559 Garner Road East, Ancaster, Ontario

L9G 3K9

Hydrogeological Investigation

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1 Introduction

1.1 Project Description

EXP Services Inc. (EXP) was retained by Elite M.D. Developments to prepare a Hydrogeological Investigation Report associated with the proposed development located at 559 Garner Road East, Ancaster, Ontario (hereinafter referred to as the 'Site').

The Site is currently vacant. It is our understanding that the proposed development plan is to construct a seven (7) storey mixed-use (residential and commercial) building with two (2) levels of underground parking. It should be noted that a plan depicting the depth and lateral extent of the underground parking has not yet been provided – it will therefore be assumed that two (2) levels of underground parking will extend across the entire site. The Site location plan is shown on Figure 1.

EXP conducted a Geotechnical Investigation and Phase Two Environmental Site Assessment in conjunction with this investigation. The pertinent information gathered from the noted investigations is utilized for this report.

1.2 Project Objectives

The main objectives of the Hydrogeological Investigation are as follows:

- Establish the local hydrogeological settings within the Site;
- Provide recommendations on construction dewatering;
- Assess groundwater quality; and
- Prepare a Hydrogeological Investigation Report.

1.3 Scope of Work

To achieve the investigation objectives, EXP has completed the following scope of work:

- Reviewed available geological and hydrogeological information for the Site;
- Drilled and installed one (1) monitoring well to an approximate depth of 10 meter below ground surface (mbgs);
- Installed 50 mm diameter monitoring wells in the geotechnical boreholes;
- Developed and conducted Single Well Response Tests (SWRT) on all new and existing monitoring wells to assess hydraulic conductivities of the saturated soils at the Site;
- Completed two (2) rounds of groundwater level measurements at all monitoring wells;
- Collected one (1) groundwater sample for analyses of parameters, as listed in the City of Hamilton Sanitary and Storm Sewer Use By-Law;
- Compare Phase Two ESA analytical results to Sewer Use By-Law parameters;
- Evaluated the information collected during the field investigation program, including borehole geological information, Water Well Records (WWR), SWRT results, groundwater level measurements and groundwater water quality;
- Prepared site plans, cross section, geological mapping and groundwater contour mapping for the Site;
- Estimated construction dewatering flow rates;

- Assessed potential impacts and recommended mitigation measures; and
- Prepared a Hydrogeological Investigation Report.

The Hydrogeological Investigation was prepared in accordance with the Ontario Water Resources Act and Ontario Regulation 387/04. The scope of work outlined above was made to assess dewatering and did not include a review of Environmental Site Assessments (ESA).

1.4 Review of Previous Reports

The following reports were reviewed as part of this Hydrogeological Investigation:

- EXP Services Inc. (June 30, 2021), Draft Geotechnical Investigation Report, 559 Garner Road East, ON, prepared for Elite M.D. Developments.
- EXP Services Inc. (December 21, 2020), Phase Two Environmental Site Assessment, 559 Garner Road East, ON, prepared for Garner South M.D. Developments.

2 Hydrogeological Setting

2.1 Regional Setting

2.1.1 Regional Physiography

The Site is within a physiographic region known as the Haldimand Clay Plain. The physiographic landform is named Till Moraines. The Site is located approximately 900 m south of Niagara Escarpment (Chapman & Putnam, 2007).

The Haldimand Clay Plain is located between Niagara Escarpment and Lake Erie, which occupies all the Niagara peninsular except the fruit belt below the escarpment. Till comes to the surface generally in the low morainic ridges in the north. The northern part of the Plain has more relief southern part.

The topography of the Iroquois Plain is relatively flat with a gradual slope to the south, toward Lake Erie.

2.1.2 Regional Geology and Hydrogeology

The surficial geology can be described as fine textured glaciolacustrine deposits consisting of silt and clay with minor sand and gravel, massive to well laminated (Ministry of Northern Development and Mines, 2012). The surficial geology of the Site and surrounding areas is shown on Figure 2. The Site is on a Till Moraine (Chapman & Putnam, 2007).

Based on the available regional geology maps, the bedrock present at the Site is mapped as sucrosic, fossiliferous, locally biohermal dolostone belonging to the Guelph Formation, Armstrong, and Dodge (2007). The area of carbonate rock units is identified as most susceptible to karst processes and is mapped as a potential karst area.

Regional groundwater across the area flows north, towards Lake Ontario. Local deviation from the regional groundwater flow pattern may occur in response to changes in topography and/or soils, as well as the presence of surface water features and/or existing subsurface infrastructure.

2.1.3 Existing Water Well Survey

Water Well Records (WWRs) were compiled from the database maintained by the Ministry of the Environment, Conservation and Parks (MECP) and reviewed to determine the number of water wells documented within a 500-m radius of the Site boundaries. The locations of the MECP WWRs within 500 m of the Site are shown on Figure 3. A summary of the WWR is included in Appendix A.

The MECP WWR database indicates that forty-nine (49) records within a 500 m radius from the Site centroid where eight (8) well record are identified onsite (Figure 3 and Appendix A). Well distances are calculated relative to the Site centroid, therefore some distances in Appendix A exceed 500 m.

The database indicates that the offsite wells are at an approximate distance of ninety-five (95) m or greater from the Site centroid. All offsite wells were reportedly identified as monitoring and observation wells, test holes, dewatering wells, water supply wells, abandoned and/or listed with unknown use.

There are twenty one (21) offsite water supply wells (16 domestic, 3 commercial, 1 industrial, and 1 irrigation/domestic). The Well Identification Number of the closest offsite water supply well is 6802208. It is reportedly 109 m from the Site boundary.

The reported water levels ranged from depths of 0.3 m to 46.3 meters below ground surface (mbgs).

Based on the locations the water supply well and since the area is partially municipally serviced, it is likely that some of the noted water supply wells are still active.

2.2 Site Setting

2.2.1 Site Topography

The Site is in a residential and commercial area. The topography is considered relatively flat with a regional gradual northwesterly slope. As indicated on the borehole logs included in Appendix B, the surface elevation of the Site ranges between approximately 247.17 to 249.01 meters above sea level (masl).

2.2.2 Local Surface Water Features

The Site is within the Spencer Creek watershed. No surface water features exist onsite. The nearest surface water feature is an unnamed tributary, located approximately 400 m north of the Site boundary. The nearest surface water feature is Lake Ontario, is approximately 9.4 km from the Site boundary to the northeast.

2.2.3 Local Geology and Hydrogeology

A summary of subsurface soil stratigraphy is provided in the following paragraphs. The soil descriptions are based on the geotechnical investigation report (EXP, 2018). They are summarized for the hydrogeological interpretations. As such, the information provided in this section shall not be used for construction design purposes.

The detailed soil profiles encountered in each borehole and the results of moisture content determinations are presented on the attached borehole logs (Appendix B). The soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones for the Hydrogeological Investigation and shall not be interpreted as exact planes of geological change.

The "Notes on Sample Description" preceding the borehole logs form an integral part of and should be read in conjunction with this report. The following is a brief description of the soil conditions encountered during the investigation.

Based on the results of the geotechnical investigation, the general subsurface soil stratigraphy consists of the following units from top to bottom:

Topsoil

The boreholes were advanced throughout the vacant property and encountered a surficial layer of topsoil ranging in thickness from approximately 50 to 175 mm.

Fill

Fill was encountered below the topsoil in all boreholes, extending to 0.3 to 1.6 m depth. The fill typically consisted of clayey silt, grading to sandy silt or silt locally. Trace grave and rootlets were observed throughout. SPT N values of the fill ranged from 5 to 15 blows per 305 mm of penetration of the split spoon sampler.

Sandy Silt to Silty Sand

A very loose to compact sandy silt to silty sand layer, distinct from the underlying silty sand to silt deposit, was observed below the fill in all boreholes and extending to 2.3 to 4.6 m depth. The layer was typically very loose to compact with SPT N values ranging from 0 to 26, locally as high as 38 (dense) at the base of the layer in Borehole BH-2, where local clayey silt layers were noted.

Silty Sand to Silt

The native soil was generally noted to become finer with depth and transitioned to silty sand or silt below depths of approximately 2.3 to 4.6 m, extending to the borehole termination depth. The silty sand to silt was brown to grey and generally in a very moist to wet state. The layer was typically dense to very dense with SPT N values ranging from 43 to 96 blows per 305 mm of penetration.

The borehole and monitoring well locations are shown on Figure 4. A geological cross-section was generated based on the available borehole logs completed as part of the previous and current investigations and shown on Figure 5 (Cross section A-A'). It is noted that the cross section shows a simplified representation of soil conditions and soil deposits may be interconnected differently than represented. Borehole logs used to generate both cross-sections are provided in Appendix B.

3 Results

3.1 Monitoring Well Details

The monitoring well network was installed as part of the Geotechnical and Environmental Investigations at the Site. It consists of the following:

- Three (3) shallow overburden monitoring wells (BH/MW2, BH/MW3, and BH/MW6) were installed in November 2020 during a previous investigation.
- One (1) deep overburden monitoring well (BH/MW101) was installed in June 2021 for this current investigation.

The diameter of all monitoring wells is 50 mm. All wells were installed with a stick-up protective casing. Borehole logs and monitoring well installation details are provided in Appendix B. The monitoring well locations are shown on Figure 4.

3.2 Water Level Monitoring

As part of the Hydrogeological Investigation, static water levels in the monitoring wells installed in the vacant lot were recorded in two (2) monitoring events, June 30, 2021, and July 14, 2021. A summary of all static water level data as it relates to the elevation survey is given in Table 3-1 below.

The groundwater elevation recorded in the intermediate wells ranged from 245.11 masl (4.78 mbgs at BH2 on July 14, 2021) to 245.35 masl (3.74 mbgs at BH/MW101 on July 14, 2021).

Table 3-1: Summary of Measured Groundwater Elevations

Monitoring Well ID	Ground Surface Elevation (masl)	Stick Up (+) / Stick Down (-) (m)	Approximate Full Well Depth - Measured (mbgs)	Units	30-Jun-21	14-Jul-21
BH/MW101	247.99	1.10	9.79	mbTOP	3.68	3.74
				mbgs	2.58	2.64
				masl	245.41	245.35
BH/MW2	249.01	0.88	8.21	mbTOP	4.65	4.78
				mbgs	3.77	3.90
				masl	245.24	245.11
BH/MW3	248.80	0.74	8.20	mbTOP	4.32	4.35
				mbgs	3.58	3.61
				masl	245.22	245.19
BH/MW6	247.17	0.68	6.70	mbTOP	2.70	2.72
				mbgs	2.02	2.04
				masl	245.15	245.13

One map was created for the Site to show groundwater contours of the water-bearing zones (Figure 6). Accordingly, the groundwater flow direction is interpreted to be southwest of the Site. For the design of foundations without perimeter and foundation drainage systems, shallower wells need to be considered to evaluate the shallow groundwater table. The hydrogeologist needs to be consulted during the design process.

Groundwater levels are expected to show seasonal fluctuations and vary in response to prevailing climate conditions. This may also affect the direction and rate of flow. It is recommended to conduct seasonal groundwater level measurements to provide more information on seasonal groundwater level fluctuations.

3.3 Hydraulic Conductivity Testing

Four (4) Single Well Response Tests (SWRTs) were completed on monitoring wells BH/MW101, BH2, BH/MW3, and BH6 on July 14, 2021. The tests were completed to estimate the saturated hydraulic conductivity (K) of the soils at the well screen depths.

The static water level within each monitoring well was measured prior to the start of testing. In advance of performing SWRTs, each monitoring well underwent development to remove fines introduced into the screens following construction. The development process involved purging of the monitoring wells to induce the flow of fresh formation water through the screen. Each monitoring well was permitted to fully recover prior to performing SWRTs.

Hydraulic conductivity values were calculated from the SWRT and constant rate test data as per Hvorslev's solution included in the Aqtesolv Pro. V.4.5 software package. The semi-log plots for normalized drawdown versus time are included in Appendix C.

A summary of the hydraulic conductivities (K-values) estimated from the SWRTs are provided in Table 3-2.

Table 3-2: Summary of Hydraulic Conductivity Testing

Monitoring Well	Well Depth (mbgs)	Screen Interval (mbgs)		Soil formation Screened	Estimated Hydraulic Conductivity (m/s)
		from	to		
BH/MW101	9.31	6.31	9.31	Silt	3.1E-7
BH2	8.092	5.092	8.092	Sand to Silty Sand	1.9E-7
BH/MW3	5.99	2.99	5.99	Sand to Silty Sand	1.5E-7
BH6	5.47	2.47	5.47	Silty Sand	7.0E-7
				Highest Estimated K Value	7.0E-7
				Geometric Mean of Estimated K values	2.8E-7

SWRTs provide K-estimates of the geological formation surrounding the well screens and may not be representative of bulk formation hydraulic conductivity. As shown in Table 3-2, the highest K-value of the tested water-bearing zone is 7.E-7 m/s, and the geometric mean of the K-values is 2.8E-7 m/s.

3.4 Groundwater Quality

To assess the suitability for discharging pumped groundwater into the sewers owned by the City of Hamilton during dewatering activities, one (1) groundwater sample was collected from monitoring well BH 101-2021, on July 2, 2021 using a peristaltic pump. Prior to collecting the noted water sample, approximately three (3) standing well volumes of groundwater were purged from the referred well. The samples were collected unfiltered and placed into pre-cleaned laboratory-supplied vials and/or bottles provided with analytical test group specific preservatives, as required. Dedicated nitrile gloves were used during sample handling. The groundwater samples were submitted for analysis to Bureau Veritas Laboratory, a CALA certified independent laboratory in Mississauga, Ontario. Analytical results are provided in Appendix D.

Table 3-3 summarizes exceedance(s) of the Sanitary (Table 1) and Storm (Table 2) Sewer Use By-Law parameters.

When comparing the chemistry of the collected groundwater samples to the City of Hamilton Sanitary and Combined Sewer Discharge Criteria (Table 1), there were no parameter exceedances to be reported.

When comparing the chemistry of the collected groundwater samples to the City of Hamilton Storm Sewer Discharge Criteria (Table 2) the following parameters reported an exceedance: Total Suspended Solids (TSS).

Reporting detection limits (RDLs) were below the Sewer Use By-Law parameter criteria of Tables 1 and 2.

Table 3-3: Summary of Analytical Results

Parameter	Units	City of Hamilton Sanitary and Combined Sewer Discharge Limit (Table 1)	City of Hamilton Storm Sewer Discharge Limit (Table 2)	Concentration BH/MW101 02-Jul-2021
Total Suspended Solids (TSS)	mg/L	350	15	47

Bold – Exceeds City of Hamilton Storm Sewer Discharge Limit (Table 2).
Bold & underlined – Exceeds City of Hamilton Sanitary and Combined Sewer Discharge Limit (Table 1).

As part of Phase 2 ESA Investigation, groundwater samples were collected on November 27, 2020. The samples were submitted for the analysis of PHCs and VOCs. All parameters were either non-detected or detected below their applicable MECP (2011) Table 3 SCS.

For the short-term dewatering system (construction phase), it is anticipated that TSS levels and some other parameters (for example, Total Metals) in the pumped groundwater may become elevated and exceed both, Sanitary and Storm Sewer Use By-Law limits. To control the concentration of TSS and associated metals, it is recommended that a suitable treatment method be implemented (filtration or decantation facilities and/ or any other applicable treatment system) during construction dewatering activities to discharge to the applicable sewer system. The specifications of the treatment system will need to be adjusted to the reported water quality results by the treatment contractor/process engineer.

It is noted that the City of Hamilton does not permit any post construction dewatering of the foundation.

An agreement to discharge into the sewers owned by the City of Hamilton will be required prior to releasing dewatering effluent.

4 Dewatering Assessment

It is our understanding that the proposed development plan is to construct a proposed seven (7) storey mixed-use (residential and commercial) building with two levels of underground parking. Table 4-1 presents the assumptions used to calculate the dewatering rate for the Site.

Table 4-1 Construction Dewatering Estimate Assumptions

Input Parameter	Assumption	Units	Notes
Ground Surface Elevation	248.24	masl	Approximate elevation based on the borehole logs and Site
Groundwater elevation	246.35	masl	The highest recorded groundwater elevation measured across the Site plus 1 meter to account for some seasonal fluctuation
Point Towers/Podiums	1 Towers, 1 Podiums	-	Assumed, based on proposal
Number of Subgrade Levels	2 Levels	-	Assumed, based on proposal
Top of Slab Elevation	242.24	masl	Assumption based on 3 m per subgrade level below ground surface elevation.
Lowest Footing Elevation	240.74	masl	Assumed to be approximately 1.5 m below the top of slab elevation
Construction Dewatering Elevation Target	239.74	masl	Assumed to be approximately 1.0 m below the lowest footing elevation
Bottom Elevation of Water-Bearing Zone	213.4	masl	Top elevation of bedrock from Feenstra (1981)
Excavation Area (Length x Width)	3,744 (52 x 72)	m^2 (m x m)	Approximate area (length x width) of Site for the proposed development (per SRM Architects Inc. figures dated 2022-04-27)
Hydraulic Conductivity (K)	7.0E-7	m/s	Highest K-value for overburden
Specific Yield	0.1	1	Assumed for Silty Sand

4.1 Dewatering Flow Rate Estimate and Zone of Influence

The Dupuit-Forcheimer equation for radial flow to both sides of an excavation through an unconfined aquifer resting on a horizontal impervious surface was used to obtain a flow rate estimate. Dewatering flow rate is expressed as follows:

$$Q_w = \frac{\pi K(H^2 - h^2)}{Ln\left[\frac{R_o}{r_e}\right]}$$

$$r_e = \frac{a+b}{\pi} \qquad R_o = R_{cj} + r_e$$

Where:

Qw = Rate of pumping (m^3/sec)
X = Length of excavation (m)
K = Hydraulic conductivity (m/sec)
H = Hydraulic head beyond the influence of pumping (static groundwater elevation) (m)
h = Hydraulic head above the base of aquifer in an excavation (m)
R_0 = Radius of influence (m)
R_{cj} = Cooper Jacob radius of influence (m)
r_e = Equivalent perimeter (m)
a = Length of the excavation area (m)
b = Width of the excavation area (m)

It is expected that the initial dewatering rate will be higher to remove groundwater from within the overburden formation. The dewatering rates are expected to decrease once the target water level is achieved in the excavation footprint as groundwater will have been removed, primarily from storage, resulting in lower seepage rates into the excavation.

