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Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

TOWN OF CALEDON
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June 9, 2022

Swaminarayan Mandir Vasna Sanstha Canada (SMVS)
114 Toryork Drive
Toronto, Ontario
M9L 1X6

Attention: Mr. Rasik Patel (SMVS)

**RE: HYDROGEOLOGICAL ASSESSMENT REPORT
6939 KING STREET
CALEDON, ONTARIO**

Dear Mr. Rasik Patel:

Terraprobe Inc. is pleased to provide Swaminarayan Mandir Vasna Sanstha Canada (SMVS) with the result of the hydrogeological assessment for 6939 King Street, Caledon, Ontario. The following document is provided as part of this package:

- Responses to Comments Responses Matrix, dated February 2022
- Hydrogeological Assessment Report (Final)

The hydrogeological assessment report includes findings of the newly installed monitoring wells, groundwater monitoring program, groundwater quality assessment, and revised short-term construction dewatering flow rate estimates. Additionally, the report includes a pre-and post-development water balance assessment, contaminant attenuation assessment, and private water supply well canvassing.

If you have any questions or concerns regarding this document, please do not hesitate to contact the undersigned.

Yours truly,
Terraprobe Inc.

Amar Neku, Ph.D., P.Eng., P.Geo.
Project Engineer

Narjes Alijani, M.Sc., P.Geo.
Project Manager

Terraprobe Inc.

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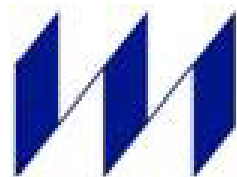
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Comments Response Matrix

First Submission Comments and Responses

6939 King Street, Town of Caledon

Town File: POPA 2020-0003 & RZ 2020-0011

Weston File: 8644

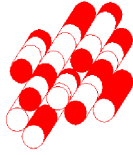
Date: February 2022

Town of Caledon | Preliminary Comments Letter - Various Departments
Jessica Krushnisky, Planner | 416-975-1556 ext. 244 | jkrushnisky@planpart.ca
May 31, 2021

Comments	Consultant	Response
<p>Hydrogeological Assessment</p> <p>1. Review and approval of the Hydrogeologic Assessment will be required by Region of Peel and TRCA Staff. Town Engineering notes that the report states that the Region of Peel Guidelines for Hydrogeologic Assessments were reviewed in order to prepare this report, but does not indicate that the report has been prepared to the Regional requirements. Town Staff defer to the Region regarding compliance with the applicable Regional requirements for Hydrogeologic Studies.</p>	<p>Terraprobe</p>	<p>Terraprobe: Noted- The hydrogeological assessment report dated June 9, 2022, is revised to indicate that the report has been prepared as per the region's requirements.</p>
<p>2. A peer review of the Hydrogeological Assessment may be required. Peer review requirement will be confirmed upon review of the applicable comments from Region of Peel and TRCA staff. If peer review is required, costs for the peer review will be forwarded under a separate cover. Payment for all peer review costs, should peer review be required, will be the responsibility of the applicant.</p>	<p>Terraprobe</p>	<p>Terraprobe: Noted.</p>
<p>3. The Hydrogeologic Study assessed the impacts from the following activities at the subject development on the existing groundwater:</p> <ul style="list-style-type: none"> a) Construction dewatering requirements and potential impacts; b) Long-term foundation groundwater impacts; and, c) Assessment of pre- and post-development water balance. <p>Results of the analysis indicate that the estimated short-term construction dewatering will be below 50,000 L/day and thus an EASR or PTTW will not be required, and that based on the proposed building design there are no anticipated long-term impacts to groundwater.</p> <p>Town engineering notes that the water balance analysis indicates a post development groundwater recharge deficiency. Reports states that LID</p>	<p>Terraprobe</p>	<p>Terraprobe: The hydrogeological assessment report was revised due to changes in the design drawings. As per the revised report dated June 9, 2022, the total estimated short-short term dewatering flow rate considering a safety factor of 1.5 and stormwater reaches up to 318,800 L/day for construction of the propose building, sewer alignment and stormwater management pond. As such, applying for EASR with the MECP is required. The slab-on-grade building proposed above shallow groundwater level. As such, long-term foundation drainage is not anticipated.</p> <p>Proposing and designing LID measures should be conducted by a stormwater management engineer.</p>

Town of Caledon | Preliminary Comments Letter - Various Departments
Jessica Krushnisky, Planner | 416-975-1556 ext. 244 | jkrushnisky@planpart.ca
May 31, 2021

Comments	Consultant	Response
measures can be considered to manage the generated runoff partially, and that details of the water balance measures are assumed to be provided in the SWM report. Water balance criteria in the SWM report is to provide measures to infiltrate the first 5mm of rainfall. Town defers to the TRCA regarding water balance requirements.		
<p>4. Town engineering notes that the following was not assessed as part of the Hydrogeologic Assessment:</p> <p>a) Impact of proposed water service well based on the estimated water taking requirements on the existing groundwater quality and quantity and any impacts to adjacent wells; and,</p> <p>b) Impact of proposed septic system on the existing groundwater quality and quantity and any impacts to adjacent wells.</p>	Terraprobe	<p>Terraprobe: Noted.</p> <p>a) A private water well survey is completed for the site with the findings presented in the revised hydrogeological assessment report dated June 9, 2022.</p> <p>b) A contaminant attenuation assessment with respect to the proposed septic bed is completed and presented in the revised hydrogeological assessment report dated June 9, 2022.</p>



Terraprobe

*Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing*

HYDROGEOLOGICAL ASSESSMENT 6939 KING STREET CALEDON, ONTARIO

Prepared for: Swaminarayan Mandir Vasna Sanstha Canada
(SMVS)
114 Toryork Drive
Toronto, Ontario
M9L 1X6

Attention: Mr. Rasik Patel

File No 1-20-0222-46.1
June 9, 2022

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1.0 EXECUTIVE SUMMARY

Terraprobe Inc. (Terraprobe) was retained by Swaminarayan Mandir Vasna Sanstha Canada (SMVS) to conduct a Hydrogeological Assessment for the proposed development of municipal address 6939 King Street, Caledon, Ontario (the ‘Site’). The current revision of the report is prepared to revise the previous hydrogeological assessment report issued on November 26, 2020. The updates include below includes:

- Revised short-term dewatering flow rates based on the groundwater levels measured in the newly installed monitoring wells within the footprint of the proposed building, stormwater management (SWM) facility and septic bed;
- Contaminant Attenuation Assessment; and
- Private water supply well canvassing.

The Site is parallelogram in shape with a total area of approximately 60,590 m² (14.97 acres). The Site is located in the southwest quadrant of the intersection of King Street and Centreville Creek Road, in the Town of Caledon, Ontario. A Site location plan is provided in **Figure 1**. The Site comprises a mixed use residential and agricultural land. **Table I** summarizes the existing conditions at the Site.

Table I: Existing Buildings Conditions

Current Development			
Development Phase	Land Use	Above Grade Levels	Below Grade Levels
6939 King Street Caledon	Agricultural and residential	Residential House and a Farm Land	NA

It is understood that the proposed development includes demolishing the existing building and construction of a 1-storey religious temple with no basement level and at-grade parking lots. Additionally, a Stormwater Management (SWM) facility and a septic bed are proposed for future development. The lowest ground floor elevation (finished floor elevation) which is reported on the revised site plan prepared by Battaglia Architect Inc. dated November 9, 2020 is 267.53 metres above sea level (masl). The base of excavation is 1.2 m below the ground as recommended by the geotechnical engineering team for frost protection. Additionally, as recommended in the geotechnical investigation report, the existing fill material at the site should be stripped and replaced with engineered fill material. The proposed development details are summarized in **Table II**.

Table II: Proposed Development Details

Proposed Development	Above Grade Levels	Underground Levels	The Lowest FFE/Invert (masl)	Approximate Base of Excavation (masl) for Construction	The Highest Shallow Groundwater Level (masl)
Slab-on-Grade Building	1	Slab-On-Grade	267.53	265.0*	266.37
Sewer Alignment	-	-	265.60	265.60	266.37
SWM Facility	-	-	263.95	263.95	266.37

*Base of the existing fill material that should be replaced with the engineered fill.

In general, two (2) main local stratigraphic units were encountered beneath the Site, in which excavation and construction will be completed. A summary of the units and the estimated hydraulic conductivity for each unit is provided in **Table III**.

Table III: Summary of Subsoil Profile and estimated hydraulic conductivity within the Proposed Excavation Depth

Site Stratigraphy			
Stratum/Formation	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Earth Fill	0.0 to 1.2	265.0 to 267.1	1×10^{-6} **
Clayey Silt Till	0.6 to the end of borehole	266.4 to the end of the borehole	1.11×10^{-7} *

*Indicates conductivity was calculated by Falling Head Test (Geomean of BH1, BH3 and BH5)

**Indicates conductivity was estimated using typical published values from Freeze and Cherry (1979)

The groundwater elevation considered for the current short-term dewatering flow rate estimation and the anticipated conceptual zone of influence are presented in **Table IV**.

Table IV: Summary of Groundwater Conditions

The Highest Stabilized Groundwater Elevation	266.37 masl (0.69 ± m below existing ground surface of BH101)
Zone of Influence	Proposed building: 6.2 Proposed sewer alignment: 5.6 Proposed SWM facility: 7.6 m

*masl meters above sea level

Details of the groundwater exceedances in comparison to the Regional Municipality of Peel Sewer Use By-Law limits are presented in **Table V**.

Table V: Summary of Groundwater Exceedances to the Regional Municipality of Peel Sewer Use By-law limits

Sample ID	Untreated Sample (Yes/No)	Sample Collection Date	Regional Municipality of Peel Storm Sewer Limits	Regional Municipality of Peel Sanitary Sewer Limits
BH3	Yes	October 13, 2020	Exceeds for TSS and Fecal Coliforms	No exceedances

Short-term construction dewatering and long-term foundation drainage flow rates were estimated considering the Site plans. The findings along with the anticipated requirements are summarized in **Table VI**.

Table VI: The water taking requirements for groundwater control

Groundwater Quantity: Short Term (Construction)						
Proposed Residential Building	Groundwater Seepage (S. F.: 1.5)*		25 mm Design Rainfall Event		Total Volume	
	L/day	L/min	L/day	L/min	L/day	L/min
Proposed Slab-on-grade Temple Building	3,620	2.5	244,500	169.8	248,120	172.3
Proposed Sewer Alignment**	830	0.6	6,500	4.5	7,330	5.1
Proposed SWM Facility	3,850	2.7	59,500	41.3	63,350	44.0

Groundwater Quantity: Long Term (Post-Construction)						
Proposed Residential Building	Groundwater Seepage		25 mm Design Rainfall Event		Total Volume	
	L/day	L/min	L/day	L/min	L/day	L/min
Proposed Slab-on-grade Temple Building	0	0	0	0	0	0

*S. F.: Safety Factor

**Total length of the proposed alignment was not available at the time of preparation of the current report. As such, the calculation considers an excavation trench with 50 m length.

Permits potentially required to be obtained for short-term and long-term dewatering are summarized in **Table VII**.

Table VII: Summary of Permits Required for Short-Term Dewatering and Long-Term Foundation Drainage Flow

Regulatory Requirements	
Environmental Activity and Sector Registry (EASR) Posting	Required
Short-Term Permit to Take Water (PTTW)	Not Required
Long-Term Permit to Take Water (PTTW)	Not Required
Short-Term Discharge Agreement Regional Municipality of Peel	Required*
Long-Term Discharge Agreement Regional Municipality of Peel	Not Required

*It is understood that there are no municipal underground services within the vicinity of the Site. As such, discharge water cannot be directed to the region's facilities.

A pre- and post-development water balance assessment was completed to evaluate opportunities and constraints for developing Low Impact Development (LID) measures for the post development Site. A summary of findings is presented in **Table VIII**.

Table VIII: Summary of Pre- and Post-Development Water Balance Components

Pre-Development Site Breakdown Areas	Precipitation (m ³ /year)	Evapotranspiration (m ³ /year)	Infiltration (m ³ /year)	Run off (m ³ /year)
Pre-Development	52,956	30,741	14,408	7,807
Post-Development	52,956	18,989	7,754	26,213
Loss (-) and Gain (+)	-	-11,752	-6,654	+18,406

A review of the findings indicates a total decrease of 11,752 m³/year and 6,654 m³/year for evapotranspiration (ET) and infiltration, respectively, and an increase of 18,406 m³/year for runoff are expected for the post-development Site.

Low Impact Development (LID) measures, such as infiltration trenches and permeable pavements, could be considered to manage the generated runoff partially. The remaining volume can be discharged to the Regional Municipality of Peel storm sewer system or overland. It is assumed that details will be provided in the Stormwater Management Report.

Based on the results of nitrate loading impact assessment, the target effluent concentration for nitrate to meet the maximum allowable concentration of 2.5 mg/L at the down-gradient Site boundary is calculated at 3.26 mg/L. Based on the distance to potential down-gradient receptors impacts to groundwater and surface water resources are not anticipated. It is recommended that a schedule of regular system maintenance shall be maintained.

Owner of six (6) water supply well records that fall within the 500 m radius of the Site, including the existing water supply well at the Site, were contacted over a door-to-door well canvassing program. Terraprobe did not receive any response by the date of issuing the current report. The existing water supply well at the Site should be decommissioned if it is not required for the post-development Site. If the well is required, a monitoring program should be considered to monitor the groundwater quality and quantity on the well, in advance of, during and after construction.

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2.0 INTRODUCTION

2.1 Site Location and Project Description

Terraprobe Inc. (Terraprobe) was retained by Swaminarayan Mandir Vasna Sanstha Canada (SMVS) to conduct a Hydrogeological Assessment for the proposed development located at 6939 King Street, Caledon, Ontario (the “Site”). The current revision of the report is prepared to revise the previous hydrogeological assessment report issued on November 26, 2020. The updates include below includes:

- Revised short-term dewatering flow rates based on the groundwater levels measured in the newly installed monitoring wells within the footprint of the proposed building, stormwater management (SWM) facility and septic bed;
- Contaminant Attenuation Assessment; and
- Private water supply well canvassing.

Surrounding land use consists of King Street and agriculture farm land to the north, agriculture land to the south, Centreville Creek Road to the east and, a mixed use residential and agricultural property, a vacant land and the tributary of Lindsay creek to the west boundary of the Site.

The Site is parallelogram in shape with a total area of approximately 60,590 m² (14.97 acres). The Site is located in the southwest quadrant of the intersection of King Street and Centreville Creek Road, in the Town of Caledon, Ontario. A Site location plan is provided in **Figure 1**. The Site currently comprises a mixed use residential and agricultural property. It is understood that the proposed development includes a one-storey religious temple with no basement level, at-grade parking lots, a stormwater management (SWM) facility, and a septic bed. The lowest ground floor elevation (finished floor elevation) of the building which is reported on the revised site plan prepared by Battaglia Architect Inc. dated November 9, 2020 is 267.531 metres above sea level (masl). The base of the SWM facility is proposed between El. 264.05 and 263.95 masl.

The study was undertaken to assess the hydrogeological conditions of the Site and to provide general information regarding the hydrogeologic impact of the proposed redevelopment on the local groundwater regime. The report addresses the following areas:

- Identifying the geological and hydrogeological setting of the Site;
- Confirming groundwater level(s) and flow direction(s) beneath the Site;
- Assessing groundwater quality in comparison to the Peel Region Sanitary and Storm Sewer Use By-Law;
- Evaluating potential short-term construction dewatering needs for the proposed development;
- Identifying potential impacts to the nearby groundwater receptors including water supply wells and natural heritage features;
- Providing a mitigation plan for the potential impacts to the groundwater receptors and/or natural heritage features, if applicable;

- Providing recommendations on any needs for applying for Permit To Take Water (PTTW), or posting on the Environmental Activity and Sector Registry (EASR) with Ministry of the Environment, Conservation and Parks (MECP);
- Assessing pre- and post-development water balance;
- Completing a contaminant attenuation assessment; and,
- Conducting a private water supply well canvassing.

The Peel Region and Town of Caledon require that a hydrogeological assessment be completed in order to assess the potential dewatering needs and associated discharge plans. Additionally, associated potential impacts of the proposed development to the system and groundwater receptors should be evaluated.

2.2 Scope of Work

The scope of work for the study consisted of the following:

- Review of Available Background Information: A review of available background geological and hydrogeological information for the Site was completed using Ontario Geological Survey (OGS) maps, Ministry of Environment Conservation and Parks (MECP), and Ministry of Natural Resources and Forestry (MNRF) databases.
- Review of the Town of Caledon Official Plan: The Town of Caledon official plans were reviewed to understand the location of the Site and the proposed development within the policy areas.
- Site Inspection: A visual inspection of the Site and surrounding areas to determine local topography and drainage, and an assessment of significant features.
- Groundwater Level Monitoring and Hydraulic Conductivity Testing: Groundwater levels within the installed monitoring wells were monitored over six (6) monitoring events. In-situ hydraulic conductivity testing was completed within the installed monitoring wells to estimate the hydraulic conductivity of the strata within the well screen interval.
- Groundwater Quality Assessment: Groundwater quality was assessed in comparison with the Regional Municipality of Peel Sanitary and Storm Sewer Use By-Law to assess available options to discharge the potential short-term dewatering effluent.
- Review of Proposed Site Development Concept: The proposed site development plans were reviewed to confirm the proposed invert elevation for developing underground structures.
- Construction Dewatering Flow Rate Estimate: Considering the proposed development plans, the construction dewatering flow rate (short-term dewatering) was estimated using the stable groundwater level and estimated hydraulic conductivity measured in the Site.
- Long-Term Foundation Drainage: Considering the proposed development plans, potential long-term foundation drainage was estimated.

- Mitigation Plans for Dewatering: A mitigation plan was recommended to mitigate potential short-term dewatering impacts to the nearby groundwater receptors and structures, if applicable.
- Potential Dewatering Permits: Considering the estimated short-term dewatering and long-term foundation drainage flow rates, recommendations were provided on any need for applying for a PTTW or posting on the EASR with MECP, if required.
- Pre- and Post-Development Water Balance Assessment: The assessment was completed considering the current and proposed pervious and impervious area.
- Contaminant Attenuation Assessment: An assessment of the potential impact of the proposed septic systems was completed. Specifically, a nitrate attenuation analysis was completed in accordance with the the Chapter 22 of the former Ministry of Environment (MOE) Design Guideline for Sewage Works
- Private Water Well Canvassing: MECP well records were reviewed and the owners of the properties with water supply wells located within the radius of 500 m away from the Site, were contacted to participate in a monitoring program.

The above scope of work was prepared in accordance with all of the following: Ontario Water Resources Act, and Ontario Regulation 387/04.

3.0 APPLICABLE REGULATION AND AGENCIES

The environmental regulations and policies relevant to this hydrogeological study are briefly discussed below.

3.1 Toronto and Region Conservation Authority (TRCA) Policies and Regulations (O. Reg. 166/06)

Under Section 28 of the Conservation Authorities Act, local conservation authorities are mandated to protect the health and integrity of the regional greenspace system, and to maintain or improve the hydrological and ecological functions performed by valley and stream corridors. The TRCA, through its regulatory mandate, is responsible for issuing permits under Ontario Regulation (O. Reg.) 166/06, Development, Interference with Wetlands and Alterations to Shorelines and Watercourses for development proposal or Site alteration work to shorelines and watercourses within the regulated areas.

TRCA Regulated Area online mapping was reviewed on November 2, 2020. It is our understanding that the Site is partially located within a TRCA Regulated Area. As such, it is anticipated that a permit from the TRCA under O. Reg. 166/06 will be required for the proposed development.

3.2 Town of Caledon Official Plan

The Town of Caledon's Official Plan sets up policies that deal with legislative and administrative concerns, guides physical growth, and addresses social, economic, and environmental concerns. The Official Plan provides land use planning designations and identifies areas of environmental significance where more stringent policies may apply for development applications.

Town of Caledon Official Plans were reviewed for the current study with the results summarized as below:

- Schedule A (Land Use Plan) - A review of the map, dated April 2018, indicates that the Site is located within an area designated as a Prime Agriculture Area.
- Schedule S (Greenbelt in Caledon) - A review of the map, dated April 2018, indicates that the Site is not located within a greenbelt area.

3.3 Permit to Take Water (PTTW) Section 34 of the Ontario Water Resource Act

For construction dewatering, water takings of more than 50,000L/day but less than 400,000L/day should be registered on the Environmental Activity and Sector Registry (EASR), while water takings of more than 400,000L/day require a Category 3 PTTW issued by the MECP. If it is identified that an EASR or PTTW is required for the Site, a hydrogeological report will need to be submitted in support of the application. Construction dewatering estimation was completed as a part of the scope of work for the current assessment.

3.4 Clean Water Act

The MECP mandates the protection of existing and future sources of drinking water under the Clean Water Act, 2006 (CWA). Initiatives under the CWA include the delineation of Wellhead Protection Areas (WHPAs),

significant groundwater recharge areas (SGRAs) and Highly Vulnerable Aquifers (HVAs) as well as the assessment of drinking water quality and quantity threats within Source Protection Areas. Source Protection Plans are developed under the CWA and include the restriction and prohibition of certain types of activities and land uses within WHPAs.

Based on regional-scale source protection mapping review on June 15, 2020, the Site is not located within a WHPA area, Intake Protection Zone, Issue Contributing Area, Event Based Area and Highly Vulnerable Aquifer. However, it is located in SGRA having a score of 4.

3.5 Peel Region Guidelines for Hydrogeologic Assessment and Reporting Requirements (July 2009)

The current report is prepared based on a review of Peel Region Guidelines for Hydrogeologic Assessment and Reporting Requirements for new developments, revised in January 2009.

4.0 METHODOLOGY

4.1 Borehole Advancement and Monitoring Well Installation

Drilling boreholes and the construction of monitoring wells were conducted in conjunction with a geotechnical investigation on July 14 and September 21, 2020. The program consisted of the drilling of twelve (12) boreholes (BH) and the installation of three (3) monitoring wells beneath the Site. Additionally, Terraprobe drilled seven (7) boreholes and installed five (5) monitoring wells between November 11 and 12, 2021. The locations of the boreholes/monitoring wells are shown on **Figure 2**.

Borehole drilling and monitoring well construction were completed by licensed water well contractors, under the full-time supervision of geotechnical technicians from Terraprobe, who also logged the soil strata encountered during borehole advancement and collected representative soil samples for textural classification. The boreholes were drilled using continuous flight, solid-stem augers. Detailed descriptions of the encountered subsoil and groundwater conditions are presented on the borehole and monitoring well logs, on the enclosed **Appendix A**.

The monitoring wells were constructed using 50-mm diameter PVC riser pipes and screens, which were installed in eight (8) selected geotechnical boreholes in accordance with Ontario Regulation (O. Reg.) 903. All of the monitoring wells were provided with monument protective casings at the ground surface.

The UTM coordinates and ground surface elevations at the BHs, as well as the monitoring well construction details, are presented on **Table 4-1**. It should be noted that the ground surface elevations at the boreholes and monitoring well locations were confirmed by Terraprobe using a Trimble R10 GNSS System. The Trimble R10 system uses the Global Navigation Satellite System and the Can-Net reference system to determine target location and elevation. The Trimble R10 system is reported to have an accuracy of up to 10 mm horizontally and up to 30 mm vertically. It should be noted that the elevations provided on the Borehole Logs are approximate only, for the purpose of relating soil stratigraphy and should not be used or relied on for other purposes.

Table 4-1- Monitoring Well Installation

Well ID	Installation Date	UTM Coordinates (m)		Ground El. (masl)	Monitoring Well Depth (mbgs)	Screen Interval (mbgs)	Casing Dia. (mm)	Screened Geological Unit	Protective Casing
		Easting	Northing						
BH1	July 14, 2020	597212	4855726	266.8	7.6	4.6-7.6	50	Clayey Silt Till	Monument
BH3	September 21, 2020	597164	4855667	266.3	7.6	4.6-7.6	50	Clayey Silt Till	Monument
BH5	September 21, 2020	597152	4855725	266.4	7.6	4.6-7.6	50	Clayey Silt Till	Monument
BH101	November 11, 2021	597102	4855671	267.1	6.1	3.1-6.1	50	Silt and clay to Clayey Silt Till	Monument
BH103	November 11, 2021	597105	4855618	266.6	6.1	3.1-6.1	50	Silt and clay to Clayey Silt Till	Monument
BH104	November 12, 2021	597253	4855671	266.2	6.1	3.1-6.1	50	Silt and clay to Clayey Silt Till	Monument
BH106	November 12, 2021	597215	4855511	265.2	6.1	3.1-6.1	50	Silt and clay to Clayey Silt Till	Monument

Well ID	Installation Date	UTM Coordinates (m)		Ground El. (masl)	Monitoring Well Depth (mbgs)	Screen Interval (mbgs)	Casing Dia. (mm)	Screened Geological Unit	Protective Casing
		Easting	Northing						
BH107	November 12, 2021	597308	4855648	265.6	6.1	3.1-6.1	50	Silt and clay to Clayey Silt Till	Monument

Notes: mbgs metres below ground surface
masl metres above sea level

4.2 Groundwater Monitoring

All eight (8) installed monitoring wells were utilized to measure and monitor groundwater levels. The groundwater monitoring program has confirmed the stabilized groundwater level beneath the Site. Groundwater levels in three (3) monitoring wells BH1, BH3 and BH5 were measured manually, starting from October 5, 2020 to October 20, 2020. Groundwater levels in the existing and newly installed monitoring wells were monitored between November 19 and December 13, 2021. Findings are presented in **Section 7.1**.

4.3 MECP Water Well Records Review

MECP Water Well Records (WWRs) were reviewed for the registered wells located at the Site and within 500 m radius of the Site boundaries (study area). The findings of the MECP well records are presented in **Section 5.6**.

4.4 In-Situ Hydraulic Conductivity Testing

Three (3) existing and four (4) selected newly installed monitoring wells BH1, BH3, BH5, BH101, BH103, BH104 and BH106 were utilized to conduct hydraulic conductivity tests. Falling head test was conducted for all three monitoring wells. The in-situ test provides estimated hydraulic conductivity (K) for subsoil strata at the depths of the well screens. The monitoring wells were developed in advance of the test. Well development involves the purging and removal of groundwater from each monitoring well to remove remnants of clay, silt and other debris introduced into the monitoring well during construction, and to induce the flow of groundwater through the well screens.

The in-situ falling head hydraulic conductivity test involves submerging a one (1) metre long slug in the monitoring well to displace the groundwater level upward. The rate at which the water level recovers to static conditions (falling head) is tracked manually using a water level tape and a data logger. The rate at which the water table recovers to static conditions is used to estimate the K value for the water-bearing strata formation at the well screen depth using the Bouwer and Rice method (1976). The findings for the hydraulic conductivity testing are presented in **Section 7.3.1**.

4.5 Hydraulic Conductivity based on Grain Size Distribution Graphs

The Hazen equation estimation method was also used to estimate the hydraulic conductivity (K) for saturated subsoils at selected depths beneath the water table below the subject Site. The method provides alternative hydraulic conductivity (K) estimates which are derived from the grain size diameter, whereby 10% by weight of

the soil particles are finer and 90% are coarser (Freeze and Cherry, 1979). The soils chosen for Hazen estimation were selected primarily from above the well screen depths. Findings are presented in **Section 7.3.2**.

4.6 Groundwater Quality Assessment

Groundwater quality should be assessed in advance of earth work. As such, one (1) set of samples was collected from one (1) selected monitoring well (BH3) on October 13, 2020 to characterize its quality for evaluation against the Regional Municipality of Peel Storm and Sanitary Sewer Use By-Law parameters. This is performed to assess whether any anticipated dewatering effluent can be disposed of into the Peel Region sewer system during construction or, following site development, for any long-term foundation drainage. Based on the results, recommendations for any pre-treatment for any dewatering/drainage effluent can be developed, if required.

One (1) selected monitoring well (BH3) was developed and purged of multiple well casings volumes of groundwater prior to sample collection. The groundwater sample was collected using a bailer. In accordance with the Regional Municipality of Peel Storm and Sanitary Sewer Use By-Law sampling protocols, one complete set of groundwater samples was not filtered during collection, prior to placement in the laboratory sample bottles. Upon sampling, all of the bottles were placed on ice and packed in a cooler at about $0.3 \pm C^{\circ}$ for shipment to the analytical laboratory. Sample analysis will be performed by an accredited lab by the Canadian Association for Laboratory Accreditation Inc. (CALA). Results of the analysis are discussed in **Section 7.4**.

4.7 A Review of Regional Data and Available Reports for the Site

The maps, data, and documents provided by the MECP, Ontario Geological Survey (OGS), Ministry of Natural Resources and Forestry (MNRF), and TRCA were reviewed. Additionally, the concurrent geotechnical report, was reviewed at the time of preparation of the current hydrogeological report.

5.0 REGIONAL AND LOCAL SITE SETTING

5.1 Regional Geology

The current understanding of the surficial geological setting of the Site is based on scientific work conducted by the OGS (OGS, 2003). The Site and surrounding area are mapped Till (5d) consisting of clay to silt-textured till derived from glaciolacustrine deposits or shale. **Figure 3** illustrates the mapped surficial geology for the Site and the surrounding area.

ORMGP produced a cross-sectional geological map to aid in the characterization of the general stratigraphy of the Site and surrounding area. Considering the regional cross-section, it is understood that the overburden units prevalent in this area are as follows, with the youngest unit at the top:

- Halton Till
- Oak Ridges Moraine
- Newmarket Till
- Thorncliffe Formation

Halton Till (Upper Till): The Halton Till mainly comprises of sandy silt to clayey silt till interbedded with silt, clay and a number of discontinuous sand and gravel lenses. It was deposited approximately 12,500 years ago. Based on cross-sectional geology, the Halton Till or equivalent is present beneath the Site with an average thickness of up to 9.0 m beneath the Site.

Oak Ridges Moraine: The Oak Ridges Moraine Aquifer Complex (ORAC) is a regionally significant aquifer in southern Ontario. The majority of the aquifer's recharge occurs at the crest of the moraine north of the Site. It is primarily composed of interbedded fine sand and silt deposits with localized coarse sand and gravel deposits. The ORAC is approximately 90 m thick beneath the crest of the moraine, but thins out rapidly towards the margins. Approximate average thickness of the ORAC could reach to 53 m beneath the Site.

Newmarket Till: The Newmarket Till is a regionally extensive till formation that acts as an aquitard. Based on the ORMGP cross-section, the Newmarket Till has an approximate average thickness less than a metre beneath the Site.

Thorncliffe Formation: The Thorncliffe Formation consists of glaciofluvial and glaciolacustrine sand and silt deposited approximately between 30,000 and 50,000 years ago. The Thorncliffe Formation shows a considerable variation in grain size and thickness, both locally and regionally. It acts as a regional aquifer. Based on the ORMGP cross-section, the Thorncliffe Formation has an approximate thickness of up to 15 m beneath the Site.

The underlying bedrock at the Site is the Queenston Formation, which consists of shale, limestone, dolostone and siltstone (OGS, 2007). A review of the ORMGP cross-section indicates that the bedrock could be contacted at the approximate 76 metres below ground surface (mbgs) beneath the Site.

5.2 Regional Physiography

The Site is located within Physiographic regions of Southern Ontario known as the South Slope. The South Slope within the vicinity of the Site comprises a Till Plains (Drumlinized).

The South Slope is the southern slope of the Oak Ridges Moraine, which includes a strip of south of the Peel Plain. It rises to the line of contact with the moraine at elevations ranging from 244.0 to 305.0 masl. The South Slope extends from the Niagara Escarpment to the Trent River where it covers an area of approximately 2,435.0 km². (Chapman and Putnam, 1984). **Figure 4** shows the location of the Site within the regional physiography map.

5.3 Regional Topography and Drainage

A review of a surface topography map for the Site and surrounding area indicates that the topography of the Site is relatively flat. The ground surface elevation ranges from 267.0 masl to 265.8 masl. Considering the topography map, ground surface elevation for the Site and the vicinity of the Site, slopes downwards in a southeasterly direction. As such, it is anticipated that generated runoff (if it is not managed) will flow in a southeast direction. **Figure 5** illustrates the topography of the Site and surrounding area.

5.4 Watershed Setting

TRCA interactive watershed mapping was reviewed. The Site is located within the Humber River watershed which falls within TRCA jurisdiction. The Humber River Watershed encompasses 911 km². Its waters, originating on the Niagara Escarpment and the Oak Ridges Moraine, flow down the Humber River into Lake Ontario. The West Humber begins in Caledon, in the rolling hills of the South Slope, and flows 45 km over the Peel Plain in Brampton before joining the Main Humber in Toronto (TRCA Humber River Watershed Menu, <https://trca.ca/conservation/watershed-management/humber-river/watershed-features/>).

5.5 Local Surface Water and Natural Heritage Features

The MNR's database was reviewed for any natural heritage features including, watercourses, bodies of water, wetland features, Area of Natural and Scientific Interest (ANSI) and wooded areas. **Figure 6** shows the location of the Site within the surrounding Natural Heritage Features. Record review indicates that there are no records for wetland features, and ANSI within or in close proximity to the Site. However, Lindsay creek, a tributary of West Humber River flows approximately 200 m away from the northeast corner of the Site. Additionally, a tributary originates northwest of the Site, flow southeast ward direction along the west boundary of the Site and crosses the Site at the southwest corner. This tributary joins Lindsay creek approximately 1.5 km to the southeast of the Site. A small pond is also located approximately 150 m to the northeast corner of the Site.

There are wetland features scattered around the Site with the closest record located approximately 100 to the northeast corner of the Site. This wetland is not evaluated as per Ontario Wetland Evaluation System (WES). Record review also indicates that a small pond is located approximately 120 m to the northeast corner of the Site.

Furthermore, records for wooded areas are scattered around the Site with the closest record located approximately 250 m to the west of the Site.

5.6 Groundwater Resources (MECP Well Records)

MECP well record database was reviewed on October 23, 2020 for records located within a radius of 500 m from the approximate Site boundary (Study Area). The location of the well records is presented on **Figure 7**. A total of ten (10) wells were located within the study area. A summary of data obtained from record review is presented in **Table 5-1** and **Appendix B**.

Table 5-1- MECP Well Record Summary

Number of the Well Records	10
Well Type	
Drilled Well	9 (90%)
Unknown	1 (10%)
Depth Ranges	
Less than 6.1 m (20 ft)	2 (20%)
6.1 m to 20 m (20 ft to 66 ft)	3 (30%)
Unknown	5 (50%)
Water Use	
Water Supply Wells	6 (60%)
Monitoring and Test Holes	2 (20%)
Observation Wells	1 (10%)
Unknown	1 (10%)
Reported Static Level	
0 to 7.5 m (0 to 25 ft)	3 (30%)
Unknown	7 (70%)

The above summary indicates that most local wells are registered as water supply wells. Approximately 50% of the registered wells are completed up to 20 m below ground surface (mbgs). Static groundwater level was unknown for the majority of the wells. It was recorded as shallower than 7.5 mbgs within three (3) of the wells. Additionally, since there are water supply wells within the Site and the Study Area, a door to door well survey is required in advance of, during and after construction. A private water supply well canvassing is completed for the Site with the findings can be reviewed in **Section 11**.

5.7 Active Permit to Take Water Application Records Review

The MECP's website was reviewed for any active PTTW application records within 1.0 km radius of the Site on October 21, 2020. Record review indicates there is one active PTTW within the Study Area as summarized in **Table 5-2**.

Table 5-2 - Active PTTW Record Summary

Permit Number	Permit Holder	Purpose	Maximum L/day	Source Type	Distance from the Site (km)
4405-BN7QWR	The Corporation of the Town of Caledon	Recreational	576,000	Groundwater	0.83

6.0 LOCAL GEOLOGY AND SUBSURFACE INVESTIGATION

Terraprobe conducted a geotechnical investigation in 2020 and 2021. The field work for the first investigation consisted of drilling a total of twelve (12) boreholes extending to a maximum depth of 8.1 mbgs. The field work for the second investigation completed in 2021 comprises drilling a total of seven (7) boreholes extending to a maximum depth of 6.6 mbgs. Information regarding borehole logs is presented in **Appendix A**. The approximate locations of boreholes are shown on **Figure 2**.

The following Site stratigraphy is based on the Terraprobe borehole findings in the field. It should be noted that the subsurface conditions are confirmed at the borehole location only, and may vary at other locations. The boundaries between the various strata represent an inferred transition rather than a precise plane of geological change. This summary is intended to correlate the data to assist in the interpretation of the subsurface conditions at the Site. For more specific subsurface details, refer to the enclosed Terraprobe Borehole Logs in **Appendix A**.

6.1 Topsoil

A topsoil layer was encountered at the ground surface in Boreholes 2 to 10 and 101 to 107. The thickness ranged from 200 to 300 mm. The topsoil was dark brown in colour and consisted of matrix of silt and sand.

The topsoil surficial layer thicknesses provided in the report were obtained at individual borehole locations, as measured through the collar of the open borehole or as inferred from non-continuous sampling. Thickness may vary between and beyond borehole locations.

6.2 Earth Fill

An earth fill zone, consisting of clayey silt with varying amounts of sand and trace amounts of gravel and organics was encountered at the ground surface in BHs 1, 11, and 12 and beneath the topsoil layer in BHs 3, 4, 6, 9, 10 and 101 to 105, and extended to depths varying from approximately 0.6 mbgs (BH 11) to 1.2 mbgs (BHs 1 and 12).

Standard Penetration Test (SPT) results (N-values) obtained from the earth fill zone ranged from 5 to 21 blows per 300 mm of penetration, indicating a firm to very stiff consistency, typically stiff. The in-situ moisture contents of the earth fill samples ranged from 10 to 22 percent by mass, indicating a moist condition.

6.3 Glacial Till

Silt and clay to clayey silt till deposit, with trace to some sand and trace amounts of gravel was encountered beneath the earth fill zone in BHs 1, 3, 4, 6, and 9 to 12, 101, 102, 103, 104 and 105, and the topsoil layer in BHs 2, 5, 7, 8, 106 and 107. It extended to the full depth of the investigation ranging from 2.0 mbgs (BHs 7 to 12) to 8.1 mbgs (BHs 1, 3, and 5). The upper zone of the glacial till deposit extending up to 0.8 mbgs was weathered and disturbed in BHs 2, 5, 6, 7, 106 and 107. The composition of the weathered and disturbed soil is generally similar to that of underlying undisturbed soil but included trace amounts of organic matter and topsoil.

The result of Standard Penetration Test (N-values) obtained from the undisturbed silt and clay to clayey silt till deposits indicates a stiff to hard consistency (typically very stiff to hard). The in-situ moisture contents of the silt and clay glacial till samples ranged from 9 to 22 percent by mass, indicating a moist condition.

It should be noted that the glacial till deposit may contain larger size particles (cobbles and boulders) that are not specifically identified in the boreholes. The size and distribution of such obstructions cannot be predicted with borings, because the borehole sampler size is insufficient to secure representative samples for the particles of this size.

6.4 Sand

A layer of sand deposit with some clay and silt was encountered sandwiched between the glacial till zone in BH 103. This layer was encountered at depth of about 2.3 mbgs and extended to the approximate depth of 3.0 mbgs.

The result of Standard Penetration Test (N-value) obtained from the sand zone was 39 blows per 300 mm of penetration, indicating a dense relative density. The in-situ moisture content of the sand soil sample was 14 percent by mass, indicating a moist condition.

7.0 LOCAL HYDROGEOLOGICAL STUDY

7.1 Groundwater Level Monitoring

A groundwater monitoring program was completed between October 5 and October 20, 2020 in the previously installed monitoring wells. The monitoring program was also completed between November 19 and December 18, 2021 in all the existing and newly installed monitoring wells over three (3) monitoring events.

Monitoring wells were developed and the groundwater levels were measured using an interface probe (Solinst Interface Metre, Model 122). The measured groundwater levels, along with other monitoring wells' details and findings, are presented in **Appendix C**. A summary of the groundwater observations is provided in **Table 7-1**:

Table 7-1– Static Groundwater Level Monitoring

Well ID		October 5, 2020	October 13, 2020	October 20, 2020	November 19, 2021	December 1, 2021	December 13, 2021
BH1	mbgs	0.95	5.73	5.00	2.37	2.64	2.90
	masl	265.82	261.04	261.77	264.40	264.13	263.87
BH3	mbgs	3.13	3.70	2.34	2.60	2.58	2.57
	masl	263.19	262.62	263.98	263.72	263.74	263.75
BH5	mbgs	2.33	3.72	2.11	4.18	4.24	4.29
	masl	264.10	262.71	264.32	262.25	262.19	262.14
BH101	mbgs	MWNI	MWNI	MWNI	1.77	0.69	0.70
	masl				265.29	266.37	266.36
BH103	mbgs	MWNI	MWNI	MWNI	0.69	0.62	0.38
	masl				265.88	265.95	266.19
BH104	mbgs	MWNI	MWNI	MWNI	Dry	5.87	5.69
	masl				Dry	260.37	260.55
BH106	mbgs	MWNI	MWNI	MWNI	2.85	1.67	1.29
	masl				262.37	263.55	263.93
BH107	mbgs	MWNI	MWNI	MWNI	2.81	2.76	2.50
	masl				262.80	262.85	263.11

Notes: mbgs: metres below ground surface
masl: metres above sea level
MENI: Monitoring Well Not Installed

As shown in **Table 7-1**, the highest and lowest stabilized shallow groundwater levels were measured at El. 266.37 masl and 260.37 masl at monitoring wells BH101 and BH104, respectively.

