Development
 Location: 17 St. Andrew Street, Toronto

Legend:
 — - Property Boundary;
 ● - Borehole with 50 mm monitoring well.


Date: April 2, 2019
 Project No.: Ma004003b
 Drawing No.: 2
 Edward Wong

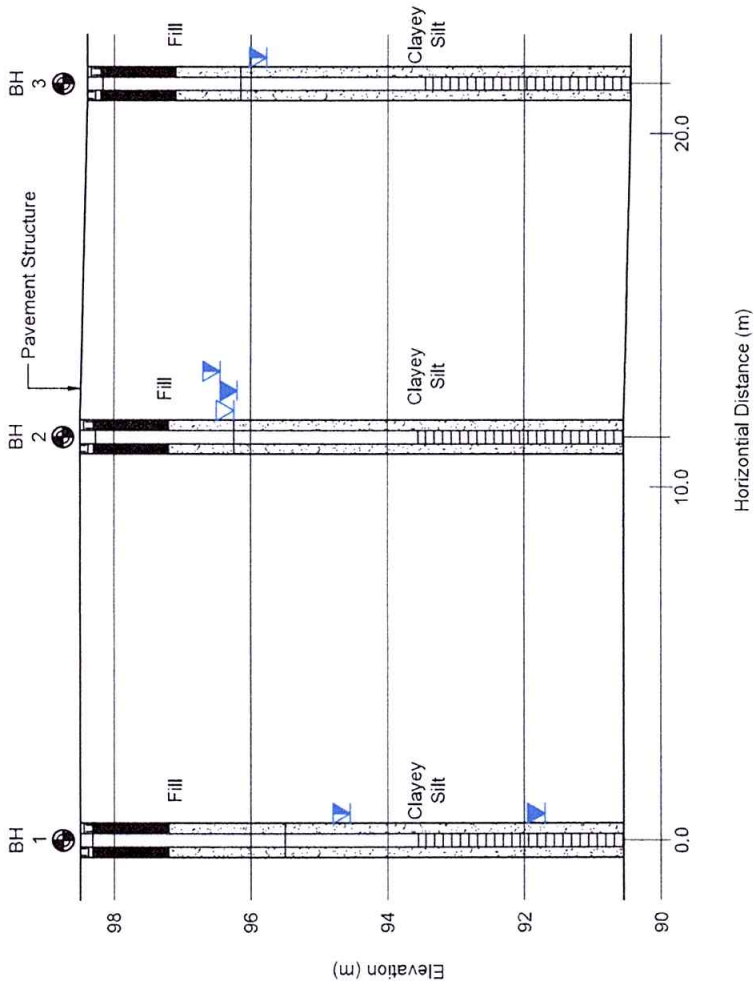


Legend:

- Property Boundary;
- Borehole with 50 mm monitoring well;
- GE - Ground surface elevation;
- GWAD - Groundwater surface elevation on February 28, 2019.

Title: Interpreted Groundwater Elevation Contours
Project: Proposed Mixed Commercial and Residential Development
Location: 17 St. Andrew Street, Toronto

Date: April 2, 2019
Project No.: Ma004003b
Drawing No.: 3
 Edward Wong







Groundwater Level Measurements				
Borehole	Ground Surface Elevation	Depth (Elevation) at Time of Drilling (m)	Depth (Elevation) at End of Drilling (m)	Depth (Elevation) after Drilling (m)
1	98.50	Dry	6.80 (91.70)	3.95 (94.55)
2	98.50	2.25 (96.25)	2.30 (96.20)	2.05 (96.45)
3	98.40	Dry	Dry	2.63 (95.77)

Title: Section A - A

Project: Proposed Mixed Commercial and Residential Development

Location: 17 St. Andrew Street, Toronto


Legend:

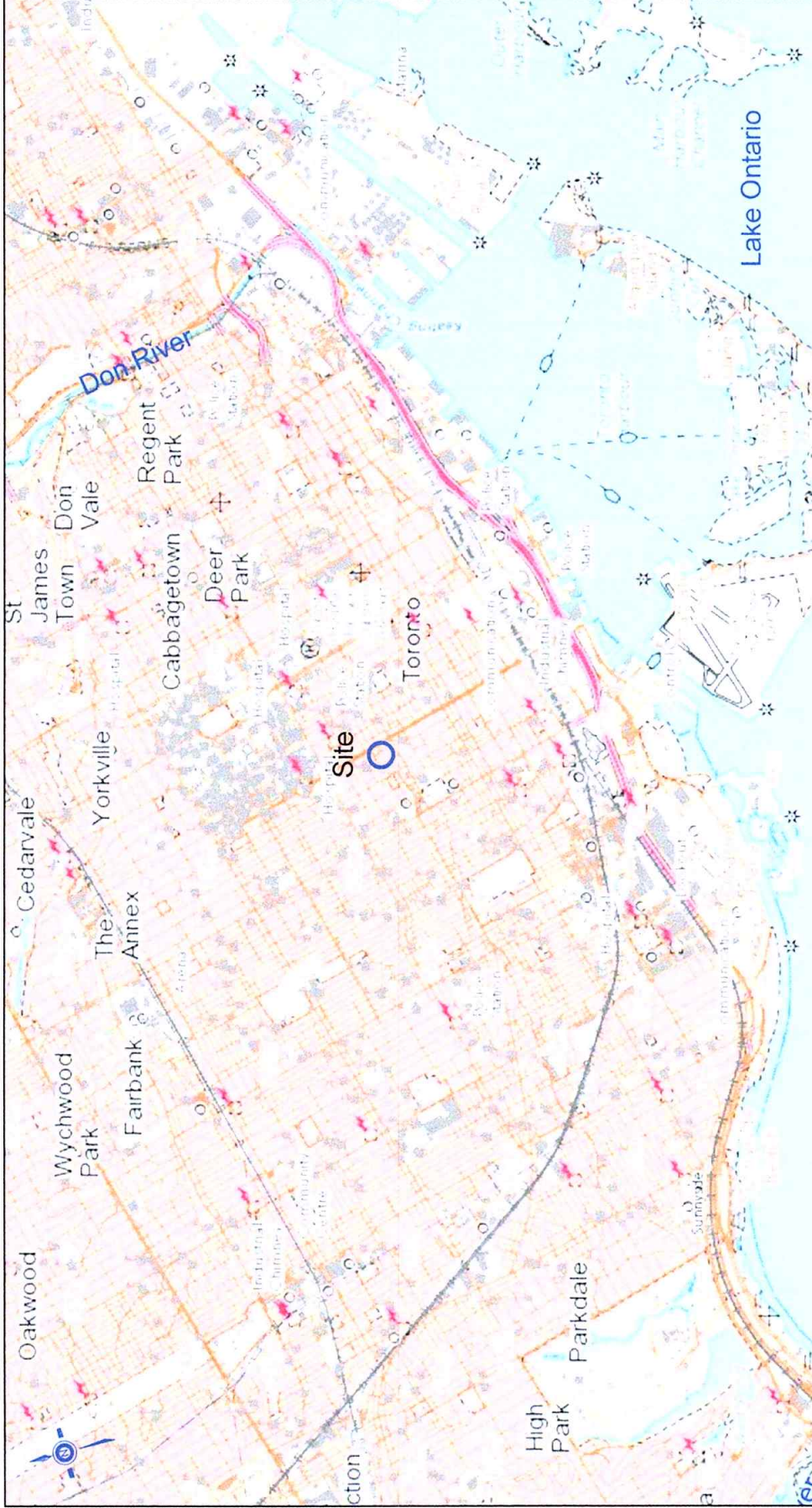
-  - Borehole with 50 mm monitoring well;
-  - Groundwater level at time of drilling;
-  - Groundwater level at end of drilling;
-  - Groundwater level after drilling.

Date: April 2, 2019

Project No.: Ma004003b

Drawing No.: 4


 Edward Wong



Title: Topographical Map
 Project: Proposed Mixed Commercial and Residential Development
 Location: 17 St. Andrew Street, Toronto

Legend:

○ - Property Location

Date: April 2, 2019
 Project No.: Ma004003b
 Drawing No.: 5
 Edward Wong