4.2 Cooper-Jacob's Radius of Influence

The radius of influence (Rcj) for the construction dewatering was calculated based on Cooper-Jacob equation. This equation is used to predict the distance at which the drawdown resulting from pumping is negligible.

The estimated radius of influence due to pumping is based on Cooper-Jacob formula as follows:

$$\mathrm{R}_{cj} = \sqrt{2.25KDt/s}$$

Where:

Ro = Estimated radius of influence (m)
D = Aquifer thickness (original saturated thickness) (m)
K = Hydraulic conductivity (m/sec)
S = Storage coefficient
t = Duration of pumping (s)

Based on Cooper-Jacob's formula and the highest K-value, the calculated radius of influence (Rcj) is provided in Appendix E.

4.3 Stormwater

Additional pumping capacity may be required to maintain dry conditions within the excavation during and following significant precipitation events. Therefore, the dewatering rates at the Site should also include removing stormwater from the excavation.

A 15 mm precipitation event was utilized for estimating the stormwater volume. The calculation of the stormwater volume is included in Appendix E.

The estimate of the stormwater volume only accounts for direct precipitation into the excavation. The dimensions of the excavation are considered in the dewatering calculations. Runoff from outside of the excavation's footprint is excluded and it should be directed away from the excavation.

During precipitation events greater than 15 mm (ex: 100-year storm), measures should be taken by the contractor to retain stormwater onsite in a safe manner to not exceed the allowable water taking and discharge limits, as necessary. A two (2) and a one hundred (100) year storm event over a 24-hour period are 59.1 and 129.9 mm, respectively, which would produce 221.3 and 486.3 m^3 of water.

4.4 Results of Dewatering Rate Estimates

4.4.1 Construction Dewatering Rate Estimate

For this assessment, it was assumed that the proposed construction plans include an excavation with shoring extending to the Site boundaries. EXP should be retained to review the assumptions outlined in this section, should the assumed shoring design change. Short-term (construction) dewatering calculations are presented in Appendix E. Pits (elevator, sump pits) are assumed to have the same excavation depth and dewatering target as the main excavation; deeper pits may require localized dewatering and revised dewatering estimates.

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

Table 4-2 Summary of Construction Dewatering Rate

Peak Dewatering Flow Rate Including Rain Collection Volume and Zone of Influence	
Description	With 2 Levels of **Underground Parking (m^3/day)**
Estimated Short Term Dewatering Rate (without safety factor or precipitation)	113
From Precipitation Event of 15 mm in one day	56
With Factor of Safety of 2.0 (excluding Precipitation) for EASR	227
With Factor of Safety of 2.0 (including Precipitation) for designs, and budgeting	283
Radius of Influence from sides of excavation (m)	37

The peak dewatering flow rates does not account for flow from utility beddings and variations in hydrogeological properties beyond those encountered during this investigation.

Local dewatering may be required for pits (elevator pits, sump pits), if these extend deeper than the dewatering target. Local dewatering is not considered to be part of this assessment. Dewatering estimates should be reviewed once the pit dimensions are available.

All grading around the perimeter of the excavation should be graded away from the shoring the systems and ramp/site access to redirect runoff away from excavation. The dewatering assumptions are based on using shoring system without open cuts and sloped excavations.

If caisson walls are installed, these should be designed for full hydrostatic pressure for shallow and deep water levels, without dewatering on the outside. Soldier pile and lagging and caisson wall systems should be designed to account for shallow groundwater conditions and take into consideration that dewatering systems may not provide fully dewatered conditions.

All grading around the perimeter of the construction Site should be graded away from the shoring the system.

The contractor is responsible for the design of the dewatering systems (depth of wells, screen length, number of wells, spacing sand pack around screens, prevent soil loss etc.) to ensure that dry conditions are always maintained within the excavation at all costs.

Dewatering should be monitored using dedicated monitoring wells within and around the perimeter of the excavation, and these wells should be monitored using manual measurements and with electronic data loggers; records should be maintained on site to track dewatering progress. Discharge rates should be monitored using calibrated flow meters and records of dewatering progress, and daily precipitation as per MECP requirements should be maintained.

4.4.2 Post-Construction Dewatering Rate Estimate

It is our understanding that the development plan does not include a permanent foundation sub-drain system that will ultimately discharge to the municipal sewer system, and therefore post-construction dewatering is not required. Further, it is noted that the City of Hamilton does not permit any post-construction dewatering of the foundation. As a result, the underground levels will need to be made watertight without any foundation drains (sub-slab and perimeter) and designed for full hydrostatic pressure.

4.5 MECP Water Taking Permits

In accordance with the Ontario Water Resources Act, if the water taking for the construction dewatering is more than 50,000 L/day but less than 400,000 L/day, then an online registration in the Environmental Activity and Sector Registry (EASR) with the MECP will be required. If groundwater dewatering rates onsite exceed 400,000 L/day, a Category 3 Permit to Take Water (PTTW) will be required from the MECP.

As of July 1, 2021 an amendment of O. Reg. 63/16 has come into effect and replaced the former subsection 7 (5) such that the water taking limit of 400,000 L/day would apply of groundwater takings of each dewatered work area only, excluding stormwater.

It is recognized that the maximum flow estimate calculated with a high K-value, provides a conservative estimate to account for higher than expected flow rates during the construction dewatering. The dewatering estimate (including a safety factor and excluding precipitation) is stated below. The MECP construction dewatering flow rate excludes the precipitation amount and is the rate used for the permit application. Based on the MECP construction dewatering an EASR would be required to facilitate the construction dewatering program of the Site.

Table 4-3: MECP Construction Dewatering Flow Rate

Scenario	Flow Rate (m^3/day)
MECP Construction Dewatering Flow Rate **With Safety Factor** of 2.0 (excluding rainwater collection)	227

A Discharge Plan (dewatering sketch, sewer discharge agreement) must be developed and applied for any discharges from the Site. Monitoring of both water quantity and water quality must be carried out for the entire duration of the construction dewatering phase. During this phase, the Discharge Plan and the daily water taking records must be available onsite.

The EASR, Discharge Plan, hydrogeological investigation report, and geotechnical assessment of settlements must also be available at the construction Site during the entire construction dewatering. EXP should be notified immediately about any changes to the construction dewatering schedule or design, since the EASR will need to be updated to reflect these modifications. Altogether, the hydrogeological report, EASR, Discharge Plan and geotechnical assessment constitute the Water Taking Plan which needs to be available onsite during the construction dewatering.

5 Environmental Impact

5.1 Surface Water Features

The Site is within the Spencer Creek watershed. No surface water features exist onsite. The nearest surface water feature is an unnamed tributary, located approximately 400 m north of the Site boundary. The nearest surface water feature is Lake Ontario, is approximately 9.4 km from the Site boundary to the northeast.

Due to the limited extent of zone of influence and the wide distance to the nearest surface water feature, no detrimental impacts on surface water features are expected during construction activities.

5.2 Groundwater Sources

Well Records from the MECP Water Well Record (WWR) Database were reviewed to determine the presence and number of water supply wells within a 500 m radius of the Site boundaries. Given that the dewatering zone of influence is limited, no dewatering related impact is expected on the water supply wells in the area.

5.3 Geotechnical Considerations

As per the MECP technical requirement for PTTW and EASRs, the geotechnical assessment of the stability of the soils due to water taking (ex: settlement, soil loss, subsidence, etc.) is required. The water taking should not have unacceptable interference on soils and underground structures (foundations, utilities, etc.).

A letter related to geotechnical issues as it pertains to the Site is required to be completed under a separate cover.

5.4 Groundwater Quality

It is our understanding that the potential effluent from the dewatering system during the construction will be released to the municipal sewer system. As such, the quality of groundwater discharge is required to conform the City of Hamilton Sewer Use By-Law.

For the short-term dewatering system (construction phase), it is anticipated that Chlorides, TSS levels and some other parameters (for example, Total Metals) in the pumped groundwater may become elevated and exceed both, Sanitary and Storm Sewer Use By-Law limits. To control the concentration of TSS and associated metals, it is recommended that a suitable treatment method be implemented (filtration or decantation facilities and/ or any other applicable treatment system) during construction dewatering activities to discharge to the applicable sewer system. The specifications of the treatment system will need to be adjusted to the reported water quality results by the treatment contractor/process engineer.

It is noted that the City of Hamilton does not permit any post construction dewatering of the foundation.

Dewatering (short-term) may induce migration of contaminants within the zone of influence and beyond due to changing hydraulic gradients, hydrogeological conditions beyond Site boundaries and preferential pathways in utility beddings etc. The water quality sampling conducted as part of this assessment was performed under static conditions. As a result, monitoring may be required during dewatering activities (short-term) to monitor potential migration, and this should be performed more frequently during early dewatering stages.

An agreement to discharge into the sewers owned by the City of Hamilton will be required prior to releasing dewatering effluent.

5.5 Well Decommissioning

In conformance with Regulation 903 of the Ontario Water Resources Act, the installation and eventual decommissioning of any dewatering system wells or monitoring wells must be completed by a licensed well contractor. This will be required for all wells that are no longer in use.

6 Conclusions and Recommendations

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

- When comparing the chemistry of the collected groundwater samples to the City of Hamilton Sanitary and Combined Sewer Discharge Criteria (Table 1), there were no parameter exceedances to be reported.
- When comparing the chemistry of the collected groundwater samples to the City of Hamilton Storm Sewer Discharge Criteria (Table 2) the following parameters reported an exceedance: Total Suspended Solids (TSS).
- Based on the assumptions outlined in this report, the estimated peak dewatering rate for proposed construction activities is approximately 283,000 L/day. This is the rate which will be required to be discharged to the municipal sewer system. As the dewatering flow rate estimate is between 50,000 L/day and 400,000 L/day, an EASR would be required to facilitate the construction dewatering program for the Site.
- It is our understanding that the development plan does not include a permanent foundation sub-drain system that will ultimately discharge to the municipal sewer system, and therefore post-construction dewatering is not required. Further, it is noted that the City of Hamilton does not permit any post-construction dewatering of the foundation. As a result, the underground levels will need to be made watertight without any foundation drains (sub-slab and perimeter) and designed for full hydrostatic pressure.
- The construction dewatering discharge volumes is based on the assumptions outlined in this report. Any variations in hydrogeological conditions beyond those encountered as part of this investigation may significantly influence the discharge volumes.
- For the short-term dewatering system (construction phase), it is anticipated that chlorides, TSS levels and some other parameters (for example, Total Metals) in the pumped groundwater may become elevated and exceed both, Sanitary and Storm Sewer Use By-Law limits. To control the concentration of TSS and associated metals, it is recommended that a suitable treatment method be implemented (filtration or decantation facilities and/ or any other applicable treatment system) during construction dewatering activities to discharge to the applicable sewer system. The specifications of the treatment system will need to be adjusted to the reported water quality results by the treatment contractor/process engineer.
- As per the MECP technical requirement for EASRs, the geotechnical assessment of the stability of the soils due to water taking (ex: settlement, soil loss, subsidence etc.) is required. The water taking should not have unacceptable interference on soils and underground structures (foundations, utilities etc.). A letter related to geotechnical issues as it pertains to the Site is required to be completed under a separate cover.
- An agreement to discharge into the sewers owned by the City of Hamilton will be required prior to releasing construction dewatering effluent.
- The EASR registration allows construction dewatering discharge of up to 400 m^3/day. A Discharge Plan (dewatering sketch, sewer discharge agreement) must be developed and applied for any discharges from the Site. The Discharge Plan and monitoring for both water quantity and water quality must be carried at the Site during the entire construction dewatering phase. The daily water taking records must be maintained onsite for the entire construction dewatering phase. The EASR, Discharge Plan, hydrogeological investigation report, and geotechnical assessment of settlements must always also be available at the construction Site for the entire construction dewatering. EXP should be notified immediately about any changes to the construction dewatering schedule or design, since EASR will need to be updated to reflect these modifications. Altogether, the hydrogeological report, EASR, Discharge Plan and geotechnical assessment constitutes the Water Taking Plan which needs to be available onsite for the duration of construction dewatering.

- In conformance with Regulation 903 of the Ontario Water Resources Act, the installation and eventual decommissioning of any dewatering system wells or monitoring wells must be completed by a licensed well contractor. This will be required for all wells that are no longer in use.

The conclusions and recommendations provided above should be reviewed in conjunction with the entirety of the report. They assume that the present design concept described throughout the report will proceed to construction. This report is solely intended for the construction dewatering assessment. Any changes to the design concept may result in a modification to the recommendations provided in this report.

7 Limitations

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

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

This report was prepared for the exclusive use of Elite M.D. Developments. This report may not be reproduced in whole or in part, without the prior written consent of EXP, or used or relied upon in whole or in part by other parties for any purposes whatsoever. Any use which a third party makes of this report, or any part thereof, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EXP Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

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

Sincerely,

EXP Services Inc.

Nicolas Sabo, B.Sc., M.E.S.
Environmental Scientist
Environmental Services

Francois Chartier, M.Sc., P. Geo.
Head of Hydrogeology Group
Environmental Services

8 References

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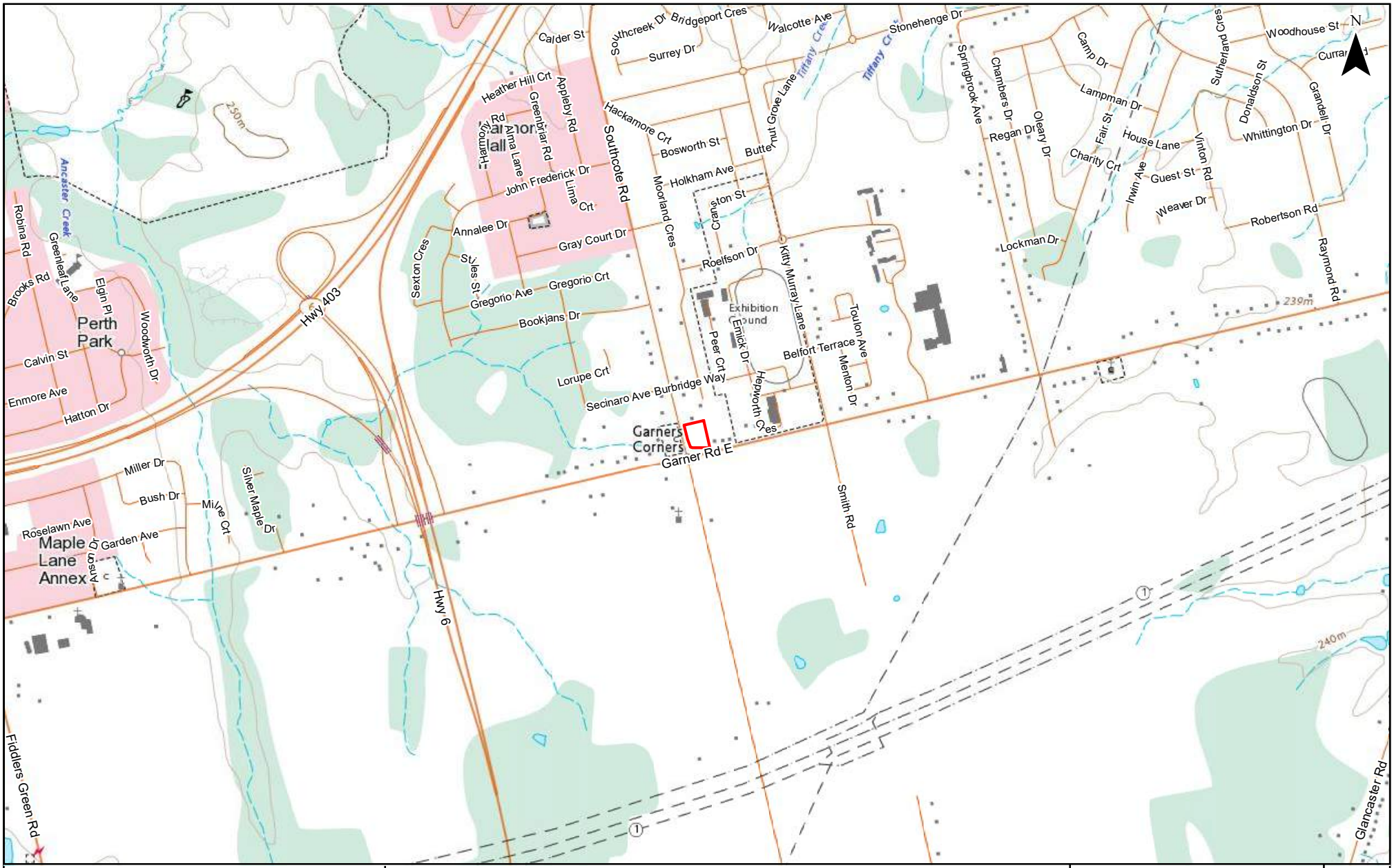
Figures



SCALE:

0 150 300 450 600 750 m

LEGEND:

APPROXIMATE SITE BOUNDARY

exp.