In addition, the highest groundwater fluctuation of 3.36 m was measured at monitoring well BH1. The lowest fluctuation of 0.01 m was recorded at monitoring well BH101 location over the monitoring period.

7.2 Shallow Groundwater Flow Pattern

Groundwater level elevations measured on December 13, 2021 were considered to interpret the shallow groundwater flow pattern beneath the Site. **Figure 8** presents the interpreted shallow groundwater elevation contours. A review of the plan indicates that the shallow groundwater is interpreted flowing the southeast direction, in general, towards the Lindsay Creek.

7.3 Hydraulic Conductivity Testing

7.3.1 In-Situ Hydraulic Conductivity Tests

The hydraulic conductivities from the monitoring wells were determined based on a falling head single well response test (SWRT). The falling head test involves the submersion of a one metre long slug thereby increasing the water level and then monitoring the water level in the well until the well has recovered. The results of the SWRT were analysed using the Bouwer and Rice method (1976). The results of the analysis are presented in **Appendix D**, with a summary of the findings provided in **Table 7-2** below:

Table 7-2– Hydraulic Conductivity Based on Rising Head Tests

Monitoring Well	Well Screen Elevation (masl)	Screened Geological Unit	Hydraulic Conductivity (m/s)	Test Method
BH1	259.2 to 262.2	Silt and Clay to Clayey Silt Till	4.25×10^{-9}	Falling Head Test
BH3	258.7 to 261.7	Silt and Clay to Clayey Silt Till	1.08×10^{-6}	Falling Head Test
BH5	258.8 to 261.8	Silt and Clay to Clayey Silt Till	3.22×10^{-7}	Falling Head Test
BH101	264.0 to 261.0	Silt and Clay to Clayey Silt Till	6.46×10^{-8}	Falling Head Test
BH103	263.5 to 260.5	Silt and Clay to Clayey Silt Till	5.00×10^{-7}	Falling Head Test
BH104	263.1 to 260.1	Silt and Clay to Clayey Silt Till	7.32×10^{-8}	Falling Head Test
BH106	262.1 to 259.1	Silt and Clay to Clayey Silt Till	6.05×10^{-8}	Falling Head Test

The estimated hydraulic conductivity varies at different locations, which is mostly related to appearance and thickness of the sand seams and layers contacted along the monitoring wells screens. As such, geomean hydraulic conductivity is calculated as 1.11×10^{-7} m/s.

7.3.2 Hydraulic Conductivity Test Using Grain Size Distribution Graphs

The Hazen Equation method is adopted to estimate the hydraulic conductivity (K) for different soil layers which may contain groundwater during the seasonal high groundwater table (spring) period, or if they are not encountered within the screen intervals.

The Hazen Equation estimate provides an indication of the groundwater yield capacity for saturated soil strata at the depths where soils samples were selected for grain size analysis. The grain size distribution graphs were used to estimate the hydraulic conductivity, with the details presented in **Appendix E**. A review of the graphs indicates significant amount of clay and silt suggesting a very low hydraulic conductivity. However, due to

significant amount of clay and silt, values for hydraulic conductivity with acceptable accuracy cannot be estimated.

7.4 Groundwater Quality

One (1) unfiltered groundwater sample was collected by Terraprobe. The sample was collected directly from monitoring well BH3 on October 13, 2020.

BH3 was developed and one (1) set of unfiltered groundwater samples was collected. Upon sampling, all of the bottles were placed in ice and packed in a cooler at about 0.3° C for shipment to the analytical laboratory. Sample analysis was performed by ALS Canada Inc., a third party laboratory accredited by the Canadian Association for Laboratory Accreditation (CALA).

The groundwater quality test results and the certificate of analysis are presented in **Appendix F**. The samples were compared to the following:

- The Regional Municipality of Peel By-Law No. 2-03 Table 1 – Limits for Sanitary and Combined Sewers Discharge
- The Regional Municipality of Peel By-Law No. 2-03 Section 5 – Storm Sewer Requirements

The exceedances, together with the storm and sanitary criteria, are presented in **Table 7-3**.

Table 7-3 - Exceedance Table and Groundwater Quality Results

Parameter	BH3 Groundwater Quality Results (mg/L)	Region of Peel Sanitary Sewer Use Limits (mg/L)	Region of Peel Storm Sewer Use Limits (mg/L)	Lowest Detection Limit (mg/L)
Total Suspended Solids (TSS)	164.0	350	15	3.0
Fecal Coliforms	200	-	0	10

As shown above, exceedances were recorded for groundwater samples in comparison with the Regional Municipality of Peel Storm Sewer By-Law. A review of the results shows that groundwater quality at monitoring well BH3 exceeds for Total Suspended Solids (TSS) and Fecal Coliform in comparison to the Regional Municipality of Peel Storm Sewer By-Law Limits. The results review indicates that there are no exceedances for all parameters compared to the Regional Municipality of Peel Sanitary Sewer By-Law Limits at BH3.

A review of the groundwater quality results suggests that short-term dewatering discharge could be directed to the Regional Municipality of Peel Sanitary sewer system. Furthermore, pre-treatment should be considered to treat the elevated parameters noted above, if discharged groundwater is proposed to be directed to the Region’s Storm Sewer System. Alternatively, dewatering effluent could be hauled and disposed using a licenced contractor.

Pre-treatment to lower TSS could involve use of settling weir tanks and/or filter bags during construction. The final design for any dewatering effluent pre-treatment system is the responsibility of the contractors undertaking construction.

8.0 CONSTRUCTION DEWATERING

8.1 Proposed Development Plan Review

The proposed development site plan, illustrated in **Appendix G**, prepared by Battaglia Architect Inc. dated November 9, 2020 (revised plan) was reviewed for the current assessment. The proposed development will consist of constructing a one-storey religious temple with no basement level. The lowest ground floor elevation (finished floor elevation) which is reported on the above mentioned plan is 267.531 masl. The approximate plan dimension of the building is 102.3 metres by 95.5 metres. Additionally, a SWM facility and a septic bed are proposed for future development.

8.2 A review of Geotechnical Investigation Report

A separate geotechnical report has been prepared by Terraprobe for this Site, which outlines in greater detail the proposed construction, shoring and foundation methodology (File. No. 1-20-0222-02). A summary of findings are presented as follows:

- The undisturbed silt and clay to clayey silt till deposit is considered suitable to support the proposed building foundations. A maximum net geotechnical reaction of 250 kPa (Serviceability Limit States, SLS) and a maximum factored geotechnical resistance of 375 kPa (Ultimate Limit States, ULS) may be used for preliminary design of conventional spread footing foundations (for vertical and concentric loads) supported on the underlying competent undisturbed silt and clay to clayey silt till deposit of very stiff to hard consistency.
- The minimum width of the continuous strip footings must be 450 mm and the minimum footing area for column must be 0.9×0.9 m² regardless of loading considerations, in conjunction with the above recommended geotechnical resistance.
- The underside of footing elevations must be designed to provide a minimum of 1.2 m of soil cover or equivalent insulation to the foundation subgrade for frost protection considerations in unheated areas. All footings must be designed to bear at least 0.3 m into the undisturbed silt and clay to clayey silt till stratum.
- The isolated footings must be supported entirely either on the competent native soils or engineered fill and cannot be supported partially on engineered fill and partially on native soils.
- The site grades will be raised in some areas of the building footprint. Where site grades are required to be raised, consideration should be given to the construction of engineered fill which may also support building foundations at normal depths, if needed.
- Prior to the placement of the engineered fill, it is recommended that the topsoil, weathered /disturbed native soils be stripped from beneath and beyond the proposed building footprints (a minimum of 2 m beyond), and that the subgrade be proof rolled.

- The earth fill and weathered/disturbed soil would be classified as Type 3 Soil while the native glacial till deposits would be classified as Types 2 Soil above and Type 3 Soil below prevailing groundwater level under these regulations.
- Minimum support system requirements for steeper excavations are stipulated in the Occupational Health and Safety Act and Regulations for Construction Projects, and include provisions for timbering, shoring and moveable trench boxes.
- Provided the finish floor level of the slab-on-grade building is at least 200 mm above the outside design grade, and the site is graded to promote drainage away from the building; subfloor drainage provisions are not required.

8.3 Summary of Hydrogeological Conditions of Site Development

The results of the investigation completed by Terraprobe indicate the following hydrogeologic features for the Site:

- Underlying the fill, native deposits mainly comprise glacial till (silt and clay to clayey silt).
- The shallow groundwater table for design purposes should be considered to be at El. 266.37 ± masl measured at BH101 located within the proposed building footprint.
- The estimated hydraulic conductivity of 1.11×10^{-7} m/s (geomean from the in-situ hydraulic conductivity measured in the monitoring wells) is considered for the clayey silt till unit, respectively.

8.4 Short-Term Groundwater Control Requirements

8.4.1 Proposed Development

Proposed Building: A review of the current development plans indicates that a one-storey temple building with no underground structure (basement) is proposed as the future development. The assumptions considered for the dewatering flow rate calculations are summarized in **Table 8-1** below.

Table 8-1- Summary of Proposed Building Details

Proposed Development Phase	Approximate Proposed Width (m)	Approximate Proposed Length (m)	Proposed Finished Floor Elevation (masl)	Foundation Elevation (masl)	Maximum Base of Excavation for Engineer Fill Replacement (masl)	Shallow Groundwater Level (masl)
Temple Building	95.5	102.3	267.53	266.33*	265	266.37

Notes:

mbgs metres below ground surface

masl metres above sea level

*1.2 m below the proposed FFE within the engineered fill material.

The lowest ground floor elevation (finished floor elevation) is proposed at 267.53 masl, which is 1.16 metres above the groundwater level measured at El. 266.37 masl.

As recommended by the geotechnical investigation report, the underside of footing elevations must be designed to provide a minimum of 1.2 m of soil cover or equivalent insulation to the foundation subgrade for frost

protection considerations in unheated areas. It is also recommended that the foundation bear at least 0.3 m into the undisturbed silt and clay to clayey silt till stratum. As such, it is assumed that the foundation will be constructed at El. 266.3 masl within the engineered fill material. Additionally, based on the geotechnical investigation report, prior to the placement of the engineered fill to raise the site grades, it is recommended that the topsoil, weathered /disturbed native soils be stripped from beneath and beyond the proposed building footprints. Base of the fill material within the footprint of the proposed building ranges between El. 265.0 and 266.5 masl at BH10 and BH11, respectively.

The highest known stabilized groundwater level is recorded at 266.37 masl at monitoring well BH101. As such, shallow groundwater level should be lowered below the base of excavation for replacing the existing fill material with the engineered fill and the base of the proposed foundations.

Proposed Underground Sewer: A review of the proposed servicing plan indicates that the invert elevations for construction of the proposed sewer alignment within the west portion of the Site (south of the proposed building) ranges between El. 265.60 and 266.04 masl. The proposed alignment is proposed below the highest shallow groundwater table 266.37 masl. As such, groundwater seepage is anticipated during the excavation and construction of the proposed underground sewer alignment. The assumptions considered for the dewatering flow rate calculations are summarized in **Table 8-2** below.

Table 8-2- Summary of Proposed Sewer Alignment details

Proposed Development Phase	Assumed Width (m)	Assumed Length (m)*	Proposed deepest Invert Elevation (masl)	Shallow Groundwater Level (masl)
Proposed Sewer	5.0	50	265.6	266.37

Notes:

mbgs metres below ground surface

masl metres above sea level

*Length of the proposed Sewer Alignment is not available. As such, 50 m was considered for the length of trench excavation per day.

Proposed Stormwater Management Facility: A review of the proposed servicing plan indicates that a SWM facility, 36 m x 66 m, is proposed within the southwest corner of the Site. The base of the SWM facility is proposed between El. 263.95 and 264.05 masl. The structure is proposed below the highest shallow groundwater table 266.37 masl. As such, groundwater seepage is anticipated during the excavation and construction of the proposed SWM facility. The assumptions considered for the dewatering flow rate calculations are summarized in **Table 8-3** below.

Table 8-3- Summary of Proposed SWM Facility details

Proposed Development Phase	Assumed Width (m)	Assumed Length (m)	Proposed deepest Invert Elevation (masl)	Shallow Groundwater Level (masl)
Proposed SWM Facility	36	66	263.95	266.37

Notes:

mbgs metres below ground surface

masl metres above sea level

8.4.2 Dewatering Calculation

Dewatering calculations were completed based on the assumption of radial flow towards a trench, as provided in Powers et al. (2007). For the purposes of this analysis, steady state flow into an open cut excavation is assumed in addition to the following assumptions:

- Ideal aquifer conditions (homogeneous, isotropic, uniform thickness and has infinite areal extent);
- Dewatering will fully penetrate target aquifer;
- Only uniform lateral flow towards open excavations; and;
- Constant pumping rate with the flow to open excavations reaching steady state.

The following equation was used to compute the dewatering rates required for the proposed manholes and catch basins and is based on unconfined aquifer conditions:

$$Q = \frac{\pi K (H^2 - h^2)}{\ln(R_0 / r_s)} + 2 \left[\frac{xK (H^2 - h^2)}{2L} \right]$$

Where;

- Q = Anticipated pumping rate (m³/day)
K = Hydraulic conductivity (m/day)
H = Distance from initial static water level to bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
R₀ = Distance from the point of greatest drawdown to the point of zero drawdown (radius of influence) (m)
L = Distance from a line source to the trench (m)
r_s = Equivalent radius of the excavation (m). The equivalent radius was estimated as an imaginary dewatering well with a radius that will produce an equivalent area of the excavation; calculated as follows:

$$r_s = \sqrt{\frac{ab}{\pi}}$$

Where;

- a = Length of the excavation
b = Width of the excavation

8.4.2.1 Zone of Influence

An estimate of the Zone of Influence (ZOI) for dewatering excavations in unconfined aquifers was calculated using the following equation (Bear, 1979):

$$R_0 = 2.45 \sqrt{\frac{HK}{S_y} t}$$

Where;

- R_0 = Zone of Influence (m), beyond which there is negligible drawdown
 H = Distance from initial static water level to bottom of saturated aquifer (m)
 S_y = Specific yield of the aquifer formation (based on Johnson (1967))
 t = Time, in seconds, required to draw the static groundwater level to the desired level (assumed to be equivalent to 14 days)
 K = Hydraulic Conductivity (m/s)

A summary of dewatering calculations is presented in **Table 8-4** below and **Appendix G**.

Table 8-4- Groundwater Seepage Flow Rate Summary

Dewatering Alignment	H (m)	h (m)	K (m/s)	rs (m)	Zone of Influence R_0 (m)	Pumping Rate (m ³ /day)(1.5 S.F.)*
Proposed Building	2.9	0.5	1.11×10^{-7}	55.8	6.2	3.62
Proposed Sewer Alignment**	2.4	0.6	1.11×10^{-7}	8.9	5.6	0.83
Proposed SWM Facility	4.4	0.9	1.11×10^{-7}	27.5	7.6	3.85
Total 8.3 m³/day (8,300 L/day)						

*S.F.-Safety Factor

**50 m length of the trench

Dewatering should be designed to take into account removal of rainfall from the excavation. Given the excavation dimensions, control of precipitation runoff to open excavations for a 25 mm storm event for the proposed underground servicing alignments have been evaluated and are summarized in **Table 8-5** and presented in **Appendix G**.

Table 8-5- Total Dewatering Flow Rate Summary

Dewatering Alignment	Excavation Dimensions (m)	Groundwater Seepage (L/day)(1.5 S.F.)	Flow over Storm Event (L/day)	Total Dewatering Flow Rate (L/day)
Proposed Building	102.3 x 95.5	3,620	244,500	248,120
Proposed Sewer Alignment**	50 x 5	830	6,500	7,330
Proposed SWM Facility	66 x 36	3,850	59,500	63,350
Total: 318,800 L/day				

**50 m length of the trench

It is expected that dewatering for servicing installations can be carried out through the placement of filtered sumps along the base of open excavations. If excavation walls are properly graded, it is expected that dewatering from the base of excavations would not result in unstable excavation walls. Pumping from a series of well points or depressurizations wells is not expected to be required.

8.5 Long-Term Groundwater Control Requirements (Post Construction)

A slab-on-grade building is proposed for the future development, where the building will be constructed above shallow groundwater level. A review of the geotechnical investigation report is also states that subfloor drainage provisions are not required. As such, discharge plan for long-term foundation drainage is not required for the post development structure.

8.6 Permit Requirements

Short-Term Dewatering: Considering the estimated total short-term (construction) dewatering flow rate of 318,800 L/day from precipitation and groundwater seepage, is above the lower limit of EASR. As such, filing EASR with MECP is required for short-term construction dewatering control.

As per the communication with the Office of General Manager, Water and Wastewater, Regional Municipality of Peel, there is no water and sanitary sewer infrastructure in the vicinity of the Site. The generated discharge water could be managed by the private hauler or any other available option. The final decision will be the responsibility of the construction contractor.

Long-Term Foundation Drainage: There is no estimated long-term foundation drainage flow rate. As such, applying for PTTW with MECP is not required for the long-term (post construction) foundation drainage.

8.7 Potential Dewatering Impacts and Mitigation Plan

8.7.1 Ground Settlement

The conceptual ZOI for dewatering reaches up to 6.2, 5.6, and 7.6 m away from dewatering area during excavation and construction of the proposed building, sewer alignment (assuming 50 m length) and SWM facility, respectively. There are no structures within the conceptual ZOI for dewatering. As such, impact of the potential ground settlement is negligible.

8.7.2 Surface Water, Wetlands and Areas of Natural Significance

Record review indicates that no natural heritage features including wetland, water bodies, watercourses and ANSI were identified on the Site. However, there is a creek in close proximity to the southwest corner of the Site, where the SWM facility is proposed. The creek may locate within the ZOI for dewatering for construction of the proposed SWM facility.

Based on regional-scale source protection mapping, the Site is not located within a WHPA area, Intake Protection Zone, Issue Contributing Area, Event Based Area and Highly Vulnerable Aquifer. However, it is located in SGRA having a score of 4. Considering the location of the Site within the area regulated by TRCA, obtaining permit from TRCA is required.

8.7.3 Water Supply Wells and Zone of Influence

A review of the MECP well records confirmed that there are 6 records for active water supply wells within 500 m of the Site. A door-to-door water supply well canvassing is completed for the Site, with the findings are presented in **Section 11** of the current report. There is an existing water supply well at the Site. The existing water supply well at the Site should be decommissioned if it is not required for the post-development Site. If the well is required, a monitoring program should be considered to monitor the groundwater quality and quantity on the well, in advance of, during and after construction.

8.7.4 Contamination Sources

Terraprobe is not aware of any Environmental Site Assessment (ESA) completed for the Site. If additional information is required for environmental purposes, a Phase One Environmental Site Assessment (ESA) and possibly a Phase Two ESA should be conducted.

9.0 PRE AND POST DEVELOPMENT WATER BALANCE

As a part of the hydrogeological assessment, a pre- and post-development water balance analyses were completed to compare pre-development and post-development hydrological conditions to evaluate potential changes in recharge and runoff volumes due to the proposed development.

The discussion below provides details on the methodology used and the results obtained from the analysis. A summary of the calculations is provided in **Appendix H**.

9.1 Site Water Balance Components

A Site scale water balance analysis was completed following the Toronto and Region Source Protection Authority (TRSPA) tool provided by TRCA. The water balance method roughly estimates annual evapotranspiration, infiltration and runoff volumes. The modified water balance components were used for the pre- and post-development water balance analyses. **Table 9-1** summarizes the details for the water balance parameters adopted from TRSP tool.

Table 9-1- Summary of Water Balance Components

Precipitation (mm/year)	Evapotranspiration (mm/year)	Infiltration (mm/year)	Runoff (mm/year)
874	514	241	119

9.1.1 Methodology

A Site scale water balance analysis was completed in order to estimate the components of the hydrologic cycle for the Site, and was modelled using the following equation:

$$P = DGS + ET + R + I$$

Where:

P= Precipitation, which represents the sum of all rainfall and snowfall

DGS=Change in groundwater storage

ET= Evapotranspiration

R= Runoff

I= Infiltration

Based on the TRCA tool; (<https://trca.ca/conservation/drinking-water-source-protection/trspa-water-balance-tool/>), evapotranspiration in pervious areas at the Site is 514 mm/yr, runoff is 119 mm/yr and infiltration (groundwater recharge) is 241 mm/yr.

Although groundwater storage experiences both gains and losses on a short-term basis, the net change in groundwater storage (DGS) over the long-term is generally zero. For this reason, the change in groundwater storage (zero (0)) has not been included in the water balance calculations.

Evapotranspiration (ET) refers to the transfer of water from vegetation and the soil surface to the atmosphere in the form of water vapour. The term considers evaporation from the soil surface and from man-made surfaces together with transpiration from plants.

9.2 Site Water Balance

Water balance analyses were completed for pre-development and post-development conditions, separately with the details presented below:

9.2.1 Pre-Development Water Balance

The Site is a mixed used agricultural and residential property and associated driveway and sheds. The pre-development water balance for the Site is calculated by multiplying the existing breakdown areas at the Site by the various, averaged annualized depth estimates for precipitation, ET, infiltration and runoff. Area of the existing structures within the Site were estimated using the available interactive maps. The average annual area-based estimates for each water balance component are summarized in **Table 9-2**.

Table 9-2 - Summary of Pre-Development Volumetric Water Balance Components

Pre-Development Site Breakdown Areas	Coverage Area (m ²)	Precipitation (m ³ /year)	Evapotranspiration (m ³ /year)	Infiltration (m ³ /year)	Run off (m ³ /year)
Existing house, driveway and sheds	897	784	78	0	706
Agricultural Land and Grass covered Area	59,693	52,172	30,663	14,408	7,101
Total	60,590	52,956	30,741	14,408	7,807

9.2.2 Post-Development Water Balance

Based on the Site Plan provided by Battaglia Architect Inc. (**Appendix I**) and an email received on November 9, 2020 the total Site area is 60,590 m². Plan review indicates that a total of 17,808 m² is considered as buildings, 10,658 m² as paved area and 32,124 m² as landscaped area.

The post-development water balance is calculated using the same depth based components that were used for the pre-development water balance calculations, i.e., average annual precipitation and average annual ET. The estimates for runoff and ET for existing pervious surfaces are 90% and 10% of the average annual precipitation, respectively. The estimated post-development water balance volumes are provided in **Table 9-3**.

Table 9-3 - Summary of Post-Development Volumetric Water Balance Components

Post-Development Site Breakdown Areas	Coverage Area (m ²)	Precipitation (m ³ /year)	Evapotranspiration (m ³ /year)	Infiltration (m ³ /year)	Run off (m ³ /year)
Proposed Buildings (Roof Top Area)	17,808	15,564	1,556	0.0	14,008
Proposed Paved Areas	10,658	9,315	932	0.0	8,383
Proposed Landscaped and open Area	32,124	28,077	16,501	7,754	3,822
Total	60,590	52,956	18,989	7,754	26,213

9.3 Water Balance Analysis Results

The volumetric comparisons in evapotranspiration, infiltration and runoff between the pre-developed and post-developed Site are summarized in **Table 9-4**.

Table 9-4 - Pre- and Post-Development Volumetric Water Balance Components

Pre-Development Site Breakdown Areas	Precipitation (m ³ /year)	Evapotranspiration (m ³ /year)	Infiltration (m ³ /year)	Run off (m ³ /year)
Pre-Development	52,956	30,741	14,408	7,807
Post-Development	52,956	18,989	7,754	26,213
Loss (-) and Gain (+)	-	-11,752	-6,654	+18,406

A review of the findings indicates a total decrease of 11,752 m³/year and 6,654 m³/year for ET and infiltration, respectively, and an increase of 18,406 m³/year for runoff are expected for the post-development Site. Low Impact Development (LID) measures such as infiltration trenches and permeable pavements could be considered to partially manage the generated runoff. Remaining volume can be discharged to the Regional Municipality of Peel storm sewer system or overland. It is assumed that details will be provided in the Stormwater Management report for the development.

Based on Table 3.5.1 of Low Impact Development Stormwater Management Planning and Design Guide, issued by TRCA dated January 2010, 1.0 m interval should be considered between base of the proposed LID measures and groundwater level. Additionally, percolation rate of the soil, where the LID measures are proposed, should be confirmed using in-situ percolation testing techniques.

10.0 CONTAMINANT ATTENUATION ASSESSMENT

It is understood that an on-site sewage system is proposed as a part of future development. As such, nitrate loading impact assessment is completed with respect to the proposed septic system.

10.1 Sewage System Design for Proposed Development

Based on review of a preliminary servicing plan (drawing C102), prepared by Crozier Consulting Engineers dated December 23, 2020 it is understood that a septic system including disposal area and sewage tank is proposed within the east/southeastern portion of the Site. Plan review indicates that the approximate width and the length of 50 and 75 m are proposed as dimensions of the proposed disposal bed, respectively. As such, a disposal bed with a total area of 3,750 m² was considered for the current assessment. The location of the proposed septic bed is presented in **Appendix G**.

Based on an email received from Crozier Consulting Engineers, dated January 12, 2022, it is understood the anticipated daily discharge flow to the septic bed based on Class 4 sewage system design as per OBC i.e tank/leaching bed system is proposed as approximately 15,000 L/day.

Considering the proposed discharge rate that is greater than 10,000 L/day, Chapter 22 of the former Ministry of Environment (MOE) Design Guideline for Sewage Works was used for the current assessment. The guideline is provided for Large Subsurface Sewage Disposal Systems (LSSDS). The following sections are prepared to satisfy the above mentioned guideline.

10.2 Subsoil Profile and Percolation Rate

As per Section 22.4 of Chapter 22 Guideline, subsoil profile at the Site and the septic bed location should be evaluated using boreholes and test pits. The investigation should extend a minimum of 0.9 m below the proposed base of the septic bed.

As previously mentioned, subsoil at the Site and the proposed septic bed location is investigated by drilling 19 boreholes scattered across the Site, of which one (1) borehole (BH104) was drilled within the proposed disposal bed footprint and one (1) borehole was advanced in close proximity to the proposed disposal bed at a depth of 6.6 mbgs (BH107). A review of the findings indicates that beneath the topsoil, fill material or weathered soil the native soil comprises silt and clay to clayey silt till deposits (glacial till). Additionally, an interbedded sand layer was contacted at BH103 location drilled within the west portion of the Site. A review of a borehole drilled within proposed disposal bed footprint (BH104) indicates that glacial till (silt and clay to clayey silt till) was contacted approximately 0.8 mbgs beneath the fill material extending to termination depth of investigation at 6.6 mbgs.

The percolation rate of the soil was confirmed by T-Time testing completed on one (1) selected soil sample retrieved from depth of 0.76 mbgs at borehole BH104 location. A review of the findings confirms the estimated percolation rate of 45 min/cm for the retrieved soil sample. As such, anticipated infiltration rate of 13.3 mm/h, and K_{fs} of 9.5×10^{-7} cm/sec is expected for the soil samples collected from a depth of 0.76 mbgs resp. **Appendix I** presents the results of the T-Time tests.

10.3 Assessment of Impact on Water Resource

As per Section 22.5 of Chapter 22 Guideline, a nitrate loading impact assessment should be completed based on the ministry Guideline B-7, incorporation of the Reasonable Use Concept into the former Ministry of Energy and Environment (MOEE) Groundwater Management Activities and Procedure B-7-1, Determination of Contaminant Limits and Attenuation Zones. These are commonly referred to as the “Reasonable Use Guideline”.

A nitrate loading impact assessment was conducted for nitrate to determine the anticipated concentration that can be predicted at the hydraulically down-gradient Site boundary based on the establishment of an on-site septic sewage system to service the proposed buildings. The assessment assumes natural attenuation for nitrate in shallow groundwater through dilution and from the input of precipitation recharge to the groundwater level and from sewage system loading as a result of the proposed established institutional development.

10.3.1 Reasonable Use Criteria

Nitrate-nitrogen is the critical contaminant in this model which is considered a conservative anion as it is not adsorbed by soil in the subsurface, nor does it degrade quickly in a groundwater environment. The maximum permitted nitrate level at the hydraulically down-gradient property boundary is 10 mg/L (based on the Ontario Drinking Water Objectives for nitrate).

One (1) groundwater sample was collected from monitoring well BH107 located within the close proximity of the proposed septic bed. The groundwater sample was collected on December 1, 2021. Upon sampling, all of the bottles were placed in ice and packed in a cooler at about 5.0° C for shipment to the analytical laboratory. Sample analysis was performed by SGS, a third party laboratory accredited by the Canadian Association for Laboratory Accreditation (CALA). The results are presented in **Appendix F**.

The background concentration for nitrate adopted from the Site’s expected hydraulically down-gradient location is less than 0.06 mg/L at monitoring well BH107 location. The background nitrate concentration in groundwater was incorporated into the nitrate loading assessment as an addition to the modelled concentration for predicted nitrate based on the Chapter 22 of former MOE Guideline. As per procedure B-7-1:

$$C_m = C_b + x (C_r - C_b)$$

Where:

C_m: Maximum Concentration of Nitrate (mg/L)

C_b: Background Concentration 0.06 mg/L

C_r: Reasonable Standard Concentration 10 mg/L

X: Health Related Parametere for Nitrate (0.25 as per former MOE procedure B-7-1)

Considering the procedure B-7-1 maximum background concentration (C_m) 2.55 mg/L was calculated for the proposed septic bed.

10.3.2 Prediction of Contaminant Attenuation

The proposed septic bed is proposed within the east/southeast portion of the Site. Considering the interpreted shallow groundwater flow pattern (Figure 8) groundwater flows southeasterly direction. The total area of the leaching bed and area located within the down-gradient of the septic bed is estimated approximately 6,678 m² as per an email received from Crozier Consulting Engineers on May 19, 2022, which was considered to be available for dilution (preliminary servicing plan, drawing C102 (**Appendix G**)). Using the calculated maximum nitrate background and a review of the Section 22.5.8 of Chapter 22 Guideline concentration of nitrate at the septic bed is calculated as below:

$$V_A = A_D \times K$$

Where:

V_A: Annual Dilution Volume 1,669.4 m³

A_D: Dilution Area 6,677.5 m²

K: 0.25 (m/a) of water per year over the area of the contaminant plume

Based on the above equation an annual volume of 1,669.4 m³ was calculated for dilution. Annual sewage flow rate of 5,475 m³ was estimated based on the proposed daily flow rate of 15.0 m³. As such total volume of water was calculated using the below equation provided in Section 22.5.8 of Chapter 22 Guideline:

$$V_T = V_A + V_S$$

Where:

V_T: Total Volume of Water 7,144.4 m³

V_A: Annual Dilution Volume 1,669.4 m³

V_S: Annual Sewage Volume of 5,475 m³

It is anticipated that total volume of water including annual anticipated dilution and annual sewage volume reaches 7,144.4 m³.

Using the estimated total volume, annual sewage volume and concentration of the nitrate at Site boundary (which is one quarter of the maximum allowable limit of 10 mg/L), the anticipated concentration for the sewage at the septic bed was calculated using the below equation:

$$C_{PB} = (C_S \times V_S) / V_T$$

Where:

V_T: Total Volume of Water 7,144.4 m³

V_S: Annual Sewage Volume of 5,475 m³

C_{PB}: Concentration at Property Boundary 2.5 mg/L

C_S: Concentration at Sewage 3.26 mg/L

10.4 Other Water Quality Impacts to Groundwater Resources

Consideration was also provided for the potential attenuation of phosphorus, ammonia and microbial pathogens. As noted in the former MOE Sewage Design Guideline for Sewage Works (2008) many geological materials have a high capacity to attenuate phosphorus by precipitation in the unsaturated zone and by adsorption below the water table. Environments including fractured bedrock or in area of thin overburden deposits phosphorus attenuation may be quite low. The subsoil investigation completed at the Site confirms that the overburden thickness is more than 8.1 m. Additionally, a review of ORMGP cross-sectional tool indicates that the thickness of overburden comprising Halton Till, ORM Formation, Newmarket Till and Thorncliffe Formation is approximately 76 m. The background concentration of Total Phosphorus (TP), measured in monitoring well BH107, is less than 0.03 mg/L. Record review indicates that a water supply well is located approximately 300 m to the down-gradient of the proposed septic bed location (Record No. 10 on Figure 7 and Appendix B). Record review also indicates that there are no records for surface water in close proximity to the proposed septic bed location. Considering the distance to potential down-gradient receptors it is anticipated that phosphorus attenuation will be high.

Un-ionized ammonia was also considered as a concern in cases where anaerobic conditions are maintained between the sewage system and the receiving surface water feature. It is expected that an unsaturated zone exists underlying the proposed sewage disposal beds to allow for the conversion of ammonium to nitrate. Ammonium concentrations are not expected to be a concern for down-gradient surface water features.

The background concentration of TKN in groundwater was measured less than 0.5 mg/L in monitoring well BH107 located within close proximity to the septic bed.

Potential impacts to groundwater as a result of microbial pathogens from the sewage effluent were also considered. A risk of contamination from microbial pathogens exists within areas where high rates of groundwater flow are expected including coarsely textured soils or fractured or karstic bedrock environments. It is expected that the Site will have sufficient vertical separation from underlying groundwater and horizontal separation from potential down-gradient receptors (i.e. property boundary and surface water features) that microbial pathogens in effluent is not expected to pose a risk to underlying groundwater resources.

Based on an email received from Crozier Consulting Engineers, dated January 12, 2022, it is understood the leaching bed will be constructed as a fill-based system, raised approximately 1 m above the existing grade. Since, the anticipated percolation rate of the engineered fill was not available at the time of preparation of the report, travel time for sewage effluent to reach to the down-gradient Site limits cannot be estimated.

10.5 Sewer Setback Requirements

It is understood that the proposed septic bed is design based on Class 4 sewage system design as per OBC. A review of the Ontario Building Code Section 8.2.1.6 “Clearances for a Class 4 or 5 Sewage System” indicates minimum clearances for treatment units and distribution pipe from structures, groundwater users and water resources. A summary of the clearances is presented in **Table 10-1**.

Table 10-1- Summary of the Clearances

Object	Minimum Clearances (m) of Treatment Units	Minimum Clearances (m) of Distribution Pipe
Structure	1.5	5
Well	15	-
Lake, Pond, River, Spring, Stream	15	15
Reservoir	15	15
Property line	3	3
Well with a watertight casing to a depth of at least 6 m	-	15
Any other well	-	30

10.6 Proposed Monitoring Program

The purpose of a monitoring program is to ensure the functionality of subsurface sewage disposal beds in operation at the Site and allow for the assessment of potential impacts to the natural environment. Based on the distance to potential down-gradient receptors, minor impacts to groundwater and surface water resources are anticipated. As such, a monitoring program for sewage disposal system at the Site is recommended.

A schedule of regular system maintenance shall be maintained. Records of system maintenance should be maintained at the Site by the owner. Regular maintenance is to be completed to ensure the proper working of sewage disposal systems in operation and to limit the occurrence of a tile bed failure.

11.0 SUMMARY OF WELL SURVEY

As previously mention in **section 5.6**, based on the review of the MECP well record database six (6) water supply wells were identified within a 500 m radius of the proposed alignment. The location of the well records is presented on **Figure 7**. Details for each record are also presented in **Appendix B**. A summary of the well records is provided in the **Table 11-1**:

Table 11-1- Water Supply Well Records Summary

MECP Well ID	Map ID (Figure 7)	Well Depth (mbhs)	Screen Interval (mbgs)	Static Groundwater Level (mbgs)	Final Use	Year Constructed	Recommended Pumping Rate (GPM)
4902999	7	17.4	-	-	Water supply	1968	2.0
4903012	3	11.00	-	0.31	Water supply	1968	5.0
4904010	10	32.64	31.72-32.64	-	Water supply	1972	5.0
4904482	1	7.62	-	-	Water supply	1974	4.0
4906340	5	9.75	-	7.32	Water supply	1985	1.0
4908359	4	18.6	15.56-18.30	-	Water supply	1998	10.0

A private well survey was carried out in areas identified within the well record review to be potentially serviced with private water supply wells on November 19, 2021. The well survey was completed to determine the construction details and operating history for private wells within the study area. The following residences were included in the well survey:

- 6923, and 7104 King Street;
- Property located at ALBION CON 2 LOT 10
- 14073 and 13799 Centreville Creek Road;

Additionally, one (1) of the records is mapped within the Site (MECP Well ID 4906340, Map ID 5 on Figure 7). Terraprobe was provided with an Environmental Health Inspection report for the well, prepared by ESSE Canada, dated June 15, 2018. A review of the report indicates that the water supply well is located south of the existing house at the Site. Based on the report the submersible well pump was tested and produced approximately 18 liters per minute for 60 minutes from the hose tap. Bacterial analysis of this single sample of the water supply showed a total coliform count of 16 and an E.coli count of which indicates that the water supply is not bacterially safe for drinking at the time of sampling.

A Site visit was completed on November 19, 2021. Each of five (5) properties were provided with a letter outlining the purpose and details of the well survey and contact information for Terraprobe. A short questionnaire was also provided to owners along with the letters, at their property. In cases where the resident was not available, the well survey letter was left at the property so that the resident could provide a telephone or email response to the survey. The well survey letter and a copy of the questionnaire are attached in **Appendix J**. Location of properties included in the private well survey is provided on the attached **Figure 7**.

None of the owners contacted Terraprobe by the date of issuing the current report to confirm participating to the monitoring program.

4.2 Monitoring, Mitigation and Contingency Measures

It is recommended that a public notice be issued in advance of construction to notify the residences in advance of construction. Written notification should provide contact information for the construction contractor to call in the event of suspected well interference.

In the event of well interference reported during construction a temporary water supply should be provided for the property and an inspection of the impacted well should be completed by a hydrogeologist and the impacted well be monitored. In the event that the impacted well does not recover the private well would be restored at cost to the developer (i.e. deepened or re-drilled).

The existing water supply well at the Site should be decommissioned if it is not required for the post-development Site. If the well is required, a monitoring program should be considered to monitor the groundwater quality and quantity on the well, in advance of, during and after construction.

12.0 CONCLUSIONS AND RECOMMENDATIONS

- The Site is located within Physiographic regions of Southern Ontario known as the South Slope. The South Slope within the vicinity of the Site comprises a Till Plains (Drumlinized).
- The Site is located within an area mapped as Fine-textured glaciolacustrine deposits (5d) consisting of clay to silt-textured till derived from glaciolacustrine deposits of shale.
- The Site is located within the Humber River watershed which falls within TRCA jurisdiction, where there are no records for natural heritage features including wetland, water bodies, watercourses and ANSI within the Site. Lindsay creek which is tributary of West Humber River, a small pond and a wetland feature are located approximately 200 m, 120 m and 100 m to the northeast corner of the Site, respectively. Additionally, a small creek which is a tributary of West Humber River flows just on the verge of south west corner of the Site.
- The subsoil profile consists mainly of earth fill and glacial till (clayey silt) to termination depth of investigation at 8.1 mbgs.
- The highest and lowest stabilized shallow groundwater levels were measured at El. 266.37 masl and 260.37 masl at monitoring wells BH101 and BH104, respectively.
- Estimated hydraulic conductivity using single well response test (SWRT) ranges from 4.25×10^{-9} m/s to 1.08×10^{-6} m/s for clayey silt till. Geomean hydraulic conductivity is 1.11×10^{-7} m/s.
- The analytical results for the unfiltered groundwater samples obtained from monitoring well BH3 indicates that the concentrations for all the analyzed parameters meet the Regional Municipality of Peel Sanitary Sewer By-law Limits but exceeds the Regional Municipality of Peel Storm Sewer By-law Limits for total suspended solids (TSS) and Fecal Coliforms.
- Anticipated total construction (short-term) dewatering reaches up to 248,120, 7,330, and 63,350 L/day for developing the proposed slab-on-grade building, 50 m sewer alignment, and SWM facility, respectively.
- A slab-on-grade building is proposed for the future development, where the building will be constructed above shallow groundwater level. A review of the geotechnical investigation report is also states that subfloor drainage provisions are not required. As such, discharge plan for long-term foundation drainage is not required for the post development structure.
- The estimated short-term construction dewatering flow rates exceeds the lower EASR threshold of 50,000 L/day. As such, filling EASR with the MECP is required for short-term dewatering.
- There is a creek in close proximity to the southwest corner of the Site, where the SWM facility is proposed. The creek may locate within the ZOI for dewatering for construction of the proposed SWM facility.

- Considering the location of the Site within the area regulated by TRCA, obtaining permit from TRCA is required.
- A review of the findings indicates a total decrease of 11,752 m³/year and 6,654 m³/year for ET and infiltration, respectively, and an increase of 18,406 m³/year for runoff are expected for the post-development Site. Low Impact Development (LID) measures such as infiltration trenches and permeable pavements could be considered for the post-development Site.
- Based on the results of nitrate loading impact assessment, the target effluent concentration for nitrate to meet the maximum allowable concentration of 2.5 mg/L at the down-gradient Site boundary is calculated at 3.26 mg/L.
- Based on the distance to potential down-gradient receptors impacts to groundwater and surface water resources are not anticipated.
- It is recommended that a schedule of regular system maintenance shall be maintained.
- Owner of six (6) water supply well records that fall within the 500 m radius of the Site, including the existing water supply well at the Site, were contacted over a door-to-door well canvassing program. Terraprobe did not receive any response by the date of issuing the current report. The existing water supply well at the Site should be decommissioned if it is not required for the post-development Site. If the well is required, a monitoring program should be considered to monitor the groundwater quality and quantity on the well, in advance of, during and after construction.