DRAWN BY:	CHECKED BY:
AC	NS

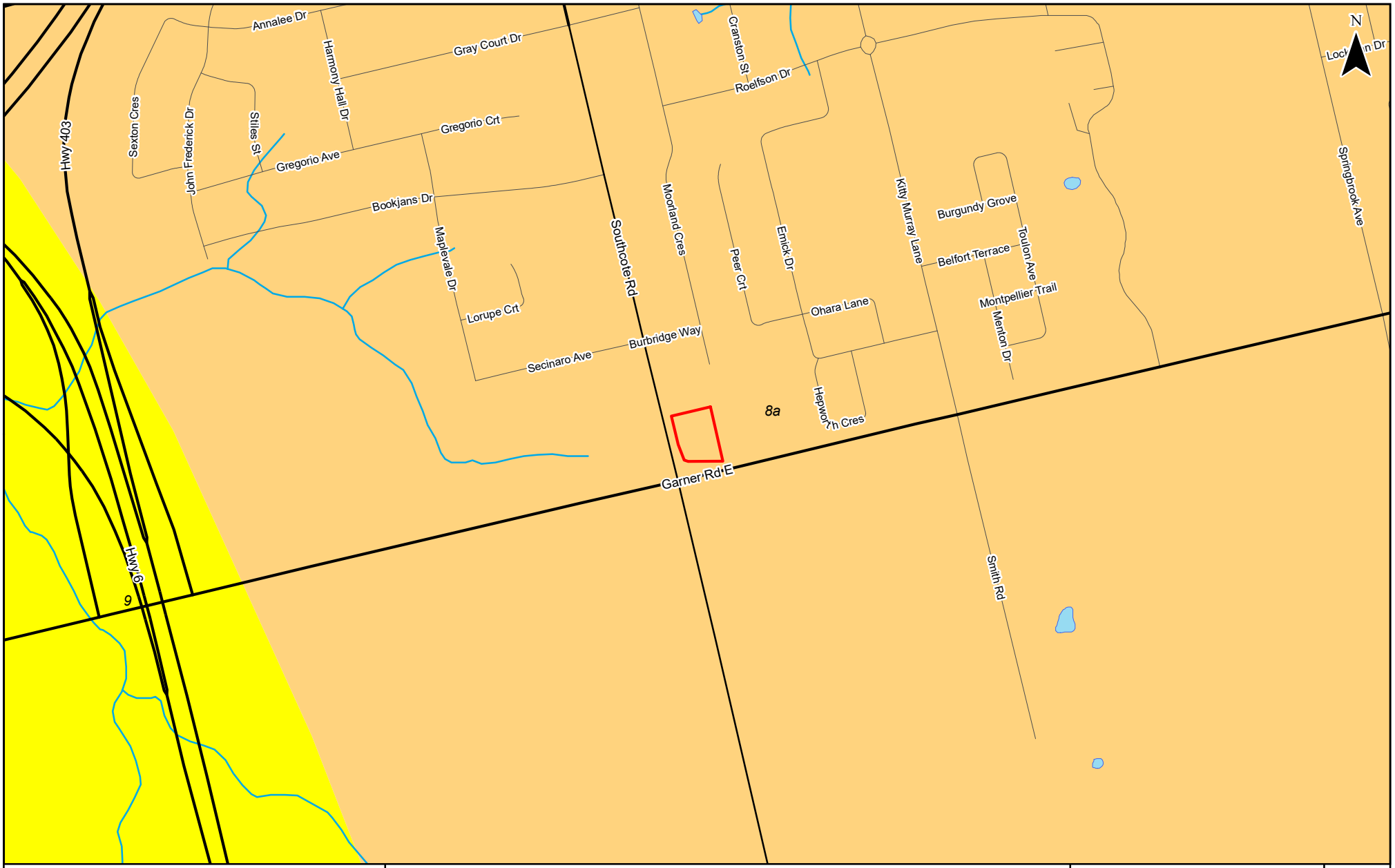
SITE LOCATION PLAN

FIGURE: 1

HYDROGEOLOGICAL INVESTIGATION
559 GARNER ROAD
ANCASTER, ONTARIO

PROJECT NUMBER: HAM-00802098-B0

DATE: JULY 2021



SCALE:
0 100 200 300 400 500 m

SOURCE:
BASED ON ONTARIO GEOLOGICAL SURVEY DATA PUBLISHED IN 2010

exp.

DRAWN BY:	CHECKED BY:
AC	NS

LEGEND:
- APPROXIMATE SITE BOUNDARY
- 9: COARSE-TEXTURED GLACIOLACUSTRINE DEPOSITS
- 8A: FINE-TEXTURED GLACIOLACUSTRINE DEPOSITS

SURFICIAL GEOLOGY

FIGURE: 2

HYDROGEOLOGICAL INVESTIGATION
559 GARNER ROAD
ANCASTER, ONTARIO

PROJECT NUMBER: HAM-00802098-B0

DATE: JULY 2021

SCALE:

0 80 160 240 320 400 m

SOURCE:

BASED ON GOOGLE EARTH IMAGERY DATED 2019,
AVAILABLE WELL RECORD INFORMATION AS OF SEPTEMBER 2019

exp.

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AC	NS

LEGEND:

- MONITORING WELL / TEST HOLE
- WATER SUPPLY WELL
- ABANDONED WELL
- UNCLASSIFIED / UNFINISHED WELL
- APPROXIMATE SITE BOUNDARY
- 500 m ZONE

MECP WATER WELL RECORDS MAP

FIGURE: 3

HYDROGEOLOGICAL INVESTIGATION
559 GARNER ROAD
ANCASTER, ONTARIO

PROJECT NUMBER: HAM-00802098-B0

DATE: JULY 2021

SCALE:

0 10 20 30 40 50 m

LEGEND:

- BOREHOLE (EXP, 2020)
- BOREHOLE / MONITORING WELL (EXP, 2020)
- CROSS SECTION AXIS
- APPROXIMATE SITE BOUNDARY

DRAWN BY:	CHECKED BY:
AC	NS

BOREHOLE / MONITORING WELL LOCATION PLAN

FIGURE: 4

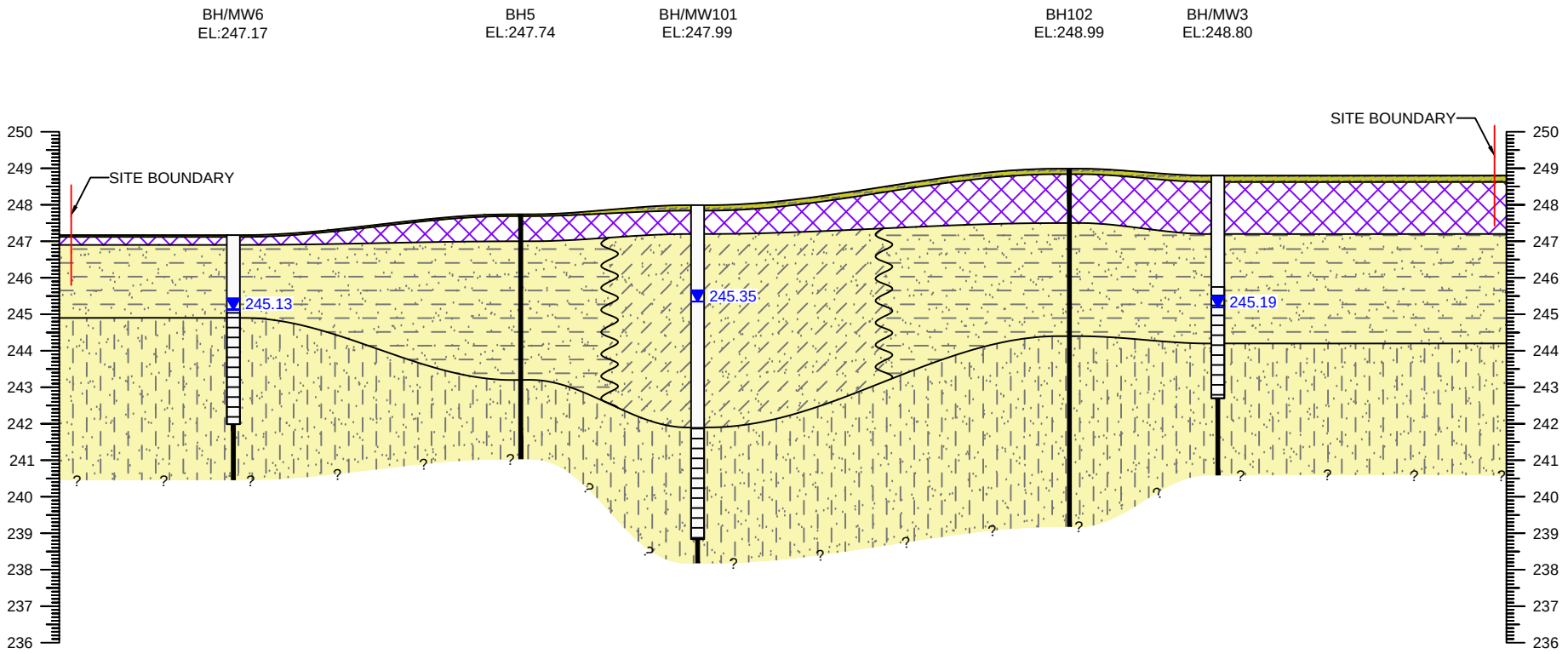
HYDROGEOLOGICAL INVESTIGATION
559 GARNER ROAD
ANCASTER, ONTARIO

PROJECT NUMBER: HAM-00802098-B0

DATE: JULY 2021

A
NORTHWEST

A'
SOUTHEAST



VERTICAL SCALE: AS SHOWN

HORIZONTAL SCALE:

0 5 10 15 20 25 m

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Brampton, ON L6T 4V1
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LEGEND:

- TOPSOIL
- FILL
- SANDY SILT
- SAND TO SILTY SAND
- SILTY SAND TO SILT
- GROUNDWATER ELEVATION (masl) AS MEASURED ON JULY 14, 2021

TITLE AND LOCATION:

CROSS SECTION A-A'
HYDROGEOLOGICAL INVESTIGATION
559 GARNER ROAD
ANCASTER, ONTARIO

PROJECT NO.:	DWN.:
HAM-00802098-B0	JA
SCALE: AS NOTED	CK: RZ
DATE: JULY 2021	FIG. NO.: 5

SCALE:

0 10 20 30 40 50 m

LEGEND:

- BOREHOLE / MONITORING WELL (EXP, 2020)
- XX.XX GROUNDWATER ELEVATION (m asl) AS MEASURED ON JULY 14, 2021
- GROUNDWATER CONTOUR
- GROUNDWATER FLOW DIRECTION
- APPROXIMATE SITE BOUNDARY

exp.

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AC	NS

GROUNDWATER CONTOUR PLAN

FIGURE: 6

HYDROGEOLOGICAL INVESTIGATION
559 GARNER ROAD
ANCASTER, ONTARIO

PROJECT NUMBER: HAM-00802098-B0

DATE: JULY 2021

Appendix A – MECP WWR Summary Table

On-Site

BORE_HOLE_ID	WELL_ID	DATE	EAST83	NORTH83	ELEVATION (m ASL)	LOCATION ACCURACY	STREET	CITY	DISTANCE TO SITE BOUNDARY (m)	CONSTRUCTION METHOD	WELL DEPTH (m bgs)	WATER FOUND (m bgs)	CASING DIAMETER (cm)	1st USE	2nd USE	FINAL STATUS
1006214487	7269042	8/2/2016	584690	4784275	247.5	margin of error : 30 m - 100 m	HWY 53 & SOUTHCOTE RD.	Hamilton	30	Boring				Monitoring		Observation Wells
1006214490	7269043	8/2/2016	584741	4784265	247.9	margin of error : 30 m - 100 m	HWY 53 & SOUTHCOTE RD.	Hamilton	26	Boring				Monitoring		Observation Wells
1006214496	7269044	8/2/2016	584741	4784232	248.9	margin of error : 30 m - 100 m	HWY 53 & SOUTHCOTE ROAD	Hamilton	38	Boring				Monitoring		Observation Wells
1006214499	7269045	7/29/2016	584703	4784225	249.2	margin of error : 30 m - 100 m	HWY 53 & SOUTHCOTE RD.	Hamilton	37	Boring				Monitoring		Observation Wells
1006796540	7299090	11/7/2017	584740	4784265	247.9	margin of error : 30 m - 100 m	HIGHWAY 53 AND SOUTHCOTE ROAD	HAMILTON	25							
1006796543	7299091	11/7/2017	584690	4784274	247.5	margin of error : 30 m - 100 m	HIGHWAY 53 AND SOUTHCOTE ROAD	HAMILTON	29							
1006796647	7299096	11/7/2017	584740	4784231	248.9	margin of error : 30 m - 100 m	HIGHWAY 53 AND SOUTHCOTE ROAD	HAMILTON	38							
1006796537	7299089	11/7/2017	584695	4784227	249.1	margin of error : 30 m - 100 m	HIGHWAY 53 AND SOUTHCOTE ROAD	HAMILTON	38							

Off-Site

BORE_HOLE_ID	WELL_ID	DATE	EAST83	NORTH83	ELEVATION (m ASL)	LOCATION ACCURACY	STREET	CITY	DISTANCE TO SITE BOUNDARY (m)	CONSTRUCTION METHOD	WELL DEPTH (m bgs)	WATER FOUND (m bgs)	CASING DIAMETER (cm)	1st USE	2nd USE	FINAL STATUS
10479563	6802101	9/26/1962	584560	4784615	247.4	margin of error : 100 m - 300 m			388	Cable Tool	18.3	18.3	12.7	Domestic		Water Supply
10479564	6802102	4/7/1962	584588	4784455	247.8	margin of error : 100 m - 300 m			233	Cable Tool	44.2	36.6	15.2	Domestic		Water Supply
10479567	6802105	11/12/1955	584527	4784758	248.8	UTM very unreliable			533	Cable Tool	33.5	32.6	15.2	Domestic		Water Supply
10479571	6802109	9/22/1962	584545	4784645	247.5	margin of error : 100 m - 300 m			421	Cable Tool	49.1	42.7	15.2	Domestic		Water Supply
10479574	6802112	2/5/1957	584673	4784385	248.0	UTM very unreliable			132	Cable Tool	33.5	33.5	15	Domestic		Water Supply
10479575	6802113	8/6/1952	585032	4784679	250.3	UTM very unreliable			526	Cable Tool	34.1	34.1	15	Domestic		Water Supply
10479576	6802114	11/7/1959	584844	4784327	250.1	margin of error : 100 m - 300 m			146	Cable Tool	46.3	46.3	15	Industrial		Water Supply
10479577	6802115	9/8/1965	584841	4784513	251.0	margin of error : 100 m - 300 m			283	Boring	14.6	4.3	76	Irrigation	Domestic	Water Supply
10479578	6802116	8/12/1960	584771	4784535	249.9	UTM very unreliable			281	Rotary (Convent.)	32.3	15.2	5	Not Used		Test Hole
10479579	6802117	8/15/1960	584972	4784377	250.0	UTM very unreliable			283	Rotary (Convent.)	31.7	13.1	13	Not Used		Test Hole
10479580	6802118	8/18/1960	585035	4784400	249.8	UTM very unreliable			349	Rotary (Convent.)	31.4	11.9	5	Not Used		Test Hole
10479582	6802120	1/11/1961	584595	4784673	248.1	margin of error : 100 m - 300 m			430	Cable Tool	19.8	16.8	13	Domestic		Water Supply
10479584	6802122	3/24/1962	585037	4784558	249.0	margin of error : 100 m - 300 m			439	Cable Tool	33.2	32.6	15	Domestic		Water Supply
10479585	6802123	5/28/1962	585059	4784681	250.5	margin of error : 100 m - 300 m			544	Cable Tool	39.6	35.1	15	Domestic		Water Supply
10479670	6802208	5/4/1957	584618	4784211	246.7	margin of error : 100 m - 300 m			109	Cable Tool	14.3	12.2	15	Commerical		Water Supply
10479672	6802210	5/23/1962	584440	4784163	247.3	margin of error : 100 m - 300 m			291	Boring	9.1	7.0	76	Domestic		Water Supply
10485066	6807659	8/19/1970	584894	4784273	249.4	margin of error : 30 m - 100 m			179	Cable Tool	19.2	14.9	15	Domestic		Water Supply
10486317	6808964	9/29/1974	584674	4783923	250.0	margin of error : 30 m - 100 m			339	Boring	4.6	2.1	91	Commerical		Water Supply
10486623	6809273	9/15/1975	584655	4784133	247.5	margin of error : 30 m - 100 m			140	Boring	9.1	4.0	91	Commerical	Domestic	Water Supply
10487519	6810190	10/18/1980	584674	4784523	248.9	margin of error : 30 m - 100 m			267	Cable Tool	17.1	13.7	15	Domestic		Water Supply
10487560	6810234	8/30/1980	585234	4784343	249.7	margin of error : 30 m - 100 m			526	Cable Tool	44.8	42.7	15	Domestic		Water Supply
10487949	6810625	12/15/1983	584556	4784113	250.2	margin of error : 10 - 30 m			216	Boring	9.1	6.1	91	Domestic		Water Supply
10488215	6810897	10/17/1985	585121	4784354	250.0	margin of error : 100 m - 300 m			417	Boring	7.6	0.3	91	Domestic		Water Supply
10489274	6811960	9/24/1990	584750	4784024	249.9	margin of error : 10 - 30 m			238	Cable Tool	46.0	40.8	15	Domestic		Water Supply
11108359	6814022	4/13/2004	584900	4784175	250.1	margin of error : 100 m - 300 m	605 GARNER RD.	ANCASTER	203	Boring	3.9	1.5	5			Observation Wells
1005121458	7227156	6/12/2014	584549	4784182	247.4	margin of error : 30 m - 100 m	515 GARNER RD. W	ANCASTER	184	Auger	4.6	4.0	5	Monitoring		Observation Wells
1002717293	7129346	7/24/2009	584890	4784334	250.1	margin of error : 10 - 30 m	617 GARNER RD.	ANCASTER	190					Not Used		Abandoned-Other
1002717296	7129347	7/24/2009	584971	4784319	249.9	margin of error : 10 - 30 m	621 GARNER RD.	ANCASTER	262							Abandoned-Other
1002717299	7129348	7/24/2009	584968	4784317	249.9	margin of error : 10 - 30 m	625 GARNER RD.	ANCASTER	259							Abandoned-Other
1003477106	7159394	5/12/2010	584604	4784613	248.0	margin of error : 10 - 30 m	431 SOUTHCOTE RD		371							Abandoned-Other
1003477108	7159395	5/18/2010	584650	4784380	247.7	margin of error : 10 - 30 m	489 SOUTHCOTE RD		137							Abandoned-Other
1003477110	7159396	5/18/2010	584684	4784378	248.1	margin of error : 10 - 30 m	497 SOUTHCOTE RD		123							Abandoned-Other
1003477144	7159413	5/18/2010	584657	4784334	246.9	margin of error : 100 m - 300 m	483 SOUTHCOTE RD		95							Abandoned-Other
23050735	7050735	8/28/2007	584237	4784125	247.4	margin of error : 10 - 30 m			497	Rotary (Convent.)			5	Not Used		Observation Wells
1007293519	7319613	6/26/2018	585062	4784338		margin of error : 30 m - 100 m	627 GARNER RD	ANCASTER	355	Boring				Monitoring		Observation Wells
1005869507	7256133	12/3/2015	584508	4784179	247.4	margin of error : 30 m - 100 m	507 GARNER RD	HAMILTON	223	Digging				Not Used		Abandoned-Other
1006363442	7282607	4/18/2016	584608	4784365	247.0	margin of error : 30 m - 100 m	492 SOUTHGATE RD	Hamilton	151							Abandoned-Other
10490723	6813416	10/16/2000	584894	4784273	249.4	margin of error : 30 m - 100 m			179	Not Known						Abandoned-Other
10536664	6813740	7/8/2002	584725	4784448	249.3	margin of error : 100 m - 300 m			189	Not Known				Not Used		Abandoned-Other
1002940296	7140278	10/14/2009	584813	4784677	250.1	margin of error : 30 m - 100 m			429							
1002943136	7140719	10/14/2009	584813	4784677	250.1	margin of error : 30 m - 100 m			429							

	COUNT
Monitoring Well / Test Hole	11
Dewatering Well	0
Water Supply Well	21
Abandoned Well	10
Unclassified / Unfinished Well	7
TOTAL	49

Appendix B – Borehole Logs

Log of Borehole BH-101

Project No. HAM-00802098-B0 | Drawing No. 9

Project: Proposed Mixed-Use Development | Sheet No. 1 of 1

Location: 559 Garner Road East, Ancaster, ON

Date Drilled: June 25, 2021

Drill Type: D-70 Track. Hollow Stem Augers.