13.0 LIMITATIONS

This report was prepared at the request of, and for the exclusive use of Swaminarayan Mandir Vasna Sanstha (SMVS) and its affiliates (“the Intended User”) is intended to provide an assessment of the hydrogeological conditions of the Site located at 6939 King Street, Caledon (the Site). No one other than the Intended User has the right to use and rely on the work without first obtaining the written authorization of Terraprobe Inc. and SMVS.

Terraprobe Inc. expressly excludes liability to any party except the Intended User for any use of, and/or reliance upon, the work. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Terraprobe 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, including consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The assessment should not be considered a comprehensive audit that eliminates all risks of encountering hydrogeological problems. The information presented in this report is based on information collected during the completion of the hydrogeological study by Terraprobe Inc. It was based on the conditions on the Site at the time of the hydrogeological study by a review of historical information and field investigation to assess the hydrogeological conditions of the Site, as reported herein.

There is no warranty expressed or implied by this report regarding the hydrogeological conditions for the Site. Professional judgement was exercised in gathering and analysing information collected by reviewing previous reports, data provided by government and are open to public and field work investigation. The conclusions presented are the product of professional care and competence, and cannot be construed as an absolute guarantee.

In the event that during future work new information regarding the hydrogeological conditions of the Site is encountered, or in the event that the outstanding responses from the regulatory agencies indicate outstanding issues on file with respect to the Site, Terraprobe Inc. should be notified in order that we may re-evaluate the findings of this assessment and provide amendments, as required.

Neither possession of the Work, nor a copy of it, carries the right of publication. All copyright in the Work is reserved to Terraprobe Inc. The Work shall not be disclosed, produced or reproduced, quoted from, or referred to, in whole or in part, or published in any manner, without the express written consent of Terraprobe Inc. or Swaminarayan Mandir Vasna Sanstha (SMVS).

14.0 CLOSURE

We trust this report meets with your requirements. Should you have any questions regarding the information presented, please do not hesitate to contact our office.

Yours truly,

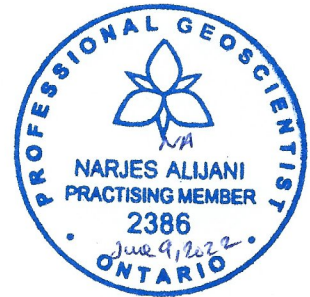
Terraprobe Inc.

Amar Neku

Amar Neku, Ph.D., P. Eng., P. Geo
Project Engineer

Narjes

Narjes Alijani, M.Sc., P. Geo.
Senior Hydrogeologist

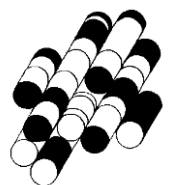


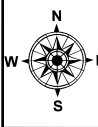
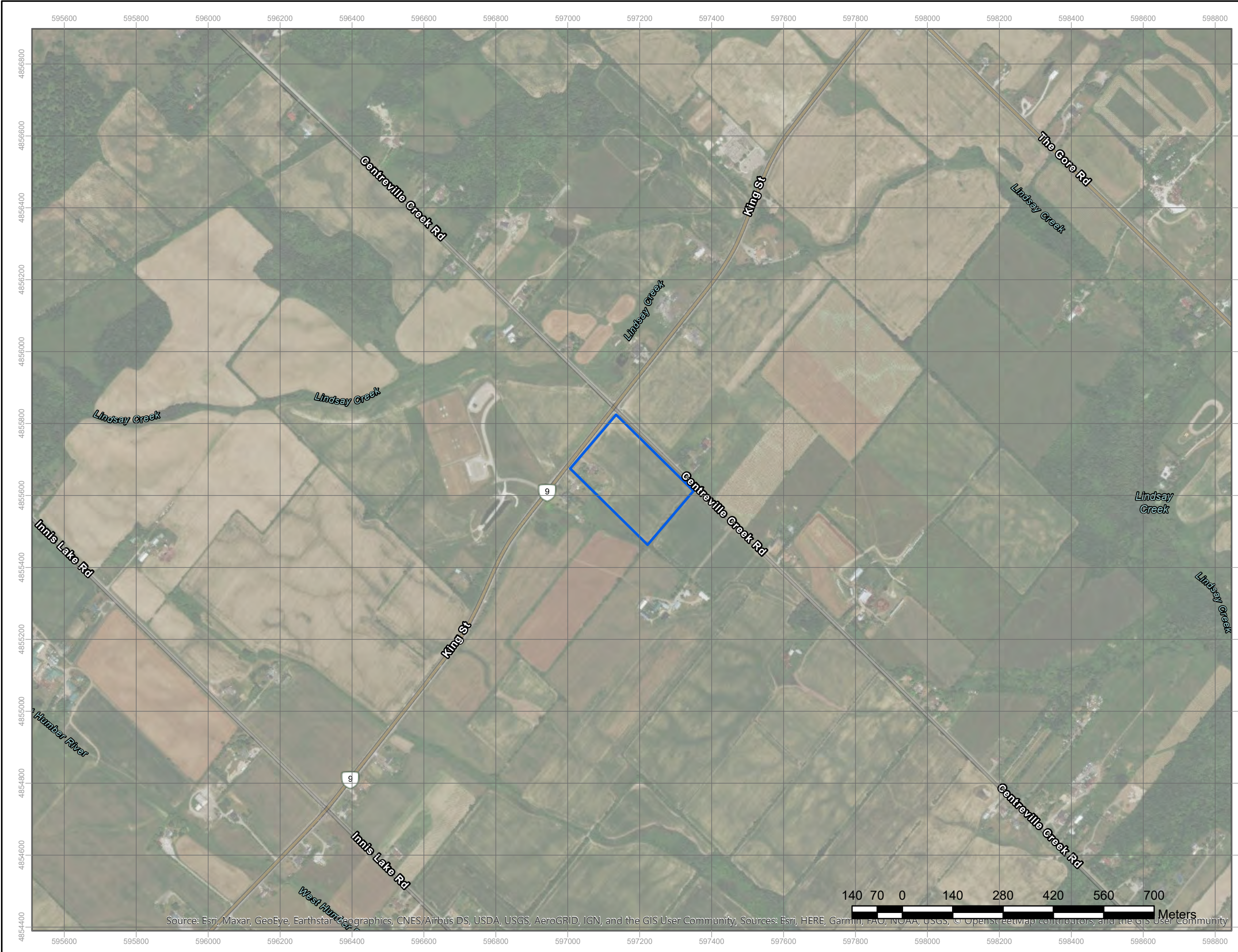
15.0 REFERENCES

1. Bouwer, H. and R. C. Rice, 1976. Bouwer and Rice Slug Test Solution for Unconfined Aquifers.
2. Chapman, L.J. and D.F. Putnam, 1984. The Physiography of Southern Ontario. Ontario.
3. Geological Survey. Ontario Geological Survey (OGS), 2003. Surficial Geology of Southern Ontario. Miscellaneous Release – Data 128 – revised.
4. Geological Survey. Ontario Geological Survey (OGS), 2007. Bedrock Geology of Ontario. Miscellaneous Release – MRD 219.
5. Geotechnical Investigation Proposed SMVS Temple, 6939 King Street, Caledon, Ontario (Draft) dated October 20, 2020.
6. Ministry of the Environment, Conservation and Parks, 2019, Source Protection Information Atlas Interactive Map.
7. Site Plan prepared by Battaglia Architect Inc. (Drawing numbers A-1) and Front Elevation dated November 9, 2020.
8. Peel Region Conservation Authority, Online Regulated Area Map.
9. Town of Caledon, Online Official Plans.
10. Watershed Features – Humber River (TRCA - <https://trca.ca/conservation/watershed-management/humber-river/watershed-features/>)

FIGURES

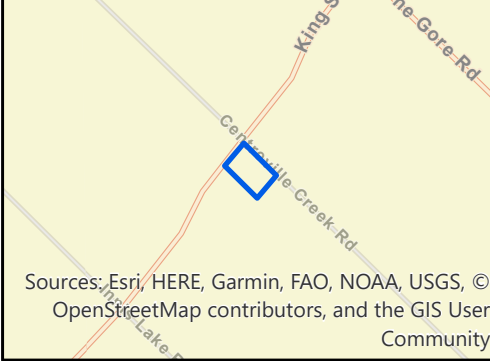
TERRAPROBE INC.





References:
 ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus Ds, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Basemaps

Key Map



Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Notes:

Legend:

Approximate Site Boundary

Project Title:
 Hydrogeological Assessment

Site Location:
 6939 King Street, Caledon, Ontario

Figure Title:
 Site Location Plan

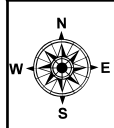
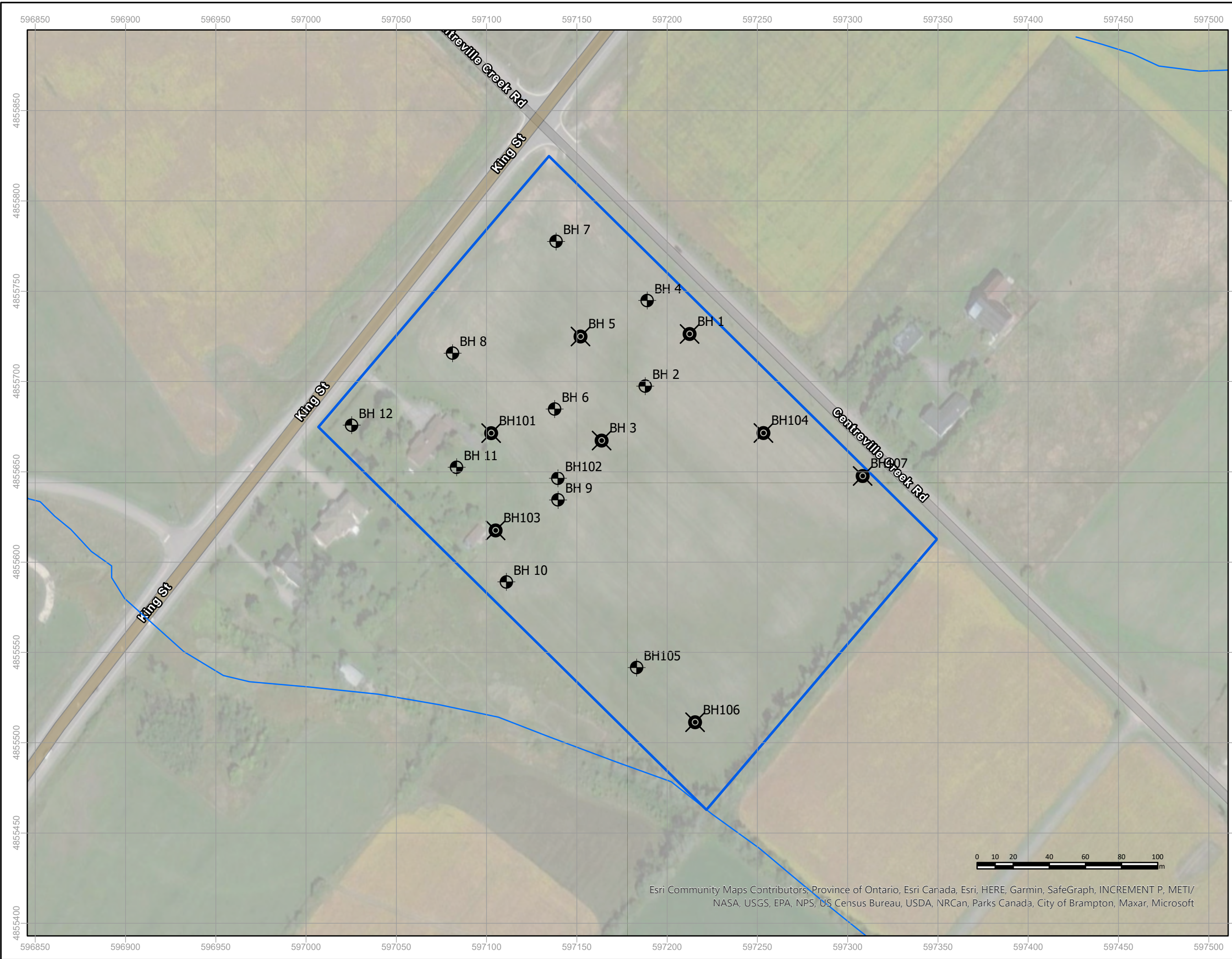
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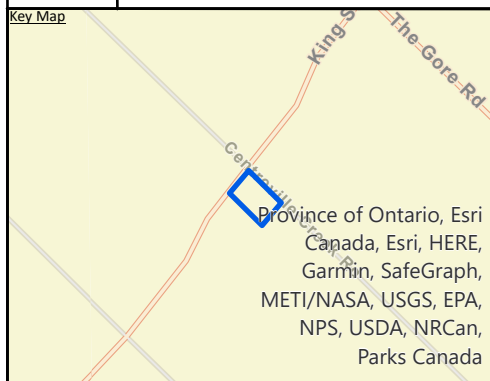
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Date: October 2020	1
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References:
 ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus Ds, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Basemaps



Notes:

- Legend:**
- Approximate Site Location
 - Water Course
 - + Approximate Borehole Location
 - X Approximate Monitoring Well Location
- Boreholes BH1 to BH12 were advanced in 2020
 Boreholes BH101 to BH107 were installed in 2021

Project Title:
 Hydrogeological Assessment

Site Location:
 6939 King Street, Caledon, Ontario

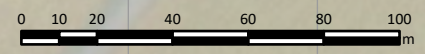
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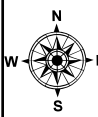
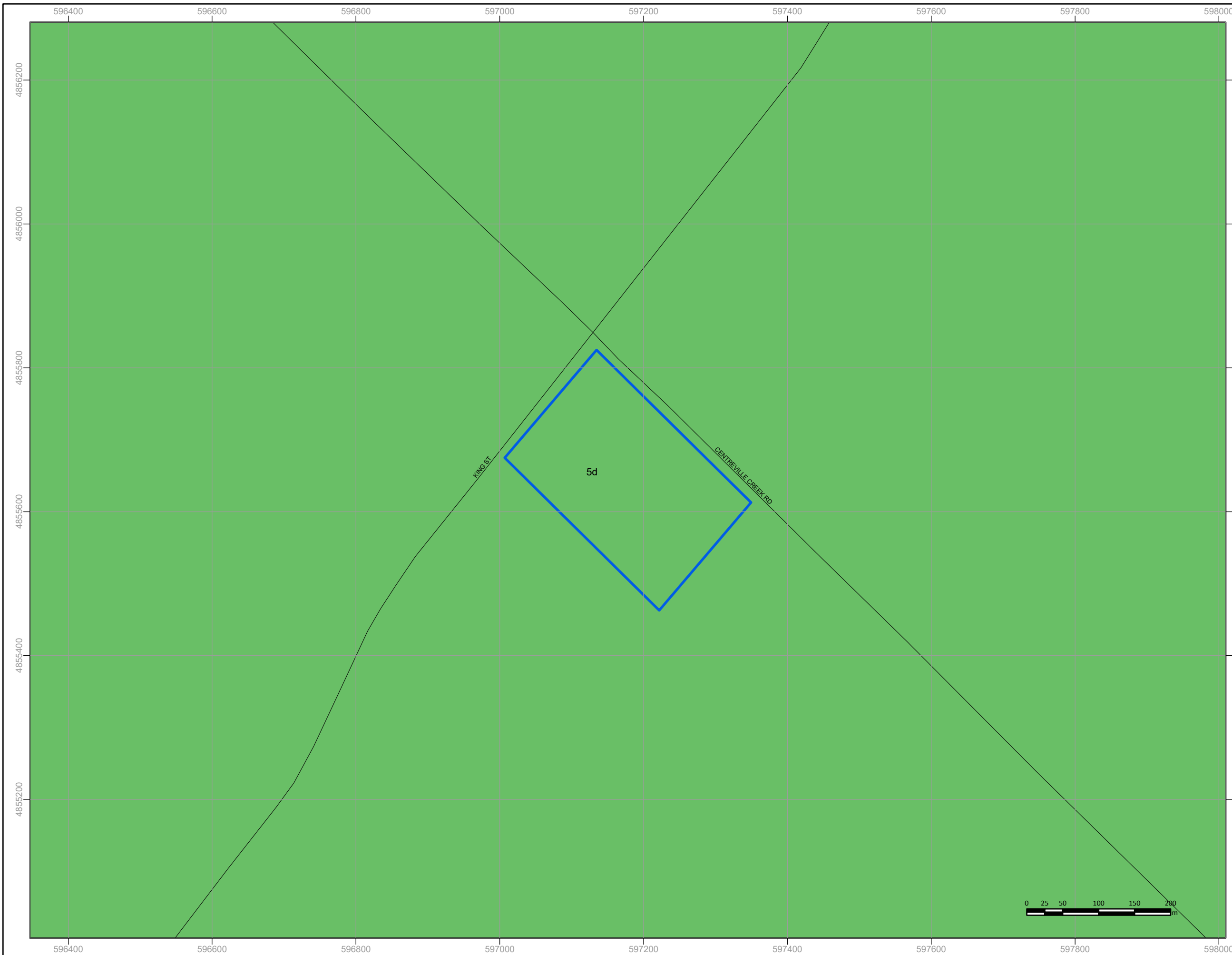
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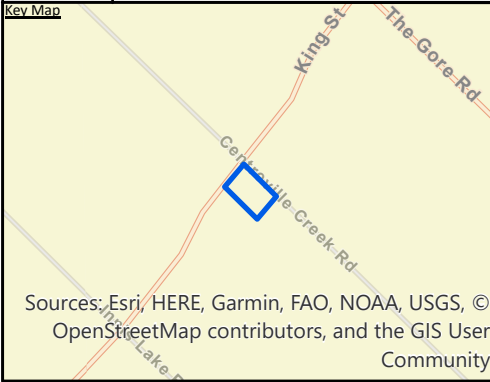
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Date: October 2020	
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References:
 Service Layer Credits: © Surface Geology Map was Produced by Terraprobe Inc. under license from the Ministry of North Development, Mines and Forestry (MNDMF). Copyright (c) is held by the Queen's Printer for Ontario. Surficial geology of southern Ontario, 2003, Ontario Geological Survey, Miscellaneous Release— Data 128— Revised.



Notes:

Legend:

- Approximate Site Boundary
- 5d: Glaciolacustrine-derived silty to clayey till
- Collector

Project Title:
Hydrogeological Assessment

Site Location:
6939 King Street, Caledon, Ontario

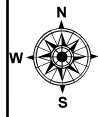
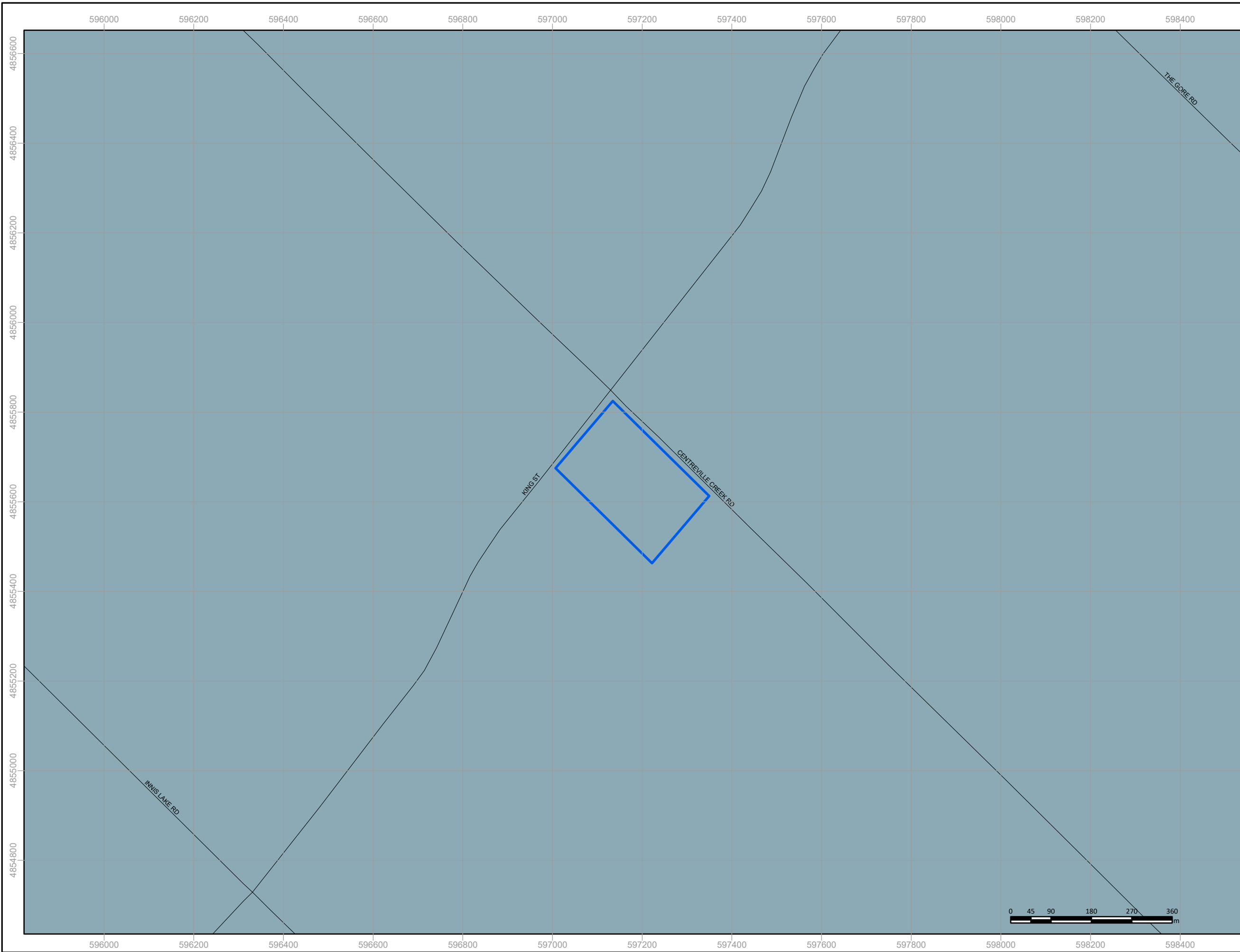
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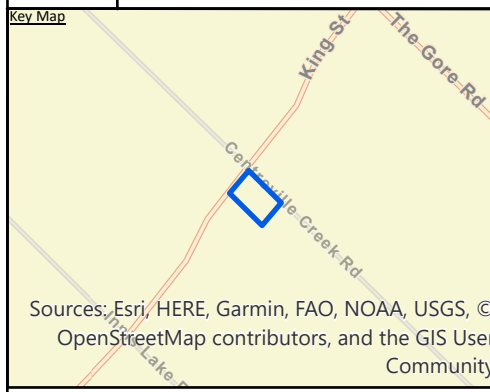
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Reviewed By: BW	Figure No.: 3
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Date: October 2020	
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References:
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Notes:

- Legend:**
- Approximate Site Boundary
 - Collector
 - 32, South Slope

Project Title:
Hydrogeological Assessment

Site Location:
6939 King Street, Caledon, Ontario

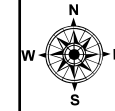
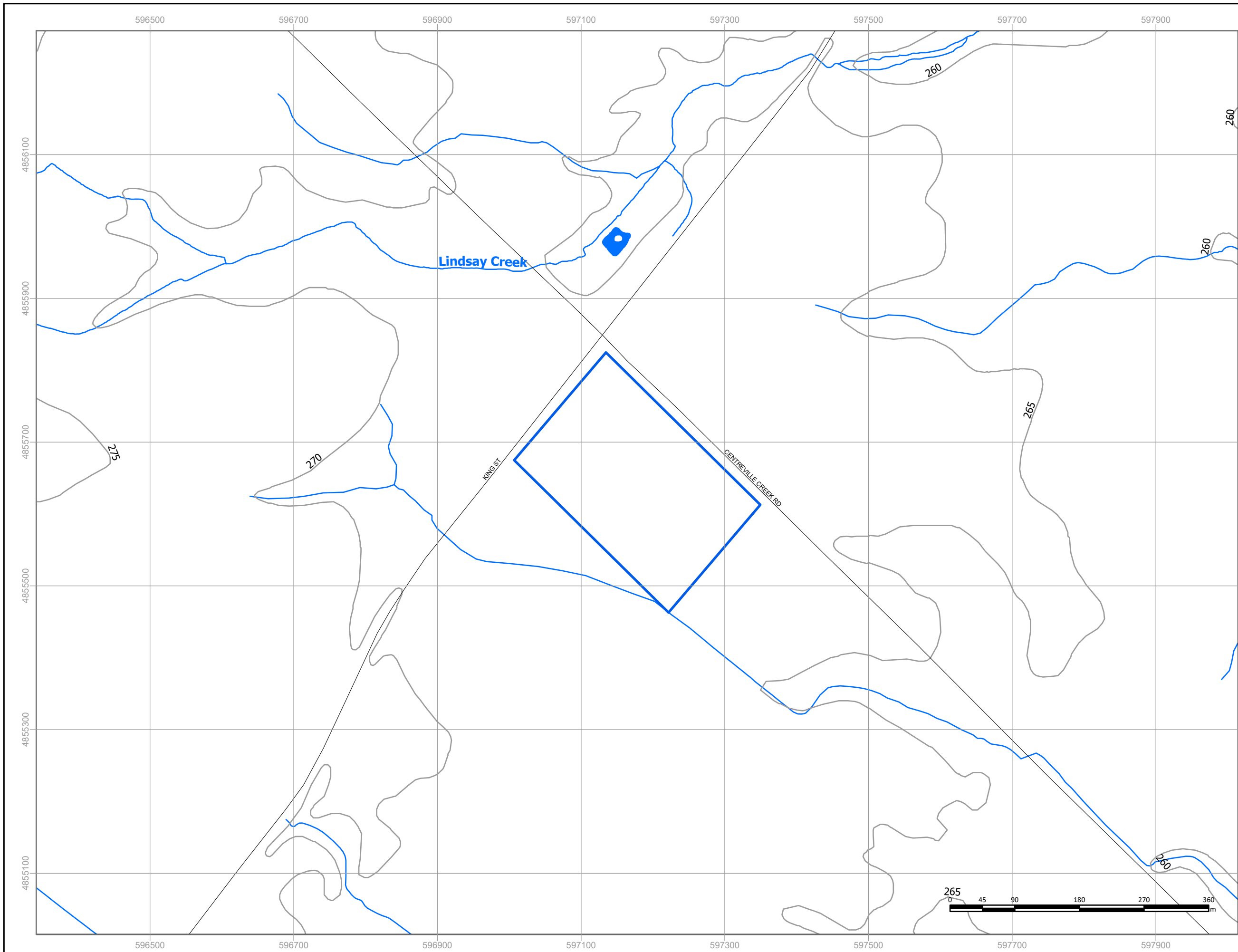
Figure Title:
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Designed By: AN	File No.: 1-20-0222-46
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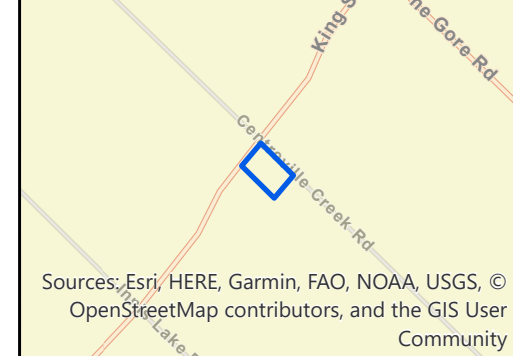
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Date: October 2020	
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References:
 Service Layer Credits: © Topography, Water Body and Watercourse Map was Produced by Terraprobe Inc. under license from the Ministry of Ministry of Natural Resources and Forestry (MNRF). Copyright (c) is hold by the Queen's Printer for Ontario 2015.

Key Map



Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Notes:

Legend:

- Approximate Site Boundary
- Water Course
- Town of Caledon; Topographic Contours
- Collector

Project Title:

Hydrogeological Assessment

Site Location:

6939 King Street, Caledon, Ontario

Figure Title:

Topography Map

Designed By:

AN

File No.:

1-20-0222-46

Drawn By:

SSK

Scale:

As Shown

Reviewed By:

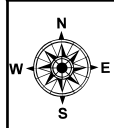
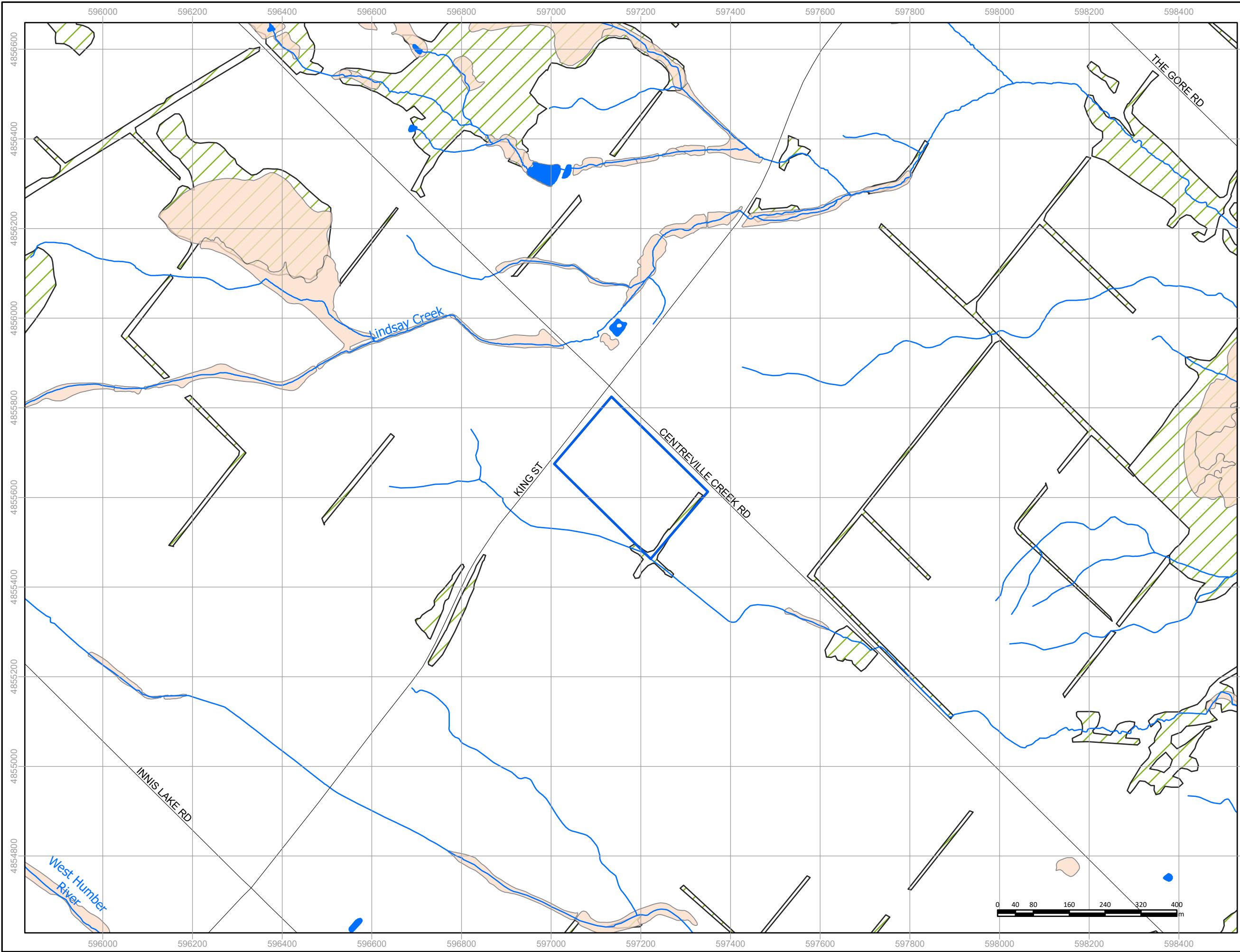
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Figure No.:

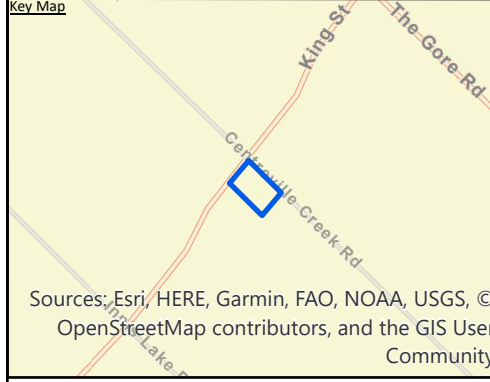
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Date:

October 2020



References:
 Service Layer Credits: © Natural Heritage Map was Produced by Terraprobe Inc. under license from the Ministry of North Development and Mines (MNOM). Copyright (c) is held by the Queen's Printer for Ontario.



Notes:

- Legend:**
- Approximate Site Boundary
 - Collector
 - Water Body
 - Water Course
 - Wetland Features-Not evaluated per OWES
 - Wooded Area

Project Title:
 Hydrogeological Assessment

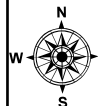
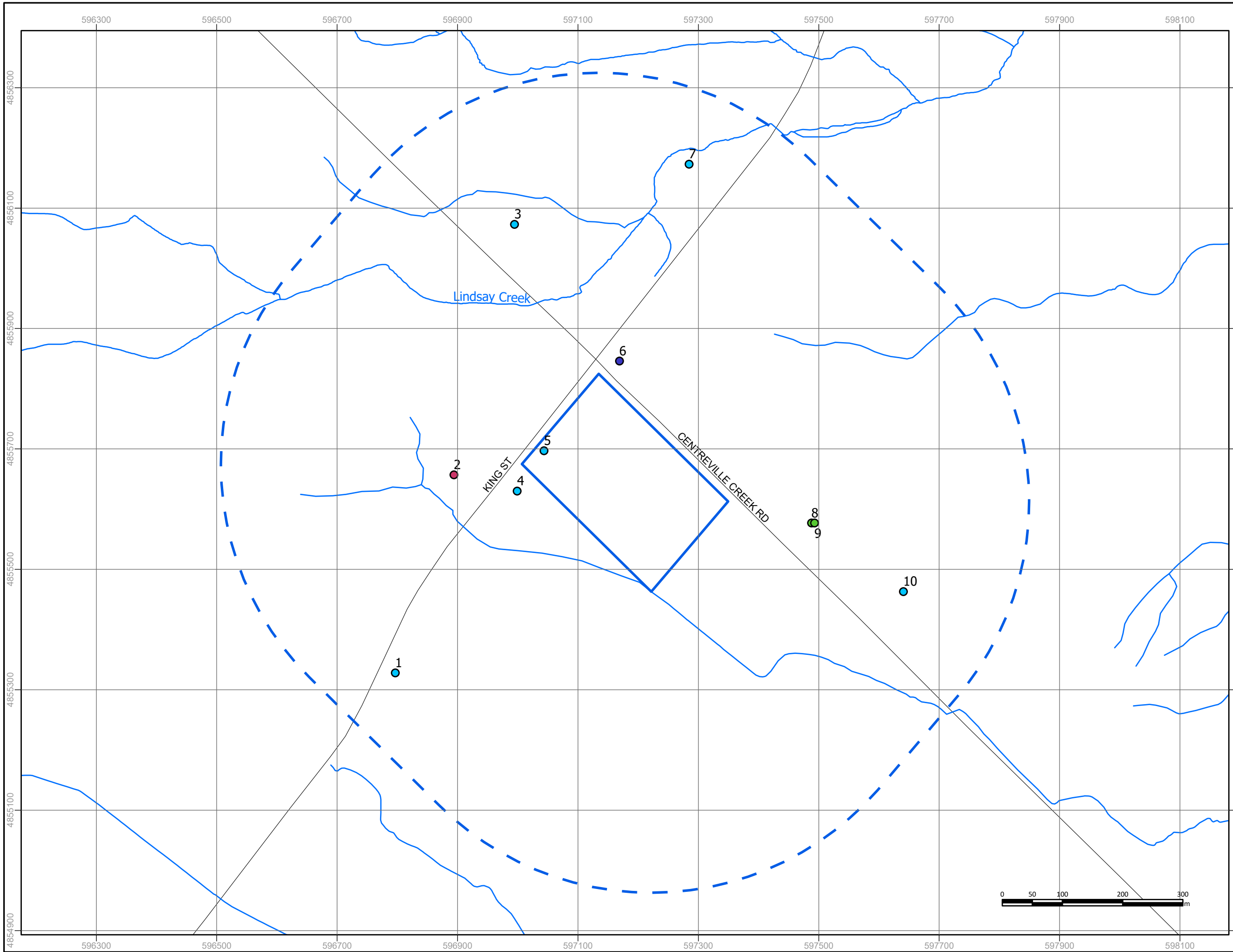
Site Location:
 6939 King Street, Caledon, Ontario

Figure Title:
 Natural Heritage Feature Map

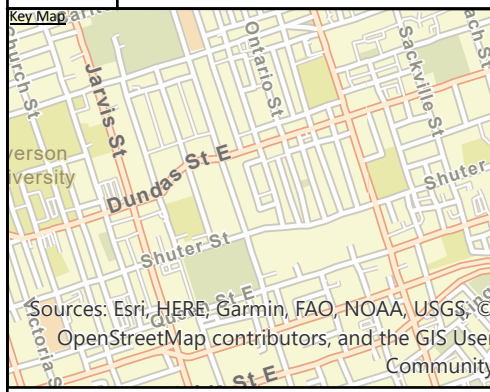
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Reviewed By: BW	Figure No.: 6
Date: October 2020	



References:
 ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus Ds, USDA, USGS, AeroGRID, IGN, and the GIS User Community produced by Terraprobe Inc. Copyright (c) Queen's Printer 2020. Water Well Information System Ministry of the Environment, Conservation and Parks, 2020



Notes:

Legend:

- Approximate Site Boundary
- Approximate Study Area; 500m
- Collector
- Water Course
- Unknown
- Monitoring and Test Hole
- Observation Wells
- Water Supply

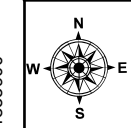
Project Title:
 Hydrogeological Assessment

Site Location:
 6939 King Street, Caledon, Ontario

Figure Title:
 MECP Well Records Map

Designed By: AN	File No.: 1-20-0222-46
Drawn By: SSK	Scale: As Shown
Reviewed By: BW	Figure No.: 7
Date: October 2020	





References:
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Notes:

- Legend:**
- Approximate Site Location
 - Approximate Monitoring Well Location; Ground Water as on December 13, 2021
 - Collector
 - Town of Caledon; Topographic Contours
 - Interpreted Groundwater Contours
 - Inferred Groundwater Contours
 - Interpreted Groundwater Flow Direction

Project Title:
 Hydrogeological Assessment

Site Location:
 6939 King Street, Caledon, Ontario

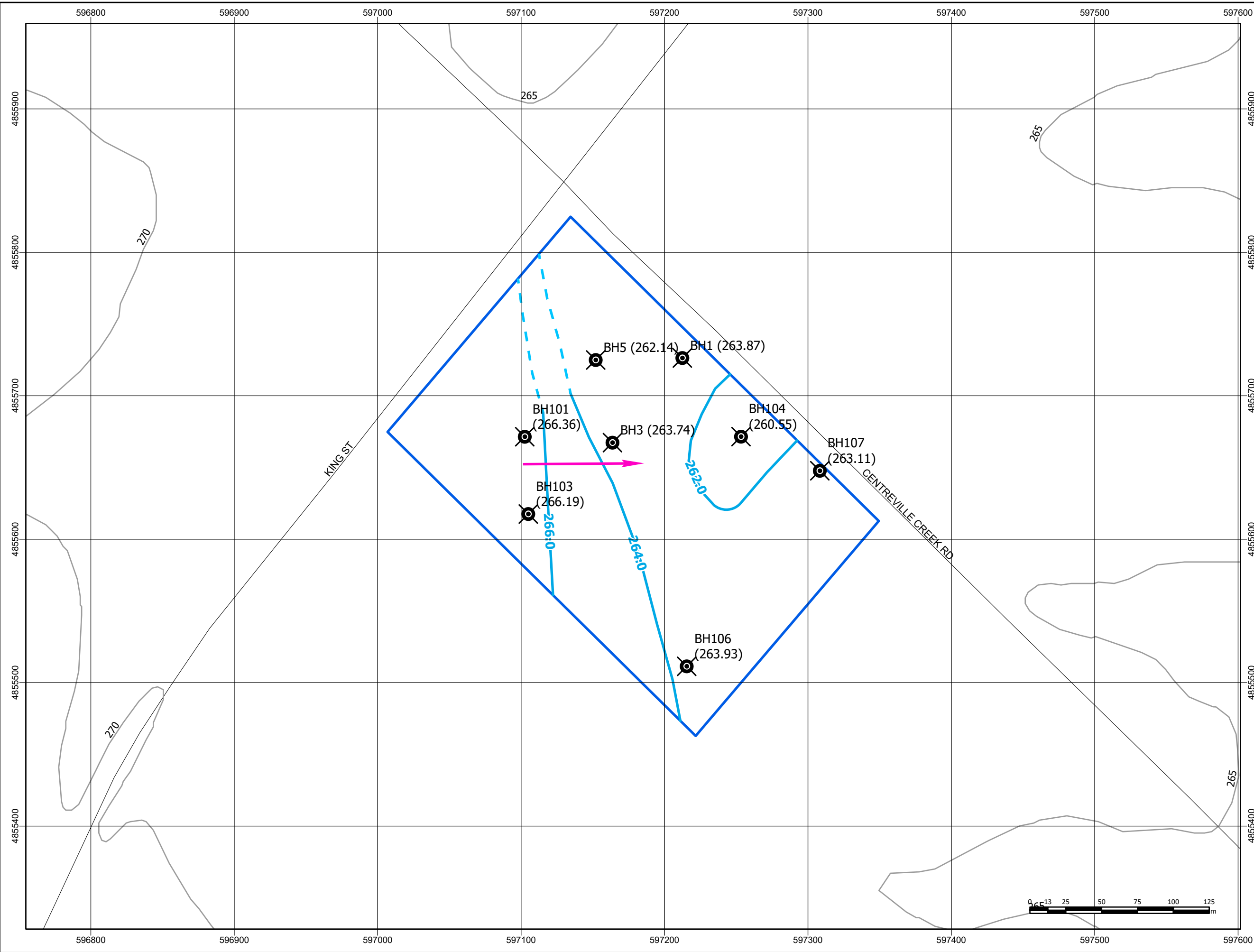
Figure Title:
 Groundwater Flow Direction

Designed By: AN	File No.: 1-20-0222-46.1
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Drawn By: SSK	Scale: As Shown
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Reviewed By: BW	Figure No.: 8
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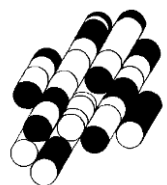
Date: January 2022	
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APPENDIX A

Boreholes and Monitoring Well Logs

TERRAPROBE INC.