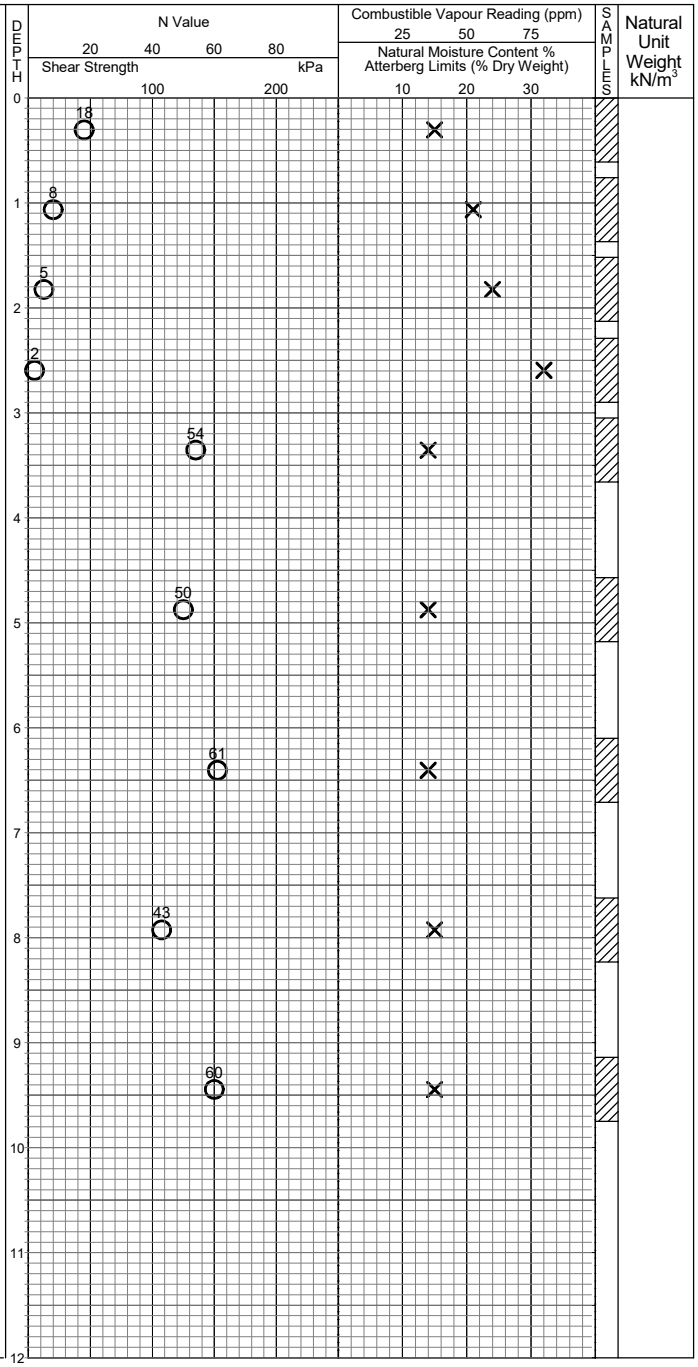
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

Soil Description	ELEV. m
	247.99
TOPSOIL: (~150 mm thick)	~247.8
FILL: silty clay, trace sand, trace gravel, trace rootlets, brown, moist	~247.2
SANDY SILT: trace clay, brown, loose, moist	
very loose, wet at 2.3 m	
very dense below 3.0 m	
	~241.9
SILT: trace gravel, grey, dense to very dense, moist	
	~238.2
Borehole terminated at 9.8 m depth	

NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.



Time	Water Level (m)	Depth to Cave (m)
on completion	8.2	open

EXP Services Inc.
Hamilton, ON
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Facsimile: 905.573.9693

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Log of Borehole BH-102

Project No. HAM-00802098-B0 | Drawing No. 10

Project: Proposed Mixed-Use Development | Sheet No. 1 of 1

Location: 559 Garner Road East, Ancaster, ON

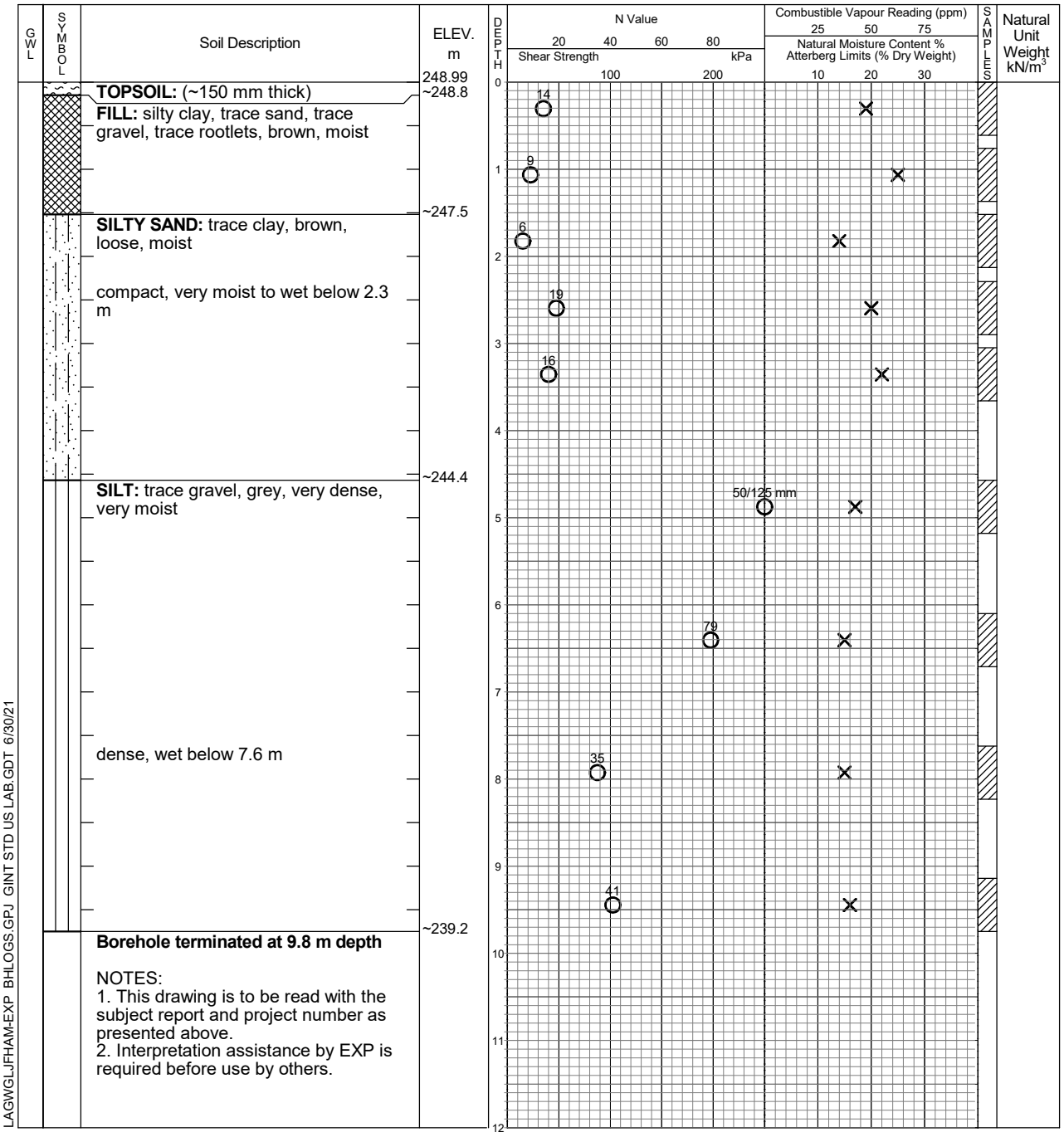
Date Drilled: June 25, 2021

Drill Type: D-70 Track. Solid Augers.

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.

Time	Water Level (m)	Depth to Cave (m)
on completion	6.1	6.1
		-

EXP Services Inc.
Hamilton, ON
Telephone: 905.573.4000
Facsimile: 905.573.9693

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Log of Borehole BH-1

Project No. HAM-00802098-B0 Drawing No. 3

Project: Proposed Mixed-Use Development Sheet No. 1 of 1

Location: 559 Garner Road East, Ancaster, ON

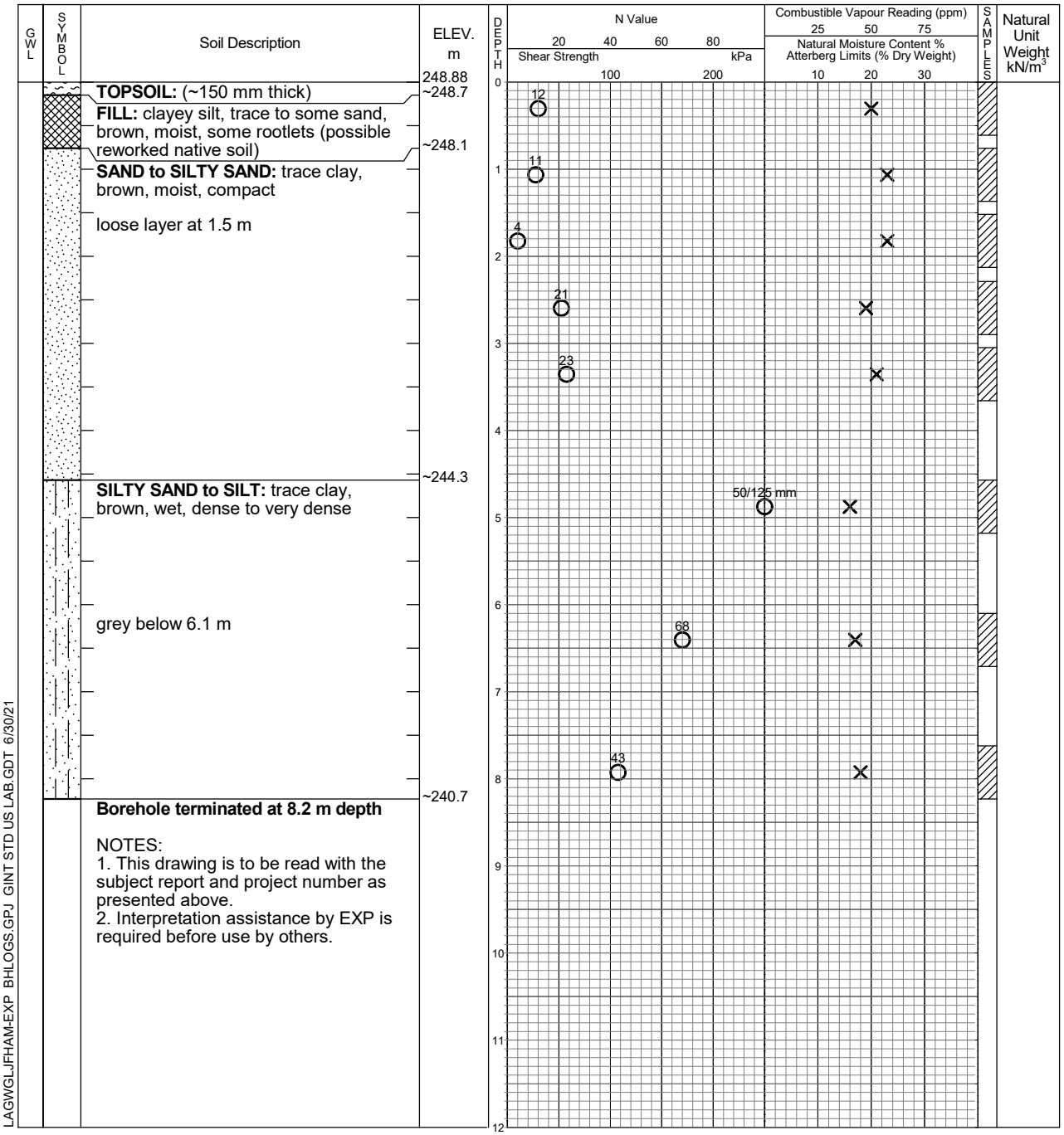
Date Drilled: November 12, 2020

Drill Type: CME 50 Track. Solid Augers.

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.

Time	Water Level (m)	Depth to Cave (m)
on completion	3.1	4.6

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Log of Borehole BH-2

Project No. HAM-00802098-B0 | Drawing No. 4

Project: Proposed Mixed-Use Development | Sheet No. 1 of 1

Location: 559 Garner Road East, Ancaster, ON

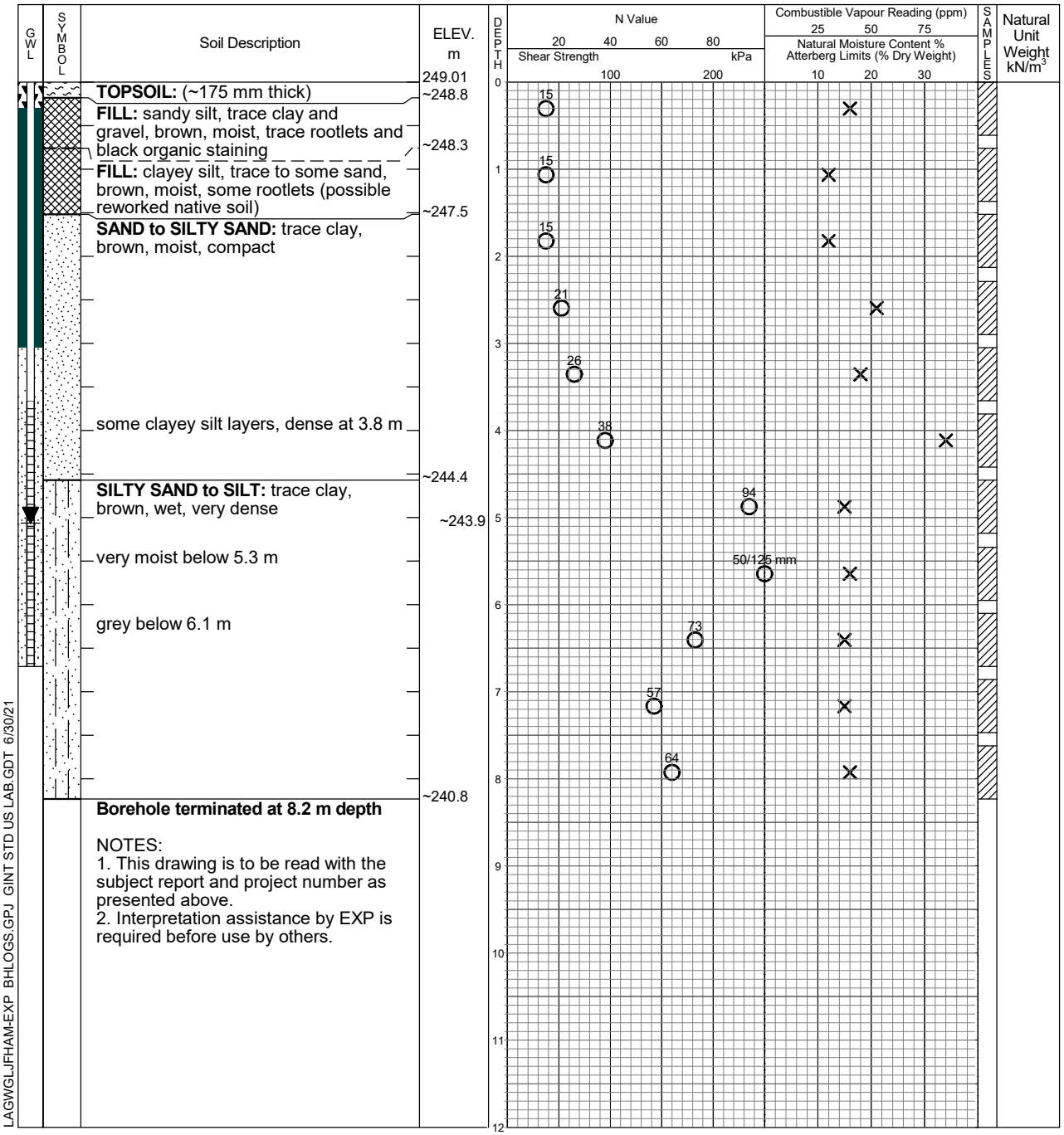
Date Drilled: November 12, 2020

Drill Type: CME 50 Track. Solid Augers.

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.