Project No. : 1-20-0222-01

Client : Swaminarayan Mandir Vasna Sansthan Canada

Originated by : Saif

Date started : July 14, 2020

Project : 6939 King Street

Compiled by : CM

Sheet No. : 1 of 1

Location : Caledon, Ontario

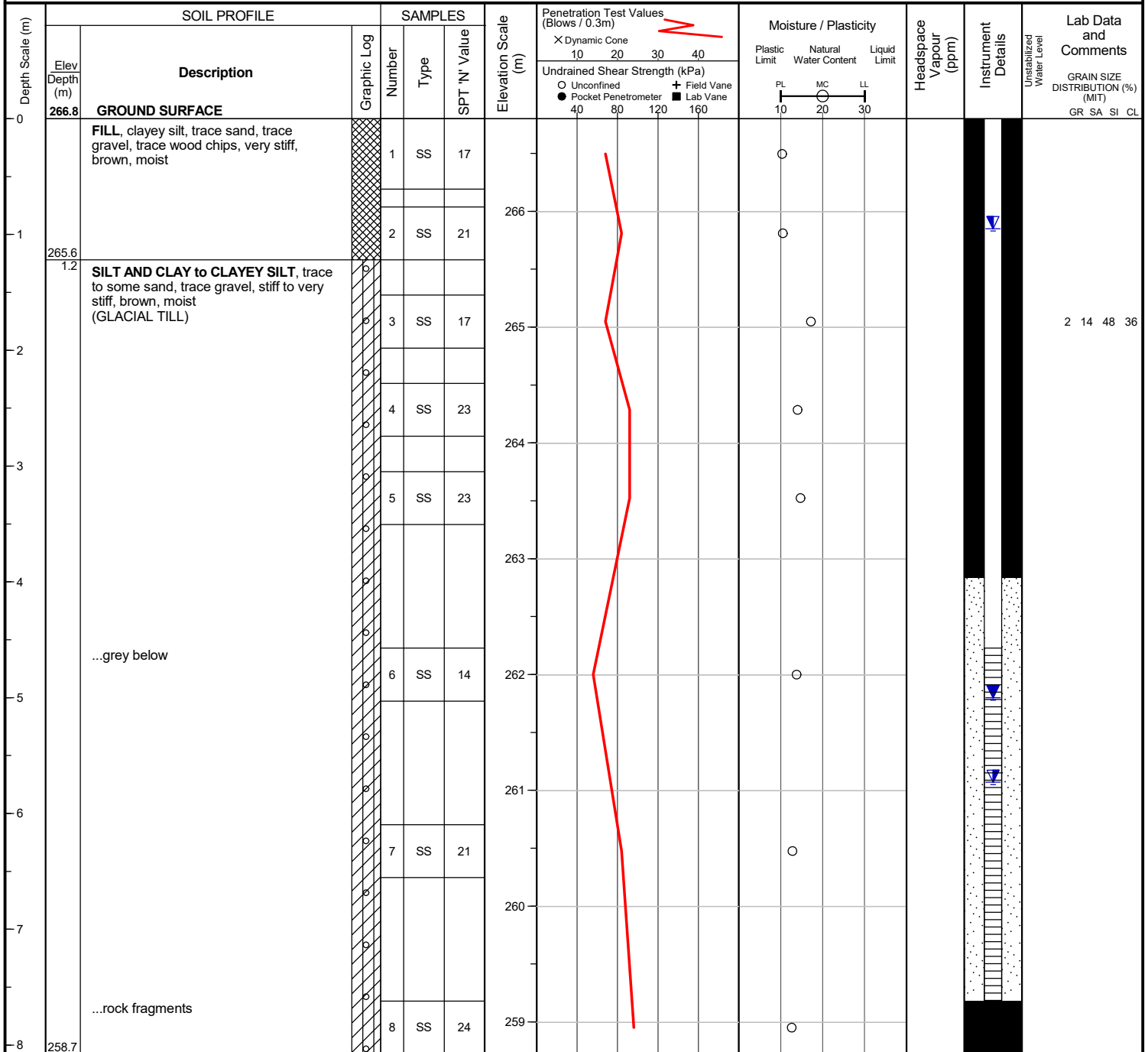
Checked by : SZ

Position : E: 597212, N: 4855726 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Deidric 60, track-mounted

Drilling Method : Solid stem augers


END OF BOREHOLE

Borehole was dry and caved to 5.8 m below ground surface upon completion of drilling.

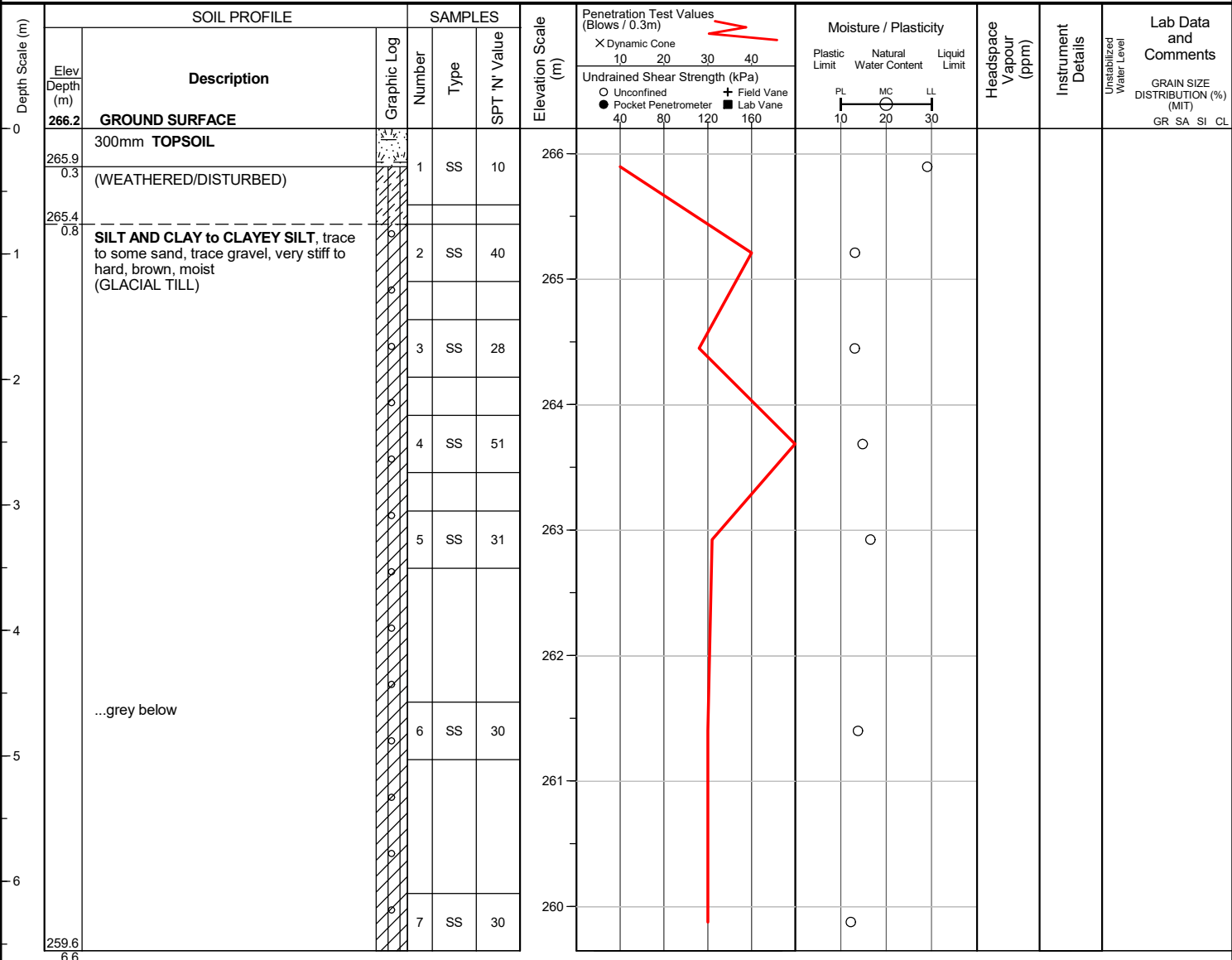
50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Oct 5, 2020	1.0	265.9
Oct 13, 2020	5.7	261.1
Oct 20, 2020	5.0	261.8

Project No. : 1-20-0222-01 Client : Swaminarayan Mandir Vasna Sansthan Canada Originated by : SM
 Date started : September 21, 2020 Project : 6939 King Street Compiled by : CM
 Sheet No. : 1 of 1 Location : Caledon, Ontario Checked by : SZ

Position : E: 597188, N: 4855697 (UTM 17T) Elevation Datum : Geodetic
 Rig type : Track-mounted Drilling Method : Solid stem augers



Borehole was dry and caved to 5.5 m below ground surface upon completion of drilling.

Project No. : 1-20-0222-01

Client : Swaminarayan Mandir Vasna Sansthan Canada

Originated by : SM

Date started : September 21, 2020

Project : 6939 King Street

Compiled by : CM

Sheet No. : 1 of 1

Location : Caledon, Ontario

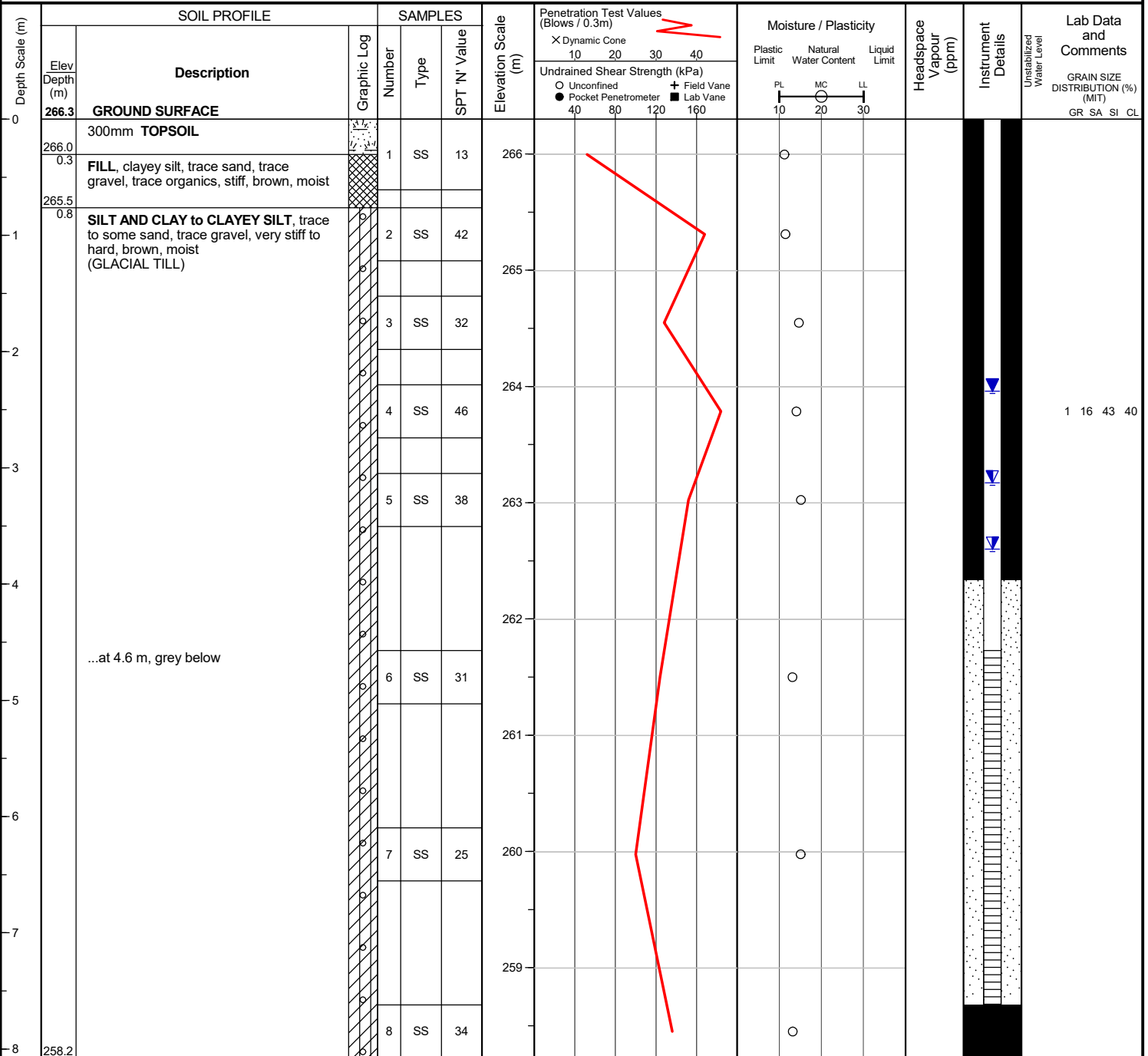
Checked by : SZ

Position : E: 597164, N: 4855667 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Track-mounted

Drilling Method : Solid stem augers


END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Oct 5, 2020	3.1	263.2
Oct 13, 2020	3.7	262.6
Oct 20, 2020	2.3	264.0

Project No. : 1-20-0222-01

Client : Swaminarayan Mandir Vasna Sansthan Canada

Originated by : SM

Date started : September 21, 2020

Project : 6939 King Street

Compiled by : CM

Sheet No. : 1 of 1

Location : Caledon, Ontario

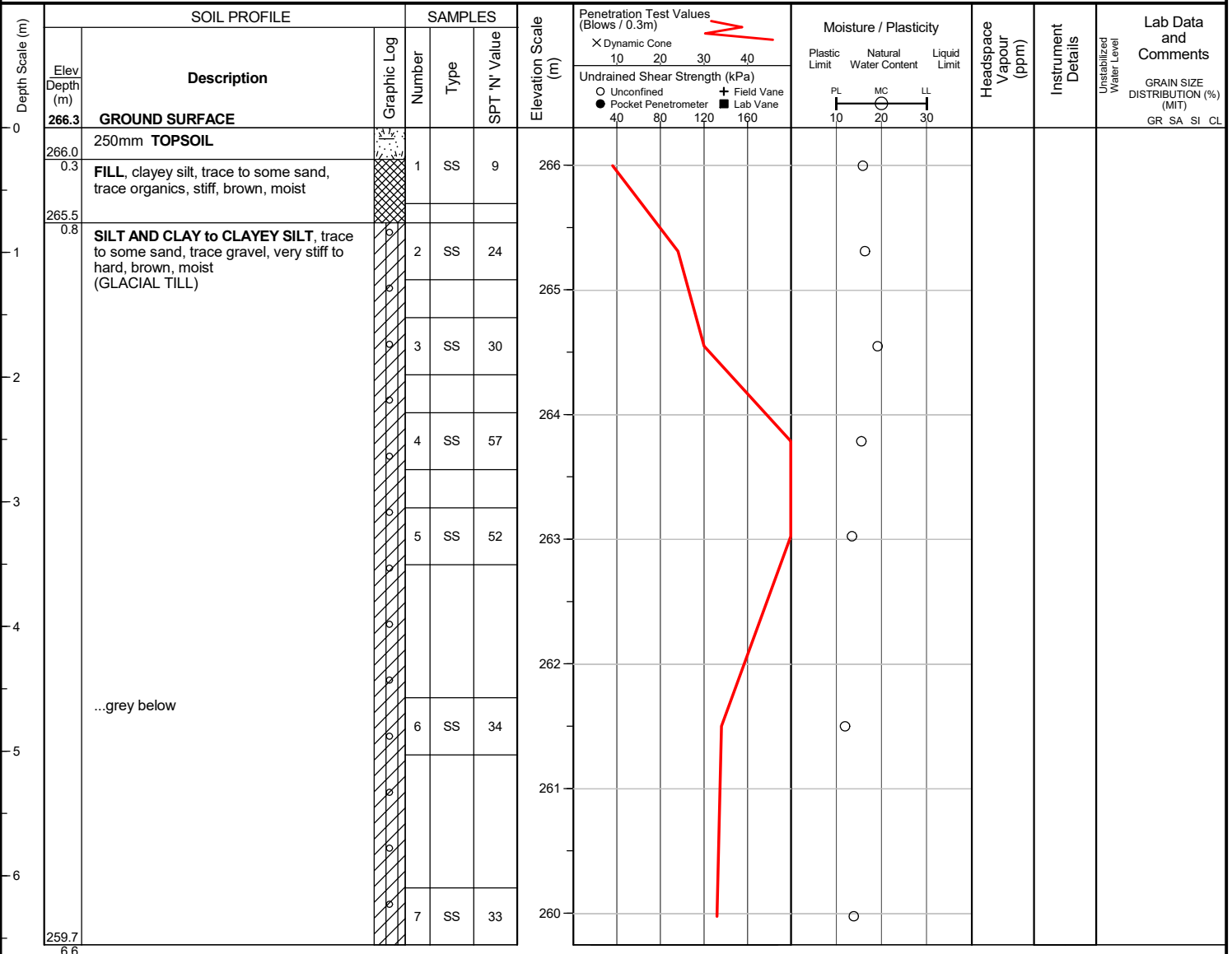
Checked by : SZ

Position : E: 597189, N: 4855745 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Track-mounted

Drilling Method : Solid stem augers


END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

Project No. : 1-20-0222-01

Client : Swaminarayan Mandir Vasna Sansthan Canada

Originated by : SM

Date started : September 21, 2020

Project : 6939 King Street

Compiled by : CM

Sheet No. : 1 of 1

Location : Caledon, Ontario

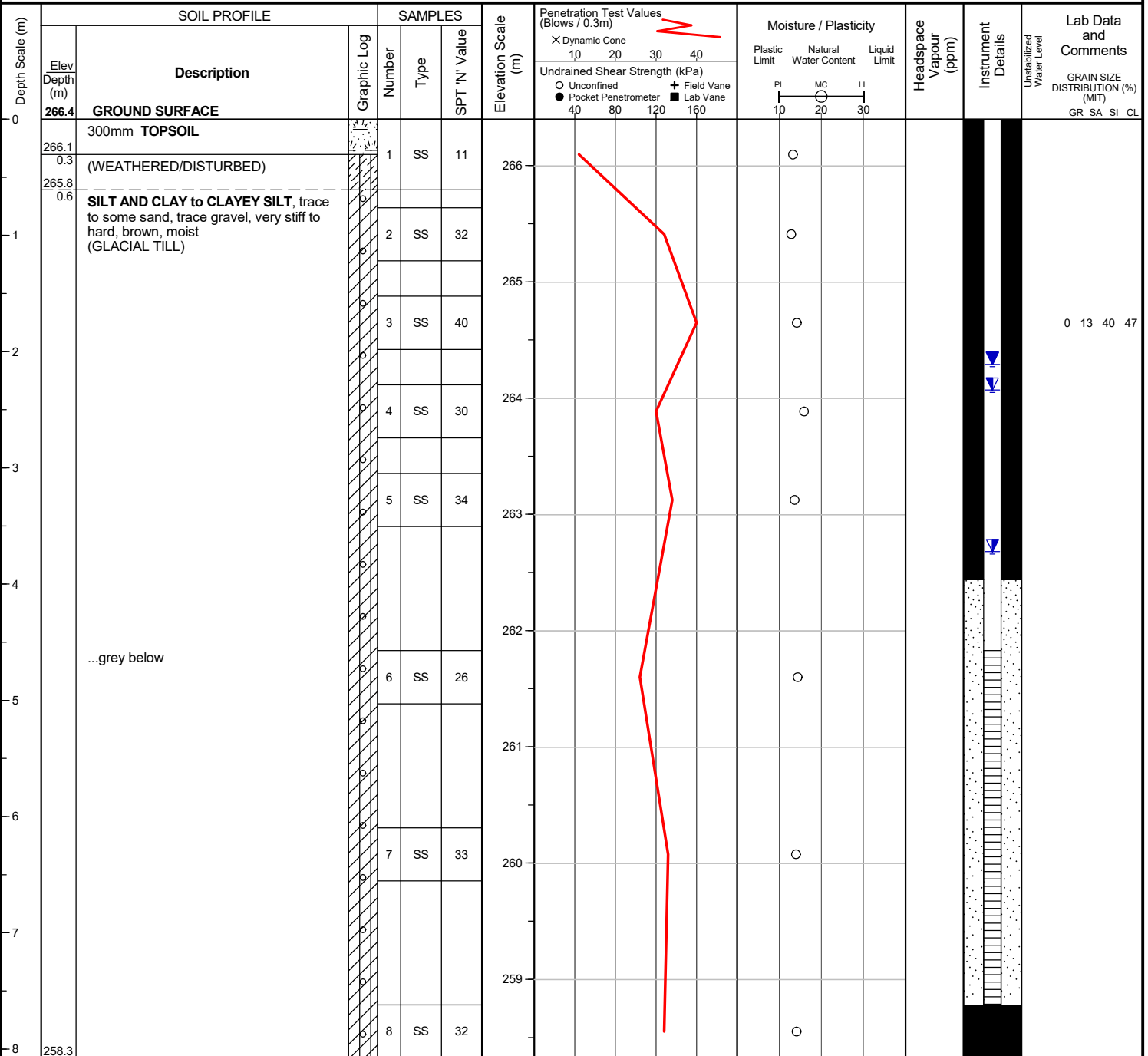
Checked by : SZ

Position : E: 597152, N: 4855725 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Track-mounted

Drilling Method : Solid stem augers


END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Oct 5, 2020	2.3	264.1
Oct 13, 2020	3.7	262.7
Oct 20, 2020	2.1	264.3

Project No. : 1-20-0222-01 Client : Swaminarayan Mandir Vasna Sansthan Canada Originated by : SM
 Date started : September 21, 2020 Project : 6939 King Street Compiled by : CM
 Sheet No. : 1 of 1 Location : Caledon, Ontario Checked by : SZ




Position : E: 597138, N: 4855685 (UTM 17T) Elevation Datum : Geodetic
 Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	SOIL PROFILE		Graphic Log	SAMPLES			Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) X Dynamic Cone Undrained Shear Strength (kPa) ○ Unconfined ● Pocket Penetrometer + Field Vane ■ Lab Vane	Moisture / Plasticity			Headspace Vapour (ppm)	Instrument Details	Lab Data and Comments GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
	Elev Depth (m)	Description		Number	Type	SPT 'N' Value			Plastic Limit	Natural Water Content	Liquid Limit			
0	266.5	GROUND SURFACE												
0.2	266.3	200mm TOPSOIL												
0.8	265.7	FILL , clayey silt, trace sand, trace gravel, trace organics, stiff, brown, moist		1	SS	14								
		SILT AND CLAY to CLAYEY SILT , trace to some sand, trace gravel, very stiff to hard, brown, moist (GLACIAL TILL)		2	SS	36								
				3	SS	37								
				4	SS	36								
				5	SS	42								
		...grey below		6	SS	26								
				7	SS	33								spoon wet
6.6	259.9	END OF BOREHOLE												

Borehole was dry and caved to 5.8 m below ground surface upon completion of drilling.

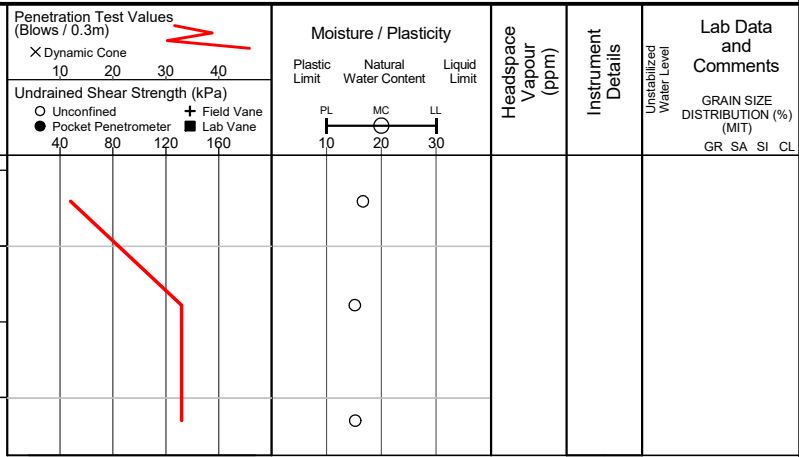
Project No. : 1-20-0222-01 Client : Swaminarayan Mandir Vasna Sansthan Canada Originated by : SM
 Date started : September 21, 2020 Project : 6939 King Street Compiled by : CM
 Sheet No. : 1 of 1 Location : Caledon, Ontario Checked by : SZ

Position : E: 597139, N: 4855778 (UTM 17T) Elevation Datum : Geodetic
 Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	SOIL PROFILE			SAMPLES			Elevation Scale (m)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Lab Data and Comments	
	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value							10
0	266.6	GROUND SURFACE											
	266.3 0.3	300mm TOPSOIL (WEATHERED/DISTURBED)		1	SS	12							
	266.0 0.6	SILT AND CLAY to CLAYEY SILT , trace to some sand, trace gravel, hard, brown, moist (GLACIAL TILL)		2	SS	33							
	264.6 2.0			3	SS	33							





END OF BOREHOLE

Borehole was dry and open upon completion of drilling.



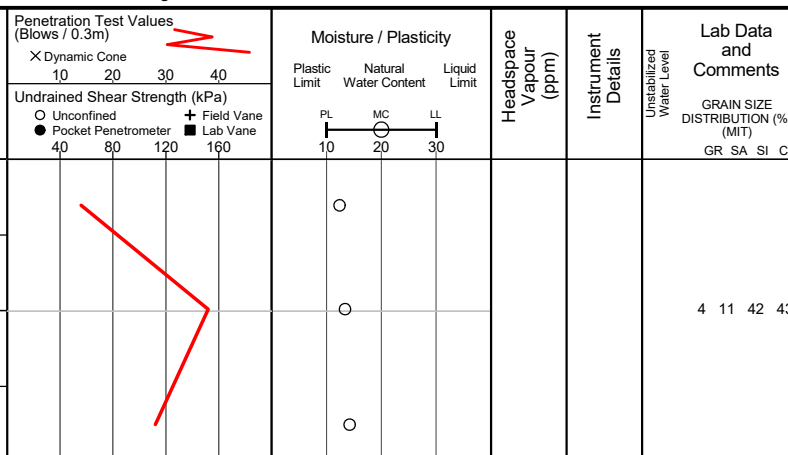
Project No. : 1-20-0222-01 Client : Swaminarayan Mandir Vasna Sansthan Canada Originated by : SM
 Date started : September 21, 2020 Project : 6939 King Street Compiled by : CM
 Sheet No. : 1 of 1 Location : Caledon, Ontario Checked by : SZ

Position : E: 597081, N: 4855716 (UTM 17T) Elevation Datum : Geodetic
 Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	SOIL PROFILE		SAMPLES			Elevation Scale (m)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Lab Data and Comments
	Elev Depth (m)	Description	Graphic Log	Number	Type						
0	267.0	GROUND SURFACE									
0.3	266.7	300mm TOPSOIL (WEATHERED/DISTURBED)		1	SS	14					
0.6	266.4	SILT AND CLAY to CLAYEY SILT , trace to some sand, trace gravel, very stiff to hard, brown, moist (GLACIAL TILL)		2	SS	38					
											
				3	SS	28					
2.0	265.0	END OF BOREHOLE									

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.



Project No. : 1-20-0222-01

Client : Swaminarayan Mandir Vasna Sansthan Canada

Originated by : SM

Date started : September 21, 2020

Project : 6939 King Street

Compiled by : CM

Sheet No. : 1 of 1

Location : Caledon, Ontario






Checked by : SZ

Position : E: 597140, N: 4855634 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Track-mounted

Drilling Method : Solid stem augers

Depth Scale (m)	SOIL PROFILE			SAMPLES			Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) X Dynamic Cone Undrained Shear Strength (kPa) ○ Unconfined ● Pocket Penetrometer	Moisture / Plasticity			Headspace Vapour (ppm)	Instrument Details	Lab Data and Comments GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value			Plastic Limit	Natural Water Content	Liquid Limit			
0	266.6	GROUND SURFACE												
	266.3 0.3	300mm TOPSOIL		1	SS	11								
	265.8 0.8	FILL , clayey silt, trace sand, trace gravel, trace organics, stiff, brown, moist												
		SILT AND CLAY to CLAYEY SILT , trace to some sand, trace gravel, hard, brown, moist (GLACIAL TILL)		2	SS	42								
		...rock fragments												
	264.6 2.0	END OF BOREHOLE		3	SS	33								

Borehole was dry and open upon completion of drilling.

Project No. : 1-20-0222-01

Client : Swaminarayan Mandir Vasna Sansthan Canada

Originated by : SM

Date started : September 21, 2020

Project : 6939 King Street

Compiled by : CM

Sheet No. : 1 of 1

Location : Caledon, Ontario




Checked by : SZ

Position : E: 597111, N: 4855589 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Track-mounted

Drilling Method : Solid stem augers

Depth Scale (m)	SOIL PROFILE			SAMPLES			Elevation Scale (m)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Lab Data and Comments
	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value						
0	265.8	GROUND SURFACE										
	265.5	250mm TOPSOIL		1	SS	11						
	0.3	FILL , clayey silt, trace sand, trace gravel, stiff, brown, moist										
	265.0	SILT AND CLAY to CLAYEY SILT , trace to some sand, trace gravel, hard, brown, moist (GLACIAL TILL)		2	SS	32						
	0.8											
	263.8			3	SS	32						
	2.0											

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

Project No. : 1-20-0222-01

Client : Swaminarayan Mandir Vasna Sansthan Canada

Originated by : Saif

Date started : July 14, 2020

Project : 6939 King Street

Compiled by : CM

Sheet No. : 1 of 1

Location : Caledon, Ontario



Checked by : SZ

Position : E: 597083, N: 4855653 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Deidric 60, track-mounted

Drilling Method : Continuous sampling

Depth Scale (m)	SOIL PROFILE			SAMPLES			Elevation Scale (m)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Lab Data and Comments	
	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value							10
0	267.1	GROUND SURFACE					267						
0.6	266.5	FILL , clayey silt, sandy, trace gravel, firm, brown, moist		1	SS	7							
1.8	265.3	SILT AND CLAY to CLAYEY SILT , trace to some sand, trace gravel, very stiff to hard, brown, moist (GLACIAL TILL)		2	SS	24							6 13 41 40
				3	SS	35							

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

Project No. : 1-20-0222-01

Client : Swaminarayan Mandir Vasna Sansthan Canada

Originated by : Saif

Date started : July 14, 2020

Project : 6939 King Street

Compiled by : CM

Sheet No. : 1 of 1

Location : Caledon, Ontario

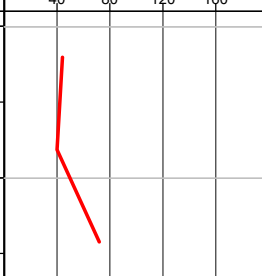
Checked by : SZ

Position : E: 597025, N: 4855676 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Deidric 60, track-mounted

Drilling Method : Continuous sampling

Depth Scale (m)	SOIL PROFILE		SAMPLES			Elevation Scale (m)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity			Headspace Vapour (ppm)	Instrument Details	Lab Data and Comments
	Elev Depth (m)	Description	Graphic Log	Number	Type			SPT 'N' Value	Dynamic Cone	Plastic Limit			
0	267.1	GROUND SURFACE					X Dynamic Cone 10 20 30 40 Undrained Shear Strength (kPa) O Unconfined + Field Vane ● Pocket Penetrometer ■ Lab Vane 40 80 120 160	PL	MC	LL			GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
0.5		FILL, clayey silt, trace sand, trace gravel, trace organics, trace top soil inclusions, stiff, brown, moist	[Cross-hatched pattern]	1	SS	11							
1.0				2	SS	10							
1.2	265.9	SILT AND CLAY, trace sand, trace gravel, very stiff, brown, moist (GLACIAL TILL)	[Diagonal hatched pattern]	3	SS	18							
1.8	265.3												

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

Project No. : 1-20-0222-02

Client : Swaminarayan Mandir Vasna Sanstha Canada

Originated by : SS

Date started : November 11, 2021

Project : 6939 King Street

Compiled by : RS

Sheet No. : 1 of 1

Location : Caledon, Ontario

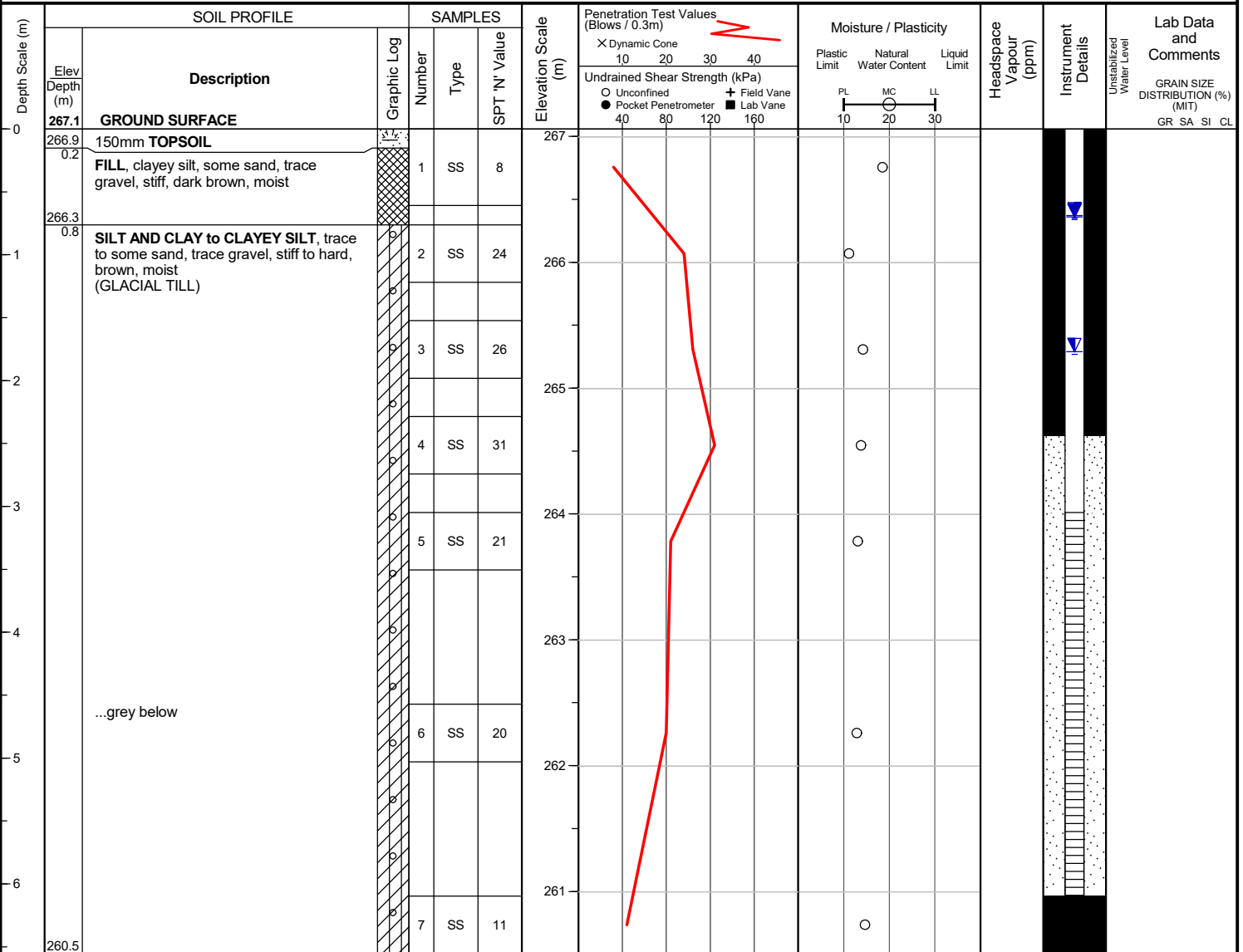
Checked by : AR

Position : E: 597102, N: 4855671 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Track-mounted

Drilling Method : Solid stem augers


END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Nov 19, 2021	1.8	265.3
Dec 1, 2021	0.7	266.4
Dec 13, 2021	0.7	266.4

Project No. : 1-20-0222-02

Client : Swaminarayan Mandir Vasna Sanstha Canada

Originated by : SS

Date started : November 11, 2021

Project : 6939 King Street

Compiled by : RS

Sheet No. : 1 of 1

Location : Caledon, Ontario

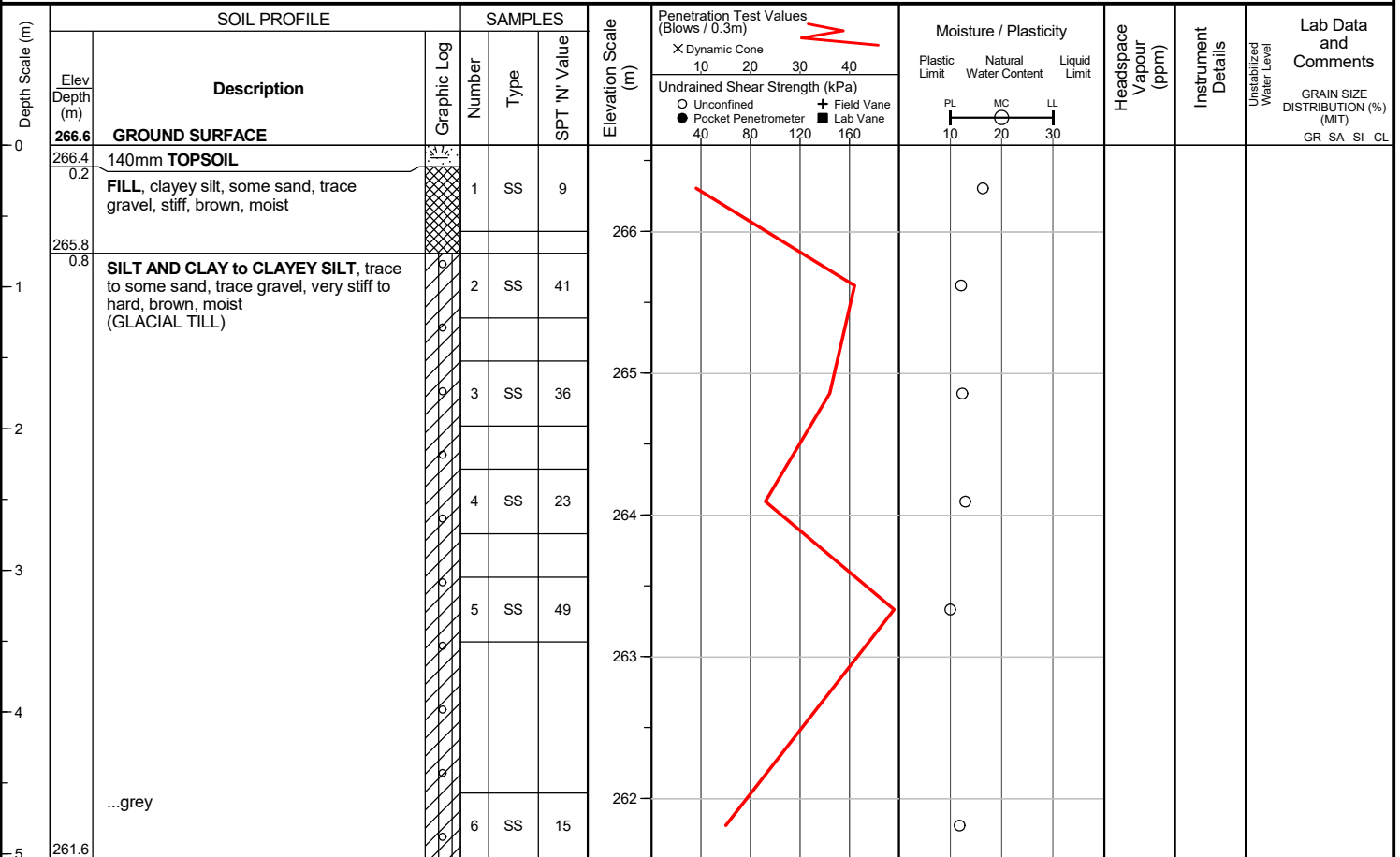
Checked by : AR

Position : E: 597140, N: 4855646 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Track-mounted

Drilling Method : Solid stem augers



Borehole was dry and open upon completion of drilling.