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Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	4.6	4.6
Nov. 20, 2020	5.18	-
Nov. 23, 2020	5.12	-
Nov. 27, 2020	5.11	-

Log of Borehole BH-3

Project No. HAM-00802098-B0 | Drawing No. 5

Project: Proposed Mixed-Use Development | Sheet No. 1 of 1

Location: 559 Garner Road East, Ancaster, ON

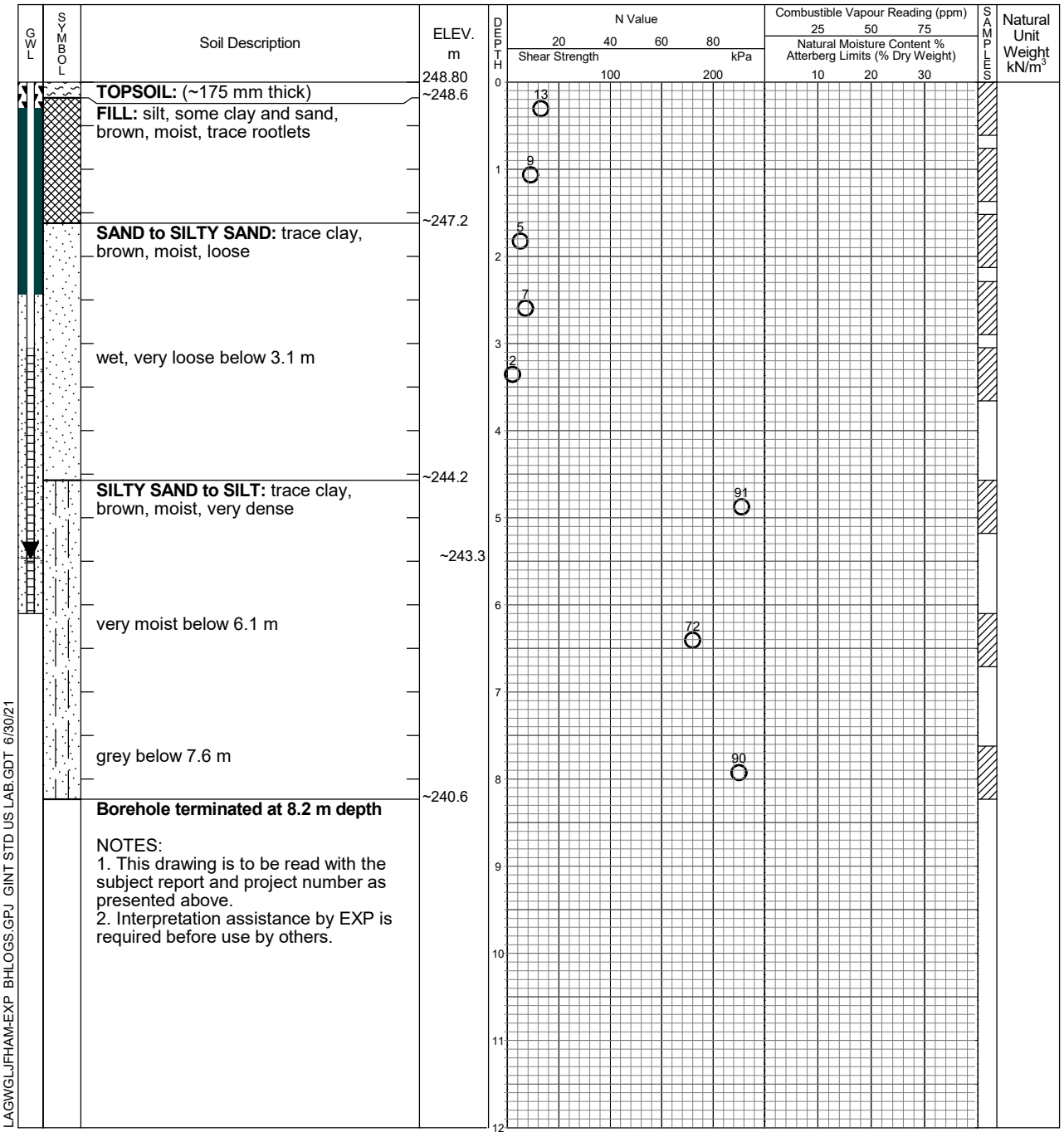
Date Drilled: November 20, 2020

Drill Type: D50 Track. Solid Augers.

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.

Time	Water Level (m)	Depth to Cave (m)
on completion	8.1	8.1
Nov. 20, 2020	dry	-
Nov. 23, 2020	5.51	-
Nov. 27, 2020	5.51	-

EXP Services Inc.
Hamilton, ON
Telephone: 905.573.4000
Facsimile: 905.573.9693

LAGWGLJFHAM-EXP BHLOGS.GPJ GINT STD US LAB.GDT 6/30/21

Log of Borehole BH-4

Project No. HAM-00802098-B0 | Drawing No. 6

Project: Proposed Mixed-Use Development | Sheet No. 1 of 1

Location: 559 Garner Road East, Ancaster, ON

Date Drilled: November 20, 2020

Drill Type: D50 Track. Solid Augers.

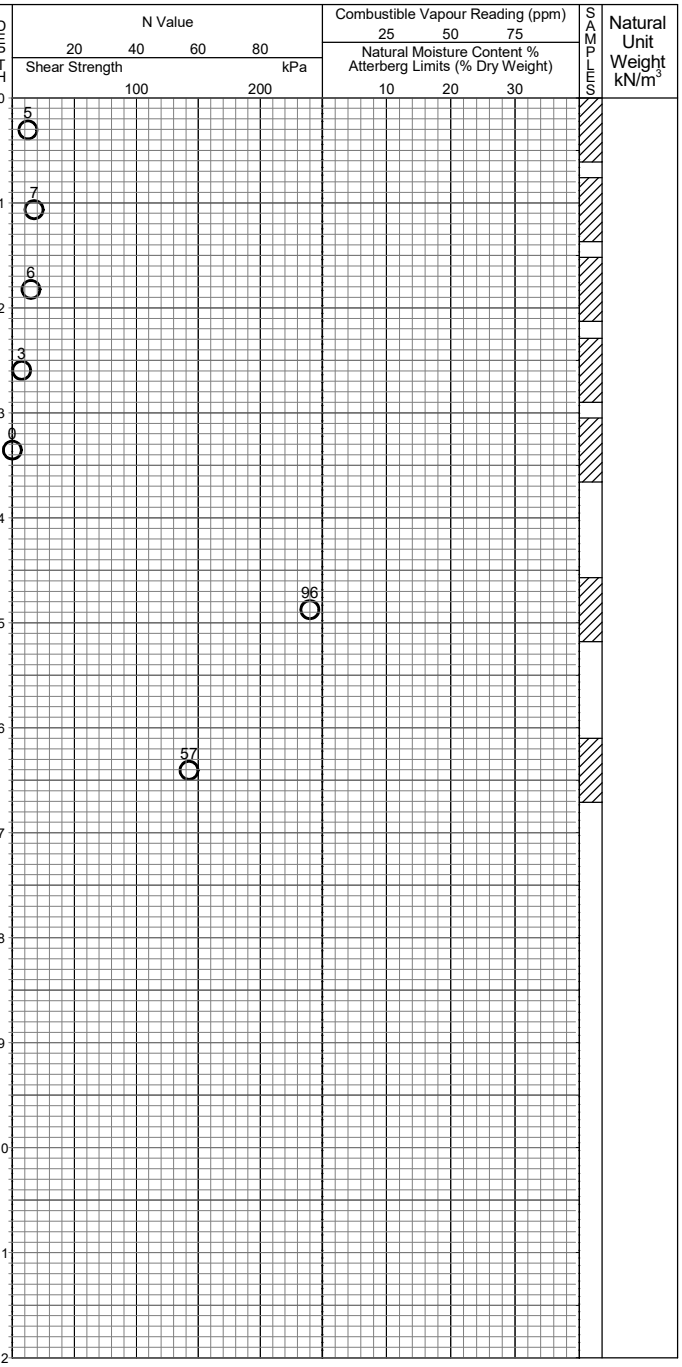
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

Soil Description	ELEV. m
	248.59
TOPSOIL: (~150 mm thick)	~248.4
FILL: clayey silt, some sand, trace gravel, brown, moist, trace rootlets	~247.8
SAND to SILTY SAND: trace clay, brown, moist, loose	
wet, very loose below 2.3 m	~244.0
SILTY SAND to SILT: trace clay, brown, very moist, very dense	~241.9
Borehole terminated at 6.7 m depth	

NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.
grey below 7.6 m



Time	Water Level (m)	Depth to Cave (m)
on completion	dry	no cave

EXP Services Inc.
Hamilton, ON
Telephone: 905.573.4000
Facsimile: 905.573.9693

LAGWGLJFHAM-EXP BHLOGS.GPJ GINT STD US LAB.GDT 6/30/21

Log of Borehole BH-5

Project No. HAM-00802098-B0 | Drawing No. 7

Project: Proposed Mixed-Use Development | Sheet No. 1 of 1

Location: 559 Garner Road East, Ancaster, ON

Date Drilled: November 20, 2020

Drill Type: D50 Track. Solid Augers.

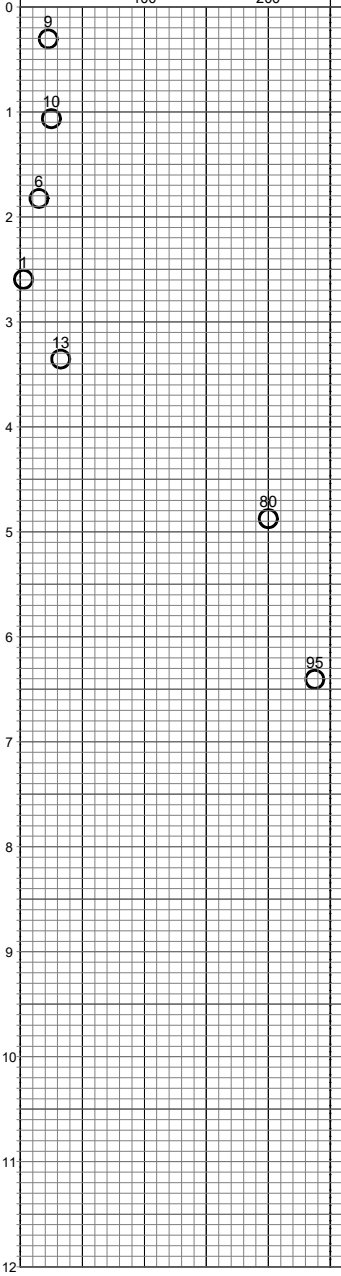
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
			247.74	
		TOPSOIL: (~50 mm thick)	~247.7	0
		FILL: clayey silt, some sand and gravel, brown, moist, trace rootlets	~247.0	
		SAND to SILTY SAND: trace clay, brown, moist, compact		1
		loose to very loose below 1.5 m		2
		wet below 2.4 m		3
				4
		SILTY SAND to SILT: trace clay, grey, very moist, very dense	~243.2	5
				6
			~241.0	7
		Borehole terminated at 6.7 m depth		8
		NOTES: 1. This drawing is to be read with the subject report and project number as presented above. 2. Interpretation assistance by EXP is required before use by others.		9
				10
				11
				12

N Value (20, 40, 60, 80)
Shear Strength (100, 200 kPa)
Combustible Vapour Reading (ppm) (25, 50, 75)
Natural Moisture Content % Atterberg Limits (% Dry Weight) (10, 20, 30)
SAMPLES
Natural Unit Weight kN/m³



LAGWGLJFHAM-EXP BHLOGS.GPJ GINT STD US LAB.GDT 6/30/21

EXP Services Inc.
Hamilton, ON
Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	3.2	4.6

Log of Borehole BH-6

Project No. HAM-00802098-B0 | Drawing No. 8

Project: Proposed Mixed-Use Development | Sheet No. 1 of 1

Location: 559 Garner Road East, Ancaster, ON

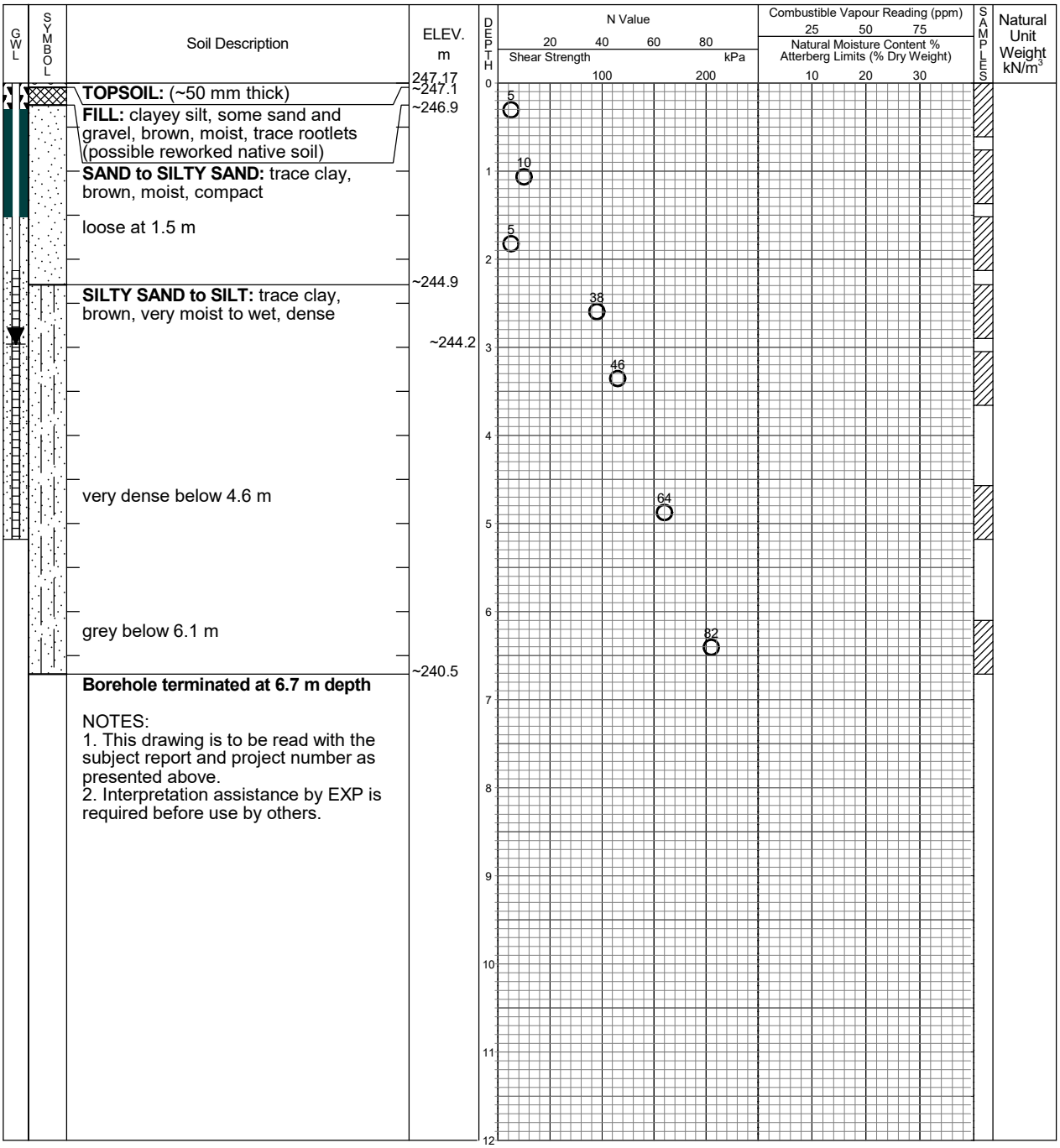
Date Drilled: November 17, 2020

Drill Type: D50 Track. Solid Augers.

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



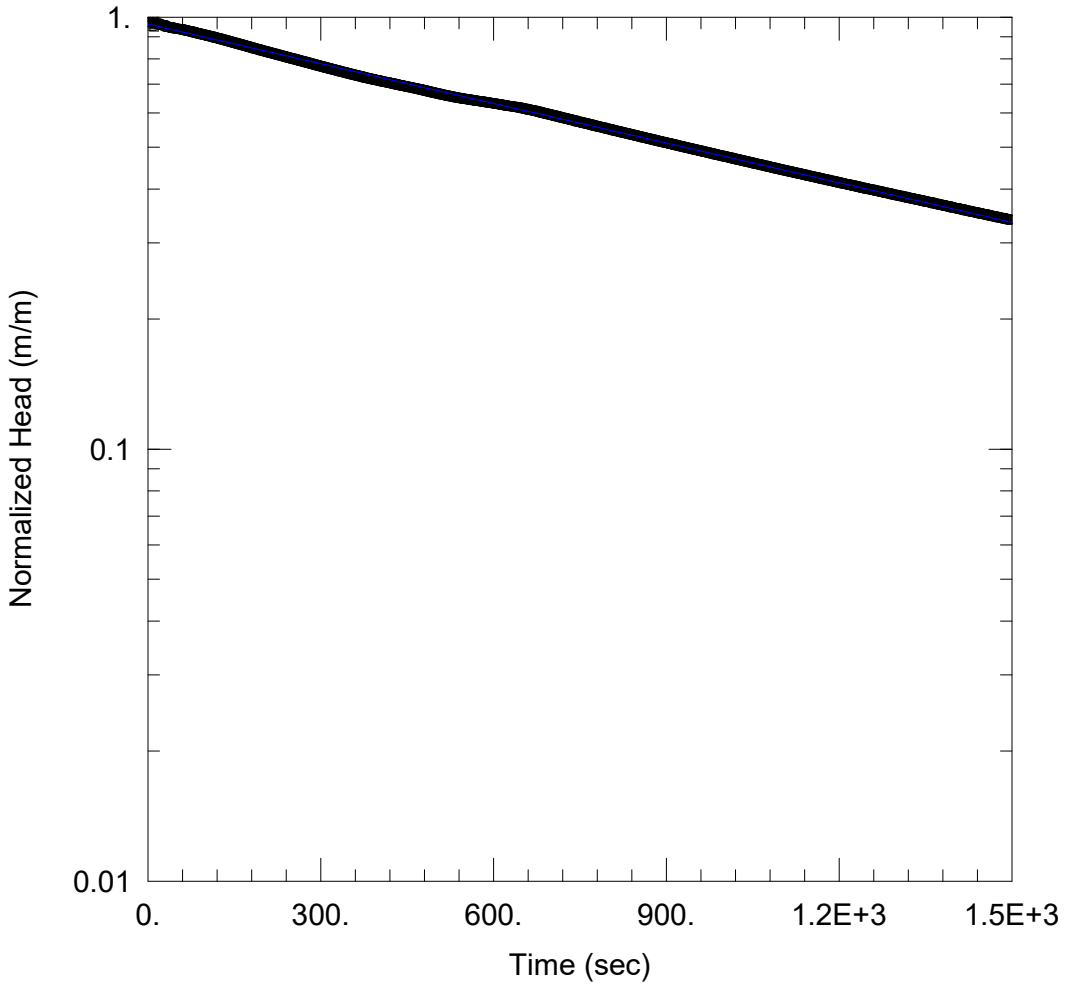
NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.