Project No. : 1-20-0222-02

Client : Swaminarayan Mandir Vasna Sanstha Canada

Originated by : SS

Date started : November 11, 2021

Project : 6939 King Street

Compiled by : RS

Sheet No. : 1 of 1

Location : Caledon, Ontario

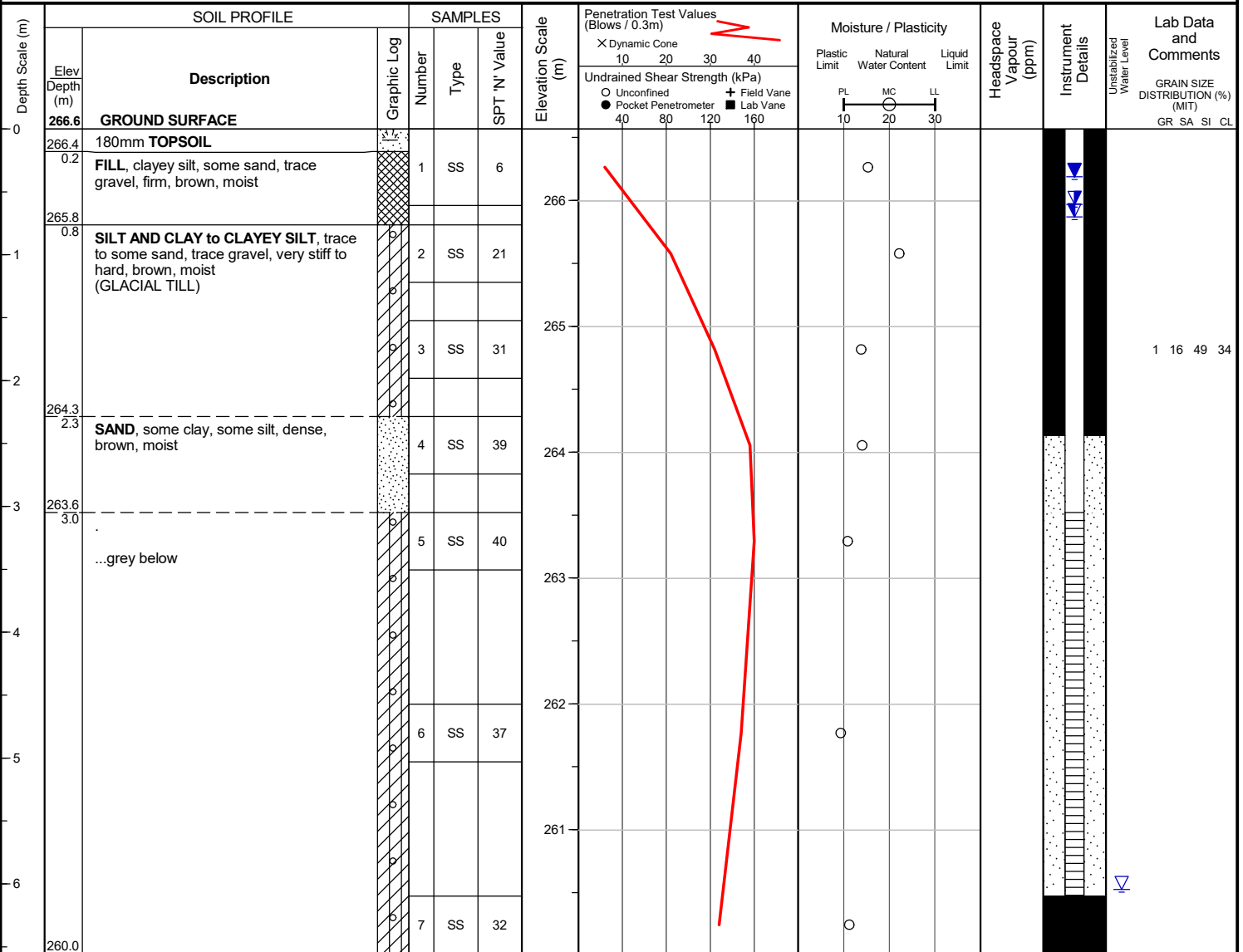
Checked by : AR

Position : E: 597105, N: 4855618 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Track-mounted

Drilling Method : Solid stem augers


END OF BOREHOLE

Unstabilized water level measured at 6.0 m below ground surface; borehole was open upon completion of drilling.

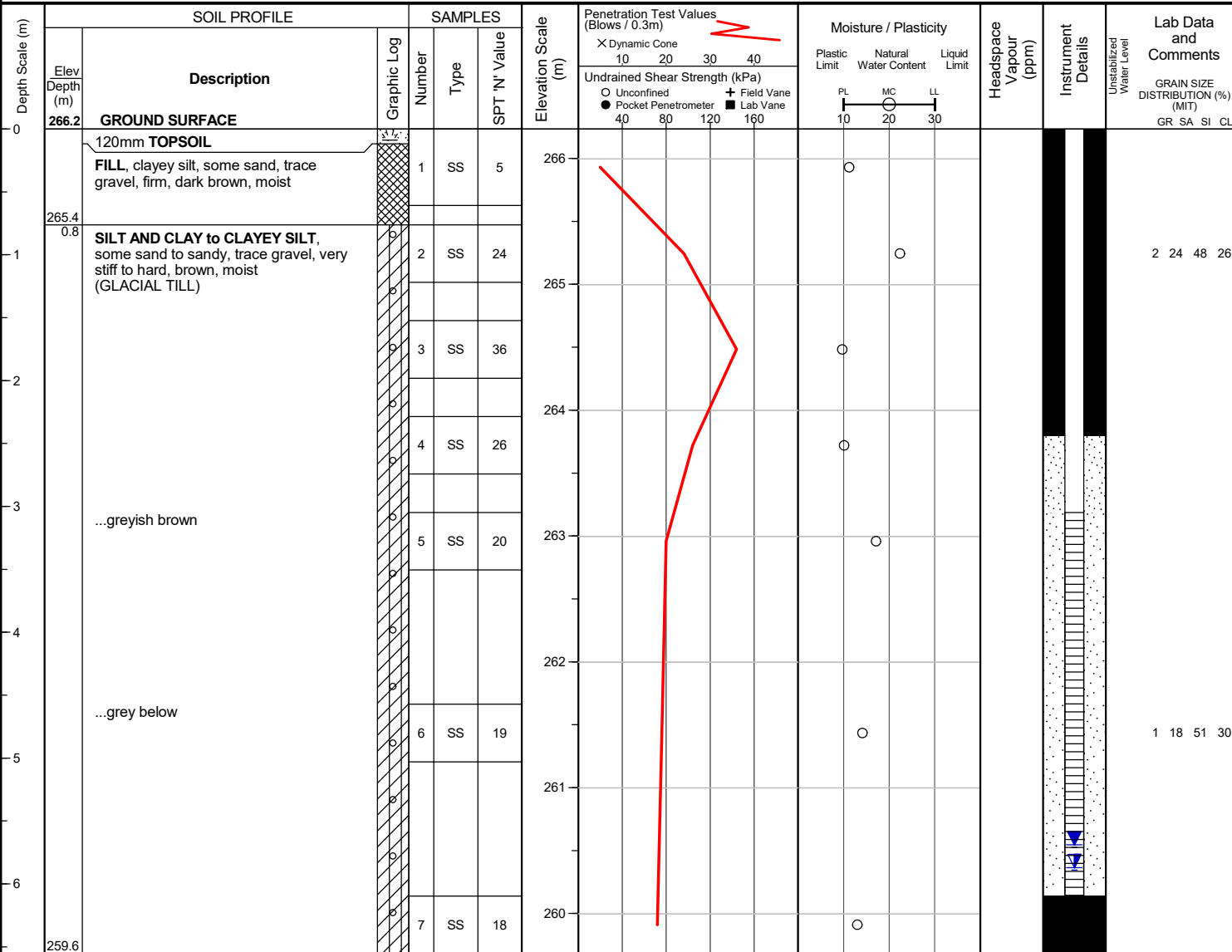
50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Nov 19, 2021	0.7	265.9
Dec 1, 2021	0.6	266.0
Dec 13, 2021	0.4	266.2

Project No. : 1-20-0222-02 Client : Swaminarayan Mandir Vasna Sanstha Canada Originated by : SS
 Date started : November 12, 2021 Project : 6939 King Street Compiled by : RS
 Sheet No. : 1 of 1 Location : Caledon, Ontario Checked by : AR

Position : E: 597253, N: 4855671 (UTM 17T) Elevation Datum : Geodetic
 Rig type : Track-mounted Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Nov 19, 2021	dry	n/a
Dec 1, 2021	5.9	260.4
Dec 13, 2021	5.7	260.5

Project No. : 1-20-0222-02

Client : Swaminarayan Mandir Vasna Sanstha Canada

Originated by : SS

Date started : November 11, 2021

Project : 6939 King Street

Compiled by : RS

Sheet No. : 1 of 1

Location : Caledon, Ontario

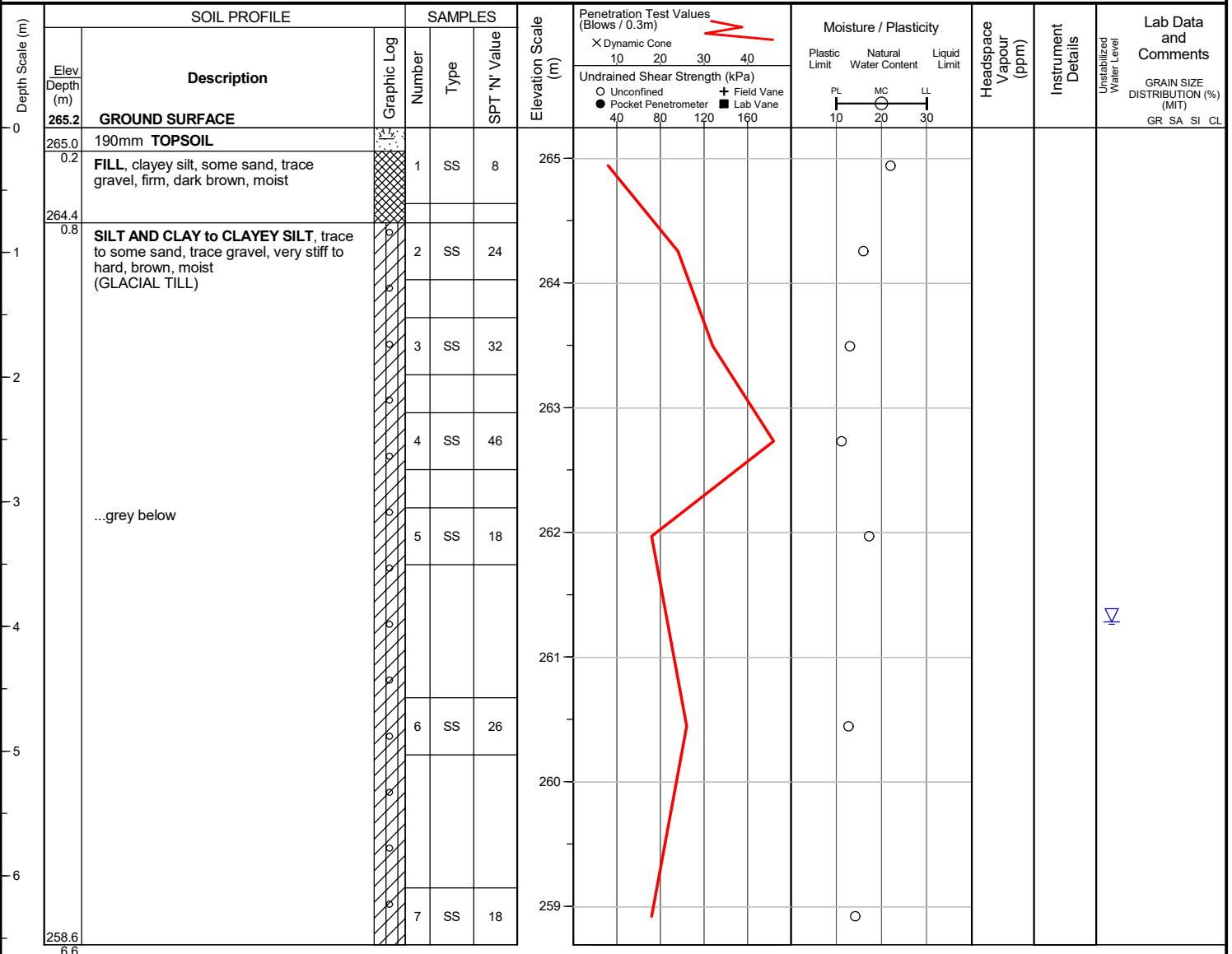
Checked by : AR

Position : E: 597183, N: 4855542 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Track-mounted

Drilling Method : Solid stem augers



Unstabilized water level measured at 4.0 m below ground surface; borehole was open upon completion of drilling.

Project No. : 1-20-0222-02

Client : Swaminarayan Mandir Vasna Sanstha Canada

Originated by : SS

Date started : November 12, 2021

Project : 6939 King Street

Compiled by : RS

Sheet No. : 1 of 1

Location : Caledon, Ontario

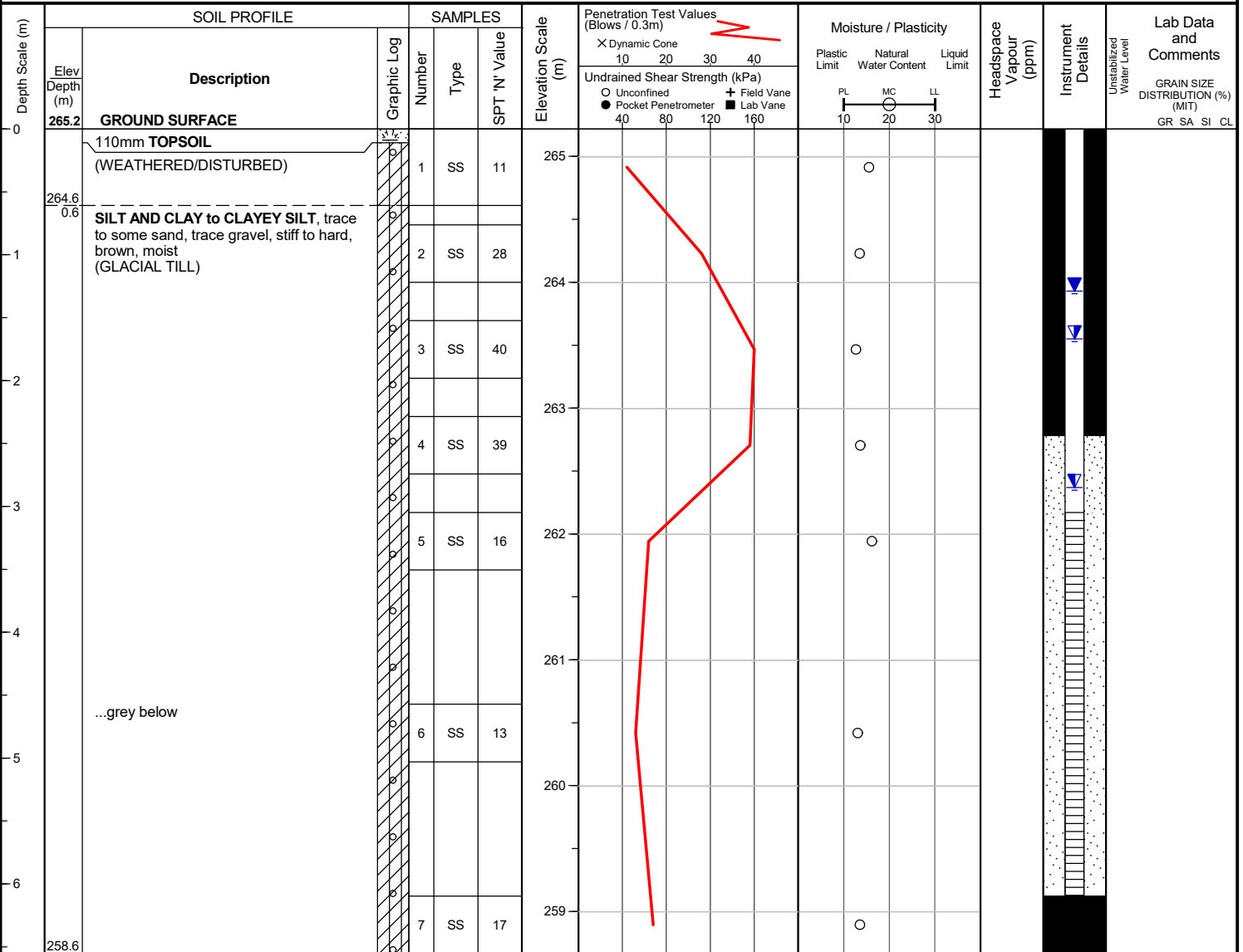
Checked by : AR

Position : E: 597215, N: 485511 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Track-mounted

Drilling Method : Solid stem augers


END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Nov 19, 2021	2.9	262.4
Dec 1, 2021	1.7	263.5
Dec 13, 2021	1.3	263.9

Project No. : 1-20-0222-02

Client : Swaminarayan Mandir Vasna Sanstha Canada

Originated by : SS

Date started : November 12, 2021

Project : 6939 King Street

Compiled by : RS

Sheet No. : 1 of 1

Location : Caledon, Ontario

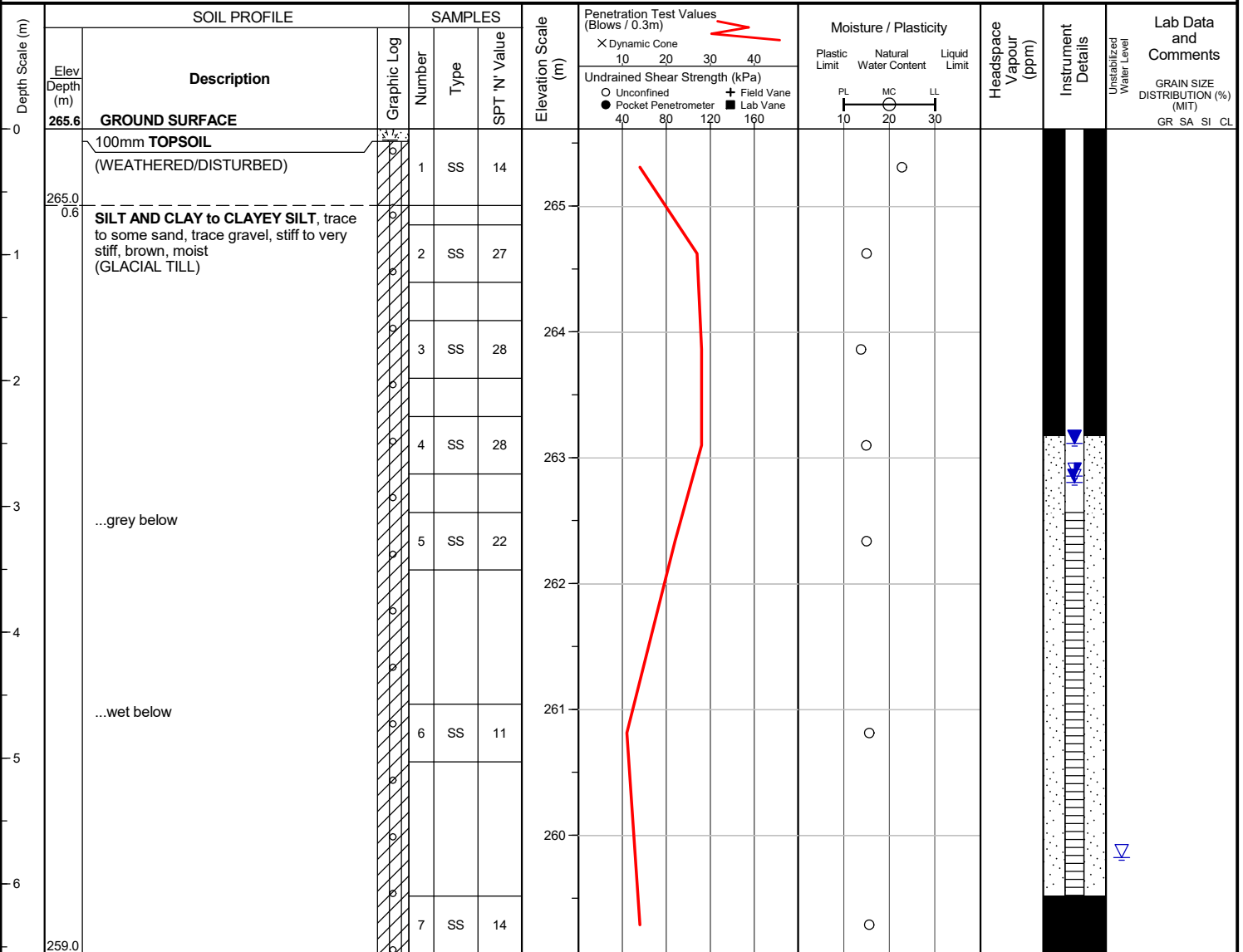
Checked by : AR

Position : E: 597308, N: 4855648 (UTM 17T)

Elevation Datum : Geodetic

Rig type : Track-mounted

Drilling Method : Solid stem augers


END OF BOREHOLE

Unstabilized water level measured at 5.8 m below ground surface; borehole was open upon completion of drilling.

50 mm dia. monitoring well installed.

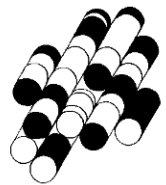
WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Nov 19, 2021	2.8	262.8
Dec 1, 2021	2.8	262.9
Dec 13, 2021	2.5	263.1

APPENDIX B

MECP Well Records

TERRAPROBE INC.



MECP Well Records Summary

WEL L ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Well Usage		Water Found (m)**	Static Water Level (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**	Date Completed
				Final Status	First Use					
1	4904482	Boring	-	Water Supply	Domestic	7.02	-	-	-	Tuesday, July 16, 1974
2	7205984	-	-	-	-	-	-	-	-	Wednesday, July 3, 2013
3	4903012	Cable Tool	-	Water Supply	Domestic	10.98	0.31	-	-	Wednesday, July 10, 1968
4	4908359	Cable Tool	18.30	Water Supply	Domestic	13.73	-	15.56	18.30	Thursday, September 10, 1998
5	4906340	Boring	-	Water Supply	Domestic	7.32	7.32	-	-	Friday, June 7, 1985
6	7130480	Boring	10.37	Observation Wells	Monitoring	7.93	-	7.32	10.37	Tuesday, May 5, 2009
7	4902999	Boring	-	Water Supply	Domestic	17.39	-	-	-	Thursday, May 9, 1968
8	7291154	Direct Push	4.58	Monitoring and Test Hole	Test Hole	-	-	3.05	4.58	Tuesday, June 13, 2017
9	7291153	Direct Push	4.58	Monitoring and Test Hole	Test Hole	-	-	0.03	4.58	Tuesday, June 13, 2017
10	4904010	Cable Tool	32.64	Water Supply	Domestic	27.45	0.00	31.72	32.64	Monday, September 11, 1972

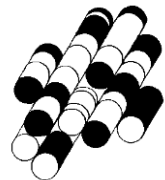
*MECP WWID: Ministry of the Environment , Conservation and Parks Water Well Records Identification

**metres below ground surface

APPENDIX C

Groundwater Monitoring Details

TERRAPROBE INC.



6939 King Street, Caledon

Ground Water Depths (m below ground surface)

Monitoring Well	Ground Elevation (masl)	Well Depth (mbgs)	Top of the Well Screen Depth (mbgs)	Stick Up	READING 1	READING 2	READING 3	READING 4	READING 5	READING 6
					Water Depth October 5, 2020 (mbgs)*	Water Depth October 13, 2020 (mbgs)	Water Depth October 20, 2020 (mbgs)	Water Depth November 19, 2021 (mbgs)*	Water Depth December 1, 2021 (mbgs)	Water Depth December 13, 2021 (mbgs)
BH1	266.77	7.60	4.60	0.92	0.95	5.73	5.00	2.37	2.64	2.90
BH3	266.32	7.60	4.60	0.80	3.13	3.70	2.34	2.60	2.58	2.57
BH5	266.43	7.60	4.60	0.80	2.33	3.72	2.11	4.18	4.24	4.29
BH101	267.06	6.10	3.10	1.16	NI	NI	NI	1.77	0.69	0.70
BH103	266.57	6.10	3.10	0.97	NI	NI	NI	0.69	0.62	0.38
BH104	266.24	6.10	3.10	0.96	NI	NI	NI	Dry	5.87	5.69
BH106	265.22	6.10	3.10	1.13	NI	NI	NI	2.85	1.67	1.29
BH107	265.61	6.10	3.10	0.92	NI	NI	NI	2.81	2.76	2.50

Ground Water Elevations (m above sea level)

Monitoring Well	Ground Elevation (masl)	Well Screen (10 feet) Bottom Elevation (masl)	Well Screen (10 feet) Top Elevation (masl)	Top of Riser Elevation (masl)	READING 1	READING 2	READING 3	READING 4	READING 5	READING 6
					Groundwater Elevation October 5, 2020 (masl)*	Groundwater Elevation October 13, 2020 (masl)	Groundwater Elevation October 20, 2020 (masl)	Groundwater Elevation November 19, 2021 (masl)*	Groundwater Elevation December 1, 2021 (masl)	Groundwater Elevation December 13, 2021 (masl)
BH1	266.77	259.17	262.17	267.69	265.82	261.04	261.77	264.40	264.13	263.87
BH3	266.32	258.72	261.72	267.12	263.19	262.62	263.98	263.72	263.74	263.75
BH5	266.43	258.83	261.83	267.23	264.10	262.71	264.32	262.25	262.19	262.14
BH101	267.06	260.96	263.96	268.22	NI	NI	NI	265.29	266.37	266.36
BH103	266.57	260.47	263.47	267.54	NI	NI	NI	265.88	265.95	266.19
BH104	266.24	260.14	263.14	267.20	NI	NI	NI	Dry	260.37	260.55
BH106	265.22	259.12	262.12	266.35	NI	NI	NI	262.37	263.55	263.93
BH107	265.61	259.51	262.51	266.53	NI	NI	NI	262.80	262.85	263.11

Note: mbgs - meters below ground surface

masl - meters above sea level

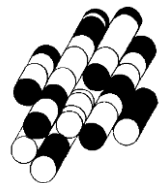
NI - Not Installed

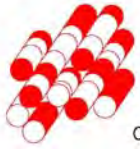
*Groundwater levels in undeveloped wells

APPENDIX D

In-situ Hydraulic Conductivity Test Results

TERRAPROBE INC.





Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

Slug Test Analysis Report

Project: 6939 King Street

Number: 1-20-0222-46

Client: Swaminarayan Mandir Vasna Sansthan Canada

Location: Caledon

Slug Test: BH1

Test Well: BH1

Test Conducted by: JB

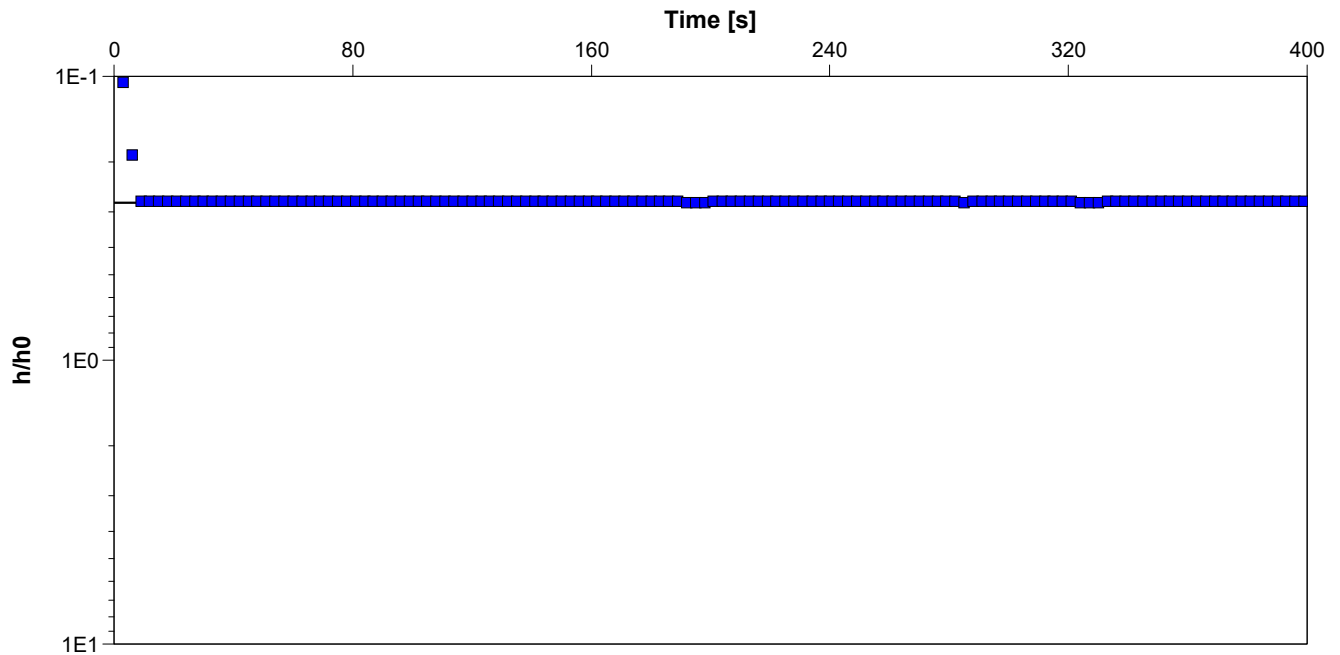
Test Date: 10/13/2020

Analysis Performed by: AN

BH1 - FHT

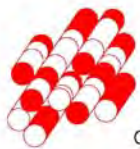
Analysis Date: 10/14/2020

Aquifer Thickness: 1.40 m



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
BH1	4.25×10^{-9}



Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

Slug Test Analysis Report

Project: 6939 King Street

Number: 1-20-0222-46

Client: Swaminarayan Mandir Vasna Sansthan Canada

Location: Caledon

Slug Test: BH3

Test Well: BH3

Test Conducted by: JB

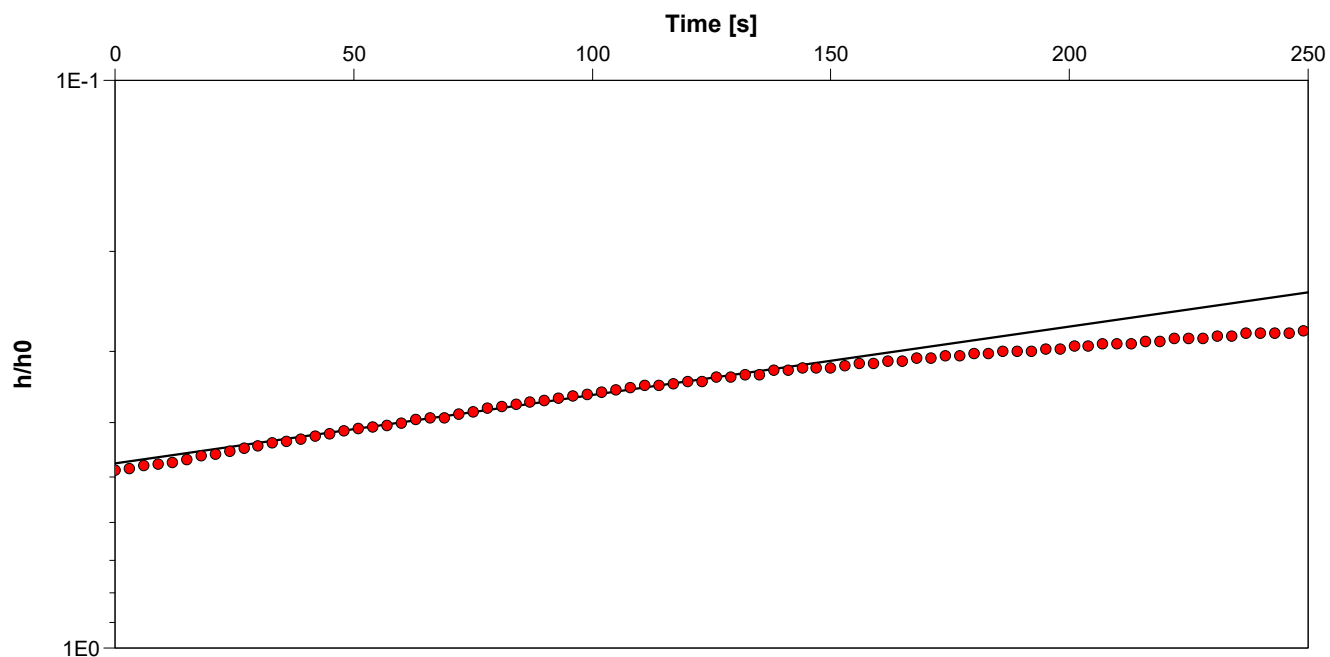
Test Date: 10/13/2020

Analysis Performed by: AN

BH3 - FHT

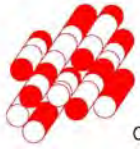
Analysis Date: 10/14/2020

Aquifer Thickness: 3.40 m



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
BH3	1.08×10^{-6}



Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

Slug Test Analysis Report

Project: 6939 King Street

Number: 1-20-0222-46

Client: Swaminarayan Mandir Vasna Sansthan Canada

Location: Caledon

Slug Test: BH5

Test Well: BH5

Test Conducted by: JB

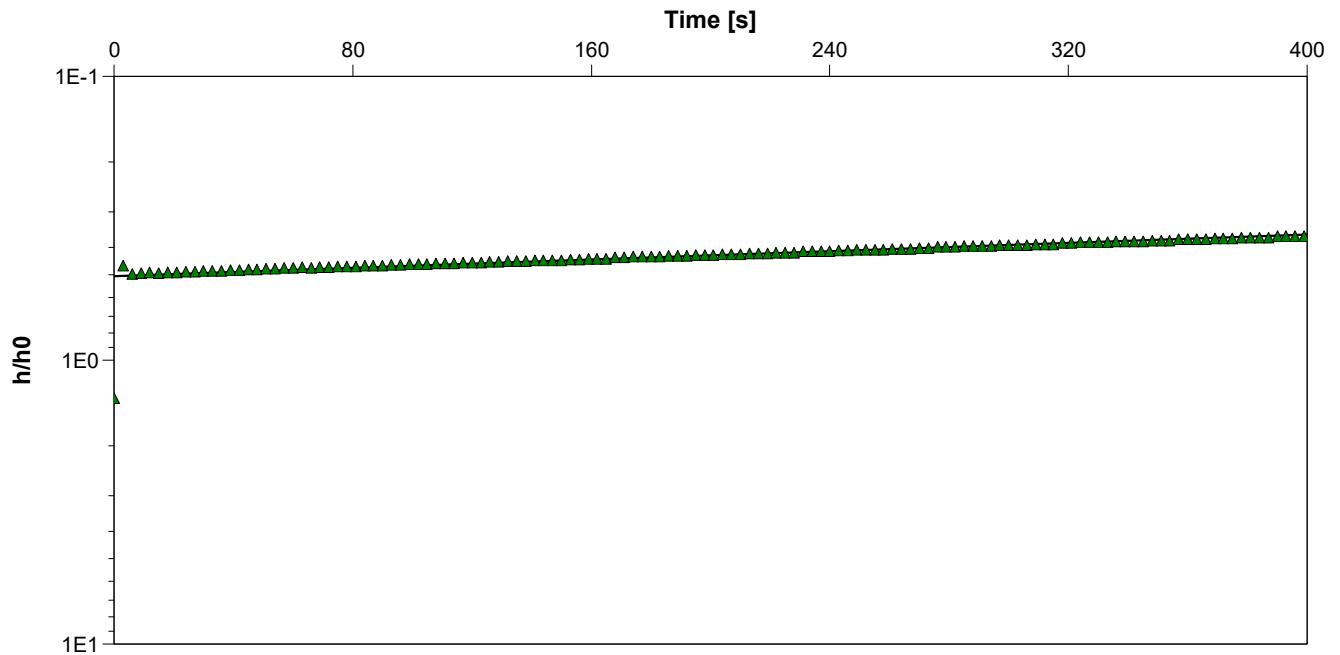
Test Date: 10/13/2020

Analysis Performed by: AN

BH5 - FHT

Analysis Date: 10/14/2020

Aquifer Thickness: 3.50 m



Calculation using Bouwer & Rice

Observation Well

Hydraulic Conductivity
[m/s]

BH5

3.22×10^{-7}



Terraprobe

Slug Test Analysis Report

Project: 6939 King Street

Number: 1-20-0222-46

Client: Swaminarayan Mandir Vasna Sansthan Canada

Location: Caledon

Slug Test: BH1

Test Well: BH1

Test Conducted by: JB

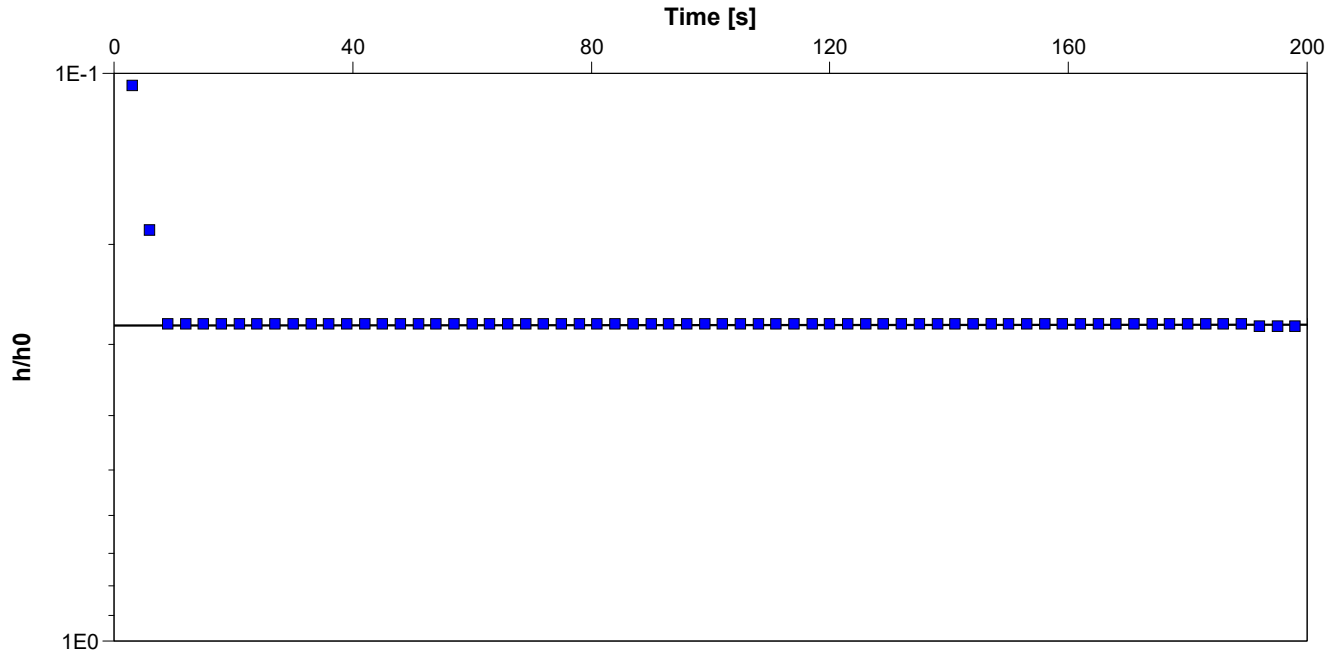
Test Date: 10/13/2020

Analysis Performed by: AN

BH1 - FHT

Analysis Date: 10/14/2020

Aquifer Thickness: 1.40 m



Calculation using Bouwer & Rice

Observation Well

Hydraulic Conductivity
[m/s]