LAGWGLJFHAM-EXP BHLOGS.GPJ GINT STD US LAB.GDT 6/30/21

Time	Water Level (m)	Depth to Cave (m)
on completion	3.1	4.3
Nov. 20, 2020	3.10	-
Nov. 23, 2020	3.05	-
Nov. 27, 2020	3.00	-

EXP Services Inc.
Hamilton, ON
Telephone: 905.573.4000
Facsimile: 905.573.9693

Appendix C – SWRT Procedures and Results



SWRT - RISING HEAD - BH1

Data Set: C:\Users\simonc\Documents\SWRT_active jobs\Garner\BH1.aqt
Date: 07/14/21 Time: 10:40:29

PROJECT INFORMATION

Company: Exp Services Inc.
Client: Brooklyn Contracting
Project: BRM-00802098-B0
Location: 559 Garner Road, Ancaster, ON
Test Well: BH1
Test Date: June 30, 2021

AQUIFER DATA

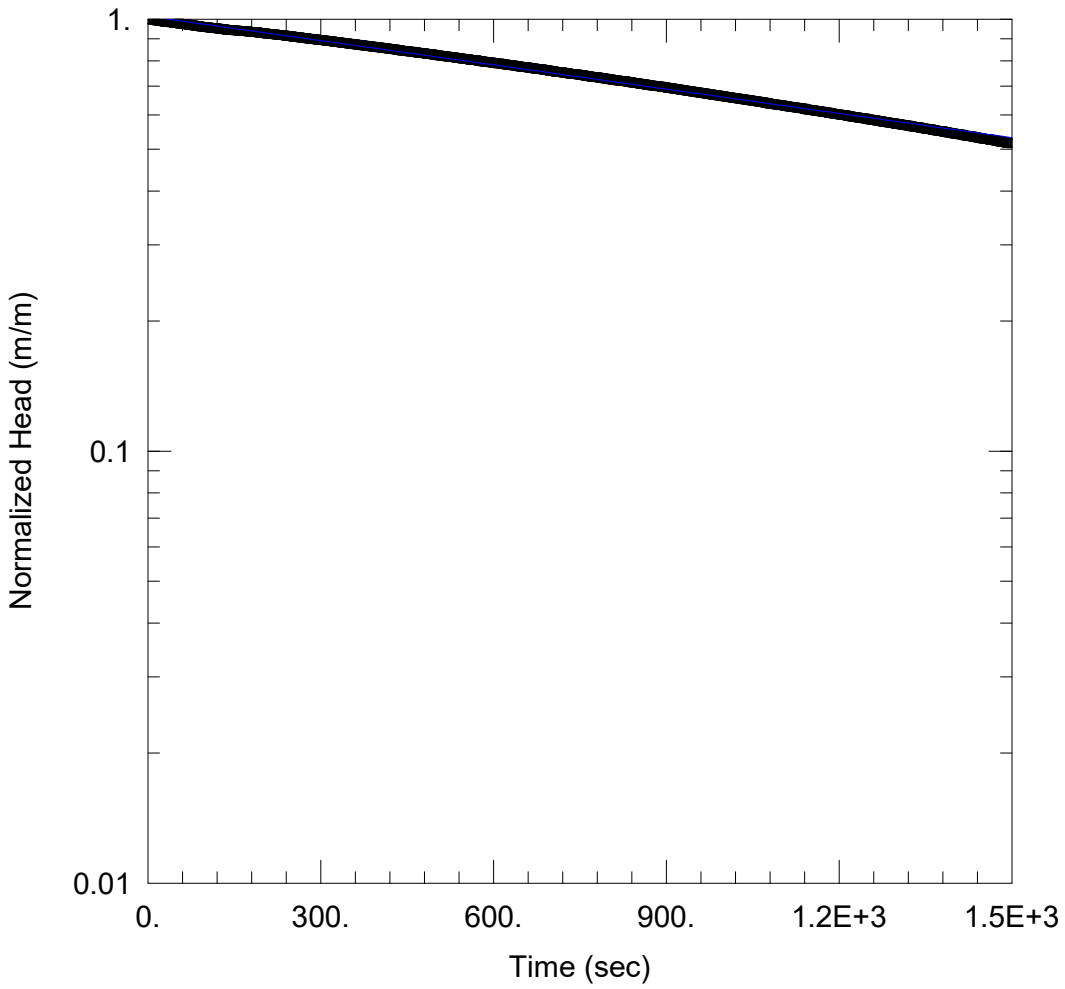
Saturated Thickness: 6.73 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH 1)

Initial Displacement: 5.943 m
Total Well Penetration Depth: 6.73 m
Casing Radius: 0.0254 m
Static Water Column Height: 6.73 m
Screen Length: 3. m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 3.09E-7 m/sec
y0 = 5.726 m



SWRT - RISING HEAD - BH2

Data Set: C:\Users\simonc\Documents\SWRT_active jobs\Garner\BH2.aqt
Date: 07/14/21 Time: 10:42:37

PROJECT INFORMATION

Company: Exp Services Inc.
Client: Brooklyn Contracting
Project: BRM-00802098-B0
Location: 559 Garner Road, Ancaster, ON
Test Well: BH2
Test Date: June 30, 2021

AQUIFER DATA

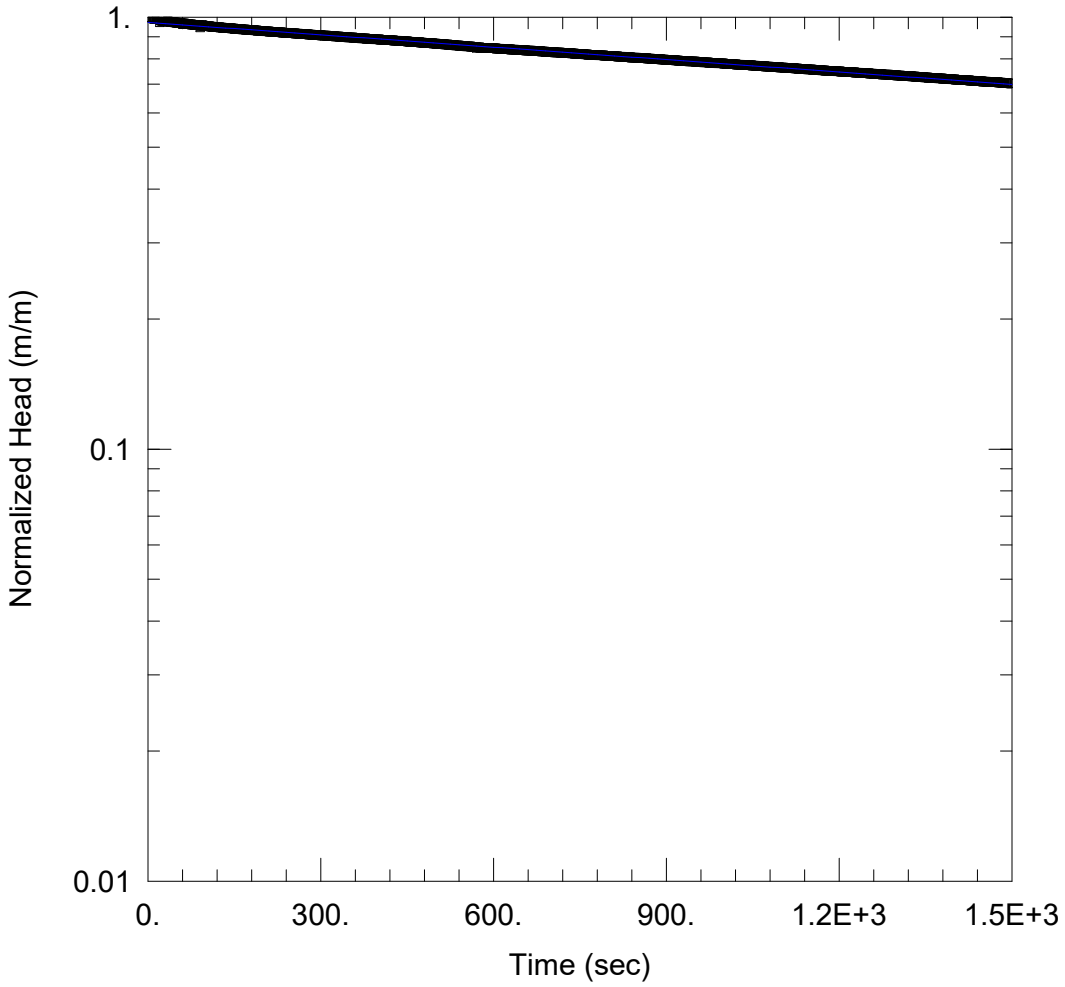
Saturated Thickness: 3.53 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH2)

Initial Displacement: 2.631 m
Total Well Penetration Depth: 3.53 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.53 m
Screen Length: 3. m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.89E-7 m/sec
y0 = 2.67 m



SWRT - RISING HEAD - BH3

Data Set: C:\Users\simonc\Documents\SWRT_active jobs\Garner\BH3.aqt
Date: 07/14/21 Time: 10:44:44

PROJECT INFORMATION

Company: Exp Services Inc.
Client: Brooklyn Contracting
Project: BRM-00802098-B0
Location: 559 Garner Road, Ancaster, ON
Test Well: BH3
Test Date: June 30, 2021

AQUIFER DATA

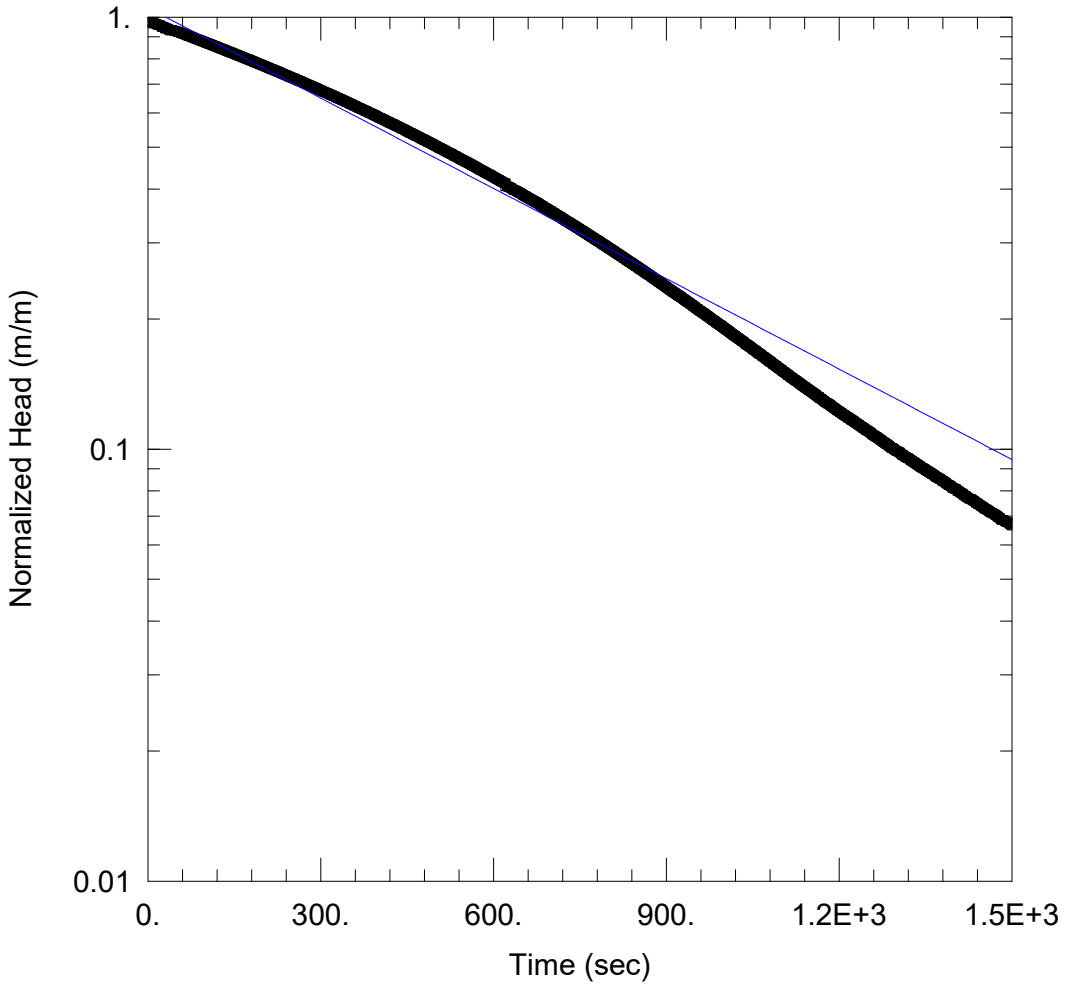
Saturated Thickness: 2.46 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH3)

Initial Displacement: 1.763 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.0254 m
Static Water Column Height: 2.46 m
Screen Length: 3. m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.53E-7 m/sec
y0 = 1.714 m



SWRT - RISING HEAD - BH6

Data Set: C:\Users\simonc\Documents\SWRT_active jobs\Garner\BH6.aqt
Date: 07/14/21 Time: 10:46:58

PROJECT INFORMATION

Company: Exp Services Inc.
Client: Brooklyn Contracting
Project: BRM-00802098-B0
Location: 559 Garner Road, Ancaster, ON
Test Well: BH6
Test Date: June 30, 2021

AQUIFER DATA

Saturated Thickness: 3.45 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH 6)

Initial Displacement: 3.173 m
Total Well Penetration Depth: 3.45 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.45 m
Screen Length: 3. m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

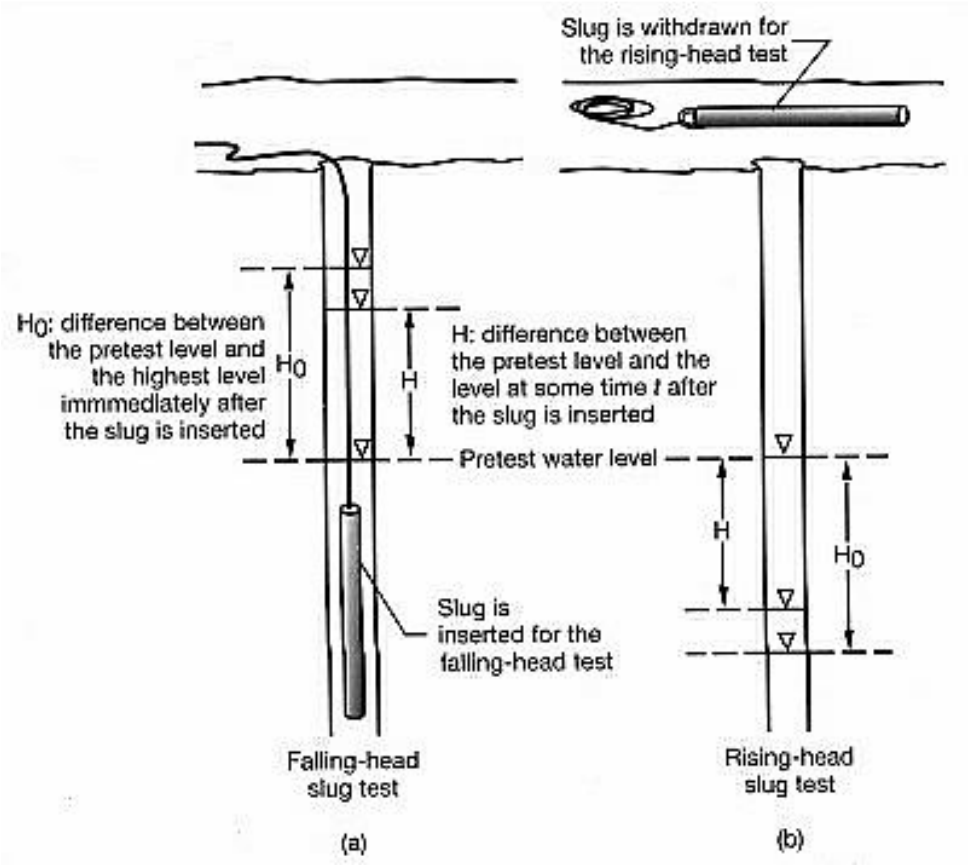
K = 7.04E-7 m/sec y0 = 3.336 m

Single Well Response Test Procedure

A Single Well Response Test (SWRT), also known as a bail test or a slug test, is conducted in order to determine the saturated hydraulic conductivity (K) of an aquifer. The method of the SWRT is to characterize the change of groundwater level in a well or borehole over time.

In order to ensure consistency and repeatability, all **exp** employees are to follow the procedure outlined in this document when conducting SWRTs.

The figure below depicts a schematic of a slug and bail test and the respective water level changes.



Initials ___

Slug Test Procedure

Equipment Required

- Copy of a signed health and safety plan
- Copy of the work program
- PPE as required by Site-Specific HASP
- Copy of the monitoring well location plan/site plan
- Waterproof pen and bound field note book
- SWRT field data Entry form
- Disposable gloves
- Duct tape
- Deionized water
- Alconox (phosphate free detergent)
- Spray bottles
- Electronic water level meter and spare batteries
- Solid PVC or stainless steel slug of known volume or clean water
- String (nylon)
- Water pressure transducer (data logger) and baro-logger
- Watch or stop watch with second hand
- Plastic sheeting

Testing Procedure

1. Remove cap from well and collect static water level
2. Remove waterra tubing/bailer and place in garbage bag. Record static water level measurement again.
3. Lower the slug into the well and record the dynamic water level.
4. Record the drawdown (for the slug test) at set five (5) second intervals for the first five (5) minutes, then reduce to every one (1) minute.
5. Continue recording the drawdown until 95% recovery is reached. To calculate this value: Find the difference between the dynamic water level and the static water level, then multiply by 95% (.95). Add the resulting value to the dynamic water level.

   (Static Water Level – Dynamic Water Level).95 + Static Water Level = 95% Recovery Value
6. Once complete, replace the waterra tubing/bailer and re-secure the well cap.

Note: If the well is deep, more than one slug may be inserted by attaching the slugs to a series.

Slugs must be washed with methanol, then lab grade soap, and then rinsed with de-ionized water after each use.

Based on the recorded observations, the hydraulic conductivity (in m/s) of the aquifer will be determined. In order to determine the hydraulic conductivity; the well diameter, radius of the borehole and length of the screen will also be required.

Bail Test Procedure

Equipment Required

- 20 L (5 gal) Graduated pail
- Stop watch or watch with seconds
- Garbage bags
- Water level meter
- Field sheets/log book
- Latex Gloves
- Bailer and Rope

Procedure

1. Remove cap from well and collect static water level.
2. If using a **bailer**:
    a. Affix the rope to the bailer.
    b. Remove the waterra tubing and place in garbage bag
    c. Record static water level measurement again.
    d. Record how much water was removed by either counting the number of full bailers or emptying removed water into a container.
    e. Quickly lower the bailer into the well and remove.
    f. Continue this process until the water level will reduce no further.
    g. Record the dynamic water level.
3. If using **waterra** to bail the water:
    a. Pump the water into graduated bucket until the water level will reduce no further.
    b. Record how much water has been removed.
    c. Record the dynamic water level.
4. Record the recovery at set five (5) second intervals for the first (5) minutes, then reduce to every one (1) minute.
5. Continue recording the drawdown/recovery until 95% recovery is reached.
6. Once complete, replace any waterra tubing that may have been removed from the well and re-secure the well cap.

Appendix D – Laboratory's Certificates of Analysis

Your P.O. #: ENV-BRM
Your Project #: HAM-00802096
Site Location: 559 GARNER RD
Your C.O.C. #: 831568-03-01

Attention: Francois Chartier

exp Services Inc
1595 Clark Blvd
Brampton, ON
CANADA L6T 4V1

Report Date: 2021/07/08
Report #: R6710457
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1I3150
Received: 2021/07/02, 15:41

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sewer Use By-Law Semivolatile Organics	1	2021/07/04	2021/07/05	CAM SOP 00301	EPA 8270 m
Carbonaceous BOD	1	2021/07/03	2021/07/08	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	1	N/A	2021/07/06	CAM SOP-00463	SM 23 4500-Cl E m
Total Cyanide	1	2021/07/05	2021/07/05	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2021/07/03	2021/07/06	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2021/07/06	2021/07/06	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by Axial ICP	1	2021/07/06	2021/07/06	CAM SOP-00408	EPA 6010D m
E.coli, (CFU/100mL)	1	N/A	2021/07/02	CAM SOP-00552	MOE LSB E3371
Animal and Vegetable Oil and Grease	1	N/A	2021/07/08	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2021/07/07	2021/07/07	CAM SOP-00326	EPA1664B m,SM5520B m
OC Pesticides (Selected) & PCB (1)	1	2021/07/06	2021/07/07	CAM SOP-00307	EPA 8081A/8082B m
OC Pesticides Summed Parameters	1	N/A	2021/07/03	CAM SOP-00307	EPA 8081A/8082B m
pH	1	2021/07/03	2021/07/06	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2021/07/05	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	1	N/A	2021/07/06	CAM SOP-00464	EPA 375.4 m
Total Kjeldahl Nitrogen in Water	1	2021/07/05	2021/07/06	CAM SOP-00938	OMOE E3516 m
Total PAHs (Hamilton, Ottawa S.U.B.) (2)	1	N/A	2021/07/06	CAM SOP - 00301	
Mineral/Synthetic O & G (TPH Heavy Oil) (3)	1	2021/07/07	2021/07/07	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2021/07/07	2021/07/07	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2021/07/06	CAM SOP-00228	EPA 8260C m

Remarks:

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

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

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

Your P.O. #: ENV-BRM
Your Project #: HAM-00802096
Site Location: 559 GARNER RD
Your C.O.C. #: 831568-03-01

Attention: Francois Chartier

exp Services Inc
1595 Clark Blvd
Brampton, ON
CANADA L6T 4V1

Report Date: 2021/07/08
Report #: R6710457
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1I3150
Received: 2021/07/02, 15:41

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

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Patricia Legette, Project Manager
Email: Patricia.Legette@bureauveritas.com
Phone# (905)817-5799

==========

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

BV Labs Job #: C1I3150
Report Date: 2021/07/08

exp Services Inc
Client Project #: HAM-00802096
Site Location: 559 GARNER RD
Your P.O. #: ENV-BRM
Sampler Initials: EC

HAMILTON SANITARY & STORM SEWER (14-090)

BV Labs ID				PZN965			PZN965		
Sampling Date				2021/07/02 12:50			2021/07/02 12:50		
COC Number				831568-03-01			831568-03-01		
	UNITS	Criteria	Criteria-2	BH 1-2021	RDL	QC Batch	BH 1-2021 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Total Animal/Vegetable Oil and Grease	mg/L	150	10	ND	0.50	7441312			
Inorganics									
Total Carbonaceous BOD	mg/L	300	-	ND	2	7442647	ND	2	7442647
Fluoride (F-)	mg/L	10	-	0.26	0.10	7443075			
Total Kjeldahl Nitrogen (TKN)	mg/L	100	-	0.36	0.10	7444664			
pH	pH	5.5:9.5	5.5:9.5	7.99		7443099			
Phenols-4AAP	mg/L	1	0.02	ND	0.0010	7443524			
Total Suspended Solids	mg/L	350	15	**47**	10	7447498	**46**	10	7447498
Dissolved Sulphate (SO4)	mg/L	1500	-	54	1.0	7444360	55	1.0	7444360
Total Cyanide (CN)	mg/L	2	-	ND	0.0050	7444633			
Dissolved Chloride (Cl-)	mg/L	1500	-	200	2.0	7444363	200	2.0	7444363
Petroleum Hydrocarbons									
Total Oil & Grease	mg/L	-	-	ND	0.50	7450053			
Total Oil & Grease Mineral/Synthetic	mg/L	15	-	ND	0.50	7450056			
Metals									
Total Aluminum (Al)	mg/L	50	-	1.0	0.1	7445560			
Total Antimony (Sb)	mg/L	5	-	ND	0.02	7445560			
Total Arsenic (As)	mg/L	1	-	ND	0.01	7445560			
Total Bismuth (Bi)	mg/L	5	-	ND	0.05	7445560			
Total Cadmium (Cd)	mg/L	0.7	1	ND	0.002	7445560			
Total Chromium (Cr)	mg/L	5	1	ND	0.01	7445560			
Total Cobalt (Co)	mg/L	5	-	ND	0.002	7445560			
Total Copper (Cu)	mg/L	2	1	ND	0.01	7445560			
Total Iron (Fe)	mg/L	50	-	1.9	0.02	7445560			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: City of Hamilton Sanitary and combined Sewer Discharge By Law No. 14-090 April 23, 2014
Criteria-2: City of Hamilton Storm Discharge By Law No. 14-090
April 23, 2014
ND = Not detected

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

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1I3150
Report Date: 2021/07/08

exp Services Inc
Client Project #: HAM-00802096
Site Location: 559 GARNER RD
Your P.O. #: ENV-BRM
Sampler Initials: EC

HAMILTON SANITARY & STORM SEWER (14-090)

BV Labs ID				PZN965			PZN965		
Sampling Date				2021/07/02 12:50			2021/07/02 12:50		
COC Number				831568-03-01			831568-03-01		
	UNITS	Criteria	Criteria-2	BH 1-2021	RDL	QC Batch	BH 1-2021 Lab-Dup	RDL	QC Batch
Total Lead (Pb)	mg/L	2	1	ND	0.01	7445560			
Total Manganese (Mn)	mg/L	5	-	0.41	0.001	7445560			
Mercury (Hg)	mg/L	0.01	-	ND	0.00010	7445792			
Total Molybdenum (Mo)	mg/L	1	-	0.005	0.005	7445560			
Total Nickel (Ni)	mg/L	2	1	ND	0.005	7445560			
Total Phosphorus (P)	mg/L	10	-	0.07	0.05	7445560			
Total Selenium (Se)	mg/L	1	-	ND	0.02	7445560			
Total Silver (Ag)	mg/L	5	-	ND	0.01	7445560			
Total Tin (Sn)	mg/L	5	-	ND	0.02	7445560			
Total Titanium (Ti)	mg/L	5	-	0.023	0.005	7445560			
Total Vanadium (V)	mg/L	5	-	ND	0.005	7445560			
Total Zinc (Zn)	mg/L	3	3	0.006	0.005	7445560			
Semivolatile Organics									
Di-N-butyl phthalate	ug/L	80	-	ND	2	7443256			
Bis(2-ethylhexyl)phthalate	ug/L	12	-	ND	2	7443256			
3,3'-Dichlorobenzidine	ug/L	2	-	ND	0.8	7443256			
Pentachlorophenol	ug/L	5	-	ND	1	7443256			
Phenanthrene	ug/L	-	-	ND	0.2	7443256			
Anthracene	ug/L	-	-	ND	0.2	7443256			
Fluoranthene	ug/L	-	-	ND	0.2	7443256			
Pyrene	ug/L	-	-	ND	0.2	7443256			
Benzo(a)anthracene	ug/L	-	-	ND	0.2	7443256			
Chrysene	ug/L	-	-	ND	0.2	7443256			
Benzo(b/j)fluoranthene	ug/L	-	-	ND	0.2	7443256			
Benzo(k)fluoranthene	ug/L	-	-	ND	0.2	7443256			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: City of Hamilton Sanitary and combined Sewer Discharge By Law No. 14-090 April 23, 2014
Criteria-2: City of Hamilton Storm Discharge By Law No. 14-090
April 23, 2014
ND = Not detected

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1I3150
Report Date: 2021/07/08

exp Services Inc
Client Project #: HAM-00802096
Site Location: 559 GARNER RD
Your P.O. #: ENV-BRM
Sampler Initials: EC

HAMILTON SANITARY & STORM SEWER (14-090)

BV Labs ID				PZN965			PZN965		
Sampling Date				2021/07/02 12:50			2021/07/02 12:50		
COC Number				831568-03-01			831568-03-01		
	UNITS	Criteria	Criteria-2	BH 1-2021	RDL	QC Batch	BH 1-2021 Lab-Dup	RDL	QC Batch
Benzo(a)pyrene	ug/L	-	-	ND	0.2	7443256			
Indeno(1,2,3-cd)pyrene	ug/L	-	-	ND	0.2	7443256			
Dibenzo(a,h)anthracene	ug/L	-	-	ND	0.2	7443256			
Benzo(g,h,i)perylene	ug/L	-	-	ND	0.2	7443256			
Dibenzo(a,i)pyrene	ug/L	-	-	ND	0.2	7443256			
Benzo(e)pyrene	ug/L	-	-	ND	0.2	7443256			
Perylene	ug/L	-	-	ND	0.2	7443256			
Dibenzo(a,j) acridine	ug/L	-	-	ND	0.4	7443256			
7H-Dibenzo(c,g) Carbazole	ug/L	-	-	ND	0.4	7443256			
Calculated Parameters									
Total PAHs (18 PAHs)	ug/L	5	-	ND	0.96	7442428			
Volatile Organics									
Benzene	ug/L	10	-	ND	0.40	7443815			
Chloroform	ug/L	40	-	ND	0.40	7443815			
1,2-Dichlorobenzene	ug/L	50	-	ND	0.80	7443815			
1,4-Dichlorobenzene	ug/L	80	-	ND	0.80	7443815			
cis-1,2-Dichloroethylene	ug/L	4000	-	ND	1.0	7443815			
trans-1,3-Dichloropropene	ug/L	140	-	ND	0.80	7443815			
Ethylbenzene	ug/L	160	-	ND	0.40	7443815			
Methylene Chloride(Dichloromethane)	ug/L	2000	-	ND	4.0	7443815			
1,1,2,2-Tetrachloroethane	ug/L	1400	-	ND	0.80	7443815			
Tetrachloroethylene	ug/L	1000	-	ND	0.40	7443815			
Toluene	ug/L	16	-	ND	0.40	7443815			
Trichloroethylene	ug/L	400	-	ND	0.40	7443815			
p+m-Xylene	ug/L	-	-	ND	0.40	7443815			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: City of Hamilton Sanitary and combined Sewer Discharge By Law No. 14-090 April 23, 2014
Criteria-2: City of Hamilton Storm Discharge By Law No. 14-090
April 23, 2014
ND = Not detected

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BV Labs Job #: C1I3150
Report Date: 2021/07/08

exp Services Inc
Client Project #: HAM-00802096
Site Location: 559 GARNER RD
Your P.O. #: ENV-BRM
Sampler Initials: EC

HAMILTON SANITARY & STORM SEWER (14-090)

BV Labs ID				PZN965			PZN965		
Sampling Date				2021/07/02 12:50			2021/07/02 12:50		
COC Number				831568-03-01			831568-03-01		
	UNITS	Criteria	Criteria-2	BH 1-2021	RDL	QC Batch	BH 1-2021 Lab-Dup	RDL	QC Batch
o-Xylene	ug/L	-	-	ND	0.40	7443815			
Total Xylenes	ug/L	1400	-	ND	0.40	7443815			
Pesticides & Herbicides									
Aldrin	ug/L	-	-	ND	0.005	7445553			
Dieldrin	ug/L	-	-	ND	0.005	7445553			
a-Chlordane	ug/L	-	-	ND	0.005	7445553			
g-Chlordane	ug/L	-	-	ND	0.005	7445553			
o,p-DDT	ug/L	-	-	ND	0.005	7445553			
p,p-DDT	ug/L	-	-	ND	0.005	7445553			
Lindane	ug/L	100	-	ND	0.003	7445553			
Hexachlorobenzene	ug/L	0.1	-	ND	0.005	7445553			
Mirex	ug/L	100	-	ND	0.005	7445553			
Microbiological									
Escherichia coli	CFU/100mL	-	2400	10	10	7442507			
Surrogate Recovery (%)									
2,4,6-Tribromophenol	%	-	-	94		7443256			
2-Fluorobiphenyl	%	-	-	69		7443256			
D14-Terphenyl (FS)	%	-	-	89		7443256			
D5-Nitrobenzene	%	-	-	74		7443256			
D8-Acenaphthylene	%	-	-	78		7443256			
2,4,5,6-Tetrachloro-m-xylene	%	-	-	78		7445553			
Decachlorobiphenyl	%	-	-	81		7445553			
4-Bromofluorobenzene	%	-	-	91		7443815			
D4-1,2-Dichloroethane	%	-	-	117		7443815			
D8-Toluene	%	-	-	88		7443815			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: City of Hamilton Sanitary and combined Sewer Discharge By Law No. 14-090 April 23, 2014
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April 23, 2014
ND = Not detected

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BV Labs Job #: C1I3150
Report Date: 2021/07/08

exp Services Inc
Client Project #: HAM-00802096
Site Location: 559 GARNER RD
Your P.O. #: ENV-BRM
Sampler Initials: EC

ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

BV Labs ID			PZN965		
Sampling Date			2021/07/02 12:50		
COC Number			831568-03-01		
	UNITS	Criteria	BH 1-2021	RDL	QC Batch
Calculated Parameters					
Aldrin + Dieldrin	ug/L	0.2	ND	0.005	7441019
Chlordane (Total)	ug/L	100	ND	0.005	7441019
DDT+ Metabolites	ug/L	-	ND	0.005	7441019
Heptachlor + Heptachlor epoxide	ug/L	-	ND	0.005	7441019
o,p-DDD + p,p-DDD	ug/L	-	ND	0.005	7441019
o,p-DDE + p,p-DDE	ug/L	-	ND	0.005	7441019
o,p-DDT + p,p-DDT	ug/L	0.1	ND	0.005	7441019
Total Endosulfan	ug/L	-	ND	0.005	7441019
Total PCB	ug/L	1	ND	0.05	7441019

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: City of Hamilton Sanitary and combined Sewer Discharge By Law No. 14-090 April 23, 2014
ND = Not detected

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BV Labs Job #: C1I3150
Report Date: 2021/07/08

exp Services Inc
Client Project #: HAM-00802096
Site Location: 559 GARNER RD
Your P.O. #: ENV-BRM
Sampler Initials: EC

TEST SUMMARY

BV Labs ID: PZN965
Sample ID: BH 1-2021
Matrix: Water

Collected: 2021/07/02
Shipped:
Received: 2021/07/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sewer Use By-Law Semivolatile Organics	GC/MS	7443256	2021/07/04	2021/07/05	Milijana Avramovic
Carbonaceous BOD	DO	7442647	2021/07/03	2021/07/08	Surleen Kaur Romana
Chloride by Automated Colourimetry	KONE	7444363	N/A	2021/07/06	Alina Dobreanu
Total Cyanide	SKAL/CN	7444633	2021/07/05	2021/07/05	Aditiben Patel
Fluoride	ISE	7443075	2021/07/03	2021/07/06	Surinder Rai
Mercury in Water by CVAA	CV/AA	7445792	2021/07/06	2021/07/06	Gagandeep Rai
Total Metals Analysis by Axial ICP	ICPX	7445560	2021/07/06	2021/07/06	Jolly John
E.coli, (CFU/100mL)	PL	7442507	N/A	2021/07/02	Soham Patel
Animal and Vegetable Oil and Grease	BAL	7441312	N/A	2021/07/08	Automated Statchk
Total Oil and Grease	BAL	7450053	2021/07/07	2021/07/07	Karamjeet Randhawa
OC Pesticides (Selected) & PCB	GC/ECD	7445553	2021/07/06	2021/07/07	Li Peng
OC Pesticides Summed Parameters	CALC	7441019	N/A	2021/07/03	Automated Statchk
pH	AT	7443099	2021/07/03	2021/07/06	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7443524	N/A	2021/07/05	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7444360	N/A	2021/07/06	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	7444664	2021/07/05	2021/07/06	Rajni Tyagi
Total PAHs (Hamilton, Ottawa S.U.B.)	CALC	7442428	N/A	2021/07/06	Automated Statchk
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	7450056	2021/07/07	2021/07/07	Karamjeet Randhawa
Total Suspended Solids	BAL	7447498	2021/07/07	2021/07/07	Sandeep Kaur
Volatile Organic Compounds in Water	GC/MS	7443815	N/A	2021/07/06	Chandni Khawas