BH1

4.25×10^{-9}



Terraprobe

Slug Test Analysis Report

Project: 6939 King Street

Number: 1-20-0222-46

Client: Swaminarayan Mandir Vasna Sansthan Canada

Location: Caledon

Slug Test: BH3

Test Well: BH3

Test Conducted by: JB

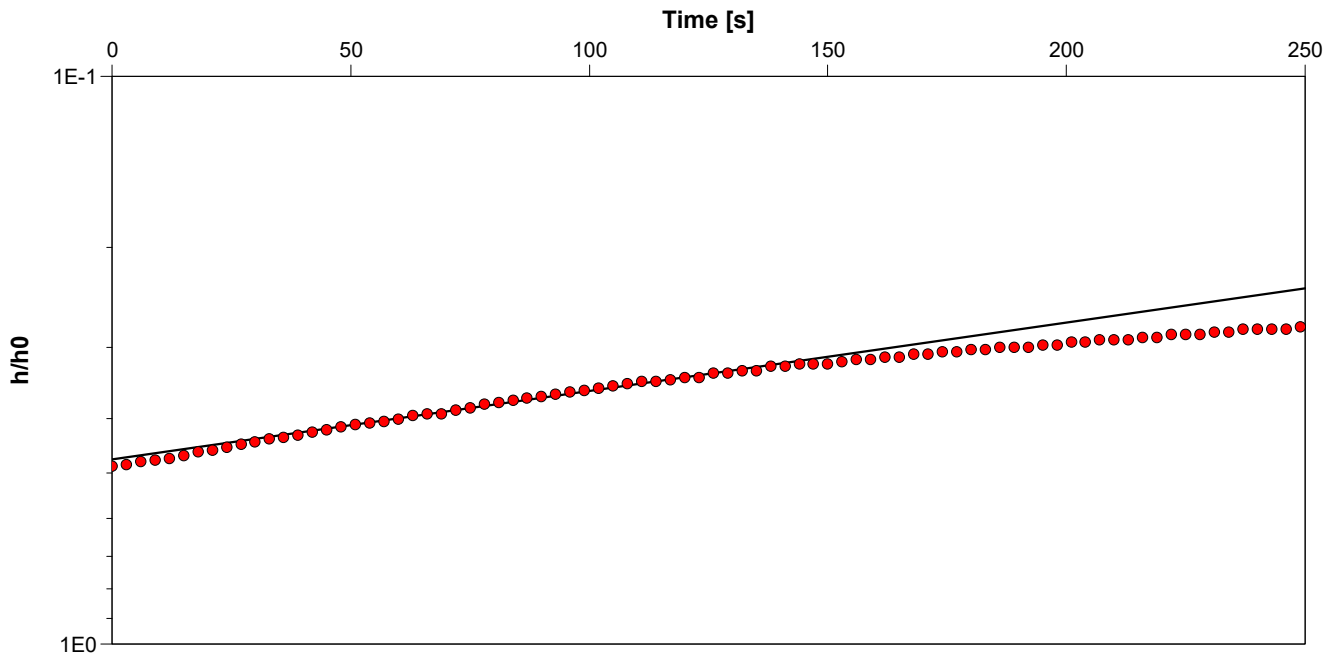
Test Date: 10/13/2020

Analysis Performed by: AN

BH3 - FHT

Analysis Date: 10/14/2020

Aquifer Thickness: 3.40 m



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
BH3	1.08×10^{-6}



Terraprobe

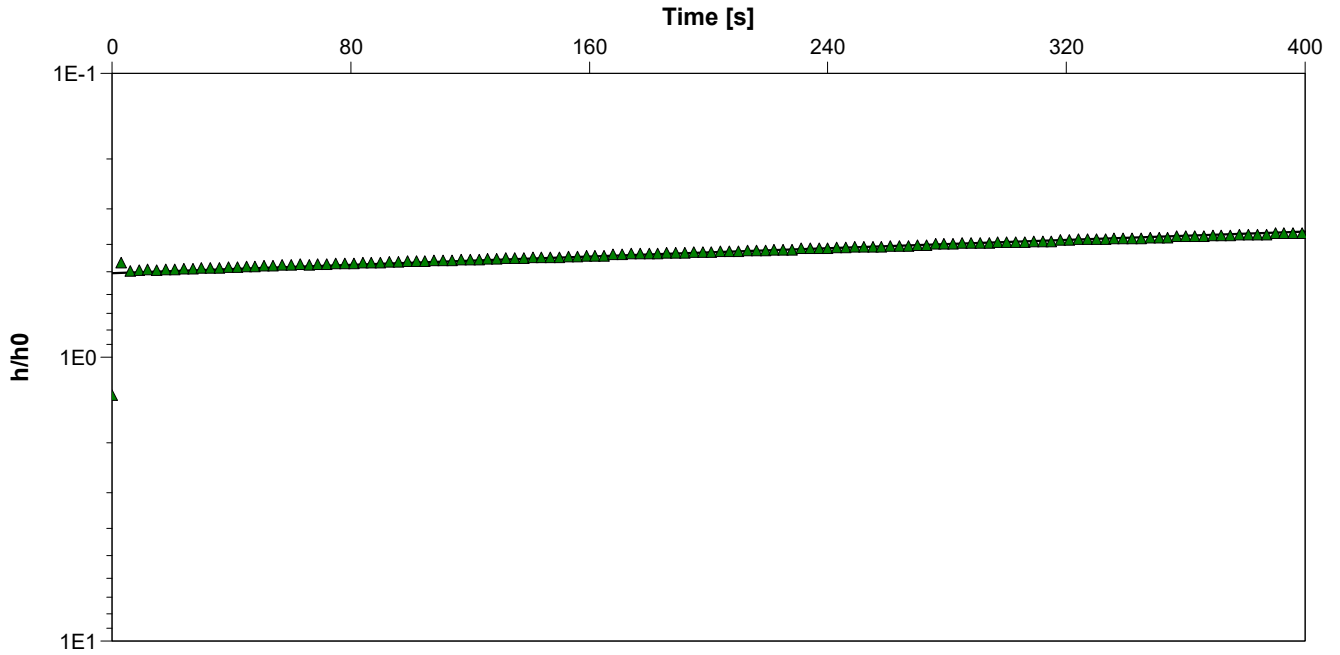
Slug Test Analysis Report

Project: 6939 King Street

Number: 1-20-0222-46

Client: Swaminarayan Mandir Vasna Sansthan Canada

Location: Caledon	Slug Test: BH5	Test Well: BH5
Test Conducted by: JB		Test Date: 10/13/2020
Analysis Performed by: AN	BH5 - FHT	Analysis Date: 10/14/2020
Aquifer Thickness: 3.50 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH5	3.22×10^{-7}	



Terraprobe

Slug Test Analysis Report

Project: 6939 King Street

Number: 1-20-0222-46

Client: Swaminarayan Mandir Vasna Sansthan Canada

Location: Caledon

Slug Test: BH101

Test Well: BH101

Test Conducted by: BR

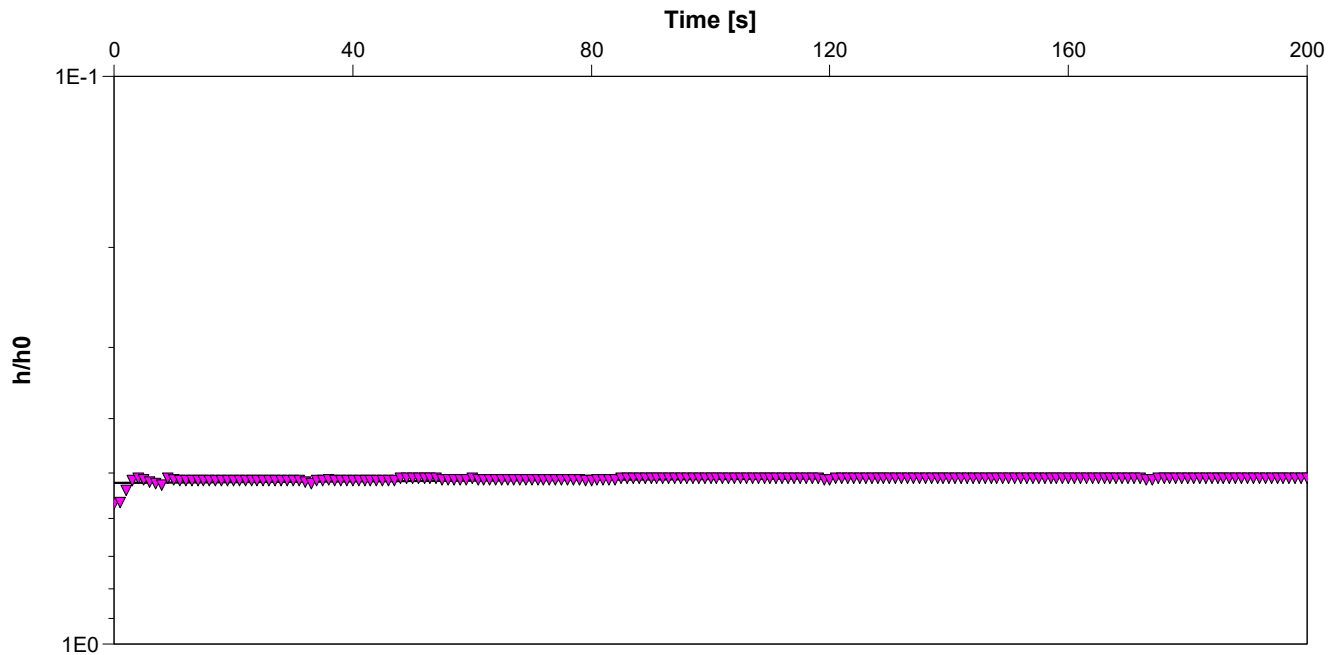
Test Date: 12/1/2021

Analysis Performed by: AN

FHT - BH101

Analysis Date: 1/7/2022

Aquifer Thickness: 5.50 m



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
BH101	6.46×10^{-8}



Terraprobe

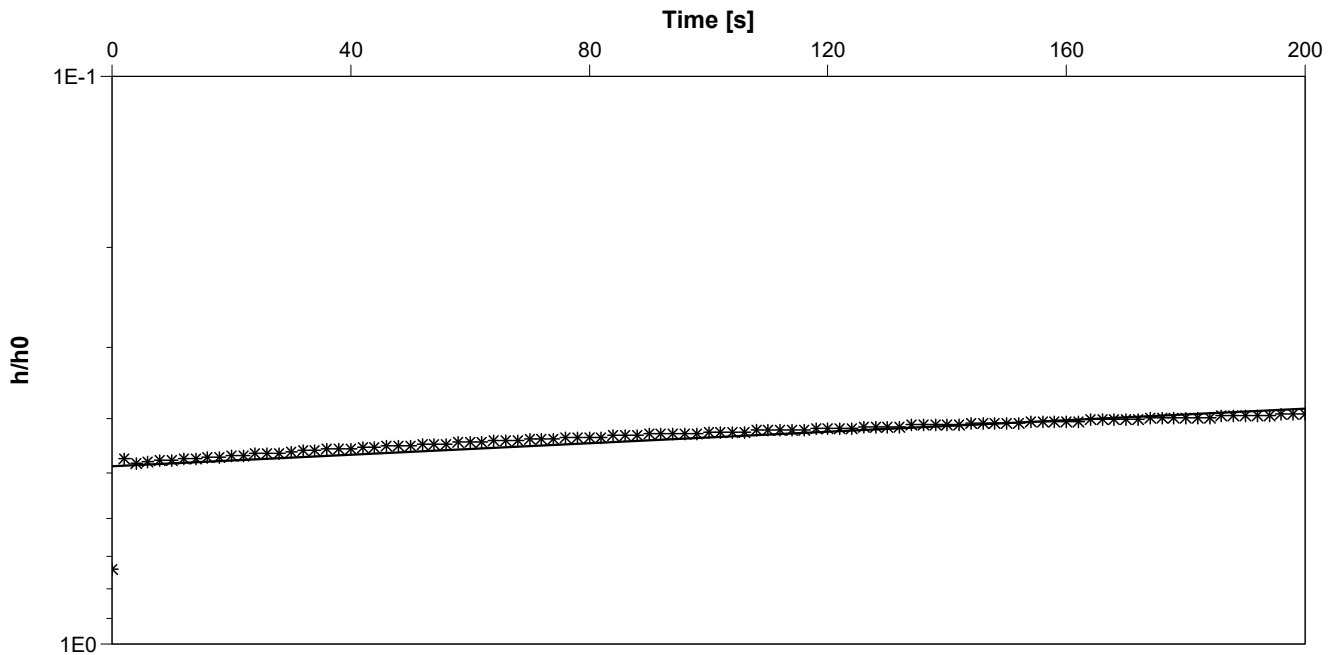
Slug Test Analysis Report

Project: 6939 King Street

Number: 1-20-0222-46

Client: Swaminarayan Mandir Vasna Sansthan Canada

Location: Caledon	Slug Test: BH103	Test Well: BH103
Test Conducted by: BR		Test Date: 12/1/2021
Analysis Performed by: AN	FHT - BH103	Analysis Date: 1/7/2022
Aquifer Thickness: 5.50 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH103	5.00×10^{-7}	



Terraprobe

Slug Test Analysis Report

Project: 6939 King Street

Number: 1-20-0222-46

Client: Swaminarayan Mandir Vasna Sansthan Canada

Location: Caledon

Slug Test: BH104

Test Well: BH104

Test Conducted by: OH

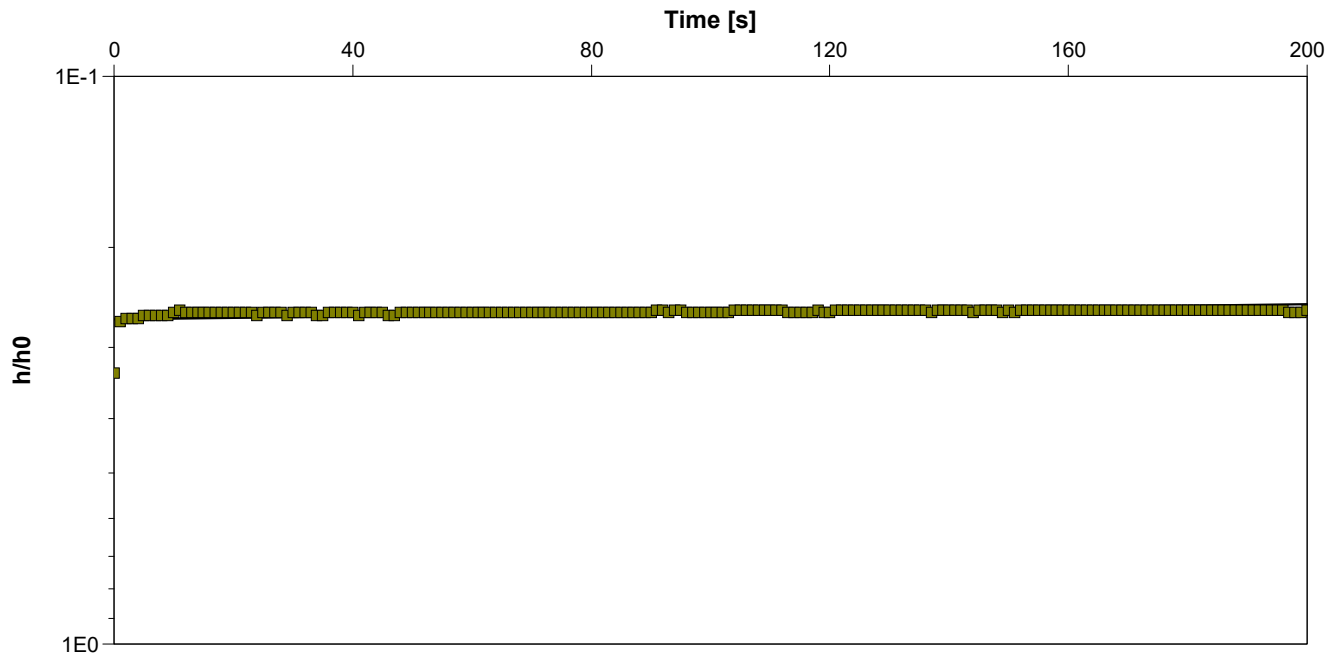
Test Date: 12/13/2021

Analysis Performed by: AN

RHT - BH104

Analysis Date: 1/7/2022

Aquifer Thickness: 0.50 m



Calculation using Bouwer & Rice

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

BH104	7.32×10^{-8}
-------	-----------------------



Terraprobe

Slug Test Analysis Report

Project: 6939 King Street

Number: 1-20-0222-46

Client: Swaminarayan Mandir Vasna Sansthan Canada

Location: Caledon

Slug Test: BH106

Test Well: BH106

Test Conducted by: BR

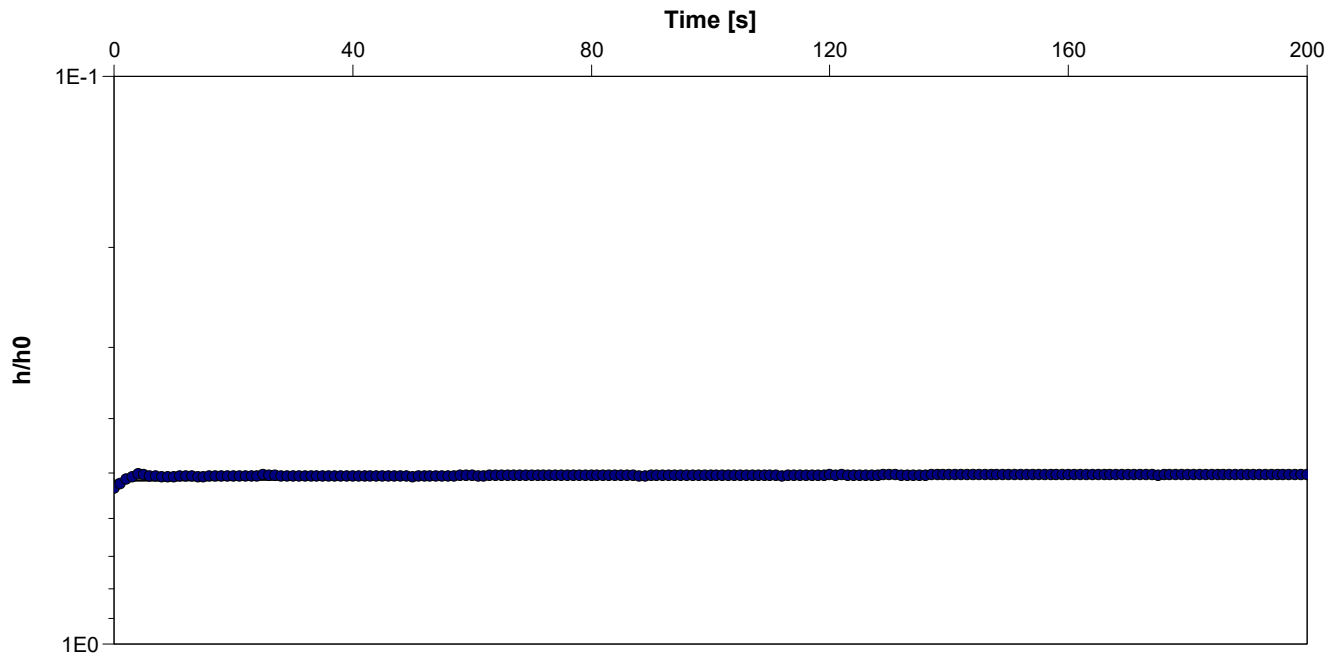
Test Date: 12/1/2021

Analysis Performed by: AN

FHT - BH106

Analysis Date: 1/7/2022

Aquifer Thickness: 4.50 m



Calculation using Bouwer & Rice

Observation Well

Hydraulic Conductivity
[m/s]

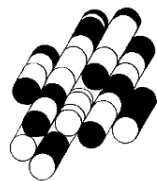
BH106

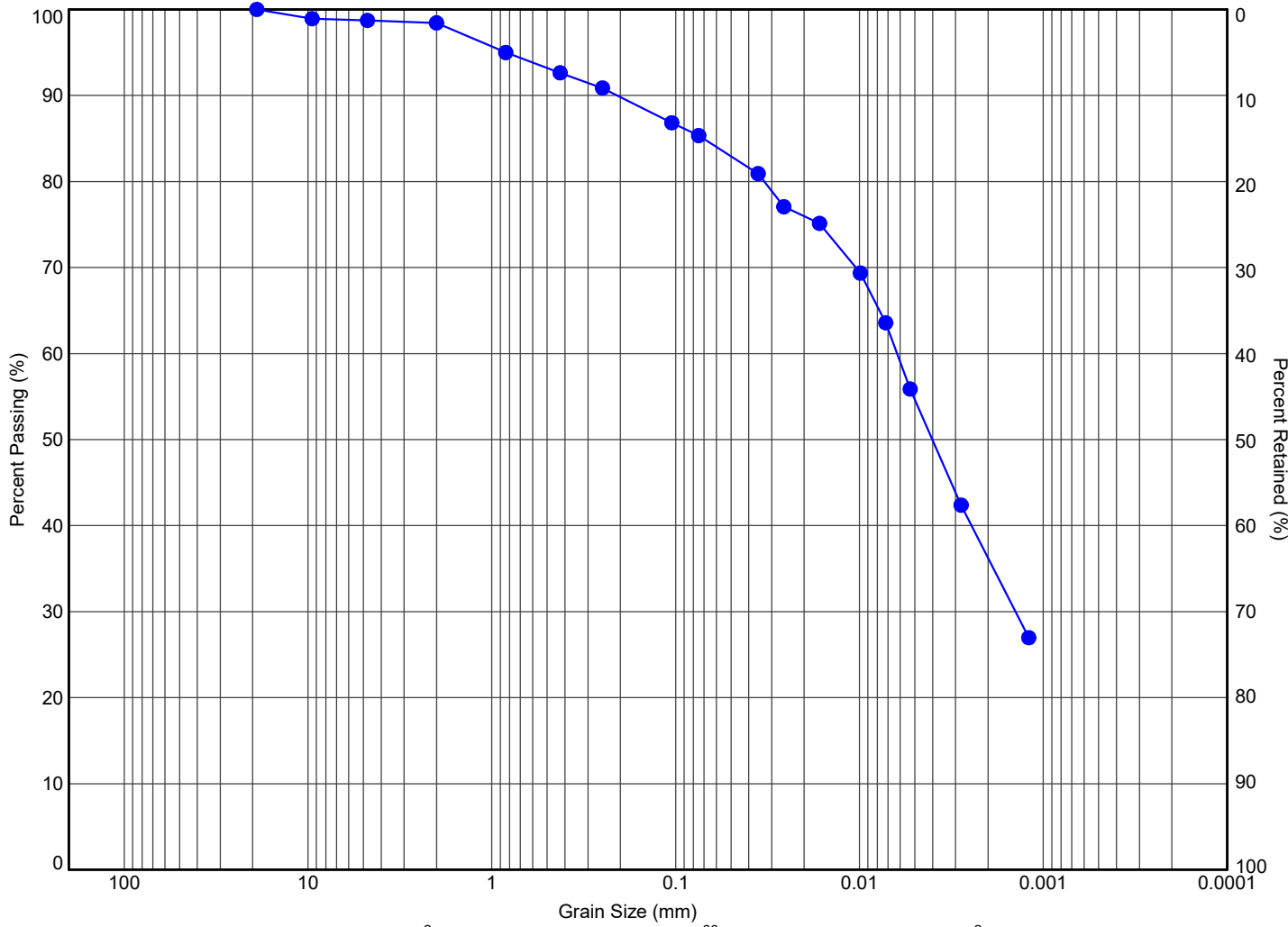
6.05×10^{-8}

APPENDIX E

Hydraulic Conductivity Using Grain Size Distribution Graphs

TERRAPROBE INC.





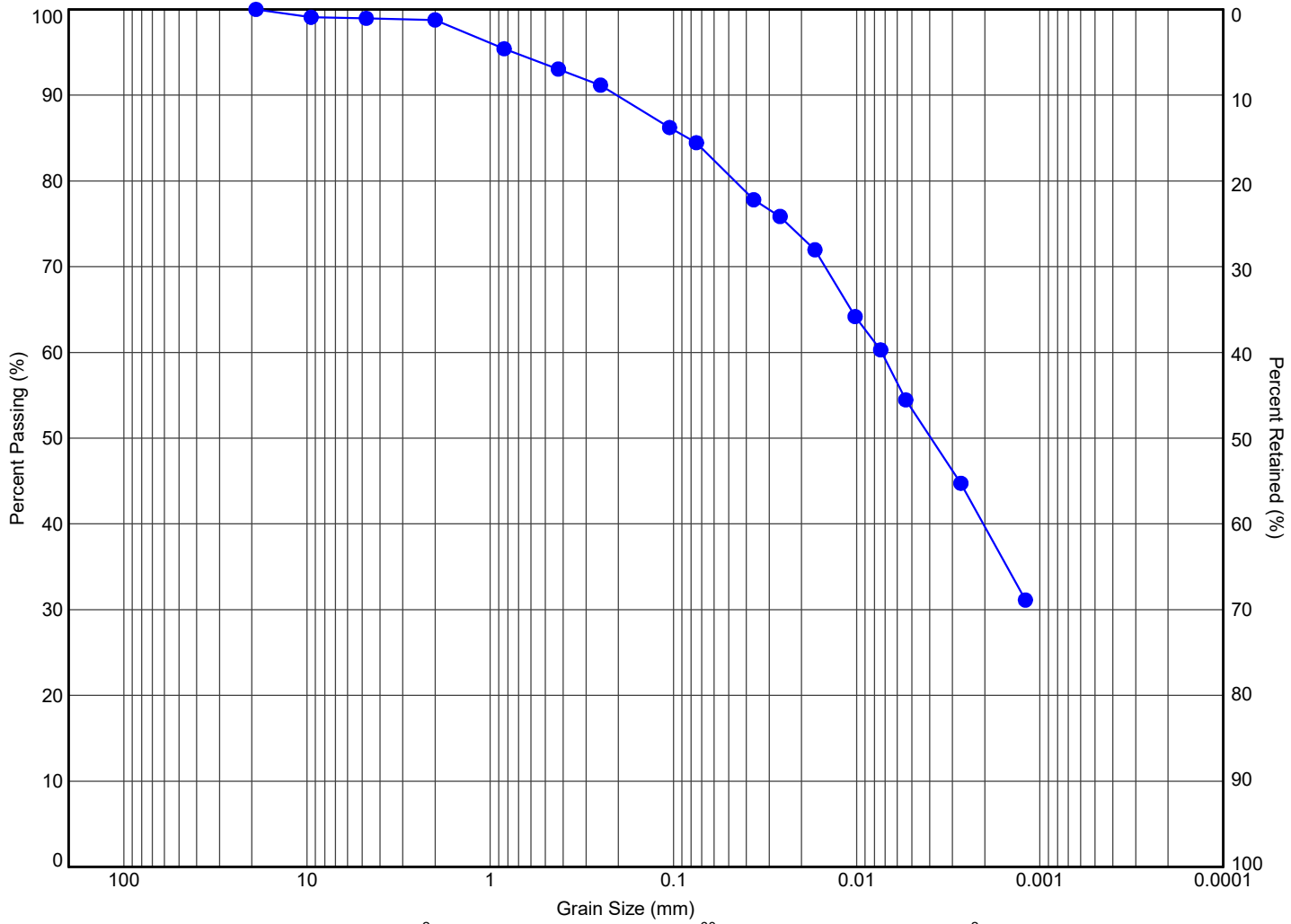
MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM									
Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	(Fines, %)	
● 1	SS3	1.8	265.0	2	14	48	36		



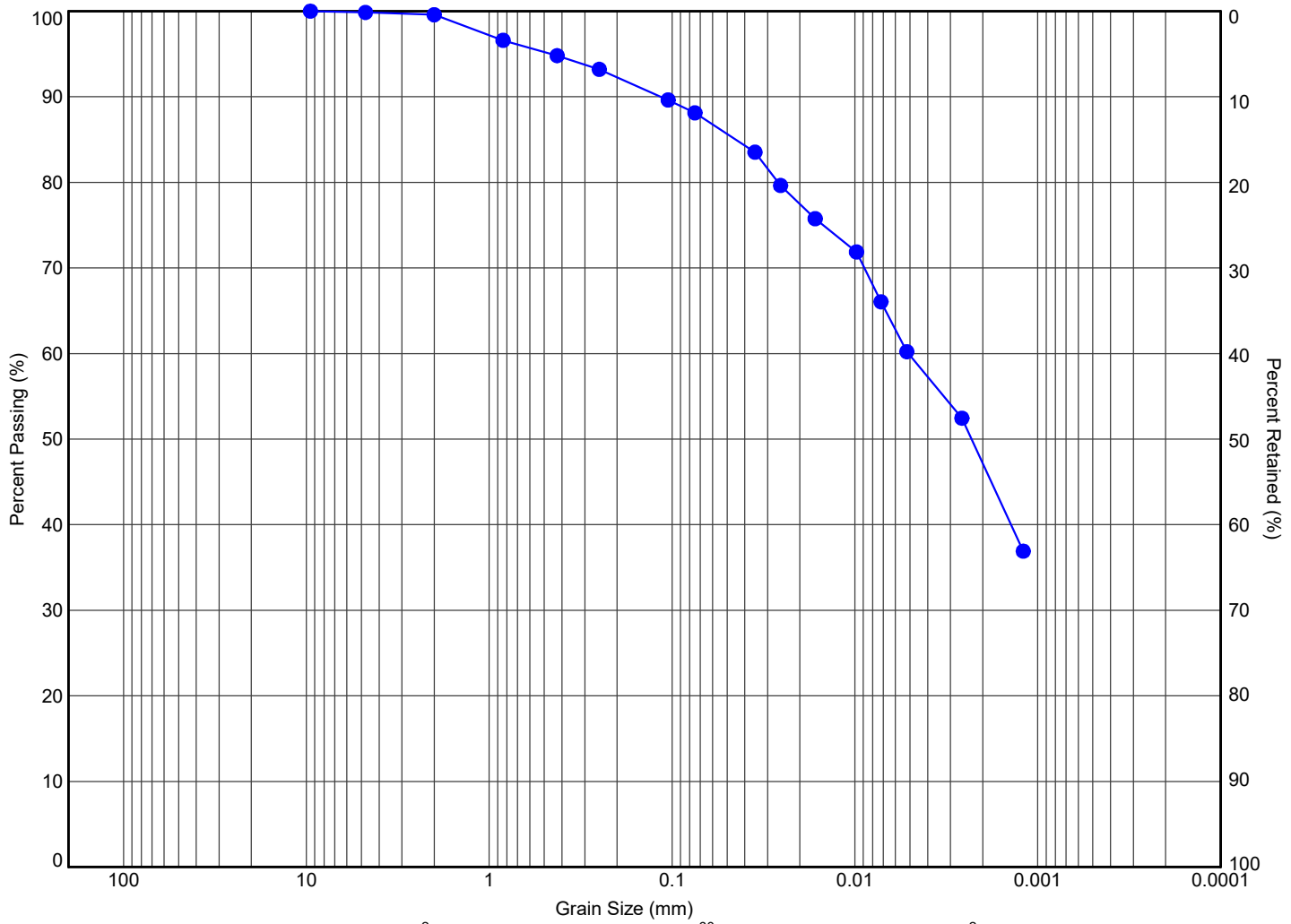
Title: **GRAIN SIZE DISTRIBUTION
SILT AND CLAY, SOME SAND, TRACE GRAVEL**

File No.: **1-20-0222-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM									
Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	(Fines, %)	
● 3	SS4	2.5	263.8	1	16	43	40		



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM									
Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	(Fines, %)	
● 5	SS3	1.8	264.6	0	13	40	47		



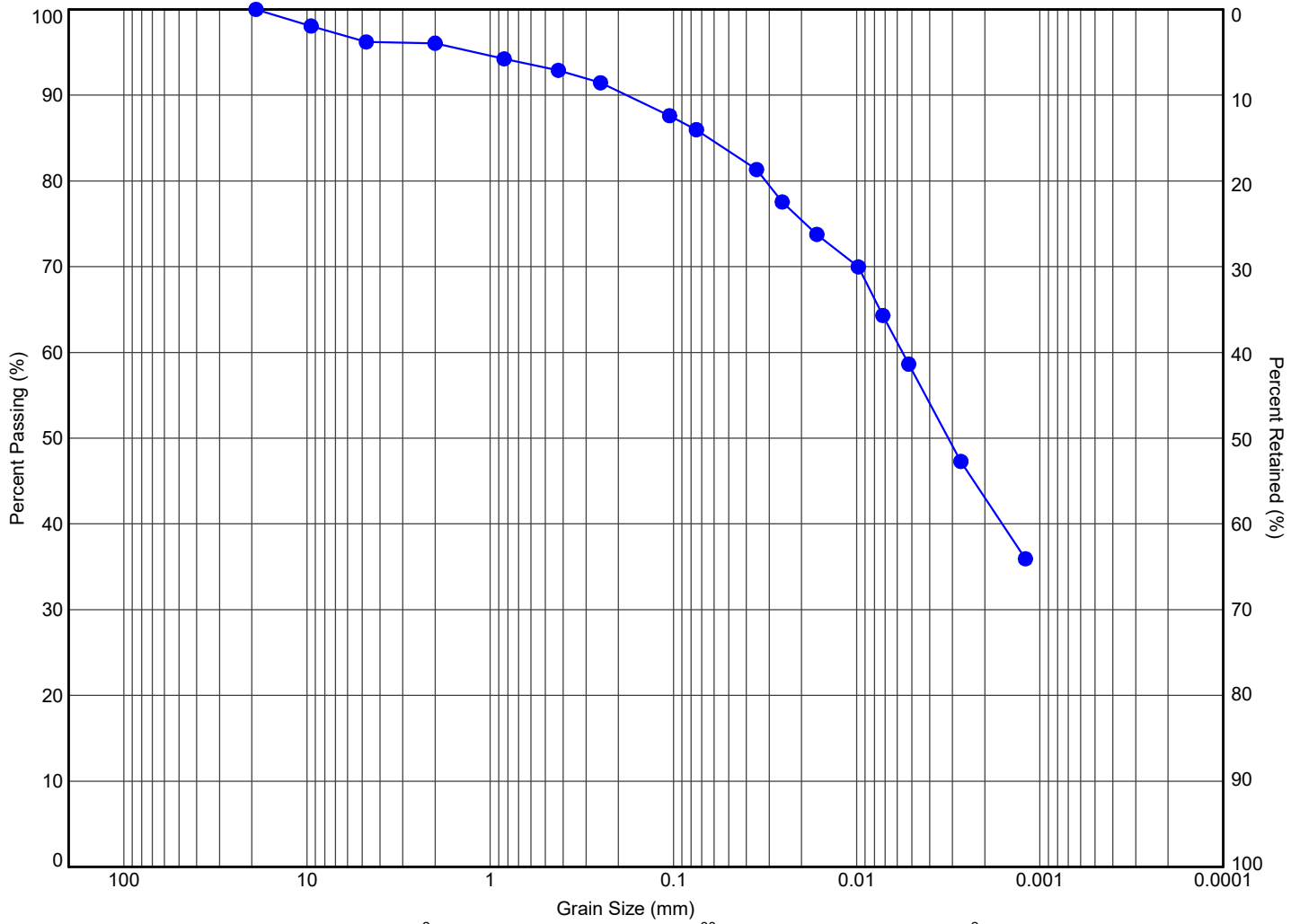
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

**GRAIN SIZE DISTRIBUTION
CLAY AND SILT, SOME SAND**

File No.:

1-20-0222-01



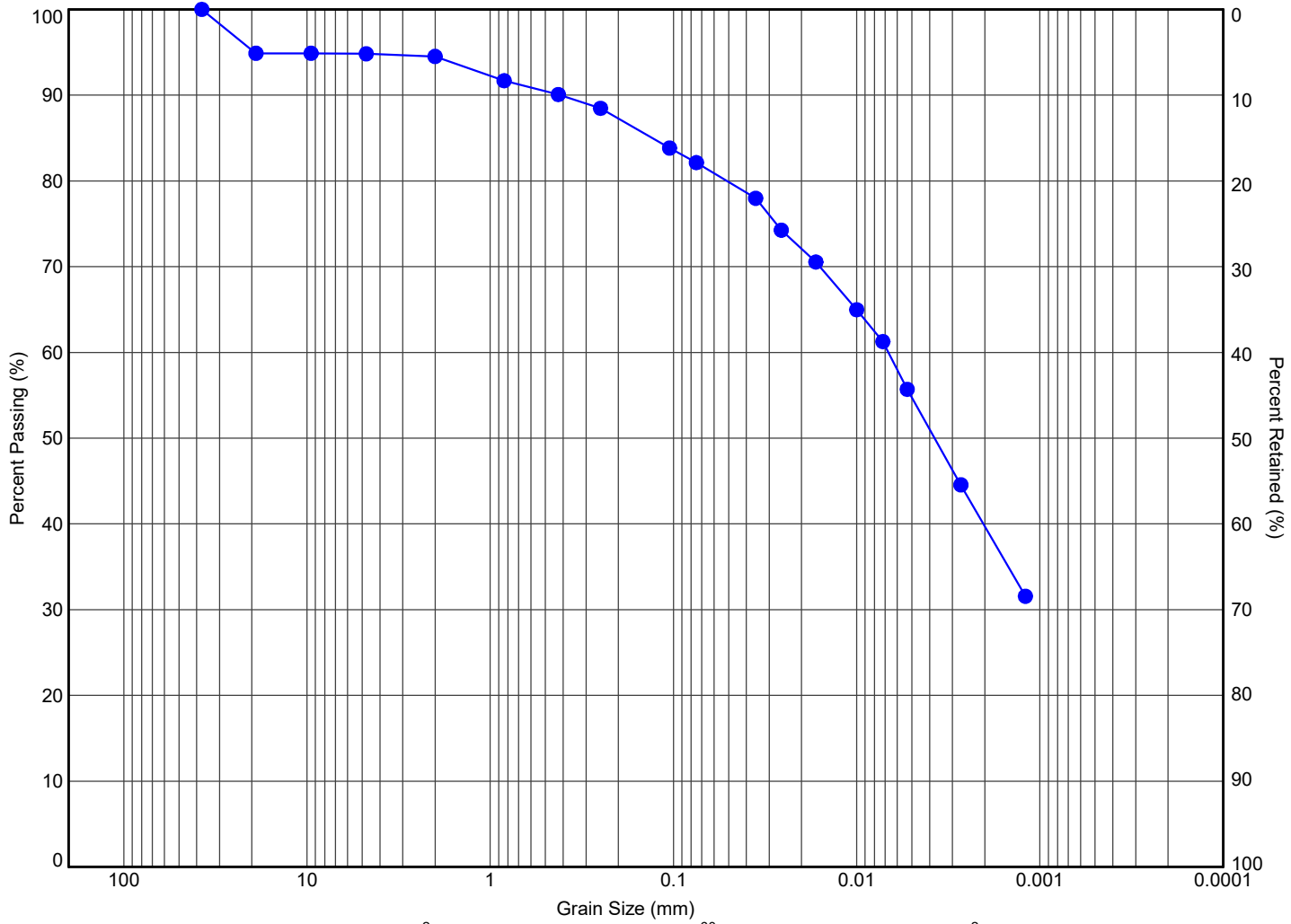
MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM									
Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	(Fines, %)	
● 8	SS2	1.0	266.0	4	11	42	43		



Title: **GRAIN SIZE DISTRIBUTION
CLAY AND SILT, SOME SAND, TRACE GRAVEL**

File No.: **1-20-0222-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

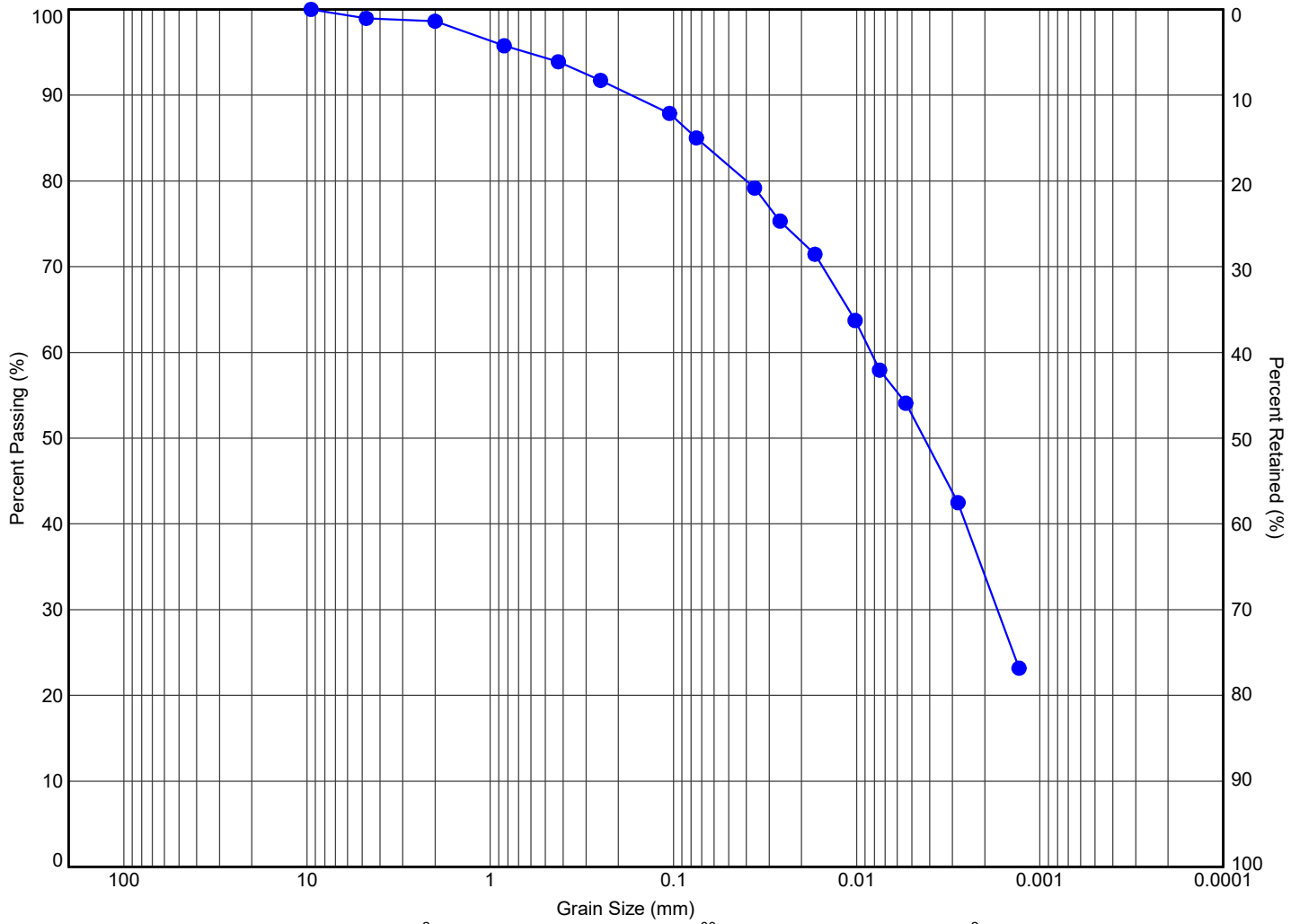
Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	(Fines, %)
● 11	SS2	0.9	266.2	6	13	41	40	



11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title: **GRAIN SIZE DISTRIBUTION
SILT AND CLAY, SOME SAND, TRACE GRAVEL**

File No.: **1-20-0222-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

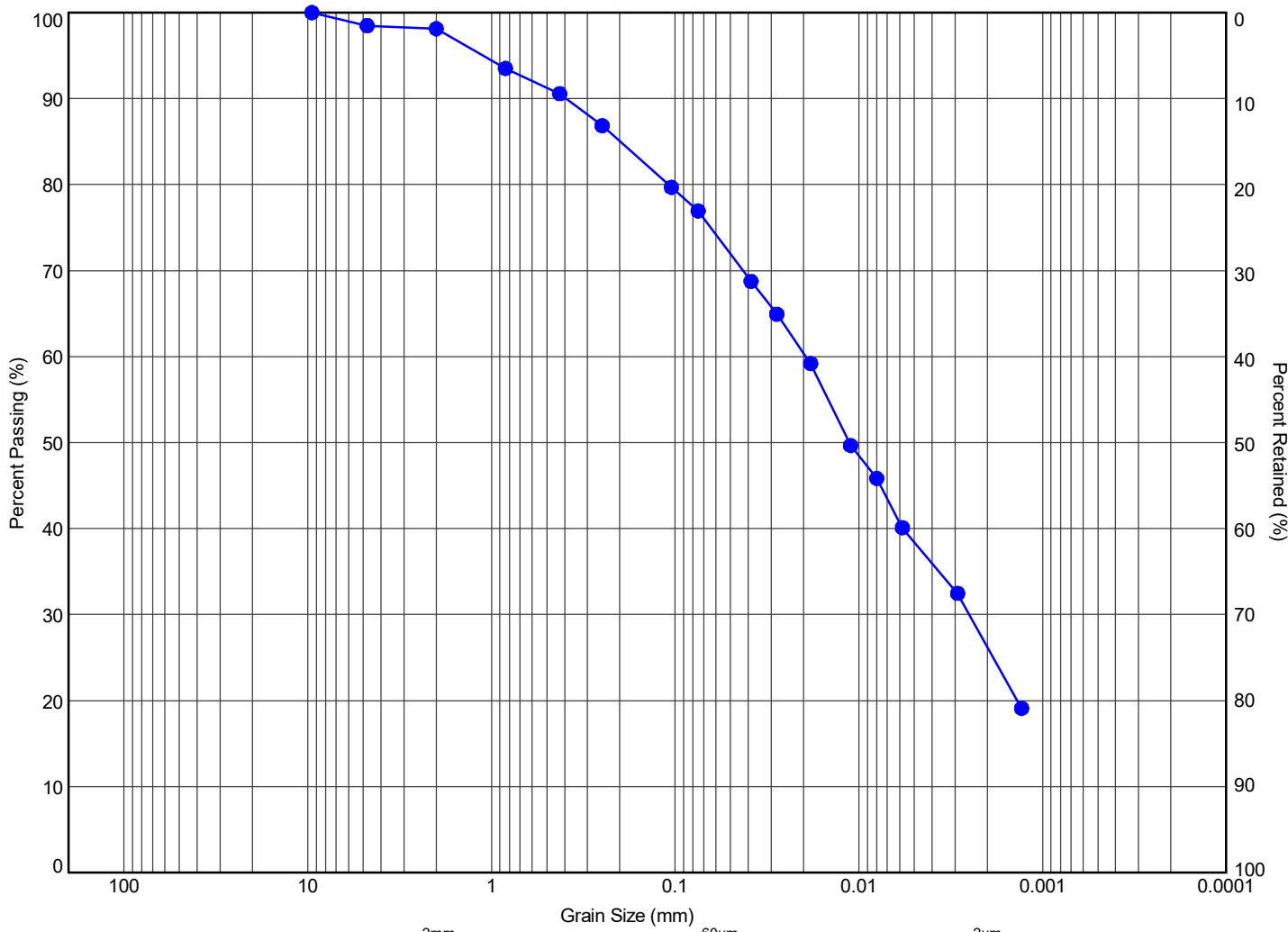
Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	(Fines, %)
● 103	SS3	1.8	264.8	1	16	49	34	



11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title: **GRAIN SIZE DISTRIBUTION**
CLAYEY SILT, SOME SAND, TRACE GRAVEL

File No.: **1-20-0222-02**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

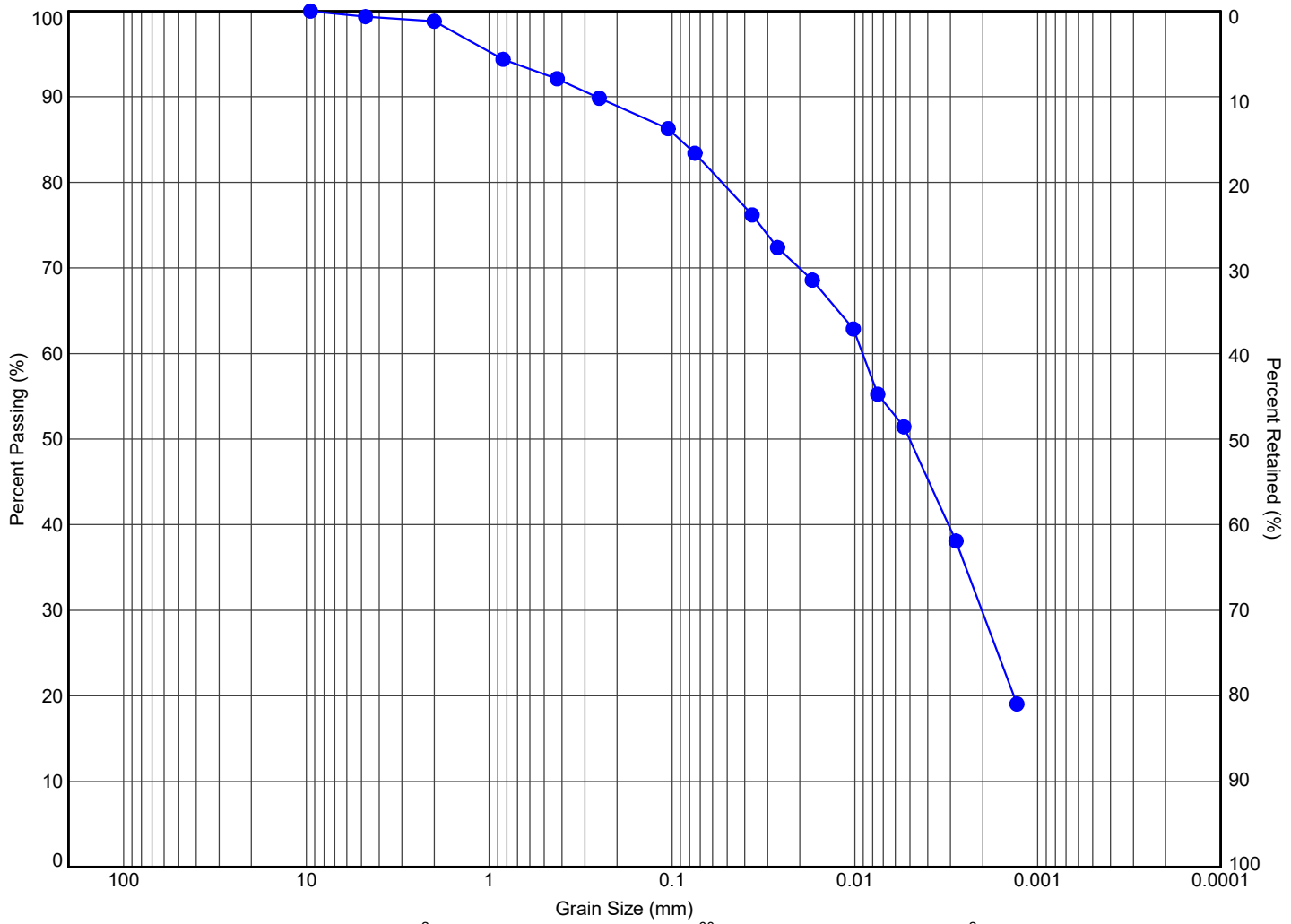
Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	(Fines, %)
● 104	SS2	1.0	265.2	2	24	48	26	



11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title: **GRAIN SIZE DISTRIBUTION
CLAYEY SILT, SANDY, TRACE GRAVEL**

File No.: **1-20-0222-02**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM									
Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	(Fines, %)	
● 104	SS6	4.8	261.4	1	18	51	30		



11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

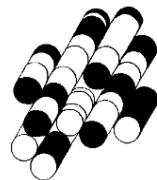
Title: **GRAIN SIZE DISTRIBUTION**
CLAYEY SILT, SOME SAND, TRACE GRAVEL

File No.: **1-20-0222-02**

APPENDIX F

Groundwater Quality Test Results

TERRAPROBE INC.





TERRAPROBE-BRAMPTON
ATTN: AMAR NEKU
11 Indell Lane
Brampton ON L6T 3Y3

Date Received: 14-OCT-20
Report Date: 21-OCT-20 14:49 (MT)
Version: FINAL

Client Phone: 905-796-2650

Certificate of Analysis

Lab Work Order #: L2516019
Project P.O. #: NOT SUBMITTED
Job Reference: 1-20-0222-46
C of C Numbers:
Legal Site Desc: 6939 KING STREET, CALEDON

Emily Smith
Account Manager

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

ADDRESS: 5730 Coopers Avenue, Unit #26, Mississauga, ON L4Z 2E9 Canada | Phone: +1 905 507 6910 | Fax: +1 905 507 6927
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

Summary of Guideline Exceedances

Guideline		Grouping	Analyte	Result	Guideline Limit	Unit
ALS ID	Client ID					
Ontario Reg. Mun. of Peel Sanitary Bylaw #53-2010 (APR. 2011) - Reg. Mun. of Peel Sanitary by-law #53-2010						
(No parameter exceedances)						
Ontario Reg. Mun. of Peel Sanitary Bylaw #53-2010 (APR. 2011) - Peel Storm Sewer By-Law #53-201- (APR. 2011)						
L2516019-1	BH3	Physical Tests	Total Suspended Solids	164	15	mg/L
		Bacteriological Tests	Fecal Coliforms	200	0	CFU/100mL

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

Physical Tests - WATER

Lab ID	L2516019-1
Sample Date	13-OCT-20
Sample ID	BH3

Analyte	Unit	Guide Limits		
		#1	#2	Result
pH	pH units	5.5-10	6-9	7.98
Total Suspended Solids	mg/L	350	15	164

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010

Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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

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

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



ANALYTICAL REPORT


Anions and Nutrients - WATER


Lab ID	L2516019-1
Sample Date	13-OCT-20
Sample ID	BH3

Analyte	Unit	Guide Limits		
		#1	#2	
Fluoride (F)	mg/L	10	-	0.388
Total Kjeldahl Nitrogen	mg/L	100	1	0.350
Phosphorus, Total	mg/L	10	0.4	0.235
Sulfate (SO4)	mg/L	1500	-	45.8

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010

Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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

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

Cyanides - WATER

Lab ID L2516019-1
Sample Date 13-OCT-20
Sample ID BH3


Guide Limits


Analyte	Unit	#1	#2
Cyanide, Total	mg/L	2	0.02

Analyte	Unit	#1	#2
Cyanide, Total	mg/L	2	0.02

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010

Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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

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

Bacteriological Tests - WATER

Lab ID L2516019-1
Sample Date 13-OCT-20
Sample ID BH3

Guide Limits
Unit #1 #2

Analyte	Unit	#1	#2	
E. Coli	CFU/100m L	-	200	0
Fecal Coliforms	CFU/100m L	-	0	200 ^{DLM}

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010

Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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

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

Total Metals - WATER

Lab ID L2516019-1
Sample Date 13-OCT-20
Sample ID BH3

Analyte	Unit	Guide Limits		
		#1	#2	
Aluminum (Al)-Total	mg/L	50	-	0.586
Antimony (Sb)-Total	mg/L	5	-	0.00058
Arsenic (As)-Total	mg/L	1	0.02	0.00238
Cadmium (Cd)-Total	mg/L	0.7	0.008	0.0000085
Chromium (Cr)-Total	mg/L	5	0.08	0.00157
Cobalt (Co)-Total	mg/L	5	-	0.00056
Copper (Cu)-Total	mg/L	3	0.05	0.0017
Lead (Pb)-Total	mg/L	3	0.120	0.000747
Manganese (Mn)-Total	mg/L	5	0.05	0.0496
Mercury (Hg)-Total	mg/L	0.01	0.0004	<0.0000050
Molybdenum (Mo)-Total	mg/L	5	-	0.00482
Nickel (Ni)-Total	mg/L	3	0.08	0.00177
Selenium (Se)-Total	mg/L	1	0.02	0.000235
Silver (Ag)-Total	mg/L	5	0.12	<0.000050
Tin (Sn)-Total	mg/L	5	-	0.00472
Titanium (Ti)-Total	mg/L	5	-	0.0153
Zinc (Zn)-Total	mg/L	3	0.04	0.0050

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010

Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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

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

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



ANALYTICAL REPORT


Aggregate Organics - WATER


Lab ID	L2516019-1
Sample Date	13-OCT-20
Sample ID	BH3

Analyte	Unit	Guide Limits		
		#1	#2	
BOD Carbonaceous	mg/L	300	15	4.2
Oil and Grease, Total	mg/L	-	-	<5.0
Animal/Veg Oil & Grease	mg/L	150	-	<5.0
Mineral Oil and Grease	mg/L	15	-	<2.5
Phenols (4AAP)	mg/L	1	0.008	0.0014

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010

Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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

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

Volatile Organic Compounds - WATER

		Lab ID	L2516019-1		
		Sample Date	13-OCT-20		
		Sample ID	BH3		
Analyte	Unit	Guide Limits			
		#1	#2		
Acetone	ug/L	-	-	<20	
Benzene	ug/L	10	2	<0.50	
Bromodichloromethane	ug/L	-	-	<1.0	
Bromoform	ug/L	-	-	<1.0	
Bromomethane	ug/L	-	-	<0.50	
Carbon Disulfide	ug/L	-	-	<1.0	
Carbon tetrachloride	ug/L	-	-	<0.20	
Chlorobenzene	ug/L	-	-	<0.50	
Dibromochloromethane	ug/L	-	-	<1.0	
Chloroethane	ug/L	-	-	<1.0	
Chloroform	ug/L	40	2	<1.0	
Chloromethane	ug/L	-	-	<1.0	
1,2-Dibromoethane	ug/L	-	-	<0.20	
1,2-Dichlorobenzene	ug/L	50	5.6	<0.50	
1,3-Dichlorobenzene	ug/L	-	-	<0.50	
1,4-Dichlorobenzene	ug/L	80	6.8	<0.50	
Dichlorodifluoromethane	ug/L	-	-	<1.0	
1,1-Dichloroethane	ug/L	-	-	<0.50	
1,2-Dichloroethane	ug/L	-	-	<0.50	
1,1-Dichloroethylene	ug/L	-	-	<0.50	
cis-1,2-Dichloroethylene	ug/L	4000	5.6	<0.50	
trans-1,2-Dichloroethylene	ug/L	-	-	<0.50	
Dichloromethane	ug/L	2000	5.2	<2.0	
1,2-Dichloropropane	ug/L	-	-	<0.50	
cis-1,3-Dichloropropene	ug/L	-	-	<0.30	
trans-1,3-Dichloropropene	ug/L	140	5.6	<0.30	
Ethylbenzene	ug/L	160	2	<0.50	
n-Hexane	ug/L	-	-	<0.50	
2-Hexanone	ug/L	-	-	<20	
Methyl Ethyl Ketone	ug/L	8000	-	<20	

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010
Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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



ANALYTICAL REPORT


Volatile Organic Compounds - WATER


Lab ID L2516019-1
 Sample Date 13-OCT-20
 Sample ID BH3

Analyte	Unit	Guide Limits		
		#1	#2	
Methyl Isobutyl Ketone	ug/L	-	-	<20
MTBE	ug/L	-	-	<0.50
Styrene	ug/L	200	-	<0.50
1,1,1,2-Tetrachloroethane	ug/L	-	-	<0.50
1,1,2,2-Tetrachloroethane	ug/L	1400	17	<0.50
Tetrachloroethylene	ug/L	1000	4.4	<0.50
Toluene	ug/L	270	2	<0.40
1,1,1-Trichloroethane	ug/L	-	-	<0.50
1,1,2-Trichloroethane	ug/L	-	-	<0.50
Trichloroethylene	ug/L	400	8	1.21
Trichlorofluoromethane	ug/L	-	-	<1.0
Vinyl chloride	ug/L	-	-	<0.50
o-Xylene	ug/L	-	-	<0.30
m+p-Xylenes	ug/L	-	-	<0.40
Xylenes (Total)	ug/L	1400	4.4	<0.50
Surrogate: 4-Bromofluorobenzene	%	-	-	104.8
Surrogate: 1,4-Difluorobenzene	%	-	-	101.3

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010

Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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

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

Phthalate Esters - WATER

Lab ID	L2516019-1
Sample Date	13-OCT-20
Sample ID	BH3

Analyte	Unit	Guide Limits		
		#1	#2	
Bis(2-ethylhexyl)phthalate	ug/L	12	8.8	<2.0
Surrogate: 2-fluorobiphenyl	%	-	-	90.2
Surrogate: p-Terphenyl d14	%	-	-	84.5

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010
Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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

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

Semi-Volatile Organics - WATER

Lab ID L2516019-1
Sample Date 13-OCT-20
Sample ID BH3

Guide Limits

Analyte	Unit	#1	#2	
Di-n-butylphthalate	ug/L	80	15	<1.0
Surrogate: 2-Fluorobiphenyl	%	-	-	90.2
Surrogate: p-Terphenyl d14	%	-	-	84.5

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010

Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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

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

Polychlorinated Biphenyls - WATER

Lab ID L2516019-1
Sample Date 13-OCT-20
Sample ID BH3

Analyte	Unit	Guide Limits		
		#1	#2	
Aroclor 1242	ug/L	-	-	<0.020
Aroclor 1248	ug/L	-	-	<0.020
Aroclor 1254	ug/L	-	-	<0.020
Aroclor 1260	ug/L	-	-	<0.020
Surrogate: Decachlorobiphenyl	%	-	-	57.5
Total PCBs	ug/L	1	0.4	<0.040
Surrogate: Tetrachloro-m-xylene	%	-	-	95.2

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010

Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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

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

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

Organic Parameters - WATER

Lab ID L2516019-1
Sample Date 13-OCT-20
Sample ID BH3

Analyte	Unit	Guide Limits		
		#1	#2	
Nonylphenol	ug/L	20	-	<1.0
Nonylphenol Diethoxylates	ug/L	-	-	<0.10
Total Nonylphenol Ethoxylates	ug/L	200	-	<2.0
Nonylphenol Monoethoxylates	ug/L	-	-	<2.0

Guide Limit #1: Reg. Mun. of Peel Sanitary by-law #53-2010

Guide Limit #2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

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

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

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
625-BIS-2-PHTH-WT	Water	Bis(2-ethylhexyl)phthalate	SW846 8270
Aqueous samples are extracted and extracts are analyzed on GC/MSD.			
625-DNB-PHTH-WT	Water	Di-n-Butyl Phthalate	SW846 8270
Aqueous samples are extracted and extracts are analyzed on GC/MSD.			
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2
Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference			
EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
EC-WW-MF-WT	Water	E. Coli	SM 9222D
A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 – 0.2 °C for 24 – 2 h. Method ID: WT-TM-1200			
F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
FC-WW-MF-WT	Water	Fecal Coliforms	APHA 9223B
FC-WW-MF-WT	Water	Fecal Coliforms	SM 9222D
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
NP,NPE-LCMS-WT	Water	Nonylphenols and Ethoxylates by LC/MS-MS	J. Chrom A849 (1999) p.467-482
		Water samples are filtered and analyzed on LCMS/MS by direct injection.	
OGG-SPEC-CALC-WT	Water	Speciated Oil and Grease A/V Calc	CALCULATION
		Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.	
OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B
		The procedure involves an extraction of the entire water sample with hexane. Sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.	
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
		This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.	
PCB-WT	Water	Polychlorinated Biphenyls	EPA 8082
		PCBs are extracted from an aqueous sample at neutral pH with aliquots of dichloromethane using a modified separatory funnel technique. The extracts are analyzed by GC/MSD.	
PH-WT	Water	pH	APHA 4500 H-Electrode
		Water samples are analyzed directly by a calibrated pH meter.	
		Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days	
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
		An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.	
SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)
		Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.	
SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric
		A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.	
TKN-F-WT	Water	TKN in Water by Fluorescence	J. ENVIRON. MONIT., 2005,7,37-42,RSC
		Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection	
VOC-ROU-HS-WT	Water	Volatile Organic Compounds	SW846 8260
		Aqueous samples are analyzed by headspace-GC/MS.	
XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION
		Total xylenes represents the sum of o-xylene and m&p-xylene.	

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
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**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

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

Laboratory Definition Code	Laboratory Location
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WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
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GLOSSARY OF REPORT TERMS

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

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

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

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

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

< - Less than.

D.L. - The reporting limit.

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

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

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

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

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



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
625-BIS-2-PHTH-WT Water								
Batch	R5256683							
WG3424695-2	LCS							
Bis(2-ethylhexyl)phthalate			92.2		%		50-140	19-OCT-20
WG3424695-1	MB							
Bis(2-ethylhexyl)phthalate			<2.0		ug/L		2	19-OCT-20
Surrogate: 2-fluorobiphenyl			84.5		%		40-130	19-OCT-20
Surrogate: p-Terphenyl d14			109.7		%		40-130	19-OCT-20
625-DNB-PHTH-WT Water								
Batch	R5256683							
WG3424695-2	LCS							
Di-n-butylphthalate			102.5		%		50-150	19-OCT-20
WG3424695-1	MB							
Di-n-butylphthalate			<1.0		ug/L		1	19-OCT-20
Surrogate: 2-Fluorobiphenyl			84.5		%		40-130	19-OCT-20
Surrogate: p-Terphenyl d14			109.7		%		40-130	19-OCT-20
BOD-C-WT Water								
Batch	R5258656							
WG3425230-2	DUP	L2515944-2						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	30	15-OCT-20
WG3425230-3	LCS							
BOD Carbonaceous			96.5		%		85-115	15-OCT-20
WG3425230-1	MB							
BOD Carbonaceous			<2.0		mg/L		2	15-OCT-20
CN-TOT-WT Water								
Batch	R5256341							
WG3426144-8	DUP	WG3426144-10						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	16-OCT-20
WG3426144-7	LCS							
Cyanide, Total			90.6		%		80-120	16-OCT-20
WG3426144-6	MB							
Cyanide, Total			<0.0020		mg/L		0.002	16-OCT-20
WG3426144-9	MS	WG3426144-10						
Cyanide, Total			93.2		%		70-130	16-OCT-20
EC-WW-MF-WT Water								
Batch	R5255753							
WG3424922-1	MB							
E. Coli			0		CFU/100mL		1	15-OCT-20



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT		Water						
Batch	R5256759							
WG3426090-19	DUP	WG3426090-20						
Fluoride (F)		0.387	0.387		mg/L	0.2	20	16-OCT-20
WG3426090-17	LCS							
Fluoride (F)			102.8		%		90-110	16-OCT-20
WG3426090-16	MB							
Fluoride (F)			<0.020		mg/L		0.02	16-OCT-20
WG3426090-18	MS	WG3426090-20						
Fluoride (F)			105.2		%		75-125	16-OCT-20
FC-WW-MF-WT		Water						
Batch	R5255759							
WG3424925-3	DUP	L2516019-1						
Fecal Coliforms		200	180		CFU/100mL	11	50	15-OCT-20
WG3424925-1	MB							
Fecal Coliforms			0		CFU/100mL		1	15-OCT-20
HG-T-CVAA-WT		Water						
Batch	R5255025							
WG3424921-3	DUP	L2515437-4						
Mercury (Hg)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	15-OCT-20
WG3424921-2	LCS							
Mercury (Hg)-Total			108.0		%		80-120	15-OCT-20
WG3424921-1	MB							
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	15-OCT-20
WG3424921-4	MS	L2515437-5						
Mercury (Hg)-Total			104.6		%		70-130	15-OCT-20
MET-T-CCMS-WT		Water						
Batch	R5254831							
WG3424604-4	DUP	WG3424604-3						
Aluminum (Al)-Total		0.257	0.260		mg/L	1.2	20	15-OCT-20
Antimony (Sb)-Total		0.00053	0.00054		mg/L	1.5	20	15-OCT-20
Arsenic (As)-Total		0.00106	0.00099		mg/L	6.6	20	15-OCT-20
Cadmium (Cd)-Total		0.0000063	0.0000076		mg/L	19	20	15-OCT-20
Chromium (Cr)-Total		0.00093	0.00093		mg/L	0.5	20	15-OCT-20
Cobalt (Co)-Total		0.00019	0.00018		mg/L	3.1	20	15-OCT-20
Copper (Cu)-Total		0.00206	0.00209		mg/L	1.4	20	15-OCT-20
Lead (Pb)-Total		0.000727	0.000749		mg/L	2.9	20	15-OCT-20
Manganese (Mn)-Total		0.00790	0.00793		mg/L	0.5	20	15-OCT-20



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT								
	Water							
Batch	R5254831							
WG3424604-4	DUP	WG3424604-3						
Molybdenum (Mo)-Total		0.00230	0.00239		mg/L	3.7	20	15-OCT-20
Nickel (Ni)-Total		0.00129	0.00130		mg/L	0.9	20	15-OCT-20
Selenium (Se)-Total		0.000138	0.000136		mg/L	1.2	20	15-OCT-20
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	15-OCT-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-OCT-20
Titanium (Ti)-Total		0.00697	0.00708		mg/L	1.6	20	15-OCT-20
Zinc (Zn)-Total		0.0037	0.0036		mg/L	3.9	20	15-OCT-20
WG3424604-2	LCS							
Aluminum (Al)-Total			104.7		%		80-120	15-OCT-20
Antimony (Sb)-Total			106.9		%		80-120	15-OCT-20
Arsenic (As)-Total			101.4		%		80-120	15-OCT-20
Cadmium (Cd)-Total			102.2		%		80-120	15-OCT-20
Chromium (Cr)-Total			101.5		%		80-120	15-OCT-20
Cobalt (Co)-Total			101.2		%		80-120	15-OCT-20
Copper (Cu)-Total			102.1		%		80-120	15-OCT-20
Lead (Pb)-Total			106.2		%		80-120	15-OCT-20
Manganese (Mn)-Total			102.9		%		80-120	15-OCT-20
Molybdenum (Mo)-Total			105.8		%		80-120	15-OCT-20
Nickel (Ni)-Total			100.3		%		80-120	15-OCT-20
Selenium (Se)-Total			97.6		%		80-120	15-OCT-20
Silver (Ag)-Total			106.0		%		80-120	15-OCT-20
Tin (Sn)-Total			99.0		%		80-120	15-OCT-20
Titanium (Ti)-Total			99.6		%		80-120	15-OCT-20
Zinc (Zn)-Total			101.6		%		80-120	15-OCT-20
WG3424604-1	MB							
Aluminum (Al)-Total			<0.0050		mg/L		0.005	15-OCT-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	15-OCT-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	15-OCT-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	15-OCT-20
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	15-OCT-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	15-OCT-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	15-OCT-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	15-OCT-20
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	15-OCT-20



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT								
	Water							
Batch	R5254831							
WG3424604-1 MB								
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	15-OCT-20
Nickel (Ni)-Total			<0.000050		mg/L		0.0005	15-OCT-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	15-OCT-20
Silver (Ag)-Total			<0.000050		mg/L		0.00005	15-OCT-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	15-OCT-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	15-OCT-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	15-OCT-20
WG3424604-5 MS		WG3424604-3						
Aluminum (Al)-Total			N/A	MS-B	%		-	15-OCT-20
Antimony (Sb)-Total			108.8		%		70-130	15-OCT-20
Arsenic (As)-Total			100.5		%		70-130	15-OCT-20
Cadmium (Cd)-Total			99.9		%		70-130	15-OCT-20
Chromium (Cr)-Total			101.4		%		70-130	15-OCT-20
Cobalt (Co)-Total			99.0		%		70-130	15-OCT-20
Copper (Cu)-Total			96.1		%		70-130	15-OCT-20
Lead (Pb)-Total			102.1		%		70-130	15-OCT-20
Manganese (Mn)-Total			97.5		%		70-130	15-OCT-20
Molybdenum (Mo)-Total			109.4		%		70-130	15-OCT-20
Nickel (Ni)-Total			97.2		%		70-130	15-OCT-20
Selenium (Se)-Total			96.7		%		70-130	15-OCT-20
Silver (Ag)-Total			102.5		%		70-130	15-OCT-20
Tin (Sn)-Total			101.0		%		70-130	15-OCT-20
Titanium (Ti)-Total			103.0		%		70-130	15-OCT-20
Zinc (Zn)-Total			94.0		%		70-130	15-OCT-20
NP,NPE-LCMS-WT								
	Water							
Batch	R5255550							
WG3424286-3 DUP		L2515579-1						
Nonylphenol		<1.0	<1.0	RPD-NA	ug/L	N/A	30	16-OCT-20
Nonylphenol Monoethoxylates		<2.0	<2.0	RPD-NA	ug/L	N/A	30	16-OCT-20
Nonylphenol Diethoxylates		<0.10	<0.10	RPD-NA	ug/L	N/A	30	16-OCT-20
WG3424286-2 LCS								
Nonylphenol			87.4		%		75-125	14-OCT-20
Nonylphenol Monoethoxylates			103.5		%		75-125	14-OCT-20
Nonylphenol Diethoxylates			101.0		%		75-125	14-OCT-20



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NP,NPE-LCMS-WT								
	Water							
Batch	R5255550							
WG3424286-1	MB							
Nonylphenol			<1.0		ug/L		1	16-OCT-20
Nonylphenol Monoethoxylates			<2.0		ug/L		2	16-OCT-20
Nonylphenol Diethoxylates			<0.10		ug/L		0.1	16-OCT-20
WG3424286-4	MS	L2515579-1						
Nonylphenol			109.0		%		50-150	16-OCT-20
Nonylphenol Monoethoxylates			110.0		%		50-150	16-OCT-20
Nonylphenol Diethoxylates			90.7		%		50-150	16-OCT-20
OGG-SPEC-WT								
	Water							
Batch	R5254997							
WG3424589-2	LCS							
Oil and Grease, Total			97.2		%		70-130	15-OCT-20
Mineral Oil and Grease			88.2		%		70-130	15-OCT-20
WG3424589-1	MB							
Oil and Grease, Total			<5.0		mg/L		5	15-OCT-20
Mineral Oil and Grease			<2.5		mg/L		2.5	15-OCT-20
P-T-COL-WT								
	Water							
Batch	R5255501							
WG3424638-3	DUP	L2515964-1						
Phosphorus, Total		0.0354	0.0316		mg/L	11	20	16-OCT-20
WG3424638-2	LCS							
Phosphorus, Total			99.4		%		80-120	16-OCT-20
WG3424638-1	MB							
Phosphorus, Total			<0.0030		mg/L		0.003	16-OCT-20
WG3424638-4	MS	L2515964-1						
Phosphorus, Total			91.5		%		70-130	16-OCT-20
PCB-WT								
	Water							
Batch	R5257556							
WG3424730-2	LCS							
Aroclor 1242			93.7		%		65-130	20-OCT-20
Aroclor 1248			89.3		%		65-130	20-OCT-20
Aroclor 1254			90.9		%		65-130	20-OCT-20
Aroclor 1260			94.0		%		65-130	20-OCT-20
WG3424730-3	LCSD	WG3424730-2						
Aroclor 1242		93.7	91.3		%	2.5	50	20-OCT-20
Aroclor 1248		89.3	89.3		%	0.0	50	20-OCT-20



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PCB-WT		Water						
Batch	R5257556							
WG3424730-3	LCS	WG3424730-2						
Aroclor 1254		90.9	91.0		%	0.1	50	20-OCT-20
Aroclor 1260		94.0	93.5		%	0.5	50	20-OCT-20
WG3424730-1	MB							
Aroclor 1242			<0.020		ug/L		0.02	20-OCT-20
Aroclor 1248			<0.020		ug/L		0.02	20-OCT-20
Aroclor 1254			<0.020		ug/L		0.02	20-OCT-20
Aroclor 1260			<0.020		ug/L		0.02	20-OCT-20
Surrogate: Decachlorobiphenyl			120.8		%		50-150	20-OCT-20
Surrogate: Tetrachloro-m-xylene			67.2		%		50-150	20-OCT-20
PH-WT		Water						
Batch	R5255649							
WG3425057-4	DUP	WG3425057-3						
pH		7.73	7.72	J	pH units	0.01	0.2	15-OCT-20
WG3425057-2	LCS							
pH			7.01		pH units		6.9-7.1	15-OCT-20
PHENOLS-4AAP-WT		Water						
Batch	R5256835							
WG3424636-7	DUP	L2516311-1						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	16-OCT-20
WG3424636-6	LCS							
Phenols (4AAP)			99.8		%		85-115	16-OCT-20
WG3424636-5	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	16-OCT-20
WG3424636-8	MS	L2516311-1						
Phenols (4AAP)			97.2		%		75-125	16-OCT-20
SO4-IC-N-WT		Water						
Batch	R5256759							
WG3426090-19	DUP	WG3426090-20						
Sulfate (SO4)		45.8	45.8		mg/L	0.1	20	16-OCT-20
WG3426090-17	LCS							
Sulfate (SO4)			104.2		%		90-110	16-OCT-20
WG3426090-16	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	16-OCT-20
WG3426090-18	MS	WG3426090-20						
Sulfate (SO4)			105.4		%		75-125	16-OCT-20



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT		Water						
Batch	R5258157							
WG3426552-3 DUP		L2516335-1						
Total Suspended Solids		<3.0	<3.0	RPD-NA	mg/L	N/A	20	20-OCT-20
WG3426552-2 LCS			98.0		%		85-115	20-OCT-20
Total Suspended Solids								
WG3426552-1 MB			<3.0		mg/L		3	20-OCT-20
Total Suspended Solids								
TKN-F-WT		Water						
Batch	R5254844							
WG3424637-3 DUP		L2515823-1						
Total Kjeldahl Nitrogen		0.270	0.190	J	mg/L	0.080	0.1	15-OCT-20
WG3424637-2 LCS			100.8		%		75-125	15-OCT-20
Total Kjeldahl Nitrogen								
WG3424637-1 MB			<0.050		mg/L		0.05	15-OCT-20
Total Kjeldahl Nitrogen								
WG3424637-4 MS		L2515823-1						
Total Kjeldahl Nitrogen			101.0		%		70-130	15-OCT-20
VOC-ROU-HS-WT		Water						
Batch	R5255673							
WG3425708-4 DUP		WG3425708-3						
1,1,1,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
1,1,1-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
1,1,2-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
1,2-Dibromoethane		<0.20	<0.20	RPD-NA	ug/L	N/A	30	19-OCT-20
1,1-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
1,1-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
1,2-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
1,2-Dichloropropane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
1,3-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
2-Hexanone		<20	<20	RPD-NA	ug/L	N/A	30	19-OCT-20
Acetone		<20	<20	RPD-NA	ug/L	N/A	30	19-OCT-20
Benzene		0.69	0.65		ug/L	6.0	30	19-OCT-20
Bromodichloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	19-OCT-20



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R5255673							
WG3425708-4	DUP	WG3425708-3						
Bromoform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	19-OCT-20
Bromomethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
Carbon Disulfide		<1.0	<1.0	RPD-NA	ug/L	N/A	30	19-OCT-20
Carbon tetrachloride		<0.20	<0.20	RPD-NA	ug/L	N/A	30	19-OCT-20
Chlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
Chloroethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	19-OCT-20
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	19-OCT-20
Chloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	19-OCT-20
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
cis-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	19-OCT-20
Dibromochloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	19-OCT-20
Dichlorodifluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	19-OCT-20
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	19-OCT-20
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
m+p-Xylenes		<0.40	<0.40	RPD-NA	ug/L	N/A	30	19-OCT-20
Methyl Ethyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	19-OCT-20
Methyl Isobutyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	19-OCT-20
n-Hexane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
MTBE		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
o-Xylene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	19-OCT-20
Styrene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
Toluene		0.86	0.87		ug/L	1.2	30	19-OCT-20
trans-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
trans-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	19-OCT-20
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
Trichlorofluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	19-OCT-20
Vinyl chloride		<0.50	<0.50	RPD-NA	ug/L	N/A	30	19-OCT-20
WG3425708-1	LCS							
1,1,1,2-Tetrachloroethane			93.3		%		70-130	16-OCT-20
1,1,1,2-Tetrachloroethane			122.7		%		70-130	16-OCT-20
1,1,1-Trichloroethane			104.6		%		70-130	16-OCT-20
1,1,2-Trichloroethane			94.6		%		70-130	16-OCT-20



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R5255673							
WG3425708-1	LCS							
1,2-Dibromoethane			92.7		%		70-130	16-OCT-20
1,1-Dichloroethane			87.4		%		70-130	16-OCT-20
1,1-Dichloroethylene			100.0		%		70-130	16-OCT-20
1,2-Dichlorobenzene			98.8		%		70-130	16-OCT-20
1,2-Dichloroethane			102.2		%		70-130	16-OCT-20
1,2-Dichloropropane			104.5		%		70-130	16-OCT-20
1,3-Dichlorobenzene			96.5		%		70-130	16-OCT-20
1,4-Dichlorobenzene			97.7		%		70-130	16-OCT-20
2-Hexanone			105.8		%		60-140	16-OCT-20
Acetone			112.0		%		60-140	16-OCT-20
Benzene			104.4		%		70-130	16-OCT-20
Bromodichloromethane			119.4		%		70-130	16-OCT-20
Bromoform			111.8		%		70-130	16-OCT-20
Bromomethane			134.4		%		60-140	16-OCT-20
Carbon Disulfide			102.0		%		70-130	16-OCT-20
Carbon tetrachloride			103.6		%		70-130	16-OCT-20
Chlorobenzene			95.1		%		70-130	16-OCT-20
Chloroethane			111.1		%		70-130	16-OCT-20
Chloroform			106.6		%		70-130	16-OCT-20
Chloromethane			126.4		%		60-140	16-OCT-20
cis-1,2-Dichloroethylene			109.0		%		70-130	16-OCT-20
cis-1,3-Dichloropropene			101.7		%		70-130	16-OCT-20
Dibromochloromethane			90.4		%		70-130	16-OCT-20
Dichlorodifluoromethane			100.4		%		50-140	16-OCT-20
Dichloromethane			102.6		%		70-130	16-OCT-20
Ethylbenzene			95.4		%		70-130	16-OCT-20
m+p-Xylenes			95.2		%		70-130	16-OCT-20
Methyl Ethyl Ketone			110.5		%		60-140	16-OCT-20
Methyl Isobutyl Ketone			118.7		%		50-150	16-OCT-20
n-Hexane			102.6		%		70-130	16-OCT-20
MTBE			108.9		%		70-130	16-OCT-20
o-Xylene			102.0		%		70-130	16-OCT-20
Styrene			93.3		%		70-130	16-OCT-20



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R5255673							
WG3425708-1	LCS							
Tetrachloroethylene			95.3		%		70-130	16-OCT-20
Toluene			96.7		%		70-130	16-OCT-20
trans-1,2-Dichloroethylene			99.1		%		70-130	16-OCT-20
trans-1,3-Dichloropropene			96.0		%		70-130	16-OCT-20
Trichloroethylene			106.3		%		70-130	16-OCT-20
Trichlorofluoromethane			98.0		%		60-140	16-OCT-20
Vinyl chloride			112.0		%		60-140	16-OCT-20
WG3425708-2	MB							
1,1,1,2-Tetrachloroethane			<0.50		ug/L		0.5	16-OCT-20
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	16-OCT-20
1,1,1-Trichloroethane			<0.50		ug/L		0.5	16-OCT-20
1,1,2-Trichloroethane			<0.50		ug/L		0.5	16-OCT-20
1,2-Dibromoethane			<0.20		ug/L		0.2	16-OCT-20
1,1-Dichloroethane			<0.50		ug/L		0.5	16-OCT-20
1,1-Dichloroethylene			<0.50		ug/L		0.5	16-OCT-20
1,2-Dichlorobenzene			<0.50		ug/L		0.5	16-OCT-20
1,2-Dichloroethane			<0.50		ug/L		0.5	16-OCT-20
1,2-Dichloropropane			<0.50		ug/L		0.5	16-OCT-20
1,3-Dichlorobenzene			<0.50		ug/L		0.5	16-OCT-20
1,4-Dichlorobenzene			<0.50		ug/L		0.5	16-OCT-20
2-Hexanone			<20		ug/L		20	16-OCT-20
Acetone			<20		ug/L		20	16-OCT-20
Benzene			<0.50		ug/L		0.5	16-OCT-20
Bromodichloromethane			<1.0		ug/L		1	16-OCT-20
Bromoform			<1.0		ug/L		1	16-OCT-20
Bromomethane			<0.50		ug/L		0.5	16-OCT-20
Carbon Disulfide			<1.0		ug/L		1	16-OCT-20
Carbon tetrachloride			<0.20		ug/L		0.2	16-OCT-20
Chlorobenzene			<0.50		ug/L		0.5	16-OCT-20
Chloroethane			<1.0		ug/L		1	16-OCT-20
Chloroform			<1.0		ug/L		1	16-OCT-20
Chloromethane			<1.0		ug/L		1	16-OCT-20
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	16-OCT-20
cis-1,3-Dichloropropene			<0.30		ug/L		0.3	16-OCT-20