BV Labs ID: PZN965 Dup
Sample ID: BH 1-2021
Matrix: Water

Collected: 2021/07/02
Shipped:
Received: 2021/07/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonaceous BOD	DO	7442647	2021/07/03	2021/07/08	Surleen Kaur Romana
Chloride by Automated Colourimetry	KONE	7444363	N/A	2021/07/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	7444360	N/A	2021/07/06	Alina Dobreanu
Total Suspended Solids	BAL	7447498	2021/07/07	2021/07/07	Sandeep Kaur

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BV Labs Job #: C1I3150
Report Date: 2021/07/08

exp Services Inc
Client Project #: HAM-00802096
Site Location: 559 GARNER RD
Your P.O. #: ENV-BRM
Sampler Initials: EC

GENERAL COMMENTS

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

Package 1	6.7°C

Sample PZN965 [BH 1-2021] : VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1I3150
Report Date: 2021/07/08

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: HAM-00802096
Site Location: 559 GARNER RD
Your P.O. #: ENV-BRM
Sampler Initials: EC

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7443256	2,4,6-Tribromophenol	2021/07/05	102	10 - 130	91	10 - 130	89	%				
7443256	2-Fluorobiphenyl	2021/07/05	84	30 - 130	81	30 - 130	72	%				
7443256	D14-Terphenyl (FS)	2021/07/05	88	30 - 130	89	30 - 130	86	%				
7443256	D5-Nitrobenzene	2021/07/05	85	30 - 130	78	30 - 130	74	%				
7443256	D8-Acenaphthylene	2021/07/05	88	30 - 130	79	30 - 130	78	%				
7443815	4-Bromofluorobenzene	2021/07/06	104	70 - 130	106	70 - 130	96	%				
7443815	D4-1,2-Dichloroethane	2021/07/06	108	70 - 130	105	70 - 130	116	%				
7443815	D8-Toluene	2021/07/06	104	70 - 130	107	70 - 130	87	%				
7445553	2,4,5,6-Tetrachloro-m-xylene	2021/07/07	85	50 - 130	79	50 - 130	72	%				
7445553	Decachlorobiphenyl	2021/07/07	87	50 - 130	92	50 - 130	82	%				
7442647	Total Carbonaceous BOD	2021/07/08					ND,RDL=2	mg/L	NC	30	96	85 - 115
7443075	Fluoride (F-)	2021/07/06	63 (1)	80 - 120	95	80 - 120	ND, RDL=0.10	mg/L	3.3	20		
7443099	pH	2021/07/06			102	98 - 103			0.093	N/A		
7443256	3,3'-Dichlorobenzidine	2021/07/05	91	30 - 130	98	30 - 130	ND, RDL=0.8	ug/L				
7443256	7H-Dibenzo(c,g) Carbazole	2021/07/05	125	30 - 130	104	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7443256	Anthracene	2021/07/05	112	30 - 130	110	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Benzo(a)anthracene	2021/07/05	113	30 - 130	111	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Benzo(a)pyrene	2021/07/05	117	30 - 130	120	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Benzo(b/j)fluoranthene	2021/07/05	121	30 - 130	121	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Benzo(e)pyrene	2021/07/05	112	30 - 130	112	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Benzo(g,h,i)perylene	2021/07/05	125	30 - 130	126	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Benzo(k)fluoranthene	2021/07/05	113	30 - 130	112	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Bis(2-ethylhexyl)phthalate	2021/07/05	94	30 - 130	95	30 - 130	ND,RDL=2	ug/L				
7443256	Chrysene	2021/07/05	123	30 - 130	127	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Dibenzo(a,h)anthracene	2021/07/05	130	30 - 130	117	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Dibenzo(a,i)pyrene	2021/07/05	117	30 - 130	114	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Dibenzo(a,j) acridine	2021/07/05	122	30 - 130	101	30 - 130	ND, RDL=0.4	ug/L	NC	40		
7443256	Di-N-butyl phthalate	2021/07/05	105	30 - 130	101	30 - 130	ND,RDL=2	ug/L				
7443256	Fluoranthene	2021/07/05	125	30 - 130	125	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Indeno(1,2,3-cd)pyrene	2021/07/05	124	30 - 130	118	30 - 130	ND, RDL=0.2	ug/L	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7443256	Pentachlorophenol	2021/07/05	71	30 - 130	43	30 - 130	ND,RDL=1	ug/L				
7443256	Perylene	2021/07/05	108	30 - 130	90	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Phenanthrene	2021/07/05	120	30 - 130	118	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443256	Pyrene	2021/07/05	125	30 - 130	125	30 - 130	ND, RDL=0.2	ug/L	NC	40		
7443524	Phenols-4AAP	2021/07/05	102	80 - 120	99	80 - 120	ND, RDL=0.0010	mg/L	1.1	20		
7443815	1,1,2,2-Tetrachloroethane	2021/07/06	96	70 - 130	93	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7443815	1,2-Dichlorobenzene	2021/07/06	92	70 - 130	91	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7443815	1,4-Dichlorobenzene	2021/07/06	105	70 - 130	107	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7443815	Benzene	2021/07/06	90	70 - 130	89	70 - 130	ND, RDL=0.20	ug/L	5.4	30		
7443815	Chloroform	2021/07/06	96	70 - 130	96	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7443815	cis-1,2-Dichloroethylene	2021/07/06	105	70 - 130	99	70 - 130	ND, RDL=0.50	ug/L	0.11	30		
7443815	Ethylbenzene	2021/07/06	86	70 - 130	83	70 - 130	ND, RDL=0.20	ug/L	1.9	30		
7443815	Methylene Chloride(Dichloromethane)	2021/07/06	96	70 - 130	95	70 - 130	ND, RDL=2.0	ug/L	NC	30		
7443815	o-Xylene	2021/07/06	NC	70 - 130	87	70 - 130	ND, RDL=0.20	ug/L	2.6	30		
7443815	p+m-Xylene	2021/07/06	NC	70 - 130	70 (2)	70 - 130	ND, RDL=0.20	ug/L	3.5	30		
7443815	Tetrachloroethylene	2021/07/06	89	70 - 130	92	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7443815	Toluene	2021/07/06	NC	70 - 130	93	70 - 130	ND, RDL=0.20	ug/L	2.2	30		
7443815	Total Xylenes	2021/07/06					ND, RDL=0.20	ug/L	3.2	30		
7443815	trans-1,3-Dichloropropene	2021/07/06	114	70 - 130	98	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7443815	Trichloroethylene	2021/07/06	99	70 - 130	101	70 - 130	ND, RDL=0.20	ug/L	0.73	30		
7444360	Dissolved Sulphate (SO4)	2021/07/06	NC	75 - 125	105	80 - 120	ND, RDL=1.0	mg/L	1.6	20		
7444363	Dissolved Chloride (Cl-)	2021/07/06	NC	80 - 120	100	80 - 120	ND, RDL=1.0	mg/L	0.64	20		
7444633	Total Cyanide (CN)	2021/07/05	88	80 - 120	91	80 - 120	ND, RDL=0.0050	mg/L	NC	20		
7444664	Total Kjeldahl Nitrogen (TKN)	2021/07/06	105	80 - 120	104	80 - 120	ND, RDL=0.10	mg/L	14	20	105	80 - 120
7445553	a-Chlordane	2021/07/07	81	50 - 130	85	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7445553	Aldrin	2021/07/07	74	50 - 130	78	50 - 130	ND, RDL=0.005	ug/L	NC	30		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7445553	Dieldrin	2021/07/07	92	50 - 130	96	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7445553	g-Chlordane	2021/07/07	81	50 - 130	84	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7445553	Hexachlorobenzene	2021/07/07	82	50 - 130	83	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7445553	Lindane	2021/07/07	85	50 - 130	87	50 - 130	ND, RDL=0.003	ug/L	NC	30		
7445553	Mirex	2021/07/07	77	30 - 130	81	30 - 130	ND, RDL=0.005	ug/L	13	40		
7445553	o,p-DDT	2021/07/07	80	50 - 130	83	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7445553	p,p-DDT	2021/07/07	88	50 - 130	84	50 - 130	ND, RDL=0.005	ug/L	NC	30		
7445560	Total Aluminum (Al)	2021/07/06	NC	80 - 120	98	80 - 120	ND, RDL=0.1	mg/L				
7445560	Total Antimony (Sb)	2021/07/06	107	80 - 120	105	80 - 120	ND, RDL=0.02	mg/L				
7445560	Total Arsenic (As)	2021/07/06	108	80 - 120	100	80 - 120	ND, RDL=0.01	mg/L				
7445560	Total Bismuth (Bi)	2021/07/06	99	80 - 120	99	80 - 120	ND, RDL=0.05	mg/L				
7445560	Total Cadmium (Cd)	2021/07/06	105	80 - 120	101	80 - 120	ND, RDL=0.002	mg/L				
7445560	Total Chromium (Cr)	2021/07/06	100	80 - 120	100	80 - 120	ND, RDL=0.01	mg/L				
7445560	Total Cobalt (Co)	2021/07/06	98	80 - 120	100	80 - 120	ND, RDL=0.002	mg/L				
7445560	Total Copper (Cu)	2021/07/06	97	80 - 120	97	80 - 120	ND, RDL=0.01	mg/L				
7445560	Total Iron (Fe)	2021/07/06	97	80 - 120	102	80 - 120	ND, RDL=0.02	mg/L				
7445560	Total Lead (Pb)	2021/07/06	95	80 - 120	100	80 - 120	ND, RDL=0.01	mg/L				
7445560	Total Manganese (Mn)	2021/07/06	96	80 - 120	97	80 - 120	ND, RDL=0.001	mg/L				
7445560	Total Molybdenum (Mo)	2021/07/06	102	80 - 120	102	80 - 120	ND, RDL=0.005	mg/L				
7445560	Total Nickel (Ni)	2021/07/06	100	80 - 120	102	80 - 120	ND, RDL=0.005	mg/L				

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7445560	Total Phosphorus (P)	2021/07/06	NC	80 - 120	111	80 - 120	ND, RDL=0.05	mg/L	1.1	20		
7445560	Total Selenium (Se)	2021/07/06	114	80 - 120	99	80 - 120	ND, RDL=0.02	mg/L				
7445560	Total Silver (Ag)	2021/07/06	98	80 - 120	99	80 - 120	ND, RDL=0.01	mg/L				
7445560	Total Tin (Sn)	2021/07/06	101	80 - 120	104	80 - 120	ND, RDL=0.02	mg/L				
7445560	Total Titanium (Ti)	2021/07/06	102	80 - 120	101	80 - 120	ND, RDL=0.005	mg/L				
7445560	Total Vanadium (V)	2021/07/06	102	80 - 120	100	80 - 120	ND, RDL=0.005	mg/L				
7445560	Total Zinc (Zn)	2021/07/06	106	80 - 120	104	80 - 120	ND, RDL=0.005	mg/L				
7445792	Mercury (Hg)	2021/07/06	97	75 - 125	99	80 - 120	ND, RDL=0.00010	mg/L	NC	20		
7447498	Total Suspended Solids	2021/07/07					ND, RDL=10	mg/L	2.2	25	96	85 - 115
7450053	Total Oil & Grease	2021/07/07			96	85 - 115	ND, RDL=0.50	mg/L	1.0	25		
7450056	Total Oil & Grease Mineral/Synthetic	2021/07/07			94	85 - 115	ND, RDL=0.50	mg/L	3.1	25		

N/A = Not Applicable

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

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

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

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

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

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

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

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

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

(2) The recovery was below the lower control limit. This may represent a low bias in some results for this specific analyte.

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

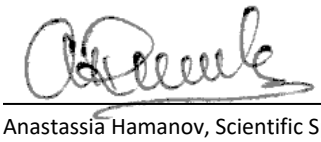
Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1I3150
Report Date: 2021/07/08

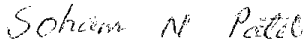
exp Services Inc
Client Project #: HAM-00802096
Site Location: 559 GARNER RD
Your P.O. #: ENV-BRM
Sampler Initials: EC

VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist



Soham Patel, Analyst 2

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

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

CHAIN OF CUSTODY RECORD

02-Jul-21 15:41
Patricia Legette
C1I3150
M2K ENV 1259

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#30554 exp Services Inc	Company Name:	EXP Services Inc	Quotation #:	B91717
Attention:	Central Services	Attention:		P.O. #:	ENV - PRM
Address:	1595 Clark Blvd	Address:	Francois.Quartier@exp.com	Project:	~~ALE-2100414-A0~~ HAM-00802095
	Brampton ON L6T 4V1		Edwin.Cwssell@exp.com	Project Name:	559 Garner Rd
Tel:	(905) 793-9800 Fax: (905) 793-0641	Tel:	Fax:	Site #:	
Email:	AP@exp.com; Karen.Burke@exp.com	Email:		Sampled By:	EC

COC #: C#831568-03-01 | Project Manager: Patricia Legette

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

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

Other Regulations: ☐ CCME ☑ Sanitary Sewer Bylaw ☐ Reg 558. ☑ Storm Sewer Bylaw ☐ MISA Municipality Ham.Hon ☐ PWQO ☐ Reg 406 Table ☐ Other

Special Instructions:

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

Field Filtered (please circle): Metals / Hg / Cr VI

ANALYSIS REQUESTED (PLEASE BE SPECIFIC): Total Oil and Grease; pH; Biochemical Oxygen Demand (BOD); Total Suspended Solids; Total Phosphorus (Colourimetric); Hamilton combined Sanitary and Storm By-law

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

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

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	# of Bottles	Comments
1		BH 1-2021	21/07/02	12:50 pm	GW	19	
2							
3							
4							
5							
6							
7							
8							
9							
10							

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Edwin Cwssell	21/07/02	3:40	[illegible]	2021/07/02	15:41	

Laboratory Use Only: Time Sensitive | Temperature (°C) on Recei 7/10/13 | Custody Seal Present Intact: Yes ✓ / No

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

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

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

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

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

BV Labs Job #: C1I3150
Report Date: 2021/07/08

exp Services Inc
Client Project #: HAM-00802096
Site Location: 559 GARNER RD
Your P.O. #: ENV-BRM
Sampler Initials: EC

Exceedance Summary Table – Hamilton Sanitary & comb.

Result Exceedances

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

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

Exceedance Summary Table – Hamilton Storm

Result Exceedances

Sample ID	BV Labs ID	Parameter	Criteria	Result	DL	UNITS
BH 1-2021	PZN965-06-Lab Dup	Total Suspended Solids	15	46	10	mg/L
BH 1-2021	PZN965-06	Total Suspended Solids	15	47	10	mg/L

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

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Appendix E – Construction and Post-Construction Flow Rate Calculations

APPENDIX E: Short-Term Flow Rate

559 Garner Road East, Ancaster, Ontario
HAM-00802098-A0

Table E-1: Flow from Under-Slab Drain System

Parameters	Symbols	Unit	Value
Geological Formation	-	-	Glacial Deposit
Ground Elevation	-	mASL	248.24
Lowest Top Slab Elevation	-	mASL	242.24
Highest Groundwater Elevation	-	mASL	246.35
Lowest Footing Elevation	-	mASL	240.74
Base of the Water-Bearing Zone	-	mASL	213.40
Height of Static Water Table Above the Base of the Water-Bearing Zone	**H**	m	32.95
Dewatering Target Elevation	-	mASL	239.74
Height of Target Water Level Above the Base of Water-Bearing Zone	**h_w**	m	26.34
Hydraulic Conductivity	**K**	m/s	7.0E-07
Length of Excavation	-	m	52.00
Width of Excavation	-	m	72.00
Equivalent Radius (equivalent perimeter)	**r_e**	m	39.47
Method to Calculate Radius of Influence	-	-	**Cooper-Jacob**
Time (30 days)	**t**	s	2592000
Specific Yield	**Sy**		0.10
Cooper-Jacob's Radius of Influence from Sides of Excavation	**Rcj**	m	36.68
Radius of Influence	**Ro**	m	76.15
Dewatering Flow Rate (unconfined radial flow component)	**Q**	m^3/day	113.32
Factor of Safety	**fs**	-	2.00
Dewatering Flow Rate (multiplied by factor of safety)	**Q.fs**	m^3/day	227
Precipitation Event	-	mm/day	15
Volume from Precipitation	-	m^3/day	56
Dewatering Flow Rate **With Safety Factor** (excluding stormwater collection)	-	m^3/day	227
Dewatering Flow Rate **With Safety Factor** (including stormwater collection)	-	m^3/day	283

Notes:
mASL - meters above sea level

Analytical Solution for Estimating Radial Flow from an Unconfined Aquifer to a Fully-Penetrating Excavation

$$Q_w = \frac{\pi K(H^2 - h^2)}{Ln\,[\frac{R_o}{r_e}]}$$

(Based on the Dupuit-Forcheimer Equation)

$$r_e = \frac{a+b}{\pi} \qquad R_o = R_{cj} + r_e \qquad R_{cj} = \sqrt{2.25KDt/S}$$

Where:

Q_w = Flow rate per unit length of excavation (m^3/s)

K = Hydraulic conductivity (m/s)

H = Height of static water table above base of water-bearing zone (m)

h_w = Height of target water level above the base of water-bearing zone (m)

Rcj=Cooper Jacob Radius of Influence (m)

R_o=Radius of influence (m)

re=Equivalent perimeter (m)