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT								
	Water							
Batch	R5255673							
WG3425708-2 MB								
Dibromochloromethane			<1.0		ug/L		1	16-OCT-20
Dichlorodifluoromethane			<1.0		ug/L		1	16-OCT-20
Dichloromethane			<2.0		ug/L		2	16-OCT-20
Ethylbenzene			<0.50		ug/L		0.5	16-OCT-20
m+p-Xylenes			<0.40		ug/L		0.4	16-OCT-20
Methyl Ethyl Ketone			<20		ug/L		20	16-OCT-20
Methyl Isobutyl Ketone			<20		ug/L		20	16-OCT-20
n-Hexane			<0.50		ug/L		0.5	16-OCT-20
MTBE			<0.50		ug/L		0.5	16-OCT-20
o-Xylene			<0.30		ug/L		0.3	16-OCT-20
Styrene			<0.50		ug/L		0.5	16-OCT-20
Tetrachloroethylene			<0.50		ug/L		0.5	16-OCT-20
Toluene			<0.40		ug/L		0.4	16-OCT-20
trans-1,2-Dichloroethylene			<0.50		ug/L		0.5	16-OCT-20
trans-1,3-Dichloropropene			<0.30		ug/L		0.3	16-OCT-20
Trichloroethylene			<0.50		ug/L		0.5	16-OCT-20
Trichlorofluoromethane			<1.0		ug/L		1	16-OCT-20
Vinyl chloride			<0.50		ug/L		0.5	16-OCT-20
Surrogate: 1,4-Difluorobenzene			101.3		%		70-130	16-OCT-20
Surrogate: 4-Bromofluorobenzene			100.8		%		70-130	16-OCT-20
WG3425708-5 MS		WG3425708-3						
1,1,1,2-Tetrachloroethane			95.5		%		50-150	19-OCT-20
1,1,2,2-Tetrachloroethane			101.7		%		50-150	19-OCT-20
1,1,1-Trichloroethane			103.9		%		50-150	19-OCT-20
1,1,2-Trichloroethane			94.7		%		50-150	19-OCT-20
1,2-Dibromoethane			91.7		%		50-150	19-OCT-20
1,1-Dichloroethane			102.6		%		50-150	19-OCT-20
1,1-Dichloroethylene			97.7		%		50-150	19-OCT-20
1,2-Dichlorobenzene			99.7		%		50-150	19-OCT-20
1,2-Dichloroethane			103.1		%		50-150	19-OCT-20
1,2-Dichloropropane			105.2		%		50-150	19-OCT-20
1,3-Dichlorobenzene			117.2		%		50-150	19-OCT-20
1,4-Dichlorobenzene			114.4		%		50-150	19-OCT-20
2-Hexanone			84.7		%		50-150	19-OCT-20



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Client: TERRAPROBE-BRAMPTON
 11 Indell Lane
 Brampton ON L6T 3Y3

Contact: AMAR NEKU

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT								
	Water							
Batch	R5255673							
WG3425708-5 MS		WG3425708-3						
Acetone			101.4		%		50-150	19-OCT-20
Benzene			103.8		%		50-150	19-OCT-20
Bromodichloromethane			120.3		%		50-150	19-OCT-20
Bromoform			102.3		%		50-150	19-OCT-20
Bromomethane			130.4		%		50-150	19-OCT-20
Carbon Disulfide			104.6		%		50-150	19-OCT-20
Carbon tetrachloride			102.3		%		50-150	19-OCT-20
Chlorobenzene			95.6		%		50-150	19-OCT-20
Chloroethane			108.6		%		50-150	19-OCT-20
Chloroform			106.7		%		50-150	19-OCT-20
Chloromethane			122.6		%		50-150	19-OCT-20
cis-1,2-Dichloroethylene			109.0		%		50-150	19-OCT-20
cis-1,3-Dichloropropene			101.7		%		50-150	19-OCT-20
Dibromochloromethane			90.4		%		50-150	19-OCT-20
Dichlorodifluoromethane			91.0		%		50-150	19-OCT-20
Dichloromethane			103.5		%		50-150	19-OCT-20
Ethylbenzene			96.5		%		50-150	19-OCT-20
m+p-Xylenes			96.6		%		50-150	19-OCT-20
Methyl Ethyl Ketone			105.0		%		50-150	19-OCT-20
Methyl Isobutyl Ketone			104.6		%		50-150	19-OCT-20
n-Hexane			99.7		%		50-150	19-OCT-20
MTBE			108.3		%		50-150	19-OCT-20
o-Xylene			103.6		%		50-150	19-OCT-20
Styrene			95.3		%		50-150	19-OCT-20
Tetrachloroethylene			94.9		%		50-150	19-OCT-20
Toluene			94.6		%		50-150	19-OCT-20
trans-1,2-Dichloroethylene			99.4		%		50-150	19-OCT-20
trans-1,3-Dichloropropene			94.4		%		50-150	19-OCT-20
Trichloroethylene			106.8		%		50-150	19-OCT-20
Trichlorofluoromethane			95.2		%		50-150	19-OCT-20
Vinyl chloride			107.6		%		50-150	19-OCT-20

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Client: TERRAPROBE-BRAMPTON
11 Indell Lane
Brampton ON L6T 3Y3
Contact: AMAR NEKU

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Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

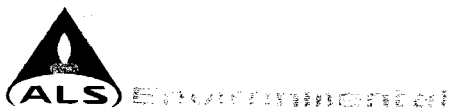
Hold Time Exceedances:

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

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

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

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



Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com



COC Number: 15 -

Page 1 of 1

Report To Contact and company name below will appear on the final report		Report Format / Distribution				E&P TATs with your AM - surcharges will apply TAT if received by 3 pm - business days - no surcharges apply												
Company:	Terraprobe	Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input checked="" type="checkbox"/> EDD (DIGITAL)		Quality Control (QC) Report with Report <input type="checkbox"/> YES <input type="checkbox"/> NO		PRIORITY (Business days)	4 day [P4]			1 Business day [E1]								
Contact:	Amar Neku	<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			3 day [P3]			Same Day, Weekend or Statutory holiday [E0]								
Phone:	905-796-2650	Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		Email 1 or Fax aneku@terraprobe.ca			2 day [P2]											
Company address below will appear on the final report		Email 2				Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm												
Street:	11 Indell Ln.	Email 3				For tests that can not be performed according to the service level selected, you will be contacted.												
City/Province:	Brampton, ON	Invoice Distribution				Analysis Request												
Postal Code:	L6T 3Y3	Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input checked="" type="checkbox"/> FAX				Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below												
Invoice To	Same as Report To <input type="checkbox"/> YES <input type="checkbox"/> NO	Email 1 or Fax aneku@terraprobe.ca				Peel Sewer Use (ON-SAN+STORM-PEEL-W)						Number of Containers						
	Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO	Email 2 lrossi@terraprobe.ca																
Company:	Terraprobe	Oil and Gas Required Fields (client use)																
Contact:	Lorena Rossi	AFE/Cost Center:		PO#														
Project Information		Major/Minor Code:		Routing Code:														
ALS Account # / Quote #:	Q71850 (2020 SOA)	Requisitioner:		Location:														
Job #:	1-20-0222-46	ALS Lab Work Order # (lab use only): L2516019		ALS Contact: Emily Smith									Sampler: JSB					
PO / AFE:		ALS Sample # (lab use only)		Sample Identification and/or Coordinates (This description will appear on the report)									Date (dd-mmm-yy)		Time (hh:mm)		Sample Type	
LSD:	6939 King Street, Caledon	Bt 3		13-OCT-20									17:01		Water		X	
Drinking Water (DW) Samples ¹ (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)											SAMPLE CONDITION AS RECEIVED (lab use only)					
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		GLAND2QC_ON-SAN/STORM-PEEL				Frozen <input type="checkbox"/>		SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>		Ice Packs <input type="checkbox"/> Ice Cubes <input checked="" type="checkbox"/>		Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>						
Are samples for human drinking water use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO						Cooling Initiated <input type="checkbox"/>		INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C								
0.3						-1.6												
SHIPMENT RELEASE (client use)				INITIAL SHIPMENT RECEPTION (lab use only)				FINAL SHIPMENT RECEPTION (lab use only)										
Released by:	Date: 10/13/2020	Time: 17:01	Received by: Karim Partah	Date: 10/14/2020	Time: 9:27	Received by: JS	Date: 10/14/2020	Time: 14:00										

REFER TO BACKPAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

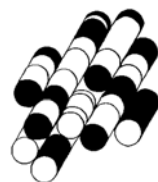
1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

OCTOBER 2015 FRONT

APPENDIX G

Reviewed Plans and Dewatering Calculations

TERRAPROBE INC.

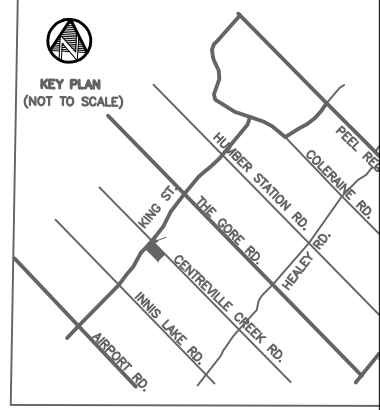


SITE STATISTICS:

AREA OF LOT	=	60,590 M ²	PAVED AREA:	=	10,657.772 M ²
TOTAL FOOTPRINT AREA	=	514.39 M ²	PARKING LOT	=	5,906.14 M ²
BUILDING FOOTPRINT COVERAGE	=	29.36 %	DRIVEWAYS	=	3,194.659 M ²
PARKING AREA:			WALKWAYS	=	536.582 M ²
REGULAR PARKING	=	331	ROADS	=	1,020.391 M ²
ACCESSIBLE PARKING	=	14	TOTAL PAVED AREA	=	10,657.772 M ²
DROP-OFF PARKING	=	6	LANDSCAPE AREA	=	2,451.279 M ²
DELIVERY PARKING	=	1	VACANT LAND(east part)	=	29,672.95 M ²
TOTAL PARKING	=	352 PARKING SPACES			

TOPOGRAPHIC SURVEY

for
 6939 KING ST.
 CALEDON, ONTARIO
 SCALE: 1:500
 0 5 10 15 Metres



BOUNDARY NOTE
 PROPERTY BOUNDARY LINES SHOWN HEREON ARE FOR REFERENCE PURPOSE ONLY, COMPILED FROM EXISTING R-plan 43R-33132.

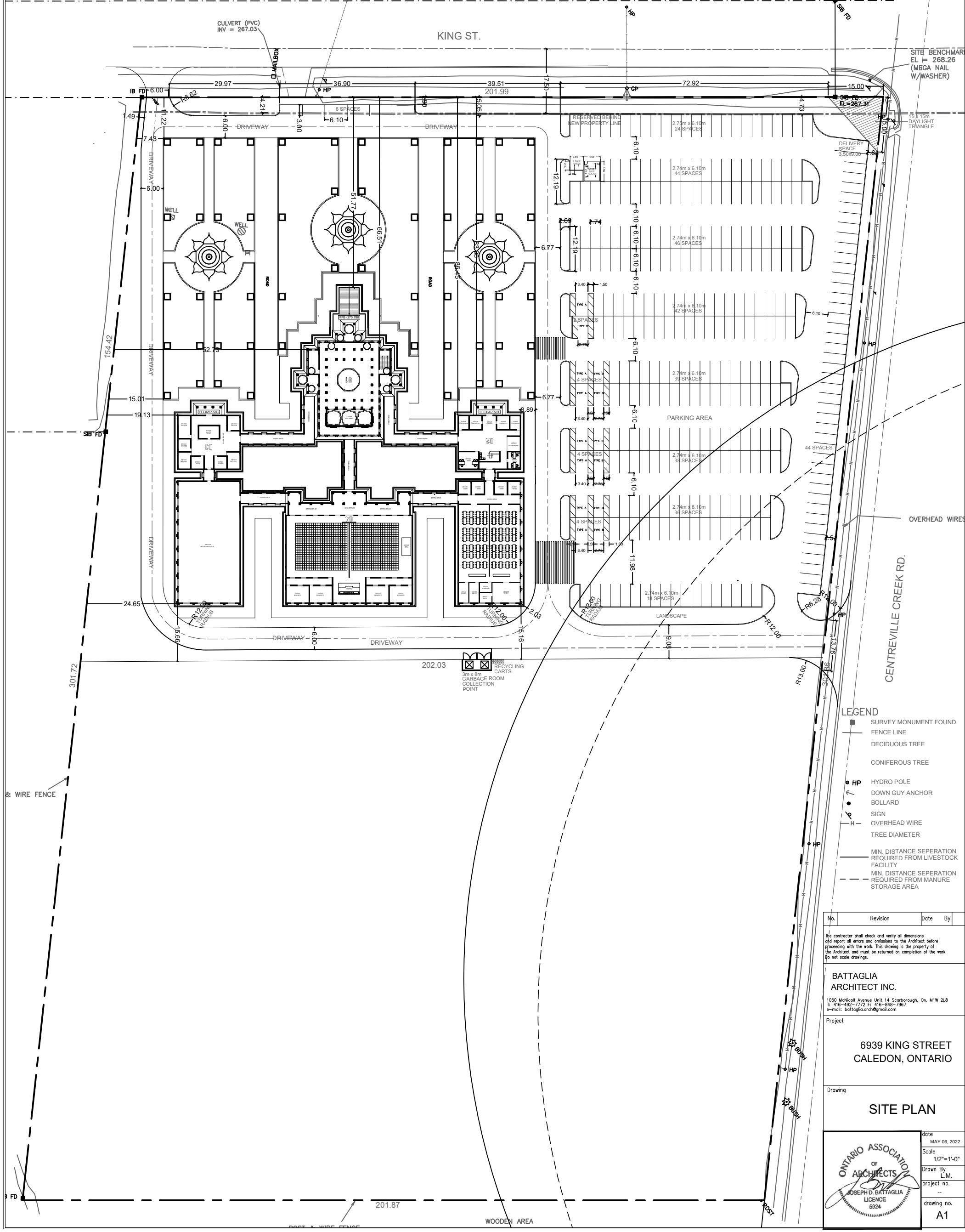
DATUM
 UTM-17 NAD83 2010.0 (ESTABLISHED BY RTK GPS AND VERIFIED WITH TWO COSINE HORIZONTAL CONTROL MONUMENTS : 04219920179 & 04219900040)

BENCH MARK
 ELEVATIONS SHOWN HERE ARE REFERRED TO A COSINE BENCHMARK No. 00819758057 HAVING AN ELEVATION OF 251.929 Metres.

METRIC
 DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

BUILDING PLAN

1. MANDIR FLOOR AREA	:476.50 SQ.M (5,136 SQ.FT)
2. ADMIN FLOOR AREA	:831.21 SQ.M (9,006 SQ.FT)
3. SAINT ASHRAM FLOOR AREA	:831.21 SQ.M (9,006 SQ.FT)
4. SABHA HALL FLOOR AREA	:1,002.8 SQ.M (10,755 SQ.FT)
TOTAL FLOOR AREA	:3,141.72 SQ.M. (33,903 SQ.FT)



LEGEND

- SURVEY MONUMENT FOUND
- FENCE LINE
- DECIDUOUS TREE
- CONIFEROUS TREE
- HP HYDRO POLE
- DOWN GUY ANCHOR
- BOLLARD
- SIGN
- OVERHEAD WIRE
- TREE DIAMETER
- MIN. DISTANCE SEPERATION REQUIRED FROM LIVESTOCK FACILITY
- MIN. DISTANCE SEPERATION REQUIRED FROM MANURE STORAGE AREA

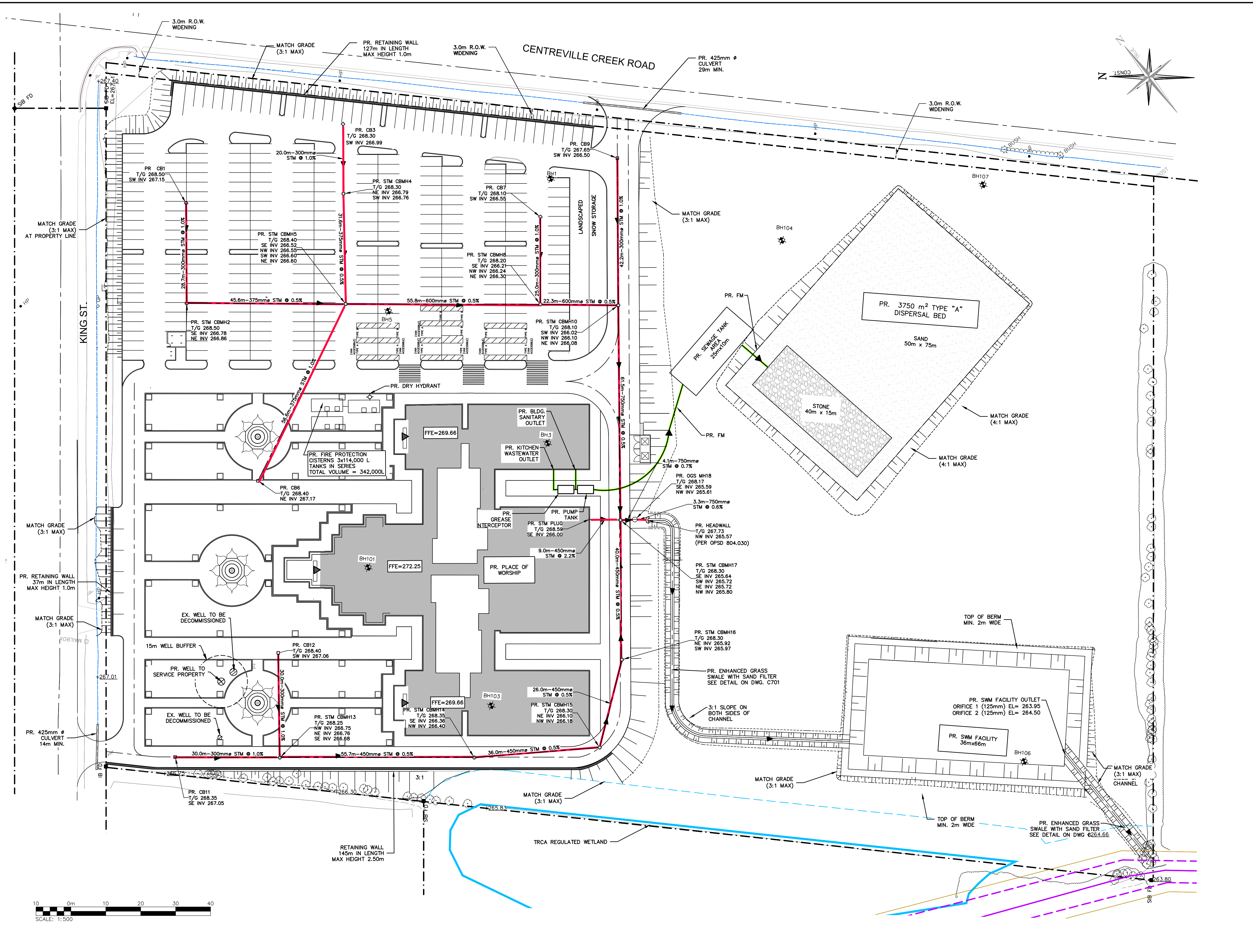
The contractor shall check and verify all dimensions and report all errors and omissions to the Architect before proceeding with the work. This drawing is the property of the Architect and must be returned on completion of the work. Do not scale drawings.

BATTAGLIA ARCHITECT INC.
 1050 Mcnicoll Avenue Unit 14 Scarborough, On. M1W 2L8
 T: 416-492-7772 F: 416-848-7967
 e-mail: battaglia.arch@gmail.com

Project
**6939 KING STREET
 CALEDON, ONTARIO**

Drawing
SITE PLAN

date MAY 06, 2022
 Scale 1/2"=1'-0"
 Drawn By L.M.
 Project no. —
 drawing no. A1



LEGEND

- PROPERTY LINE
- EXISTING DITCH
- EXISTING FENCE
- EXISTING TREE DRIP LINE
- EXISTING TREE
- TRCA REGULATED WETLAND
- 10.0m TRCA REGULATED WETLAND BUFFER
- BOREHOLES (BY OTHERS)
- PROPOSED RETAINING WALL
- PROPOSED SLOPE
- PROPOSED WELL
- PROPOSED SANITARY FORCEMAIN
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED DRY HYDRANT

NOT FOR CONSTRUCTION

PRELIMINARY

No.	ISSUE / REVISION	DATE
0	ISSUED FOR FIRST SUBMISSION	2020/DEC/23

ELEVATION NOTE:
ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM A COSINE BENCHMARK No. 00B1975057
ELEVATION = 251.929m

SURVEY NOTES:
SURVEY COMPLETED BY P&C SURVEYING INC. (2019/DEC/06)
REFERENCE No.: 2019-1206
BEARINGS ARE UTM GRID, DERIVED FROM RTN OBSERVATIONS
UTM ZONE 17, NAD83 (GSR) (2010.0)
DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996781

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY BATTAGLIA ARCHITECT INC.
DRAWING No.: A1, REV 2 (2022/MAY/31)

DRAWING NOTES:
THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.
ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
6939 KING STREET
TOWN OF CALEDON
REGION OF PEEI

Drawing
PRELIMINARY SERVICING PLAN

CROZIER
CONSULTING ENGINEERS

2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	N.C.	Design	M.C./J.A.	Project No.	1990-5787
Check	M.C./J.A.	Check	J.L.	Scale	1:500
				Dwg.	C102



Dewatering Calculations
Dewatering at 6939 King Street, Caledon

Dewatering Rate Formula for an Unconfined Aquifer (Powers et al., 2007):

$$Q = \frac{\pi K (H^2 - h^2)}{\ln(R_0 / r_s)} + 2 \left[\frac{xK (H^2 - h^2)}{2L} \right]$$

Where:

- Q = Anticipated pumping rate (m³/day)
- K = Hydraulic Conductivity (m/day)
- H = Initial Height of static groundwater level to bottom of the saturated aquifer (m)
- h = Depth of water in the well while pumping (m)
- R₀ = Distance from a point of greatest drawdown to a point where there is no drawdown (Radius of influence) (m)
- r_s = Distance to the wellpoints from the centre of the trench (m), assumed to be half of the trench width
- x = Trench Length (m)
- L = Distance from a line source to the trench, R₀ (m)/2

Radius of Influence Formula (Bear, 1979):

$$R_0 = 2.45 \sqrt{\frac{HK}{S_y} t}$$

Where:

- R₀ = Radius of Influence (m), beyond which there is negligible drawdown
- H = Distance from initial static water level to bottom of saturated aquifer (m)
- K = Hydraulic conductivity (m/s)
- S_y = Specific yield of the aquifer formation
- t = Time (s) required to draw the static groundwater level to the desired level (assumed to be equivalent to 14 days)

Parameter	Units	Value		
		Building	Sewer Alignment (50 m)	SWM Facility
Q s.f. 1.5	m³/day	3.62	0.83	3.85
Q	m³/day	2.4	0.6	2.6
K	m/day	0.01	0.01	0.01
H	m	2.9	2.4	4.4
h	m	0.5	0.6	0.9
R₀	m	6.2	5.6	7.6
Trench width (b)	m	95.5	5	36
r_s	m	55.8	8.9	27.5
x (a)	m	102.3	50.0	66.0
L	m	3.1	2.8	3.8
	a/b	1.1	10.0	1.8

Parameter	Units	Value	Value	Value
R₀	m	6.2	5.6	7.6
H	m	2.9	2.4	4.4
K	m/s	1.1E-07	1.1E-07	1.1E-07
S_y (Johnson,1967)		0.06	0.06	0.06
t	s	1209600	1209600	1209600

6939 King Street, Caledon

**Short-Term Construction Dewatering Flow Rate Estimate Details
Construction of Footing Wall (Proposed Building)**

Dewatering flow rate from Groundwater Source	
Excavation Dimensions	
<i>Length of the Building*</i>	102.3
<i>Width of the Building</i>	95.5
<i>Area (m²)</i>	9769.65
<i>Perimeter (m)</i>	395.6
Total Flow (m³/day)	Flow (l/day)
3.62	3,620.00

Dewatering Flow Rate from Rainfall Event		
Rainfall Event		
<i>Year</i>	2	100
<i>Hour</i>	3	12
<i>Depth (mm)</i>	25	94
<i>Depth (m)</i>	0.025	0.094
2 Year Event (L/day)	244,241	244,500
100 Year Event (L/Day)	918,347	920,000

*presening the excavation area for engineer fill replacement.

Estimated Short-Term Dewatering Flow Rate

2 Year Event (L/day)	248,120.00
100 Year Event (L/day)	920,000.00

6939 King Street, Caledon

**Short-Term Construction Dewatering Flow Rate Estimate Details
Construction of Footing Wall (Proposed Sewer Alignment)**

Dewatering flow rate from Groundwater Source	
Excavation Dimensions	
<i>length of the trench*</i>	50
<i>Width of the trench</i>	5
<i>Area (m²)</i>	250
<i>Perimeter (m)</i>	-
Total Flow (m³/day)	Flow (l/day)
0.83	830.00

*Considering 50 m for the length of the trench

Dewatering Flow Rate from Rainfall Event		
Rainfall Event		
<i>Year</i>	2	100
<i>Hour</i>	3	12
<i>Depth (mm)</i>	25	94
<i>Depth (m)</i>	0.025	0.094
2 Year Event (L/day)	6,250	6,500
100 Year Event (L/Day)	23,500	23,500

Estimated Short-Term Dewatering Flow Rate

2 Year Event (L/day)	7,330.00
100 Year Event (L/day)	23,500.00

6939 King Street, Caledon

**Short-Term Construction Dewatering Flow Rate Estimate Details
Construction of SWM Facility**

Dewatering flow rate from Groundwater Source	
Excavation Dimensions	
<i>Length</i>	66
<i>Width</i>	36
<i>Area (m²)</i>	2376
<i>Perimeter (m)</i>	204
Total Flow (m³/day)	Flow (l/day)
3.85	3850.00

Dewatering Flow Rate from Rainfall Event		
Rainfall Event		
<i>Year</i>	2	100
<i>Hour</i>	3	12
<i>Depth (mm)</i>	25	94
<i>Depth (m)</i>	0.025	0.094
2 Year Event (L/day)	59,400	59,500
100 Year Event (L/Day)	223,344	223.500

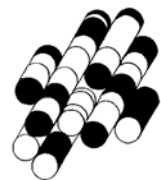
Estimated Short-Term Dewatering Flow Rate

2 Year Event (L/day)	63,350.00
100 Year Event (L/day)	223.50

APPENDIX H

Pre- and Post-Development Water Balance Analyses

TERRAPROBE INC.



Pre- and Post Water Balance - 6939 King Street, Caledon**1. Climate Information (using TRSP Water Balance Tool)**

	Row Data	Modified	
Precipitation	874 mm/a	874 mm/a	0.87 m/a
Evapotranspiration	747 mm/a	514 mm/a	0.51 m/a
Runoff	173 mm/a	119 mm/a	0.12 m/a
Recharge	351 mm/a	241 mm/a	0.24 m/a

The site development area is underlain by clayey silt fill and weathered silt and clay/clayey silt till

2. Site Statistics**Pre- Development Site Coverage**

	Subcatchment Areas	
Existing House, Driveway and Sheds	897 m ²	0.09 ha
Agricultural Land and Grass Covered Area	59,693 m ²	5.97 ha
Total Site Area	60,590 m ²	6.06 ha

Post-Development Site Coverage

	Subcatchment Areas	
Area Covered by Proposed Buildings (Roof Top)	17,808 m ²	1.78 ha
Area Covered by Proposed Paved Area	10,658 m ²	1.07 ha
Area Covered by Proposed Landscaped Area and the Area that will remain untouched.	32,124 m ²	3.21 ha
TOTAL:	60,590 m ²	6.06 ha

3. Annual Pre-Development Water Balance

Land Use	Area (m ²)	Precipitation (m ³ /yr)	Evapotranspiration (m ³ /yr)	Infiltration (m ³ /yr)	Runoff (m ³ /yr)
Existing Structures	897	784	78	0	706
Agricultural Land and Green Area	59,693	52,172	30,663	14,408	7,101
TOTAL	60,590	52,956	30,741	14,408	7,807

4. Annual Post-Development Water Balance

Land Use	Area (m ²)	Precipitation (m ³ /yr)	Evapotranspiration (m ³ /yr)	Infiltration (m ³ /yr)	Runoff (m ³ /yr)
Proposed Buildings	17,808	15,564	1,556	0	14,008
Proposed Paved Area	10,658	9,315	932	0	8,383
Proposed Landscaped Area	32,124	28,077	16,501	7,754	3,822
TOTAL	60,590	52,956	18,989	7,754	26,213

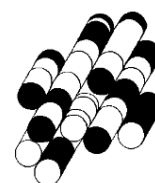
	Precipitation (m ³ /yr)	Evapotranspiration (m ³ /yr)	Infiltration (m ³ /yr)	Runoff (m ³ /yr)
Pre-Development	52,956	30,741	14,408	7,807
Post-Development	52,956	18,989	7,754	26,213
Gain/Loss (-)		-11,752	-6,654	18,406

* <https://trca.ca/conservation/drinking-water-source-protection/trspa-water-balance-tool/>

APPENDIX I

T-Time Test Results

TERRAPROBE INC.





PROJECT: **6939 King Street, Caledon, Ontario**
 LOCATION: **Greater Toronto Area, On.**
 CLIENT: **Swaminarayan Mandir Vasna Sansthan Canada**
 CONTACT: **Rattan**
 SOIL SAMPLE: **104-2**
2'6" - 4'0"

FILE NO.: **1-20-0222**
 SAMPLE DATE: **Nov 11, 2021**
 SAMPLED BY: **S.S.**
 TEST DATE: **Dec 2, 2021**
 TESTED BY: **S.R.**
 LAB NO.: **1387**

MIT DESCRIPTION: **SANDY CLAYEY SILT, trace gravel**
 USC SYMBOL: **SM**

Estimated rate of Percolation = 45 min/cm

COARSE SIEVES

Dry Weight (g)		159.8		
SIEVE SIZE		CUM. WT.	PERCENT	PERCENT
Standard	(mm)	RET.	RET.	PASSING
3.0"	75.0	0.00	0.0	100.0
1.5"	37.5	0.00	0.0	100.0
3/4"	19.0	0.00	0.0	100.0
3/8"	9.5	0.00	0.0	100.0
No. 4	4.75	2.43	1.5	98.5
No. 10	2.00	3.00	1.9	98.1
PAN		156.76		
Dry Weight After Sieving (g)		159.8		
Percent Loss After Sieving		0.03		

FINE SIEVES (after washing)

Dry Weight		50.65		
Percent Passing No.4 (%)		98		
SIEVE SIZE		CUM. WT.	PERCENT	PERCENT
Standard	(mm)	RET.	RET.	PASSING
No. 20	0.840	2.37	4.7	93.5
No. 40	0.425	3.90	7.7	90.6
No. 60	0.250	5.81	11.5	86.8
No. 140	0.105	9.53	18.8	79.7
No. 200	0.075	10.94	21.6	76.9

HYGROSCOPIC MOISTURE CONTENT

Wt. of wet soil and tare (g)	2.00
Wt. of dry soil and tare (g)	2.00
Wt. of water (g)	2.00
Wt. of tare (g)	1.00
Wt. of wet soil (g) (W_A)	1.00
Wt. of dry soil (g) (W_D)	1.00
Water content (%)	200.00

HYDROMETER

Hygroscopic Correction Factor		1.000000								
Corrected Sample Weight (M_0)		50.65								
Test sample represented by soil (W)		51.62								
Gs Correction Factor		0.985632								
Specific Gravity		2.715								
Date and time	Elapsed Time	H_s in Divisions (G/L)	H_c in Divisions (G/L)	Temp. T_c (C)	Corrected Reading $R = H_s - H_c$	Percent Passing P in %	L in cm	n in millipoise	K	Particle Diameter D in mm
	1	42.0	6.0	22.8	36.0	68.74	8.9029	9.4364	0.0130	0.0387
	2	40.0	6.0	22.8	34.0	64.92	9.3029	9.4364	0.0130	0.0280
	5	37.0	6.0	22.8	31.0	59.19	9.9029	9.4364	0.0130	0.0183
	15	32.0	6.0	22.6	26.0	49.65	10.9029	9.4807	0.0130	0.0111
	30	30.0	6.0	22.6	24.0	45.83	11.3029	9.4807	0.0130	0.0080
	60	27.0	6.0	22.6	21.0	40.10	11.9029	9.4807	0.0130	0.0058
	250	23.0	6.0	23.0	17.0	32.46	12.7029	9.3925	0.0129	0.0029
	1440	16.0	6.0	23.1	10.0	19.09	14.1029	9.3707	0.0129	0.0013



PROJECT: 6939 King Street, Caledon, Ontario
 LOCATION: Greater Toronto Area, On.
 CLIENT: Swaminarayan Mandir Vasna Sansthan Canada
 CONTACT: Rattan
 SOIL SAMPLE: 104-2
 2'6" - 4'0"

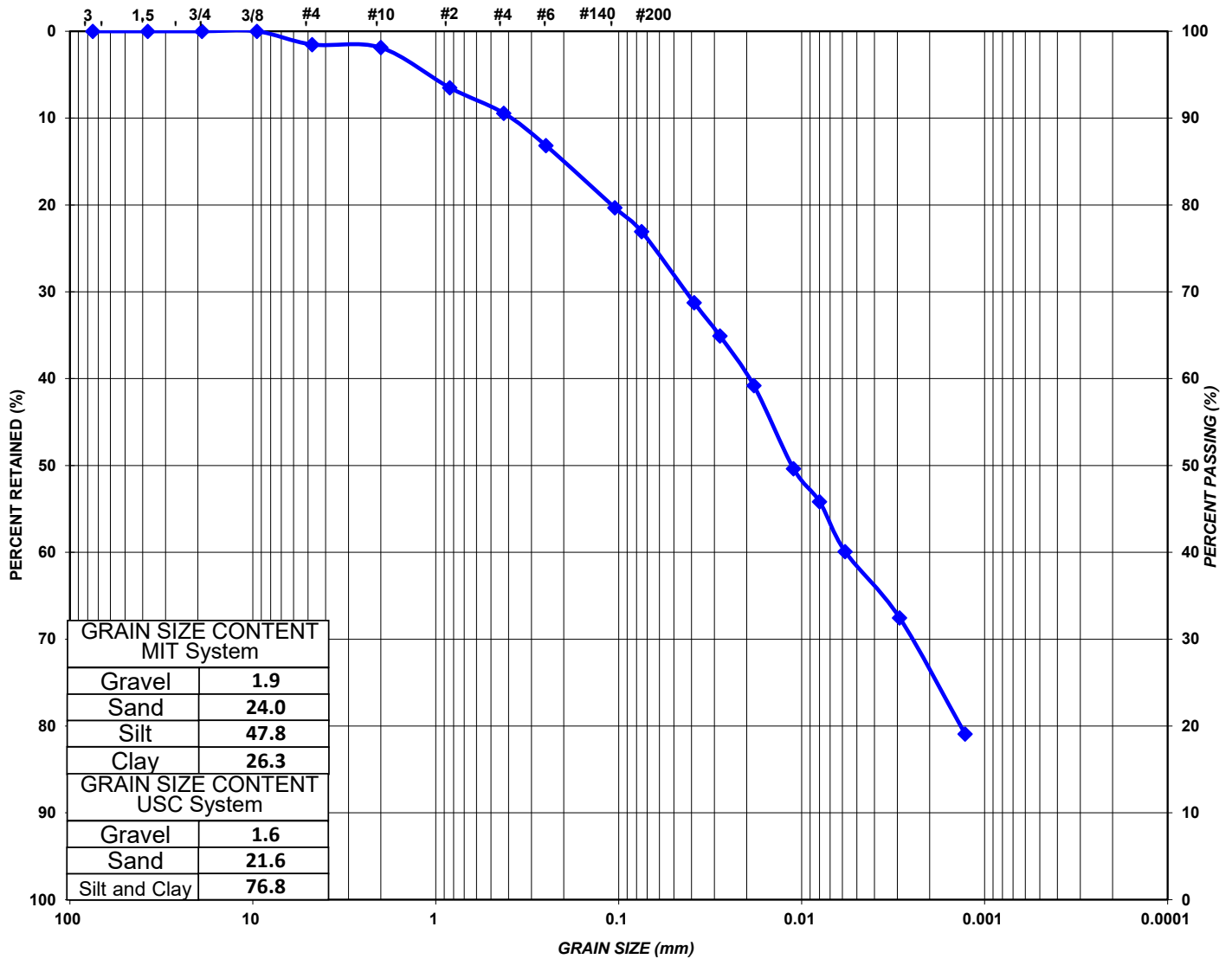
FILE NO.: 1-20-0222
 LAB NO.: 1387
 SAMPLE DATE: #####
 SAMPLED BY: S.S.

MIT DESCRIPTION: SANDY CLAYEY SILT, trace gravel
 USC SYMBOL: SM

** To be read in conjunction with cover letter only **
Estimated rate of Percolation = 45 min/cm

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES

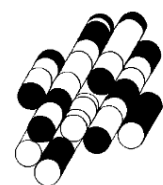


MIT SYSTEM	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		
UNIFIED SYSTEM	GRAVEL			SAND			SILT AND CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE			

APPENDIX J

Private Water Well Canvassing Details

TERRAPROBE INC.





November 19, 2021

File No. 1-20-0222-46.1
Brampton Office

Dear Resident/ Property Owner:

**RE: Private Well Inventory for
Proposed Sanitary Sewer Pipe, Mayfield Road and
Goreway Drive
Brampton, Ontario**

Terraprobe Inc. was retained by Swaminarayan Mandir Vasna Sanstha (SMVS) to undertake a private well inventory for properties within 500 m around 6939 King Street, Caledon, Ontario. The well inventory is being conducted to identify private wells within the area noted above prior to construction of the religious temple (Swaminarayan).

The purpose of our visit is to conduct interviews with local residents and land owners in regards to water supply wells surrounding the above noted area. The information we hope to obtain will include:

- The Location of the well(s) and septic bed (if known)
- Status of well (used, unused, abandoned)
- The depth, diameter and construction details of the well(s)
- Type of well (i.e. drilled, dug, bored)
- Casing material (i.e. Metal, concrete, stone, etc.)
- Pump type & depth (i.e. Submersible [Pump in well]/Jet Pump [Pump in house])
- Water treatment systems in use (i.e. Water Softener, Reverse Osmosis, UV light)
- Date well was constructed
- Use of the well (i.e. Residential/Agriculture/Livestock/Commercial etc.)
- Number of residents/people well supplies water
- Past water quality problems with well (i.e. High bacteria levels, high iron, etc.)
- Past water quantity problems with well (i.e. Does/has well run dry in past, why?)
- Is well water consumed, or is water purchased for consumption (i.e. bottled water)
- Any past operating problems with well detailing the nature of the problem and when it occurred.

Terraprobe Inc.

Greater Toronto
11 Indell Lane
Brampton, Ontario L6T 3Y3
(905) 796-2650 Fax: 796-2250

Hamilton – Niagara
903 Barton Street, Unit 22
Stoney Creek, Ontario L8E
(905) 643-7560 Fax: 643-7559

Central Ontario
220 Bayview Drive, Unit 25
Barrie, Ontario L4N 4Y8
(705) 739-8355 Fax: 739-8369

Northern Ontario
1012 Kelly Lake Rd., Unit 1
Sudbury, Ontario P3E 5P4
(705) 670-0460 Fax: 670-0558

If there is access to your well and with your permission, our representatives will measure the depth and level of water in your well. In addition, we will collect a water quality sample from your tap (with your permission). The results of the water quality testing and a copy of the information collected during the site visit will be provided to you by mail.

The information will be used to develop baseline information related to the wells surrounding the above noted project prior to construction which is required by the local municipalities.

If you would like to participate in the survey, please contact Mr. Amar Neku of Terraprobe at (905) 796-2650, any question you may have regarding the survey can also be answered at that time. When calling indicate to the receptionist that you are calling in regards to the "Pre-Development, Well Survey". Our receptionist is available during regular working hours of 8:30 am to 5 pm. The information above may also be provided over the telephone, or can be answered and forwarded via email to aneku@terraprobe.ca.

We understand that your participation in this survey is voluntary; however your co-operation is greatly appreciated. Thank you for your consideration of our private well inventory.

Yours truly,
Terraprobe Inc.

Amar Neku, Ph.D., P.Eng., P. Geo.
Project Manager

Brampton Office

*11 Indell Lane
Brampton, Ontario L6T 3Y3
905-796-2650 Fax 796-2250*



Terraprobe

PRIVATE WELL SURVEY

PROJECT No. _____

I.D. No. _____

OWNER _____ ORIG. OWNER _____

ADDRESS _____

LOT / CONC. / TWP. _____ PHONE _____

DATE _____

WELL DETAILS

TYPE _____ DIAMETER _____

CASING _____ SCREEN _____

PUMP TYPE & DEPTH _____

WATER TREATMENT _____

DATE CONSTRUCTED _____

DEPTH _____ Meas/Stated

WATER LEVEL _____ b.m.p.

STICK-UP _____ a.g.l.

INSPECTION NOTES:

WELL USE

WELL USE _____

No. OF RESIDENTS _____

WATER QUALITY _____

WATER QUANTITY _____

EVER BOUGHT WATER? _____

WHEN? WHY? _____

PREVIOUS PROBLEMS WITH WELL (WHEN?)

COMMENTS:

WELL CONSTRUCTION

WELL LOCATION / SEPTIC

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NOTES:

OWNER: _____

ENGINEER: _____

PERMISSION TO SURVEY WELL: _____

GEODETTIC ELEVATION: _____

MOE WELL No. _____